Institiúid Teicneolaíochta, Trá Lí
INSTITUTE OF TECHNOLOGY - TRALEE

AUTUMN EXAMINATION, 2011
AY 2010/2011

Operating Systems
CRN 43835

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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 3 states of a process are Ready, Running and Blocked. Describe these 3 states. **(9 marks)**

(b) The diagram below illustrates process state transitions. Describe each of the transitions. In your answer specify if the scheduler is involved in a transition and if so, how it is involved. **(12 marks)**

(c) Windows 7 and Linux use a combination of priority-based and round robin scheduling algorithms.
(i) Describe round robin scheduling. **(4 marks)**

(ii) The following table shows the arrival times and burst times of 3 processes:

Process	Arrival Time	Burst Time
P1	0	9
P2	2	3
P3	3	7

Draw a Gantt chart for the round robin scheduling algorithm. Quantum is 4.
(4 marks)

Give the waiting times and turnaround times of each process. Give the average waiting time and the average turnaround time. **(4 marks)**

Question 2. Memory Management

(a) Contiguous Allocation is one method that can be used to allocate memory. It can use one of following three algorithms:

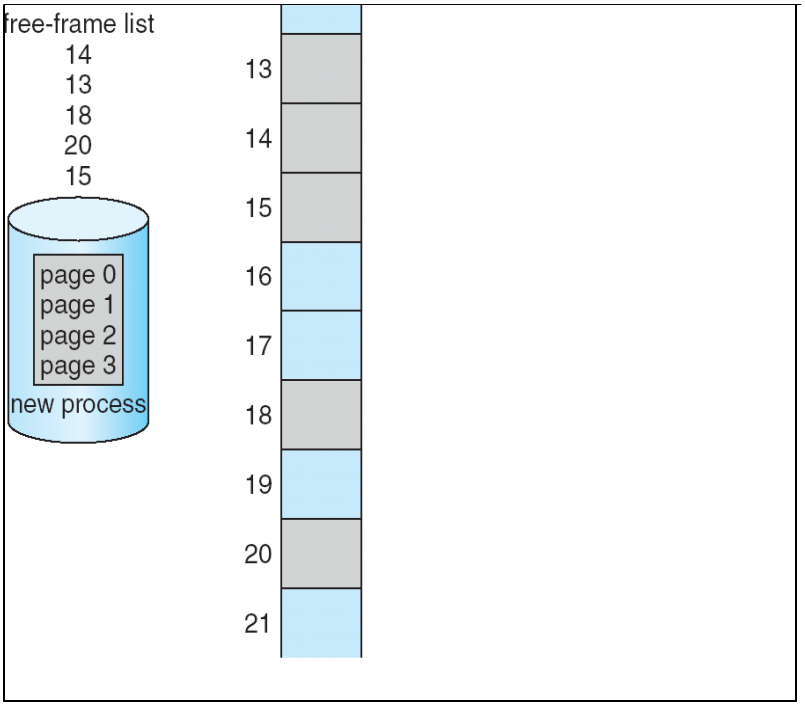
- First-fit allocation
- Best-fit allocation
- Worst-fit allocation

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

(ii) Assume memory has the following holes (free blocks) in order:
30K, 15K, 20K, 50K, 45K, 30K
How would each of the first-fit, best-fit, and worst-fit algorithms place processes of 10K, 25K, and 20K (in that order)? **(9 marks)**

(iii) External fragmentation can occur with contiguous allocation. Describe how this occurs. **(5 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 the free frame list and the memory frames before a new process is allocated memory. The new process has 4 pages.
Describe how memory is allocated to this new process and give a diagram to show the free frame list and the contents of memory after allocation. Also give the contents of the page table for the new process. **(13 marks)**



Question 3. Performance of your computer

The following is a number of ways you can improve your computer's performance:

- Reduce number of processes running at the same time
- Defragment the hard disk
- Add more memory (RAM)
- Clean the desktop

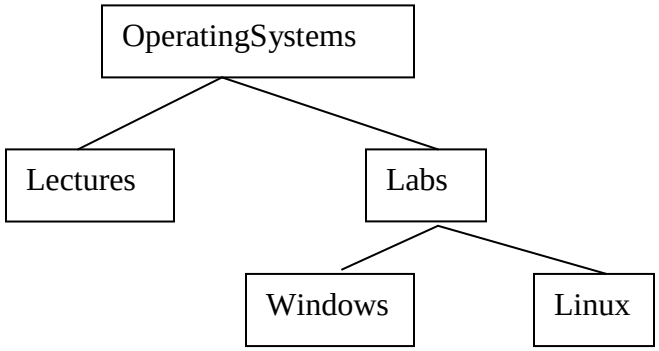
In each case specify which of the following the performance improvement will relate to:

- CPU
- Memory (RAM)
- Primary Hard Disk

and describe why the improvement will take place. **(33 marks)**

Question 4. Linux

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



OperatingSystems directory has two directories: Lectures and Labs.
Labs has two directories: Windows and Linux
Windows has a file lab1
Linux has a file lab2

Assume OperatingSystems directory is in your home directory i.e. /home2/t0012345
Assuming that you are in OperatingSystems directory initially, give the commands to move the files in Windows and Linux directories to Labs directory. Then remove the Windows and Linux directories. Give the command to list the contents of Labs folder so that you can check its contents. **(20 marks)**

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

-rw-rw-rw- 1 t00012345 students 4096 2011-03-17 14:30 test

(i) Is test a file or a directory? Give reasons for your answer. **(2 marks)**

(ii) Explain the meaning of rw-rw-rw- in this output. **(6 marks)**

Assume the following command is given:
chmod go-w test

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

(iv) What changes would this command make to the output from the ls-l command? **(2 marks)**