



KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2010/2011

FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF
BACHELOR OF SCIENCE (COMPUTER TECHNOLOGY)

SCT 302: COMPUTER OPERATING SYSTEM

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DATE: TUESDAY 30TH NOVEMBER 2010

TIME: 2.00 P.M. - 4.00 P.M.

INSTRUCTIONS

1. Attempt Question ONE and any other TWO questions.
All questions attract equal marks.
2. Total marks = 60

Question One (Compulsory)

- a) List and briefly explain TWO fundamental responsibilities of an operating system.
(2 marks)
- b) Describe the following terms, giving its importance to the computer user.
 - i) Multiprogramming
 - ii) Page fault
 - iii) Virtual Memory
(3 marks)
- c) Differentiate between CPU-Bound and Memory-Bound Processes.
(2 marks)

- d) What is a child process. Which UNIX system call creates a new Child process. (3 marks)
- e) Differentiate between internal and external memory fragmentation. (4 marks)
- f) Describe the Belady's anomaly. (2 marks)
- g) What is the difference between deadlock and starvation? (2 marks)
Consider a virtual space of 16 K, with 2K page size and an address 3045.
- h) What the virtual page number and offset corresponding to this VA? (2 marks)

Question Two

- a) Discuss THREE advantages of Virtual Memory Management. (6 marks)
- b) Describe the process states. Use a diagram to illustrate. (3 marks)
- c) Consider a disk with the following characteristics:
- Number of surfaces: 16
 - Number of sectors / cylinder: 4096
 - Number of tracks / surface: 2048
 - Number of bytes / sector: 512
- i) How many platters does this disk have? (3 marks)
- ii) How many sectors per track? (4 marks)
- iii) What is the total size (i.e. capacity) of this disk? For full credit, please show your work. (4 marks)

Question Three

- a) Five jobs A through E arrive at a computer center having estimated run times of 10, 6, 2, 4, and 8 minutes. Their priorities are 3, 5, 2, 1, and 4, respectively (with 1 being the highest priority). For each of the following scheduling algorithms:
- Draw a table and fill in clearly how jobs will be processed
 - Determine the mean *turnaround time*.
- i) **Priority** scheduling (2 marks)
 - ii) **Roundrobin** (assuming time quantum = 1) (4 marks)
 - iii) **SJG** (Non - pre-emptive) (2 marks)
- b) Describe what you understand by memory Hierarchy. What is the importance of memory hierarchy? (4 marks)
- c) In your understanding draw a diagram to demonstrate the Thrashing condition (Remember, explanation not required) (2 marks)
- d) How are the four deadlocks avoided in deadlock management? (4 marks)

Question Four

- a) Discuss RAID and its importance. (5 marks)
- b) Scheduling, buffering and caching are three roles performed by the I/O subsystem within the OS. List three reasons why the **buffering** of data is useful or necessary. (3 marks)
- c) What are the three types of low-level operations that higher-level synchronization operations (e.g., locks semaphores, and monitors) can be built upon? (3 marks)
- d) A IT lecturer once commented in class, “The Operating System is the most complex software one can develop, forget the programming languages or the application software developed”. Support the statement showing clearly what the lecturer meant. (4 marks)

- g) What is a context switch. (2 marks)
- h) Describe as accurately as you can how a context switch between processes is achieved. (3 marks)

Question Five

- a) A disk drive has 2 surfaces, each with 1024 tracks. Each track has 64 sectors of 512 bytes each. The average seek time from rest is 8msec. And the track to adjacent seek time is 1 msec. The disk rotates at 7200 rpm.
- i) What is the capacity of this drive? (3 marks)
- ii) What is the capacity of a single cylinder? (3 marks)
- b) Suppose we have a process that is 32Kb in size (This includes the stack and heap information as well as the program). Now suppose that program is running on a computer that has 12Kb of RAM.
- i) What would have to happen if the program were to execute the instructions:
MOV BX, 6144 (Note: 6144 = 6K) (2 marks)
- ii) What happens if the program were to execute the instruction: **OV BX 12288**
(Note: 12288 = 12K) (2 marks)
- iii) What is the physical address that corresponds to the virtual address 12290? (5 marks)
- d) The last ten years, the RISC architecture philosophy has become increasingly popular. Explain the concepts of CISC and RISC architecture. Showing the principles tha characterize RISC approach. (5 marks)