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Candidate's Signature: Date of Examination: 1ST AUG 2013

2920/105
OPERATING SYSTEMS
July 2012
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

# DIPLOMA IN INFORMATION COMMUNICATION TECHNOLOGY

## MODULE I

OPERATING SYSTEMS

**3 hours**

**INSTRUCTIONS TO CANDIDATES:**

*Write your **name** and **index number** in the spaces provided above.*
***Sign** and write the **date of examination** in the spaces provided above.*
*Answer any **FIVE** of the following **EIGHT** questions.*

*All questions carry equal marks*

**For Official Use Only**

| Question | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Marks | | | | | | | | |

| TOTAL MARKS |
|---|
| |

**This paper consists of 11 printed pages.**

**Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**

1. (a) (i) State **four** objectives of *operating systems*. (2 marks)

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(ii) Explain the meaning of each of the following terms as used in operating systems: (6 marks)

I. kernel;

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II. shell;

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III. process.

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(b) Differentiate between *monolithic* and *non-monolithic* operating systems. (4 marks)

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(c) The following are characteristics of different file systems:

(i) supports very large disk capacity; NTFS

(ii) supports a block size of between 4KB-32KB; FAT

(iii) supports compression and encryption of entire disk partition; NTFS

(iv) formats floppy diskette. NTFS

For each of the characteristic, identify the most appropriate file system. (4 marks)

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(d) Ann, a system analyst with a certain company created a system file using an operating system. Explain **two** file properties she could have used. (4 marks)

(i) Name: A given file must have been given a name that distinguishes it from other files in the directory.

(ii) Location: She must have specified where the file is going to be stored.

(iii) ftp

2. (a) (i) State **four** file organization methods used in operating systems. (2 marks)

Sequency

Indexed sequential

Random

(ii) Outline **four** typical operations that could be performed on files in a computer system. (2 marks)

(iii) Outline **two** file attributes used in operating systems. (2 marks)

(b) (i) Explain each of the following terms as used in operating systems: (4 marks)

I. disk caching;

II volume.

(ii) Differentiate between *low-level* and *high-level* formatting as used in disk operations. (4 marks)

(c) During data input using a keyboard, the operating system temporarily stores keyboard key strokes on the keyboard memory.

(i) Identify this I/O communication technique. (1 mark)

Interrupt driven technique

(ii) State **one** advantage of the technique identified in (i). (1 mark)

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(iii) Explain **two** purposes of using the I/O technique identified in (i). (4 marks)

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3. (a) State **four** types of disk-arm scheduling algorithms. (2 marks)

FCFS preemptive non

preemptive scheduling

Round Robin

Shortest job first

(b) During an operating systems lesson in a certain college, a lecturer mentioned various kernel components that facilitates the I/O manager. Outline **four** kernel components that could have been mentioned. (4 marks)

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(c) Figure 1 shows a memory allocation technique used by an operating system. Use it to answer the questions that follow.

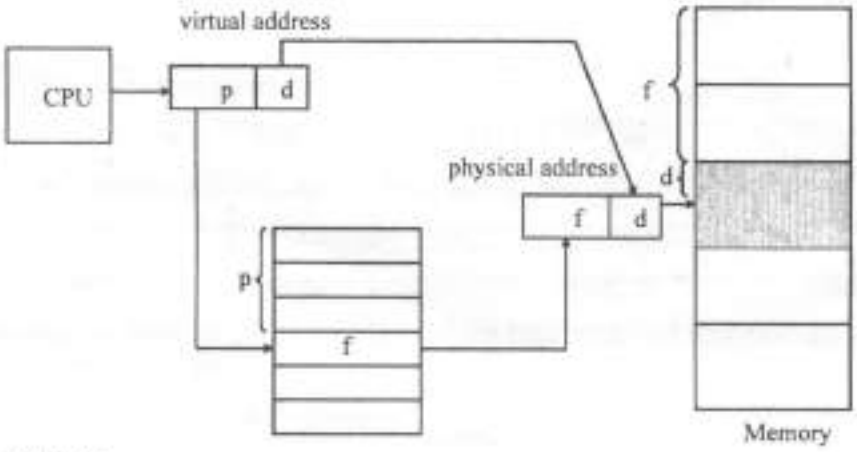


Figure 1

(i) Identify the memory allocation technique used justifying your answer. (2 marks)

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(ii) Explain the procedure that could be used for address transition. (4 marks)

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(iii) Explain **two** benefits of the memory allocation techniques identified in (i). (4 marks)

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(d) A group of ICT Module I students in a certain college were carrying out an assignment about causes of process termination in operating systems. Explain **two** possible causes they could have written in their report. (4 marks)

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4. (a) Explain each of the following terms as used in operation systems: (4 marks)

(i) semaphore;

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(ii) monitor.

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(b) Differentiate between *symmetric* and *asymmetric* multiprocessing operating systems. (4 marks)

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(c) Paul, a Module I student in a certain college was carrying out a term project which involved developing an interactive operating system. He decided to use preemptive scheduling algorithm.

(i) Explain **one** reason that could have influenced his choice of this scheduling algorithm. (2 marks)

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(ii) Explain **two** limitations of this scheduling algorithm. (4 marks)

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(d) A certain organization uses a distributed operating system. Assuming you are hired as an IT consultant, explain **three** file access control methods you could recommend to safeguard the organizational data. (6 marks)

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Sequential

Indexed sequential

Serial access method

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5. (a) (i) Outline **two** strategies that could be used to prevent deadlock in computer systems. (2 marks)

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(ii) Explain the term *virtual memory* as used in operating systems. (2 marks)

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(iii) Explain **two** objectives of memory management as used in operating systems. (4 marks)

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(b) Differentiate between *virtual* and *physical* memory addressing as used in operating systems. (4 marks)

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(c) The following are file management operations that could be carried out using operating systems.

(i) File re-organization.

(ii) Create volume label.

(iii) Create file allocation table.

(iv) Assign quota to users.

For each of the operations, outline the appropriate system utility that could be used to perform the task justifying your answer. (8 marks)

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6. (a) (i) List **four** files access methods in operating systems. (2 marks)

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(ii) Outline **three** characteristics of the 4th generation operating systems. (3 marks)

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(b) Differentiate between *block* oriented and *character* oriented I/O devices giving an example in each case. (4 marks)

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(c) With the aid of a diagram, describe the *process life cycle* as used in operating systems. (7 marks)

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(d) With the aid of a diagram, describe the memory hierarchy in computer systems (4 marks)

.....Registers.....

.....cache.....

.....magnetic disk.....

.....Magnetic tape.....

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7. (a) (i) State **four** examples of network operating systems from other different families. (2 marks)

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(ii) Outline **two** advantages of distributed operating systems. (2 marks)

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(b) Table 1 shows details of processes in a computer system. Use it to answer the questions that follow.

| Process ID | Arrival time | Run time |
|---|---|---|
| W | 0 | 2 |
| X | 2 | 7 |
| Y | 2 | 20 |
| Z | 3 | 3 |

Table 1

Assuming that the system uses the SJF scheduling algorithm.

(i) Determine the average waiting time for the processes. (6 marks)

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(ii) Explain **one** disadvantage of the system. (2 marks)

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(c) A certain software company developed an operating system but during testing, the results showed that the system has a problem with memory segmentation. Outline **four** causes of the problem. (4 marks)

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(d) James, a student with a certain college was carrying out an assignment about memory registers in computer systems. Describe **two** types of registers James would include in his report. (4 marks)

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8. (a) Explain **two** advantages of *dynamic linking* as used in memory management. (4 marks)

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(b) A certain company intends to deploy RAID technology as a backup strategy on their distributed system. Outline **four** levels of RAID technology the company could use to accomplish the task. (4 marks)

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(c) Alex, a systems analyst with a certain company was given a task of designing an operating system that would work with different hardware vendors. Describe **three** types of I/O communication techniques that he would use. (6 marks)

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(d) With the aid of a diagram, outline the internal structure of a hard disk. (6 marks)

file properties = Date
Size