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Blanchardstown
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Baile Bhlainséir

INSTITUTE OF TECHNOLOGY
BLANCHARDSTOWN

Year	Year 2	
Semester	Semester 1	
Date of Examination	Tuesday 17th August 2010	
Time of Examination	1.00pm - 3.00pm	

Prog Code	BN002	Prog Title	Higher Certificate in Science in Computing in information Technology	Module Code	COMP H2028
Prog Code	BN013	Prog Title	Bachelor of Science in Computing in Information Technology	Module Code	COMP H2028
Prog Code	BN104	Prog Title	Bachelor of Science (Honours) in Computing	Module Code	COMP H2028

Module Title	Operating Systems (Client)

Internal Examiner(s):   **Dr. Kevin Farrell**

External Examiner(s):   **Dr. Richard Studdert**
                       Mr. John Dunnion

Instructions to candidates:

1. Question One in Section A is COMPULSORY.
2. Candidates should attempt ALL parts of Question One in Section A
3. ~~Candidates should attempt ONE question from Section B, and ONE question from Section C~~
4. This paper is worth 100 marks.
5. Question One is worth 40 marks, and all other questions are worth 30 marks each.

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Candidates should answer any two questions in section B.

SECTION A: COMPULSORY QUESTION

Question 1: Answer *ALL* parts of this question *(4 marks for each part)*

a)   What is the UNIX *Shell*?

b)   Briefly describe the *Clock page-replacement algorithm* commonly used in memory management.

c)   List **two** possible rules of thumb when determining the *time quantum* in a *round robin* scheduling algorithm.

d)   Consider the situation of a Linux System Administrator who has forgotten the *root* password. Propose a solution to this problem.

e)   Explain the concept of a *file link* in Linux. Distinguish between a *hard link* and a *symbolic link*.

f)   If the *page size* in a particular Operating System is **4 K**, and the *virtual address space* is **4 GB**, what is the maximum number of pages available? If each *page table* entry is **2 Bytes**, how much space is required to store the whole page table?

g) Why is it considered bad practice to log directly into a Linux GUI-based system as *root*? What command must an ordinary user type in a *terminal window*, in order to become *root*?

h) Distinguish between *user mode* and *kernel mode* in an Operating System.

i) In relation to types of process-scheduling algorithms, explain the terms *pre-emptive* and a *non-pre-emptive*.

j) In relation to Linux, distinguish between an *absolute pathname* and a *relative pathname*.

(40 Marks Total)

SECTION B: ANSWER ANY *TWO* QUESTIONS

Question 2

a)   Explain the following terms with regard to Process Management: *ageing, PCB, thread, context switch.*

(4 marks)

b)   List **four** objectives of a good *process scheduling policy* for an operating system.

(4 marks)

c)   (i) Distinguish between *high level, medium level* and *low level* scheduling.

(6 marks)

(ii) What is the relationship between the *low level scheduler* and the *dispatcher*?

(2 marks)

d)   (i) Compare and contrast the *First-Come First Served* (FCFS) and *Shortest Job First* (SJF) low level scheduling algorithms.

(6 marks)

(ii) How does the average wait time for processes differ for each of the algorithms referred to in **(i)** above, and what do you conclude from this difference? Illustrate your answer by showing how a set of sample processes are scheduled by each algorithm.

(8 marks)

(30 Marks Total)

Question 3

a) In relation to memory management, describe the method of *simple paging*.

(6 marks)

b) A particular operating system uses 32-bit addressing. Each 32-bit address is subdivided by allocating **20 bits** to the *page number* and the remaining **12 bits** to the *displacement*. What is the maximum number of pages available in such a system? What is the size, in bytes, of each page?

(8 marks)

c) In relation to virtual memory using simple paging, explain the concept of the *working set model*. Your answer should refer to the terms: *locality of reference, working set window, working set* and *resident set*.

(8 marks)

d) What is *thrashing*? Explain how processor utilisation is effected by *thrashing*. Propose a method to reduce the effects of *thrashing*.

(8 marks)

(30 Marks Total)

Question 4

a)   Distinguish between *automatic* and *manual* booting in Linux.

(2 marks)

b)   List and describe the **six** distinct phases involved in bootstrapping a Linux Operating System.

(12 marks)

c)   Briefly describe **six** tasks, which are generally performed by *start-up scripts* during the bootstrapping of a Linux Operating System

(6 marks)

d) (i)   With reference to Linux, explain the concept of a *run-level*.

(2 marks)

    (ii)   How many *run-levels* are supported in Linux, and how many are actually defined?

(2 marks)

    (iii)   Describe each of the defined *run-levels*.

(6 marks)

(30 Marks Total)