THE OPEN UNIVERSITY OF SRI LANKA
FACULTY OF ENGINEERING TECHNOLOGY
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

ECX 5235 – OPERATING SYSTEMS

FINAL EXAMINATION – 2011 / 2012 ***(Closed Book Type)***

Date: 09th, March 2012 **Time: 0930-1230 hrs**

INSTRUCTIONS TO CANDIDATES

Answer Q1 and any FOUR questions from Q2 – Q8. All questions carry equal mark.

[Q 1] Compulsory question

i.) Briefly describe following operating system components:

a.) System kernel

b.) Device drivers

[4 Marks]

ii.) Give the main feature of the following types of OS outlining their limitations and strengths :

a.) Time Sharing OS

b.) Real time OS

c.) Mobile OS

[6 Marks]

iii.) Briefly explain the following major functions of an operating system :

a.) Memory Management

b.) Process Management

c.) Device Management

[6 Marks]

iv.) State at least four tasks to be done to carry out the responsibilities of a file manager of an operating system?

[4 Marks]

[Q 2]

i)

a.) Why should paging be used by operating systems?

[2 Marks]

b.) What is the major difference between paged memory allocation and segmented memory allocation schemes?

[4 Marks]

ii) What is the cause of thrashing?

[2 Marks]

iii) How does the system detect thrashing? Once it detects thrashing what does the system do to eliminate this problem?

[4 Marks]

iv) Briefly describe the difference between logical and physical address space and explain the process of swapping.

[4 Marks]

v.) Describe virtual memory and the importance of it in memory management.

[4 Marks]

[Q 3]

i.) What is called a process in operating systems?

[2 Marks]

ii.) What is the role of process control block? Explain the function of three attributes in process control block?

[8 Marks]

iii.) How is a process control block represented in Linux operating system?

[2 Marks]

iv.) What do you understand by Linux shell? Name two shells available in Linux.

[3 Marks]

v.) What is a system call? Explain the following system calls used for file management in Linux :

a.) OPEN

b.) READ

c.) WRITE

[5 Marks]

[Q 4]

The following sequence of events has occurred when allocating multiple resources to perform a function of a processor.

"P" indicates a process and "R" indicates a resource.

Event	Action
1	P1 requests and is allocated R1.
2	P2 requests and is allocated R2.
3	P3 requests and is allocated R3.
4	P1 requests R2.
5	P2 requests R3.
6	P3 requests R1.

i.) Draw directed graphs to analyze the above scenario using Holt's modeling method.

[3 Marks]

ii.) Is this system, as a whole, deadlocked? Justify your answer.

[2 Marks]

iii.) Describe the four necessary conditions for deadlocks.

[8 Marks]

iv.) If your operating system supports a device allocation policy which says no event could be started unless all resources have been allocated to the process, what could be the result? Explain.

[3 Marks]

v.) What is "process starvation"? How can this problem be overcome?

[4 Marks]

[Q 5]

i.) What are the various scheduling criteria for process scheduling? Explain by drawing suitable diagrams.

[8 Marks]

ii.) What is the use of inter process communication?

[4 Marks]

iii.) What is meant by context switch?

[4 Marks]

iv.) A random access file with contiguous allocation takes less time to read/write than a random access file with a non contiguous allocation using block chaining, explain.

[4 Marks]

[Q 6]

Consider the following memory requirements of processes;

Process No	Memory Required (kB)
P1	700
P2	500
P3	740
P4	100
P5	100
P6	70
P7	25

Available memory is 2MB. Processes will be requested in the sequence of P1,P2,P3,.....P7 at the time 0.

1) Explain the major problem with the single user contiguous scheme of memory allocation considering the given information.

[2 Marks]

2) Consider the following fixed memory partitioning ;

Memory Partition	Size(kB)
Partition 1	610(low – order memory)
Partition 2	738
Partition 3	700 (high – order memory)

(a) Use the best-fit algorithm to allocate the memory partitions to the arriving processes and draw the memory configuration diagram. Explain the problem of using this memory configuration.

[4 Marks]

(b) Write a pseudo-code to illustrate the memory allocation if first fit algorithm is used.

[6 Marks]

3) Explain the difference between internal and external fragmentation.

[4 Marks]

4) What is the difference between the processes of deallocation of memory space in the fixed memory allocation scheme and in the dynamic partition allocation scheme? Explain using diagrams.

[4 Marks]

[Q 7]

i.) What is the most significant limitation of a Network-Operating System?

[6 Marks]

ii.) How does object based distributed operating system view the computer system? Briefly explain.

[6 Marks]

iii.) Write a pseudo code program to illustrate the prevention of circular waits in a distributed operating system.

[8 Marks]

[Q 8]

i) Briefly describe the key aspects of a security system.

[4 Marks]

ii) Explain the following terms related to system security:

(a) System Survivability

(b) Social Engineering

(c) System Protection Methods

(d) Phishing

[8 Marks]

iii) If you are a system administrator for a network how are you going to address the above issues with regard to the role of the operating system in security?

[8 Marks]

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