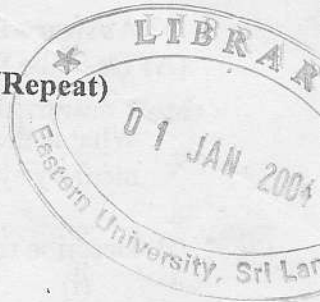


EASTERN UNIVERSITY, SRI LANKA
SECOND EXAMINATION IN SCIENCE 2002/2003 (Repeat)
FIRST SEMESTER (June/July, 2003)



CS 202 Operating Systems
Answer all questions

Time allowed: 2 Hours

Q1 Answer all parts

- State clearly the main functions of a modern operating system.
- Describe what multiprogramming is and explain why it is needed
- State clearly what is meant by spooling and describe the use of it.
- State clearly what is meant by batch system, and explain how it works.
- Distinguish between the operating systems of microcomputers and mainframe computers

Q2 Answer all parts

- State clearly what race condition is, and give an example of it. Explain clearly how race condition would be avoided.
- Five batch jobs A through E, arrive at a computer center almost at the same time. Their estimated running times are 8, 4, 2, 5 and 7 minutes. Their (externally determined) priorities are 3, 5, 2, 1 and 4, respectively, with 5 being the highest priority. For each of the following scheduling algorithms, determine the mean process turnaround time. Ignore process-switching overhead.
 - Round robin.
 - Priority scheduling.
 - First-come, first served (run in order 8, 4, 2, 5, 7).
 - Shortest job first.

For (i), assume that the system is multiprogrammed, and that each job gets its fair share of the CPU (the time quantum 2 minutes). For (ii) to (iv) assume that only one job runs at a time, until it finishes. All jobs are completely CPU bound.

Q3 Answer all parts

(A) Describe Static memory allocation and Dynamic memory allocation.

What is the difference between a **Virtual address** and a **Physical address** in a virtual memory system.

(B) Describe the following memory allocation algorithms:

- (i) First-fit
- (ii) Best-fit
- (iii) Worst-fit
- (iv) Next-fit

Consider a swapping system in which memory consists of the following hole sizes in memory order: 10K, 4K, 20K, 18K, 7K, 9K, 12K, and 15K. Which hole is taken for successive segment requests of

- (a) 12K
- (b) 10K
- (c) 9K,

for the above allocation algorithms.

Q4 Answer all parts

(A) Describe the deadlock detection algorithm using Resource Graph.

Consider the system:

1. Process A holds R and wants S.
2. Process B holds nothing but wants T.
3. Process C holds nothing but wants S.
4. Process D holds U and wants S and T.
5. Process E holds T and wants V.
6. Process F holds W and wants S.
7. Process G holds V and wants U.

Draw the resource graph for the above system.

Examine this system for deadlock situation and if it is deadlocked, which processes are involved?

(B) Explain the **Banker's** algorithm of deadlock avoidance.

A system has five processes P₀, P₁, P₂, P₃ and P₄ and four allocatable resources R₀, R₁, R₂, and R₃. The current allocation and maximum needs are as follows:

This question continues

Continuation.....

	<i>Allocated</i>					<i>Maximum Needs</i>			
	R0	R1	R2	R3		R0	R1	R2	R3
P0	2	0	1	1	3	2	1	4	
P1	0	1	2	1	0	2	5	2	
P2	4	0	0	3	5	1	0	5	
P3	0	2	1	0	1	5	3	0	
P4	1	0	3	0	3	0	3	5	

<i>Available</i>				
	R0	R1	R2	R3
	8	5	9	7

Investigate the state of the system for deadlock situation using Banker's algorithm.