COMSATS UNIVERSITY ISLAMABAD
DEPARTMENT OF COMPUTER SCIENCE

Terminal Examination, FALL 2019

Class/Section: - BSCS- 4,5, BSSE- 4,5
Marks: - 70
Dated: - 31/12/2019

Subject: - Operating Systems (CSC322)
Time: - Three hours

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================= **Question No.2** (Marks 12) ================= (CLO 2)

Part 1: Compare the following scheduling algorithms in terms of possibility of starvation:
FCFS Vs. Priority based scheduling (explain the reason if starvation is possible) (2)

Part 2: Suppose, in an OS multilevel-feedback queue scheduling is implemented. There are three queues to hold the ready processes. In Q1, RR scheduling algorithm is used to schedule processes (quantum is 6, assigned on FCFS basis). While in Q2 and Q3, priority based (preemptive) and SJF (preemptive) scheduling is used respectively. When a process arrives, it is kept in Q1. If a process in Q1, does not completes in one quantum it is moved to Q2 if its priority is less 10 otherwise it is sent to Q3. When the Q1 gets empty, processes from Q2 are executed and then Q3 processes are executed. Considering this scheduling system, draw a Gantt chart showing the execution order of following processes (10)

Process ID	Priority	Burst Time
P0	12	4
P1	8	24
P2	16	15
P3	24	14
P4	6	18
P5	4	12
P6	20	14
P7	1	12

Note: smaller priority number means higher priority

================= **Question No.3** (Marks 12) ================= (CLO 3)

Part 1: Compare the following synchronization tools: Mutex-Locks vs. Semaphore (2)

Part 2: write the conditions that must-be fulfilled to be a valid solution to Critical Section Problem (2)

Part 3: Suppose the following resource-allocation state

Process	Allocation	Request	Total Resources
P1	1,0,1,1,0	0,1,0,0,1	2,1,1,2,1
P2	1,1,0,0,0	0,0,1,0,1	
P3	0,0,0,1,0	0,0,0,0,1	
P4	0,0,0,0,0	1,0,1,0,1	

Find whether the system is in deadlock state or not? If yes, then which processes are in deadlock? Also suggest a recovery scheme to get out of the deadlock situation. (6+2)

================== **Question No.4** (Marks 20) ================== (CLO 4)

Part 1: Compare the following

External Fragmentation Vs. Internal Fragmentation

Contiguous Vs. Non-Contiguous Memory Allocation   (4)

Part 2: Consider a simple paging system with frame size of 16 bytes. Following is the page table of a process:

Page Number	Frame Number
0	4
1	8
2	3
3	2
4	9

For each of the following logical addresses, determine the physical address or indicate if a memory error occurs: (6)

a. 3, 12   b. 0, 7   c. 4, 13   d. 1, 18   e. 2, 12   f. 4,8

Part 3: Given page reference string: 1,0,3,7,1,3,5,4,2,1,5,3,7,6,3,2,1,2,3,6

Assume that the frame quota is 4, compare the number of page faults for LRU (with stack implementation) and Second-chance page replacement algorithms   (10)

================== **Question No.5** (Marks 12) ================== (CLO 5)

Part 1: Suppose that a disk drive has 5,000 cylinders, numbered 0 to 4,999. The drive is currently serving a request at cylinder 2,150, and the previous request was at cylinder 1,805. The queue of pending requests, in FIFO order, is:

2069, 1980, 2296, 1864, 1544, 2339, 356, 1523, 4965, 3681

Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests for each of the following disk-scheduling algorithms?

a. SSTF   b. SCAN   (8)

Part 2: Compare the following

Sequential File Access Vs. Direct File Access

Tree Structured Directories Vs. Acyclic-Graph Directories   (4)

================== **Question No.6** (Marks 14) ================== (CLO 6)

Part 1: Define the OS Protection. What are the basic principles of OS protection?   (7)

Part 2: What are the different categories of OS security violation? Explain the security violation methods   (7)

The End