Paper Code: IC1823

M. Sc (Informatics)-Sem.II, 2018
Paper : IT -23 Operating Systems

Time: 3hrs. Max. Marks: 75

(Answer any five questions)
Attempt all sub-parts of a question together

Q1)

a) Describe the differences between symmetric and asymmetric multiprocessor systems highlighting advantages and disadvantages of the same?

b) What is the optimistic assumption made in deadlock-detection algorithm? How can this assumption be violated?

c) What are the differences between user-level threads and kernel-level threads? Under what circumstances is one better than another?

d) What is a Zombie process? How can we avoid creating them?

e) What is Little's formula of algorithm evaluation? Explain with example.

[3 * 5]

Q2)

a) Design a file-copying program named ***fcopy*** using ordinary pipes. The Program will create an **named pipe P1** and write the contents of the contents of the file to be copied to the pipe. The child will read from the pipe and write the contents to the destination file after converting the same to uppercase.

Program would be invoked as

filecopy input.txt copy.txt

Write program using UNIX and C

b) *Explain the Dining-Philosophers* Synchronization problem. Suggest solution using monitors.

[9 + 6]

Q3)

a) *Consider the following page reference string:*

1,0,3,2,6,4, 5,0,1,7,6,7, 4, 3, 2,5, 1, 3,2,7, 5,0, 6,7, 3, 1, 2

Assume demand paging with three frames, how many page faults would occur for the following replacement algorithms

i. LRU replacement

ii. Optimal Replacement

If the number of page frames increase to four, what will be the effects on the number of page faults?

b) Explain the difference between **Segmentation** and **Paging.** Why are they sometimes combined into one paging scheme?

c) Some systems provide file sharing by maintaining a single copy of file. Other systems maintain several copies, one for each of the users sharing the file. Discuss the merits of each.

[8 + 4 + 3]

P.T.O

Q4)

a) Consider a set of processes {P1, P2, P3, P4, P5}. The arrival time and the CPU time needed for the processes are given below.

Process	Arrival Time	CPU Time
P1	3	7
P2	4	5
P3	2	7
P4	0	8
P5	9	4
P6	6	3

Calculate the average waiting time and turnaround time for the following cases,

i) Using FCFS scheduling

ii) Using Preemptive SJF scheduling

iii) Using RR scheduling (time quantum 3 ms)

b) What is Processor Affinity? Explain difference between soft affinity and hard affinity.

c) What is race condition? Explain mutual exclusion using Compare and Swap instruction.

[9 + 3 + 3]

Q5)

a) Consider the following snapshot of the system.

	Allocation	Max
	A B C D	A B C D
P1	2 1 2 4	5 2 3 6
P2	1 2 1 3	1 2 3 3
P3	4 1 0 3	7 1 1 5
P4	0 1 2 2	1 1 3 2
P5	0 1 5 0	2 1 6 4

Use banker's algorithm to determine if the following are safe and in which order they must Complete. If not why the state is unsafe

i. Available (1, 0, 3, 0)

ii. Available (1, 0, 0, 2)

How can we recover from deadlock? Explain keeping minimum cost in mind.

[10 + 5]

Q

a) Assume a globally declared **matrix M** of size NxN and a variable sum which will store the sum of elements of Matrix.

Write a multithreaded program populates the matrix with data. It will create N threads. Each thread computes the sum of one row of the matrix. Parent will wait for all the threads to join. It will then display the contents of the Matrix and the sum of elements of the array.

b) Differentiate between data parallelism and task parallelism with an example?

c) What is Aging? How can we solve starvation problem with aging? [9 + 3 + 4]