CS1551/CS512

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RAMAIAH INSTITUTE OF TECHNOLOGY

(Autonomous Institute, Affiliated to VTU)
Bangalore – 560 054

MAKEUP EXAMINATIONS – MARCH 2017

Course & Branch : B.E: Computer Science Engineering **Semester : V**
Subject : Operating Systems **Max. Marks : 100**
Subject Code : CS1551/CS512 **Duration : 3 Hrs**

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT- I

1. a) With a data structure, explain the information an OS needs to track about each process in xv6 kernel. CO1 (08)
   b) Describe the responsibilities of an operating system in managing memory. CO1 (06)
   c) Differentiate between fork( ) and vfork( ) system call with a program. CO1 (06)

2. a) List and explain the services provided by an operating system to the user and the system. CO1 (08)
   b) Compare procedure call and system call with an example. CO1 (06)
   c) List out and explain different APIs (Application Program Interface) used in managing the processes. CO1 (06)

UNIT- II

3. a) Consider the following set of processes with arrival time and burst time CO2 (08)

Process	Burst-Time	Priority	Arrival Time
P1	5	3	0
P2	7	2	1
P3	8	1	2
P4	4	4	3

   Draw the Gantt chart and find the average waiting time and turnaround time by using the following scheduling algorithms
   i) FCFS algorithm ii) Preemptive Priority algorithm.
   b) Justify "Multi-Queue Scheduling increases throughput than single-queue scheduling" in the system. CO2 (06)
   c) Identify the cache affinity problem in multi processor systems and provide the solution for the same. CO2 (06)

4. a) Consider the following set of processes with arrival time and burst time ; CO2 (08)

Process	Burst-Time	Arrival Time
P1	6	0
P2	5	1
P3	3	2
P4	5	3

Draw the Gantt chart and find the average waiting time and turnaround time by using the following scheduling algorithms
i) Preemptive Shortest Job First algorithm
ii) Round-Robin algorithm(time slice=3ms)

b) With basic rules explain the working of Multi level feedback scheduling technique (MLFQ). CO2 (06)

c) Identify the features of different schedulers in Linux operating system. CO2 (06)

UNIT- III

5. a) Illustrate with an example the address translation for segmentation technique of memory virtualization. CO3 (06)

b) Consider the following page reference string: CO3 (08)

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

How many page faults would occur for LRU replacement and FIFO replacement algorithms? Assume number of frames=4.

c) Explain how to manage the contents of TLB during context switch with a suitable example. CO3 (06)

6. a) Given five memory partitions of 150 KB, 600 KB, 250 KB, 350 KB, and 650 KB (in order), how would the first-fit, best-fit, and worst-fit algorithms place processes of 258 KB, 477 KB, 136 KB, and 524 KB (in order)? Which algorithm makes the most efficient use of memory? CO3 (06)

b) Illustrate multi level page table with a suitable example. CO3 (06)

c) Write page-fault hardware control flow algorithm. CO3 (08)

UNIT- IV

7. a) Explain "binary semaphore as lock" and also show the traces of threads. CO4 (08)

b) Demonstrate the interaction between the threads using condition variables. CO4 (06)

c) Describe briefly the different techniques used to handle deadlock. CO4 (06)

8. a) Discuss the problems of sharing global data with a code. CO4 (10)

c) Consider the following snapshot of a system, with total resources of A(3), b(14) and C(12) CO4 (10)

Processes	Allocation				Max			
	R1	R2	R3	R4	R1	R2	R3	R4
P1	**2**	**0**	**1**	**1**	**3**	**2**	**1**	**4**
P2	**0**	**1**	**2**	**1**	**0**	**2**	**5**	**2**
P3	**4**	**0**	**0**	**3**	**5**	**1**	**0**	**5**
P4	**0**	**2**	**1**	**0**	**1**	**5**	**3**	**0**
P5	**1**	**0**	**3**	**0**	**3**	**0**	**3**	**3**

Using the banker's algorithm answer the following.
i) Calculate the need matrix
ii) Determine whether system is in deadlock state or not.

UNIT- V

9.	a)	Describe the free space management for file systems with suitable examples.	CO5	(06)
	b)	Explain the inode and multi level index of a file system organization.	CO5	(08)
	c)	Illustrate the various crash scenarios for a single write operation.	CO5	(06)
10.	a)	Suppose that a disk drive has 5,000 cylinders, numbered 0 to 4999. The drive is currently serving a request at cylinder 143 and the previous request was at cylinder 125. The queue of pending requests in order is: 86, 1470, 913, 1774, 948, 1509 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 Shortest Seek Time First (SSTF) and SCAN disk-scheduling algorithms?	CO5	(06)
	b)	Describe the various techniques of caching and buffering in file systems.	CO5	(08)
	c)	Illustrate the policies to allocate files and directories for a fast file system.	CO5	(06)

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