GLA University, Mathura

Department of Computer Engineering and Applications

Operating System and Concepts BCSC0055

1. What is Deadlock? How you prevent system from Hold & Wait and circular wait condition?
2. Draw the Resource Allocation graph for

    P1-> R1-> P2->R3->P3->R2->P1

    P2->R3->P3->R2->P2 and find out whether deadlock exist or not? Justify

    (Note: - R1, R2, R3 has one, two, and three instances respectively.

3. Attempt **all** of the following:

Process	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P0	0	1	0	7	5	3	3	3	2
P1	2	0	0	3	2	2			
P2	3	0	2	9	0	2			
P3	2	1	1	2	2	2			
P4	0	0	2	4	3	3			

   a) Find the Content of Need Matrix?
   b) Find the Safe sequence? if exist
   c) If P4 request for additional resource (3,3,0) .should it be granted immediately .

4. **Consider the snapshot of the system and solve the following using Banker's Algorithm.**

	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	0	0	1	2	0	0	1	2	1	5	2	0
P1	1	0	0	0	1	7	5	0				
P2	1	3	5	4	2	3	5	6				
P3	0	6	3	2	0	6	5	2				
P4	0	0	1	4	0	6	5	6				

   i. Obtain the array 'Need'.
   ii. Is the system in a safe state?
   iii. If a request from process p1 arrives for (0,4,2,0) can the request be immediately granted?

5. A computer system has 6 tape drives, with n processes competing for them. Each process may need 3 tape drives. What is the maximum value of n for which the system is guaranteed to be deadlock? Justify your answer.

6. An OS contains 3 resource classes. The number of resource units in these classes is 7,7,10 respectively. The Current resource allocation is shown below :

	Allocated Resource			Maximum Requirement		
	R1	R2	R3	R1	R2	R3
P1	2	2	3	3	6	8
P2	2	0	3	4	3	3
P3	1	2	4	3	4	4

   a) Is the current allocation state safe ?
   b) Would the following request be granted in current state
      i)   Process P1 request (1,1,0)
      ii)   Process P2 request (0,1,0)
      iii)   Process P1 request (0,1,0)

7. A computer system has 6 tape drives, with n processes competing for them. Each process may need 3 tape drives. What is the maximum value of n for which the system is guaranteed to be deadlock? Justify your answer.

8. On a simple paging system with 2^{24} bytes of physical memory , 256 pages of logical address space , and a page size of 2^{10} bytes,
   a. How many bits are there in logical address space?
   b. How many bytes are there in a page frame?
   c. How many bits in the physical address specify the page frame?
   d. How many entries are there in page table(how long is the page table)?
   e. How many bits are needed to store an entry in the page table (how wide is the page table)? Assume each page entry contain a valid/invslid bit in addition to the page frame number

9. On a simple paging system with page table containing 64 entries of 11 bits (including valid/invalid bit) each, and a page size of 512 bytes .
   a. How many bits in the logical address space specify the page number?
   b. How many bits in the logical address space specify the offset within the page?
   c. How many bits are in a logical address ?
   d. What is the size of the logical address space
   e. How many bits in the physical address space specify the page frame number?
   f. How many bits in the physical address space specify the offset within the page frame
   g. How many bits are in the physical address?
   h. What is the size of the physical address space?

10. An address space is specified by 24 bits and the corresponding memory space by 16 bits. How many words are there in the address space. How many words are there in the

memory space? If a page consists of 2K words, how many pages and frames are there in the system?

11.

V.   A computer system has a 36-bit virtual address space with a page size of 8K, and 4 bytes per page table entry.
a) How many pages are in the virtual address space?
b) What is the maximum size of addressable physical memory in this system?

12. Consider a logical address space of 64 pages each of 1024 words mapped onto physical memory of 32 frames.
- How many bits are there in Logical address Space?
- How many bits are there in physical address space?

13. Given five memory partitions of 500 KB, 350 KB, 250 KB, 420 KB, and 450 KB (in order), how would the, best fit and worst-fit algorithms place processes of 325 KB, 150 KB, 400 KB, and 375 KB (in order)?

14. The Logical memory and physical memory is 32k and 512 words respectively. If Page size is of 64 words, formulate logical and physical memory space. How many pages logical and physical memory can accommodate? Write number of entries in the page table also.