

CSI 4337
2 Hr.

Exam #3
CLOSED BOOK

May. 10, 2003

Name _____

All questions are worth 10 points. Maximum score:

1. Suppose you are using a shared variable named **S**, and that **S** currently has the value 6. You are running two independent processes, **P₁** and **P₂**, which contain the following two statements.

P₁
S = S*7;

P₂
S = S/3;

These two statements are executed once and only once. After these two processes complete, what are the possible values of **S**? Explain how each possible value could occur.

2. Is the following system deadlocked? If not show the “safe sequence” otherwise, list the processes that are deadlocked.

	Has			Req			Free		
	A	B	C	A	B	C	A	B	C
P0	0	0	1	0	0	0	0	0	0
P1	1	0	1	0	1	0			
P2	0	1	0	0	0	1			
P3	1	0	0	0	1	2			
P4	0	1	1	2	0	0			

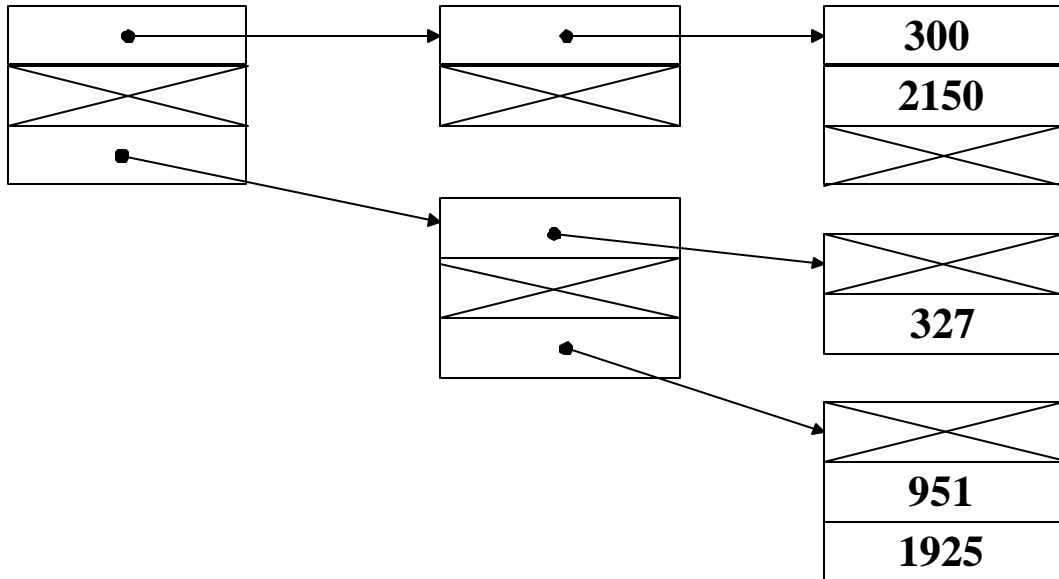
3. Suppose we have created a decimal computer with two kinds of virtual memory, segmented memory and paged memory. A bit in the status register allows the operating system to switch between the two. When in paging mode the page size is 1000. Segments may begin at any real address, but maximum size is 1000, with segment offset being the last three digits of the virtual address. Translate the following four addresses twice. Once using the page table and once using the segment table. If any address is illegal write ERROR in the appropriate column

Page Table	
0	99
1	241
2	369
3	4

Seg. Addr.	Seg. Len
0	222
1	974
2	3
3	2211

Virtual	Real (paging)	Real (Segmentation)
391		
7672		
3914		
2222		
1010		
2417		

4. You have constructed a decimal computer with a two-level tree-structured page-table system. Each field in the address has three digits. Consider the following page table structure. Translate the given addresses. Invalid entries are marked with an X. If essential information is missing from the tables, supply it before answering the question.



Virtual	Real
000000001221	
001002001011	
002002002002	
002000001291	
000000001340	
000001001000	
002002001111	

5. Using the FIFO page replacement algorithm, show how many page faults would occur with the following reference string, assuming that you have 3 available page-frames.

fault													
page	1	2	3	1	4	2	1	3	4	3	1	2	4

Total Faults _____

6. Using the LRU page replacement algorithm, show how many page faults would occur with the following reference string, assuming that you have 3 available page-frames.

fault													
page	1	2	3	1	4	2	1	3	4	3	1	2	4

Total Faults _____

7. Using the OPT page replacement algorithm, show how many page faults would occur with the following reference string, assuming that you have 3 available page-frames.

fault													
page	1	2	3	1	4	2	1	3	4	3	1	2	4

Total Faults _____

8. You are designing the high-level structure of a hard disk for a new operating system. What are the four things that you need to put there?

9. What is a driver and why is it needed?

10. You have a file named “goodie.txt” that is stored on a hard disk. This file is 2,234 bytes long and is stored in five sectors, 21, 22, 30, 31, and 32. Show the directory entry for this file, as it might appear in the three different file organizations given below. Omit any information that is not specifically given in this problem.

Linked List

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Multiple Contiguous Blocks

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Indexed

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