

CS 471: Operating System Concepts
Fall 2005
Examination II
Points: 150
November 12, 2005
Time: 8:30-11:30 AM
CLOSED BOOK

Turning in this exam under your name confirms your continued support for the honor code of Old Dominion University and further indicates that you have neither received nor given assistance in completing it.

Name: _____ UID: _____

CS Unix ID: _____ [@cs.odu.edu](mailto:_____@cs.odu.edu)

Question #	Points	
	Maximum	Obtained
1	30	
2	30	
3	30	
4	30	
5	30	
Total	150	

**YOU MUST WRITE ONLY IN THE SPACE PROVIDED. WORK
OUTSIDE THIS SPACE WILL NOT BE GRADED.**

USE A BLACK PEN TO ANSWER THE QUESTIONS

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Question 1.

(a) How many page faults occur for LRU page replacement algorithm for the following reference string with 4 page frames?

1,3,4,5,5,6,4,7,8,5,4,1,1,7

WORK AREA

(b) In a virtual paging system, on the average 1 out of 10 page references result in a page fault. If average page-fault handling time is 1 milliseconds and a main-memory access time is 500 nanoseconds, determine the effective access time in nanoseconds.

WORK AREA

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Question 2.

(a) On a disk, space is allocated using indexed allocation. If a file F1 is allocated the following blocks (in that order), show the contents of the directory for F1 and the index block for F1 (located in block 200).

Blocks allocated to f1: 15, 9, 210, 13, 35, 27, 96, 230

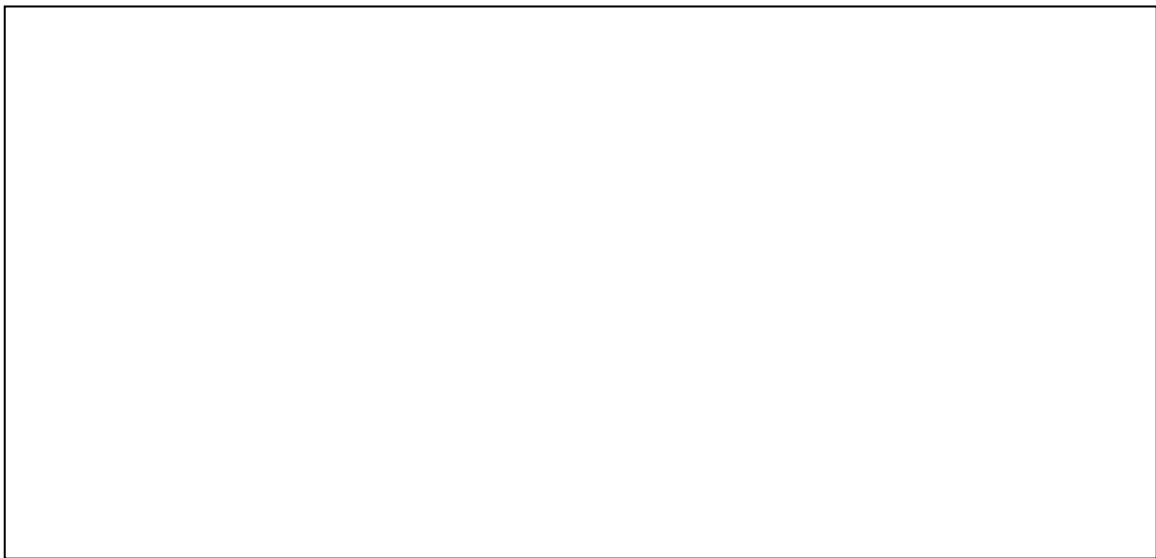
WORK AREA



(b) In the same system, free space on the disk is managed using link list. If the following blocks are the only blocks that are free, show how the free space will be represented.

23, 45, 78, 190, 245, 997, 1234

WORK AREA:



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Question 3.

- (a) Suppose that a disk drive has 8000 cylinders, numbered 0..7999. The drive is currently serving a request at cylinder 250, and the previous request was at cylinder 320. The queue of pending requests, in FIFO order, is:

500, 200, 750, 50, 4000

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 SCAN disk-scheduling algorithm

WORK AREA:

- (b) Answer (a) above assuming SSTF (Shortest seek time first) disk-scheduling algorithm.

WORK AREA:

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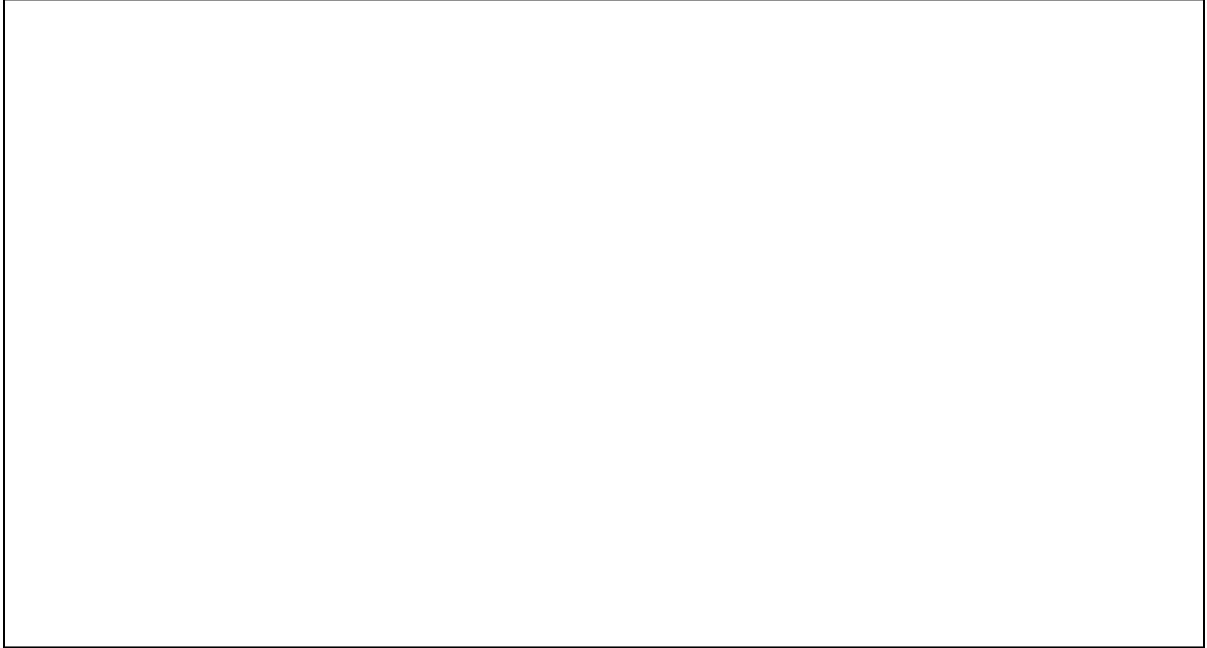


Question 4.

(a) A user U1 has requested for write access to a file F1. In **each of the following two** access matrix implementations, state (1) **what is associated with the request**, and (2) **what operations are performed at the file server**.

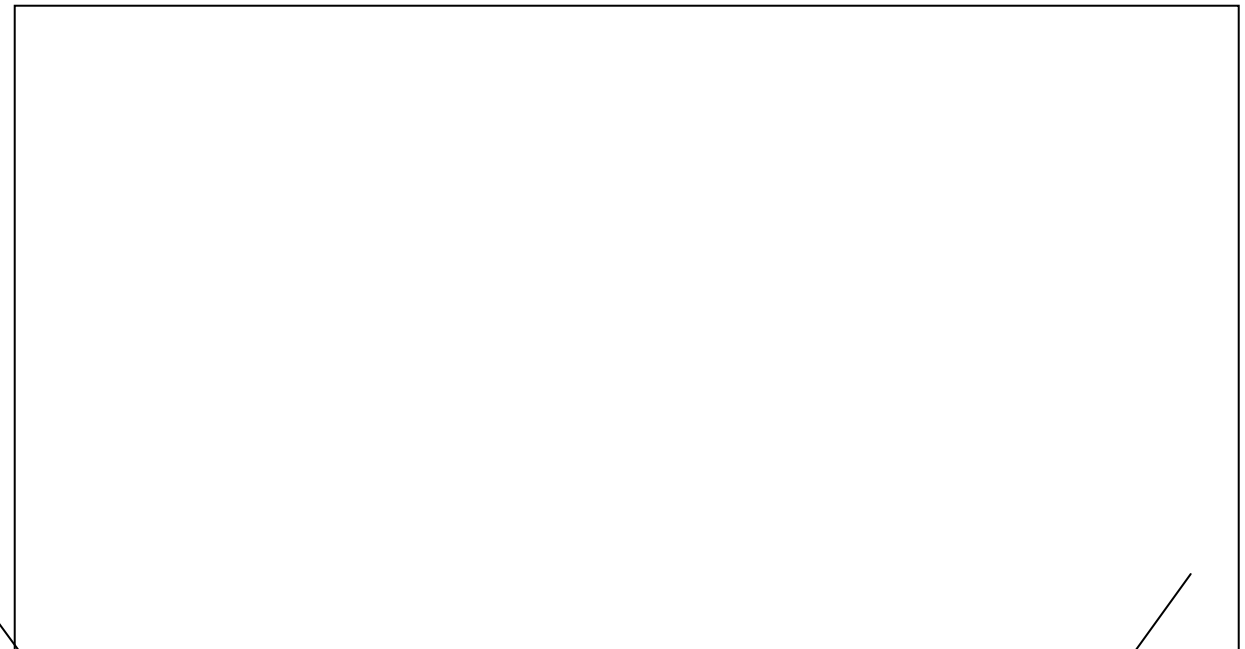
(i) Access lists for objects (as in Unix) (ii) Lock-key mechanism

WORK AREA:



(b) Illustrate the following security attacks with an example (one for each). (i) masquerading attack; (ii) man-in-the-middle attack

WORK AREA:



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Question 5.

- (a) Explain how cache consistency is maintained in NFS and AFS file servers.

WORK AREA:

- (b) 100, 150, 200 are the timestamps of processes P1, P2, and P3, respectively. Currently, resource R1 is held by P2. Both P1 and P3 (in that order) also made requests for R1. Discuss the outcome of the requests from P1 and P3 under (i) Wait-die scheme (ii) Wound-wait scheme.

WORK AREA: