

CSE3502, Operating Systems Fall 2019, Homework 2

1. (5 points) What is segmentation for?

2. (10 points) For each of the following decimal virtual addresses, compute the virtual page number and offset for a 4-KB page: 20000, 32768, 60000.

4k:

	<i>Page number</i>	<i>offset</i>
<i>20000</i>		
<i>32768</i>		
<i>60000</i>		

3. (5 points) Given a two-level page table with 4-KB pages and. Assume that each level uses 10 bits. What would be the virtual address if PT1=2, PT2=3, offset=5?

4. (5 points) Describe how does the clock page replacement algorithm work?

5. (5 points) What are external and internal fragmentations?

6. (10 points) Consider a system with 3 physical frames of memory that is given the following page memory reference sequence: 1, 3, 6, 7, 1, 3, 6, 7, 1, 3, 6, 7. What is the number of page faults that would occur for each of the following page replacement algorithms?

- a. An optimal page replacement algorithm
- b. FIFO
- b. LRU

7. (5 points) Compare the following free memory management algorithms: first-fit, next-fit, best-fit, and worst-fit.

8. (5 points) Why do not we store information in the process address space? In other words, why we need files in OS?

9. (5 points) What are memory-mapped files and what are the advantages.

10. (10 points) Discuss the advantages and disadvantages of contiguous allocation, linked list allocation, and FAT.

11. (5 points) Why the index allocation (e.g., i-node) requires much less space than FAT?

12. (5 points) What is symbolic linking?

13. (5 points) Give two examples (each) of block devices and character devices.

14. (5 points) What is Direct Memory Access (DMA)?

15. (15 points) Suppose that a disk drive has 300 cylinders, numbered 0 to 299. The drive is currently serving a request at cylinder 143, and the previous request was at cylinder 15. The queue of pending requests, in FIFO order, is 86, 147, 291, 18, 95, 151, 12, 175, 30. 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 each of the following disk-scheduling algorithms?

- a. FCFS
- b. SSF
- c. Elevator algorithm