ARD-203 Operating System

Assignment 1

1. Given six memory partitions of 300 KB,600KB,350KB,200KB,750KB, and 125 KB (in order), how would the first-fit, best-fit, and worst-fit algorithms place processes of size 115 KB,500KB,358KB,200KB, and 375 KB (in order)? Rank the algorithms in terms of how efficiently they use memory.

2. Consider a logical address space of 256 pages with a 4-KB page size, mapped onto a physical memory of 64 frames. a. How many bits are required in the logical address? b. How many bits are required in the physical address?

3. Consider a paging system with the page table stored in memory. a. If a memory reference takes 50 nanoseconds, how long does a paged memory reference take? b. If we add TLBs, and 75 percent of all page-table references are found in the TLBs, what is the effective memory reference time? (Assume that finding a page-table entry in the TLBs takes 2 nanoseconds, if the entry is present.)

4. Consider the segment table: What are the physical address for the following logical addresses:

   a. 0,430   b. 1,10   c. 1,11   d. 2,500

Segment	Base	Length
0	219	600
1	2300	14
2	90	100
3	1327	580
4	1952	96

5. On a system with paging, a process cannot access memory that it does not own; why? How could the operating system allow access to other memory? Why should it or should it not?

6. Consider the following page reference string:

   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 the following replacement algorithms, assuming one, two, three, four, five, six, and seven frames? Remember that all frames are initially empty, so your first unique pages will cost one fault each. • LRU replacement • FIFO replacement • Optimal replacement

7. Consider a logical address space of 8 pages of 1024 words mapped into memory of 32 frames. a. How many bits are there in the logical address? b. How many bits are there in physical address?

8. Given memory partitions of 100K, 500K, 200K, 300K and 600K (in order), how would each of the First-fit, Best-fit and Worst-fit algorithms place processes of 212K, 417K, 112K and 426K (in order)? Which algorithm makes the most efficient use of memory?

9. Why is that, on a system with paging, a process cannot access memory it does not own? How could the operating system allow access to other memory? Why should it or should it not?
10. Explain how the system establishes the physical location of a virtual address in the given computer system with the help of an example. Distinguish between hardware and software operations.