COSC 3346 Operating Systems

Homework 2

1. Given six memory partitions of 300 KB, 500 KB, 400 KB, 200 KB, 700 KB, and 125 KB (in order), how would the first fit and best fit algorithms place processes of size 210 KB, 450 KB, 500 KB, 200 KB, and 500 KB (in order)?

**FIRST FIT:** **BEST FIT:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Partition Size |  |  | Partition Size |  |
| 300 KB | 210 |  | 300 KB | 210 |
| 500 KB | 450 |  | 500 KB | 450 |
| 400 KB | 200 |  | 400 KB |  |
| 200 KB |  |  | 200 KB | 200 |
| 700 KB | 500 |  | 700 KB | 500 |
| 125 KB |  |  | 125 KB |  |

2. Consider the following segment table:

|  |  |  |
| --- | --- | --- |
| **Segment** | **Base** | **Length** |
| 0  1  2  3 | 209  2204  903  1325 | 501  14  102  380 |

What are the physical addresses for the following logical addresses (if valid)?

1. 0, 852
   1. NOT VALID
2. 1, 8
   1. 2212
3. 2, 92
   1. 995

3. Consider the page table shown for a system with 12-bit virtual and physical addresses and with 256 byte pages. The list of free frames is D, E, F (that is, D is at the head of the list, E is the second, and F is the last).

|  |  |
| --- | --- |
| Page | Page Frame |
| 0 | - |
| 1 | 2 |
| 2 | C |
| 3 | A |
| 4 | - |
| 5 | 4 |
| 6 | 3 |
| 7 | - |
| 8 | B |
| 9 | 0 |

Convert the following virtual addresses to their equivalent physical addresses in hexadecimal. All numbers are given in hexadecimal. (A dash for a page frame indicates that the page is not in memory.)

* 9EF = 0EF
* 111 = 211
* 700 = F99
* 0FF = DFF

4. Consider the following page reference strings:

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

|  |  |
| --- | --- |
| Frames | Faults |
| 1 | 20 |
| 2 | 18 |
| 3 | 15 |
| 4 | 10 |
| 5 | 8 |
| 6 | 7 |
| 7 | 7 |

* FIFI replacement

|  |  |
| --- | --- |
| Frames | Faults |
| 1 | 20 |
| 2 | 18 |
| 3 | 16 |
| 4 | 14 |
| 5 | 10 |
| 6 | 10 |
| 7 | 7 |

* Optimal replacement

|  |  |
| --- | --- |
| Frames | Faults |
| 1 | 20 |
| 2 | 15 |
| 3 | 11 |
| 4 | 8 |
| 5 | 7 |
| 6 | 7 |
| 7 | 7 |