

## Problem 1

Following the method outlined on page 369. If the size of the logical address space is  $2^m$ , and a page size is  $2^n$ , the the high order  $m - n$  bits designate the page, where  $m = 16$ ,  $n = 12$  and  $m - n = 4$ .

- Page = 13. Frame = 11. No fault.
  - Page = 6. Page fault.
  - Page = 5. Frame = 14. No fault.
  - Page = 7. Frame = 1. No fault.
- 2, 4, 5, 8, 9, 12, 15.
- Pages 2, 4, 5, 8 and 15 have been used recently, leaving 16, 13, 0, and 3 available to swap.

## Problem 2

- Reduced system throughput.
- Repeated page faults requiring memory to be swapped in and out.
- Monitor the rate of page faults.
- Halt execution of a thrashing process until there are enough resources to prevent thrashing.

## Problem 3

- This will just cause the CPU to page faster.
- This will have no effect.
- This will cause more competition for resources, and increase the thrashing.
- This will free up system resources, and reduce thrashing.
- This will add system resources, and reduce thrashing.
- This will cause the system to page faster.
- This will help reduce thrashing.

## Problem 4

- In associative memory
  - Not in associative memory
  - Page fault
- 1 microsecond
  - 2 microseconds
  - 2 microseconds + 100 microseconds + 18 milliseconds + 1 microsecond

3. (a) 85%
  - (b) 10%
  - (c) 5%
4. 0.9062 milliseconds

## Problem 5

From the book page 427: “The accuracy of the working set depends on the selection of  $\Delta$ . If  $\Delta$  is too small, it will not encompass the entire locality; if  $\Delta$  is too large; it may overlap several localities. In the extreme, if  $\Delta$  is infinite, the working set is the set of pages touched during the process execution.”

## Problem 6

$$x = \frac{7}{8}ms, y = \frac{1}{8} \frac{ms}{cyl.}$$

FCFS

## Problem 7

The fastest algorithm was SSTF.

<b>FCFS</b>		
<b>Cylinder Visited</b>	<b>Delta Cylinders</b>	<b>Seek Time (ms)</b>
2000	200	2.642766953
1000	1000	4.827847075
3100	2100	6.603219619
1100	2000	6.465169944
4000	2900	7.606456009
<b>Totals</b>	8200	28.1454596

**SSTF**

<b>Cylinder Visited</b>	<b>Delta Cylinders</b>	<b>Seek Time (ms)</b>
2000	200	2.642766953
1100	900	4.625
1000	100	2.125
3100	2100	6.603219619
4000	900	4.625
<b>Totals</b>	4200	20.62098657

SCAN

**SCAN**

<b>Cylinder Visited</b>	<b>Delta Cylinders</b>	<b>Seek Time (ms)</b>
2000	200	2.642766953
3100	1100	5.020780988
4000	900	4.625
1100	3899	8.680246633
1000	100	2.125
<b>Totals</b>	6199	23.09379457

**LOOK**

<b>Cylinder Visited</b>	<b>Delta Cylinders</b>	<b>Seek Time (ms)</b>
2000	200	2.642766953
3100	1100	5.020780988
4000	900	4.625
1100	2900	7.606456009
1000	100	2.125
<b>Totals</b>	5200	22.02000395

## C-SCAN

**C-SCAN**

<b>Cylinder Visited</b>	<b>Delta Cylinders</b>	<b>Seek Time (ms)</b>
2000	200	2.642766953
3100	1100	5.020780988
4000	900	4.625
1000	5999	10.55665146
1100	100	2.125
<b>Totals</b>	8299	24.9701994

## C-LOOK

<b>C-LOOK</b>		
<b>Cylinder Visited</b>	<b>Delta Cylinders</b>	<b>Seek Time (ms)</b>
2000	200	2.642766953
3100	1100	5.020780988
4000	900	4.625
1000	3000	7.721531969
1100	100	2.125
<b>Totals</b>	5300	22.13507991