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CSCI-3753
Problem set 4

Q1: I'll be using Compaction as my general approaches in memory management :

- Full Compaction: is where we move all the allocated memory to one side of memory (fixed fragmentation) and then release the old allocated memory processes from it.
- Partial Compaction: is when we move the allocated memory and then free up memory segments until we have got enough memory to honor memory requests and preform them.
- With Swapping: when we start by moving the allocated memory to a disk, then we free up memory after, then after that we would reallocate memory with the disk allocated memory contents.
- Paging: is when we start by dividing the system memory into fixed size pages, selectively allocating pages to frames, and then we manage the pages in memory with their pointers.
- Finally, Garbage Collection: which maintains a reference to unused and inaccessible allocated memory and treat it as free memory.

Q2:

a) 2200
b) 1000
c) 2200
d) 2200
e) 2200
f) 2200

Q3:

P1: 7 pages
P2 : 4 pages

Shared pages: x & y

16 frames

Page table P1:

	#	Frames
x	0	2
y	1	6
	2	11
	3	9
	4	3
	5	4
	6	8

page table P2:

	#	Frames
x	0	2
y	1	6
	2	15
	3	1

Even thought it takes 4 entries to fill out a frame paging does not need to be contiguous thus we has page # in 2 page table all have unique frame except #0 & #1 because they both share memory in the physical frames 2&6

Frames in physical memory:

F0		
F1	P2 #3	
F2	P1#0 & P2#0	x
F3	P1#4	
F4	P1#5	
F5		
F6	P1#1 & P2#1	y
F7		
F8	P1#6	
F9	P1#3	
F10		
F11	P1#2	
F12		
F13		
F14		
F15	P2#2	

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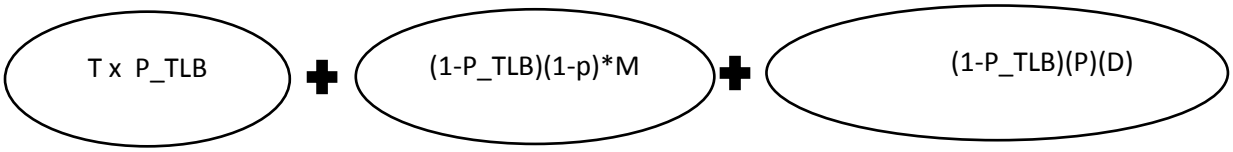
Q4 :

TLB Hit | TLB miss & page hit | TLB miss& page fault



T= 1ns

P_TLB=0.9

M=10 ns

P=0.001

D=10^7 ns

1+(0.1*0.999*10)+(0.1*0.001*10^7)

=1001.999 ns

Q5 :

Example : calculate page fault with LRU using 3 as frame size

0	2	8	0	2	3	0	4	0	5
[0]	0	(0)	0	0	0	(0)	0	(0)	0
	[2]	2	2	(2)	2	2	[4]	4	4
		[8]	8	8	[3]	3	3	3	[5]

[ ] : page fault

( ) : recently used

Page fault of 6

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Q6:

a) FIFO

3	2	4	3	4	2	2	3	4	5	6	7	7	6	5	4	5	6	7	2	1
[3]	3	3	3	3	3	3	3	[5]	5	5	5	5	5	[4]	4	4	[7]	7	7	
	[2]	2	2	2	2	2	2	2	[6]	6	6	6	[5]	5	5	5	5	[2]	2	
		[4]	4	4	4	4	4	4	4	[7]	7	7	7	7	7	[6]	6	6	[1]	

Page fault =12

b) OPT

3	2	4	3	4	4	2	2	3	4	5	6	7	7	6	5	4	5	6	7	2	1
[3]	3	3	3	3	3	3	3	3	[5]	5	5	5	5	5	5	5	[7]	7	7		
	[2]	2	2	2	2	2	2	2	[6]	6	6	6	6	6	6	6	[2]	2			
		[4]	4	4	4	4	4	4	4	[7]	7	7	7	[4]	4	4	4	[1]			

Page fault = 10

c) LRU

3	2	4	3	4	2	2	3	4	5	6	7	7	6	5	4	5	6	7	2	1
[3]	3	3	(3)	3	3	(3)	3	3	[5]	5	5	(5)	5	5	[4]	4	4	[7]	7	7	
	[2]	2	2	(2)	2	2	(2)	2	2	[6]	6	6	(6)	6	6	[5]	5	5	[2]	2	
		[4]	4	4	(4)	4	4	(4)	4	4	[7]	7	7	(7)	7	7	[6]	6	6	[1]	

Page fault = 12

Thus OPT has the fewest page fault.

Q7:

working set Δ =6