

Theory Assignment 2 : Homework on Memory Management, Virtual Memory and Flash memory architecture

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1. $(4095)_{10} = (111111111111)_2$, Page Size = 2KB = 2^{11} bytes = 11 bit offset
Page offset = $(111111111111)_2 = \mathbf{2047}$
Page Number = 1

2. Page Size = 2KB = 2^{11} bytes = 11 bit offset
Physical Frame = 24 - 11 = 13 bit offset
Inverted Page table contains Physical frame numbers so,
#of entries = 2^{13}

3. 512 \rightarrow 256 + 256
256 \rightarrow 128 + 128
128 \rightarrow 64 + 64
64 \rightarrow 32 + 32 (Not possible to hold 57 KB data)
So a segment of 64 KB will be allocated for 57 KB process.

4.
a. 584
b. Invalid address
c. 6326

5.

Segment	Base	Length
0	1100	700
1	9350	550
2	5600	600
3	2200	3400
4	6200	2500

6. To remember the length of each page, to get size of each page and check each logical address to verify that address is in valid range for the process.
7. Outermost Level = 29 bits
Second Level = 13 bits
Third Level = 9 bits
Fourth Level = 6 bits
Offset = 7 bits
8. Initial Order : 320, 580, 480, 220, 890, 600,155

Algorithm	Process (KB)	New Order
Best Fit	135	320, 580, 480, 220, 890, 600, 20
	650	320, 580, 480, 220, 240, 600, 20
	398	320, 580, 82, 220, 240, 600, 20
	220	320, 580, 82, 0, 240, 600, 20
	520	320, 60, 82, 0, 240, 600, 20
	440	320, 60, 82, 0, 240, 160, 20
Worst Fit	135	320, 580, 480, 220, 755, 600, 155
	650	320, 580, 480, 220, 105, 600, 155
	398	320, 580, 480, 220, 105, 202, 155
	220	320, 360, 480, 220, 105, 202, 155
	520	Not allocated
	440	320, 360, 40, 220, 105, 202, 155

9.

0 (VALID)	5 (VALID)	INVALID	4 (VALID)	INVALID
6 (VALID)	INVALID	2 (VALID)	1 (VALID)	INVALID
FREE	8 (VALID)	3 (VALID)	7 (VALID)	INVALID

4 erase operations were performed at write operation number 16,18,20,23.

10. # logical pages = $2^{36}/2^{12} = 2^{24}$ pages
physical pages = $4 \times 2^{24} = 2^{26}$ pages
Table Size = TS = # logical pages * log(# physical pages) bits
= $2^{24} \times 26$ bits = **52 MB**