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Assignment 5

1. first-fit

free	P10	P1	P3	free	P11	free	P12	free	P13	P2	free
100	10	212	112	176	20	200	30	300	40	417	183

P4 cannot be placed.

best-fit

free	P10	P2	free	P11	P3	free	P12	P1	free	P13	P4	free
100	10	417	83	20	112	88	30	212	88	40	426	174

worst-fit

free	P10	P2	free	P11	free	P12	free	P13	P1	P3	free
100	10	417	83	20	200	30	300	40	212	112	276

P4 cannot be placed.

next-fit

free	P10	P1	free	P11	free	P12	free	P13	P2	P3	free
100	10	212	288	20	200	30	300	40	417	112	71

P4 cannot be placed.

2.

Logical address	Page Number	Page Offset	Physical address		
1027	2	3	3	$1027 = 2 \times 512 + 3$	$0 \times 512 + 3 = 3$
2058	4	10	522	$2058 = 4 \times 512 + 10$	$1 \times 512 + 10 = 522$
522	1	10	522	$522 = 1 \times 512 + 10$	$1 \times 512 + 10 = 522$
5	0	5	1541	$5 = 0 \times 512 + 5$	$3 \times 512 + 5 = 1541$
2047	3	511	2559	$2047 = 3 \times 512 + 511$	$4 \times 512 + 511 = 2559$

3. a) 2KiB = 2048 = 2^{11}

$2^{32} / 2^{11} = 2^{21}$ entries

b) 128MiB = 2^{27}

2KiB = 2^{11}

$2^{27} / 2^{11} = 2^{16}$ entries

4. a) time = look up table time + reference page time

= 150ns + 150ns

= 300ns

b) time = (1 - 0.8) × (20ns + 2 × 150) + 0.8 × (20ns + 150ns)

= 0.2 × 320ns + 0.8 × 170ns

= 64ns + 136ns

= 200ns

5. LRU

1	2	1	4	2	1	5	2	4	7	5	4	1	4	7	1	4	2	1	7
1	1		1			1		4	4	4		4		4			4		7
	2		2			2		2	2	5		5		7			2		2
			4			5		5	7	7		1		1			1		1
1	2		3			4		5	6	7		8		9			10		11

11 page faults

Optimal

1	2	1	4	2	1	5	2	4	7	5	4	1	4	7	1	4	2	1	7
1	1		1			5			5			1					1		
	2		2			2			7			7					7		
			4			4			4			4					2		
1	2		3			4			5			6					7		

7 page faults