

$$\frac{4229}{4 \times 1024} = 1.03, \text{tag} = 1 \quad \text{TLB: miss, Page table: valid bit} = 0, \text{page fault, page num} = 28$$

$$\frac{2447}{4096} = 0.597, \text{tag} = 0 \quad \text{TLB: miss, Page table: valid bit} = 0, \text{page fault, page \#} = 56$$

$$\frac{10756}{4096} = 2.63, \text{tag} = 2 \quad \text{TLB} = \text{Hit}$$

$$\frac{35557}{4096} = 8.68, \text{tag} = 8 \quad \text{TLB} = \text{miss, Page table: valid bit} = 0, \text{page fault, page \#} = 112$$

$$\frac{44530}{4096} = 10.87, \text{tag} = 10 \quad \text{TLB} = \text{miss, Page table: valid bit} = 1, \text{page num} = 3$$

$$\frac{12068}{4096} = 2.94, \text{tag} = 2 \quad \text{TLB} = \text{Hit}$$

$$\frac{42925}{4096} = 10.47, \text{tag} = 10 \quad \text{TLB} = \text{Hit}$$

$$\frac{10756}{4096} = 2.62, \text{tag} = 2 \quad \text{TLB} = \text{Hit}$$

$$\frac{35557}{4096} = 8.68, \text{tag} = 8 \quad \text{TLB} = \text{Hit}$$

Page Table

Valid	Page Num
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1	56
1	28
1	5
1	6
1	9
1	11
0	Disk
1	4
1	112
0	Disk
1	3
1	12
1	7
1	8
0	Disk
0	Disk
0	Disk
0	Disk
1	2
0	Disk
1	10
1	14

TLB

Valid	Tag	Page Num	LRU
1	8	112	0
1	2	5	1
1	0	56	2
1	10	3	3

$$\frac{4229}{2 \times 1024} = 2.06, \text{ tag } 2 \quad \text{TLB} = \text{HIT}$$

$$\frac{2847}{2048} = 1.19, \text{ tag } 1 \quad \text{TLB} = \text{miss}, \text{ Page Table, valid bit} = 0, \text{ page fault, page \# } 28$$

$$\frac{10756}{2048} = 5.25, \text{ tag } 5 \quad \text{TLB} = \text{miss}, \text{ Page Table} = \text{HIT}$$

$$\frac{35557}{2048} = 17.36, \text{ tag } 17 \quad \text{TLB} = \text{miss}, \text{ Page Table} = \text{valid bit} = 0, \text{ page fault, page \# } = 56$$

$$\frac{44520}{2048} = 21.74, \text{ tag } 21 \quad \text{TLB} = \text{miss}, \text{ Page Table} = \text{HIT}$$

$$\frac{12068}{2048} = 5.89, \text{ tag } 5 \quad \text{TLB} = \text{HIT}$$

$$\frac{49295}{2048} = 20.95, \text{ tag } 20 \quad \text{TLB} = \text{miss}, \text{ Page Table} = \text{HIT}$$

$$\frac{10765}{2048} = 5.25, \text{ tag } 5 \quad \text{TLB} = \text{HIT}$$

$$\frac{35557}{2048} = 17.36, \text{ tag } 17 \quad \text{TLB} = \text{HIT}$$

Page Table	
Valid	Page #
0	Disk
1	28
1	5
1	6
1	9
1	11
0	Disk
1	4
0	Disk
0	Disk
1	3
1	12
1	7
1	8
0	Disk
0	Disk
0	Disk
1	56
1	2
0	Disk
1	10
1	14

TLB			
Valid	Tag	Page #	LRU
1	17	56	0
1	21	14	3
1	5	11	1
1	20	10	2

Drew Pallian DTP180003  
CS3340.004

#2

a 420 ps

b load-store word = 945 ps

ALU = 200 ps

branches = 840 ps

#3 a 0.45 b 0.65 c nothing