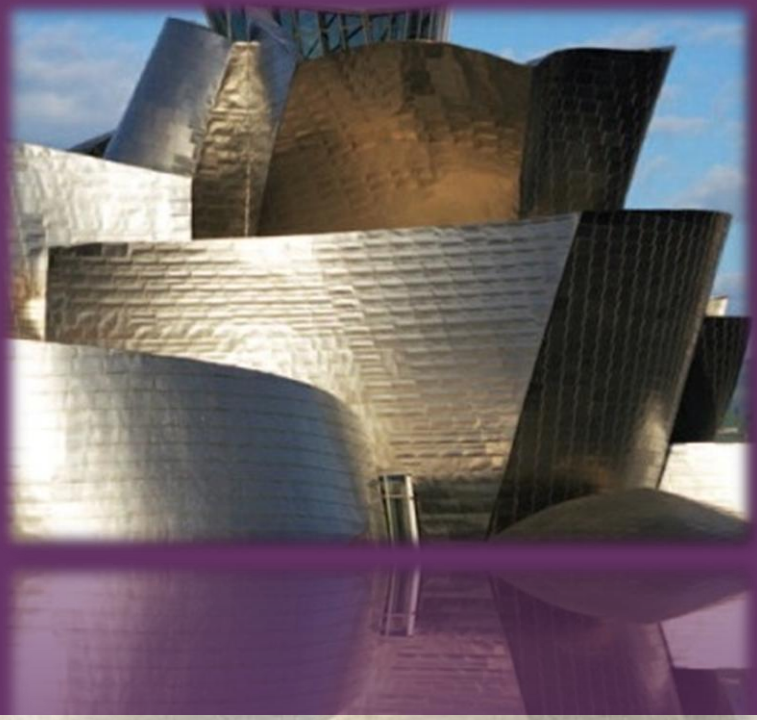

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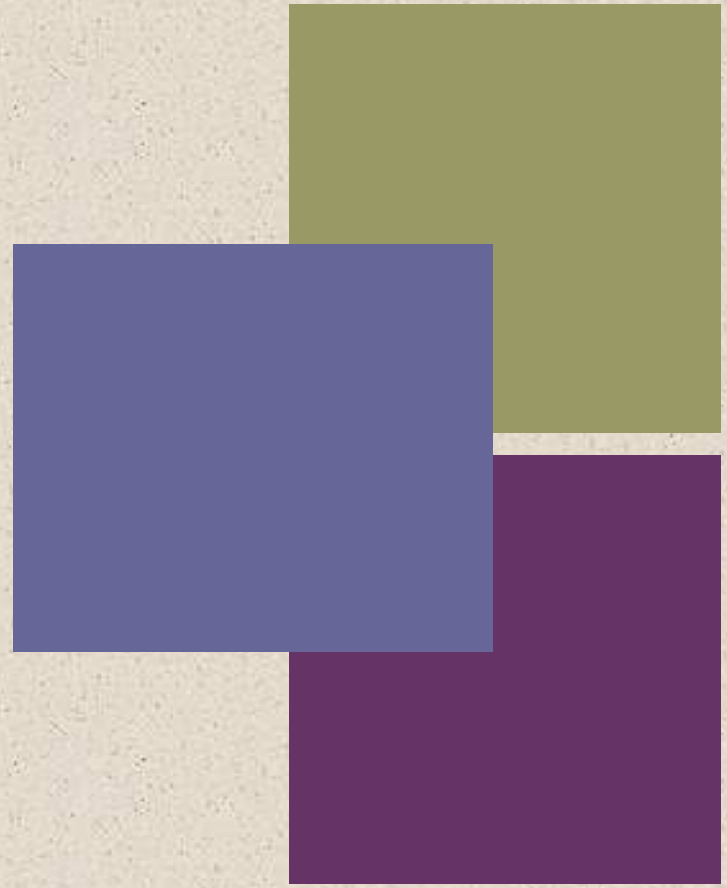
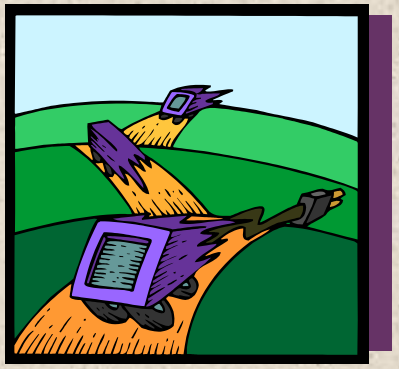


Chapter 4

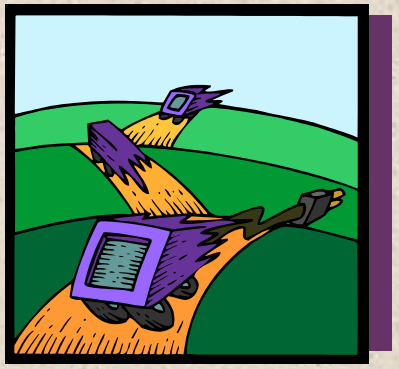
Cache Memory

Mapping Function Example



- 128 B Cache, 12 bit address
- Direct Mapped, 32 B block
- # of word bit = $\log_2 32 = 5\ bit$
- # of lines = $\frac{128\ B}{32\ B} = 4\ \#\ of\ bits = \log_2 4 = 2\ bit$
- # of tag bits = 12-5-2=5 bits
- 060H =00000 11 00000

Mapping Function Example

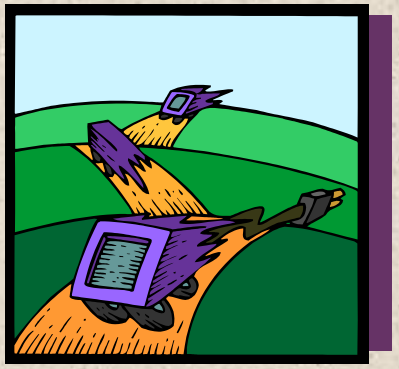


Add	Tag	Line	word	1st	2nd
070 H	00000	11	10000	M	H
080 H	00001	00	00000	M	M
068 H	00000	11	01000	H	H
190 H	00011	00	10000	M	M
084 H	00001	00	00100	M	M
178 H	00010	11	11000	M	M
08C H	00001	00	01100	H	H
F00 H	11110	00	00000	M	M
064 H	00000	11	01000	M	M

$$1st\ hit\ rate = \frac{2}{9} = 22\%$$

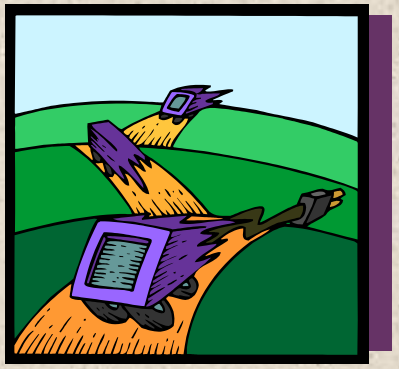
$$2nd\ hit\ rate = \frac{3}{9} = 33\%$$

Mapping Function Example



- 128 B Cache, 12 bit address
- 2-Way set associative, 32 B block
- # of word bit = $\log_2 32 = 5\ bit$
- # of set = $\frac{128\ B}{32\ B * 2} = 2\ set$
- # of bit /set=1 bit
- # of tag bits = 12-5-1=6 bits

Mapping Function Example

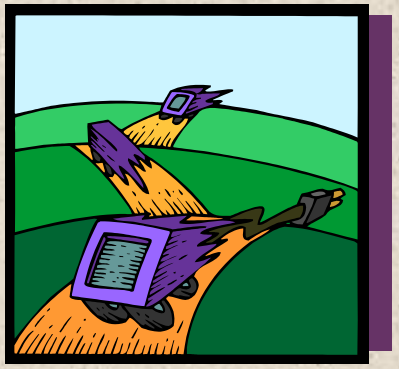


Add	Tag	set	word	1st	2nd
070 H	000001	1	10000	M	H
080 H	000010	0	00000	M	H
068 H	000001	1	01000	H	H
190 H	000110	0	10000	M	M
084 H	000010	0	00100	H	H
178 H	000101	1	11000	M	H
08C H	000010	0	01100	H	H
F00 H	111100	0	00000	M	M
064 H	000001	1	01000	H	H

$$1st\ hit\ rate = \frac{4}{9} = 44\%$$

$$2nd\ hit\ rate = \frac{7}{9} = 77\%$$

Mapping Function Example



- 128 B Cache, 12 bit address
- 2-Way set associative, 16 B block
- # of word bit = $\log_2 16 = 4\ bit$
- # of set = $\frac{128\ B}{16\ B * 2} = 4\ sets \gg \log_2 4 = 2\ bit$
- # of bit /set=2 bit
- # of tag bits = 12-4-2=6 bits