2.5 CPI = 4

2 GHz CPI = 1

$$\frac{\frac{10^{-9}}{2.5} \times 4 \times x}{\frac{10^{-9}}{2} \times 1 \times x}$$

$\frac{8}{2.5} = 3.2$

800 + 500 + 400 + 300   2000 ps

600 + 350   950 ps

1.455

8800 / 800 = 11

9050 / 19600 / 9650 / 950 / 19

$2k + (x-1)\,800 = 10k$ ps

$950 + (y-1)\,600 = 10k$

$x = 11$

$y = \frac{193}{19}$ ~~210~~   16 $\approx \frac{16}{11}$ 45%

193 / 9650 / 600 / 12

R1: ~~10~~ 9

R2: 110   ~~R3: 2000~~

R3: 2000

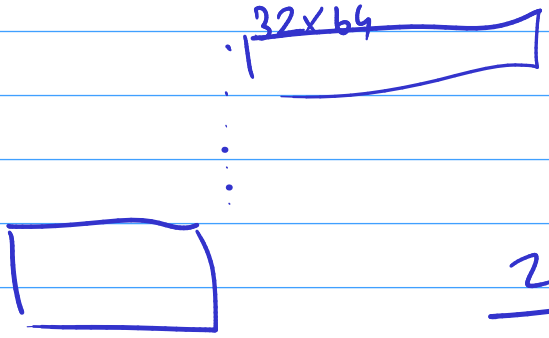
2000
110

1 + 20

| 83 | 10 | 30 | 00 |

2^{16} bytes 32 lines, 64 bytes

(32+)



1100 H

0001 0001 0000 0000

625

$\frac{2500}{64}$ $\frac{2500}{4}$

64 x32

(45) : (64)

6bits 6bits 6bits

(14) 18bits

$2^{14}-1$

9

0
0
0
0
0
0
0

$\frac{10^{-3}}{10^{-7} \times w^2} = 10^4$

CPI=1

$+ 1 \times 0.8 \times \cancel{4} \times \cancel{2} \; 2.2$

$0.2 \times 4.4 \times \cancel{4}$

: $1 \times 0.8 \times \cancel{4} \times 1$

$+ 0.2 \times 5 \times \cancel{4}$

IF	ID/RF	EX	MEM	WB
1	2.2	2	1	0.75
1ns	ID/RF1 | RF2 (2.2/3 | 2.2/3 | 2.2/3)	EX1 | EX2 (1ns | 1ns)	1ns	0.75

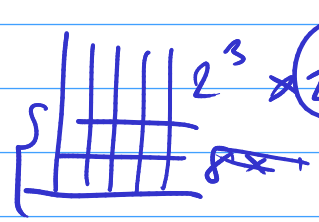
IF ID ex ME WB

$1 \times 0.8 \times x$

$0.2 \times 3 \times x$

1.4

9 ×8



$512 \times 512 \times 8$ 2^{21}

[510:512][-f][512 x 512)

[ ]

$\frac{2^{15}}{2^7} = 2^8$

32kb $= 2^{15}$

256 × 2^6 2^{15}

32kB $\frac{2^{21}}{2^8} = 2^{13}$

Cache blocks = 256

no. of array elts in each line: 16

16 256 P2

$\frac{2^{18}}{2^4} = 2^{14}$ misses

512 x 152

170

165 ns

MR $\frac{165 \times 4 + 999 \times 165}{1003 \times 165}$ ns