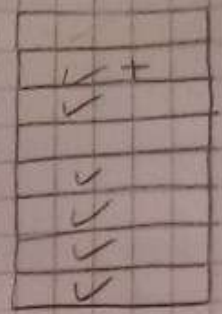
ZI 2013./2014.

1. adrese 32-bita
C1: 8 linija po 16 $S = n \cdot b = 8 \cdot 16$

$w(p) = \log_2(b) = 0$

$w(i) = \log_2(n) = 3$

$w(o) = 32 - 3 = 29$



1. 0x01
   o=0 i=1 PROMAŠAJ
2. 0x86
   1000 0110
   i=6
3. 0xD4
   1101 0100
   i=4 PROMAŠAJ
4. 0x01
   i=1 POGODAK
5. 0x37
   i=7 PROMAŠAJ
6. D5
   i=5 PROMAŠAJ
7. A2
   i=2 PROMAŠAJ
8. 0x41
   i=1 PROMAŠAJ, ZAMJENA
9. 0x02
   i=2 PROMAŠAJ, ZAMJENA
10. 0x9c
    i=1 1100 4 PROMAŠAJ, ZAMJENA
11. 0x29
    i=1 PROMAŠAJ, ZAMJENA
    0010 1001
    o=
12. 0xDD
    1101 1101
    PROMAŠAJ, ZAMJENA
    i=5 o=

CJENA = 25T

C1: 2T
C2: 3T
C3: 5T

ukupno za C1: 502T

2. LA = 32b
stranica = 4KB
opisnici = 4B
program = 1GB x 2

4432

a) jednorazinsko straničenje

$VP = \log_2(4KB) = 12$ $VS = 32 - 12 = 20$ bita

$2GB = \frac{2 \cdot 1024 \cdot 1024 \cdot 1024}{2^2 \cdot 1024} = \frac{2^{20}}{2^1} = 524288$ opisnika potrebno

ukupno zauzeće: $2^{19} \cdot 4B = 2^{19} \cdot 2^2 B = 2^{21} B = 2MB$

b) dvorazinsko straničenje, stranični imenik 256 stavki, po 6B

$VP = 12$ bita $VS1 = \log_2 256 = 8$ bita

$VS2 = 12$ bita

tablica ima: $2^{12} = 128$

ukupno zauzeće: $256 \cdot 6B + 4096 \cdot 128 \cdot 4B = 2MB$

3.

f	CPI A	CPI B	CPI C	CPI D

ukupno zauzeće: $256 \cdot 6B + 4096 \cdot 128 \cdot 4B = \underline{2\ MB}$

3.

	f	CPI_A	CPI_B	CPI_C	CPI_D
P1	1.5	1	2	4	4
P2	2	2	2	2	3
P3	2.5	3	1	4	1

$P = 10^6$ instrukcija

A=10%, B=20%, C=50% D=20%

$CPI_1 = 0.1 \cdot 1 + 0.2 \cdot 2 + 0.5 \cdot 4 + 0.2 \cdot 4 = 3.3$

$CPI_2 = 0.1 \cdot 2 + 0.2 \cdot 2 + 0.5 \cdot 2 + 0.2 \cdot 3 = 2.2$

$CPI_3 = 0.1 \cdot 3 + 0.2 \cdot 1 + 0.5 \cdot 4 + 0.2 \cdot 1 = 2.7$

$n_c = n_i \cdot CPI$

$n_{c1} = n_i \cdot CPI_1 = 3\,300\,000$

$n_{c2} = n_i \cdot CPI_2 = 2\,200\,000$

$n_{c3} = n_i \cdot CPI_3 = 2\,700\,000$

$T_1 = \frac{1}{f} =$

$t_{CPU_1} = n_i \cdot CPI \cdot T_{takt} = \frac{n_{c1}}{f_1} = 2.2\ ms$

$t_{CPU_2} = \frac{n_{c2}}{f_2} = 1.1\ ms$

$t_{CPU_3} = \frac{n_{c3}}{f_2} = 1.08\ ms$

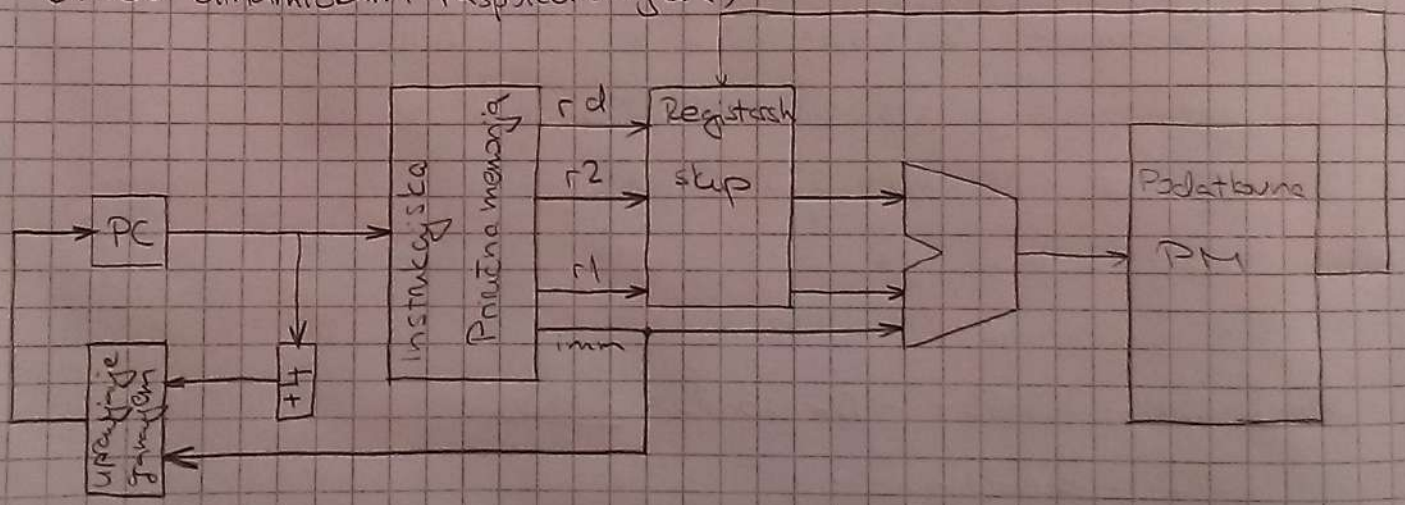
P3 će najbrže izvesti zadani program.

4. LW $t5, -16($t5)
SW $t5, -16($t5)
add $t5, $t5, $t5

IF	ID	EX	MEM	WB	
	IF	ID	EX	MEM	WB
		IF	ID	EX	MEM	WB

1. i 2. instrukcija RAW hazard
~~2. i 3. instrukcija WAR hazard~~

Pošto je protočna arhitektura, nema izvođenja izvan redoslijeda pa stoga u ovoj arhitekturi ne postoji WAW i WAR hazard (i bez dinamičkim rasporedivanjem)



b)

IF	ID	EX	MEM	WB						
					IF	ID	EX	MEM	WB	
						IF	ID	EX	MEM	WB

c)

IF	ID	EX	MEM	WB						
	IF				ID	EX	MEM	WB		
					IF	ID	EX	MEM	WB	

6.

5. $\vec{C} = S(\vec{A} - \vec{B})$

VEKTORSKI KÔD:

```
        MOVE R0, #4 - inicializacija števca
        LD R1, (#s) - velikost sklada
LOOP:   LDV V0, 0($a) - naloži A
        LDV V1, 0($b) - naloži B
        LDV V2, 0($c) - naloži C
        SUBV V2, V0, V1
        MULVS V2, R1, V2
        STV V2, 0($c)
        ADD $a, $a, #8
        ADD $b, $b, #8
        ADD $b, $b, #8
        SUB R0, R0, #1
        BNE R0, #0, LOOP
```

6. LDA $1324 // op. kód 34 Little endian - nižší bajt, nižší adresa
STA $3142 // op. kód A2

$1320 : $34
$1321 : 24
$1322 : 13
$1323 : $A2
$1324 : 42
$1325 : 31