

# EXAMEN CM

## SUBIECT Memorie CACHE

$C = 8$  cuvinte  $\mid \Rightarrow B = 4$  blocuri  
 $b = 2$  cuvinte

a) Correspondență directă :  $N=1 \Rightarrow S=4$  seturi de câte 1 cale

$00h = 0...0\text{--}\underline{00}\text{--}0\text{--}00 \Rightarrow \text{setul } 0$   
 $04h = 0...0\text{--}\underline{04}\text{--}0\text{--}00 \Rightarrow \text{setul } 1$   
 $12h = 0...0\text{--}\underline{10}\text{--}0\text{--}10 \Rightarrow \text{setul } 2$   
 $14h = 0...0\text{--}\underline{10}\text{--}1\text{--}00 \Rightarrow \text{setul } 2$   
 $16h = 0...0\text{--}\underline{10}\text{--}1\text{--}10 \Rightarrow \text{setul } 2$   
 $20h = 0...01\text{--}\underline{00}\text{--}0\text{--}00 \Rightarrow \text{setul } 0$   
 $22h = 0...01\text{--}\underline{00}\text{--}0\text{--}10 \Rightarrow \text{setul } 0$   
 $24h = 0...01\text{--}\underline{00}\text{--}1\text{--}00 \Rightarrow \text{setul } 0$   
 $26h = 0...01\text{--}\underline{00}\text{--}1\text{--}10 \Rightarrow \text{setul } 0$   
 $30h = 0...01\text{--}\underline{10}\text{--}0\text{--}00 \Rightarrow \text{setul } 2$   
 $32h = 0...01\text{--}\underline{10}\text{--}0\text{--}10 \Rightarrow \text{setul } 2$

Operația	Tipul	Setul 0	Setul 1	Setul 2	Setul 3
LD 00h	Miss compulsory	00h			
LD 04h	Miss compulsory	00h	04h		
LD 16h	Miss compulsory	00h	10h	20h	
ST 00h	HIT	00h	10h	20h	
LD 12h	HIT	00h	10h	20h	
LD 08h	HIT	00h	10h	20h	
ST 20h	Miss compulsory	4 08h	10h	20h	
LD 08h	HIT	4 08h	10h	20h	
ST 16h	HIT	4 08h	10h	20h	
LD 22h	HIT	4 08h	10h	20h	
LD 24h	HIT	4 08h	10h	20h	
LD 26h	HIT	4 08h	10h	20h	
LD 30h	Miss compulsory	4 00h	10h	60h	
LD 32h	HIT	4 00h	10h	60h	
ST 16h	Miss conflict	4 00h	10h	20h	
ST 00h	Miss conflict	00h	10h	20h	
LD 14h	HIT	00h	10h	20h	

$$MR = \frac{7}{14}$$



b)  $N=2$ set - asociativă  $\Rightarrow$  2 seturi cu 2 cai

Operația	Miss/HIT	Set 0		Set 1	
		Cale 0	Cale 1	Cale 0	Cale 1
LD 0h	Miss compulsory	0h			
LD 8h	Miss compulsory	0h		1h	
LD 16h	Miss compulsory	0h	2h	1h	
ST 0h	HIT	0h	2h	1h	
LD 12h	HIT	0h	2h	1h	
LD 8h	HIT	0h	2h	1h	
ST 20h	Miss compulsory	4h	2h	1h	
LD 8h	HIT	4h	2h	1h	
ST 16h	HIT	4h	2h	1h	
LD 22h	HIT	4h	2h	1h	
LD 24h	HIT	4h	2h	1h	
LD 26h	HIT	4h	2h	1h	
LD 30h	Miss compulsory	4h	6h	1h	
LD 32h	HIT	4h	6h	1h	
ST 16h	Miss conflict	2h	6h	1h	
ST 0h	Miss conflict	2h	0h	1h	
LD 14h	HIT	2h	0h	1h	

$$MR = \frac{7}{14}$$



~~Subiect~~

# SUBIECT MIPS în banda de asamblare

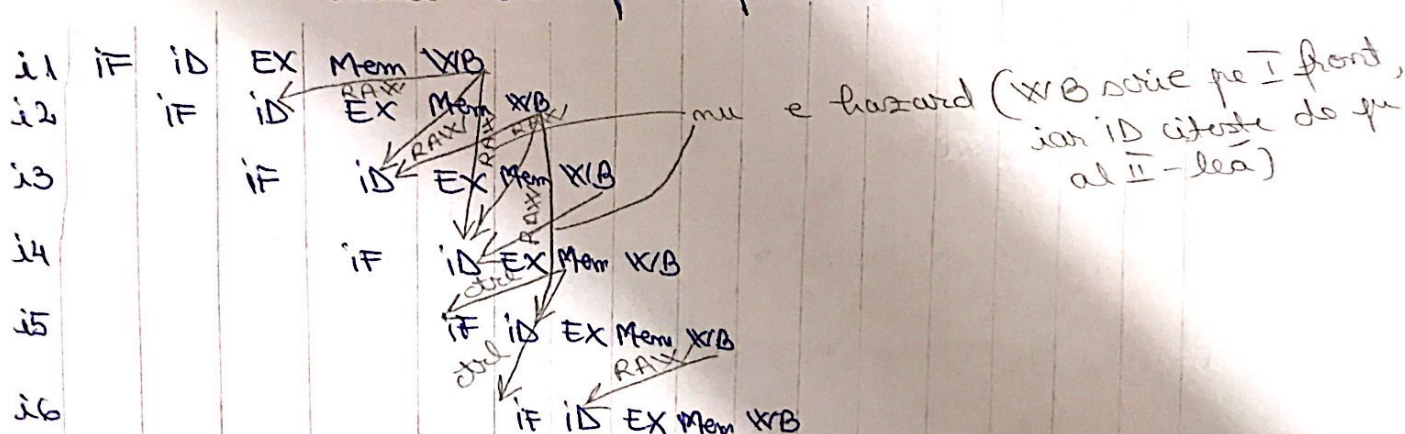
LW \$s1, 0(\$s2)  
 LW \$s3, 0(\$s1)  
 ADD \$s1, \$s1, \$s3  
 BEQ \$s1, \$s3, ET1  
 OR \$s2, \$s2, \$s3  
 SW \$s2, 0(\$s3)

ET1: - - -

Dependente

Instruction	RAW	WAR	WAW	Control
i1) LW \$s1, 0(\$s2)	i1 → i2(\$s1) i1 → i3(\$s1) i1 → i4(\$s1)	-	i1 → i3(\$s1)	-
i2) LW \$s3, 0(\$s1)	i2 → i3(\$s3) i2 → i4(\$s3) i2 → i5(\$s3)	i2 → i3(\$s1)	-	-
i3) ADD \$s1, \$s1, \$s3	i3 → i4(\$s1)	-	-	-
i4) BEQ \$s1, \$s3, ET1	-	i4 → i5(\$s3)	-	i4 → i5 i4 → i6
i5) OR \$s2, \$s2, \$s3	i5 → i6(\$s2)	-	-	-
i6) SW \$s2, 0(\$s3)	-	-	-	-

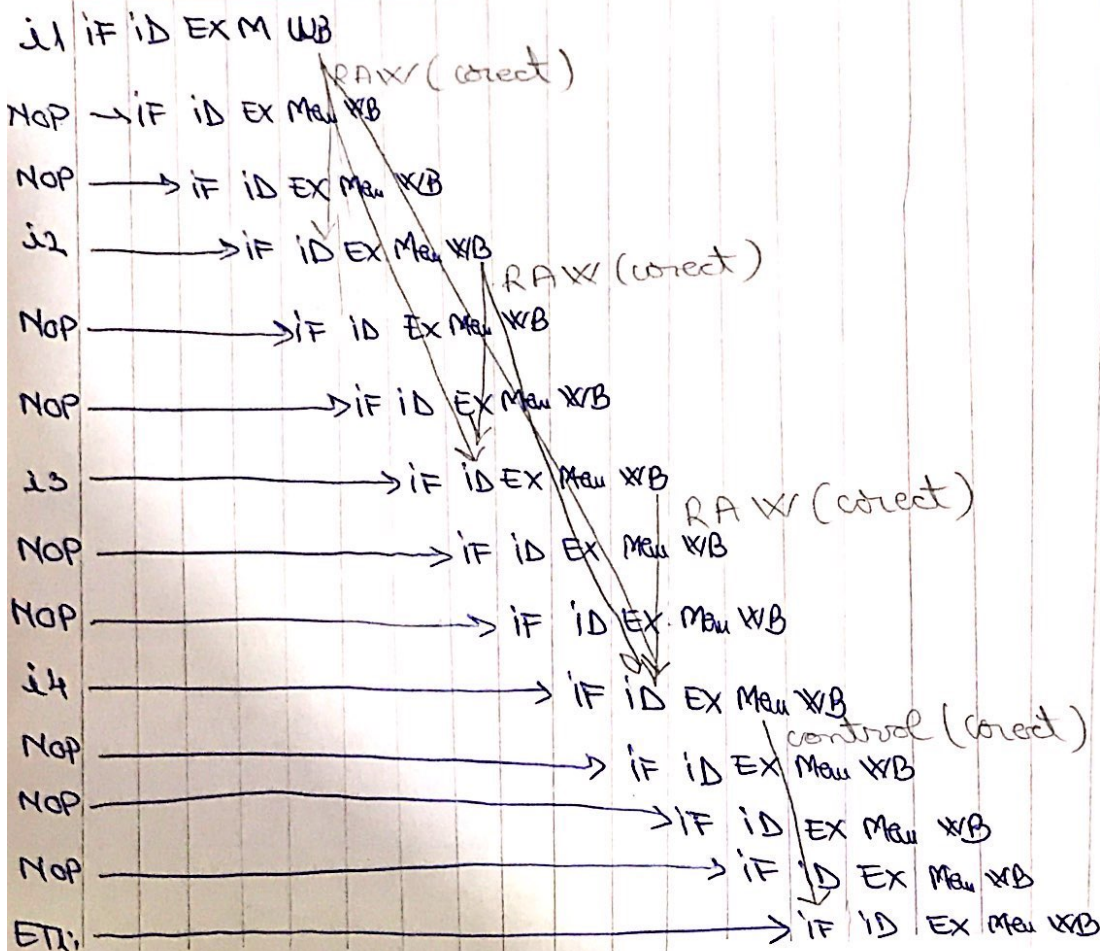
Doar în cazul RAW pot apărea hazard.



În total: 5 hazarduri RAW și 1 hazard de control.

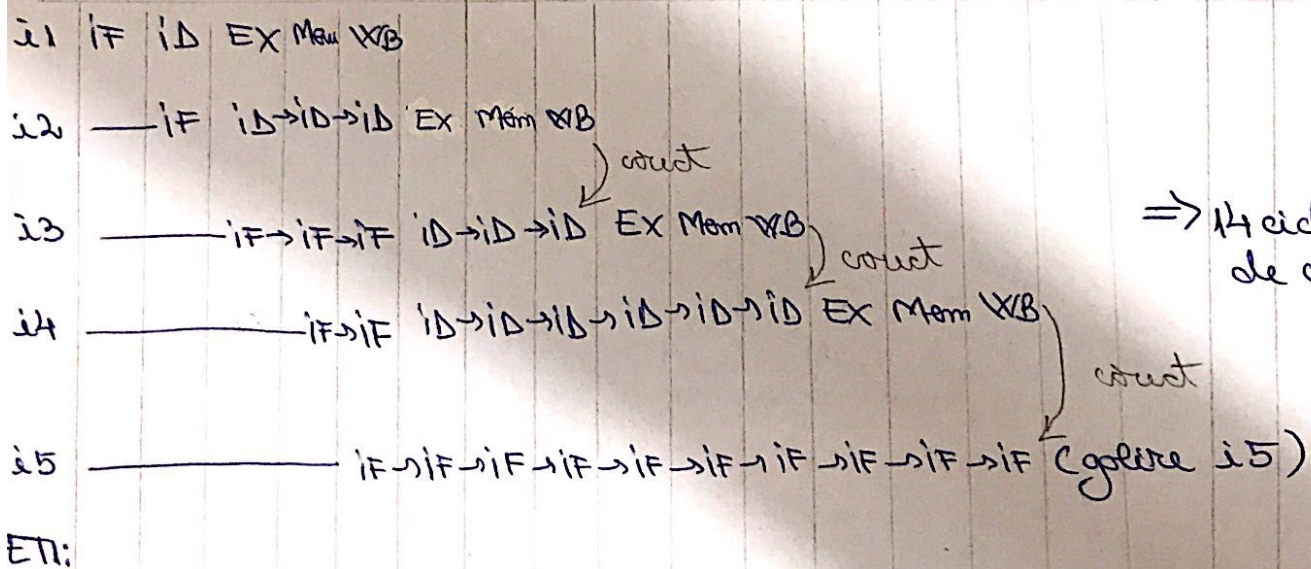


## b) inserare de NOP-uri



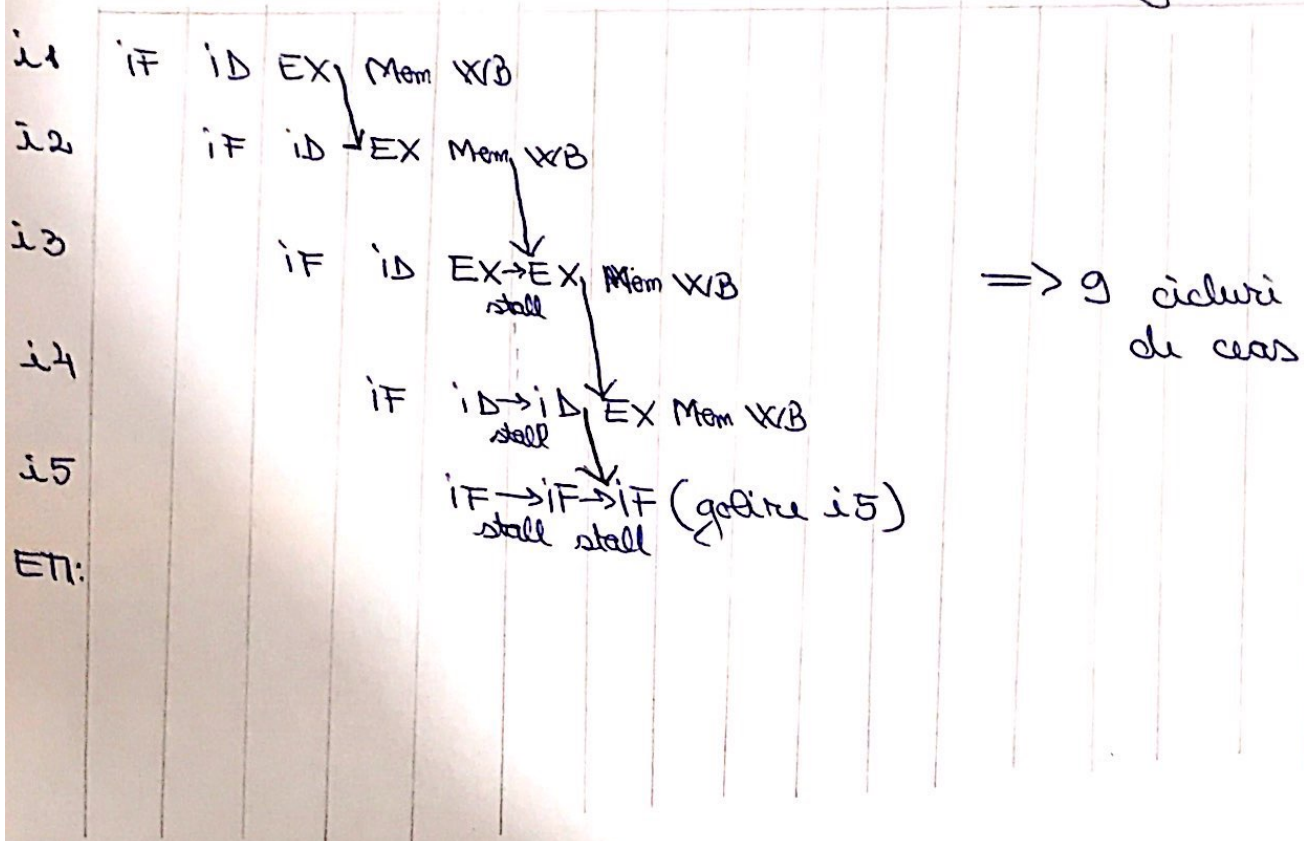
⇒ 17 cicluri de ceas

## c) inserare de STALL-uri



⇒ 14 cicluri de ceas

d) Forwarding + detectie hazarduri + reorganizare cod



Hazard de control:

