(2)

CACHE

C = 64 cuvinte
L = 16 cuvinte | => B = 4 blocuri

→ block offset
→ byte offset

00 = 0.........0_0000_00b => 0h => offset = 6 biți
1700 = 0.........01_1110_00b => 1h
1600 = 0.........01_1100_00b => 1h
1200 = 0.........01_0100_00b => 1h
700 = 0.........0_1110_00b => 0h
10000 = 0.....01000_0000_00b => 8h
2000 = 0.........010_0000_00b => 2h
12000 = 0......01010_0000_00b => Ah
2200 = 0.........010_0100_00b => 2h
1240 = 0......01010_1000_00b => Ah
12600 = 0....01010_1100_00b => Ah
3000 = 0.....0011_0000_00b => 3h
3200 = 0.........011_0100_00b => 3h
11600 = 0.....01001_1100_00b => 9h
540 = 0.........0_1011_00b => 0h
720 = 0.........0_1110_10b => 0h

↓
valori tag

(a)

INSTRUCȚIUNE	HIT / MISS	SET0	SET1	SET2	SET3
LD 00	Miss COMPULSORY	0R	–	–	–
LD 1700	Miss COMPULSORY	0R	1R	–	–
LD 1600	HIT	0R	1R	–	–
ST 00	HIT	0R	1R	–	–
LD 1200	HIT	0R	1R	–	–
LD 700	HIT	0R	1R	–	–
LD 10000	Miss COMPULSORY	8R	1R	–	–
ST 2000	Miss COMPULSORY	8R	1R	2R	–
LD 12000	Miss COMPULSORY	8R	1R	AR	–
ST 1600	HIT	8R	1R	AR	–
LD 2200	Miss COMPULSORY	8R	1R	2R	–
LD 12400	Miss COMPULSORY	8R	1R	AR	–
LD 12600	HIT	8R	1R	AR	–
LD 3000	Miss COMPULSORY	8R	1R	AR	3R
LD 3200	HIT	8R	1R	AR	3R
ST 11600	Miss COMPULSORY	8R	9R	AR	3R
ST 00	Miss CONFLICT	0R	9R	AR	3R
LD 2000	Miss CONFLICT	0R	8R	2R	3R
LD 540	HIT	0R	9R	2R	3R
LD 720	HIT	0R	9R	2R	3R

$MR = \frac{11}{20} =$ 55%

corespondență directă

6.

INSTRUCȚIUNE	HIT / MISS	set 0		set 1	
		Cale 0	Cale 1	Cale 0	Cale 1
LD 0 0	Miss COMPULSORY	0R	–	–	–
LD 1700	Miss COMPULSORY	0R	–	1R	–
LD 1600	HIT	0R	–	1R	–
ST 00	HIT	0R	–	1R	–
LD 1200	HIT	0R	–	1R	–
LD 400	HIT	0R	–	1R	–
LD 10000	Miss COMPULSORY	0R	8R	1R	–
ST 2000	Miss COMPULSORY	2R	8R	1R	–
LD 12000	Miss COMPULSORY	2R	AR	1R	–
ST 1600	HIT	2R	AR	1R	–
LD 2200	HIT	2R	AR	1R	–
LD 12400	HIT	2R	AR	1R	–
LD 12600	HIT	2R	AR	1R	–
LD 3000	Miss COMPULSORY	2R	AR	1R	3R
LD 3200	HIT	2R	AR	1R	3R
ST 11600	Miss COMPULSORY	2R	AR	3R	3R
ST 00	Miss CONFLICT	0R	AR	3R	3R
LD 2000	Miss CONFLICT	0R	2R	3R	3R
LD 540	HIT	0R	2R	3R	3R
LD 720	HIT	0R	2R	3R	3R

$MR = \frac{9}{20} = 45\%$ (mai bună ca la corespondentă directă)

corespondentă set-asociativă

$1 < u < B \Rightarrow u = 2$ grad de asociativitate

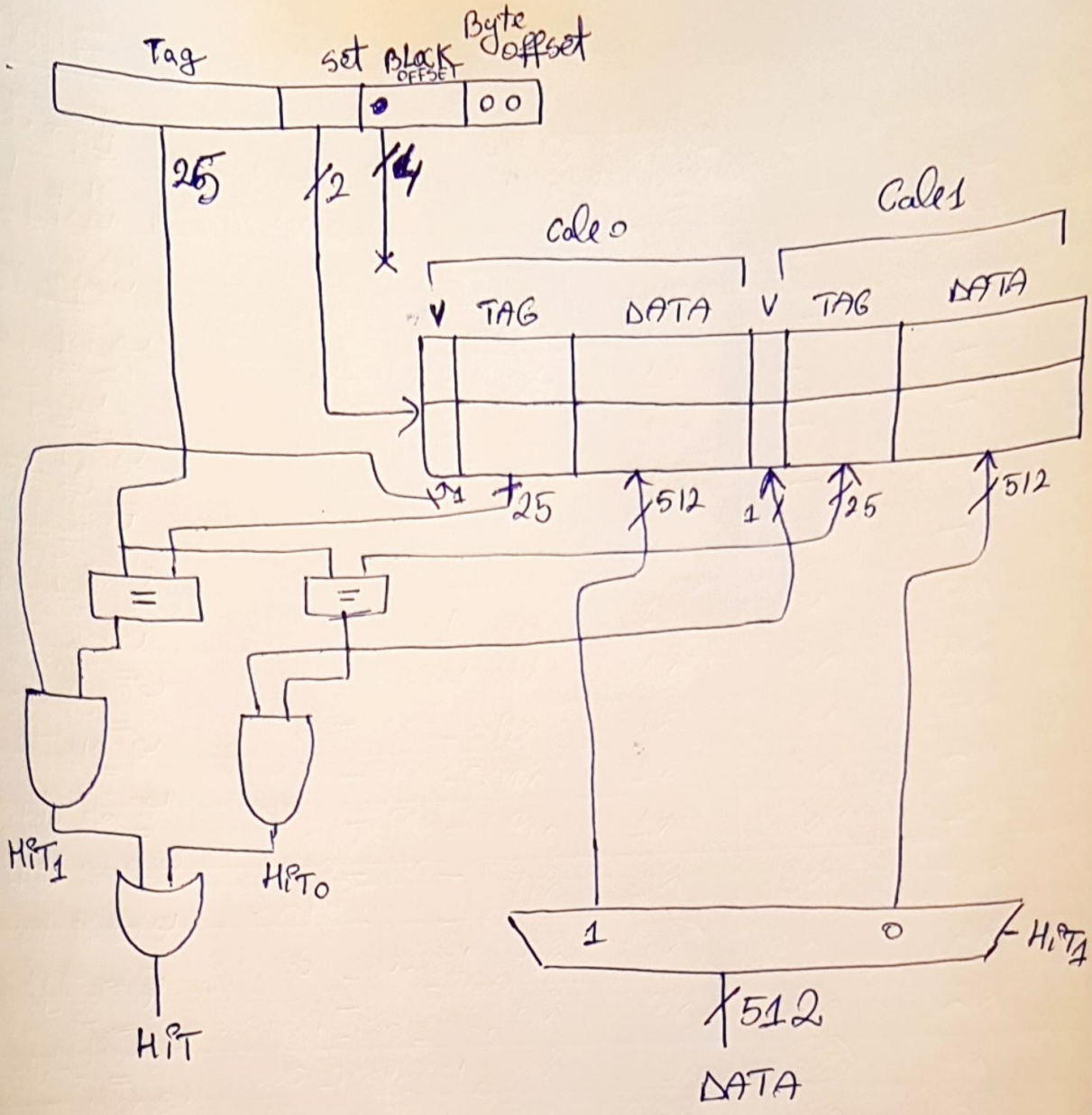
$S = B/u = 4/2 = 2$ seturi cu câte 2 căi

INSTRUCȚIUNE	HIT / MISS	Cale 0	Cale 1	Cale 2	Cale 3
LD 00	MISS COMPULSORY	0R	–	–	–
LD 1700	MISS COMPULSORY	0R	1R	–	–
LD 1600	HIT	0R	1R	–	–
ST 00	HIT	0R	1R	–	–
LD 1200	HIT	0R	1R	–	–
LD 700	HIT	0R	1R	–	–
LD 10000	MISS COMPULSORY	0R	1R	8R	–
ST 2000	MISS COMPULSORY	0R	1R	8R	2R
LD 12000	MISS COMPULSORY	AR	1R	8R	2R
ST 1600	HIT	AR	1R	8R	2R
LD 2200	HIT	AR	1R	8R	2R
LD 12400	HIT	AR	1R	8R	2R
LD 12600	HIT	AR	1R	8R	2R
LD 3000	MISS COMPULSORY	AR	3R	8R	2R
LD 3200	HIT	AR	3R	8R	2R
ST 11600	MISS COMPULSORY	AR	3R	9R	2R
ST 00	MISS CAPACITY	AR	3R	9R	0R
LD 2000	MISS CAPACITY	2R	3R	9R	0R
LD 540	HIT	2R	3R	9R	0R
LD 720	HIT	2R	3R	9R	0R

$MR = \frac{9}{20} = 45\%$ (la fel ca cea set-asociativă)

corespondentă cu plet asociativă
$\Rightarrow m = 4 \Rightarrow S = B/u = 4/4 =$ 1 set cu 4 căi

d)



Fiecare set conține două căi (grade de asociativitate). Fiecare cale conține un bloc de date și biți de validare și de tag. Memoria Cache citește blocuri din ambele căi din setul selectat și verifică tag-ul și biții de validare pentru un HIT. Dacă există în oricare din cele două căi, un multiplexor citește datele din acea cale.