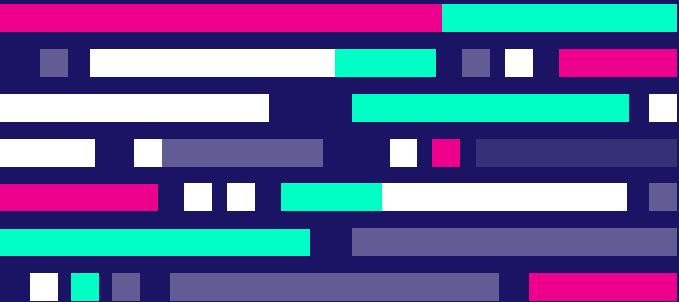


Computer Organization & Architecture



Group members:

Shahad Ahmed Alqarni 2111214

Lameer Mohammed Almoallim 2111368

Shahd Ali Alshikhi 2111228

Mrs.Bashair Alrashed

TABLE OF CONTENTS

01

Simulation Study of Cache
Hit & Miss Ratios

02

Maximum Hit
Ratio

03

Mapping Lines

04

Assembly Language
Program

1

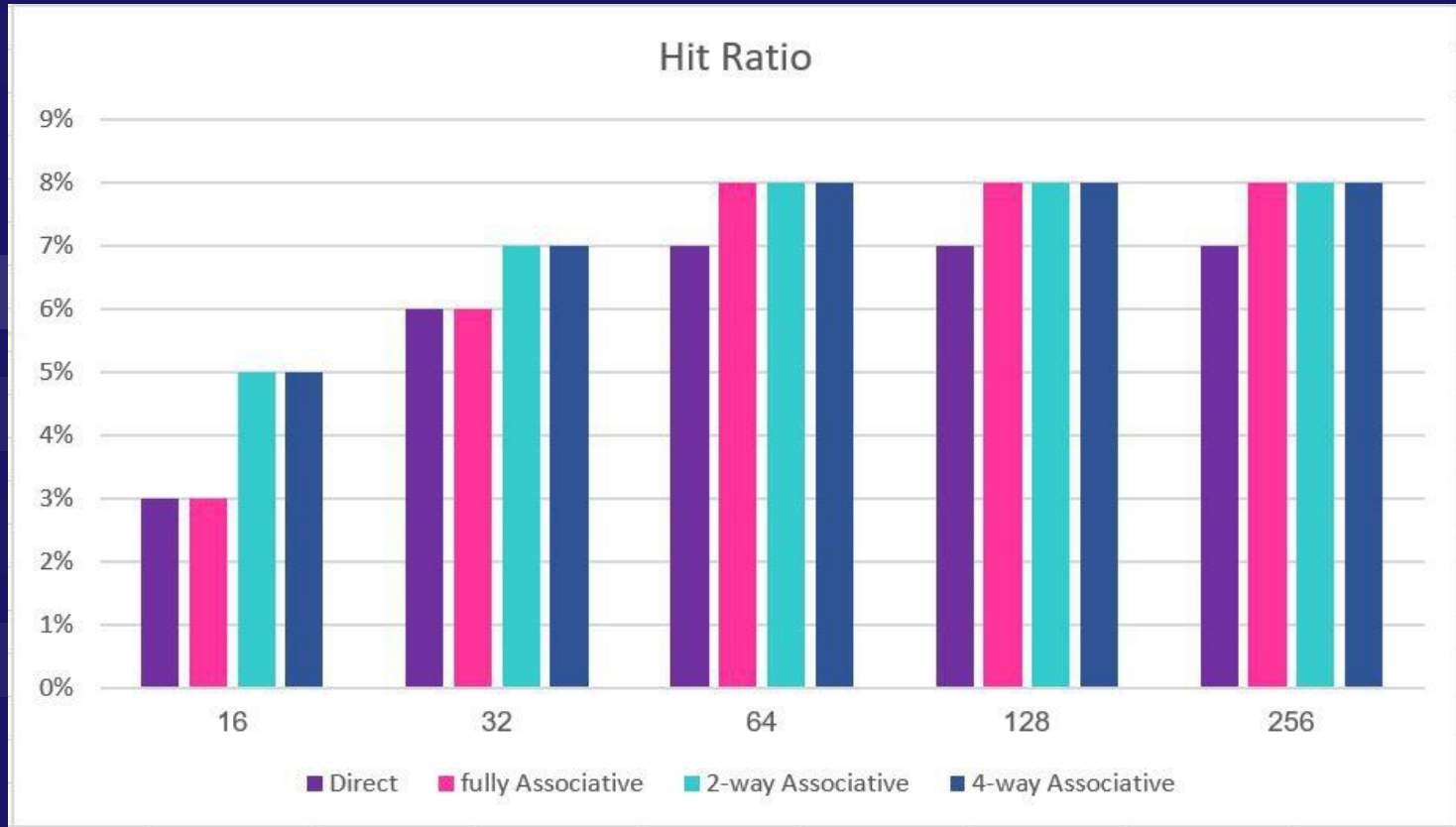
Simulation Study of Cache Hit Ratios

Memory Size (power of 2)

512

Offset Bits

0



1

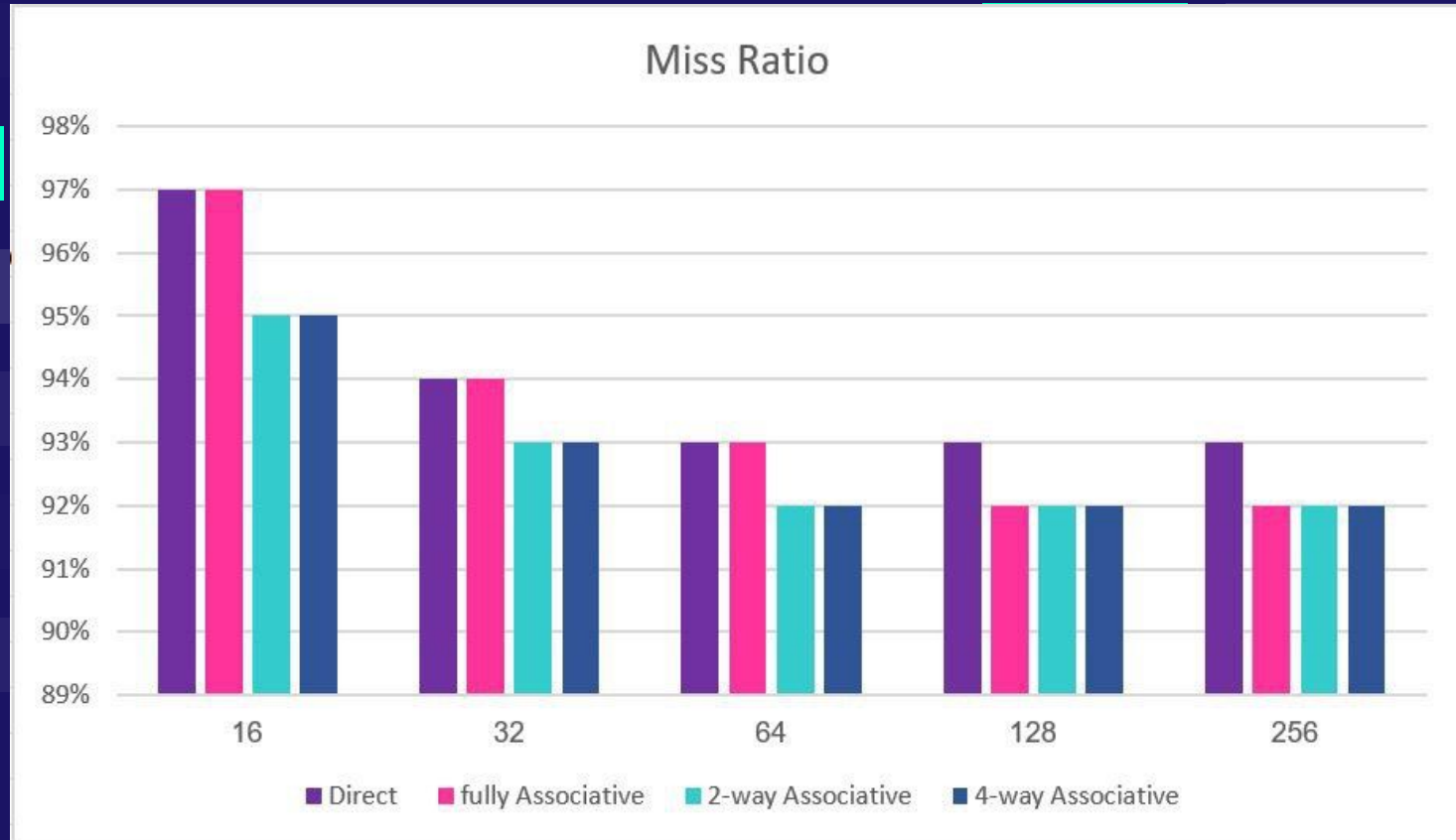
Simulation Study of Cache Miss Ratios

Memory Size (power of 2)

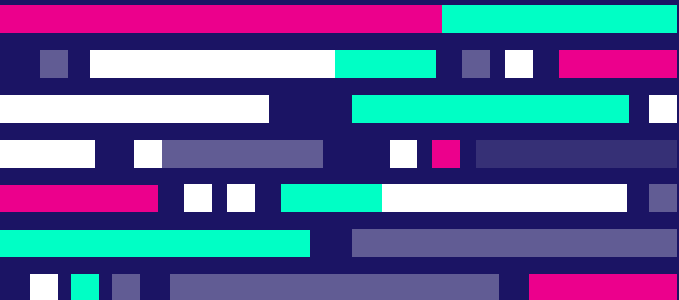
512

Offset Bits

0



2 Maximum Hit Ratio

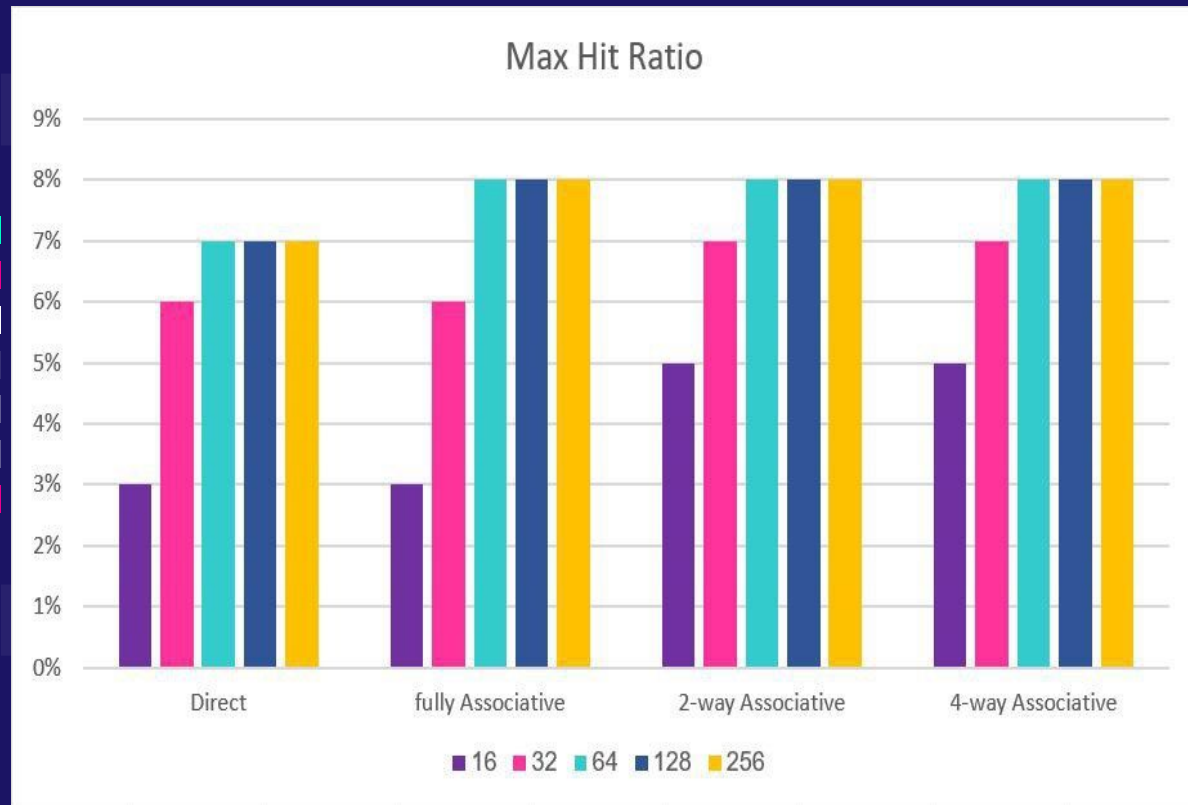


Memory Size (power of 2)

512

Offset Bits

0



3 Mapping Lines

Direct Mapping

Word (0 bits)	Line (4 bits)	Tag (5 bits)
1. Direct Mapped Cache[16] HIT 3% MISS 97% ADD. RESOURCES 1616 NAND		
Instruction Breakdown		
00101	0011	0
5 bit	4 bit	0 bit

#Number of line
 $= 2^r = 2^4 = 16$

#Size of Tag
 $= s - r = 9 - 4 = 5 \text{ bit}$

#Number of bits required for RAM address
 $= s + w ((\text{tag} + r) + \text{word}) = ((5+4) + 0) = 9 \text{ bits}$

#Size of RAM
 $= 2^{w+s} = 2^9 = 512$

3 Mapping Lines

Fully Associative Mapping

Word (0 bits)	Tag (9 bits)
2. Fully Associative Cache[16] HIT 3% MISS 97% ADD. RESOURCES 28256 NAND	
Instruction Breakdown	
001010011	0
9 bit	0 bit

#Number of line undetermined

#Size of Tag
= 9

#Number of bits required for RAM address
= $s + w$ (tag + word) = $(9+0) = 9$ bits

#Size of RAM
= $2^{w+s} = 2^9 = 512$

3 Mapping Lines

2-way Set Associative Mapping

Word (0 bits)	Set (3 bits)	Tag (6 bits)
3. 2-Way Set Associative Cache[8]		
HIT 5% MISS 95% ADD. RESOURCES 2272 NAND		
Instruction Breakdown		
001010	011	0
6 bit	3 bit	0 bit

#Number of line

$$= k * 2^d = 2 * 2^3 = 16$$

#Number of sets

$$= 2^d = 2^3 = 8$$

#Size of Tag

$$= s - d = 9 - 3 = 6 \text{ bit}$$

#Number of bits required for RAM address

$$= s + w ((\text{tag} + d) + \text{word}) = ((6+3) + 0) = 9 \text{ bits}$$

#Size of RAM

$$= 2^{w+s} = 2^9 = 512$$

3 Mapping Lines

4-way Set Associative Mapping

Word (0 bits)	Set (2 bits)	Tag (7 bits)
---------------	--------------	--------------

4. 4-Way Set Associative Cache[4]

HIT 5% MISS 95% || ADD. RESOURCES 3056 NAND

Instruction Breakdown

0010100	11	0
7 bit	2 bit	0 bit

#Number of line

$$= k * 2^d = 4 * 2^2 = 16$$

#Number of sets

$$= 2^d = 2^2 = 4$$

#Size of Tag

$$= s - d = 9 - 2 = 7 \text{ bit}$$

#Number of bits required for RAM address

$$= s + w ((\text{tag} + d) + \text{word}) = ((7+2) + 0) = 9 \text{ bits}$$

#Size of RAM

$$= 2^{w+s} = 2^9 = 512$$

4 Assembly Language Program >>output

The screenshot shows the MARS 4.5 assembly simulator interface. The main window displays the execution output of an assembly program. The output shows three attempts to enter an octal number: 22 (invalid), 123 (valid, decimal 83), and 1234 (invalid). The program includes a reset function and a 'Clear' button. The registers window on the right shows the state of the processor registers, including \$zero, \$at, \$v0, \$v1, \$a0, \$a1, \$a2, \$a3, \$t0, \$t1, \$t2, \$t3, \$t4, \$t5, \$t6, \$t7, \$a0, \$a1, \$a2, \$a3, \$a4, \$a5, \$a6, \$a7, \$a8, \$a9, \$k0, \$k1, \$gp, \$sp, \$ra, \$pc, \$hi, and \$lo.

Mars Messages **Run I/O**

```
Enter Octal Number :22
Number invalid
-- program is finished running --

Reset: reset completed.

Enter Octal Number :123
Octal number in decimal is :83
-- program is finished running --

Reset: reset completed.

Enter Octal Number :1234
Number invalid
-- program is finished running --
```

Registers **Coproc 1** **Coproc 0**

Name	Number	Value
\$zero	0	0x00000000
\$at	1	0x10010000
\$v0	2	0x0000000a
\$v1	3	0x00000000
\$a0	4	0x10010016
\$a1	5	0x00000000
\$a2	6	0x00000000
\$a3	7	0x00000000
\$t0	8	0x000004d2
\$t1	9	0x00000000
\$t2	10	0x00000000
\$t3	11	0x00000000
\$t4	12	0x00000064
\$t5	13	0x0000000a
\$t6	14	0x000003e7
\$t7	15	0x00000000
\$a0	16	0x00000000
\$a1	17	0x00000000
\$a2	18	0x00000000
\$a3	19	0x00000000
\$a4	20	0x00000000
\$a5	21	0x00000000
\$a6	22	0x00000000
\$a7	23	0x00000000
\$a8	24	0x00000000
\$a9	25	0x00000000
\$k0	26	0x00000000
\$k1	27	0x00000000
\$gp	28	0x10000000
\$sp	29	0x7fffffc0
\$fp	30	0x00000000
\$ra	31	0x00000000
\$pc		0x004000e0
\$hi		0x00000000
\$lo		0x00000000

تنشيط Windows
انتقل إلى الإعدادات لتنشيط Windows.



Thank You!

