Trịnh Duy Hưng MSSV: 1913652

Bài 1:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Tag | Index | Offset |
| Directed map | 10 | 14 | 8 |
| 4-way set associative | 12 | 12 | 8 |
| Fully associative | 24 | 0 | 8 |

Bài 2:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Tag | Index | Half-word offset |
| Directed map | 11 | 10 | 7 |
| 4-way set associative | 13 | 8 | 7 |
| Fully associative | 21 | 0 | 7 |

Bài 3:

Hệ thống có 256B caches, 4 words block

=> Index chạy từ 0 tới 15, Tag chạy từ 0 tới 256 / 16 = 16.

Directed map:

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0 | 4 | 1 | 5 | 65 | 1 | 67 | 46 | 1 | 70 | 2 | 0 |
| Tag | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| Index | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 11 | 0 | 1 | 0 | 0 |
| Hit / Miss | M | M | H | H | M | M | M | M | M | M | H | H |

1. way set associative:

=> chỉ còn 1/2 số block, chạy từ 0 tới 7

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0 | 4 | 1 | 5 | 65 | 1 | 67 | 46 | 1 | 70 | 2 | 0 |
| Tag | 0 | 0 | 0 | 0 | 2 | 0 | 2 | 1 | 0 | 2 | 0 | 0 |
| Index | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 0 |
| Hit / Miss | M | M | H | H | M | M | M | M | M | M | H | H |

Fully associative:

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0 | 4 | 1 | 5 | 65 | 1 | 67 | 46 | 1 | 70 | 2 | 0 |
| Tag | 0 | 1 | 0 | 1 | 16 | 0 | 16 | 11 | 0 | 17 | 0 | 0 |
| Hit / Miss | M | M | H | H | M | H | H | M | H | M | H | H |

Bài 4:

Thời gian truy xuất RAM = miss penalty = 10 ns.

1 cycles = 0,5 ns

Hit time = 5 cycles = 0,5 \* 5 = 2,5 ns

Directed map:

AMAT = Hit time + Miss rate \* miss penalty

= 2,5 + (7/12)\*10

= 9,167 (ns)

2-way associative:

AMAT = Hit time + Miss rate \* miss penalty

= 2,5 + (7/12)\*10

= 9,167 (ns)

Fully associative:

AMAT = Hit time + Miss rate \* miss penalty

= 2,5 + (5/12)\*10

= 6,667 (ns)

Bài 5:

Miss rate RAM = 100 - 20 - 10 = 70 %

Thời gian truy xuất vùng nhớ trung bình:

= 10 \* 20% + 15\*10% + 100\*70%

= 73,5 (cycles)

Bài 6:

1. Cache Misses = I-Count×I-Cache Miss Rate

D-Cache Misses = LS-Count×D-Cache Miss Rate.

Base CPI = 1

I-cache misses = 1000\* 5% = 5

D-cache misses = 100 \* 10%\*10% = 1

=>CPI = 7