**Case 1: Direct Mapping Takes More Time**

Welcome to Cache Memory Mapping Simulator

Enter no. of lines in the Cache Memory: 10

Enter Time Required to Read data from Cache: 3

Enter Time Required to Read data from Main Memory: 6

Enter Time Required to Compare data in Cache: 0.2

Enter no. of Sets in Set Associative Mapping: 5

Memory is Restricted from 0 to 99 Blocks Only

Pass input in the given format { Block No. Data(in Numbers only)}

No. of Blocks to be Added: 6

34 56

44 65

67 87

87 67

98 89

88 98

Main Memory Visualization

Block No. Data

34 56

44 65

67 87

87 67

88 98

98 89

Enter no. of Memory calls to be made: 12

Enter Memory read Calls in Order by specifing Block number:

34 88 67 87 44 98 88 67 34 44 87 98

After 34 --> 56

Time taken for the Operation in Direct Mapping = 9

Time taken for the Operation in Associative Mapping = 11.2

Time taken for the Operation in Set Associative Mapping = 9.4

Table

Line no. Direct Associative Set

0 0 56 0

1 0 0 0

2 0 0 0

3 0 0 0

4 56 0 0

5 0 0 0

6 0 0 0

7 0 0 0

8 0 0 56

9 0 0 0

After 88 --> 98

Time taken for the Operation in Direct Mapping = 9

Time taken for the Operation in Associative Mapping = 11.2

Time taken for the Operation in Set Associative Mapping = 9.4

Table

Line no. Direct Associative Set

0 0 56 0

1 0 98 0

2 0 0 0

3 0 0 0

4 56 0 0

5 0 0 0

6 0 0 98

7 0 0 0

8 98 0 56

9 0 0 0

After 67 --> 87

Time taken for the Operation in Direct Mapping = 9

Time taken for the Operation in Associative Mapping = 11.2

Time taken for the Operation in Set Associative Mapping = 9.4

Table

Line no. Direct Associative Set

0 0 56 0

1 0 98 0

2 0 87 0

3 0 0 0

4 56 0 87

5 0 0 0

6 0 0 98

7 87 0 0

8 98 0 56

9 0 0 0

After 87 --> 67

Time taken for the Operation in Direct Mapping = 9

Time taken for the Operation in Associative Mapping = 11.2

Time taken for the Operation in Set Associative Mapping = 9.4

Table

Line no. Direct Associative Set

0 0 56 0

1 0 98 0

2 0 87 0

3 0 67 0

4 56 0 87

5 0 0 67

6 0 0 98

7 67 0 0

8 98 0 56

9 0 0 0

After 44 --> 65

Time taken for the Operation in Direct Mapping = 9

Time taken for the Operation in Associative Mapping = 11.2

Time taken for the Operation in Set Associative Mapping = 9.4

Table

Line no. Direct Associative Set

0 0 56 0

1 0 98 0

2 0 87 0

3 0 67 0

4 65 65 87

5 0 0 67

6 0 0 98

7 67 0 0

8 98 0 56

9 0 0 65

After 98 --> 89

Time taken for the Operation in Direct Mapping = 9

Time taken for the Operation in Associative Mapping = 11.2

Time taken for the Operation in Set Associative Mapping = 9.4

Table

Line no. Direct Associative Set

0 0 56 0

1 0 98 0

2 0 87 0

3 0 67 0

4 65 65 87

5 0 89 67

6 0 0 98

7 67 0 89

8 89 0 56

9 0 0 65

After 88 --> 98

Time taken for the Operation in Direct Mapping = 9

Time taken for the Operation in Associative Mapping = 3.4

Time taken for the Operation in Set Associative Mapping = 3

Table

Line no. Direct Associative Set

0 0 56 0

1 0 98 0

2 0 87 0

3 0 67 0

4 65 65 87

5 0 89 67

6 0 0 98

7 67 0 89

8 98 0 56

9 0 0 65

After 67 --> 87

Time taken for the Operation in Direct Mapping = 9

Time taken for the Operation in Associative Mapping = 3.6

Time taken for the Operation in Set Associative Mapping = 3

Table

Line no. Direct Associative Set

0 0 56 0

1 0 98 0

2 0 87 0

3 0 67 0

4 65 65 87

5 0 89 67

6 0 0 98

7 87 0 89

8 98 0 56

9 0 0 65

After 34 --> 56

Time taken for the Operation in Direct Mapping = 9

Time taken for the Operation in Associative Mapping = 3.2

Time taken for the Operation in Set Associative Mapping = 3

Table

Line no. Direct Associative Set

0 0 56 0

1 0 98 0

2 0 87 0

3 0 67 0

4 56 65 87

5 0 89 67

6 0 0 98

7 87 0 89

8 98 0 56

9 0 0 65

After 44 --> 65

Time taken for the Operation in Direct Mapping = 9

Time taken for the Operation in Associative Mapping = 4

Time taken for the Operation in Set Associative Mapping = 3.2

Table

Line no. Direct Associative Set

0 0 56 0

1 0 98 0

2 0 87 0

3 0 67 0

4 65 65 87

5 0 89 67

6 0 0 98

7 87 0 89

8 98 0 56

9 0 0 65

After 87 --> 67

Time taken for the Operation in Direct Mapping = 9

Time taken for the Operation in Associative Mapping = 3.8

Time taken for the Operation in Set Associative Mapping = 3.2

Table

Line no. Direct Associative Set

0 0 56 0

1 0 98 0

2 0 87 0

3 0 67 0

4 65 65 87

5 0 89 67

6 0 0 98

7 67 0 89

8 98 0 56

9 0 0 65

After 98 --> 89

Time taken for the Operation in Direct Mapping = 9

Time taken for the Operation in Associative Mapping = 4.2

Time taken for the Operation in Set Associative Mapping = 3.2

Table

Line no. Direct Associative Set

0 0 56 0

1 0 98 0

2 0 87 0

3 0 67 0

4 65 65 87

5 0 89 67

6 0 0 98

7 67 0 89

8 89 0 56

9 0 0 65

Comparison

Direct Associative Set Associative

Time 108 92.4 82.8

Hit 0 6 6

miss 12 6 6

**Case 2: Set Associative Takes Minimum Time**

Memory is Restricted from 0 to 99 Blocks Only

Pass input in the given format { Block No. Data(in Numbers only)}

No. of Blocks to be Added: 6

34 56

45 67

68 77

23 43

17 86

87 76

Main Memory Visualization

Block No. Data

17 86

23 43

34 56

45 67

68 77

87 76

Enter no. of Memory calls to be made: 12

Enter Memory read Calls in Order by specifing Block number:

17 34 68 87 45 23 68 87 34 23 17 45

After 17 --> 86

Time taken for the Operation in Direct Mapping = 9

Time taken for the Operation in Associative Mapping = 11.6

Time taken for the Operation in Set Associative Mapping = 9.4

Table

Line no. Direct Associative Set

0 0 86 0

1 0 0 0

2 0 0 0

3 0 0 0

4 0 0 0

5 86 0 0

6 0 0 0

7 0 0 0

8 0 0 0

9 0 0 0

10 0 0 86

11 0 0 0

After 34 --> 56

Time taken for the Operation in Direct Mapping = 9

Time taken for the Operation in Associative Mapping = 11.6

Time taken for the Operation in Set Associative Mapping = 9.4

Table

Line no. Direct Associative Set

0 0 86 0

1 0 56 0

2 0 0 0

3 0 0 0

4 0 0 0

5 86 0 0

6 0 0 0

7 0 0 0

8 0 0 56

9 0 0 0

10 56 0 86

11 0 0 0

After 68 --> 77

Time taken for the Operation in Direct Mapping = 9

Time taken for the Operation in Associative Mapping = 11.6

Time taken for the Operation in Set Associative Mapping = 9.4

Table

Line no. Direct Associative Set

0 0 86 0

1 0 56 0

2 0 77 0

3 0 0 0

4 0 0 77

5 86 0 0

6 0 0 0

7 0 0 0

8 77 0 56

9 0 0 0

10 56 0 86

11 0 0 0

After 87 --> 76

Time taken for the Operation in Direct Mapping = 9

Time taken for the Operation in Associative Mapping = 11.6

Time taken for the Operation in Set Associative Mapping = 9.4

Table

Line no. Direct Associative Set

0 0 86 0

1 0 56 0

2 0 77 0

3 76 76 0

4 0 0 77

5 86 0 0

6 0 0 76

7 0 0 0

8 77 0 56

9 0 0 0

10 56 0 86

11 0 0 0

After 45 --> 67

Time taken for the Operation in Direct Mapping = 9

Time taken for the Operation in Associative Mapping = 11.6

Time taken for the Operation in Set Associative Mapping = 9.4

Table

Line no. Direct Associative Set

0 0 86 0

1 0 56 0

2 0 77 0

3 76 76 0

4 0 67 77

5 86 0 0

6 0 0 76

7 0 0 67

8 77 0 56

9 67 0 0

10 56 0 86

11 0 0 0

After 23 --> 43

Time taken for the Operation in Direct Mapping = 9

Time taken for the Operation in Associative Mapping = 11.6

Time taken for the Operation in Set Associative Mapping = 9.4

Table

Line no. Direct Associative Set

0 0 86 0

1 0 56 0

2 0 77 0

3 76 76 0

4 0 67 77

5 86 43 0

6 0 0 76

7 0 0 67

8 77 0 56

9 67 0 0

10 56 0 86

11 43 0 43

After 68 --> 77

Time taken for the Operation in Direct Mapping = 3

Time taken for the Operation in Associative Mapping = 3.6

Time taken for the Operation in Set Associative Mapping = 3

Table

Line no. Direct Associative Set

0 0 86 0

1 0 56 0

2 0 77 0

3 76 76 0

4 0 67 77

5 86 43 0

6 0 0 76

7 0 0 67

8 77 0 56

9 67 0 0

10 56 0 86

11 43 0 43

After 87 --> 76

Time taken for the Operation in Direct Mapping = 3

Time taken for the Operation in Associative Mapping = 3.8

Time taken for the Operation in Set Associative Mapping = 3

Table

Line no. Direct Associative Set

0 0 86 0

1 0 56 0

2 0 77 0

3 76 76 0

4 0 67 77

5 86 43 0

6 0 0 76

7 0 0 67

8 77 0 56

9 67 0 0

10 56 0 86

11 43 0 43

After 34 --> 56

Time taken for the Operation in Direct Mapping = 3

Time taken for the Operation in Associative Mapping = 3.4

Time taken for the Operation in Set Associative Mapping = 3

Table

Line no. Direct Associative Set

0 0 86 0

1 0 56 0

2 0 77 0

3 76 76 0

4 0 67 77

5 86 43 0

6 0 0 76

7 0 0 67

8 77 0 56

9 67 0 0

10 56 0 86

11 43 0 43

After 23 --> 43

Time taken for the Operation in Direct Mapping = 3

Time taken for the Operation in Associative Mapping = 4.2

Time taken for the Operation in Set Associative Mapping = 3.2

Table

Line no. Direct Associative Set

0 0 86 0

1 0 56 0

2 0 77 0

3 76 76 0

4 0 67 77

5 86 43 0

6 0 0 76

7 0 0 67

8 77 0 56

9 67 0 0

10 56 0 86

11 43 0 43

After 17 --> 86

Time taken for the Operation in Direct Mapping = 3

Time taken for the Operation in Associative Mapping = 3.2

Time taken for the Operation in Set Associative Mapping = 3

Table

Line no. Direct Associative Set

0 0 86 0

1 0 56 0

2 0 77 0

3 76 76 0

4 0 67 77

5 86 43 0

6 0 0 76

7 0 0 67

8 77 0 56

9 67 0 0

10 56 0 86

11 43 0 43

After 45 --> 67

Time taken for the Operation in Direct Mapping = 3

Time taken for the Operation in Associative Mapping = 4

Time taken for the Operation in Set Associative Mapping = 3.2

Table

Line no. Direct Associative Set

0 0 86 0

1 0 56 0

2 0 77 0

3 76 76 0

4 0 67 77

5 86 43 0

6 0 0 76

7 0 0 67

8 77 0 56

9 67 0 0

10 56 0 86

11 43 0 43

Comparison

Direct Associative Set Associative

Time 72 94.8 84

Hit 6 6 6

miss 6 6 6

**Case 3: Direct Mapping Takes Minimum Time**

Memory is Restricted from 0 to 99 Blocks Only

Pass input in the given format { Block No. Data(in Numbers only)}

No. of Blocks to be Added: 6

23 45

34 67

46 75

58 73

69 98

72 87

Main Memory Visualization

Block No. Data

23 45

34 67

46 75

58 73

69 98

72 87

Enter no. of Memory calls to be made: 8

Enter Memory read Calls in Order by specifing Block number:

23 34 46 58 69 72 23 34

After 23 --> 45

Time taken for the Operation in Direct Mapping = 9

Time taken for the Operation in Associative Mapping = 11.6

Time taken for the Operation in Set Associative Mapping = 9.8

Table

Line no. Direct Associative Set

0 0 45 0

1 0 0 0

2 0 0 0

3 0 0 0

4 0 0 0

5 0 0 0

6 0 0 0

7 0 0 0

8 0 0 45

9 0 0 0

10 0 0 0

11 45 0 0

After 34 --> 67

Time taken for the Operation in Direct Mapping = 9

Time taken for the Operation in Associative Mapping = 11.6

Time taken for the Operation in Set Associative Mapping = 9.8

Table

Line no. Direct Associative Set

0 0 45 0

1 0 67 0

2 0 0 0

3 0 0 0

4 0 0 67

5 0 0 0

6 0 0 0

7 0 0 0

8 0 0 45

9 0 0 0

10 67 0 0

11 45 0 0

After 46 --> 75

Time taken for the Operation in Direct Mapping = 9

Time taken for the Operation in Associative Mapping = 11.6

Time taken for the Operation in Set Associative Mapping = 9.8

Table

Line no. Direct Associative Set

0 0 45 0

1 0 67 0

2 0 75 0

3 0 0 0

4 0 0 67

5 0 0 75

6 0 0 0

7 0 0 0

8 0 0 45

9 0 0 0

10 75 0 0

11 45 0 0

After 58 --> 73

Time taken for the Operation in Direct Mapping = 9

Time taken for the Operation in Associative Mapping = 11.6

Time taken for the Operation in Set Associative Mapping = 9.8

Table

Line no. Direct Associative Set

0 0 45 0

1 0 67 0

2 0 75 0

3 0 73 0

4 0 0 67

5 0 0 75

6 0 0 73

7 0 0 0

8 0 0 45

9 0 0 0

10 73 0 0

11 45 0 0

After 69 --> 98

Time taken for the Operation in Direct Mapping = 9

Time taken for the Operation in Associative Mapping = 11.6

Time taken for the Operation in Set Associative Mapping = 9.8

Table

Line no. Direct Associative Set

0 0 45 98

1 0 67 0

2 0 75 0

3 0 73 0

4 0 98 67

5 0 0 75

6 0 0 73

7 0 0 0

8 0 0 45

9 98 0 0

10 73 0 0

11 45 0 0

After 72 --> 87

Time taken for the Operation in Direct Mapping = 9

Time taken for the Operation in Associative Mapping = 11.6

Time taken for the Operation in Set Associative Mapping = 9.8

Table

Line no. Direct Associative Set

0 87 45 98

1 0 67 87

2 0 75 0

3 0 73 0

4 0 98 67

5 0 87 75

6 0 0 73

7 0 0 0

8 0 0 45

9 98 0 0

10 73 0 0

11 45 0 0

After 23 --> 45

Time taken for the Operation in Direct Mapping = 3

Time taken for the Operation in Associative Mapping = 3.2

Time taken for the Operation in Set Associative Mapping = 3

Table

Line no. Direct Associative Set

0 87 45 98

1 0 67 87

2 0 75 0

3 0 73 0

4 0 98 67

5 0 87 75

6 0 0 73

7 0 0 0

8 0 0 45

9 98 0 0

10 73 0 0

11 45 0 0

After 34 --> 67

Time taken for the Operation in Direct Mapping = 9

Time taken for the Operation in Associative Mapping = 3.4

Time taken for the Operation in Set Associative Mapping = 3

Table

Line no. Direct Associative Set

0 87 45 98

1 0 67 87

2 0 75 0

3 0 73 0

4 0 98 67

5 0 87 75

6 0 0 73

7 0 0 0

8 0 0 45

9 98 0 0

10 67 0 0

11 45 0 0

Comparison

Direct Associative Set Associative

Time 66 79.2 69.6

Hit 1 2 2

miss 7 6 6