Advanced Computer Architecture

Assignment 6

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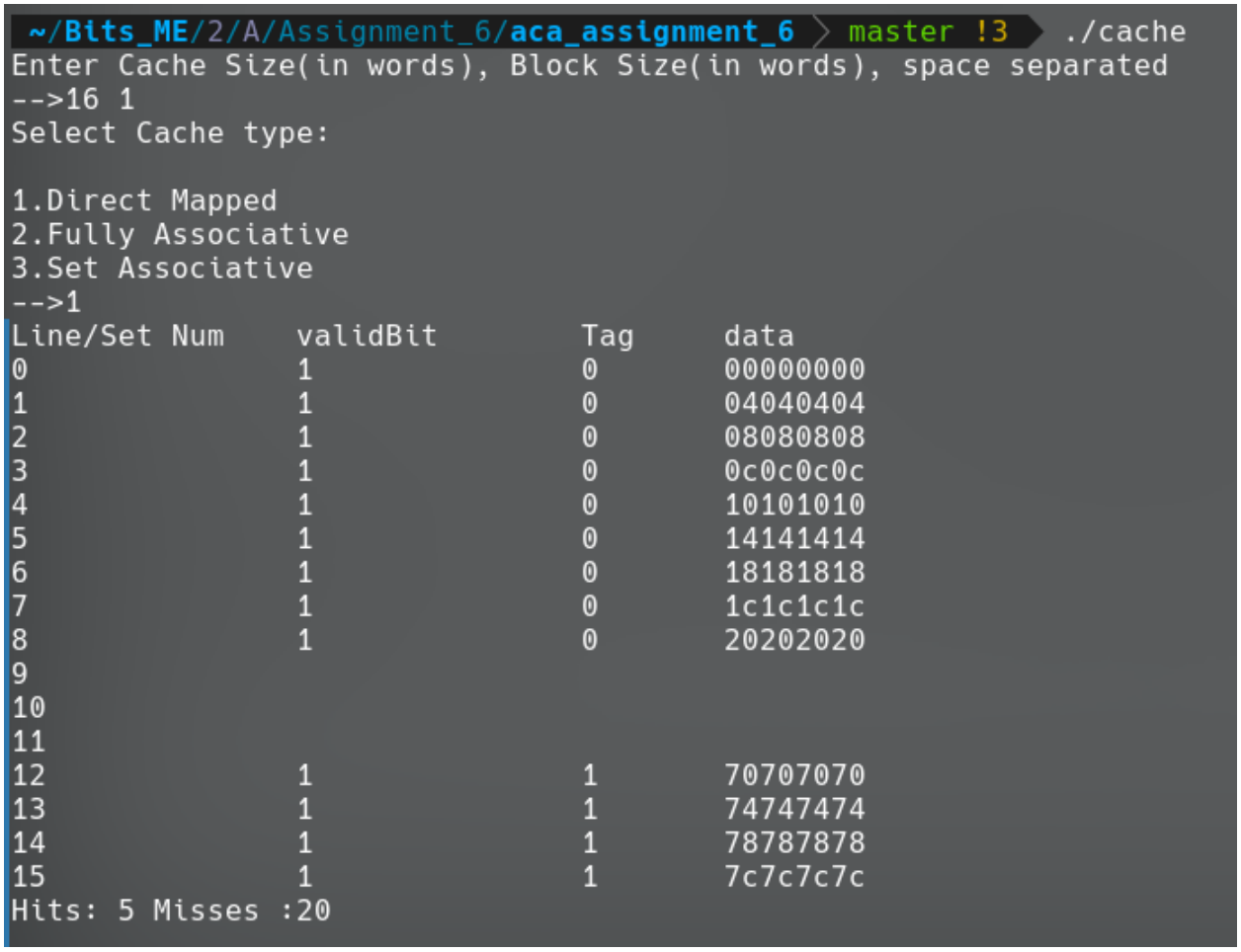
Cache size = 16-words		
Cache Organisation	Miss Rate	
	Block=1-word	Block=2-word
Direct	79.80%	39.90%

Cache size = 16-words				
Cache Organisation	Replacement Policy			
	FIFO		LRU	
	Miss Rate			
	Block=1-word	Block=2-word	Block=1-word	Block=2-word
Fully Associative	99.75%	51.87%	99.75%	51.87%
2-way Associative	99.75%	51.87%	97.75%	51.87%
4-way Associative	99.75%	51.87%	99.75%	51.87%

Cache state after 2nd iteration:

- Direct Mapping,
    - Block size: 1-word

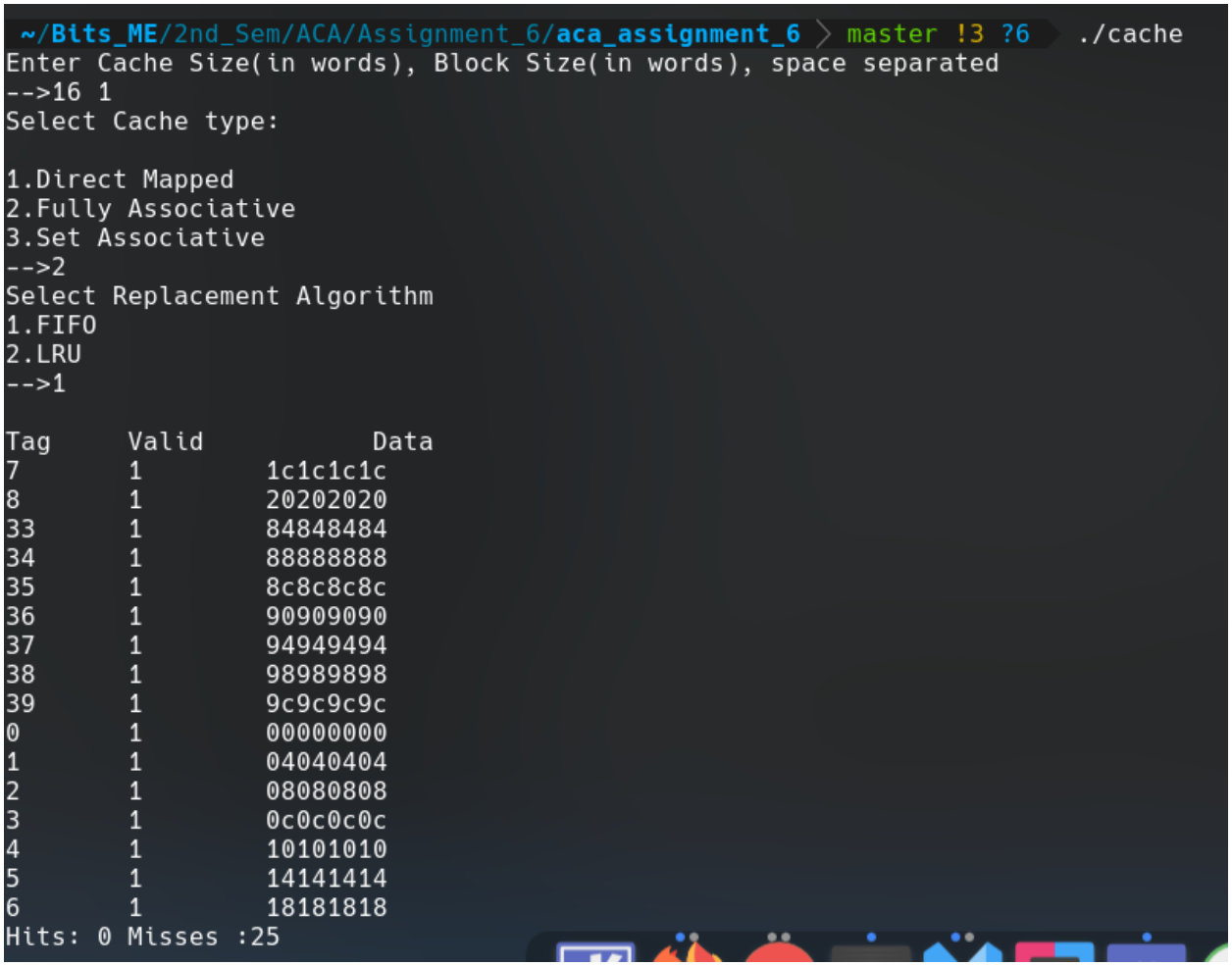


```
~/Bits_ME/2/A/Assignment_6/aca_assignment_6 master !3 ./cache
Enter Cache Size(in words), Block Size(in words), space separated
-->16 1
Select Cache type:

1.Direct Mapped
2.Fully Associative
3.Set Associative
-->1
Line/Set Num    validBit        Tag     data
0               1               0       00000000
1               1               0       04040404
2               1               0       08080808
3               1               0       0c0c0c0c
4               1               0       10101010
5               1               0       14141414
6               1               0       18181818
7               1               0       1c1c1c1c
8               1               0       20202020
9
10
11
12              1               1       70707070
13              1               1       74747474
14              1               1       78787878
15              1               1       7c7c7c7c
Hits: 5 Misses :20
```

- Block Size: 2-word

```
~/Bits_ME/2/A/Assignment_6/aca_assignment_6 master !3 ./cache
Enter Cache Size(in words), Block Size(in words), space separated
-->16 2
Select Cache type:

1.Direct Mapped
2.Fully Associative
3.Set Associative
-->1
Line/Set Num    validBit        Tag     data
0               1               0       00000000  04040404
1               1               0       08080808  0c0c0c0c
2               1               0       10101010  14141414
3               1               0       18181818  1c1c1c1c
4               1               0       20202020  24242424
5
6               1               1       70707070  74747474
7               1               1       78787878  7c7c7c7c
Hits: 15 Misses :10
```

- Fully Associative
    - FIFO
        - Block size: 1 -word



- Block size: 2 -word

```
~/Bits_ME/2nd_Sem/ACA/Assignment_6/aca_assignment_6 master !3 ?6 ./cache
Enter Cache Size(in words), Block Size(in words), space separated
-->16 2
Select Cache type:

1.Direct Mapped
2.Fully Associative
3.Set Associative
-->2
Select Replacement Algorithm
1.FIFO
2.LRU
-->1

Tag     Valid           Data
3       1       18181818  1c1c1c1c
4       1       20202020  24242424
17      1       88888888  8c8c8c8c
18      1       90909090  94949494
19      1       98989898  9c9c9c9c
0       1       00000000  04040404
1       1       08080808  0c0c0c0c
2       1       10101010  14141414
Hits: 0 Misses :13
```

- LRU
  - Block size: 1 -word

```
~/Bits_ME/2/A/Assignment_6/aca_assignment_6 master !4 ./cache
Enter Cache Size(in words), Block Size(in words), space separated
-->16 1
Select Cache type:

1.Direct Mapped
2.Fully Associative
3.Set Associative
-->2
Select Replacement Algorithm
1.FIFO
2.LRU
-->2
Line/Set Num    validBit        Tag     data
0               1               0       00000000
1               1               1       04040404
2               1               2       08080808
3               1               3       0c0c0c0c
4               1               4       10101010
5               1               5       14141414
6               1               6       18181818
7               1               7       1c1c1c1c
8               1               8       20202020
9               1               33      84848484
10              1               34      88888888
11              1               35      8c8c8c8c
12              1               36      90909090
13              1               37      94949494
14              1               38      98989898
15              1               39      9c9c9c9c
Hits: 0 Misses :25
```

- Block size: 2 -word

```
~/Bits_ME/2/A/Assignment_6/aca_assignment_6 master !4 ./cache
Enter Cache Size(in words), Block Size(in words), space separated
-->16 2
Select Cache type:

1.Direct Mapped
2.Fully Associative
3.Set Associative
-->2
Select Replacement Algorithm
1.FIFO
2.LRU
-->2
Line/Set Num    validBit        Tag     data
0               1               0       00000000  04040404
1               1               1       08080808  0c0c0c0c
2               1               2       10101010  14141414
3               1               3       18181818  1c1c1c1c
4               1               4       20202020  24242424
5               1               17      88888888  8c8c8c8c
6               1               18      90909090  94949494
7               1               19      98989898  9c9c9c9c
Hits: 12 Misses :13
```

- Set Associative
    - FIFO
        - 2-way
            - Block size: 1 -word

```
~/Bits_ME/2nd_Sem/ACA/Assignment_6/aca_assignment_6 > master !3 ?6 ./cache
Enter Cache Size(in words), Block Size(in words), space separated
-->16 1
Select Cache type:

1.Direct Mapped
2.Fully Associative
3.Set Associative
-->3
Select Replacement Algorithm
1.FIFO
2.LRU
-->1
Enter the number of Ways
-->2
Line/Set Num    validBit        Tag     data
0                 1             0       00000000
0                 1             1       20202020
1                 1             4       84848484
1                 1             0       04040404
2                 1             4       88888888
2                 1             0       08080808
3                 1             4       8c8c8c8c
3                 1             0       0c0c0c0c
4                 1             4       90909090
4                 1             0       10101010
5                 1             4       94949494
5                 1             0       14141414
6                 1             4       98989898
6                 1             0       18181818
7                 1             4       9c9c9c9c
7                 1             0       1c1c1c1c
Hits: 0 Misses :25
```

- Block size: 2 -word

```
~/Bits_ME/2nd_Sem/ACA/Assignment_6/aca_assignment_6 master !3 ?7 ./cache
Enter Cache Size(in words), Block Size(in words), space separated
-->16 2
Select Cache type:

1.Direct Mapped
2.Fully Associative
3.Set Associative
-->3
Select Replacement Algorithm
1.FIFO
2.LRU
-->1
Enter the number of Ways
-->2
Line/Set Num    validBit        Tag     data
0                 1             0       00000000  04040404
0                 1             1       20202020  24242424
1                 1             4       88888888  8c8c8c8c
1                 1             0       08080808  0c0c0c0c
2                 1             4       90909090  94949494
2                 1             0       10101010  14141414
3                 1             4       98989898  9c9c9c9c
3                 1             0       18181818  1c1c1c1c
Hits: 12 Misses :13
```

- 4-way
  - Block size: 1 -word

```
~/Bits_ME/2nd_Sem/ACA/Assignment_6/aca_assignment_6 > master !3 ?7  ./cache
Enter Cache Size(in words), Block Size(in words), space separated
-->16 1
Select Cache type:

1.Direct Mapped
2.Fully Associative
3.Set Associative
-->3
Select Replacement Algorithm
1.FIFO
2.LRU
-->1
Enter the number of Ways
-->4
Line/Set Num    validBit        Tag     data
0                 1             9       90909090
0                 1             0       00000000
0                 1             1       10101010
0                 1             2       20202020
1                 1             8       84848484
1                 1             9       94949494
1                 1             0       04040404
1                 1             1       14141414
2                 1             8       88888888
2                 1             9       98989898
2                 1             0       08080808
2                 1             1       18181818
3                 1             8       8c8c8c8c
3                 1             9       9c9c9c9c
3                 1             0       0c0c0c0c
3                 1             1       1c1c1c1c
Hits: 0 Misses :25
```

- Block size: 2 -word

```
~/Bits_ME/2nd_Sem/ACA/Assignment_6/aca_assignment_6 > master !3 ?7  ./cache
Enter Cache Size(in words), Block Size(in words), space separated
-->16 2
Select Cache type:

1.Direct Mapped
2.Fully Associative
3.Set Associative
-->3
Select Replacement Algorithm
1.FIFO
2.LRU
-->1
Enter the number of Ways
-->4
Line/Set Num    validBit        Tag     data
0                 1             9       90909090  94949494
0                 1             0       00000000  04040404
0                 1             1       10101010  14141414
0                 1             2       20202020  24242424
1                 1             8       88888888  8c8c8c8c
1                 1             9       98989898  9c9c9c9c
1                 1             0       08080808  0c0c0c0c
1                 1             1       18181818  1c1c1c1c
Hits: 12 Misses :13
```

- LRU
  - 2-way
    - Block size: 1 -word

```
~/Bits_ME/2/A/Assignment_6/aca_assignment_6 master !4 ./cache
Enter Cache Size(in words), Block Size(in words), space separated
-->16 1
Select Cache type:

1.Direct Mapped
2.Fully Associative
3.Set Associative
-->3
Select Replacement Algorithm
1.FIFO
2.LRU
-->2
Enter the number of Ways
-->2
num sets :8
Line/Set Num    validBit        Tag     data
0               1               1       20202020
0               1               0       00000000
1               1               0       04040404
1               1               4       84848484
2               1               0       08080808
2               1               4       88888888
3               1               0       0c0c0c0c
3               1               4       8c8c8c8c
4               1               0       10101010
4               1               4       90909090
5               1               0       14141414
5               1               4       94949494
6               1               0       18181818
6               1               4       98989898
7               1               0       1c1c1c1c
7               1               4       9c9c9c9c
Hits: 0 Misses :25
```

- Block size: 2 -word

```
~/Bits_ME/2/A/Assignment_6/aca_assignment_6 master !4 ./cache
Enter Cache Size(in words), Block Size(in words), space separated
-->16 2
Select Cache type:

1.Direct Mapped
2.Fully Associative
3.Set Associative
-->3
Select Replacement Algorithm
1.FIFO
2.LRU
-->2
Enter the number of Ways
-->2
num sets :4
Line/Set Num    validBit        Tag     data
0               1               1       20202020  24242424
0               1               0       04040404  08080808
1               1               0       0c0c0c0c  10101010
1               1               4       8c8c8c8c  90909090
2               1               0       14141414  18181818
2               1               4       94949494  98989898
3               1               0       1c1c1c1c  20202020
3               1               4       9c9c9c9c  a0a0a0a0
Hits: 12 Misses :13
```

- 4-way
  - Block size: 1 -word

```
~/Bits_ME/2/A/Assignment_6/aca_assignment_6 > master !4 ./cache
Enter Cache Size(in words), Block Size(in words), space separated
-->16 1
Select Cache type:

1.Direct Mapped
2.Fully Associative
3.Set Associative
-->3
Select Replacement Algorithm
1.FIFO
2.LRU
-->2
Enter the number of Ways
-->4
num sets :4
Line/Set Num    validBit        Tag     data
0               1               2       20202020
0               1               1       10101010
0               1               0       00000000
0               1               9       90909090
1               1               1       14141414
1               1               0       04040404
1               1               9       94949494
1               1               8       84848484
2               1               1       18181818
2               1               0       08080808
2               1               9       98989898
2               1               8       88888888
3               1               1       1c1c1c1c
3               1               0       0c0c0c0c
3               1               9       9c9c9c9c
3               1               8       8c8c8c8c
Hits: 0 Misses :25
```

- Block size: 2 -word

```
~/Bits_ME/2/A/Assignment_6/aca_assignment_6 master !4 ./cache
Enter Cache Size(in words), Block Size(in words), space separated
-->16 2
Select Cache type:

1.Direct Mapped
2.Fully Associative
3.Set Associative
-->3
Select Replacement Algorithm
1.FIFO
2.LRU
-->2
Enter the number of Ways
-->4
num sets :2
Line/Set Num    validBit        Tag     data
0               1               2       20202020  24242424
0               1               1       14141414  18181818
0               1               0       04040404  08080808
0               1               9       94949494  98989898
1               1               1       1c1c1c1c  20202020
1               1               0       0c0c0c0c  10101010
1               1               9       9c9c9c9c  a0a0a0a0
1               1               8       8c8c8c8c  90909090
Hits: 12 Misses :13
```