CS3021 Computer Architecture II - Tutorial 6

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1&2) Cache Hits / Misses

i) 128 Bytes 1-way direct mapped cache with 16 bytes per line

```
CACHE PARAMETERS
-----
L (Bytes per cache line) -> 16
K (Cache lines per set) -> 1
N (Number of sets) -> 8
N (Number of sets)
           CACHE INFORMATION
------
Cache Size -> 128
Set Selector Length (Bits) -> 3
   HEX | TAG BITS | DATA | OFFSET | RESULT
 0x0000 | 000000000 | 000 | 0x0004 | 000000000 | 000 |
                                0000
                                        MISS
                                0100
                                        HIT
           000000000
  0x000c
                       000
                                1100
                                        HIT
  0x2200
           001000100
                       000
                                0000
                                        MISS
  0x00d0
           000000001
                       101
                                0000
                                        MISS
  0x00e0
           000000001
                       110
                                0000
                                        MISS
  0x1130
           000100010
                       011
                                0000
                                        MISS
                       010
                                        MISS
  0x0028
                                1000
           000000000
  0x113c
           000100010
                       011
                                1100
                                        HIT
                       000
  0x2204
           001000100
                                0100
                                        HIT
  0x0010
           000000000
                       001
                                0000
                                        MISS
  0x0020
           000000000
                       010
                                0000
                                        HIT
  0x0004
           000000000
                       000
                                0100
                                        MISS
  0x0040
           000000000
                       100
                                0000
                                        MISS
  0x2208
           001000100
                       000
                                1000
                                        MISS
  0x0008
           000000000
                       000
                                1000
                                        MISS
  0x00a0
           000000001
                       010
                                0000
                                        MISS
  0x0004
           000000000
                       000
                                0100
                                        HIT
           000100010
                       000
                                0100
                                        MISS
  0x1104
  0x0028
           000000000
                       010
                                1000
                                        MISS
                       000
  0x000c
           000000000
                                1100
                                        MISS
                       000
  0x0084
           000000001
                                0100
                                        MISS
  0x000c
           000000000
                       000
                                1100
                                        MISS
                                        MISS
  0x3390
           001100111
                       001
                                0000
  0x00b0
           000000001
                       011
                                0000
                                        MISS
  0x1100
           000100010
                       000
                                0000
                                        MISS
  0x0028
           000000000
                       010
                                1000
                                        HIT
  0x0064
           000000000
                        110
                                0100
                                        MISS
                                0000
                                        MISS
  0x0070
           000000000
                       111
  0x00d0
           000000001
                       101
                                0000
                                        HIT
  0x0008
           000000000
                       000
                                1000
                                        MISS
  0x3394
         001100111
                       001
                                0100
                                        HIT
Total Hit Count = 9
Total Miss Count = 23
```

```
CACHE PARAMETERS
------
L (Bytes per cache line) -> 16
K (Cache lines per set) -> 2
N (Number of sets) -> 4
          CACHE INFORMATION
------
Cache Size -> 128
Set Selector Length (Bits) -> 2
| HEX | TAG BITS | DATA | OFFSET | RESULT
  0x0000 | 0000000000 | 00 | 0000 | MISS
0x0004 | 0000000000 | 00 | 0100 | HIT
         0000000000
  0x000c
                        00
                               1100
                                       HIT
  0x2200
                        00
                               0000
                                       MISS
                               0000
                                       MISS
  0x00d0
           0000000011
                        01
  0x00e0
           0000000011
                        10
                               0000
                                       MISS
  0x1130
           0001000100
                        11
                               0000
                                       MISS
  0x0028
           0000000000
                        10
                               1000
                                       MISS
           0001000100
                               1100
  0x113c
                        11
                                       HIT
                               0100
  0x2204
           0010001000
                        00
                                       HTT
  0x0010
           0000000000
                        01
                               0000
                                       MISS
  0x0020
           0000000000
                        10
                               0000
                                       HIT
  0x0004
           0000000000
                        00
                               0100
                                       HIT
  0x0040
           0000000001
                        00
                               0000
                                       MISS
  0x2208
           0010001000
                        00
                               1000
                                       HIT
           0000000000
                        00
                                       MISS
  0x0008
                               1000
  0x00a0
           0000000010
                        10
                               0000
                                       MISS
                               0100
  0x0004
           0000000000
                        00
                                       HIT
  0x1104
           0001000100
                        00
                               0100
                                       MISS
                               1000
  0x0028
           0000000000
                        10
                                       HIT
  0x000c
           0000000000
                        00
                               1100
                                       HIT
  0x0084
           0000000010
                        00
                               0100
                                       MISS
  0x000c
           0000000000
                        00
                               1100
                                       MISS
           0011001110
                               0000
                                       MISS
  0x3390
                        01
  0x00b0
           0000000010
                               0000
                                       MISS
                        11
           0001000100
                               0000
  0x1100
                        00
                                       HIT
  0x0028
           0000000000
                        10
                               1000
                                       HIT
  0x0064
           0000000001
                        10
                               0100
                                       MISS
  0x0070
           0000000001
                               0000
                                       MISS
                        11
           0000000011
                        01
                               0000
  0x00d0
                                       MISS
  0x0008
           0000000000
                        00
                               1000
                                       HIT
         0011001110 01
                                      HIT
  0x3394
                               0100
Total Hit Count = 14
Total Miss Count = 18
```

```
CACHE PARAMETERS
L (Bytes per cache line) -> 16
K (Cache lines per set) -> 4
N (Number of sets) -> 2
            CACHE INFORMATION
Cache Size -> 128
Set Selector Length (Bits) -> 1
| HEX | TAG BITS | DATA | OFFSET | RESULT
 0x0000 | 00000000000 | 0 | 0000 | MISS
0x0004 | 00000000000 | 0 | 0100 | HIT
0x000c | 00000000000 | 0 | 1100 | HIT
0x2200 | 00100010000 | 0 | 0000 | MISS
0x00d0 | 00000000110 | 1 | 0000 | MISS
0x00e0 | 00000000111 | 0 | 0000 | MISS
            00010001001
                                            MISS
                                    0000
  0x1130
                             1
                                            MISS
                           0 |
                                    1000
  0x0028
            00000000001
  0x113c
            00010001001
                                    1100
                                            HIT
                             1
                           0
  0x2204
             00100010000
                                    0100
                                              HIT
  0x0010
             00000000000
                             1
                                    0000
                                              MISS
  0x0020
            00000000001
                             0
                                    0000
                                              HIT
  0x0004
             00000000000
                             0
                                    0100
                                              HIT
  0x0040
                             0
                                    0000
             00000000010
                                              MISS
  0x2208
             00100010000
                             0
                                     1000
                                              HIT
  0x0008
             00000000000
                             0
                                     1000
                                              MISS
  0x00a0
             00000000101
                             0
                                    0000
                                              MISS
  0x0004
                             0
                                    0100
                                              MISS
             00000000000
                             0
                                    0100
                                              MISS
  0x1104
             00010001000
  0x0028
             00000000001
                             0
                                     1000
                                              HIT
  0x000c
             00000000000
                             0
                                     1100
                                              MISS
  0x0084
                             0
                                    0100
                                              MISS
             0000000100
  0x000c
            00000000000
                                     1100
                                              MISS
                             0
            00110011100
  0x3390
                             1
                                    0000
                                              MISS
  0x00b0
             0000000101
                                    0000
                                              MISS
  0x1100
             00010001000
                           0
                                    0000
                                              MISS
                                            HIT
                           0 0 1
  0x0028
             00000000001
                                     1000
  0x0064
             00000000011
                                    0100
                                             MISS
  0x0070
             0000000011
                                     0000
                                              MISS
                                    0000
                                            MISS
  0x00d0
             00000000110
                             1
  0x0008
            00000000000
                           0
                                     1000
                                            MISS
          00110011100 | 1
  0x3394
                                    0100
                                            HIT
Total Hit Count = 10
Total Miss Count = 22
```

```
CACHE PARAMETERS
------
L (Bytes per cache line) -> 16
K (Cache lines per set) -> 8
N (Number of sets) -> 1
            CACHE INFORMATION
------
Cache Size
                                -> 128
Set Selector Length (Bits) -> 0
| HEX | TAG BITS | DATA | OFFSET | RESULT
  0x0000 | 00000000000 | 0 | 0000
0x0004 | 00000000000 | 0 | 0100
0x000c | 00000000000 | 0 | 1100
0x2200 | 001000100000 | 0 | 0000
0x00d0 | 00000001101 | 0 | 0000
0x00e0 | 00000001110 | 0 | 0000
0x1130 | 00010010011 | 0 | 0000
0x113c | 000100010011 | 0 | 1100
0x113c | 000100010011 | 0 | 1100
                                                MISS
                                                HIT
                                                HIT
                                                MISS
                                                MISS
                                                MISS
                                                MISS
                                                MISS
                                                HIT
  0x2204
             001000100000
                               0
                                       0100
                                                HIT
  0x0010
             000000000001
                               0
                                       0000
                                                MISS
  0x0020
             000000000010
                               0
                                       0000
                                                HIT
                               0
  0x0004
             000000000000
                                       0100
                                                HIT
  0x0040
                               0
                                                MISS
             00000000100
                                       0000
                               0
  0x2208
             001000100000
                                       1000
                                                HIT
  0x0008
             000000000000
                               0
                                       1000
                                                HIT
                               0
                                       0000
  0x00a0
             000000001010
                                                MISS
  0x0004
             00000000000
                               0
                                       0100
                                                MISS
  0x1104
             000100010000
                               0
                                       0100
                                                MISS
                               0
  0x0028
             000000000010
                                       1000
                                                HIT
                               0
                                                MISS
  0x000c
             000000000000
                                       1100
                               0
                                                MISS
  0x0084
             000000001000
                                       0100
  0x000c
             00000000000
                               0
                                       1100
                                                MISS
  0x3390
             001100111001
                               0
                                       0000
                                                MISS
  0x00b0
                               0
                                       0000
             000000001011
                                                MISS
             000100010000
                               0
                                       0000
  0x1100
                                                MISS
           1000
  0x0028
                                                HIT
  0x0064
                                       0100
                                                MISS
  0x0070
                                       0000
                                                MISS
  0x00d0
                                       0000
                                                HIT
  0x0008
                                       1000
                                                MISS
  0x3394
                                       0100
                                                MISS
Total Hit Count = 11
Total Miss Count = 21
```