# Project 02 [Cache Simulator](http://williamstallings.com/COA/Animation/Links9e.html)

**Due on 10/15/2018**

1) Consider the input sequence of length 120 given below. (Copy-and-paste the input sequence listed below into the text area on the [Cache Simulator](http://www.ecs.umass.edu/ece/koren/architecture/Cache/frame1.htm). ).

Make sure that either the Limit Queue Length box is unchecked or the size is changed from 20 to more than 120.

220 66 131 35 94 172 126 217 73 176 250 84 114 187 201 116 4 102 84 22 44 87 114 82 144 28 211 131 25 192 12 134 176 157 197 211 223 67 199 203 30 154 51 123 140 172 218 249 27 91 5 51 202 59 196 240 238 71 100 217 49 231 226 12 118 233 204 222 220 31 220 66 173 5 6 94 62 126 124 250 21 81 74 116 233 9 167 62 20 4 161 35 152 102 79 73 86 84 182 22 92 44 66 159 187 240 167 100 169 201 174 114 232 82 187 87 175 131 156 301

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 2- way | | | 4 – way | | | 8 - way | | |
|  | LRU | FIFO | RAND | LRU | FIFO | RAND | LRU | FIFO | RAND |
| 8 blocks |  |  |  |  |  |  |  |  |  |
| 16 blocks |  |  |  |  |  |  |  |  |  |
| 32 blocks |  |  |  |  |  |  |  |  |  |
| 64 blocks |  |  |  |  |  |  |  |  |  |

(a) Analyze the effectiveness of different block replacement techniques by listing down the miss rate in each case into the above table.

(b) Which block replacement technique is more efficient in general? Explain.

2) In a N-way set-associative cache, blocks are mapped to different sets when number of sets changes. Also, for a particular sequence, the number of compulsory and conflict misses change with the cache type. Consider the following sequence 4 0 9 7 8 11 7 5 2 1 12 6 8.

(a) List the compulsory and conflict misses for different replacement techniques for the caches below.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **MISSES** | **LRU** | | **FIFO** | | **RANDOM** | |
| ***Comp*** | ***Conflict*** | ***Comp*** | ***Conflict*** | ***Comp*** | ***Conflict*** |
| 4blocks 2sets |  |  |  |  |  |  |
| 8blocks 2sets |  |  |  |  |  |  |
| 16blocks 2sets |  |  |  |  |  |  |

(b) Define compulsory, capacity and conflict misses. Explain the differences between them.

(c) What is the best way to reduce conflict misses?

(d) List which set in the given cache will the following blocks be mapped

|  |  |  |
| --- | --- | --- |
| **BLOCK** | **CACHE** | **#SET** |
| 0 | ***8block,2sets*** |  |
| 9 |  |
| 11 |  |
| 4 |  |
| 2 | ***8blocks,4sets*** |  |
| 9 |  |
| 10 |  |
| 4 |  |
| 7 | ***16blocks,2sets*** |  |
| 1 |  |
| 12 |  |
| 3 |  |

Project Assignment Hand-in Policies:   
Upload your report on the class Sakai Drop Box before the due day.