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Report
CS 352 project: L1 cache simulator

Problem statement:

The goal of the project is to create a level 1 data cache simulator in C++. Using object oriented programming, the source code is written to clearly illustrate how a data cache works. Also, by passing different parameters for the dimensions of the cache/memory, the statistics printed by the simulator can be compared. Varying parameters cache size (KiB), block size (Bytes), and associativity will affect the cache miss rates.

Solution:

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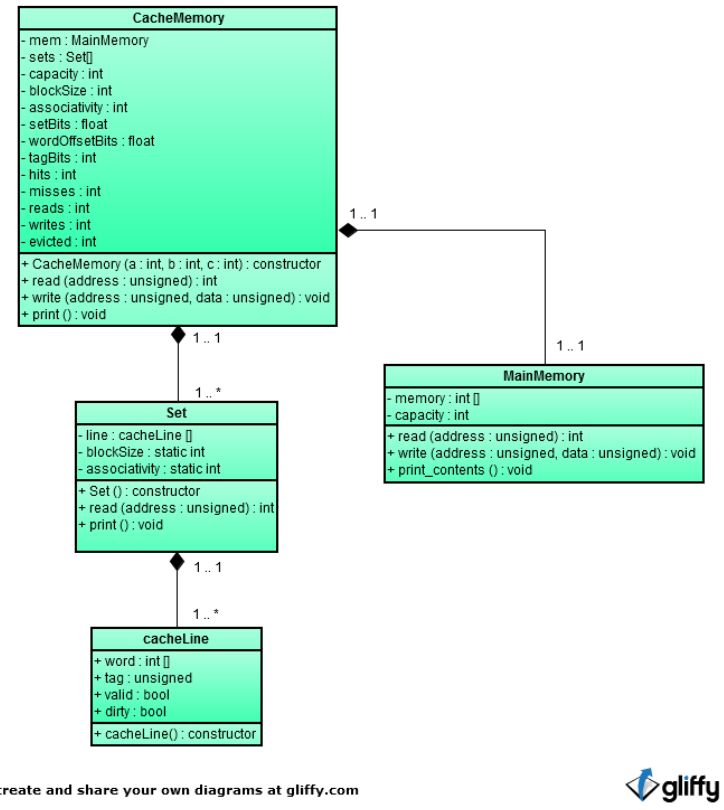
Class design:

The cache simulator with 4 classes. MainMemory, CacheMemory, Set, and CacheLine. Each aims to simulate that hardware compenent. Most of the implementation is in the CacheMemory class. It contains a MainMemory object and an array of Set objects. It also contains all the statistic variables as private members.

MainMemory has an integer array to hold all the data. It has simple accessors and mutators to interact with that data along with a print() method.

The Set class contains an array of CacheLine objects and the LRU algorithm.

The CacheLine contains and array of integer words, the tag and the valid and dirty bits.



UML class diagram