CMSC 411
Computer Systems Architecture
Project
Cache Simulator

Cache Simulator

- Goals
  - Build a cache simulator
  - Validate correctness
  - Use cache simulator to study
    - » Cache organizations
    - » Cache management policies

Simulation Approach

- Trace-driven
  - Sequence of memory accesses
    - » Taken from actual execution on machine
- Cache model
  - Maintain cache in software
- Software
  - C code
  - Text files listing application traces
    - » spice, cc, tex

Cache Parameters

- Total cache size
- Block size
- Unified vs. split I- and D-caches
- Associativity
- Write back vs. write through
- Write allocate vs. write no allocate

Simulation Statistics

- Number of instruction references
- Number of data references
- Number of instruction misses
- Number of data misses
- Number of words fetched from memory
- Number of words copied back to memory

Project Milestones

1. Basic cache
   - 8K direct mapped, unified cache
   - Block size = 16, write back, write allocate
2. Vary cache parameters
   - Size, associativity, etc…
3. Performance evaluation
   - Working set
   - Impact of
     - » Block size
     - » Associativity
     - » Memory bandwidth (writeback vs writethrough, etc.)