Chapter 5 Review

- Memory hierarchy
  - Goal is to have a large memory space that is accessible quickly
  - Use a hierarchy of progressively larger and slower memories
  - The top level (cache) is a small fast memory

Chapter 5 Review

- ABCs of caches
  - Hits and misses
  - Memory stall cycles
  - Can break down the equation into terms involving miss rate and miss penalty

Chapter 5 Review

- ABCs…
  - 4 questions
  1. Block placement
  2. Block ID
  3. Block replacement
  4. Write strategy

Chapter 5 Review

- Average Memory Access Time (AMAT)
  - Better measure of memory system performance than miss rate

Chapter 5 Review

- Cache optimizations
- Reduce miss rate, miss penalty and hit time
- We saw miss penalty reduction techniques
  - Multilevel caches
  - Multilevel exclusion
  - Critical word first / early restart
  - Priority of read misses over writes
  - Merging write buffers
  - Victim caches

Chapter 5 Review

- 3 C's of cache misses
  - Compulsory
  - Capacity
  - Conflict
- Compiler Optimizations

Chapter 5 Review

- Virtual Memory
  - Adds the disk as the lowest level in the memory hierarchy
  - Expands memory capacity
  - Supports multitasking and relocation

Chapter 5 Review

- Pages – fixed size
- Segments – variable size
- Page (and/or) segment table – maps virtual addresses to physical addresses
- Translation Lookaside Buffer (TLB)
  - Cache the most recent translations