

**CIS 452 Operating Systems Final Exam Study Guide**  
**Fall 2023**  
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- I. Main Memory
  - a. Memory management
  - b. Logical vs Physical Address Space
  - c. Swapping
  - d. Memory Protection
  - e. Fragmentation (Internal/External)
  - f. Paging
    - i. Page Tables
    - ii. Addressing for page tables
- II. Virtual Memory
  - a. Shared Pages
  - b. Demand Paging
  - c. Effective Access Time
  - d. Page Replacement
    - i. Algorithms
    - ii. Local vs. Global
  - e. Thrashing
  - f. Working Set
  - g. Kernel Memory
- III. Mass Storage Structure
  - a. Hard Disk Structure
  - b. Disk Scheduling
  - c. Calculating Average IO Time