

Test 2 for Computer Architecture will be Thursday, Nov. 13 in class. The test will be open book and notes. Test 2 review topics are:

Chapter 6. Memory Hierarchy (Only sections 6.5-6.6 on Test 2)

General idea of the memory hierarchy

Virtual memory Concepts: pages, page frames, page faults, demand paging

Paging: page table, virtual to physical address translation, time and memory efficiency considerations, page-replacement policies and their implementations, write policy; page-size tradeoff,

Page Table Organization and Page table entries (physical page #, disk page address, valid bit, dirty bit, reference bit, owner information, protection bit)

TLB (translation lookaside buffer)

Page-table Placement: searching hierarchical (two or more levels) page tables, inverted page table frame-allocation algorithm: page-fault frequency

Segmentation

Combining paging and segmentation

Pentium processor memory-management example

Chapter 7. I/O and Storage Systems (Only sections 7.1-7.6, 7.9-7.10 on Test 2)

I/O and performance; Amdahl's law

General I/O Architecture

I/O Module/Controller role and function

I/O address mapping: Isolated-I/O vs. memory-mapped I/O

I/O Control Methods: programmed I/O, interrupt-driven I/O, and direct-memory access (DMA), channel I/O

Usage of interrupts by the hardware/operating system to restrict a user program's activities

Steps involved when an interrupt occurs

Buses

Bus interconnection: shared collection of wires with lines classified as data, addr., control

Steps of a typical bus transfer

Bus design issues: 1) bus width, 2) bus type: dedicated/(time) multiplexed, 3) bus operations

Parallel vs. Serial data transmission

Synchronous and asynchronous operations

Bus Arbitration: centralized vs. decentralized arbitration, Daisy-chaining, Centralized with independent requests, hidden arbitration (overlapping of current bus operation with arbitration of next)

Multiple bus hierarchies

Hard disks and RAID

General concepts of hard disk: seek time, rotational delay, data transfer time, layout of surfaces, tracks, and sector

RAID: levels, striping (bitwise to large stripes) effects on the number of independent requests that can be handled and the data transfer rate of a single large request.

Operation of RAID when a disk fails

I/O Performance Measures: throughput and response time