

Test Review for Thursday, September 27, 2012

- Introduction
 - Architecture vs organization.
 - Organization
 - NAND gates
 - Architecture
 - How techniques used affect performance of the system
 - Assembly language programmers view of the machine
 - What instructions do you have, what registers do you have?
 - Processor families
 - Performance
 - Consider all inputs
 - Example: which is faster - short data transfer on a 56K modem or 2400 baud?
 - depends on transfer time, sync time, and disconnect time
- Early Architectures
 - The same concepts that applied then still apply now
 - Concepts
 - Babbage's machine was base 10, why?
 - The mechanics were on wheels, wheels have many more positions
 - Base 2 is used now because that's how transistors work
 - Fixed point
 - Conrad's Zeus machine
 - used base 2
 - Floating point, but used a different format for floating point that we have today
 - Manchester Baby
 - First stored program machine, only had 32x32 bit memory locations
 - The instruction set had a relative branch, important for branching and relocatable code
 - ASCC
 - Probably had the most extensive instruction set at its time
 - All of these (except Baby) had a particular format for their data - called the Harvard architecture - separate data and code
 - The benefits of separate data and code is that it can be accessed in parallel
 - Another can be completely different in terms of format
 - Drawback - not as flexible
 - The Baby is the von Neumann architecture, makes the von Neumann bottleneck
- Addressing Modes
 - Many different modes - look at the worksheet
 - Instructions and operands - 0 to 3
 - Take the Reverse Polish Notation and turn it into a 0 instruction
 - Values get pushed into the stack, operation combines (**look at slides**)
 - Data structure alignment
- Stack Slides
 - Push and pop
 - **Review PowerPoint**
- Instruction Set Architecture
 - Characteristics of an instruction set
 - If it's fixed length, the instruction decoder isn't needed; variable length will

- need the decoder
 - It affects performance
 - Gotta keep instructions forever so that backwards compatibility is maintained
 - Some people were bypassing the instruction set and executing microcode
 - Execution of a Machine Instruction
 - be able to discuss this
 - An instruction fetch will be fixed if instruction set is fixed
 - Number of possible instructions for a given set
 - Fixed width instruction
- Caches
 - Block address, word ID, and TAG
 - Cache lines
 - Replacement and mapping algorithms
 - Fully associative versus direct (set associate)
 - Split cache
 - Problem writing back to cache
 - Multiple processors and caches
 - **Look at worksheet**
- Pipelining
 - Operation
 - Way to measure performance improvement
 - Effects of a branch and how it effects