Assembly Review for Final Exam

Fall 2022 CS 301 Assembly Language Programming

Performance: a tool for optimization and program analysis

OS - Assembly Interface

Syscalls in x64 and arm64
mmap
Writing your own malloc

Threads

Multicore via threads or OpenMP or CUDA

Details of threads
How multicore locks work (or don't!)
Multicore cache coherence and "false sharing"
Multicore memory consistency and barrier/fence operations

CUDA
GPU vs CPU
Comparing CUDA and multicore+SIMD

SIMD

Floating point assembly via SSE
Single instruction multiple data (SIMD) floats via SSE
Logic gates and the SSE bitwise if-then-else (and osl/floats.h intro)
SIMD performance example

Bits
Bits inside a float and special float values
Bitwise operators and SIMD within a register

Beyond x86

AArch64, the 64-bit ARM
Quantum computing, the future(?) of computing