

Projects for Advanced Computer Architecture

Research paper

- Pick a topic
- Find articles about it
- Write a paper in acceptable scientific/technical format
- Draw a conclusion!
 - If you don't conclude anything, there's no point in writing it
- Style guide:
 - <http://www.computer.org/portal/documents/942852/cf1d1ee8-c13a-426f-af48-f74618d83251>
- Link to scientific paper guidelines on the class web site

Programming/Design project

- Simulations
 - In a high level language
 - In a hardware description language (VHDL, Verilog)
 - Using a commercial or open-source simulator
 - SPIM simulator (that's MIPS spelled backwards)
 - Cache simulator (Dinero)

Some Programming/Design Topics

- Develop a pipelined RISC simulator
- Develop a pipelined and bypassed simulator
- Simulate cache performance for a set of codes
- Simulate/compare various cache coherence protocols
- Develop a superscalar RISC simulator using Tomasulo's algorithm
- Develop a superscalar RISC simulator using Scoreboarding
- Develop a superscalar RISC simulator using simultaneous multithreading

Some Research-oriented Topics

- Glossary of computer architecture. We talked in class about doing this.
- Chip multiprocessors
- Simultaneous multithreading
- Branch prediction using trace caches
- VLIW architectures
- Things to do with a billion transistors
- Digital Signal Processing (DSP) architectures
- Survey of cache configurations
- Dataflow architectures
- Fine-grained execution architectures
- Dynamic compilation (Transmeta)
- Multimedia instruction sets

- Reconfigurable computing
- Formal methods verification of computer architectures
- GPU architectures
- “Game Box” architectures
- Hypertransport(AMD)/QPI(Intel) interconnection buses