EEL 6764 Principles of Computer Architecture
Final Exam Topics

Topics

The final exam covers all the topics listed for the midterm exam, plus new topics as shown below

Pipelining and ILP

1. Basic pipelining concepts
2. Structural dependences, data (true, anti-dependence, and name dependences), and control dependencies/hazards
3. RAW, WAR, WAW hazards due to data dependences, hazard detection
4. Data forwarding, Pipeline stalls
5. Static and dynamic Branch Prediction
6. Compiler optimizations − loop unrolling, instruction re-ordering, register renaming
7. Dynamic instruction scheduling − Tomasulo's algorithm
8. Hardware speculation
9. Multiple instruction issue
10. Various types of multithreading – coarse-, fine-grained, and simultaneous MT

TLP and Multiprocessing

1. Characterization of TLP
2. Differences between TLP and ILP
3. MIMD execution model and multiprocessors
4. Symmetric multiprocessors and distributed shared memory multiprocessors
5. Challenges for shared multiprocessing architectures
6. The cache coherence problem
7. Directory based and snooping coherence protocols

DLP and Vector Architecture

1. Characterization of DLP, typical example application
2. SIMD execution model and vector processor architecture, key architectural features
3. Advantages of vector processing over scalar processors
4. Pipelined FUs, chaining, concepts of lanes
5. Strip Mining, and conditional executions
6. Predicate registers for conditional execution,
7. Memory addressing with strides, and gather-scatter
8. Strip mining

Preparation

- Read book carefully guided by lecture slides

- Review all homework problems and sample solutions thoroughly and make sure you truly understand how the solution is reached for every problem.

- Review all quiz problems, and make sure you truly understand all of them.

Format

- The exam is closed book, and closed notes.

- Everyone is allowed to bring to the exam two 8.5" × 11" sheets of paper with whatever information one would like to write on both sides.

- Calculators are allowed.

- All cell phones must be turned off.

- Formats of exam problems, subject to some minor changes, include

  – Short answer questions
  – Multiple choice questions
  – Questions that need calculations