EEL 5764 Computer Architecture
Fall 2018
Term Paper and Project

The project can be an architectural exploration/experiment/benchmark on a specific topic or a survey of a specific area. If you choose an implementation/experiment topic, your presentation must include a demo. We expect the experiments and implementation to be on SimpleScalar, which is an open source tool. It is your responsibility to make sure that you can run SimpleScalar on your laptop before you submit your proposal. If you decide to use an alternative environment you must explain that in your proposal and get instructor approval for using it. If you choose a survey topic you still need to give a presentation, and your report grading will consider the depth and breadth of your survey.

Project schedule:

(1) **Oct 18 (4am):** Submit a 1-page project proposal. The proposal should include (a) a title for your project, (b) team member names and UFID, (c) a name for your team, and (d) a brief description of what you want to do, and why you want to do it. If you pick one of the topics suggested, you should still write one page on the rationale of the project and what experiments/implementations you should be doing. This must be submitted through Canvas.

(2) **Oct 24:** We provide feedback, suggestion, and modification to the proposal. If you disagree with our suggestion, you must talk to us within a week. Otherwise, we will assume that you agree on the suggestion and we will grade you based on the quality of your work vis-à-vis the proposal.

(3) **Nov 27-30:** You give a short (less than 10 minutes) presentation on your project. We will set up a doodle poll for scheduling the presentations.

(4) **Dec 1 (4am):** Submit a report describing your work. The report should be no more than 5 pages.

Grade division:

- Proposal 10%
- Presentation/demo 60%
- Report 30%

You will be graded both on the content and on the quality of your writing/presentation for each component.

Potential Project Topics:

Note: These topics are for your guidance. You can pick one of these topics, but you can also pick a topic of your own. In any case, you should explain in your proposal what you will do for each topic. For example, for the suggested topic 1, if you pick it, you should be clear what schemes you will consider (or at least candidate schemes), what experiments you will do, and on what platform. Correspondingly, if you choose a survey topic you should explain what components of the overall topic you will focus in your survey. For example, if you choose topic 16, you should explain which component of automotive systems you will be studying.

1. Implementation and comparison of two cache prefetching schemes
2. Implementation of two-level on-chip caching and study of the effect of various parameters (e.g., associativity, cache size, block size, etc.)
3. Implementation of TLB and evaluation of its effect on cache performance
4. Implementation and comparison of different branch prediction schemes
5. Implementation and comparison of two static code scheduling schemes to exploit ILP
6. Implementation and comparison of victim cache and skewed associative cache
7. Implementation and comparison of in-order vs. out-of-order instruction execution
8. An implementation study of register renaming logic
9. Implementation and comparison of page replacement policies
10. Survey of energy efficient processor design
11. Survey of different nonvolatile memory technologies
12. Survey of architecture features for microarchitecture validation
13. Survey of microarchitecture correctness statements and verification techniques
14. Survey of architectures for deep learning
15. Survey of automotive system architectures

Report:

Your report should explain your findings, whether from your implementation (if you did an implementation project) or survey (if you did a survey). You should write it in the style of an academic publication. For instance, you should explain the background and problem you are looking at, and you must cite any source that you consulted as part of the activity. The report should include all team members as authors.