

Final Project Guidelines

The course culminates in a significant research project in the area of computer architecture, which students will complete in groups of 2-3. Each group, in consultation with the instructor, will select a topic for themselves: the project could be of several types such as reproducing the results of a published work, implementing a model or simulator, measuring real hardware, or designing a new architecture or algorithm.

Students will be evaluated on their ability to communicate both the goals and final results of their research. Assignments include a written project proposal, oral presentation of the project and a final report.

Important Dates

2/13 + 2/15	Presentations on one computer architecture research area, summarize one computer architecture lecture series.
3/6	Generate three potential project ideas, bring a three sentence description of each to class. Completed individually. Graded pass/fail only.
3/13	Project proposal due. Project proposal feedback meeting. Within a week of submitting the project proposal, meet with the instructor as a group to discuss the project proposal, and revise the plan.
4/5	Before class on 4/6, meet with the instructor as a group to discuss the project progress. Graded pass/fail.
4/24 + 4/26	Oral presentation of project in class.
5/5 ?	Final report due. (Final Exam Block for Class)

Grading

Half of the project grade will reflect the instructor's evaluation of the content and quality of the research project. The other half of the grade is determined by the quality of the written assignments (e.g. the project proposal and final report), the final presentation, and the completion of tasks along the way.

Breakdown:

- 40% Research content and quality. Graded from the content presented in the final report and presentation.
- A: Outstanding work. An "A" group completed significant work to execute the assignment and showed an exceptional level of insight in both the implementation and analysis of his/her project. The experimental results and data make a strong case for the students' arguments.
 - B: Solid work. The "B" group's work and level of insight are strong and his/her experimental results are sufficient to sell the idea.
 - C: Weak work. The "C" group completed a limited amount of work and had few experimental results.

15%	Project Proposal
15%	Project Presentation
20%	Final Report
5%	Survey Presentation on Computer Architecture Research Area
2%	Generated project ideas. Individual. Pass/Fail
3%	Update meeting with instructor. Pass/Fail.

Late assignments: Any assignment that is handed in late will suffer a 10% reduction per day. In the case of illness or other extenuating circumstances, the instructor should be contacted promptly and prior to the deadline. As this is a group project, you may not use late days for group project assignments.

Group grades: All grades for project assignments will be the same for each student in the group.

Detailed Description of Assignments

Survey of a Current Computer Architecture Research Area: In a group of 2-4 (does not have to be your project group) you will read one of the Computer Architecture Lecturer Series books and summarize it for the class. This book is designed to give you an overview of a new area, and many citations for further reading. In a 15 minute presentation to the class you will present the following key content (other content will depend on the particular subject matter): <https://www-springer-com.ezproxy.library.tufts.edu/series/16916>

1. Motivation and Background of the research area. Why is this topic important in computer architecture right now? Why did the authors write the survey?
2. Current state of the art. What are the different approaches to solve the technical challenges and what have they accomplished?
3. Tools and techniques necessary to do research in this area. (For your audience to understand, you might need to explain the jargon or terminology specific to the research area.)
4. Open research problems. What technical challenges are currently holding the field back, what open research questions seem interesting to you?

Project Proposal: The project proposal is a short document, less than 4 pages, that describes the background and scope of the project as well as the logistics of the proposed work. Required elements:

- Background and related work. Cite and summarize at least four research papers related to the proposed work.
- Description of project goals. Describe what question this work will answer. Describe what you plan to do, whether it is building a system, recreating a paper, or measuring hardware.
- Equipment needs. List and justify any equipment, software or computers you need and identify where you can get the equipment.

- List of tasks and proposed timeline. List all the major milestones of the project and when you propose to complete them. This is the only part of the proposal that can be a list. The rest should be narrative.

Final Presentation: Each group will give a 15 minute presentation to the class with speaking time divided evenly among all group members. The presentation should discuss the motivation and goals of the project and the results up to that point. Every member of the group must take turns speaking.

Final Report: The final report will be in the form of a conference paper: it should include citations, figures, and results. The report will be graded on content and writing style. While your report will, of course, be informed by the specific nature of your project, it should include:

- Introduction and related work
- Project motivation and definition of the problem being solved.
- Experimental design and tools used
- Results
- Analysis of results

Project Ideas

Please talk with the course staff to ensure that your project is sufficiently ambitious as this affects the “research content and quality” portion of your grade. The project should answer a computer architecture question and motivate a potential solution. You should design an experiment on your own that illustrates, quantitatively, that potential problem. You might not have time to evaluate properly a “new solution” to the problem but you should be able to propose a potential solution based on the problem you select

Course Infrastructure

- EECS Linux Cluster
 - Sniper Simulator, CAD tools
- FPGA Platforms
 - FPGA from EE 26
 - Xilinx Zynq SoCs (ARM processor and FPGA)
 - Amazon F1 Instances (must request early for credits)
- GPU Platforms from Parallel Architecture Course
- Wide Array of Open Source tools and benchmarks
 - <http://arch-www.cs.wisc.edu/home>
 - “gem5 Simulator”
http://www.m5sim.org/Main_Page
 - GPGPUsim
 - Opencores.org (Verilog and VHDL) <http://opencores.org/>

- Suggestion: Stick with what you know. It can take a month or more to get a new infrastructure working

Policy for Using Ongoing Research Projects

A group may leverage ongoing research efforts (your MS/PhD project or independent project) for the class project if it is in the computer architecture / computer systems field. However, you must clearly state in the proposal the current status of your research efforts and show significant new results through this class project. Additionally, at least one member of the group must not currently be involved in the research project and must make significant contributions to the class project.

Conference Deadlines

For teams that are interested in attempting to publish their research please speak with Prof. Hempstead. You will be able to use your conference or workshop paper submission as your final report.