

This review contains information about what you need to read and what type of questions you can get. Follow these guidelines. Don't hesitate to send me or the TA email if you have questions.

The Exam will be 1 hour and closed-book. The exam will be held during regular class time. For date and classroom, please review the class website.

All materials covered in the classroom, even if not in textbook, are required for the exam. Also make sure that you check the homework problem and project. You WILL get questions that relate to them and the discussions we had in the classroom.

The following sections are required from the textbook (if your book has a different order for the Chapters below please identify the topic instead). There will be NO questions, however, on material that is in the textbook if it was not covered in class.

Chapter 1: Fundamentals of Computer Design

Recommended exercises: 1.1, 1.2, 1.4, 1.7, 1.12, 1.14

A1: Pipelining: Basic and Intermediate Concepts

Chapter 2: Instructions Level Parallelism and Its Exploitation

Recommended Exercises: 2.1, 2.2, 2.3, 2.4, 2.5, 2.11, 2.12

Chapter 3: Limits on Instruction Level Parallelism (sections including 3.4)

The exam questions will be of the following nature (note: list is not exhaustive):

- (1) Short questions. (20%) Requires a sentence or two as answers. What is the yield?
How do you define power consumption?
- (2) Problems that require analytical analysis/reasoning. (10%). For example, express the performance of a machine given some distribution of instructions and costs associated with different operations. Estimate power consumption. Estimate performance for various branch predictors assuming a pattern of taken/not taken branches.

Other Question Types/Examples (70%):

- (3) ISA Building. How do you design a new ISA and what kind of things you need to take into consideration?

- (4) Pipelining including Tomasulo. I might ask you questions and give you a scenario of instructions that you need to show executing including how the data structures (ROB, RS, RSR, etc) are updated.
- (5) Speculative Tomasulo. Understand how the original algorithm was modified to deal with speculation and precise interrupts.
- (6) ILP Estimates. Have an architect's intuition for how ILP is lost with more realistic assumptions of the resources.
- (7) Power consumption in pipelines. Calculate energy consumed in a program given some distribution of power in core architectural components and a simple pipeline structure.

The best way to prepare is to study the notes and solve (some of) the exercises recommended. In general I will be testing your ability to use the material for new type of architectures including slight modifications to what we discussed. Focus on understanding rather than memorizing when you study.

Good luck!

Professor Moritz