Spring 2023 Midterm Exam Review

When / Where

Wednesday, 29 March 2023 9:30 CDT.

Topics

All material covered up until this point.

Conditions

Closed Book, Closed Notes

Bring one sheet of notes (both sides), $216\,\mathrm{mm} \times 280\,\mathrm{mm}$.

No use of communication devices.

Format

Several problems, short-answer questions.

Resources

Solved tests and homework:. `https://www.ece.lsu.edu/ee4720/prev.html`

Statically Scheduled MIPS Study Guide:. . .

. . . `https://www.ece.lsu.edu/ee4720/guides/ssched.pdf`

Study Recommendations

Study **this semester's homework assignments**. Similar problems may appear on the exam.

Solve Old Problems—memorizing solutions **is not the same** as solving.

Following and understanding solutions **is not the same as** solving.

Use the solutions for **brief hints** and **to check** your own solutions.

Emphasis

MIPS Programming and Instruction Use

Should be able to write MIPS programs.

Should be able to easily understand MIPS programs.

Should be able to use other ISAs' instructions in examples.

Not required to memorize instruction names, except for common MIPS instructions.

MIPS Implementation

Implementation Diagrams and Pipeline Execution Diagrams

They are a *team*, so study them together.

Topics

ISA v. Implementation.

See Lecture Slides 1—`https://www.ece.lsu.edu/ee4720/2023/lsli01.pdf`

Why separating ISA from implementation is important.

Why it's hard to design an ISA without bias towards first implementation.

MIPS ISA

See MIPS Overview—`https://www.ece.lsu.edu/ee4720/2023/lmips.s.html`

Write and read programs.

Understand how instructions are coded.

LSU EE 4720 Lecture Transparency. Formatted 14:53, 24 March 2023 from lslimr.

Statically Scheduled MIPS Implementations

See Lecture Slides 6—https://www.ece.lsu.edu/ee4720/2023/lsli06.pdf
and Statically Scheduled Study Guide—https://www.ece.lsu.edu/ee4720/guides/ssched.pdf

Unpipelined Implementation

Understand relationship between insn format and connections to register file, etc.

Pipelined Implementation Versions

Basic (no bypassing).

ALU bypassing, branch in ID.

Many variations covered in class and in assignments.

Terminology

Dependency Definitions

Hazard Definitions

MIPS Implementation Skills

For a Given Pipelined Implementation

    Show pipeline execution diagrams.

    Show register contents at any cycle.

    Design control logic.

    Determine instruction throughput (IPC or $\frac{1}{\mathrm{CPI}}$).

Add bypass paths.

Add functional units.