ELEC-H-473 Microprocessor Architectures

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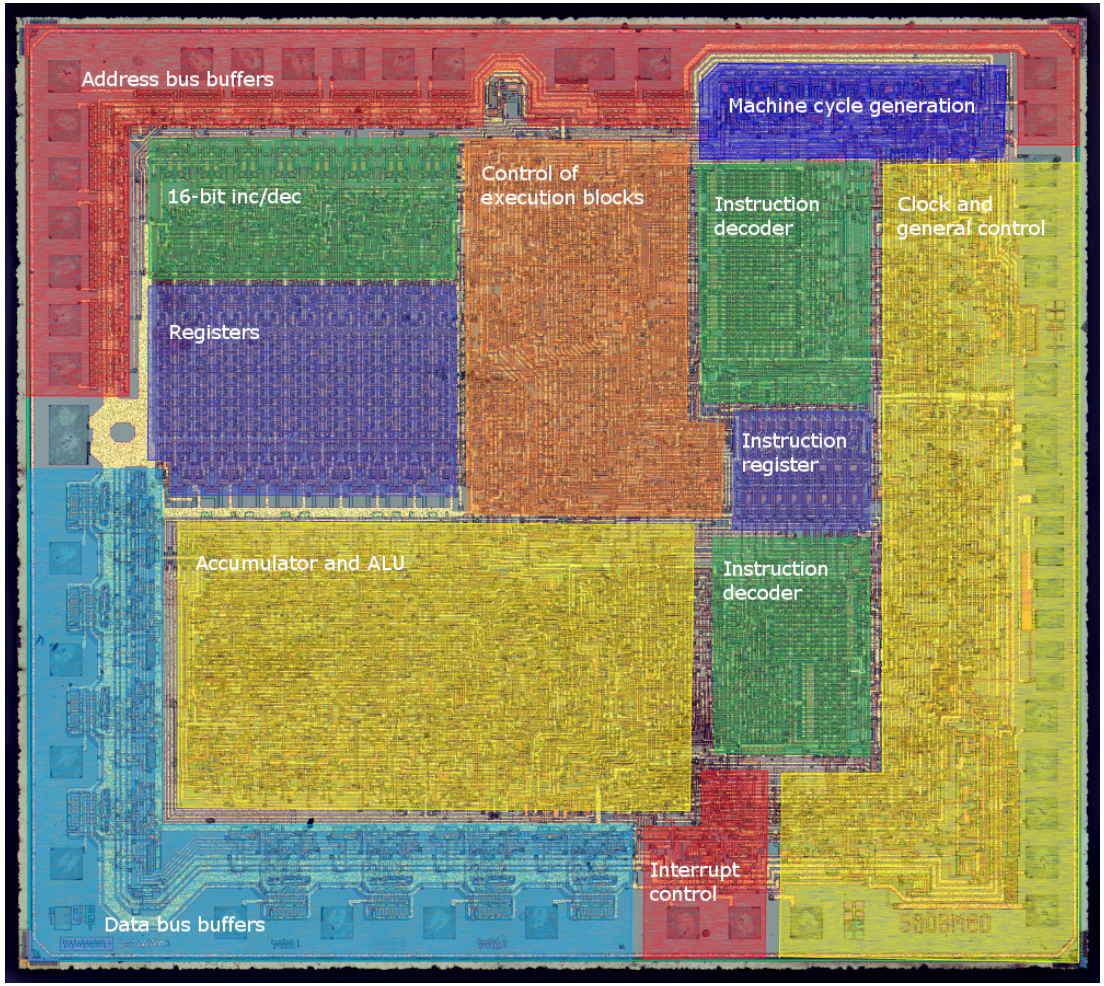
Brief introduction to the labs

Practical discovery of microprocessors



KR580VM80A die shot, https://zeptobars.com/en/read/KR580VM80A-intel-i8080-verilog-reverse-engineering

How does it work, for real?

Plan

People involved

- Dragomir Milojevic

- Muhammad Ali

- Lucas Stefanidis

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The labs

Three microprocessor architectures:

- RiSC16: Very small RISC, 4 labs
- TIS-100, 1 lab
- x86_64: Standard computer microprocessor (CISC), 2 labs

Ok, where do we start ?

- All handouts are on the UV, ELEC-H-473.
- Form groups of up to 4 students and **enroll on the UV**.
- Assignments have to be submitted in subscribed groups on the UV. The deadline is one week after the related lab, see the schedule on UV.
- Without groups and beyond the deadlines no submission is possible.
- All assignments will be evaluated and contribute **25%** to your final exam marks

RiSC 16

Labs 1-4:

- Discover the RiSC16 and its 8 instructions ISA
- Adapt the architecture
- Enhance it with a pipeline
- Finish everything

Assignments:

- Tested and verified codes (lab 1-2)
- Codes and Test vectors (lab 3)

Use the "**Online Verification Tool**" to check your codes

Tessellated Intelligence System

Lab 6:

- Read the TIS-100 reference manual
- Download and setup the TIS100 on your workstation (Windows, Linux, IOS)
- Use custom specifications

Assignments:

- solve two custom levels: “Decode the image” and “Coprime detector”

See the "**Benchmark bounds**" to get good marks

Single Instruction/Multiple Data

Lab 7-8:

- Download and install the Code::Block IDE
  https://www.codeblocks.org/downloads/binaries/
- Read the inline assembly and SIMD reference documents on UV
- Implementation of C and SIMD versions of program

Assignments:

- Image threshold processing and filtering in plain C and SIMD

Benchmark both C and SIMD codes for each task

Submitting assignments

Comment your codes line by line and follow the instructions in the lab manuals to get maximum points.

Lab	Topic	Assignment
1-2	RISC 1-2	✔
3	RISC 3	✔
4	RISC 4	✖
5	dsPIC	✖
6	TIS-100	✔
7	SIMD 1	✔
8	SIMD 2	✔
9	Multithreading	✖