Class 247
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Simple CPU Design

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Introduction

In programming language, the source code will first generate the token by Lexer, then the Parser will compose the generated token into the Abstract Syntax tree, and finally the Opcode will be generated by the compiler through the VM. These Opcodes will be executed directly by the machine. However, OPCODE such as "ADD","ASSIGN","JUMP","IS_EQUAL", how does the machine know these symbols and use transistors to execute it. This project will design a simple CPU to implement a single line of programming code. The purpose is to understand the organization of basic computer components.

Objective

Design a simple CPU circuit. Enter a positive integer N, calculate the sum of the numbers from 0 to N.

Schedule

- Preparing environment (week 2)
- Design a CPU circuit (week 6)
    - Memory
    - Processor register
    - Arithmetic logic unit
    - Control unit
- Implement the circuit diagram with VHDL code (week10)
    - Memory
    - Processor register
    - Arithmetic logic unit
    - Control unit
- Test Code (week 11)
- Simulate code (week 12)
- report (week 13)

Language and Tools

- VHDL
- Vivado
- CircuitLab, https://www.circuitlab.com/