

8Bit Microprocessor Project

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Introduction:

An 8-bit microprocessor is a simplified version of the processors used in computers. It can process 8 bits of data at a time and is commonly used for educational purposes. In this project, we designed and simulated a basic 8-bit microprocessor to understand how data flows through different components like the ALU, registers, and control unit.

Our project

01

**Mainly
Components**

02

**8Bit
Microprocessoror
Design**

03

Codes

04

**Project
Live Demo**

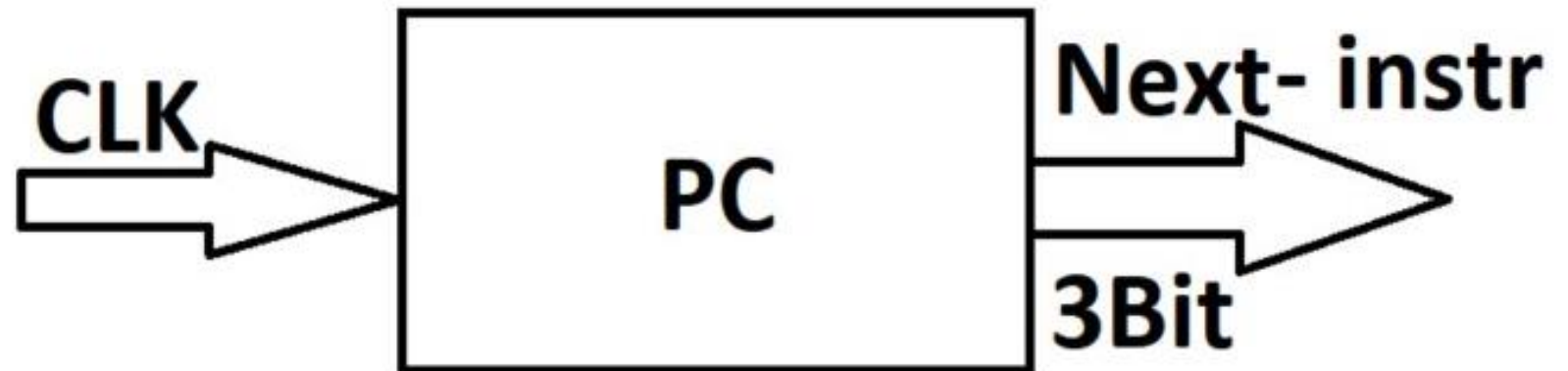
01-Mainly Components

- Program Counter (PC)
- Instruction Memory
- 4 × 8-bit Registers
- Arithmetic Logic Unit (ALU)
- Control Unit

01-Mainly Components

Program Counter (PC):-

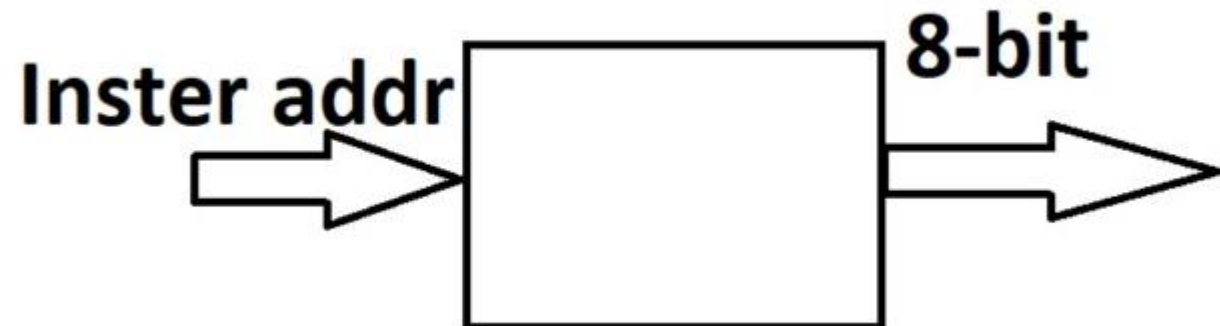
- The Program Counter is a small register that holds the address of the next instruction.
- After the processor fetches an instruction, the PC increases automatically to point to the next one.
- Simply, it tells the processor “what to do next.”



01-Mainly Components

Instruction Memory:-

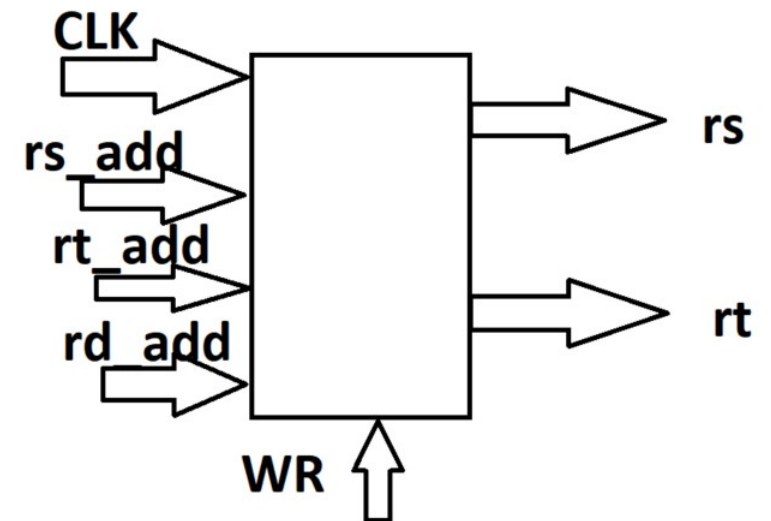
- Instruction Memory is where all the program instructions are stored. The processor uses the address from the Program Counter to fetch the instruction from this memory.
- It's a read-only memory during execution — we don't change it while the program is running.
- Simply, it's the place that holds “what to do.”



01-Mainly Components

Registers:-

- Our processor has 4 general-purpose registers, each one is 8-bit wide. We use them to temporarily store data during instruction execution.
- For example, when we load a value, do a calculation, or store a result — we use these registers.
- They are fast and directly connected to the ALU, so they help speed up operations.



01-Mainly Components

ALU:-

- The ALU is like the calculator of the processor.
- It does math and logic — like add two numbers, or check if values are equal.

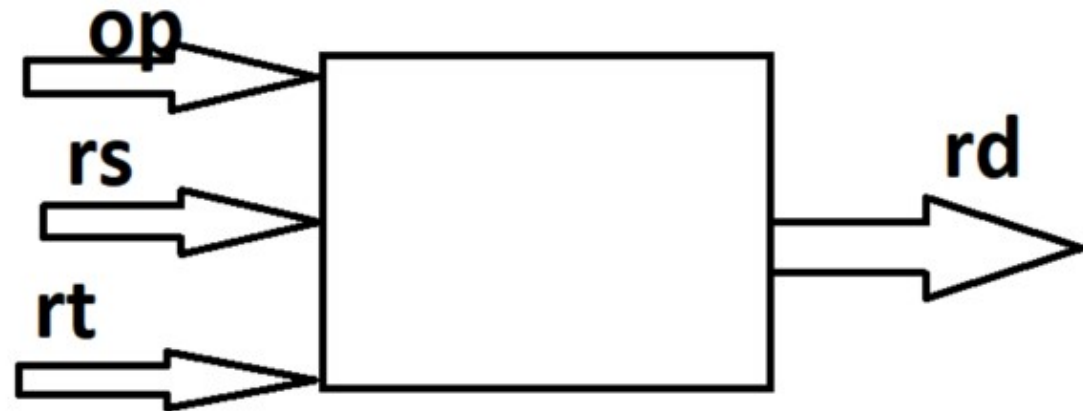
op

00 => $rs \& rt = rd$

01 => $rs + rt = rd$

10 => $rs - rt = rd$

11 => $rs + rd.addr = rt$



01-Mainly Components

Control Unit:-

The Control Unit is like the brain inside the processor.

It reads the instruction and tells all other components what to do.

For example, it decides which registers to use, what operation the ALU should perform, and when to read or write data.

Simply, it controls the flow of the entire microprocessor.

01-Mainly Components

MUX0:-

a=> addr of reg2

b=>default destination addr

y=>distination addr

2Bit

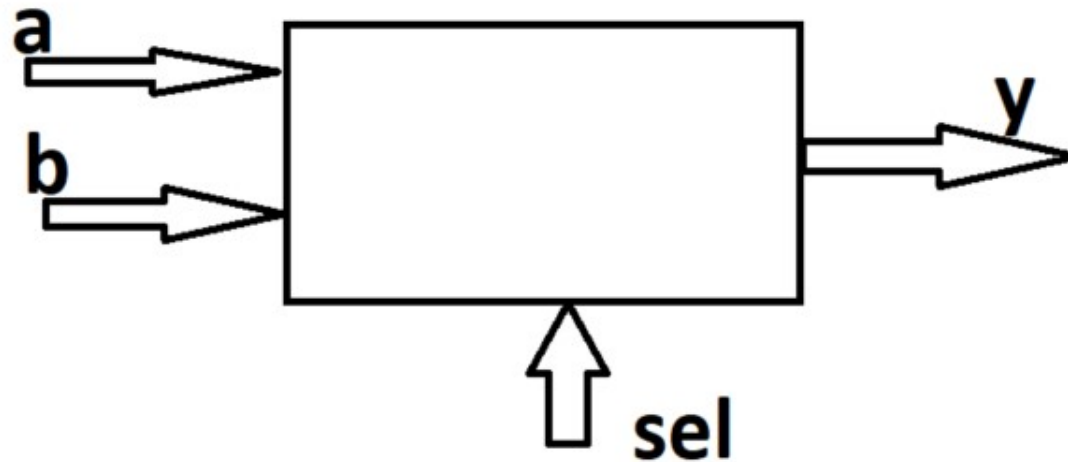
MUX1:-

a=>default data

b=>constant data

y=>output data

8Bit



01-Mainly Components

Signal Extend:-

-Convert 2 bits to 8 bits

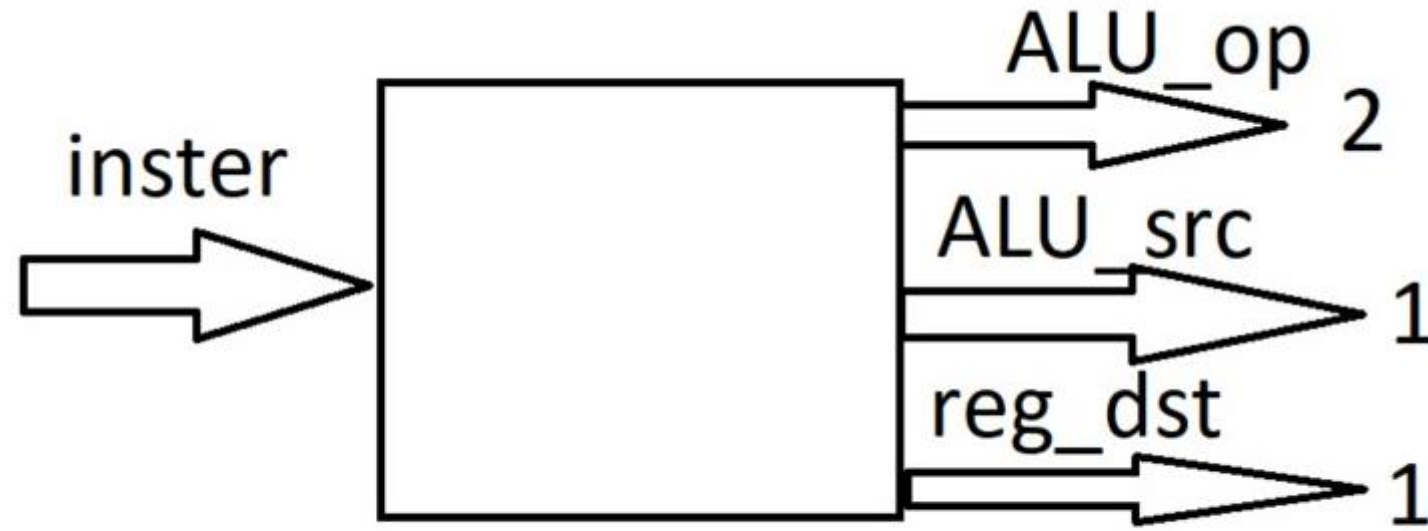


01-Mainly Components

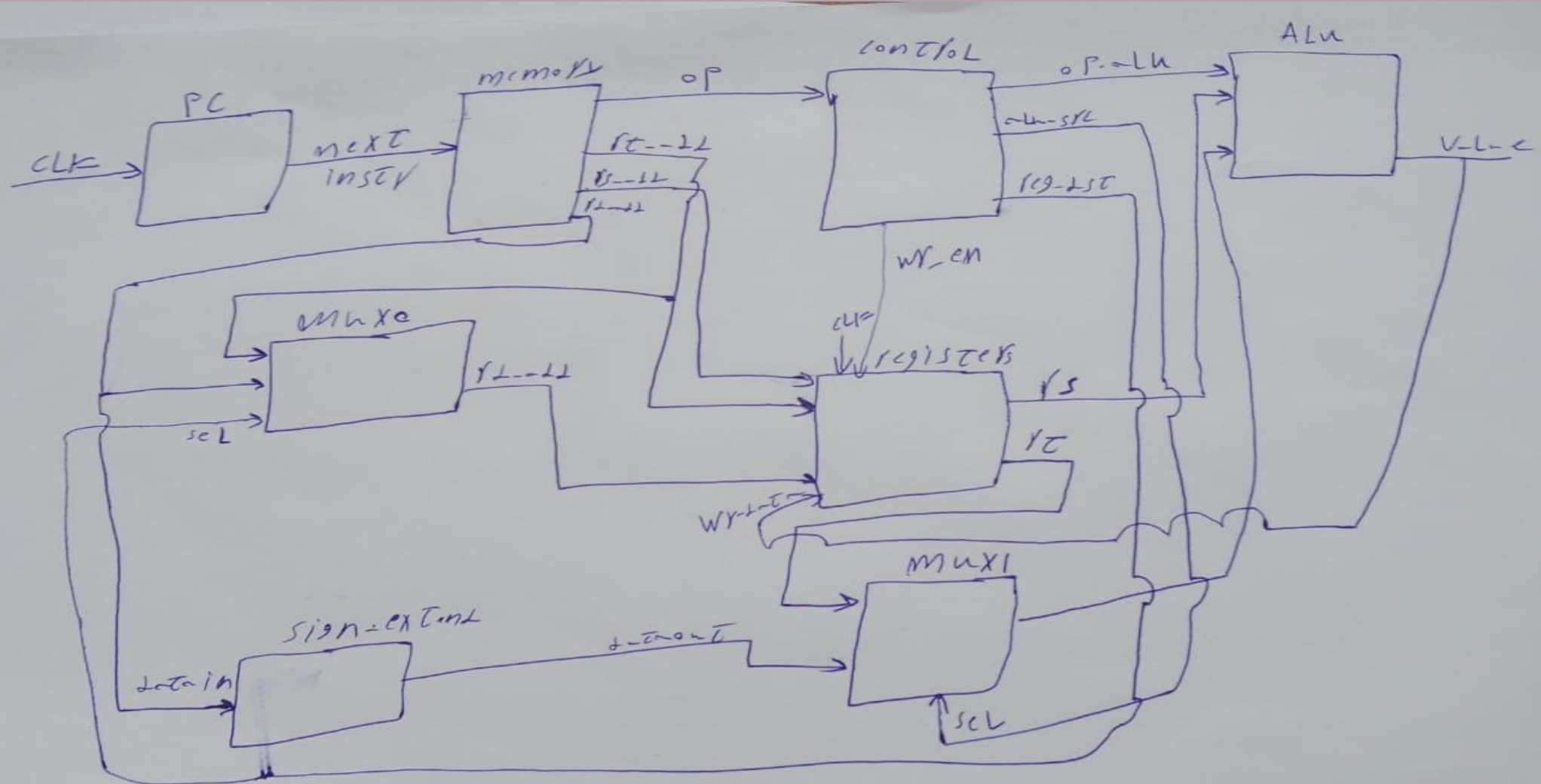
Control Unit:-

ALU_src=> selection line of mux1

Reg_dst=> selection line of mux0



02-8Bit Microprocessor Design



03-Codes

04- Project Live Demo

Thank you