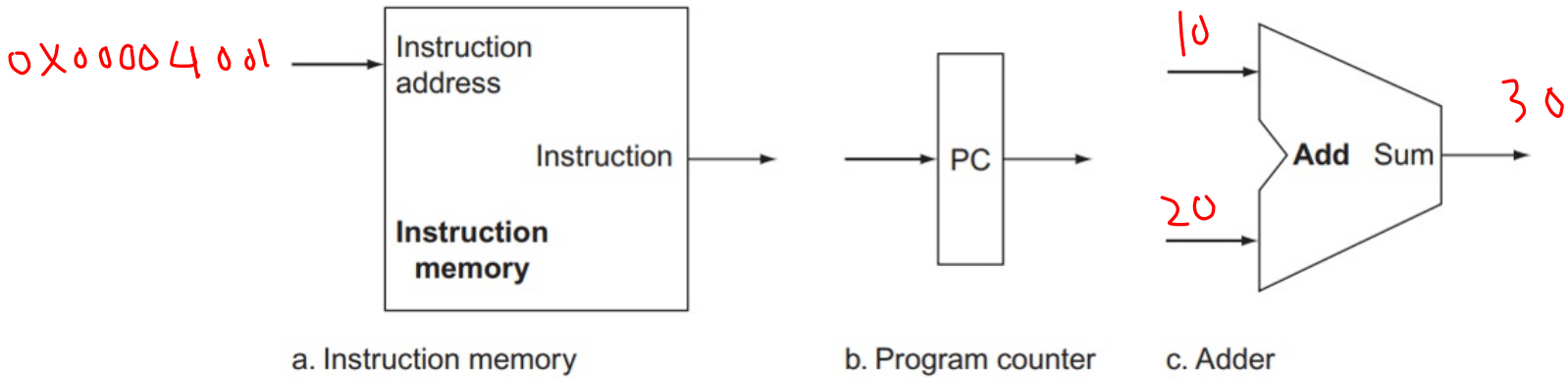
# Chapter 4

Datapath element : A unit used to operate on or hold data within a processor. In the LEGv8 implementation, the datapath elements include the instruction and data memories, the register file, the ALU, and adders

Program counter (PC): A register that contains the address of the current instruction.

Instruction memory: It is the memory that instructions are fetched from, and data memory is the memory where the data is written to and read from.

Adder: An adder is a digital circuit that performs addition of numbers.




a. Instruction memory b. Program counter c. Adder

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MOV  X2, #30
MOV  X3, #20
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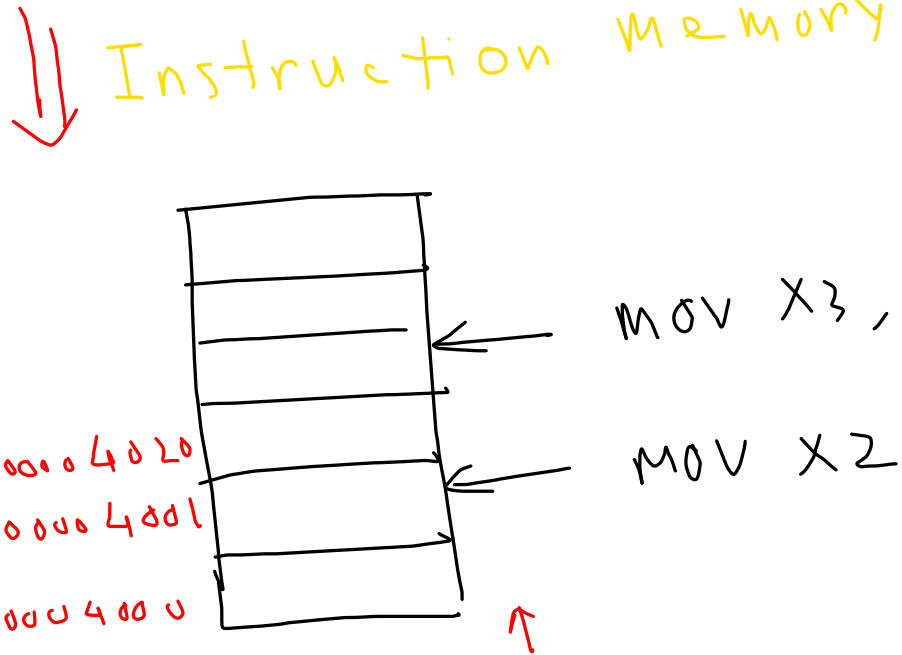
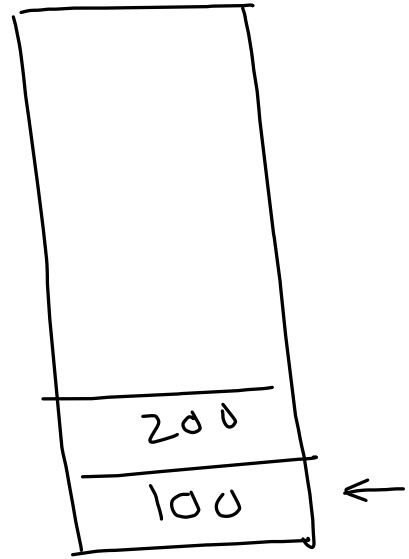


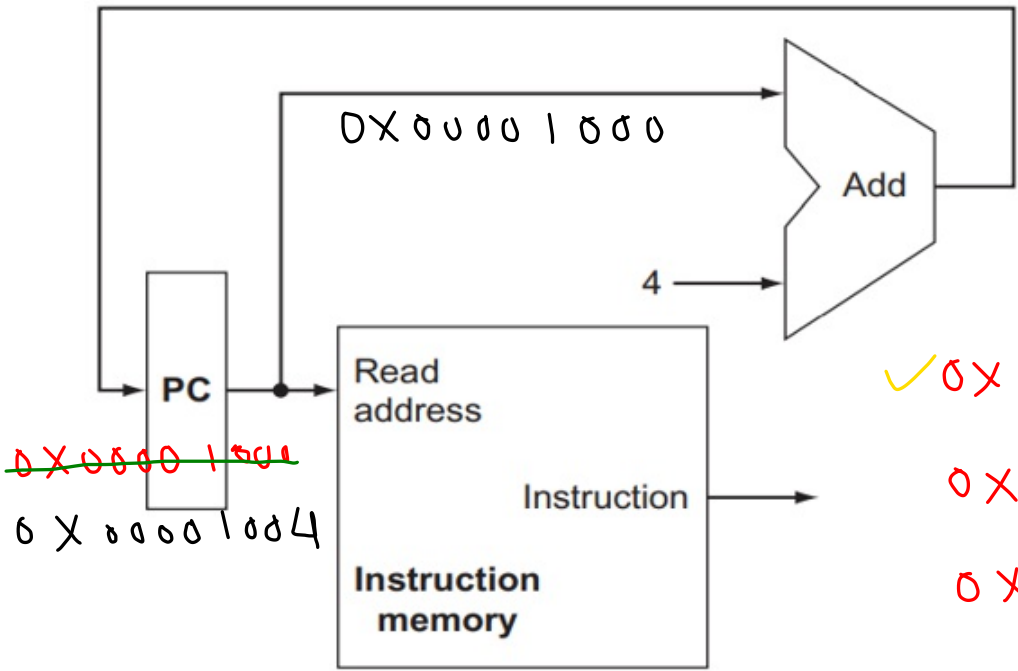



# Instruction Fetch and incrementing Program Counter

•To execute any instruction, we must start by fetching the instruction from memory. To prepare for executing the next instruction, we must also increment the program counter so that it points at the next instruction, 4 bytes later.

(64) LEGv8 - ARMv8

(32) ARMv7 - ARMsim




0X0000 1000 MOV X2, #30

0X0000 1004 MOV X3, #20

0X0000 1008 ADD X1, X2, X3

↑ address

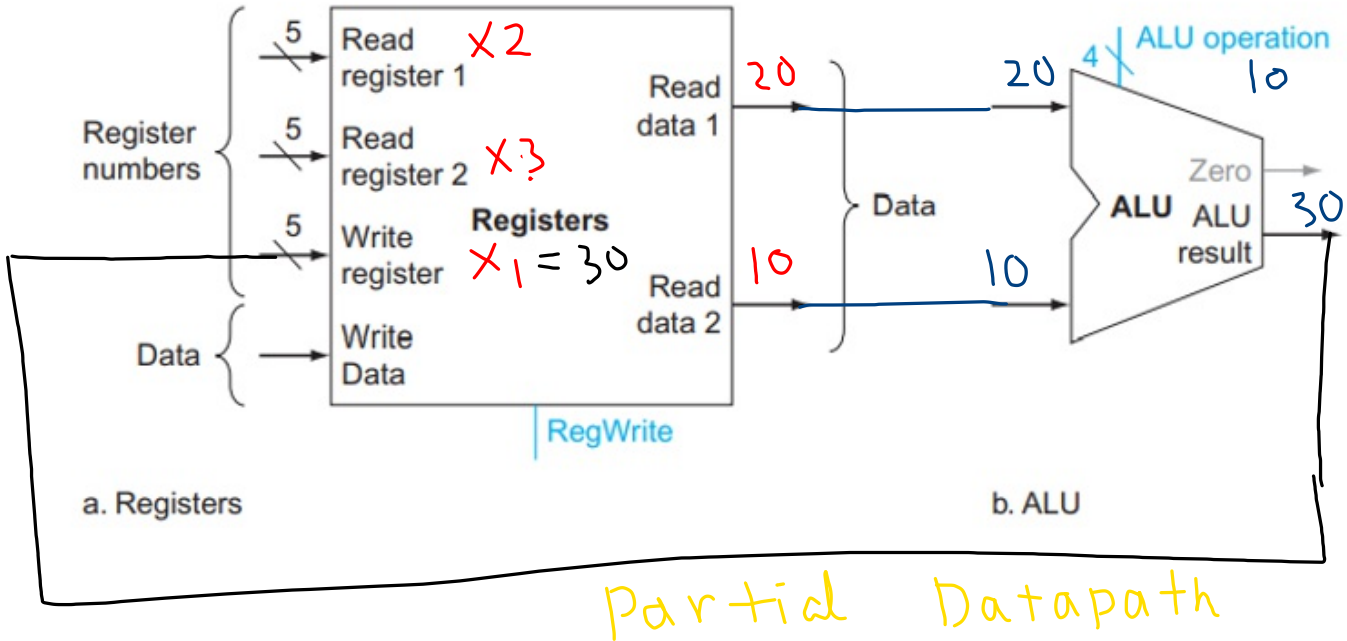
LE Gv 8

Register file: The processor's 32 general-purpose registers are stored in a structure called a register file. A register file is a collection of registers in which any register can be read or written by specifying the number of the register in the file.

ALU: In computing, an arithmetic logic unit (**ALU**) is a combinational digital circuit that performs arithmetic and bitwise operations on integer binary numbers.

ADD X1, X2, X3

Write Register ✓ Read Registers



ADD X1, X2, X3 → X1 = X2+X3

X2 = 20

X3 = 10