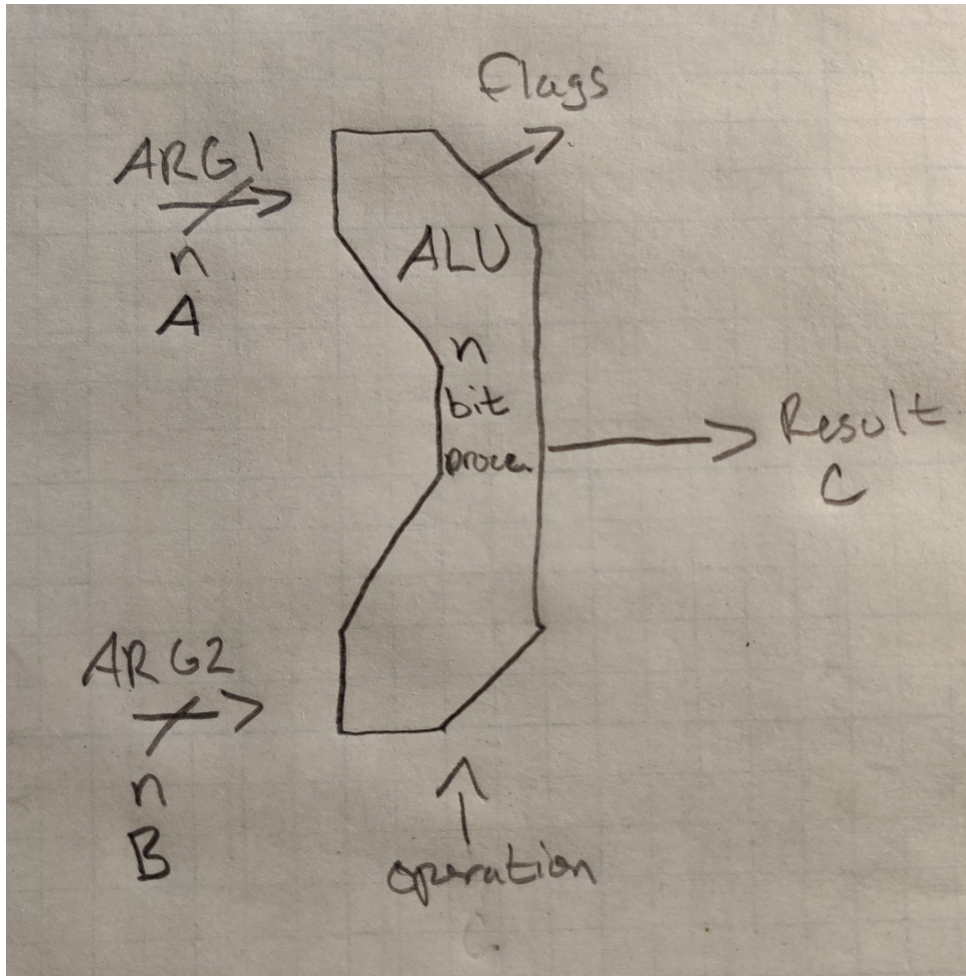


1 The Arithmetic Logic Unit (ALU)

- Located in the CPU
- performs
 - $+$, $-$, \div , \times
 - AND, OR, NOT, etc.
- Accepts 2 args (sometimes just 1)
- Calculates a result
- Accepts an operation
- Outputs flags (status of results)
- Binary operations
 - $a + b$, $a - b$, $a \times b$, $\mathbf{a} \ \& \ \mathbf{b}$, etc.
- Unary Operations
 - $\neg \mathbf{a}$ (negation)
 - $\sim \mathbf{a}$ (inversion)

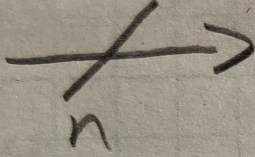
1.1 ALU Layout

Basic Diagram



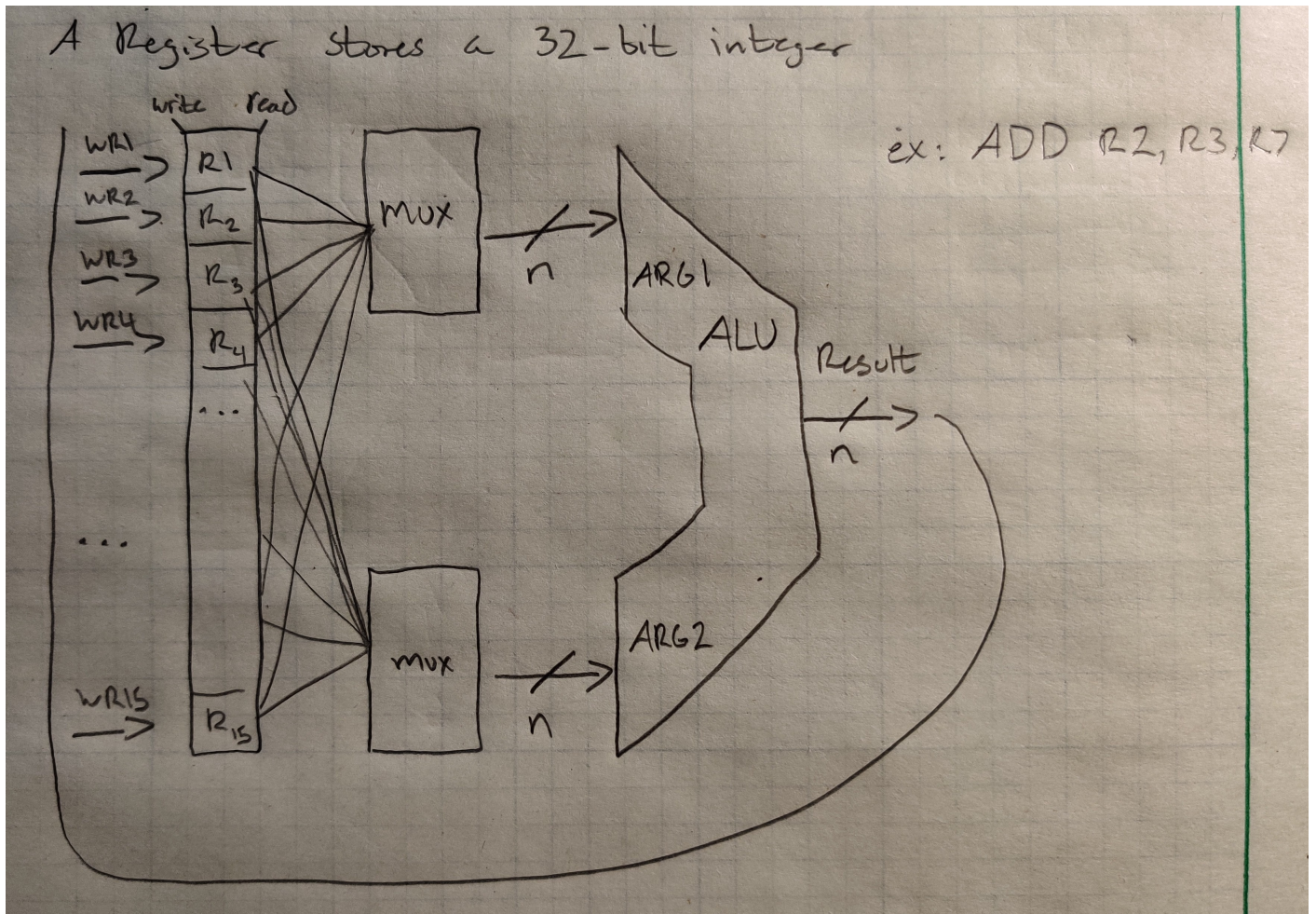
The ALU takes an ARG1 and ARG2 (or A and B) and outputs a result as well as some flags about the result.

The arrows with a slash and n below them are buses:

 Bus
a bus is
like this

Bit₀ —————>
Bit₁ —————>
Bit₂ —————>
Bit₃ —————>
...
Bit_{n-1} —————>

ALU Diagram



Switches called **muxes** will pull 32-bit (n-bit) integers from **registers** $[0, (\frac{n}{2} - 1)]$ and channel them into the ALU's inputs. Then the ALU will calculate a result and write it back into a register. Reading from registers is significantly faster than reading from memory. Values in memory must be loaded into registers before being operated upon.