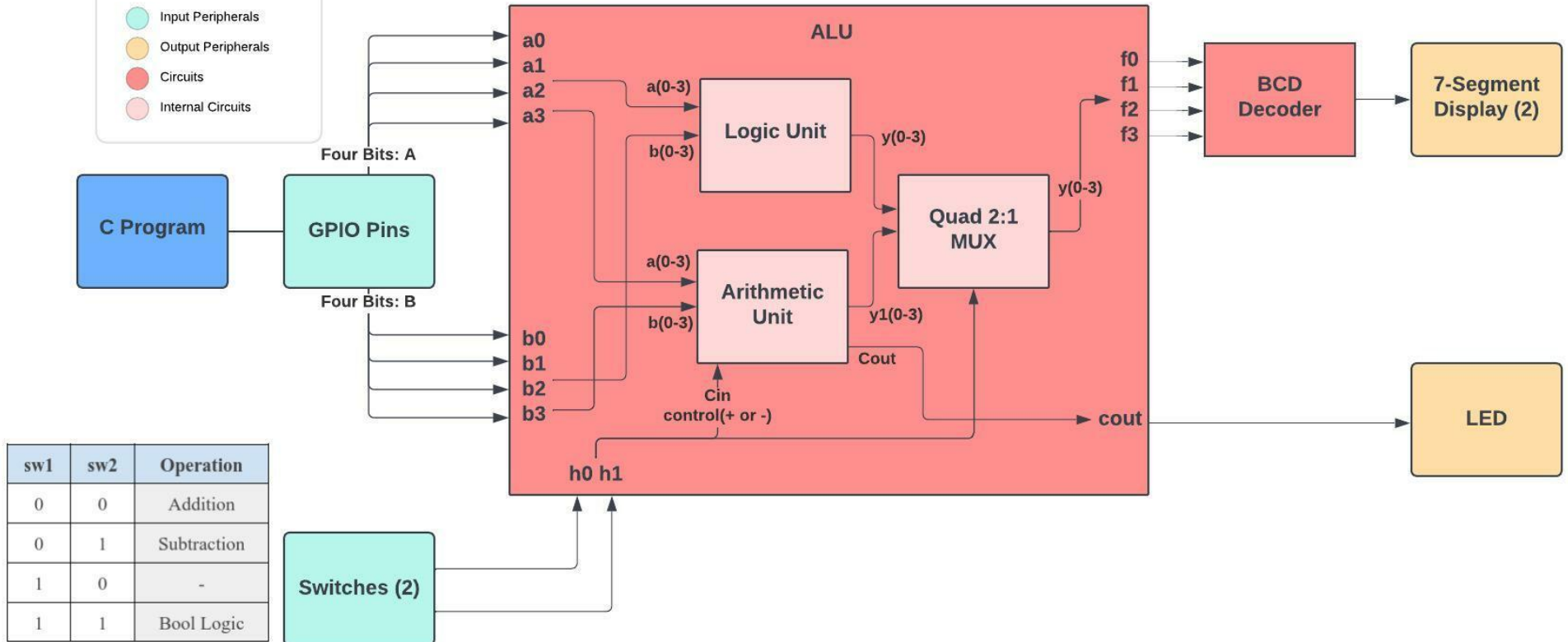# Milestone 2: "Poorman's ALU"
System Design

Diagram Key
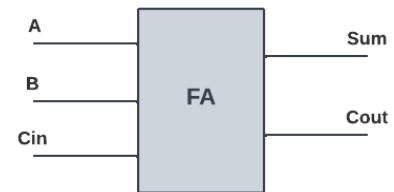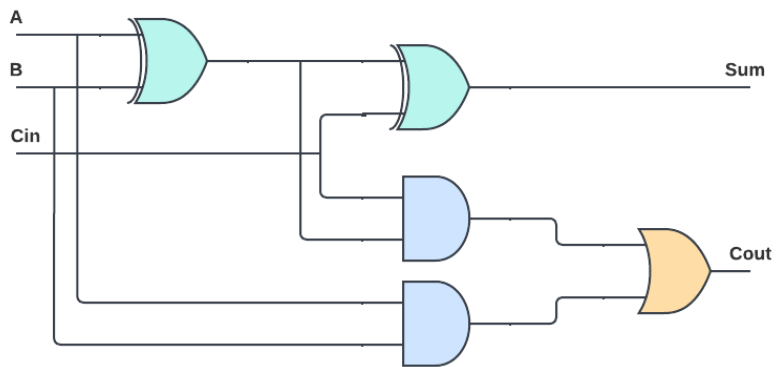
- 🔵 Input Peripherals
- 🟡 Output Peripherals
- 🔴 Circuits
- 🔴 Internal Circuits

C Program — **GPIO Pins**

Four Bits: A

Four Bits: B

ALU

a0
a1
a2
a3

b0
b1
b2
b3

a(0-3)
b(0-3)

Logic Unit — y(0-3)

a(0-3)
b(0-3)

Arithmetic Unit — y1(0-3)

Cout

Quad 2:1 MUX — y(0-3)

Cin
control(+ or -)

h0 h1

cout

f0
f1
f2
f3

BCD Decoder — **7-Segment Display (2)**

LED

sw1	sw2	Operation
0	0	Addition
0	1	Subtraction
1	0	-
1	1	Bool Logic

Switches (2)

Milestone 2: "Poorman's ALU"
Arithmetic Unit: Circuit & Block Diagrams

1-bit Full-Adder (FA)
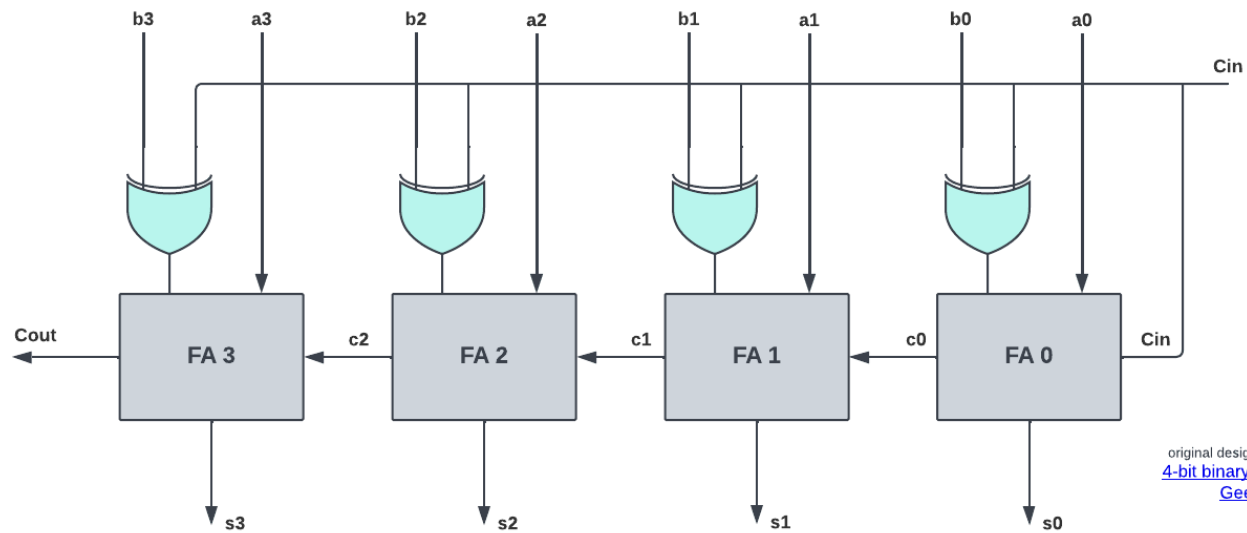
A
B
Cin

Sum

Cout

A
B
Cin

FA

Sum

Cout

4-bit Full-Adder

b3 a3   b2 a2   b1 a1   b0 a0

Cin

Cout

FA 3   c2   **FA 2**   c1   **FA 1**   c0   **FA 0**   Cin

s3   s2   s1   s0

Full Circuit Design (Integrating the Two from Above)

b3 a3   b2 a2   b1 a1   b0 a0
                                                    Cin

cout   s3   c2   s2   c1   s1   c1   s0
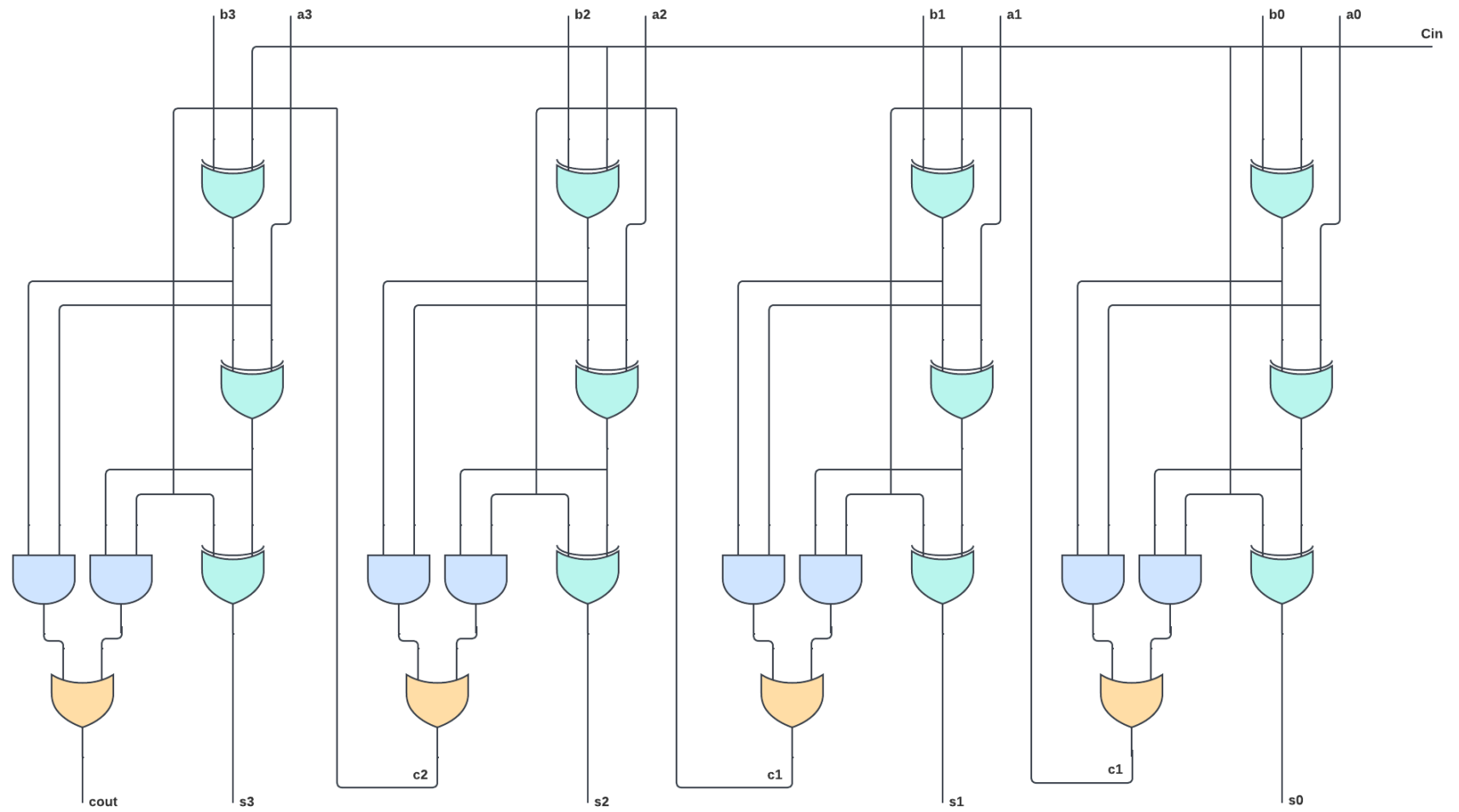
Logic Unit Will consist of AND gates that send 4-bits to the MUX. I've not Yet designed the MUX

Milestone 2: "Poorman's ALU"
Logic Unit Circuit Diagram

a0

a1   r0

a2   r1

a3

b0   r2

b1

b2   r3

b3