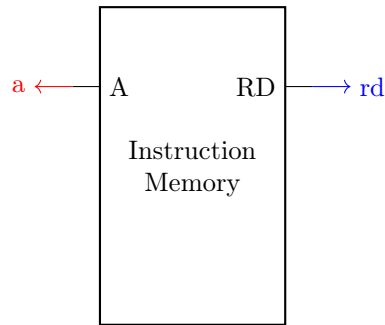


RISC-V Processor Circui*Tik*Z Library

March 11, 2025

1 Components

1.1 Instruction Memory

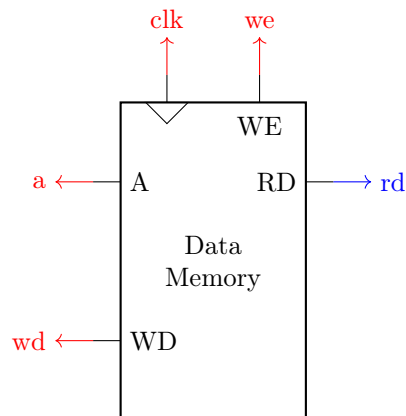


```

1 \begin{circuitikz}
2   \node[instrmem, align=center] (comp) {
3     Instruction\\Memory};
4   \draw[->, red] (comp.a) -- ++(-.5, 0) node[
5     left] {a};
6   \draw[->, blue] (comp.rd) -- ++(.5, 0) node[
7     right] {rd};
8 \end{circuitikz}

```

1.2 Data Memory

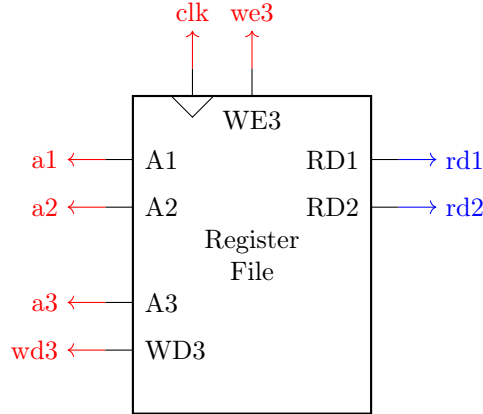


```

1 \begin{circuitikz}[]
2   \node[datamem, align=center] (comp) {Data\\
3     Memory};
4   \draw[->, red] (comp.a) -- ++(-.5, 0) node[
5     left] {a};
6   \draw[->, red] (comp.wd) -- ++(-.5, 0) node[
7     left] {wd};
8   \draw[->, red] (comp.clk) -- ++(0, .5) node[
9     above] {clk};
10  \draw[->, red] (comp.we) -- ++(0, .5) node[
11    above] {we};
12  \draw[->, blue] (comp.rd) -- ++(.5, 0) node[
13    right] {rd};
14 \end{circuitikz}

```

1.3 Register File

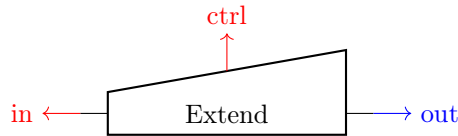


```

1 \begin{circuitikz}[]
2 \node[regfile, align=center] (comp) {
3   Register\\File};
4 \draw[->, red] (comp.a1) -- ++(-.5, 0)
5   node[left] {a1};
6 \draw[->, red] (comp.a2) -- ++(-.5, 0)
7   node[left] {a2};
8 \draw[->, red] (comp.a3) -- ++(-.5, 0)
9   node[left] {a3};
10 \draw[->, red] (comp.wd3) -- ++(-.5,
11   0) node[left] {wd3};
12
13 \draw[->, red] (comp.clk) -- ++(0, .5)
14   node[above] {clk};
15 \draw[->, red] (comp.we3) -- ++(0, .5)
16   node[above] {we3};
17 \draw[->, blue] (comp.rd1) -- ++(.5,
18   0) node[right] {rd1};
19 \draw[->, blue] (comp.rd2) -- ++(.5,
20   0) node[right] {rd2};
21 \end{circuitikz}

```

1.4 Extend Unit

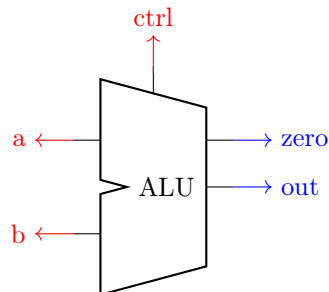


```

1 \begin{circuitikz}[]
2 \node[extend, align=center] (comp) {
3   Extend};
4 \draw[->, red] (comp.in) -- ++(-.5, 0)
5   node[left] {in};
6 \draw[->, red] (comp.ctrl) -- ++(0, .5)
7   node[above] {ctrl};
8 \draw[->, blue] (comp.out) -- ++(.5, 0)
9   node[right] {out};
10 \end{circuitikz}

```

1.5 Arithmetic Logic Unit

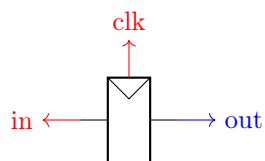


```

1 \begin{circuitikz}[]
2 \node[alu, align=center] (comp) {ALU};
3 \draw[->, red] (comp.a) -- ++(-.5, 0) node[left] {
4   a};
5 \draw[->, red] (comp.b) -- ++(-.5, 0) node[left] {
6   b};
7 \draw[->, red] (comp.ctrl) -- ++(0, .5) node[above
8   ] {ctrl};
9 \draw[->, blue] (comp.out) -- ++(.5, 0) node[right
10  ] {out};
11 \draw[->, blue] (comp.zero) -- ++(.5, 0) node[
12   right] {zero};
13 \end{circuitikz}

```

1.6 Register

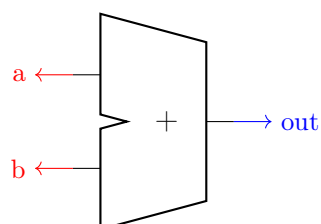


```

1 \begin{circuitikz}[]
2   \node[reg, align=center] (comp) {};
3   \draw[->, red] (comp.in) -- ++(-.5, 0) node[left] {in};
4   \draw[->, red] (comp.clk) -- ++(0, .5) node[above] {clk};
5   \draw[->, blue] (comp.out) -- ++(.5, 0) node[right] {out};
6 \end{circuitikz}

```

1.7 Adder

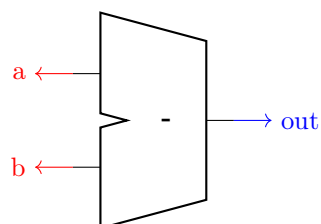


```

1 \begin{circuitikz}[]
2   \node[adder, align=center] (comp) {};
3   \draw[->, red] (comp.a) -- ++(-.5, 0) node[left] {a};
4   \draw[->, red] (comp.b) -- ++(-.5, 0) node[left] {b};
5   \draw[->, blue] (comp.out) -- ++(.5, 0) node[right] {out};
6 \end{circuitikz}

```

1.8 Subtractor

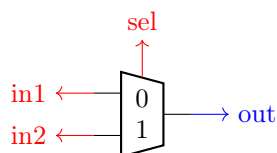


```

1 \begin{circuitikz}[]
2   \node[sub, align=center] (comp) {};
3   \draw[->, red] (comp.a) -- ++(-.5, 0) node[left] {a};
4   \draw[->, red] (comp.b) -- ++(-.5, 0) node[left] {b};
5   \draw[->, blue] (comp.out) -- ++(.5, 0) node[right] {out};
6 \end{circuitikz}

```

1.9 Multiplexer

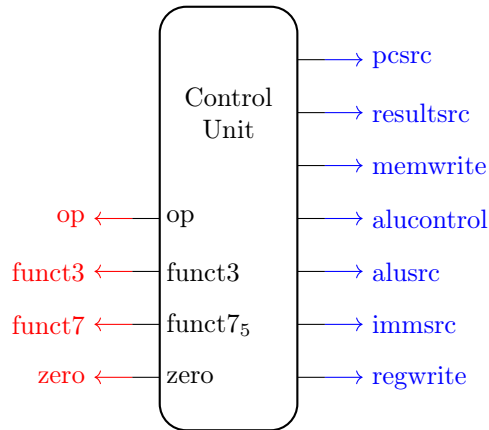


```

1 \begin{circuitikz}[]
2   \node[mux, align=center] (comp) {};
3   \draw[->, red] (comp.in1) -- ++(-.5, 0) node[left] {in1};
4   \draw[->, red] (comp.in2) -- ++(-.5, 0) node[left] {in2};
5   \draw[->, red] (comp.sel) -- ++(0, .5) node[above] {sel};
6   \draw[->, blue] (comp.out) -- ++(.5, 0) node[right] {out};
7 \end{circuitikz}

```

1.10 Single-Cycle Control Unit



```

1 \begin{circuitikz}[]
2   \node[ctrlunitsc, align=center] (comp)
3     {Control\\Unit};
4   \draw[->, red] (comp.op) -- ++(-.5, 0)
5     node[left] {op};
6   \draw[->, red] (comp.funct3) --
7     ++(-.5, 0) node[left] {funct3};
8   \draw[->, red] (comp.funct7) --
9     ++(-.5, 0) node[left] {funct7};
10  \draw[->, red] (comp.zero) -- ++(-.5,
11    0) node[left] {zero};
12
13  \draw[->, blue] (comp.pcsrc) -- ++(.5,
14    0) node[right] {pcsrc};
15  \draw[->, blue] (comp.resultsrc) --
16    ++(.5, 0) node[right] {resultsrc};
17  \draw[->, blue] (comp.memwrite) --
18    ++(.5, 0) node[right] {memwrite};
19  \draw[->, blue] (comp.alucontrol) --
20    ++(.5, 0) node[right] {alucontrol};
21  \draw[->, blue] (comp.alusrc) --
22    ++(.5, 0) node[right] {alusrc};
23  \draw[->, blue] (comp.immsrc) --
24    ++(.5, 0) node[right] {immsrc};
25  \draw[->, blue] (comp.regwrite) --
26    ++(.5, 0) node[right] {regwrite};
27 \end{circuitikz}

```

2 Single-Cycle RISC-V Processor

