Building An ALU

Arithmetic and Logic Unit
Components

- AND Gate
  ![AND Gate Diagram]

- OR Gate
  ![OR Gate Diagram]

- NOT Gate
  ![NOT Gate Diagram]

- Adder
  ![Adder Diagram]

- Multiplexor
  ![Multiplexor Diagram]
One-bit ALU
One-bit ALU

Diagram showing a one-bit ALU with inputs 'a', 'b', 'b Invert', 'Carry In', and 'Control'. The ALU includes logic gates for addition and carry-out, with outputs 'Out' and 'Carry Out'.
32-bit ALU

Carry In

Control

Carry Out

ALU
One-bit ALU -- MIPS

Diagram of a one-bit ALU with inputs a, b, set, and outputs Carry In, aInv, bNeg, Select Out, Carry Out, Out. The diagram includesMUX and logic gates for the ALU operations.
One-bit ALU -- MIPS High Bit
32-bit ALU -- MIPS

b  32  a  32

Carry In

Control

b0  a0
b1  a1
b2  a2
b3  a3
b30 a30
b31 a31

Zero

Overflow

32 Result

Carry Out

Result

32
Register-Register Data Path

Reg 1 Read  
Reg 2 Read  
Reg Write   
Write Data  

Read Data 1  
Read Data 2  

Write Enable  
Clock  

ALU Control  
Zero  
Overflow  

ALU Control  
Zero  
Overflow  

ALU