

Instruction format(16-bit):

R-type:

Opcode(4-bit)	Rs(4-bit)	Rt(4-bit)	Rd(4-bit)
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I-type:

Opcode(4-bit)	Rs(4-bit)	Rt(4-bit)	Imm/Address/Offset (4-bit)
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Instructions and Opcodes:

Instruction	Op Code	format
add	0000	R
sub	0001	R
mul	0010	R
div	0011	R
ori	0100	I
nor	0101	R
nand	0110	R
sw	0111	I
lw	1000	I
blt	1001	I






Control Unit Truth Table:

	R-format	ori	sw	lw	blt
RegDst	1	0	X	0	X
Alusrc	0	1	1	1	0
MemToReg	0	0	X	1	X
RegWrite	1	1	0	1	0
MemWrite	0	0	1	0	0
Branch	0	0	0	0	1
ExtOp	X	0	1	1	0
Aluctr	Op[2:0]	Op[2:0]	000	Op[2:0]	Op[2:0]

add, sub, mul, div, nor and nand are the same but with different Opcodes.

List - Default											
ps	delta	/ControlUnit_tb/Opcode /ControlUnit_tb/RegDst /ControlUnit_tb/ALUSrc /ControlUnit_tb/MemtoReg /ControlUnit_tb/RegWrite /ControlUnit_tb/MemWrite /ControlUnit_tb/Branch /ControlUnit_tb/ExtOp /ControlUnit_tb/ALUctr /ControlUnit_tb/RegWrite									
0	+0	0000	StX	StX	StX	StX	StX	StX	StX	StX	xxx
0	+2	0000	St1	St0	St0	St1	St0	St0	St0	St0	000
100	+0	0001	St1	St0	St0	St1	St0	St0	St0	St0	000
100	+2	0001	St1	St0	St0	St1	St0	St0	St0	St0	001
200	+0	0010	St1	St0	St0	St1	St0	St0	St0	St0	001
200	+2	0010	St1	St0	St0	St1	St0	St0	St0	St0	010
300	+0	0011	St1	St0	St0	St1	St0	St0	St0	St0	010
300	+2	0011	St1	St0	St0	St1	St0	St0	St0	St0	011
400	+0	0101	St1	St0	St0	St1	St0	St0	St0	St0	011
400	+2	0101	St1	St0	St0	St1	St0	St0	St0	St0	101
500	+0	0110	St1	St0	St0	St1	St0	St0	St0	St0	101
500	+2	0110	St1	St0	St0	St1	St0	St0	St0	St0	110
600	+0	0100	St1	St0	St0	St1	St0	St0	St0	St0	110
600	+2	0100	St0	St1	St0	St1	St0	St0	St0	St0	100
700	+0	0111	St0	St1	St0	St1	St0	St0	St0	St0	100
700	+2	0111	St0	St1	St0	St0	St1	St0	St0	St1	000
800	+0	1000	St0	St1	St0	St0	St1	St0	St0	St1	000
800	+2	1000	St0	St1	St1	St1	St1	St0	St0	St1	000
900	+0	1001	St0	St1	St1	St1	St1	St0	St0	St1	000
900	+2	1001	St0	St0	St0	St0	St0	St0	St1	St0	001

Adder and subtractor tests:

Wave - Default		Msgs				
 /ALU_tb/A	10	12	35	12	10	
 /ALU_tb/B	10	35	12	35	10	
 /ALU_tb/Opcode	001	000	001			
 /ALU_tb/Result	0	47	23	-23	0	
 /ALU_tb/ZERO	St1					

Wave - Default

Time	Signal	Value
2	JALU, rd/a	100
4	JALU, rd/b	69
010	JALU, rd/Opcode	011
8	JALU, rd/Result	3
	JALU, rd/ZERO	0
S10		

Wave - Default

Signal	Value
/ALU_tb/A	0000000000001100
/ALU_tb/B	000000000000101
/ALU_tb/Opcode	101
/ALU_tb/Result	1111111111110010
/ALU_tb/ZERO	S0