

RV32I Base Instruction Set

(Assembled by jinho.rho)

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	TYPE	MNEMONIC	NAME	Descript	Note						
Funct7 (7)							Register Source 2 (5)					Register Source 1 (5)					Funct3 (3)			Register Destination (5)					Opcode (7)																	
0	0	0	0	0	0	0	rs2					rs1					0 0 0			rd					0 1 1 0 0 1 1							R-TYPE	ADD	ADD	rd = rs1 + rs2							
0	1	0	0	0	0	0	rs2					rs1					0 0 0			rd					0 1 1 0 0 0 1 1								SUB	SUB	rd = rs1 - rs2							
0	0	0	0	0	0	0	rs2					rs1					0 0 1			rd					0 1 1 0 0 0 1 1								SLL	Shift Left Logical	rd = rs1 << rs2							
0	0	0	0	0	0	0	rs2					rs1					1 0 1			rd					0 1 1 0 0 0 1 1								SRL	Shift Right Logical	rd = rs1 >> rs2							
0	1	0	0	0	0	0	rs2					rs1					1 0 1			rd					0 1 1 0 0 0 1 1								SRA	Shift Right Arith*	rd = rs1 >>> rs2	msb-extends						
0	0	0	0	0	0	0	rs2					rs1					0 1 0			rd					0 1 1 0 0 0 1 1								SLT	Set Less Than	rd = (rs1 < rs2) ? 1:0							
0	0	0	0	0	0	0	rs2					rs1					0 1 1			rd					0 1 1 0 0 0 1 1								SLTU	Set Less Than (U)	rd = (rs1 < rs2) ? 1:0	zero-extends						
0	0	0	0	0	0	0	rs2					rs1					1 0 0			rd					0 1 1 0 0 0 1 1								XOR	XOR	rd = rs1 ^ rs2							
0	0	0	0	0	0	0	rs2					rs1					1 1 0			rd					0 1 1 0 0 0 1 1								OR	OR	rd = rs1 rs2							
0	0	0	0	0	0	0	rs2					rs1					1 1 1			rd					0 1 1 0 0 0 1 1								AND	AND	rd = rs1 & rs2							

add x7, x5, x6 # x7 = x5 + x6

sub x7, x5, x6 # x7 = x5 - x6

sll x7, x5, x6 # x7 = x5 << x6

srl x7, x5, x6 # x7 = x5 >> x6

sra x7, x5, x6 # x7 = x5 >>> x6

slt x7, x5, x6 # x7 = 1 if x5 < x6 else 0

sltu x7, x5, x6 # x7 = 1 if x5 < x6 else 0

xor x7, x5, x6 # x7 = x5 ^ x6

or x7, x5, x6 # x7 = x5 | x6

and x7, x5, x6 # x7 = x5 & x6

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immediate (7)							shift amount (5)					Register Source 1 (5)					Funct3 (3)					Register Destination (5)					Opcode (7)							L-TYPE	LB	Load Byte	rd = M[rs1+imm][0:7]	
imm[11:0]												rs1					0 0 0					rd					0 0 0 0 0 0 1 1								LH	Load Half	rd = M[rs1+imm][0:15]	
imm[11:0]												rs1					0 1 0					rd					0 0 0 0 0 0 1 1								LW	Load Word	rd = M[rs1+imm][0:31]	
imm[11:0]												rs1					1 0 0					rd					0 0 0 0 0 0 1 1								LBU	Load Byte (U)	rd = M[rs1+imm][0:7]	zero-extends
imm[11:0]												rs1					1 0 1					rd					0 0 0 0 0 0 1 1								LHU	Load Half (U)	rd = M[rs1+imm][0:15]	zero-extends
imm[11:0]												rs1					0 0 0					rd					0 0 1 0 0 0 1 1							I-TYPE	ADDI	ADD Immediate	rd = rs1 + imm	
imm[11:0]												rs1					0 1 0					rd					0 0 1 0 0 0 1 1								SLTI	Set Less Than Imm	rd = (rs1 < imm) ? 1 : 0	
imm[11:0]												rs1					0 1 1					rd					0 0 1 0 0 0 1 1								SLTIU	Set Less Than Imm (U)	rd = (rs1 < imm) ? 1 : 0	
imm[11:0]												rs1					1 0 0					rd					0 0 1 0 0 0 1 1								XORI	XOR Immediate	rd = rs1 ^ imm	
imm[11:0]												rs1					1 1 0					rd					0 0 1 0 0 0 1 1								ORI	OR Immediate	rd = rs1 imm	
imm[11:0]												rs1					1 1 1					rd					0 0 1 0 0 0 1 1								ANDI	AND Immediate	rd = rs1 & imm	
0	0	0	0	0	0	0	shamt					rs1					0 0 1					rd					0 0 1 0 0 0 1 1								SLLI	Shift Left Logical Imm	rd = rs1 << shamt[0:4]	
0	0	0	0	0	0	0	shamt					rs1					1 0 1					rd					0 0 1 0 0 0 1 1								SRLI	Shift Right Logical Imm	rd = rs1 >> shamt[0:4]	
0	1	0	0	0	0	0	shamt					rs1					1 0 1					rd					0 0 1 0 0 0 1 1								SRAI	Shift Right Arith Imm	rd = rs1 >>> shamt[0:4]	

lb x5, 0(x10) # Load byte from memory

lh x5, 0(x10) # Load halfword from memory

lw x5, 0(x10) # Load word from memory

lbu x7, 4(x10)

lhu x7, 6(x10)

addi x7, x5, 10 # x7 = x5 + 10

slti x7, x5, 10 # x7 = 1 if x5 < 10 else 0

sltiu x7, x5, 10 # x7 = 1 if x5 < 10 else 0

xori x7, x5, 0xFF # x7 = x5 ^ 0xFF

ori x7, x5, 0x0F # x7 = x5 | 0x0F

andi x7, x5, 0xF0 # x7 = x5 & 0xF0

slli x7, x5, 4 # x7 = x5 << 4

srli x7, x5, 4 # x7 = x5 >> 4

srai x7, x5, 4 # x7 = x5 >>> 4

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immediate (7)							Register Source 2 (5)					Register Source 1 (5)					Funct3 (3)			immediate (5)					Opcode (7)							S-TYPE	SB	Store Byte	M[rs1+imm][0:7] = rs2[0:7]	
imm[11:5]							rs2					rs1					0 0 0			imm[4:0]					0 1 0 0 0 0 1 1								SH	Store Half	M[rs1+imm][0:15] = rs2[0:15]	
imm[11:5]							rs2					rs1					0 0 1			imm[4:0]					0 1 0 0 0 0 1 1								SW	Store Word	M[rs1+imm][0:31] = rs2[0:31]	
imm[11:5]							rs2					rs1					0 1 0			imm[4:0]					0 1 0 0 0 0 1 1											