Risc V Reference Card

Instruction Formats

31 25	24 20	19 15	14 11	7	6 0	
funct7	rs2	rs1	funct3	rd	opcode	R-type
imm[11:0]		rs1	funct3	rd	opcode	I-type
imm[11:5]	rs2	rs1	imm[4:0]	rd	opcode	S-type
imm[12|10:5]	rs2	rs1	imm[4:1|11]	rd	opcode	B-type
imm[31:12]				rd	opcode	U-type
imm[20|10:1|11|19:12]				rd	opcode	J-type

RV32I Base Instructions

Name	Fmt	Opcode	Funct3	Funct7	Assembly	Description	Note
Add	R	0110011	000	0000000	add rd, rs1, rs2	$rd = rs1 + rs2$	
Subtract	R	0110011	000	0100000	sub rd, rs1, rs2	$rd = rs1 - rs2$	
AND	R	0110011	111	0000000	and rd, rs1, rs2	$rd = rs1 \wedge rs2$	
OR	R	0110011	110	0000000	or rd, rs1, rs2	$rd = rs1 \vee rs2$	
XOR	R	0110011	100	0000000	xor rd, rs1, rs2	$rd = rs1 \oplus rs2$	
Shift Left Logical	R	0110011	001	0000000	sll rd, rs1, rs2	$rd = rs1 \ll rs2$	
Set Less Than	R	0110011	010	0000000	slt rd, rs1, rs2	$rd = (rs1 < rs2)?1 : 0$	
Set Less Than (U)	R	0110011	011	0000000	sltu rd, rs1, rs2	$rd = (rs1 < rs2)?1 : 0$	zero extends [1]
Shift Right Logical	R	0110011	101	0000000	srl rd, rs1, rs2	$rd = rs1 \gg rs2$	
Shift Right Arithmetic	R	0110011	101	0100000	srl rd, rs1, rs2	$rd = rs1 \gg rs2$	msb extends [2]

[2]Assumes values are unsigned integers
[2]Fills in with sign bit during right shift

Bibliography

[1] C. A. R. Hoare. Communicating sequential processes. *Communications of the ACM*, 21(8):666–677, 1978. ISSN 1557-7317.

[2] B. Vinter and K. Skovhede. Synchronous message exchange for hardware designs. *Communicating Process Architectures*, pages 201–212, 2014.