ANEXO INFORMATIVO

1. Principais formatos das instruções em RISC-V

31 27	26 25	24 20	19 15	14 12	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	funct3	imm[4:0]	opcode	S-type
imm[12|10:5]		rs2	rs1	funct3	imm[4:1|11]	opcode	B-type
imm[31:12]					rd	opcode	U-type
imm[20|10:1|11|19:12]					rd	opcode	J-type

2. Formato, opcode, funct3 e funct7 de algumas instruções RISC-V

Inst	Name	FMT	Opcode	funct3	funct7	Description (C)	Note
add	ADD	R	0110011	0x0	0x00	rd = rs1 + rs2	
sub	SUB	R	0110011	0x0	0x20	rd = rs1 - rs2	
xor	XOR	R	0110011	0x4	0x00	rd = rs1 ^ rs2	
or	OR	R	0110011	0x6	0x00	rd = rs1 | rs2	
and	AND	R	0110011	0x7	0x00	rd = rs1 & rs2	
addi	ADD Immediate	I	0010011	0x0	–	rd = rs1 + imm	
lb	Load Byte	I	0000011	0x0	–	rd = M[rs1+imm][0:7]	
lbu	Load Byte (U)	I	0000011	0x4	–	rd = M[rs1+imm][0:7]	zero-extends
lw	Load Word	I	0000011	0x2	–	rd = M[rs1+imm][0:31]	
sw	Store Word	S	0100011	0x2	–	M[rs1+imm][0:31] = rs2[0:31]	

3. Registradores de uso geral da RISC-V:

Register	ABI Name	Description	Saver
x0	zero	Zero constant	—
x1	ra	Return address	Caller
x2	sp	Stack pointer	Callee
x3	gp	Global pointer	—
x4	tp	Thread pointer	—
x5-x7	t0-t2	Temporaries	Caller
x8	s0 / fp	Saved / frame pointer	Callee
x9	s1	Saved register	Callee
x10-x11	a0-a1	Fn args/return values	Caller
x12-x17	a2-a7	Fn args	Caller
x18-x27	s2-s11	Saved registers	Callee
x28-x31	t3-t6	Temporaries	Caller

4. Formatos de ponto flutuante em IEEE-754:

Single Precision: 32 bits no total; 1 bit para o sinal, 8 bits para expoente com viés de 127, e 23 bits para a fração.

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
s	expoente								fração																						
(1)	(8 bits, viés de 127)								(23 bits)																						

$$\text{Viés} = 2^{(\text{bits do } e)-1} - 1$$

$$\text{Forma normalizada} = \underbrace{1}_{\text{MSB}} \cdot \overbrace{\text{bbb}\ldots\text{bbb}}^{\text{fração}} \times 2^{e} \quad \text{(significando)}$$