

CS21BTECH11061 - Vishal Vijay Devadiga

Lab 8

Testing my Code

I tested my code using a file containing all possible types of instruction covering all cases for labels, offsets .etc.

1	00208033	1	L6: add x0, x1, x2
2	405201b3	2	sub x3, x4, x5
3	0083c333	3	L5: xor x6, x7, x8
4	00b564b3	4	or x9, x10, x11
5	00e6f633	5	and x12, x13, x14
6	011817b3	6	sll x15, x16, x17
7	0149d933	7	srl x18, x19, x20
8	417b5ab3	8	sra x21, x22, x23
9	020c8c13	9	addi x24, x25, 32
10	ff0dcd13	10	xori x26, x27, -16
11	01beee13	11	ori x28, x29, 27
12	c1907f13	12	andi x30, x0, -999
13	02e09e93	13	L4: slli x29, x1, 46
14	0177d793	14	srli x15, x15, 23
15	43d15e13	15	srai x28, x2, 61
16	03b18223	16	sb x27, 36(x3)
17	fda21e23	17	L3: sh x26, -36(x4)
18	0792a223	18	sw x25, 100(x5)
19	ff833e23	19	sd x24, -4(x6)
20	007b8e63	20	beq x23, x7, L1
21	028b1a63	21	bne x22, x8, L2
22	02f7d863	22	bge x15, x15, L2
23	fe9ac4e3	23	blt x21, x9, L3
24	fcaa6ae3	24	bltu x20, x10, L4
25	fab9f4e3	25	bgeu x19, x11, L5
26	ff460967	26	jalr x18, x12, -12
27	00068883	27	L1: lb x17, 0(x13)
28	ffc71803	28	lh x16, -4(x14)
29	0047a783	29	lw x15, 4(x15)
30	0c883703	30	ld x14, 200(x16)
31	f388c683	31	lbu x13, -200(x17)
32	e7095603	32	lhu x12, -400(x18)
33	1909e583	33	lwu x11, 400(x19)
34	f7dff7ef	34	L2: jal x15, L6
35	100001b7	35	lui x3, 65536

One interesting case i observed is the `srai` instruction. The risc-V card says that for `srai` instruction, `imm[6:11] = 0x20 = 32`. But, during testing, I observed that the value of `imm[6:11]` of the instruction in the **Ripes Emulator** is `0x10 = 16`.

Coding Approach

Below are the steps i took in the code:

1. Initialize input, output file and other variables(for instance map for labels)

2. Execute a loop for number of lines as iterations where:

1. Take input from file
 2. Convert the hex to binary number
 3. Extract the format from opcode
 4. Set all required variables such as rs1,rs2 .etc using the binary expression according to the type of instruction
 5. Decode the instruction by opcode, func3, and func7
 6. If instruction is a B or J type instruction, replace immediate with a label and add the line number to the map(labels) where the label must be added at the start of the line
 7. Club all the variables to get the disassembled instruction
 8. Write the lines to the output file
3. As done with writing all the lines, read the output file, and create another file and add the required labels at the start of the line
4. Replace the output file with the new file and rename it as "output.txt"

If an instruction does not adhere to the risc-V card, then my code outputs a error line on the terminal.