User GUIDE

① Open **simulator-1.0-SNAPSHOT.jar**

② Click Button **[IPL],** and the Simulator is initialized.

If you want to use the simulator, you must click IPL first.

How to Test Floating Point Instructions/Vector Operations

Here are some instructions:

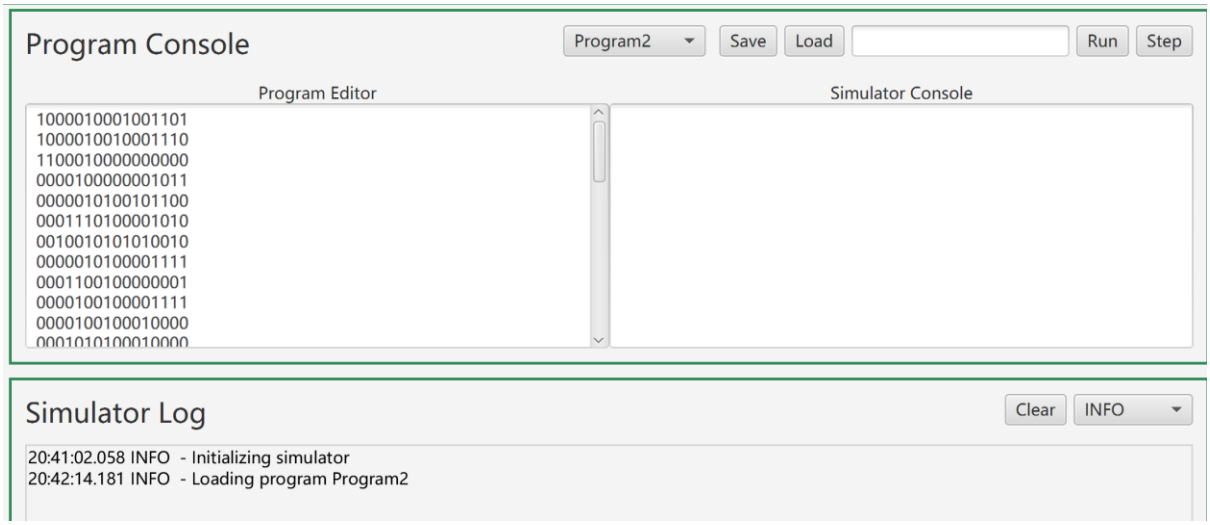
- ✧ Deposit FR0 and memory[22] a floating point number first. (e.g. FR0 = 2.0, memory[22] = 3.25)
- ➢ FADD FR0,0,0,22 (FR0 = FR0 + memory[22])
  0110110000010110
- ➢ FSUB FR0,0,0,22 (FR0 = FR0 – memory[22])
  0111000000010110
- ✧ Deposit R0 0 or 1, if R0 = 0, deposit memory[23] a floating point number, if R0 = 1, deposit memory[23] a fixed point number.
- ➢ CNVRT R0,0,0,23 (if R0 = 0, R0 = (float->int) memory[23]; if R0 = 1, FR0 = (int->float) memory[23])
  0111110000010111
- ✧ Deposit some values to memory and registers

FR0	2.0
Memory[20]	100
Memory[21]	200
Memory[100]	1
Memory[101]	2
Memory[200]	3
Memory[201]	4

- ➢ VADD FR0,0,0,20
  (Vector1 starts from 100(memory[20]) and Vector2 starts from 200(memory[21]))
  1000110000010100
- ➢ VSUB FR0,0,0,20
  1001000000010100
- ✧ memory[24] = 3;
  memory[25] = 0.25(0010000000000000->Fixed-point decimal representation);
- ➢ LDFR FR0,0,0,24 (FR0 = memory[24]. memory[25])
  1010000000011000
- ➢ STFR FR0,0,0,24 (memory[24]. memory[25] = FR0)
  1010010000011000

How to Run Program2 (included in Part3)

Program2 is pre-stored in a file, thus you can select Program2 in **ComboBox [programNameSelector]** and see pre-stored instructions for program 2 in **Program Editor**.



To test program 2:

① Click Button **[PreStroeMemoryForProgram2]**

That will store some values into memory, which helps run the program2;

memory[12]	0000001000000000	512	Word store start
memory[13]	0000000001000000	64	for X1
memory[14]	0000000001100000	96	for X2
memory[15]	0000000000000001	1	sentence number
memory[16]	0000000000000001	1	word number

② Click Button **[LoadProgram2]**

That will store instructions used program2 into memory [64-100] and set the PC =64.

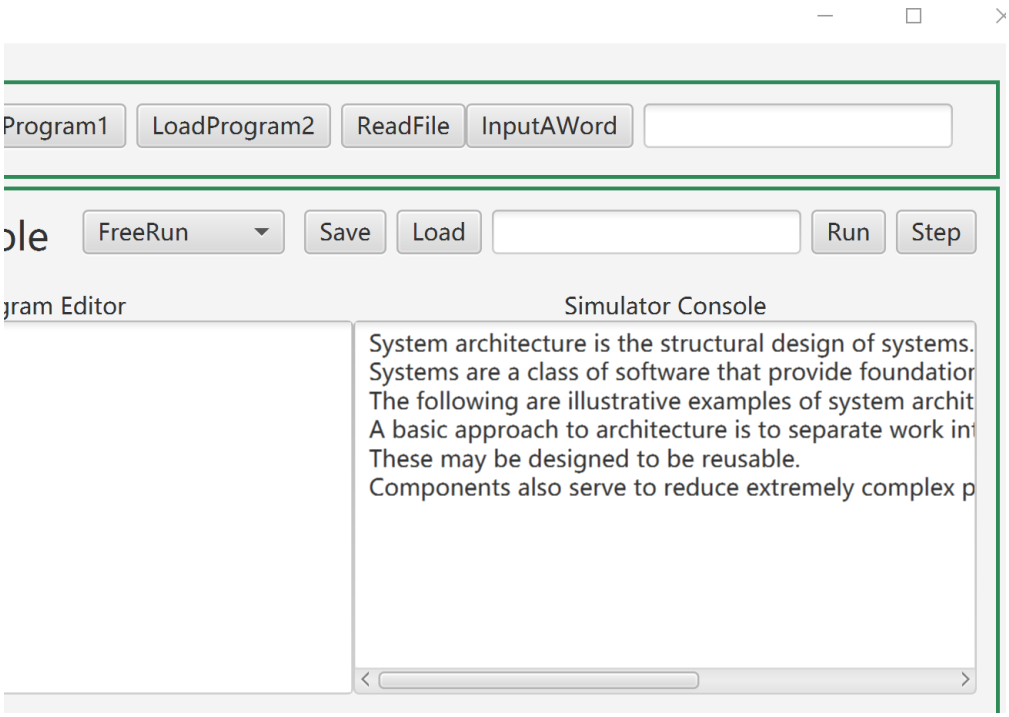
For more details of programs, please check **program2.xlsx**

If you want to load program2 manually, make sure program2 is stored from memory [64].

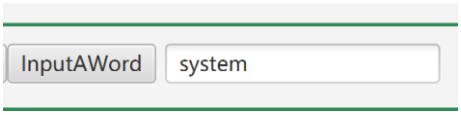
③ Click Button **[ReadFile]**

Our simulator will read "program2_paragraph.txt" and store each word into memory automatically.

("**simulator-1.0-SNAPSHOT.jar" and** *"program2_paragraph.txt" should be* in the same folder.)

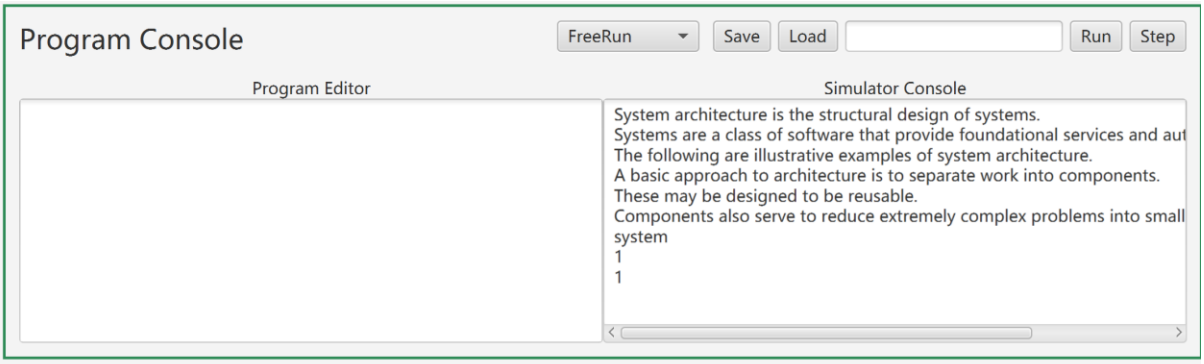


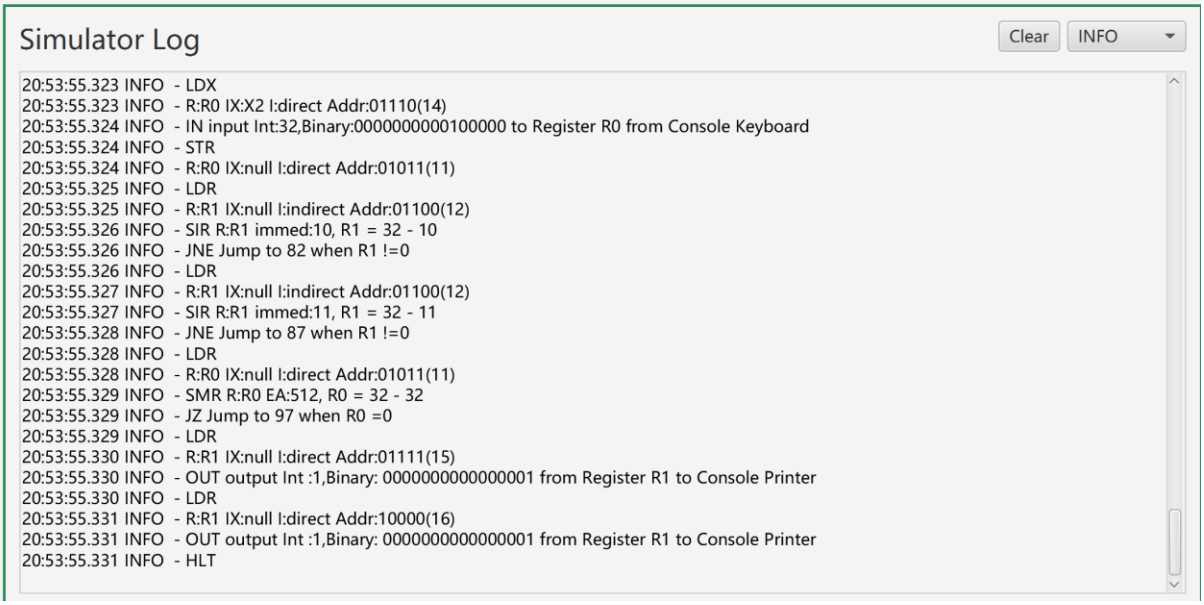
④ Input a word here, such as “system,” then click **[InputAWord]**.



⑤ Then click **[Run]** or **[Step]** to run the program2. After executing instructions orderly, the Simulator Log will output information about what our simulator has done.

⑥ The word, sentence number and word number will output in Simulator Console.

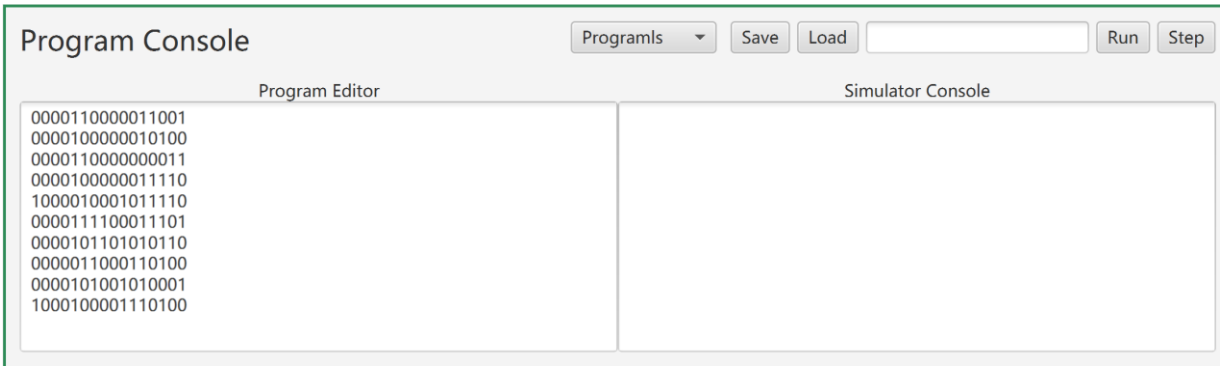




A quick test on Instructions (included in Part2)

We have pre-stored a “Load and Store Test Program” supporting quick experiments.

① Select **[ProgramIs],** it will be loaded automatically.



② Input a number in the *TextField if you need it.*

③ Click Button **[Load],** and then the **“programIs”** will be loaded to memory start from StartIndex(input in last step) or Default Location(no input), which is 32.

④ Then click **[Run]** or **[Step]** to run it.

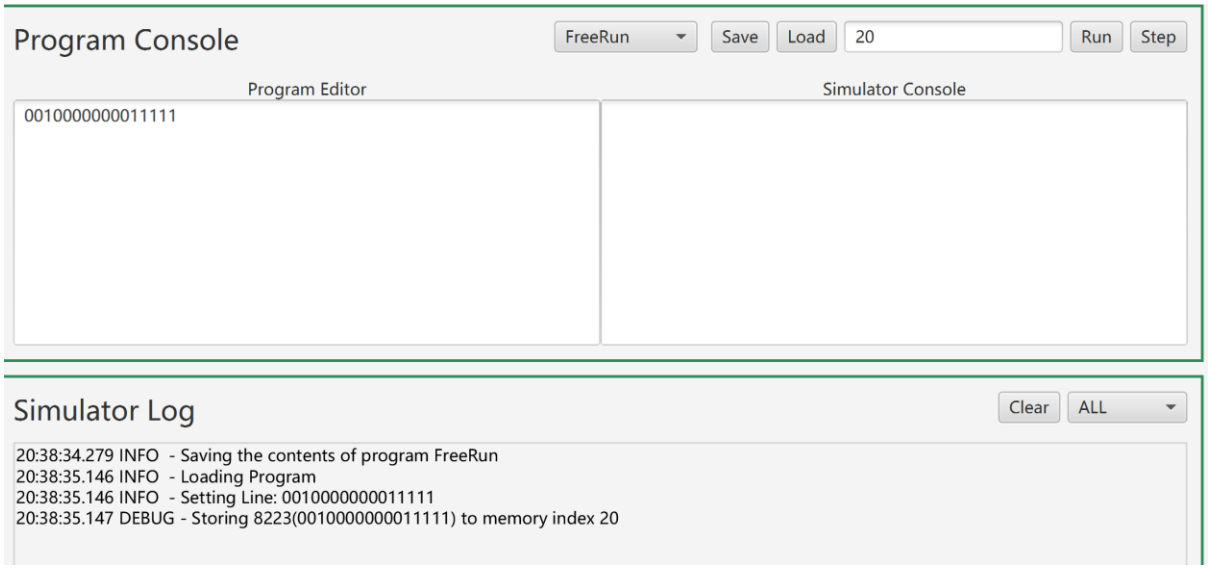
Test instructions freely (included in Part2)

You can use instructions freely by choosing **[FreeRun]** and set your own instructions.

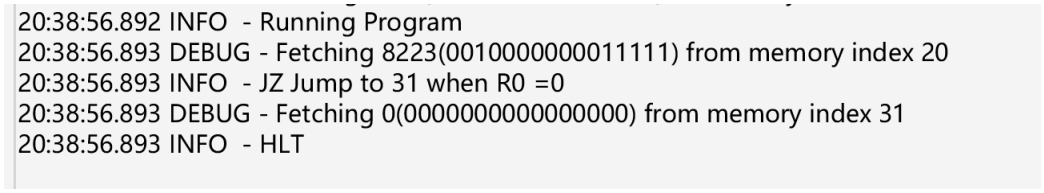
① Input an instruction in Program Editor.

Such as “0010000000011111” (JZ R0,0,31)

② Input in *TextField* an memory index where the instruction will be sored. E.g., we store it in memory[20]



③ Click **[Run]** or **[Step]**, this instruction is executed

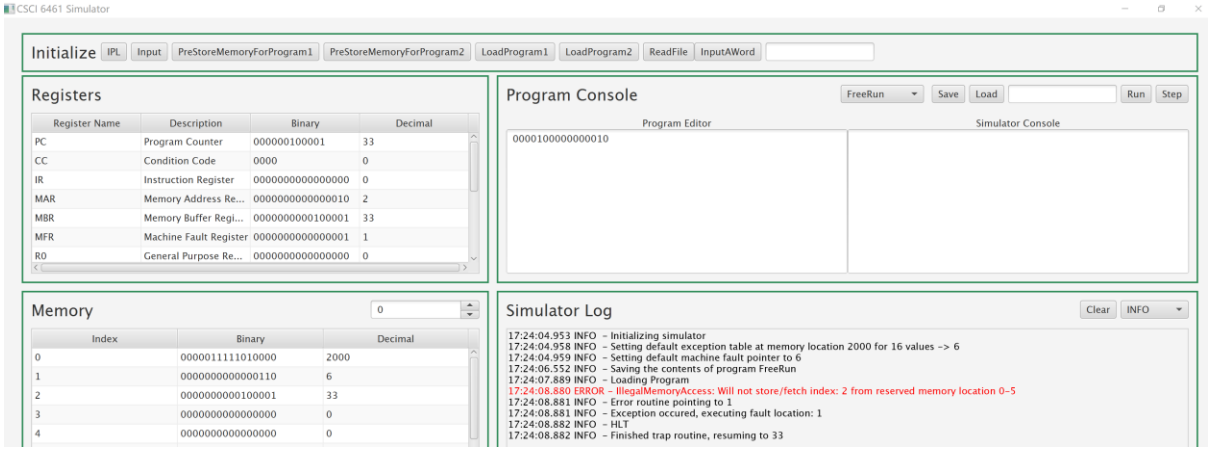


Tests for Machine Fault and Trap (included in Part3)

0 Illegal Memory Address to Reserved Locations **MFR set to binary 0001**
1 Illegal TRAP code **MFR set to binary 0010**
2 Illegal Operation Code **MFR set to 0100**
3 Illegal Memory Address beyond 2048 (memory installed) **MFR set to binary 1000**

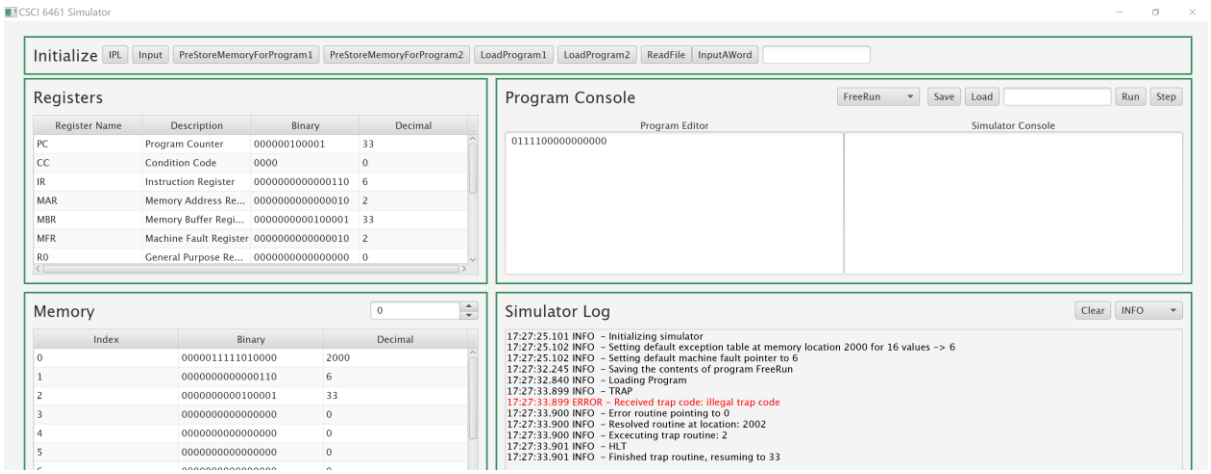
① Illegal Memory Address to Reserved Locations

STR R0,0,2 0000100000000010
Memory[2] is a reserved location, so it will throw IllegalMemoryAccess Exception.



② Illegal TRAP code

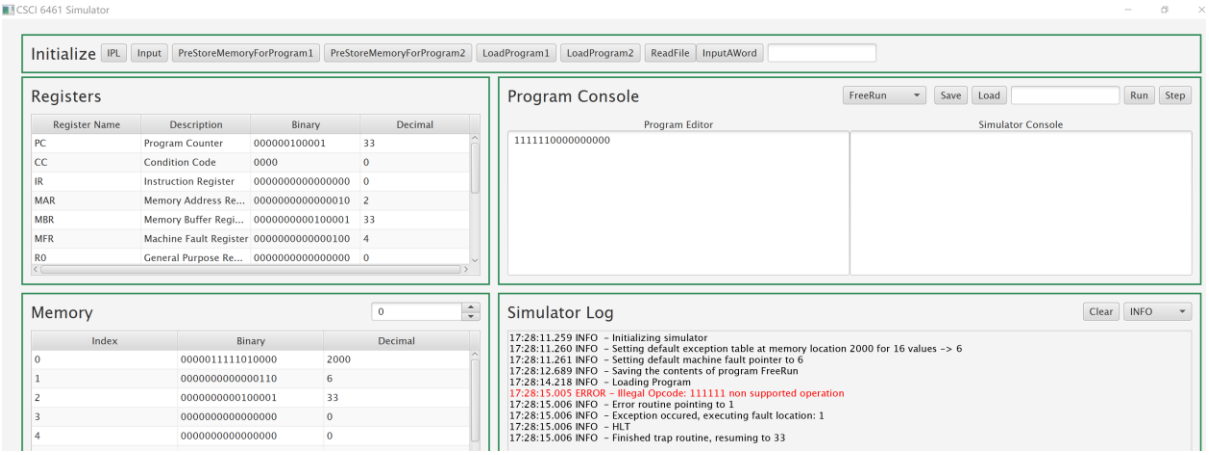
0111100000000000 TRAP 0
We don't have routine 0, so Trap 0 will throw IllegalTrapCode Exception.



③ Illegal Operation Code

1111110000000000

“111111” is not an operation type, so it will throw IllegalOpcode Exception.

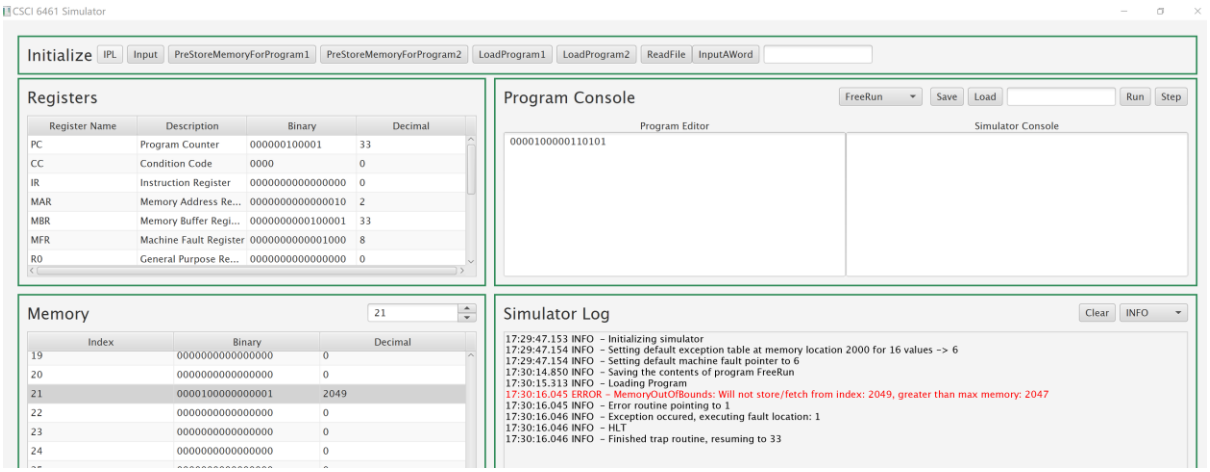


④ Illegal Memory Address beyond 2048

Memory [21] = 2049

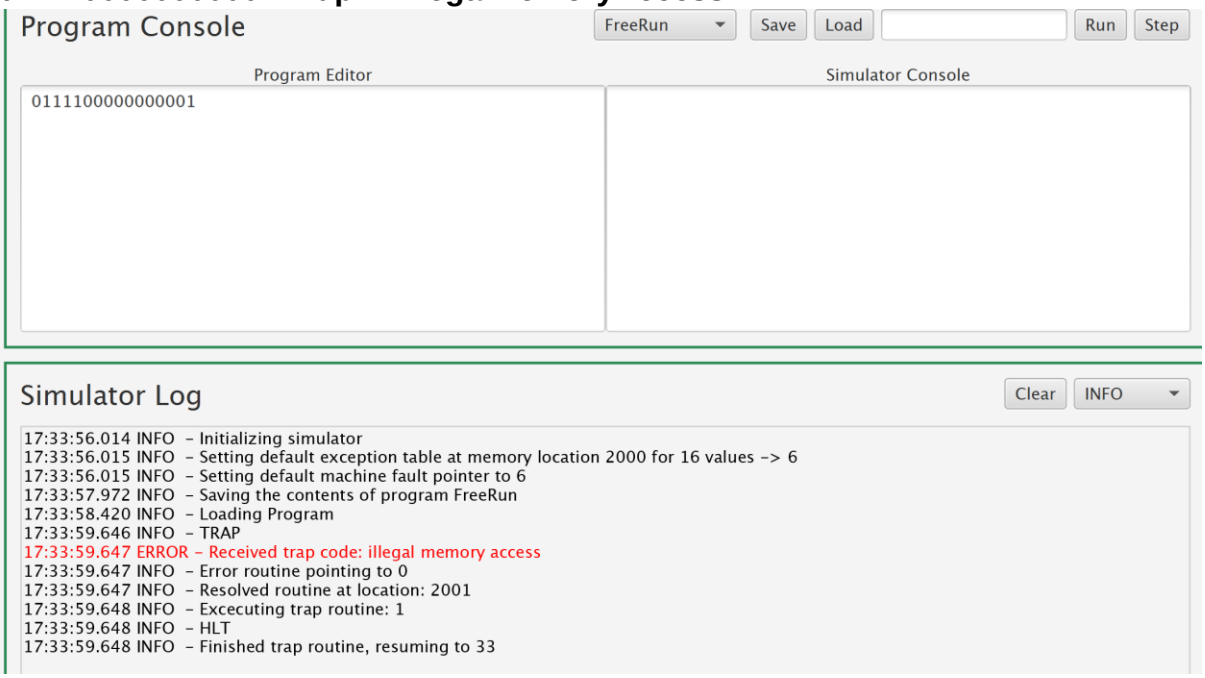
STR R0,1,21 0000100000110101

Memory[2049] is out of bounds, so it will throw MemoryOutOfBounds Exception.

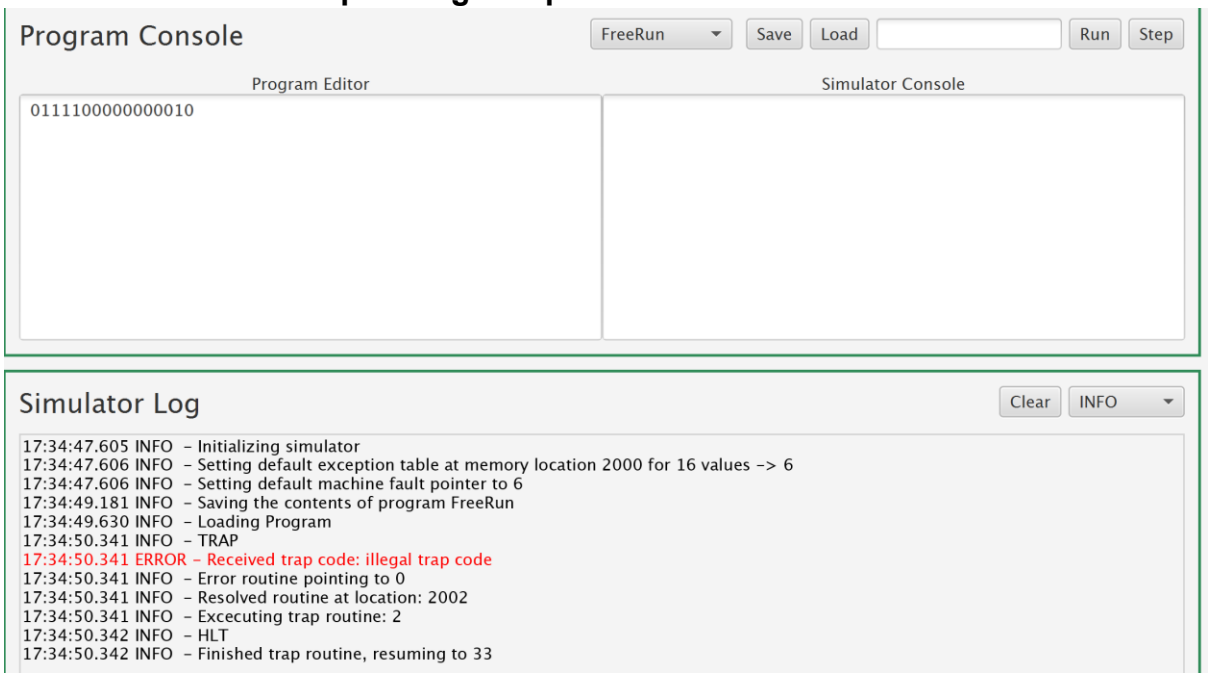


⑤ Trap

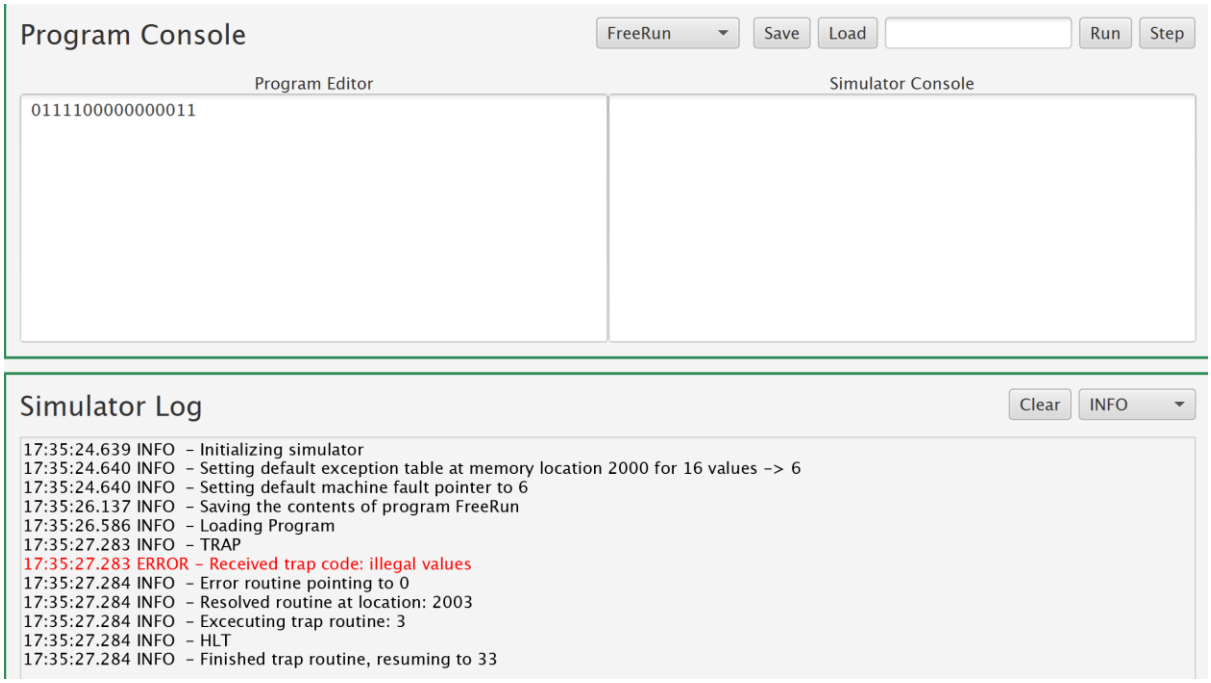
0111100000000001 Trap 1: IllegalMemoryAccess



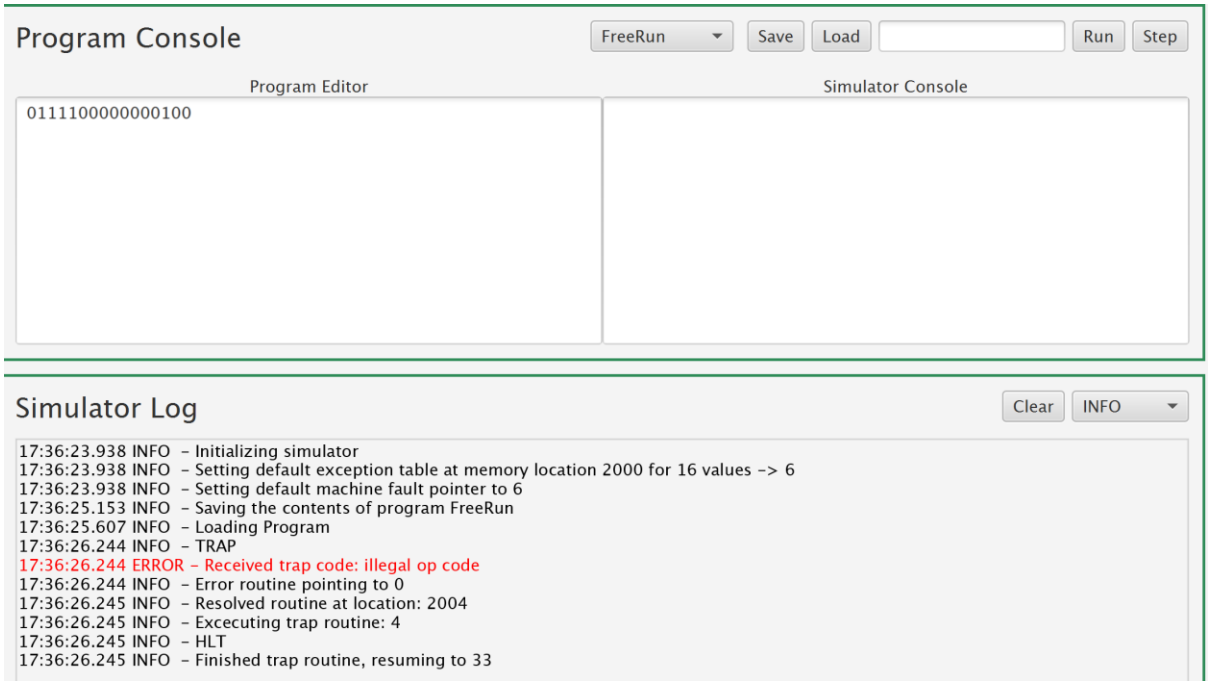
0111100000000010 Trap 2: IllegalTrapCode



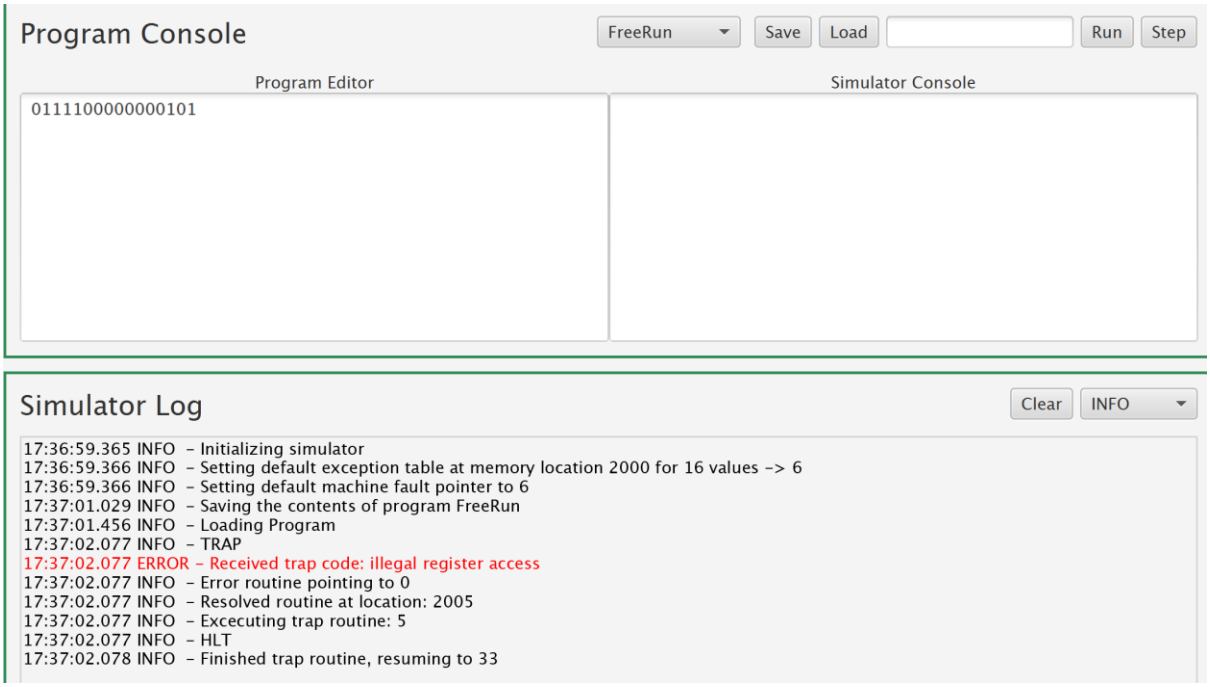
0111100000000011 Trap 3: IllegalValue



0111100000000100 Trap 4: IllegalOpcode



0111100000000101Trap 5: IllegalRegisterAccess



0111100000001000 Trap 8: MemoryOutOfBounds