

User Guide

1. Start machine

1)

press IPL button to start and get initial status.

The image shows a screenshot of a 'Machine Simulator' window. It features a light blue background with various input fields and buttons. At the top, there are four red, yellow, and green window control buttons. The main area is divided into several sections: GPRs (General Purpose Registers) 0-3, IXRs (Instruction Register) 1-3, PC (Program Counter), MAR (Memory Address Register), MBR (Memory Buffer Register), IR (Instruction Register), MFR (Memory Function Register), and a Privileged status checkbox. Below these are two rows of buttons for 'Operation' and 'Address'. The 'Operation' row has buttons for 15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1, 0. The 'Address' row has buttons for 15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1, 0. The 'LD' button is highlighted in red.

Register	Value	LD
GPR 0	0	LD
GPR 1	0	LD
GPR 2	0	LD
GPR 3	0	LD
IXR 1	111	LD
IXR 2	1100100	LD
IXR 3	1111101000	LD
PC	111	LD
MAR	0	LD
MBR	0	LD
IR	0	LD
MFR	0	LD
Privileged	<input type="checkbox"/>	

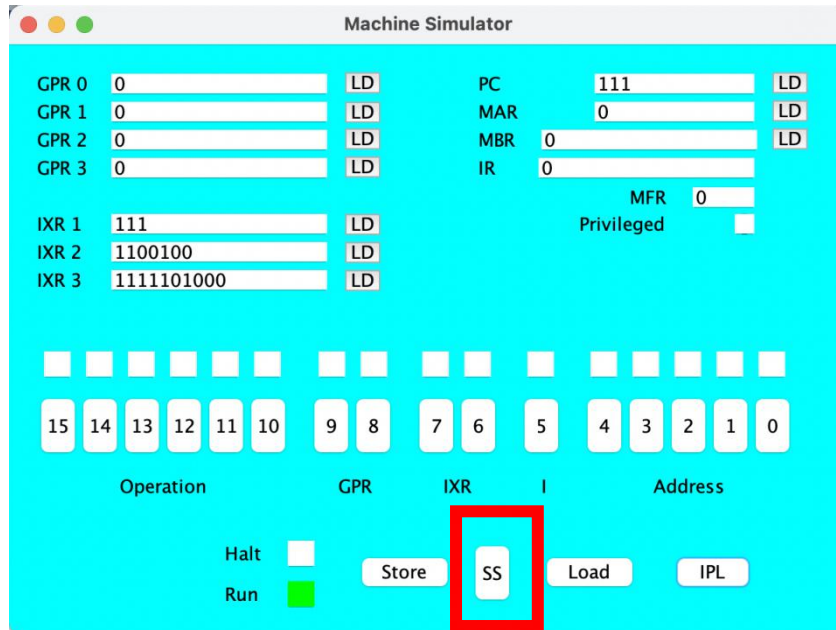
Operation: 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0

Address: 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0

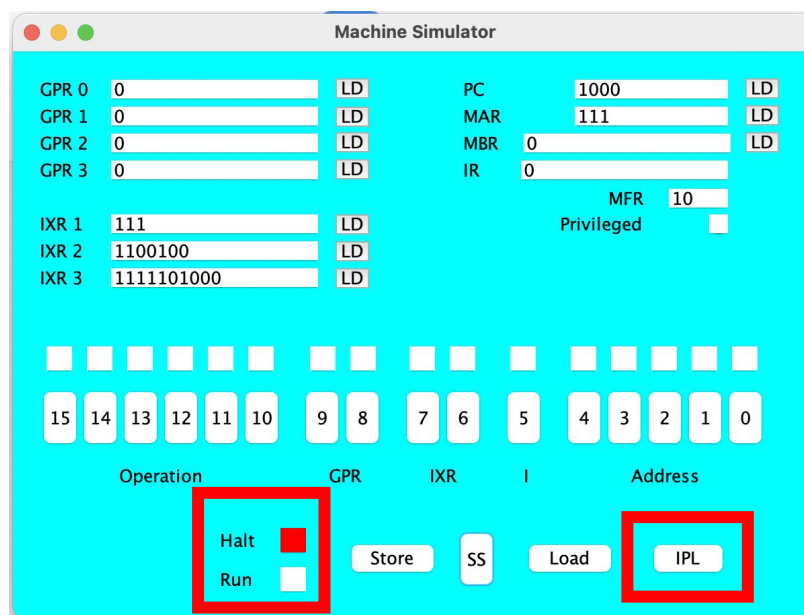


2. Run instructions in IPL

1) If the IPL.txt consist instructions starting from location 0, use SS button to run the instructions in the IPL.txt one by one. (opcode include halt, LDR, STR and LDA, LDX, STX which are 0, 1, 2, 3, 33, 34)



2) If the machine run all the instructions in the IPL.txt and reach the end or get the halt instruction which is 0, or the IPL.txt does not consists correct instructions, the machine will halt. Then the machine will not work anymore. Then you should press IPL button to restart the machine.



3. load and store button

1) If the IPL.txt is not instructions, then you can use load and store button to get the data from the memory or write the data to the memory.

2) For load instruction, type the correct instructions in the textbox with correct opcode "000001" (If the opcode is not correct, the machine will halt and need to be restarted using IPL button), then click the Load button. Then you can see the changes in the register above.

The screenshot shows the Machine Simulator interface. At the top, there are status lights (red, yellow, green). Below them, the title bar says "Machine Simulator". The interface is divided into several sections:

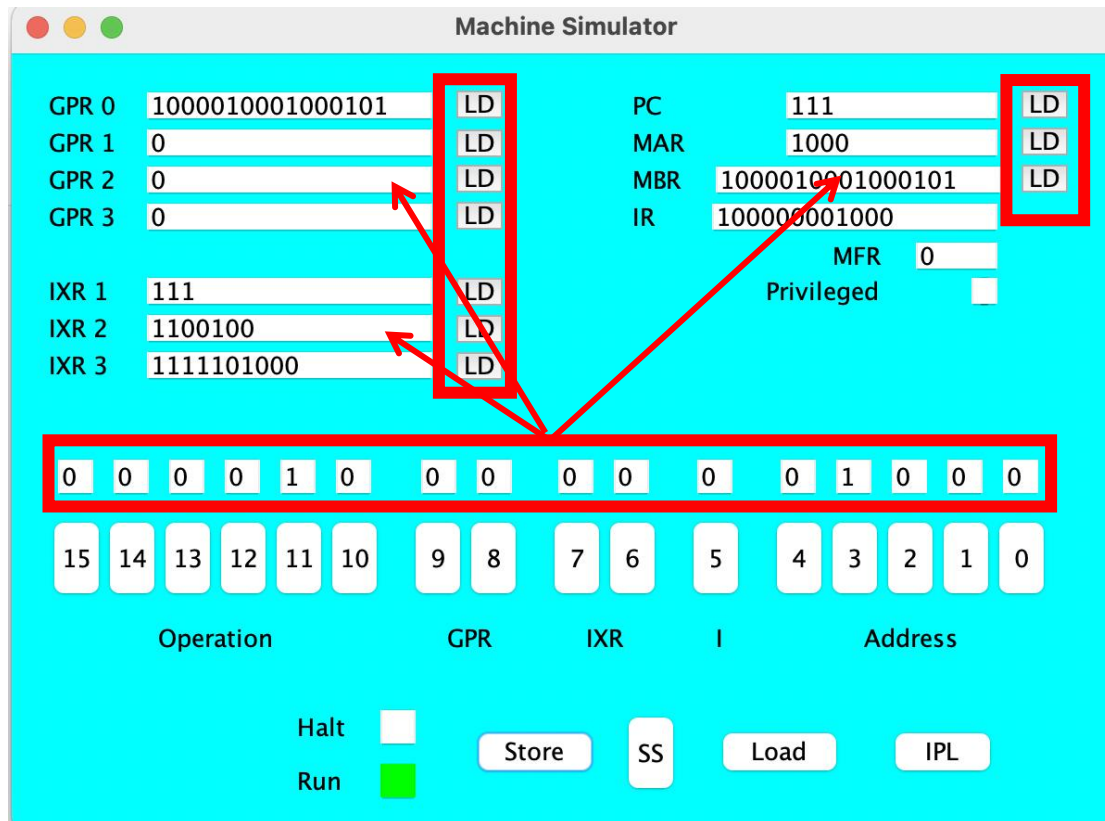
- Registers:** GPR 0, GPR 1, GPR 2, GPR 3, IXR 1, IXR 2, IXR 3. Each has a value and a "LD" button.
- PC, MAR, MBR, IR:** Program Counter, Memory Address Register, Memory Buffer Register, Instruction Register. Each has a value and a "LD" button.
- MFR:** Memory Function Register, with a value and a "Privileged" checkbox.
- Instruction Entry:** A row of 16 input boxes for the instruction. A red box highlights the first six boxes, which contain "0 0 0 0 0 1". A red arrow points to this box with the text "Type Here".
- Bit Labels:** Below the instruction entry, there are 16 boxes labeled 15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1, 0.
- Operation, GPR, IXR, I, Address:** Labels for the instruction fields.
- Controls:** "Halt" (checkbox), "Run" (checkbox), "Store", "SS", "Load" (highlighted with a red box), and "IPL" buttons.

3) For store instruction, the opcode should be "000010"

The screenshot shows the Machine Simulator interface after a store instruction. The "Store" button is highlighted with a red box. The instruction entry row is highlighted with a red box and contains the binary value "0 0 0 0 1 0". The bit labels below the instruction entry are 15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1, 0. The "Operation" label is now "Store". The "Load" button is no longer highlighted.

4. LD button

We can use the “LD” buttons to change the data in any register if the data is not beyond the limitation.



5. Machine Fault

If the machine halts, we can see the machine fault status in the “MFR” textbox.

“0” means accessing to the reserved location, “10” means the opcode is not correct, “11” means accessing the location in the memory beyond limitation.

