Lab MST Worksheet - 1

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Branch: BE-CSE (LEET)
Section/Group: ON20BCS-809/A
Semester: 4th Sem
Date of Performance: 21/03/2022
Subject Name: MPI Lab
Subject Code: 22E-20CSP-253

1. Aim/Overview of the practical:

Write an assembly language program in 8085 microprocessors to subtract two 16-bit numbers.

2. Task to be done:

a) Write the program to calculate the subtraction of two 16bit numbers.
b) Add the screenshot of the output.

3. Apparatus/Simulator used (For applied/experimental sciences/materials-based labs):

I. 8085 Jubin simulator version 2 (Microprocessor Simulator)
II. Java (jdk/ jre1.8.0_321) or any

4. Algorithm/Flowchart (For programming-based labs):

Subtraction of two 16bit number

I. Load the 1st pair number from memory location 3000,3001 to HL pair.
II. Exchange it with the DE pairs.
III. Load the 2nd pair number from memory location 3002,3003 to HL pair.
IV. Move the content from E to accumulator.
V. Subtract the L from accumulator.
VI. Move the content from accumulator to L register.
VII. Move the content from D to accumulator.
VIII. Subtract the H from accumulator with the borrow.
IX. Move Accumulator to H register.
X. Move the content of HL pair Register to memory location 1004,1005,
XI. Exit the program.

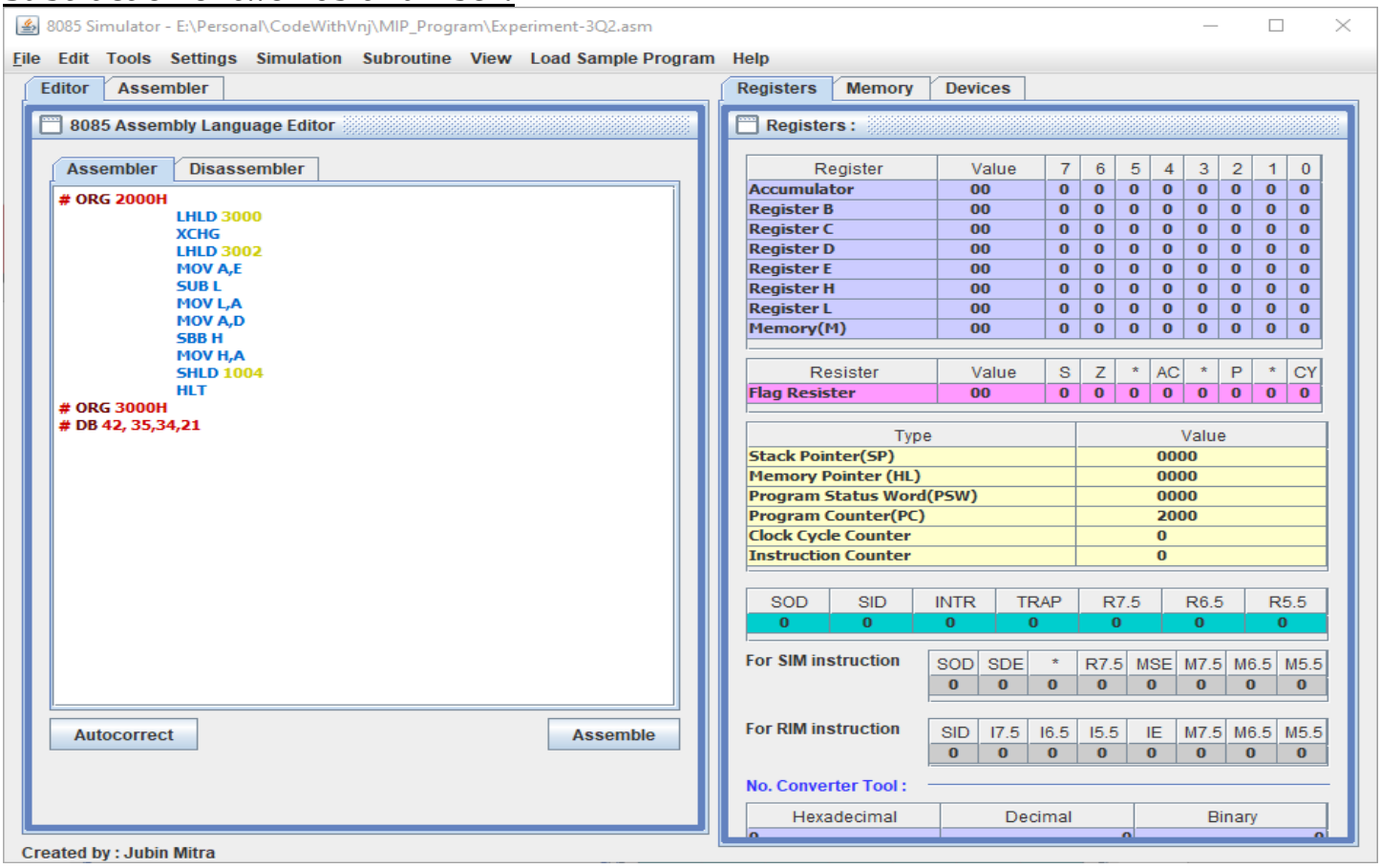
5. Description/ Code:

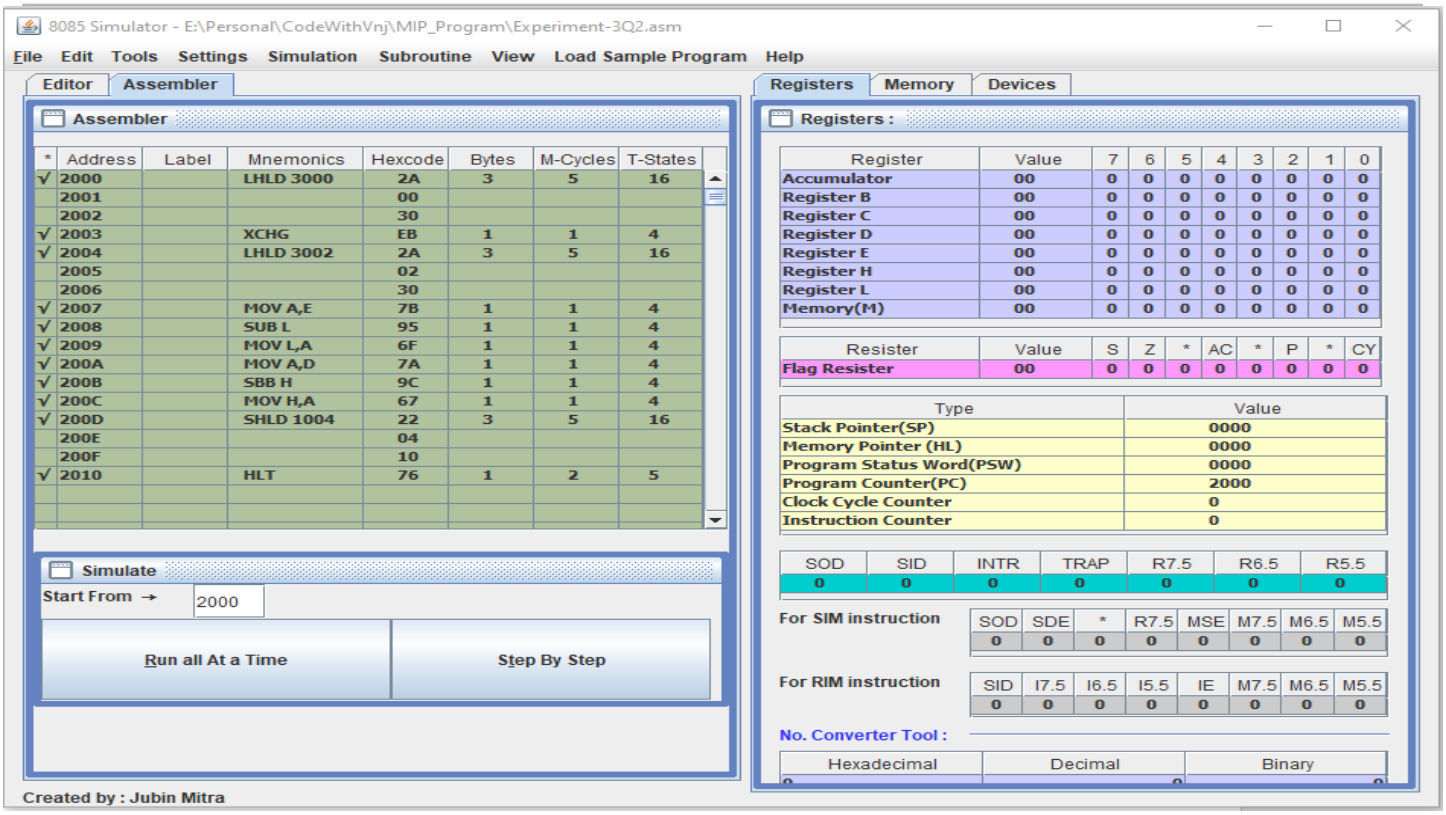
Subtraction of two 16bit number

```
# ORG 2000H
        LHLD 3000
        XCHG
        LHLD 3002
        MOV A,E
        SUB L
        MOV L,A
        MOV A,D
        SBB H
        MOV H,A
        SHLD 1004
        HLT
# ORG 3000H
# DB 42, 35,34,21
```

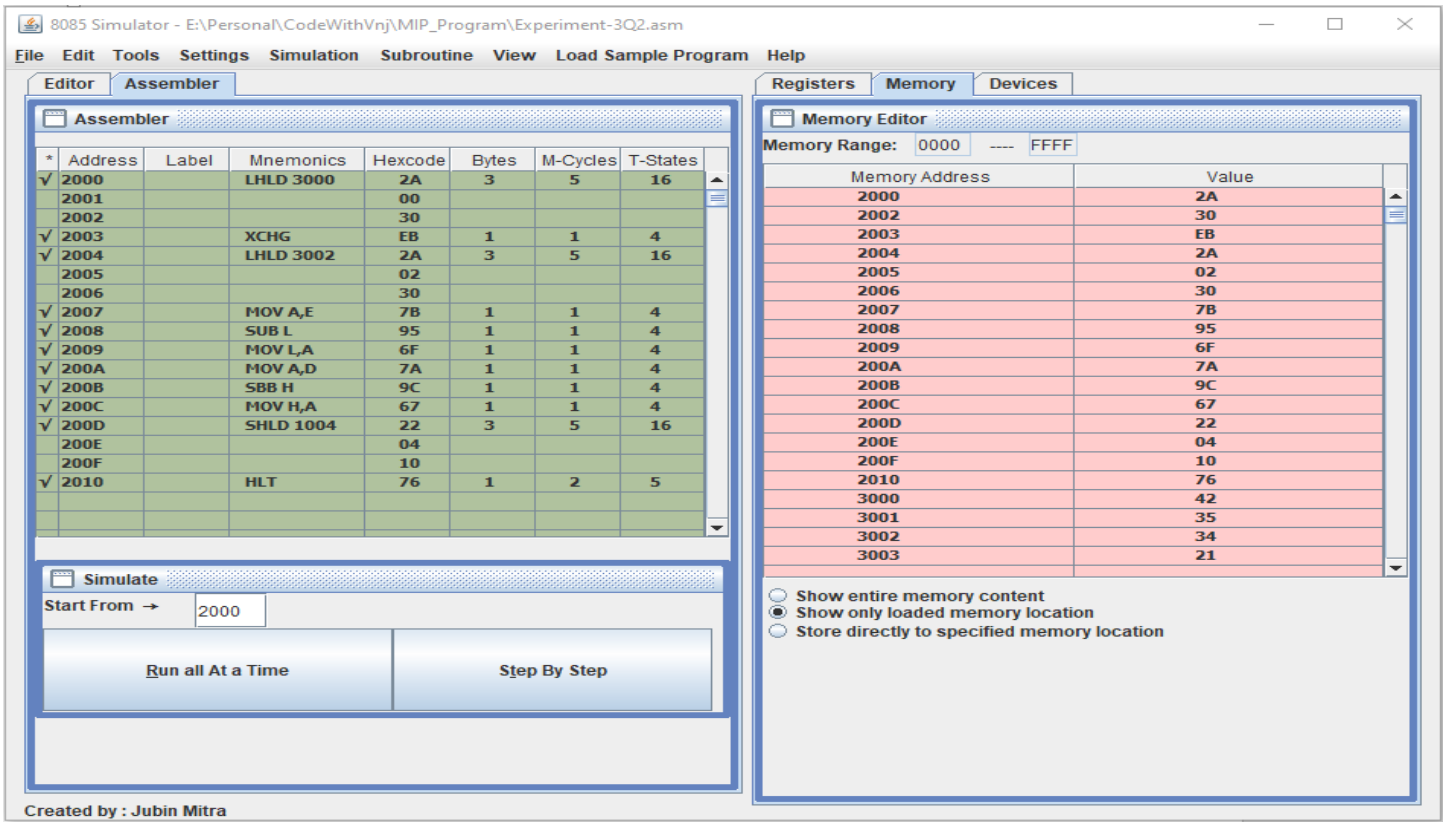
6. Result/Output/Writing Summary:

Subtraction of two 16bit number:





*	Address	Label	Mnemonics	Hexcode	Bytes	M-Cycles	T-States
√	2000		LHLD 3000	2A	3	5	16
	2001			00			
	2002			30			
√	2003		XCHG	EB	1	1	4
√	2004		LHLD 3002	2A	3	5	16
	2005			02			
	2006			30			
√	2007		MOV A,E	7B	1	1	4
√	2008		SUB L	95	1	1	4
√	2009		MOV L,A	6F	1	1	4
√	200A		MOV A,D	7A	1	1	4
√	200B		SBB H	9C	1	1	4
√	200C		MOV H,A	67	1	1	4
√	200D		SHLD 1004	22	3	5	16
	200E			04			
	200F			10			
√	2010		HLT	76	1	2	5



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√	2000		LHLD 3000	2A	3	5	16
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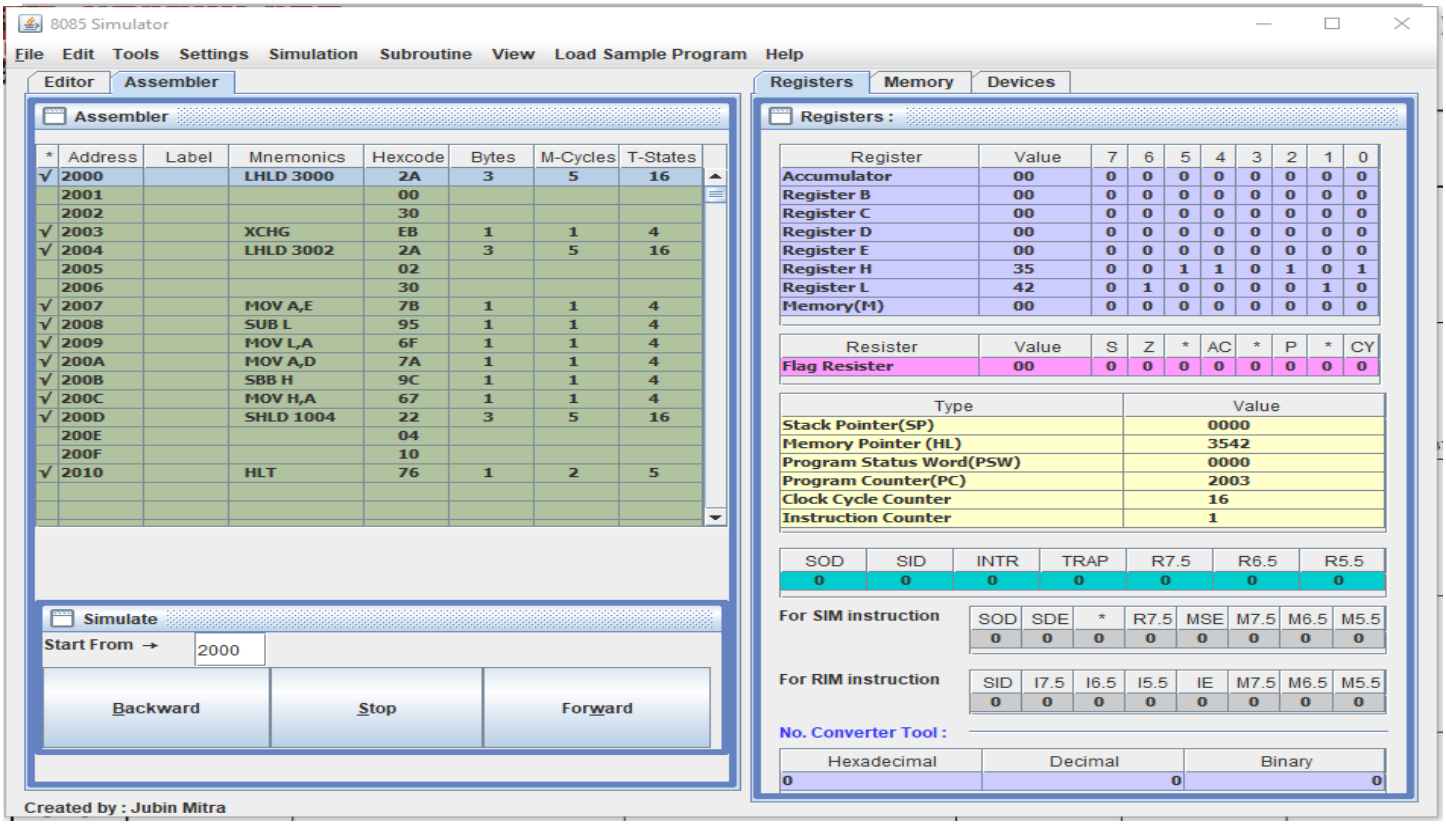
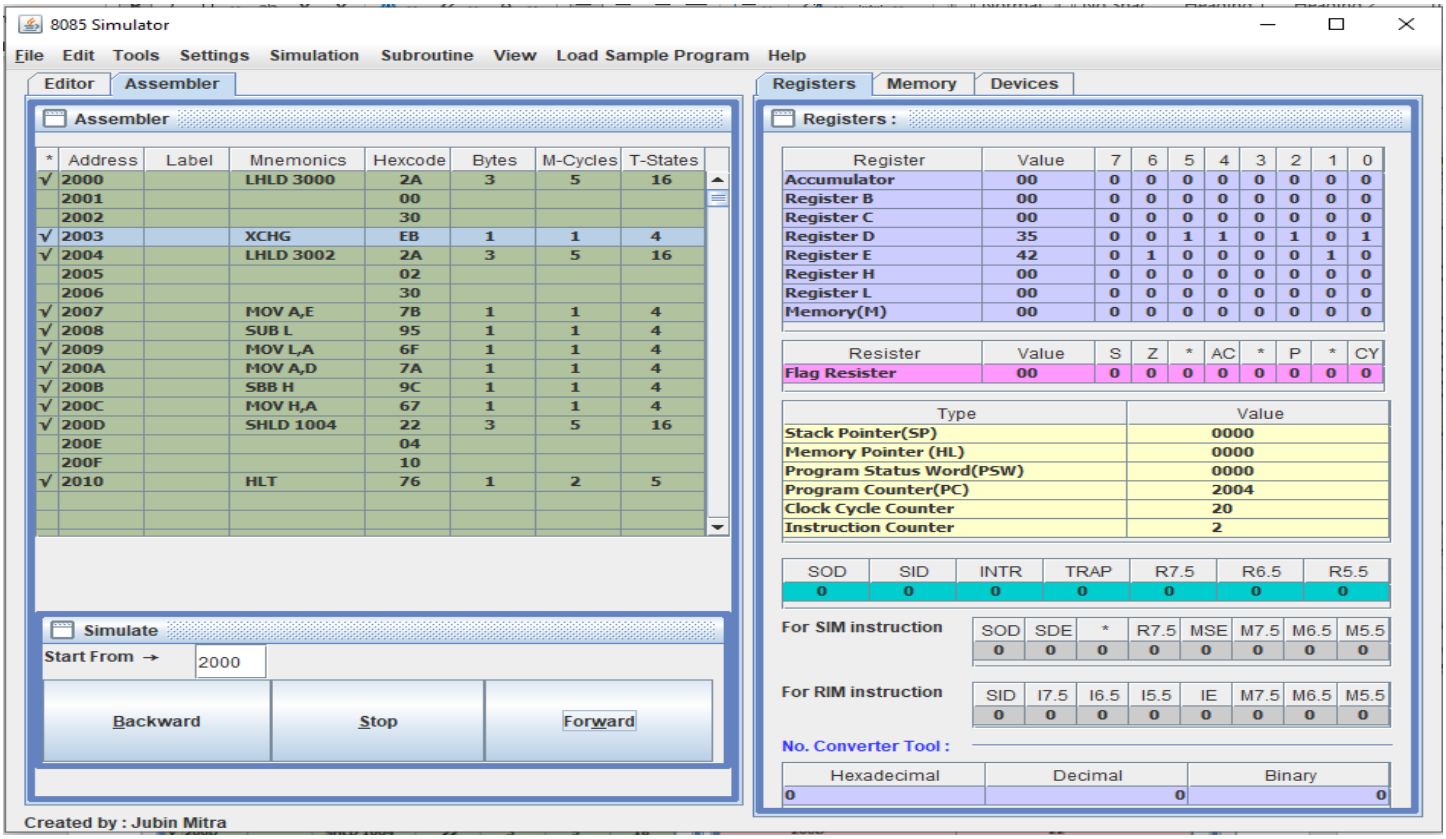
	2005			02			
	2006			30			
√	2007		MOV A,E	7B	1	1	4
√	2008		SUB L	95	1	1	4
√	2009		MOV L,A	6F	1	1	4
√	200A		MOV A,D	7A	1	1	4
√	200B		SBB H	9C	1	1	4
√	200C		MOV H,A	67	1	1	4
√	200D		SHLD 1004	22	3	5	16
	200E			04			
	200F			10			
√	2010		HLT	76	1	2	5


8085 Simulator
File Edit Tools Settings Simulation Subroutine View Load Sample Program Help
Editor Assembler
Assembler
Registers Memory Devices
Registers :
Simulate
Start From → 2000
Backward Stop Forward
Created by : Jubin Mitra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Assembler
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Backward Stop Forward
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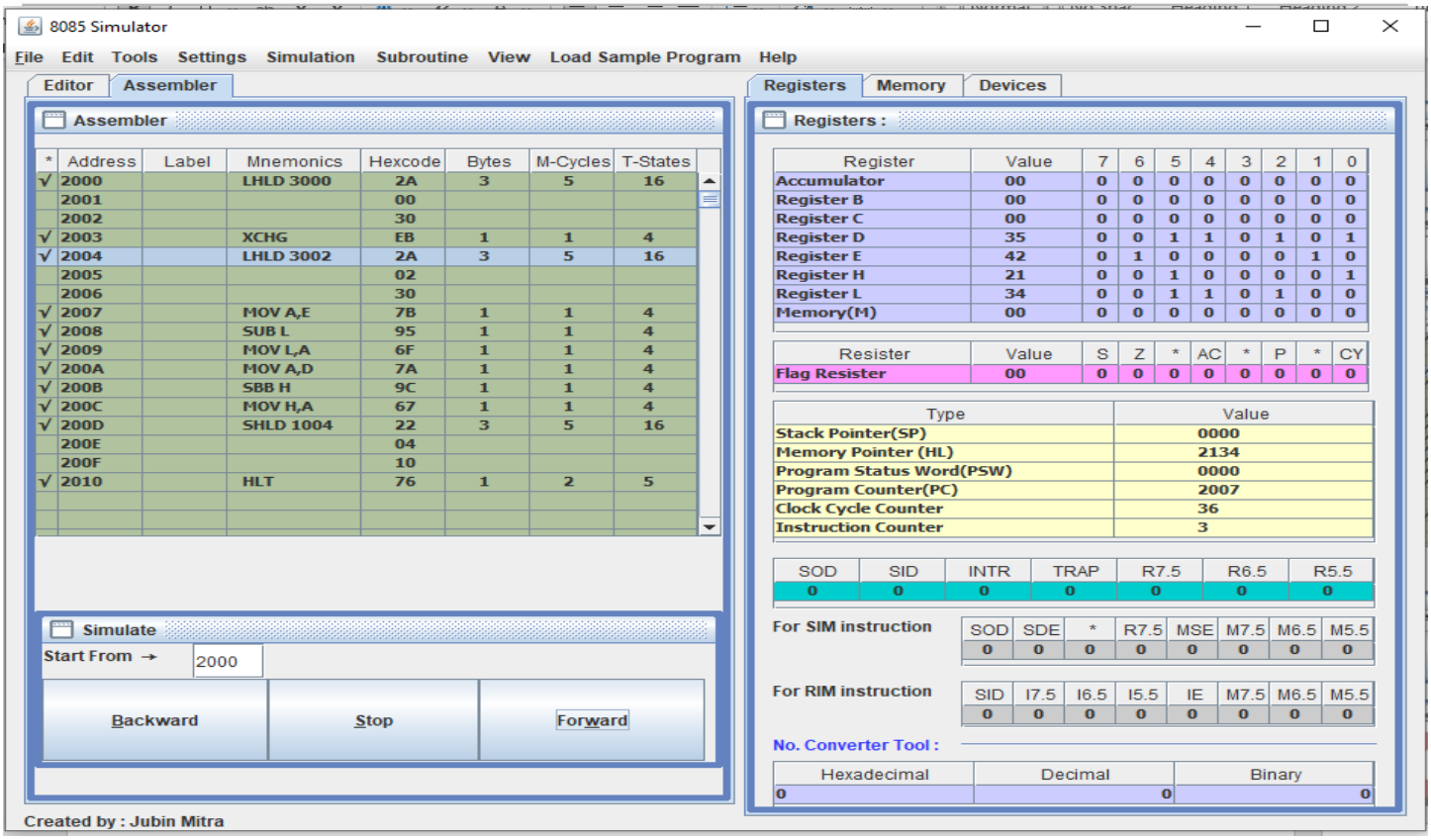

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√	200B		SBB H	9C	1	1	4
√	200C		MOV H,A	67	1	1	4
√	200D		SHLD 1004	22	3	5	16
	200E			04			
	200F			10			
√	2010		HLT	76	1	2	5

Register	Value	7	6	5	4	3	2	1	0
Accumulator	00	0	0	0	0	0	0	0	0
Register B	00	0	0	0	0	0	0	0	0
Register C	00	0	0	0	0	0	0	0	0
Register D	35	0	0	1	1	0	1	0	1
Register E	42	0	1	0	0	0	0	1	0
Register H	21	0	0	1	0	0	0	0	1
Register L	34	0	0	1	1	0	1	0	0
Memory(M)	00	0	0	0	0	0	0	0	0

Resister	Value	S	Z	*	AC	*	P	*	CY
Flag Resister	00	0	0	0	0	0	0	0	0

Type	Value
Stack Pointer(SP)	0000
Memory Pointer (HL)	2134
Program Status Word(PSW)	0000
Program Counter(PC)	2007
Clock Cycle Counter	36
Instruction Counter	3

SOD	SID	INTR	TRAP	R7.5	R6.5	R5.5
0	0	0	0	0	0	0

For SIM instruction

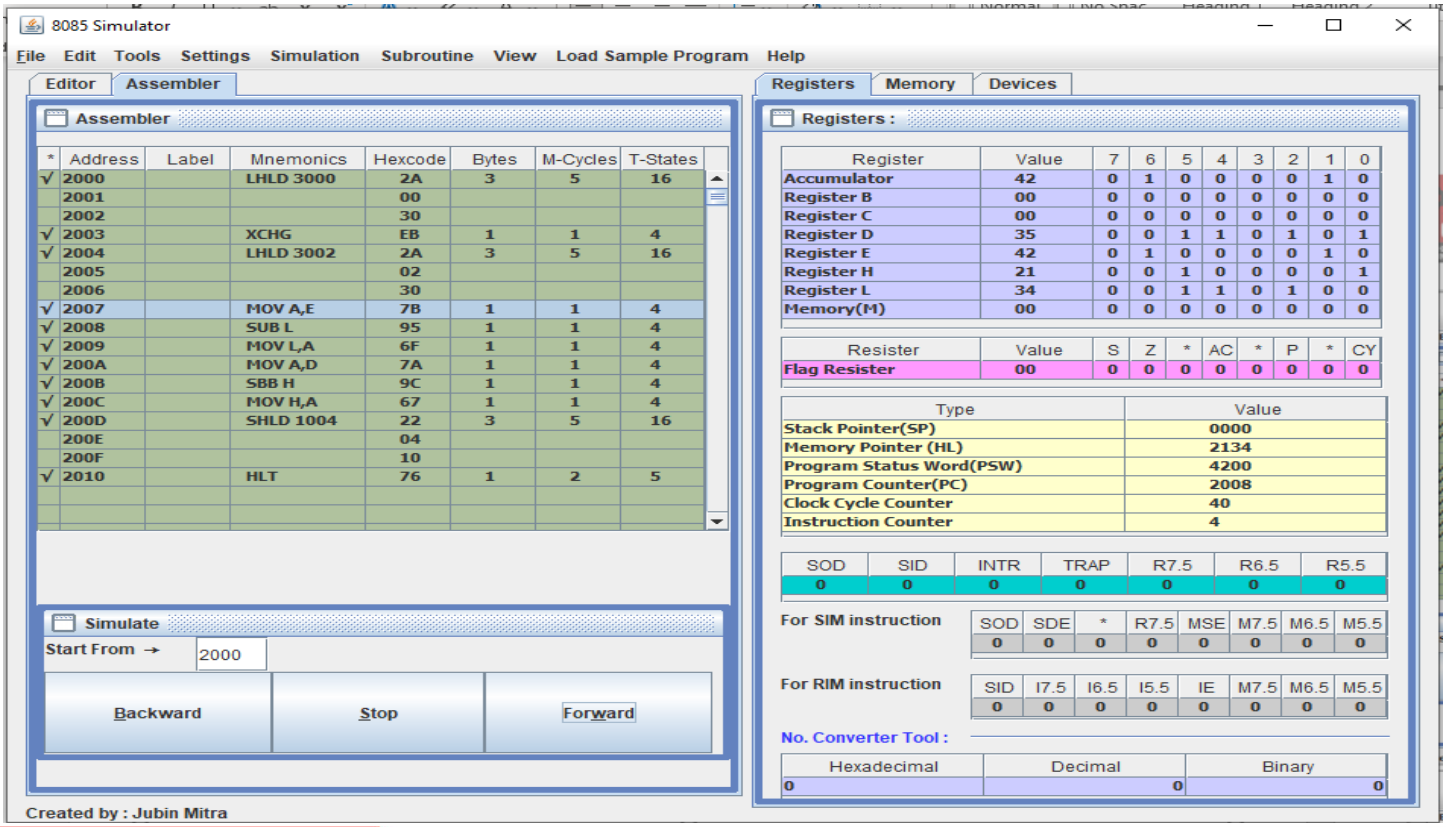
SOD	SDE	*	R7.5	MSE	M7.5	M6.5	M5.5
0	0	0	0	0	0	0	0

For RIM instruction

SID	I7.5	I6.5	I5.5	IE	M7.5	M6.5	M5.5
0	0	0	0	0	0	0	0

No. Converter Tool :

Hexadecimal	Decimal	Binary
0	0	0



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	2001			00			
	2002			30			
√	2003		XCHG	EB	1	1	4
√	2004		LHLD 3002	2A	3	5	16
	2005			02			
	2006			30			
√	2007		MOV A,E	7B	1	1	4
√	2008		SUB L	95	1	1	4
√	2009		MOV L,A	6F	1	1	4
√	200A		MOV A,D	7A	1	1	4
√	200B		SBB H	9C	1	1	4
√	200C		MOV H,A	67	1	1	4
√	200D		SHLD 1004	22	3	5	16
	200E			04			
	200F			10			
√	2010		HLT	76	1	2	5

Register	Value	7	6	5	4	3	2	1	0
Accumulator	42	0	1	0	0	0	0	1	0
Register B	00	0	0	0	0	0	0	0	0
Register C	00	0	0	0	0	0	0	0	0
Register D	35	0	0	1	1	0	1	0	1
Register E	42	0	1	0	0	0	0	1	0
Register H	21	0	0	1	0	0	0	0	1
Register L	34	0	0	1	1	0	1	0	0
Memory(M)	00	0	0	0	0	0	0	0	0

Resister	Value	S	Z	*	AC	*	P	*	CY
Flag Resister	00	0	0	0	0	0	0	0	0

Type	Value
Stack Pointer(SP)	0000
Memory Pointer (HL)	2134
Program Status Word(PSW)	4200
Program Counter(PC)	2008
Clock Cycle Counter	40
Instruction Counter	4

SOD	SID	INTR	TRAP	R7.5	R6.5	R5.5
0	0	0	0	0	0	0

For SIM instruction

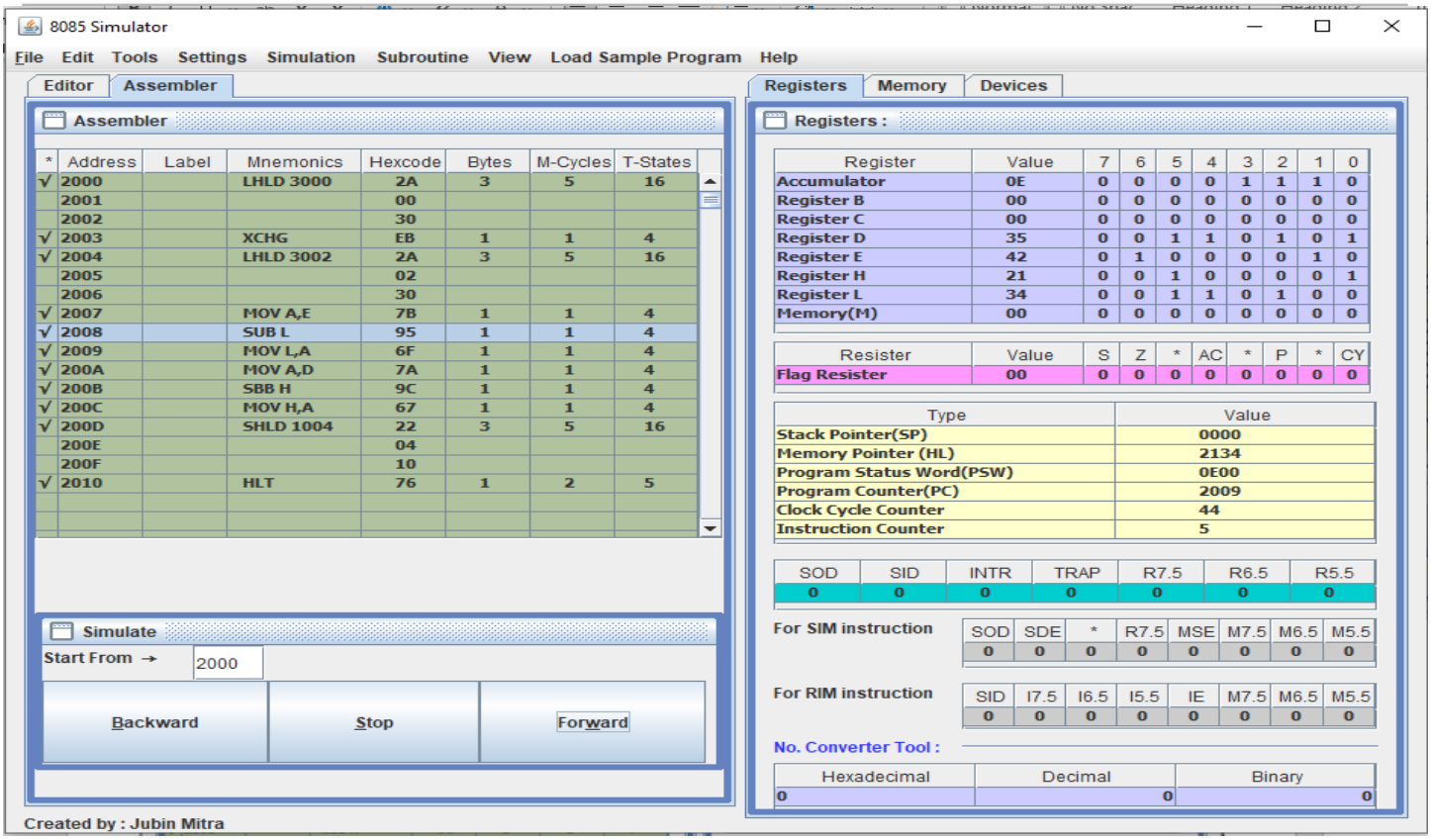
SOD	SDE	*	R7.5	MSE	M7.5	M6.5	M5.5
0	0	0	0	0	0	0	0

For RIM instruction

SID	I7.5	I6.5	I5.5	IE	M7.5	M6.5	M5.5
0	0	0	0	0	0	0	0

No. Converter Tool :

Hexadecimal	Decimal	Binary
0	0	0



8085 Simulator

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Assembler

*	Address	Label	Mnemonics	Hexcode	Bytes	M-Cycles	T-States
√	2000		LHLD 3000	2A	3	5	16
	2001			00			
	2002			30			
√	2003		XCHG	EB	1	1	4
√	2004		LHLD 3002	2A	3	5	16
	2005			02			
	2006			30			
√	2007		MOV A,E	7B	1	1	4
√	2008		SUB L	95	1	1	4
√	2009		MOV L,A	6F	1	1	4
√	200A		MOV A,D	7A	1	1	4
√	200B		SBB H	9C	1	1	4
√	200C		MOV H,A	67	1	1	4
√	200D		SHLD 1004	22	3	5	16
	200E			04			
	200F			10			
√	2010		HLT	76	1	2	5

Simulate

Start From → 2000

Backward | Stop | Forward

Created by : Jubin Mitra

Registers | Memory | Devices

Registers :

Register	Value	7	6	5	4	3	2	1	0
Accumulator	0E	0	0	0	0	1	1	1	0
Register B	00	0	0	0	0	0	0	0	0
Register C	00	0	0	0	0	0	0	0	0
Register D	35	0	0	1	1	0	1	0	1
Register E	42	0	1	0	0	0	0	1	0
Register H	21	0	0	1	0	0	0	0	1
Register L	34	0	0	1	1	0	1	0	0
Memory(M)	00	0	0	0	0	0	0	0	0

Resister	Value	S	Z	*	AC	*	P	*	CY
Flag Resister	00	0	0	0	0	0	0	0	0

Type	Value
Stack Pointer(SP)	0000
Memory Pointer (HL)	2134
Program Status Word(PSW)	0E00
Program Counter(PC)	2009
Clock Cycle Counter	44
Instruction Counter	5

SOD	SID	INTR	TRAP	R7.5	R6.5	R5.5
0	0	0	0	0	0	0

For SIM instruction

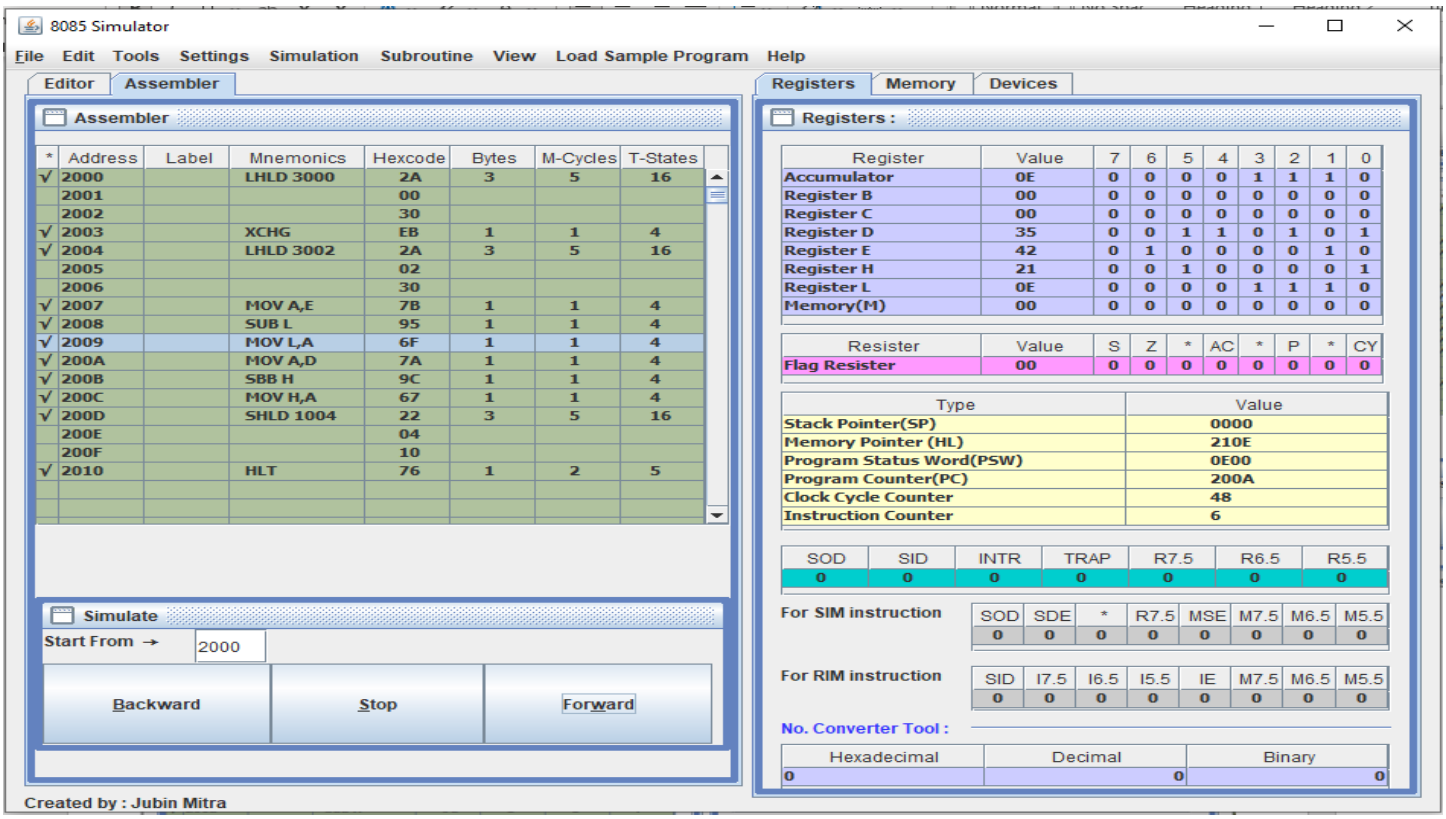
SOD	SDE	*	R7.5	MSE	M7.5	M6.5	M5.5
0	0	0	0	0	0	0	0

For RIM instruction

SID	I7.5	I6.5	I5.5	IE	M7.5	M6.5	M5.5
0	0	0	0	0	0	0	0

No. Converter Tool :

Hexadecimal	Decimal	Binary
0	0	0



8085 Simulator

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Assembler

*	Address	Label	Mnemonics	Hexcode	Bytes	M-Cycles	T-States
√	2000		LHLD 3000	2A	3	5	16
	2001			00			
	2002			30			
√	2003		XCHG	EB	1	1	4
√	2004		LHLD 3002	2A	3	5	16
	2005			02			
	2006			30			
√	2007		MOV A,E	7B	1	1	4
√	2008		SUB L	95	1	1	4
√	2009		MOV L,A	6F	1	1	4
√	200A		MOV A,D	7A	1	1	4
√	200B		SBB H	9C	1	1	4
√	200C		MOV H,A	67	1	1	4
√	200D		SHLD 1004	22	3	5	16
	200E			04			
	200F			10			
√	2010		HLT	76	1	2	5

Simulate

Start From → 2000

Backward | Stop | Forward

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Registers | Memory | Devices

Registers :

Register	Value	7	6	5	4	3	2	1	0
Accumulator	0E	0	0	0	0	1	1	1	0
Register B	00	0	0	0	0	0	0	0	0
Register C	00	0	0	0	0	0	0	0	0
Register D	35	0	0	1	1	0	1	0	1
Register E	42	0	1	0	0	0	0	1	0
Register H	21	0	0	1	0	0	0	0	1
Register L	0E	0	0	0	0	1	1	1	0
Memory(M)	00	0	0	0	0	0	0	0	0

Resister	Value	S	Z	*	AC	*	P	*	CY
Flag Resister	00	0	0	0	0	0	0	0	0

Type	Value
Stack Pointer(SP)	0000
Memory Pointer (HL)	210E
Program Status Word(PSW)	0E00
Program Counter(PC)	200A
Clock Cycle Counter	48
Instruction Counter	6

SOD	SID	INTR	TRAP	R7.5	R6.5	R5.5
0	0	0	0	0	0	0

For SIM instruction

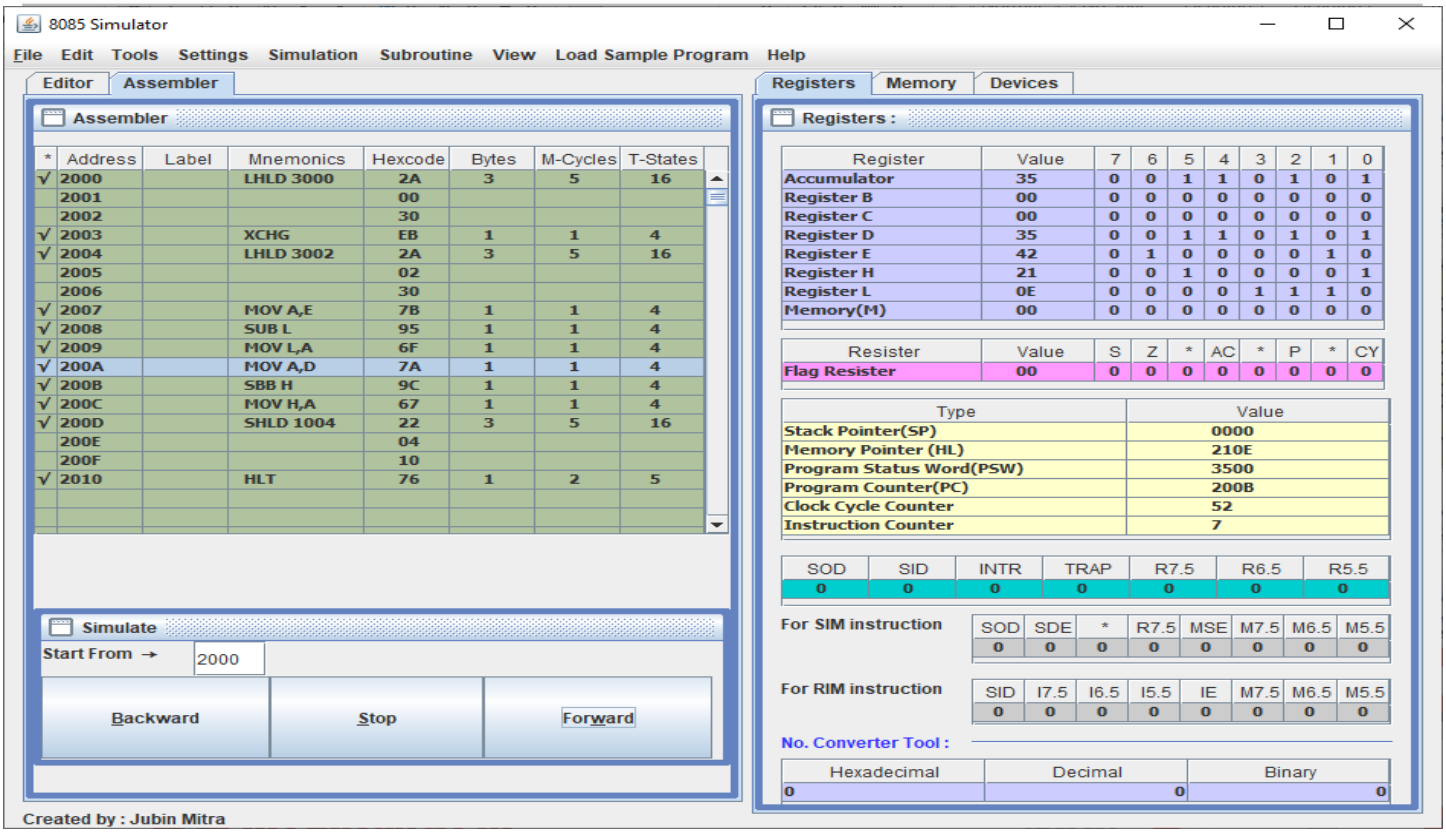
SOD	SDE	*	R7.5	MSE	M7.5	M6.5	M5.5
0	0	0	0	0	0	0	0

For RIM instruction

SID	I7.5	I6.5	I5.5	IE	M7.5	M6.5	M5.5
0	0	0	0	0	0	0	0

No. Converter Tool :

Hexadecimal	Decimal	Binary
0	0	0



*	Address	Label	Mnemonics	Hexcode	Bytes	M-Cycles	T-States
√	2000		LHLD 3000	2A	3	5	16
	2001			00			
	2002			30			
√	2003		XCHG	EB	1	1	4
√	2004		LHLD 3002	2A	3	5	16
	2005			02			
	2006			30			
√	2007		MOV A,E	7B	1	1	4
√	2008		SUB L	95	1	1	4
√	2009		MOV L,A	6F	1	1	4
√	200A		MOV A,D	7A	1	1	4
√	200B		SBB H	9C	1	1	4
√	200C		MOV H,A	67	1	1	4
√	200D		SHLD 1004	22	3	5	16
	200E			04			
	200F			10			
√	2010		HLT	76	1	2	5

Register	Value	7	6	5	4	3	2	1	0
Accumulator	35	0	0	1	1	0	1	0	1
Register B	00	0	0	0	0	0	0	0	0
Register C	00	0	0	0	0	0	0	0	0
Register D	35	0	0	1	1	0	1	0	1
Register E	42	0	1	0	0	0	0	1	0
Register H	21	0	0	1	0	0	0	0	1
Register L	0E	0	0	0	0	1	1	1	0
Memory(M)	00	0	0	0	0	0	0	0	0

Resister	Value	S	Z	*	AC	*	P	*	CY
Flag Resister	00	0	0	0	0	0	0	0	0

Type	Value
Stack Pointer(SP)	0000
Memory Pointer (HL)	210E
Program Status Word(PSW)	3500
Program Counter(PC)	200B
Clock Cycle Counter	52
Instruction Counter	7

SOD	SID	INTR	TRAP	R7.5	R6.5	R5.5
0	0	0	0	0	0	0

For SIM instruction

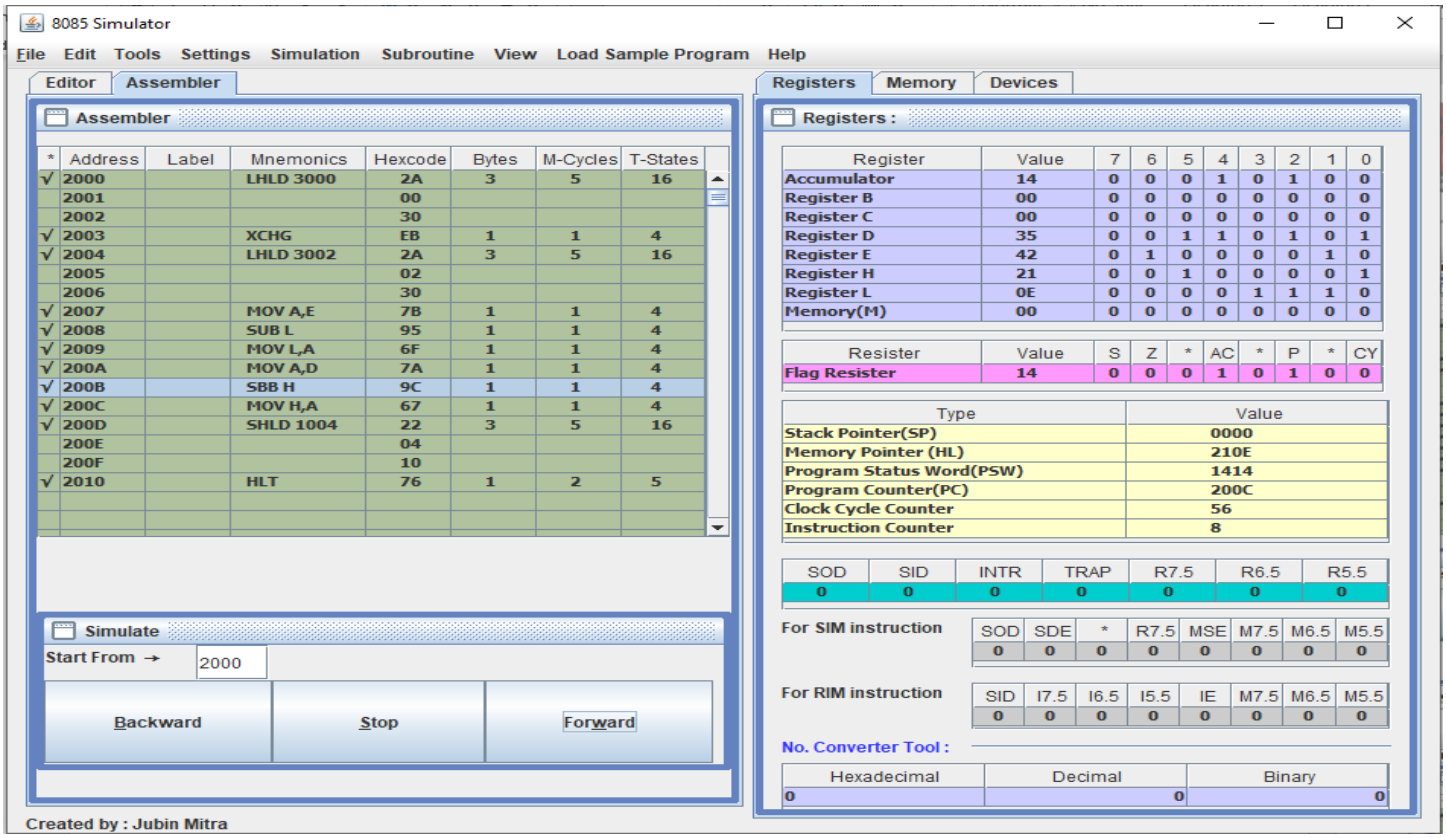
SOD	SDE	*	R7.5	MSE	M7.5	M6.5	M5.5
0	0	0	0	0	0	0	0

For RIM instruction

SID	I7.5	I6.5	I5.5	IE	M7.5	M6.5	M5.5
0	0	0	0	0	0	0	0

No. Converter Tool :

Hexadecimal	Decimal	Binary
0	0	0



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	2002			30			
√	2003		XCHG	EB	1	1	4
√	2004		LHLD 3002	2A	3	5	16
	2005			02			
	2006			30			
√	2007		MOV A,E	7B	1	1	4
√	2008		SUB L	95	1	1	4
√	2009		MOV L,A	6F	1	1	4
√	200A		MOV A,D	7A	1	1	4
√	200B		SBB H	9C	1	1	4
√	200C		MOV H,A	67	1	1	4
√	200D		SHLD 1004	22	3	5	16
	200E			04			
	200F			10			
√	2010		HLT	76	1	2	5

Register	Value	7	6	5	4	3	2	1	0
Accumulator	14	0	0	0	1	0	1	0	0
Register B	00	0	0	0	0	0	0	0	0
Register C	00	0	0	0	0	0	0	0	0
Register D	35	0	0	1	1	0	1	0	1
Register E	42	0	1	0	0	0	0	1	0
Register H	21	0	0	1	0	0	0	0	1
Register L	0E	0	0	0	0	1	1	1	0
Memory(M)	00	0	0	0	0	0	0	0	0

Resister	Value	S	Z	*	AC	*	P	*	CY
Flag Resister	14	0	0	0	1	0	1	0	0

Type	Value
Stack Pointer(SP)	0000
Memory Pointer (HL)	210E
Program Status Word(PSW)	1414
Program Counter(PC)	200C
Clock Cycle Counter	56
Instruction Counter	8

SOD	SID	INTR	TRAP	R7.5	R6.5	R5.5
0	0	0	0	0	0	0

For SIM instruction

SOD	SDE	*	R7.5	MSE	M7.5	M6.5	M5.5
0	0	0	0	0	0	0	0

For RIM instruction

SID	I7.5	I6.5	I5.5	IE	M7.5	M6.5	M5.5
0	0	0	0	0	0	0	0

No. Converter Tool :

Hexadecimal	Decimal	Binary
0	0	0

8085 Simulator

File Edit Tools Settings Simulation Subroutine View Load Sample Program Help

Editor | Assembler

Assembler

*	Address	Label	Mnemonics	Hexcode	Bytes	M-Cycles	T-States
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	2002			30			
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√	2004		LHLD 3002	2A	3	5	16
	2005			02			
	2006			30			
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	200E			04			
	200F			10			
√	2010		HLT	76	1	2	5

Simulate

Start From → 2000

Backward | Stop | Forward

Created by : Jubin Mitra

Registers | Memory | Devices

Registers :

Register	Value	7	6	5	4	3	2	1	0
Accumulator	14	0	0	0	1	0	1	0	0
Register B	00	0	0	0	0	0	0	0	0
Register C	00	0	0	0	0	0	0	0	0
Register D	35	0	0	1	1	0	1	0	1
Register E	42	0	1	0	0	0	0	1	0
Register H	14	0	0	0	1	0	1	0	0
Register L	0E	0	0	0	0	1	1	1	0
Memory(M)	00	0	0	0	0	0	0	0	0

Resister	Value	S	Z	*	AC	*	P	*	CY
Flag Resister	14	0	0	0	1	0	1	0	0

Type	Value
Stack Pointer(SP)	0000
Memory Pointer (HL)	140E
Program Status Word(PSW)	1414
Program Counter(PC)	200D
Clock Cycle Counter	60
Instruction Counter	9

SOD	SID	INTR	TRAP	R7.5	R6.5	R5.5
0	0	0	0	0	0	0

For SIM instruction

SOD	SDE	*	R7.5	MSE	M7.5	M6.5	M5.5
0	0	0	0	0	0	0	0

For RIM instruction

SID	I7.5	I6.5	I5.5	IE	M7.5	M6.5	M5.5
0	0	0	0	0	0	0	0

No. Converter Tool :

Hexadecimal	Decimal	Binary
0	0	0

8085 Simulator

File Edit Tools Settings Simulation Subroutine View Load Sample Program Help

Editor | Assembler

Assembler

*	Address	Label	Mnemonics	Hexcode	Bytes	M-Cycles	T-States
√	2000		LHLD 3000	2A	3	5	16
	2001			00			
	2002			30			
√	2003		XCHG	EB	1	1	4
√	2004		LHLD 3002	2A	3	5	16
	2005			02			
	2006			30			
√	2007		MOV A,E	7B	1	1	4
√	2008		SUB L	95	1	1	4
√	2009		MOV L,A	6F	1	1	4
√	200A		MOV A,D	7A	1	1	4
√	200B		SBB H	9C	1	1	4
√	200C		MOV H,A	67	1	1	4
√	200D		SHLD 1004	22	3	5	16
	200E			04			
	200F			10			
√	2010		HLT	76	1	2	5

Simulate

Start From → 2000

Backward | Stop | Forward

Created by : Jubin Mitra

Registers | Memory | Devices

Registers :

Register	Value	7	6	5	4	3	2	1	0
Accumulator	14	0	0	0	1	0	1	0	0
Register B	00	0	0	0	0	0	0	0	0
Register C	00	0	0	0	0	0	0	0	0
Register D	35	0	0	1	1	0	1	0	1
Register E	42	0	1	0	0	0	0	1	0
Register H	14	0	0	0	1	0	1	0	0
Register L	0E	0	0	0	0	1	1	1	0
Memory(M)	00	0	0	0	0	0	0	0	0

Resister	Value	S	Z	*	AC	*	P	*	CY
Flag Resister	14	0	0	0	1	0	1	0	0

Type	Value
Stack Pointer(SP)	0000
Memory Pointer (HL)	140E
Program Status Word(PSW)	1414
Program Counter(PC)	2010
Clock Cycle Counter	76
Instruction Counter	10

SOD	SID	INTR	TRAP	R7.5	R6.5	R5.5
0	0	0	0	0	0	0

For SIM instruction

SOD	SDE	*	R7.5	MSE	M7.5	M6.5	M5.5
0	0	0	0	0	0	0	0

For RIM instruction

SID	I7.5	I6.5	I5.5	IE	M7.5	M6.5	M5.5
0	0	0	0	0	0	0	0

No. Converter Tool :

Hexadecimal	Decimal	Binary
0	0	0

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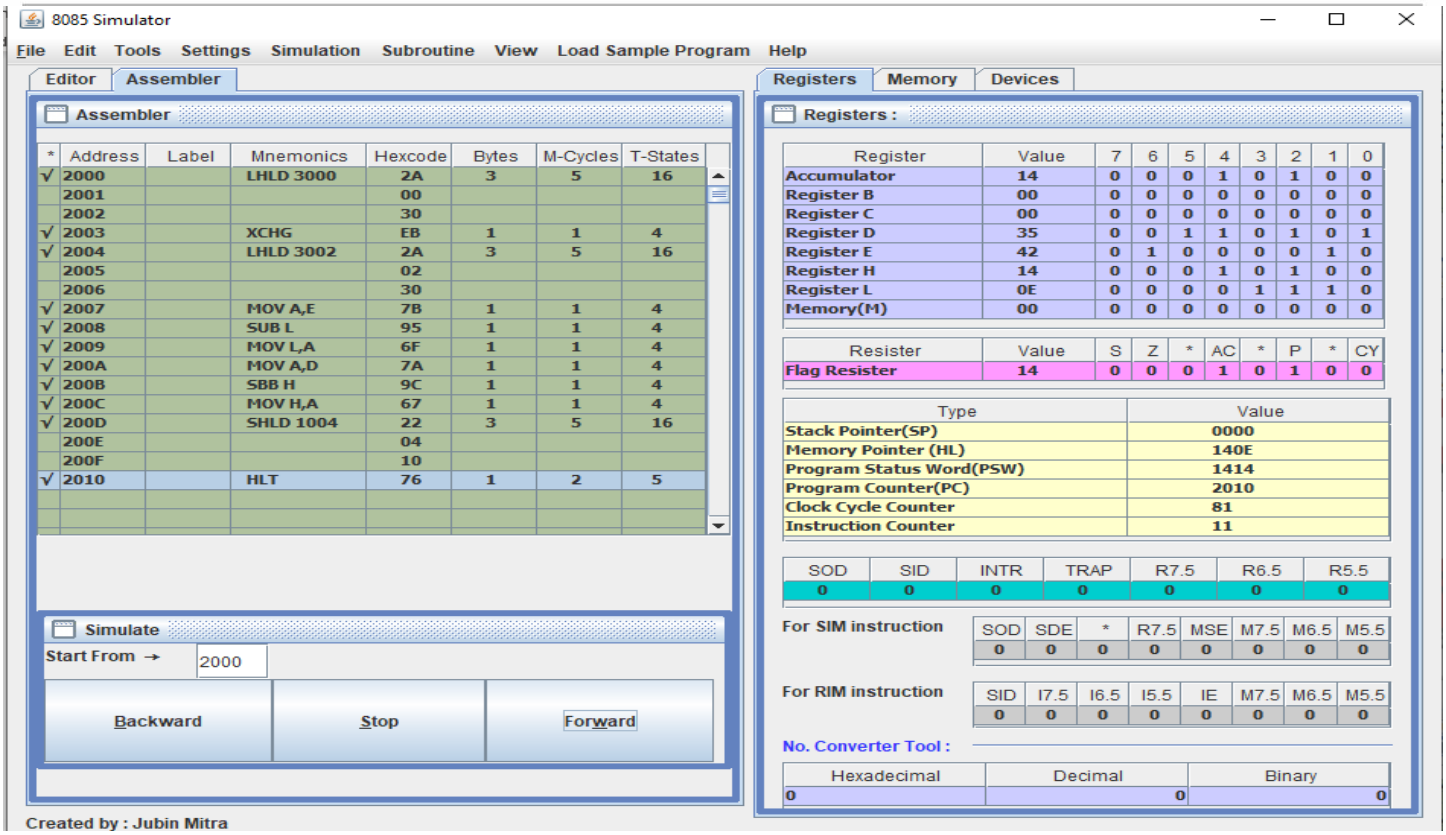
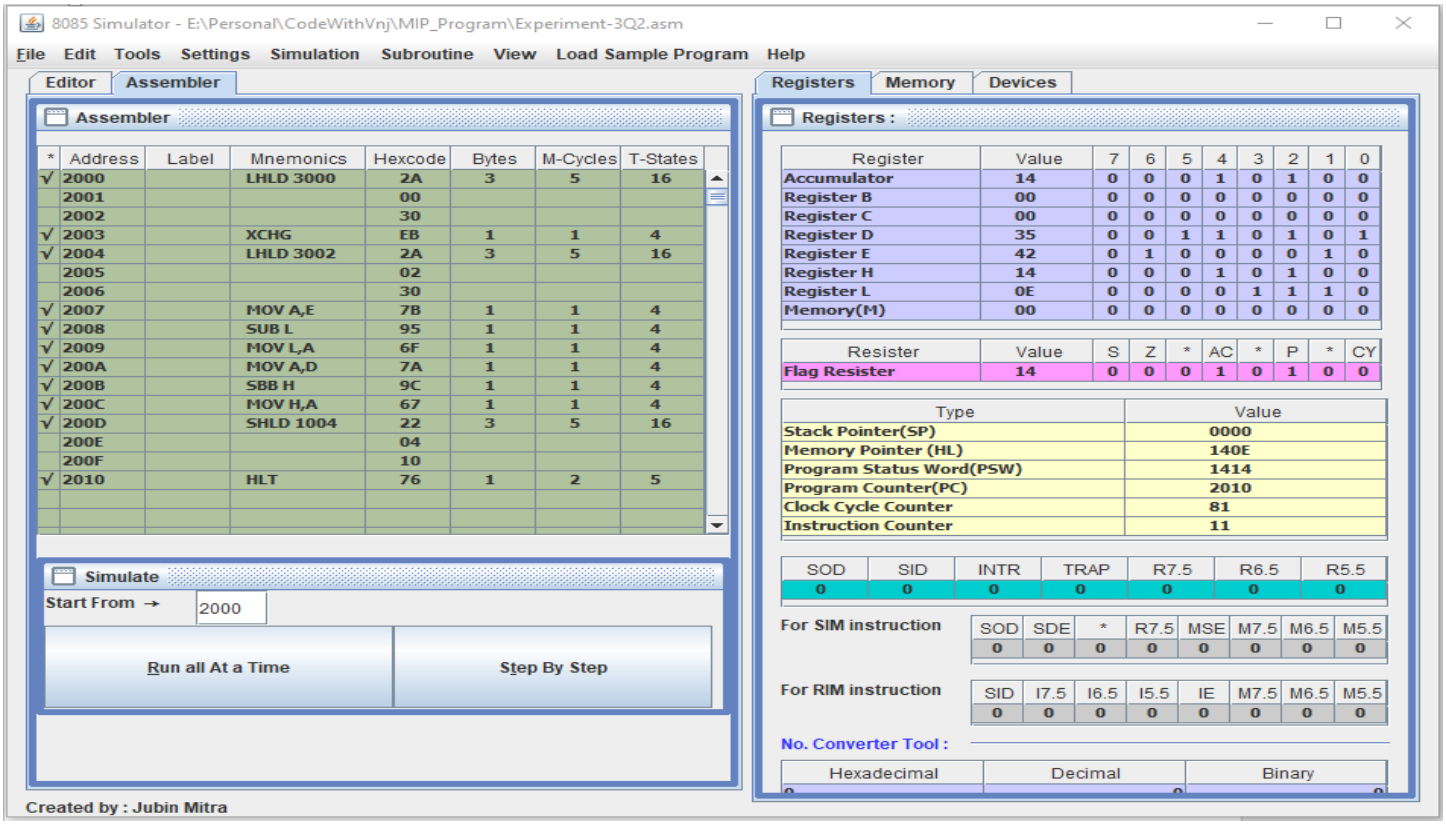
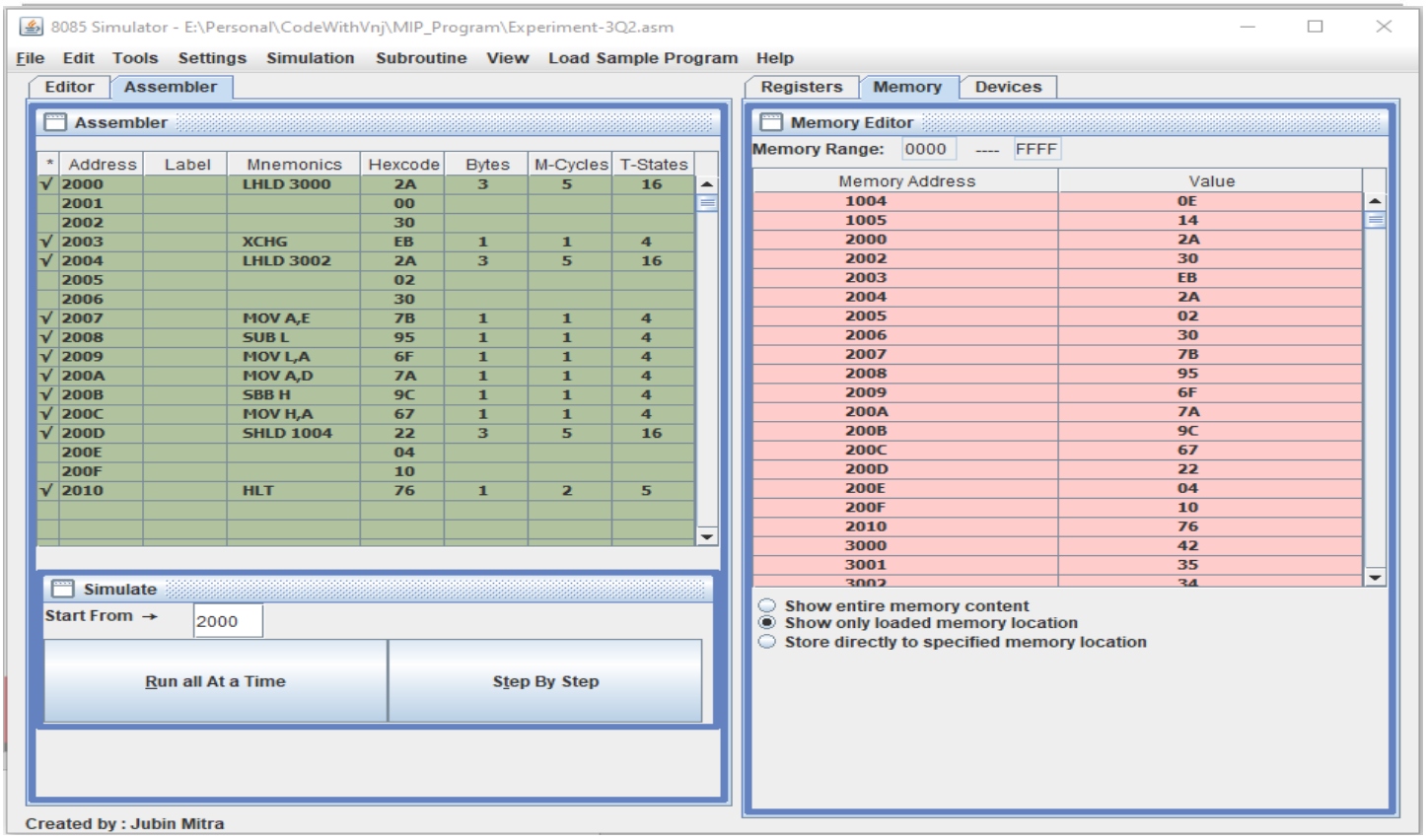

8085 Simulator
File Edit Tools Settings Simulation Subroutine View Load Sample Program Help
Editor Assembler
Assembler
Registers Memory Devices
Registers :
Simulate
Start From → 2000
Backward Stop Forward
Created by : Jubin Mitra


8085 Simulator - E:\Personal\CodeWithVnj\MIP_Program\Experiment-3Q2.asm
File Edit Tools Settings Simulation Subroutine View Load Sample Program Help
Editor Assembler
Assembler
Registers Memory Devices
Registers :
Simulate
Start From → 2000
Run all At a Time Step By Step
Created by : Jubin Mitra



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√	200C		MOV H,A	67	1	1	4
√	200D		SHLD 1004	22	3	5	16
	200E			04			
	200F			10			
√	2010		HLT	76	1	2	5

Learning outcomes (What I have learnt):

1. Learnt how to do the 8085-microprocessor programming.

2. Learnt how to Subtract the two 16bits numbers in assembly language.

Evaluation Grid (To be created as per the SOP and Assessment guidelines by the faculty):

Sr. No.	Parameters	Marks Obtained	Maximum Marks
1.			
2.			
3.			