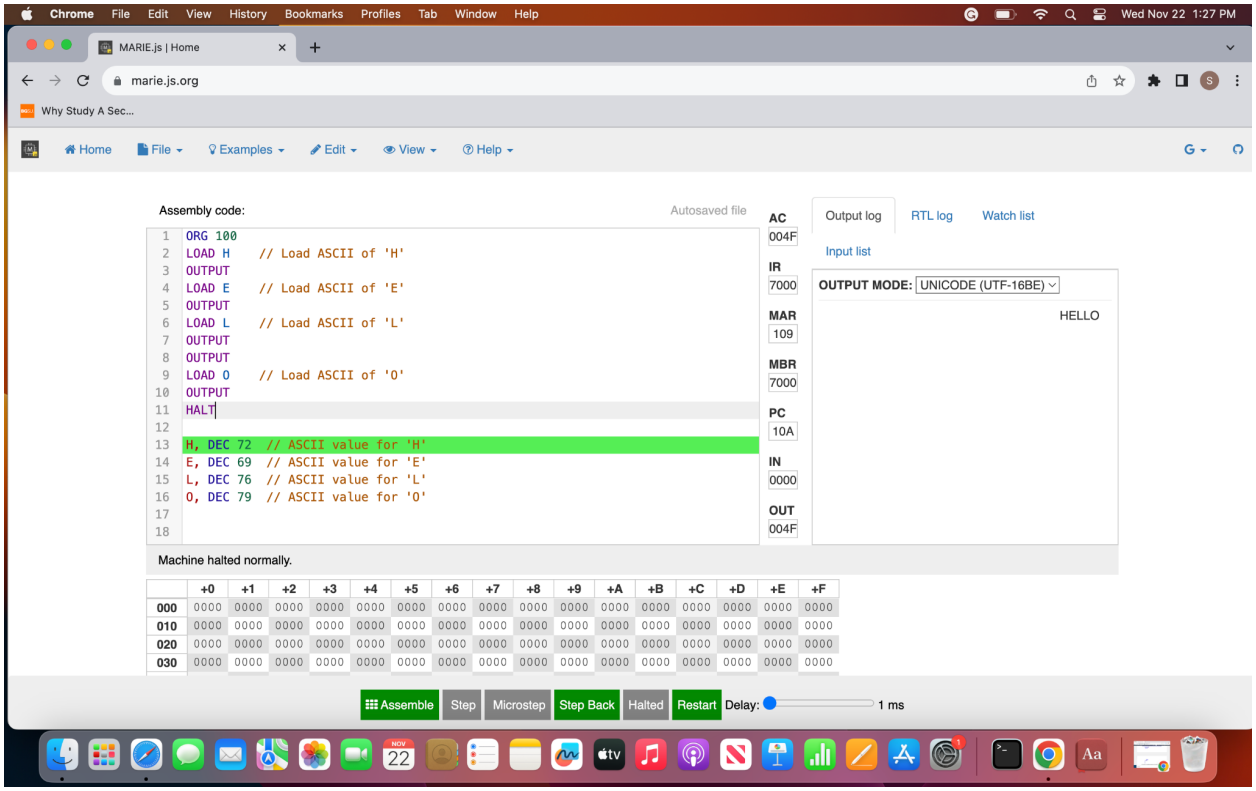
Swagat Neupane(19698)
Computer Organization-305
Assignment-4

Solution-1:

```
ORG 100
LOAD H    // Load ASCII of 'H'
OUTPUT
LOAD E    // Load ASCII of 'E'
OUTPUT
LOAD L    // Load ASCII of 'L'
OUTPUT
OUTPUT
LOAD O    // Load ASCII of 'O'
OUTPUT
HALT

H, DEC 72  // ASCII value for 'H'
E, DEC 69  // ASCII value for 'E'
L, DEC 76  // ASCII value for 'L'
O, DEC 79  // ASCII value for 'O'
```

Output:

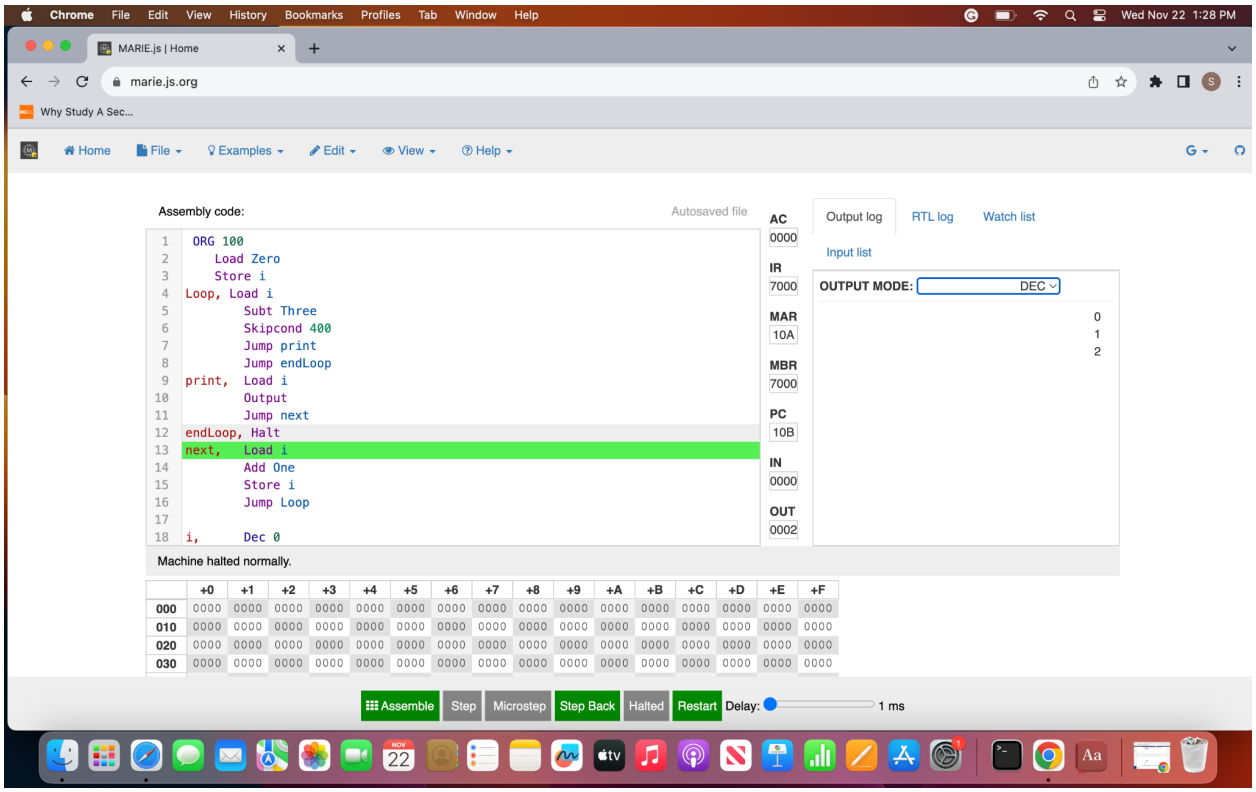


Solution-2:

```
       ORG 100
    Load Zero
    Store i
Loop, Load i
        Subt Three
        Skipcond 400
        Jump print
        Jump endLoop
print,  Load i
        Output
        Jump next
endLoop, Halt
next,   Load i
        Add One
        Store i
        Jump Loop

i,      Dec 0
Zero,   Dec 0
One,    Dec 1
Three,  Dec 3
```

Output: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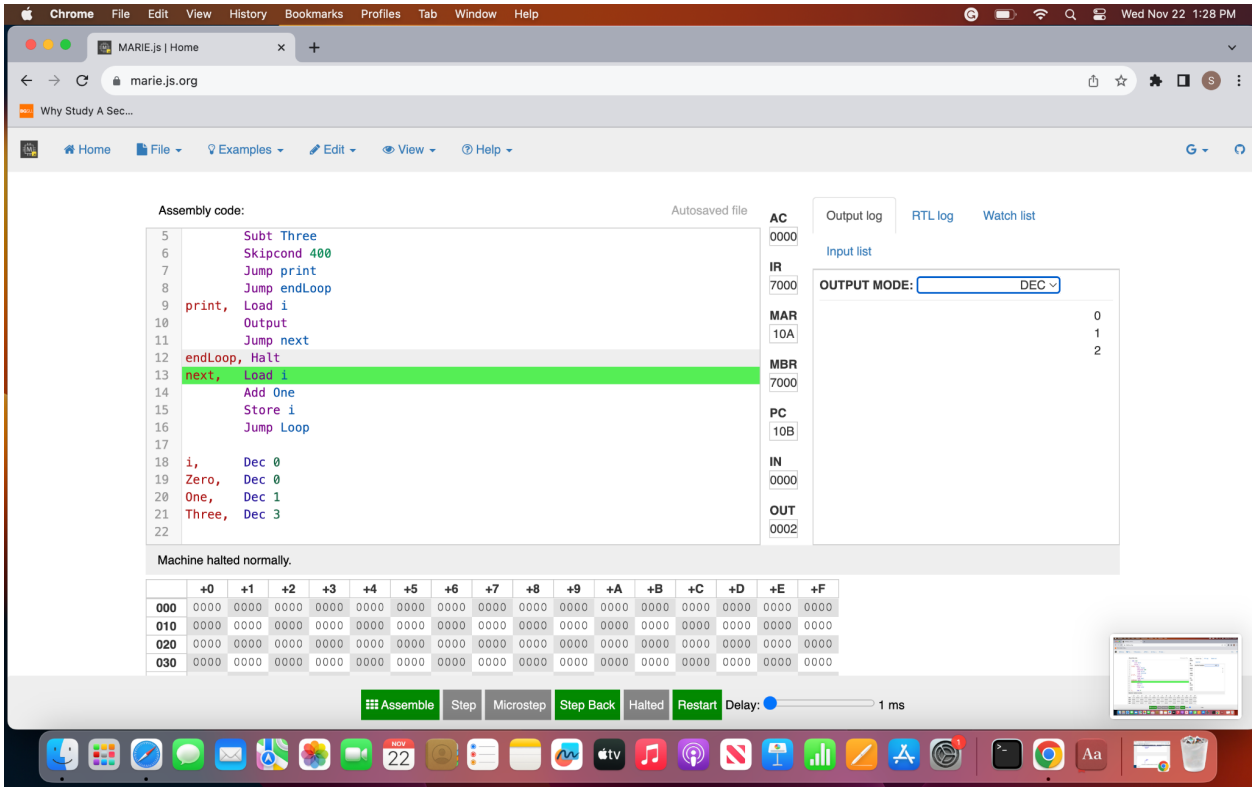
Assembly code:
Autosaved file
1 ORG 100
2 Load Zero
3 Store i
4 Loop, Load i
5 Subt Three
6 Skipcond 400
7 Jump print
8 Jump endLoop
9 print, Load i
10 Output
11 Jump next
12 endLoop, Halt
13 next, Load i
14 Add One
15 Store i
16 Jump Loop
17
18 i, Dec 0
AC 0000
IR 7000
MAR 10A
MBR 7000
PC 10B
IN 0000
OUT 0002
Output log
RTL log
Watch list
Input list
OUTPUT MODE: DEC
0
1
2
Machine halted normally.
+0 +1 +2 +3 +4 +5 +6 +7 +8 +9 +A +B +C +D +E +F
000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
010 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
020 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
030 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
Assemble Step Microstep Step Back Halted Restart Delay: 1 ms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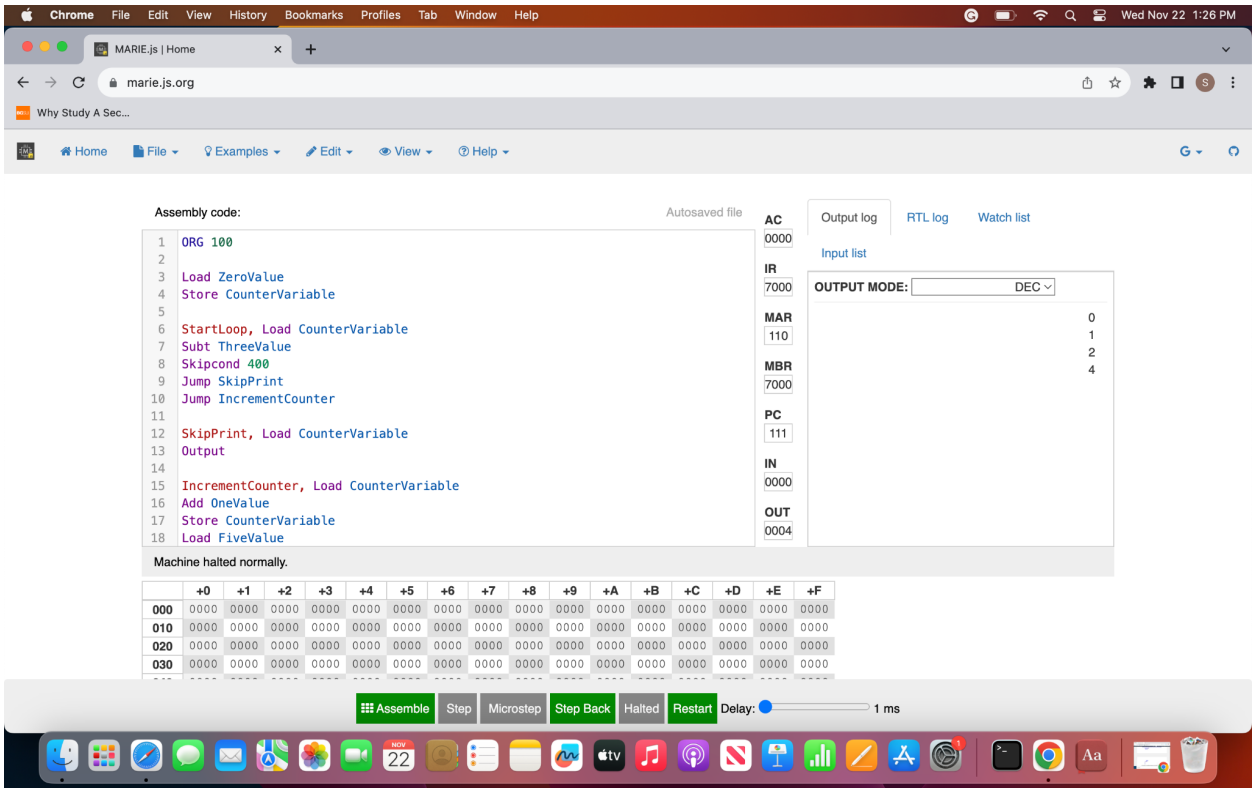
Assembly code:
Autosaved file
5 Subt Three
6 Skipcond 400
7 Jump print
8 Jump endLoop
9 print, Load i
10 Output
11 Jump next
12 endLoop, Halt
13 next, Load i
14 Add One
15 Store i
16 Jump Loop
17
18 i, Dec 0
19 Zero, Dec 0
20 One, Dec 1
21 Three, Dec 3
22
AC 0000
IR 7000
MAR 10A
MBR 7000
PC 10B
IN 0000
OUT 0002
Output log
RTL log
Watch list
Input list
OUTPUT MODE: DEC
0
1
2
Machine halted normally.
+0 +1 +2 +3 +4 +5 +6 +7 +8 +9 +A +B +C +D +E +F
000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
010 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
020 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
030 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
Assemble Step Microstep Step Back Halted Restart Delay: 1 ms

Solution-3:

```
ORG 100

Load ZeroValue
Store CounterVariable

StartLoop, Load CounterVariable
Subt ThreeValue
Skipcond 400
Jump SkipPrint
Jump IncrementCounter

SkipPrint, Load CounterVariable
Output

IncrementCounter, Load CounterVariable
Add OneValue
Store CounterVariable
Load FiveValue
Subt CounterVariable
Skipcond 400
Jump StartLoop

EndLoop, Halt

CounterVariable, HEX 0
OneValue, DEC 1
ThreeValue, DEC 3
FiveValue, DEC 5
ZeroValue, HEX 0

END
```

Output: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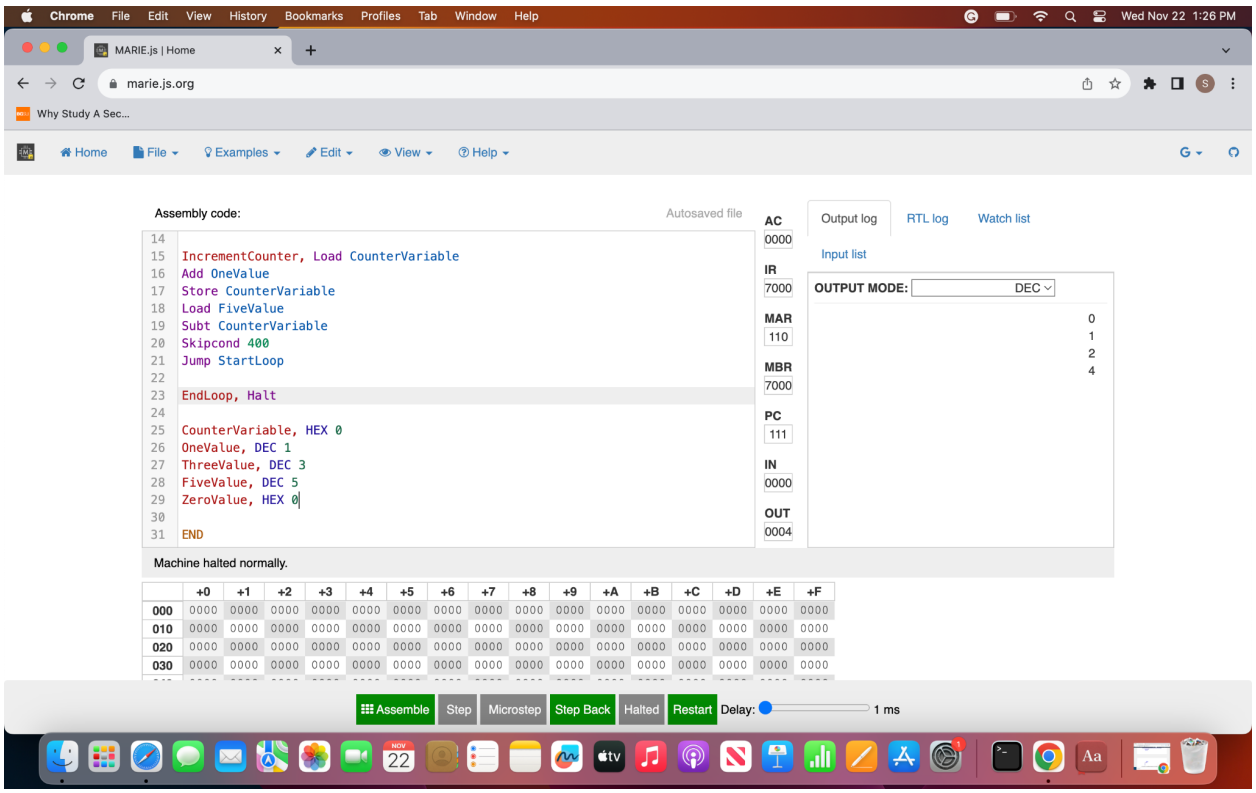
Assembly code:
Autosaved file
1 ORG 100
2
3 Load ZeroValue
4 Store CounterVariable
5
6 StartLoop, Load CounterVariable
7 Subt ThreeValue
8 Skipcond 400
9 Jump SkipPrint
10 Jump IncrementCounter
11
12 SkipPrint, Load CounterVariable
13 Output
14
15 IncrementCounter, Load CounterVariable
16 Add OneValue
17 Store CounterVariable
18 Load FiveValue
AC 0000
IR 7000
MAR 110
MBR 7000
PC 111
IN 0000
OUT 0004
Output log
RTL log
Watch list
Input list
OUTPUT MODE: DEC
0
1
2
4
Machine halted normally.
+0 +1 +2 +3 +4 +5 +6 +7 +8 +9 +A +B +C +D +E +F
000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
010 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
020 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
030 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
Assemble Step Microstep Step Back Halted Restart Delay: 1 ms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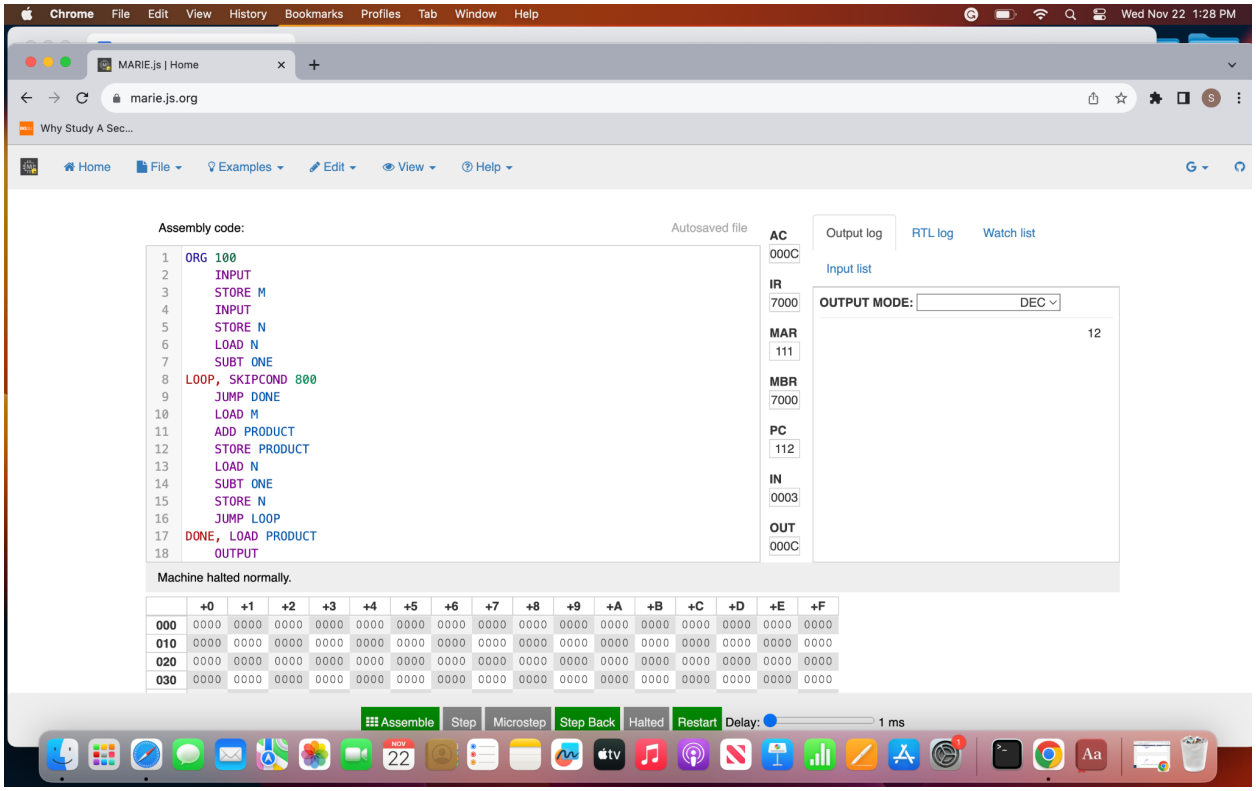
Assembly code:
Autosaved file
14
15 IncrementCounter, Load CounterVariable
16 Add OneValue
17 Store CounterVariable
18 Load FiveValue
19 Subt CounterVariable
20 Skipcond 400
21 Jump StartLoop
22
23 EndLoop, Halt
24
25 CounterVariable, HEX 0
26 OneValue, DEC 1
27 ThreeValue, DEC 3
28 FiveValue, DEC 5
29 ZeroValue, HEX 0
30
31 END
AC 0000
IR 7000
MAR 110
MBR 7000
PC 111
IN 0000
OUT 0004
Output log
RTL log
Watch list
Input list
OUTPUT MODE: DEC
0
1
2
4
Machine halted normally.
+0 +1 +2 +3 +4 +5 +6 +7 +8 +9 +A +B +C +D +E +F
000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
010 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
020 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
030 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
Assemble Step Microstep Step Back Halted Restart Delay: 1 ms

Solution-4:

```
ORG 100
    INPUT
    STORE M
    INPUT
    STORE N
    LOAD N
    SUBT ONE
LOOP, SKIPCOND 800
    JUMP DONE
    LOAD M
    ADD PRODUCT
    STORE PRODUCT
    LOAD N
    SUBT ONE
    STORE N
    JUMP LOOP
DONE, LOAD PRODUCT
    OUTPUT
    HALT
M, DEC 0
N, DEC 0
PRODUCT, DEC 0
ONE, DEC 1
```

Output: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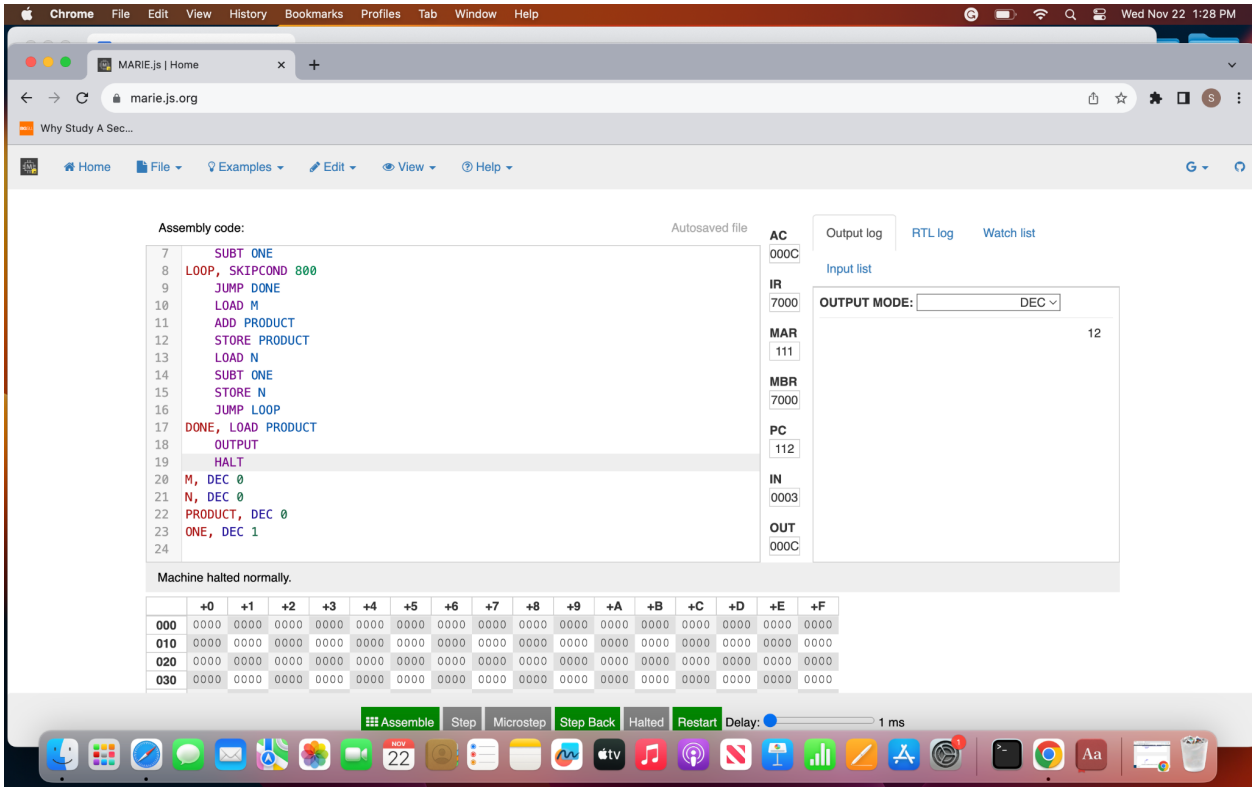
Assembly code:
Autosaved file
1 ORG 100
2 INPUT
3 STORE M
4 INPUT
5 STORE N
6 LOAD N
7 SUBT ONE
8 LOOP, SKIPCOND 800
9 JUMP DONE
10 LOAD M
11 ADD PRODUCT
12 STORE PRODUCT
13 LOAD N
14 SUBT ONE
15 STORE N
16 JUMP LOOP
17 DONE, LOAD PRODUCT
18 OUTPUT
AC 000C
IR 7000
MAR 111
MBR 7000
PC 112
IN 0003
OUT 000C
Output log
RTL log
Watch list
Input list
OUTPUT MODE: DEC
12
Machine halted normally.
+0 +1 +2 +3 +4 +5 +6 +7 +8 +9 +A +B +C +D +E +F
000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
010 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
020 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
030 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
Assemble Step Microstep Step Back Halted Restart Delay: 1 ms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Assembly code:
Autosaved file
7 SUBT ONE
8 LOOP, SKIPCOND 800
9 JUMP DONE
10 LOAD M
11 ADD PRODUCT
12 STORE PRODUCT
13 LOAD N
14 SUBT ONE
15 STORE N
16 JUMP LOOP
17 DONE, LOAD PRODUCT
18 OUTPUT
19 HALT
20 M, DEC 0
21 N, DEC 0
22 PRODUCT, DEC 0
23 ONE, DEC 1
24
AC 000C
IR 7000
MAR 111
MBR 7000
PC 112
IN 0003
OUT 000C
Output log
RTL log
Watch list
Input list
OUTPUT MODE: DEC
12
Machine halted normally.
+0 +1 +2 +3 +4 +5 +6 +7 +8 +9 +A +B +C +D +E +F
000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
010 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
020 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
030 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
Assemble Step Microstep Step Back Halted Restart Delay: 1 ms