SCREENSHOTS OF THE OUTPUT(IMT2021542)

1. swapping two Numbers

```
Enter '1' to Swap two Numbers
Enter '2' to Add two Numbers
Enter '3' to difference two numbers(a-b)
Enter '4' to Find perimeter of rectangle
Enter '5' to find 5th element of fibonacci
1
Enter two numbers a and b
7 5
LOAD M(X) 200 ADD M(X) 201
STOR M(X) 200
LOAD M(X) 200 SUB M(X) 201
STOR M(X) 201
LOAD M(X) 200 SUB M(X) 201
STOR M(X) 200
HALT


Elements before swapping are 7 5
RIGHT INSTRUCTION CYCLE---------->
INSTRUCTION ---------->1
00000001000011001000000001010000011001001
LEFT INSTRUCTION CYCLE---------->
AC=00000000000000000000000000000000000000111
MBR=00000000000000000000000000000000000000111
PC=0
MAR=000011001000
IR=00000001
IBR=00000101000011001001

RIGHT INSTRUCTION CYCLE---------->
AC=00000000000000000000000000000000000001100
MBR=00000000000000000000000000000000000000101
PC=1
MAR=000011001001
IR=00000101

INSTRUCTION ---------->2
00000000000000000000010000100001100100 0
RIGHT INSTRUCTION CYCLE---------->
AC=00000000000000000000000000000000000001100
MBR=00000000000000000000000000000000000001100
PC=1
MAR=000011001000
IR=00100001

INSTRUCTION ---------->3
00000001000011001000000001100000011001001
LEFT INSTRUCTION CYCLE---------->
AC=00000000000000000000000000000000000001100
MBR=00000000000000000000000000000000000001100
PC=2
MAR=000011001000
IR=00000001
IBR=00000110000011001001

RIGHT INSTRUCTION CYCLE---------->
AC=00000000000000000000000000000000000000111
```

```
MAR=000011001000
IR=00100001

INSTRUCTION ---------->3
00000001000011001000000011000011001001
LEFT INSTRUCTION CYCLE---------->
AC=00000000000000000000000000000001100
MBR=00000000000000000000000000000001100
PC=2
MAR=000011001000
IR=00000001
IBR=00000110000011001001

RIGHT INSTRUCTION CYCLE---------->
AC=00000000000000000000000000000000111
MBR=00000000000000000000000000000000101
PC=3
MAR=000011001001
IR=00000110

INSTRUCTION ---------->4
00000000000000000000001000010000011001001
RIGHT INSTRUCTION CYCLE---------->
AC=00000000000000000000000000000000111
MBR=00000000000000000000000000000000111
PC=3
MAR=000011001001
IR=00100001

INSTRUCTION ---------->5
00000001000011001000000011000011001001
LEFT INSTRUCTION CYCLE---------->
AC=00000000000000000000000000000001100
MBR=00000000000000000000000000000001100
PC=4
MAR=000011001000
IR=00000001
IBR=00000110000011001001

RIGHT INSTRUCTION CYCLE---------->
AC=00000000000000000000000000000000101
MBR=00000000000000000000000000000000111
PC=5
MAR=000011001001
IR=00000110

INSTRUCTION ---------->6
00000000000000000000001000010000011001000
RIGHT INSTRUCTION CYCLE---------->
AC=00000000000000000000000000000000101
MBR=00000000000000000000000000000000101
PC=5
MAR=000011001000
IR=00100001

INSTRUCTION ---------->7
00000000000000000000000000000000000000000000
Elements after swapping are 5 7
```

2. Adding two numbers

```
++ IASFINALop.cpp -o IASFINALop && "/Users/yogeshgoyal/Deskto
Enter '1' to Swap two Numbers
Enter '2' to Add two Numbers
Enter '3' to difference two numbers(a-b)
Enter '4' to Find perimeter of rectangle
Enter '5' to find 5th element of fibonacci
2
Enter two numbers a and b
7 5
LOAD M(X) 200 ADD M(X) 201
STOR M(X) 200
HALT


INSTRUCTION --------->1
00000001000011001000000001010000011001001
LEFT INSTRUCTION CYCLE--------->
AC=00000000000000000000000000000000000000111
MBR=00000000000000000000000000000000000000111
PC=0
MAR=000011001000
IR=00000001
IBR=00000101000011001001

RIGHT INSTRUCTION CYCLE--------->
AC=00000000000000000000000000000000000001100
MBR=00000000000000000000000000000000000000101
PC=1
MAR=000011001001
IR=00000101

INSTRUCTION --------->2
00000000000000000000010000100000011001000
RIGHT INSTRUCTION CYCLE--------->
AC=00000000000000000000000000000000000001100
MBR=00000000000000000000000000000000000001100
PC=1
MAR=000011001000
IR=00100001

INSTRUCTION --------->3
00000000000000000000000000000000000000000000
Sum of a and b is 12
```

3. Subtracting two numbers

```
Enter '1' to Swap two Numbers
Enter '2' to Add two Numbers
Enter '3' to difference two numbers(a-b)
Enter '4' to Find perimeter of rectangle
Enter '5' to find 5th element of fibonacci
3
Enter two numbers a and b
7 5
LOAD M(X) 200 SUB M(X) 201
STOR M(X) 200
HALT


INSTRUCTION --------->1
00000001000011001000000011000011001001
LEFT INSTRUCTION CYCLE--------->
AC=00000000000000000000000000000000000111
MBR=00000000000000000000000000000000000111
PC=0
MAR=000011001000
IR=00000001
IBR=0000110000011001001

RIGHT INSTRUCTION CYCLE--------->
AC=00000000000000000000000000000000000010
MBR=00000000000000000000000000000000000101
PC=1
MAR=000011001001
IR=00000110

INSTRUCTION --------->2
00000000000000000000010000100001100100 0
RIGHT INSTRUCTION CYCLE--------->
AC=00000000000000000000000000000000000010
MBR=00000000000000000000000000000000000010
PC=1
MAR=000011001000
IR=00100001

INSTRUCTION --------->3
00000000000000000000000000000000000000000
Difference of a and b is 2
```

4. Perimeter of rectangle

```
Enter '1' to Swap two Numbers
Enter '2' to Add two Numbers
Enter '3' to difference two numbers(a-b)
Enter '4' to Find perimeter of rectangle
Enter '5' to find 5th element of fibonacci
4
Enter two numbers a and b
7 5
LOAD M(X) 200 ADD M(X) 201
STOR M(X) 200 LSH 1
STOR M(X) 200
HALT


INSTRUCTION ---------->1
00000001000011001000000001010000011001001
LEFT INSTRUCTION CYCLE---------->
AC=00000000000000000000000000000000000000111
MBR=00000000000000000000000000000000000000111
PC=0
MAR=000011001000
IR=00000001
IBR=0000101000011001001

RIGHT INSTRUCTION CYCLE---------->
AC=00000000000000000000000000000000000001100
MBR=00000000000000000000000000000000000000101
PC=1
MAR=000011001001
IR=00000101

INSTRUCTION ---------->2
00100001000011001000000101000000000000001
LEFT INSTRUCTION CYCLE---------->
AC=00000000000000000000000000000000000001100
MBR=00000000000000000000000000000000000001100
PC=1
MAR=000011001000
IR=00100001
IBR=0001010000000000001

RIGHT INSTRUCTION CYCLE---------->
AC=00000000000000000000000000000000000011000
MBR=00000000000000000000000000000000000001100
PC=2
MAR=000000000001
IR=00010100

INSTRUCTION ---------->3
00000000000000000000001000010000011001000
RIGHT INSTRUCTION CYCLE---------->
AC=00000000000000000000000000000000000011000
MBR=00000000000000000000000000000000000011000
PC=2
MAR=000011001000
IR=00100001

INSTRUCTION ---------->4
```

```
Enter '3' to difference two numbers(a-b)
Enter '4' to Find perimeter of rectangle
Enter '5' to find 5th element of fibonacci
4
Enter two numbers a and b
7 5
LOAD M(X) 200 ADD M(X) 201
STOR M(X) 200 LSH 1
STOR M(X) 200
HALT


INSTRUCTION ---------->1
00000001000011001000000001010000011001001
LEFT INSTRUCTION CYCLE---------->
AC=00000000000000000000000000000000000000111
MBR=00000000000000000000000000000000000000111
PC=0
MAR=000011001000
IR=00000001
IBR=0000010100001100100 1

RIGHT INSTRUCTION CYCLE---------->
AC=00000000000000000000000000000000000001100
MBR=00000000000000000000000000000000000000101
PC=1
MAR=000011001001
IR=00000101

INSTRUCTION ---------->2
00100001000011001000000101000000000000001
LEFT INSTRUCTION CYCLE---------->
AC=00000000000000000000000000000000000001100
MBR=00000000000000000000000000000000000001100
PC=1
MAR=000011001000
IR=00100001
IBR=0001010000000000001

RIGHT INSTRUCTION CYCLE---------->
AC=00000000000000000000000000000000000011000
MBR=00000000000000000000000000000000000001100
PC=2
MAR=000000000001
IR=00010100

INSTRUCTION ---------->3
00000000000000000000001000010000011001000
RIGHT INSTRUCTION CYCLE---------->
AC=00000000000000000000000000000000000011000
MBR=00000000000000000000000000000000000011000
PC=2
MAR=000011001000
IR=00100001

INSTRUCTION ---------->4
00000000000000000000000000000000000000000000
perimeter of rectangle is 24
```

5. 5th element of Fibonacci series

```
Enter '1' to Swap two Numbers
Enter '2' to Add two Numbers
Enter '3' to difference two numbers(a-b)
Enter '4' to Find perimeter of rectangle
Enter '5' to find 5th element of fibonacci
5
Enter two numbers a and b
0 1
LOAD M(X) 200 ADD M(X) 201
STOR M(X) 202
LOAD M(X) 201 STOR M(X) 200
LOAD M(X) 202 STOR M(X) 201
JUMP M(X,0:19) 0
HALT


INSTRUCTION --------->1
00000001000011001000000001010000011001001
LEFT INSTRUCTION CYCLE--------->
AC=00000000000000000000000000000000000000000
MBR=00000000000000000000000000000000000000000
PC=0
MAR=000011001000
IR=00000001
IBR=00000101000011001001

RIGHT INSTRUCTION CYCLE--------->
AC=00000000000000000000000000000000000000001
MBR=00000000000000000000000000000000000000001
PC=1
MAR=000011001001
IR=00000101

INSTRUCTION --------->2
00000000000000000000001000010000011001010
RIGHT INSTRUCTION CYCLE--------->
AC=00000000000000000000000000000000000000001
MBR=00000000000000000000000000000000000000001
PC=1
MAR=000011001010
IR=00100001

INSTRUCTION --------->3
00000001000011001001001000010000011001000
LEFT INSTRUCTION CYCLE--------->
AC=00000000000000000000000000000000000000001
MBR=00000000000000000000000000000000000000001
PC=2
MAR=000011001001
IR=00000001
IBR=00100001000011001000
```

```
INSTRUCTION ---------->3
00000001000011001001001000010000011001000
LEFT INSTRUCTION CYCLE--------->
AC=00000000000000000000000000000000000000000001
MBR=00000000000000000000000000000000000000000001
PC=2
MAR=000011001001
IR=00000001
IBR=00100001000011001000

RIGHT INSTRUCTION CYCLE--------->
AC=00000000000000000000000000000000000000000001
MBR=00000000000000000000000000000000000000000001
PC=3
MAR=000011001000
IR=00100001

INSTRUCTION ---------->4
00000001000011001010001000010000011001001
LEFT INSTRUCTION CYCLE--------->
AC=00000000000000000000000000000000000000000001
MBR=00000000000000000000000000000000000000000001
PC=3
MAR=000011001010
IR=00000001
IBR=00100001000011001001

RIGHT INSTRUCTION CYCLE--------->
AC=00000000000000000000000000000000000000000001
MBR=00000000000000000000000000000000000000000001
PC=4
MAR=000011001001
IR=00100001

INSTRUCTION ---------->5
00000000000000000000000001101000000000000
RIGHT INSTRUCTION CYCLE--------->
PC=0
MAR=000000000000
IR=00001101

RIGHT INSTRUCTION CYCLE--------->
INSTRUCTION ---------->6
00000001000011001000000001010000011001001
LEFT INSTRUCTION CYCLE--------->
AC=00000000000000000000000000000000000000000001
MBR=00000000000000000000000000000000000000000001
PC=1
MAR=000011001000
IR=00000001
IBR=00000101000011001001

RIGHT INSTRUCTION CYCLE--------->
AC=00000000000000000000000000000000000000000010
```

```
IBR=0000010100011001001

RIGHT INSTRUCTION CYCLE--------->
AC=00000000000000000000000000000000000010
MBR=00000000000000000000000000000000000001
PC=2
MAR=000011001001
IR=00000101

INSTRUCTION --------->7
00000000000000000000010000100011001010
RIGHT INSTRUCTION CYCLE--------->
AC=00000000000000000000000000000000000010
MBR=00000000000000000000000000000000000010
PC=2
MAR=000011001010
IR=00100001

INSTRUCTION --------->8
00000001000011001001001000010000011001000
LEFT INSTRUCTION CYCLE--------->
AC=00000000000000000000000000000000000001
MBR=00000000000000000000000000000000000001
PC=3
MAR=000011001001
IR=00000001
IBR=00100001000011001000

RIGHT INSTRUCTION CYCLE--------->
AC=00000000000000000000000000000000000001
MBR=00000000000000000000000000000000000001
PC=4
MAR=000011001000
IR=00100001

INSTRUCTION --------->9
00000001000011001010001000010000011001001
LEFT INSTRUCTION CYCLE--------->
AC=00000000000000000000000000000000000010
MBR=00000000000000000000000000000000000010
PC=4
MAR=000011001010
IR=00000001
IBR=00100001000011001001

RIGHT INSTRUCTION CYCLE--------->
AC=00000000000000000000000000000000000010
MBR=00000000000000000000000000000000000010
PC=5
MAR=000011001001
IR=00100001

INSTRUCTION --------->10
00000000000000000000000011010000000000000
```

```
INSTRUCTION ---------->10
00000000000000000000000001101000000000000
RIGHT INSTRUCTION CYCLE---------->
PC=0
MAR=000000000000
IR=00001101

RIGHT INSTRUCTION CYCLE---------->
INSTRUCTION ---------->11
00000001000011001000000001010000011001001
LEFT INSTRUCTION CYCLE---------->
AC=00000000000000000000000000000000000000000001
MBR=00000000000000000000000000000000000000000001
PC=1
MAR=000011001000
IR=00000001
IBR=0000010100001100100 1

RIGHT INSTRUCTION CYCLE---------->
AC=00000000000000000000000000000000000000000011
MBR=00000000000000000000000000000000000000000010
PC=2
MAR=000011001001
IR=00000101

INSTRUCTION ---------->12
00000000000000000000000100001000011001010
RIGHT INSTRUCTION CYCLE---------->
AC=00000000000000000000000000000000000000000011
MBR=00000000000000000000000000000000000000000011
PC=2
MAR=000011001010
IR=00100001

INSTRUCTION ---------->13
00000001000011001001001000010000011001000
LEFT INSTRUCTION CYCLE---------->
AC=00000000000000000000000000000000000000000010
MBR=00000000000000000000000000000000000000000010
PC=3
MAR=000011001001
IR=00000001
IBR=00100001000011001000

RIGHT INSTRUCTION CYCLE---------->
AC=00000000000000000000000000000000000000000010
MBR=00000000000000000000000000000000000000000010
PC=4
MAR=000011001000
IR=00100001

INSTRUCTION ---------->14
00000001000011001010001000010000011001001
```

```
INSTRUCTION ---------->14
00000001000011001010001000010000011001001
LEFT INSTRUCTION CYCLE---------->
AC=00000000000000000000000000000000000000011
MBR=00000000000000000000000000000000000000011
PC=4
MAR=000011001010
IR=00000001
IBR=00100001000011001001

RIGHT INSTRUCTION CYCLE---------->
AC=00000000000000000000000000000000000000011
MBR=00000000000000000000000000000000000000011
PC=5
MAR=000011001001
IR=00100001

INSTRUCTION ---------->15
00000000000000000000000011010000000000000
RIGHT INSTRUCTION CYCLE---------->
PC=0
MAR=000000000000
IR=00001101

RIGHT INSTRUCTION CYCLE---------->
INSTRUCTION ---------->16
00000001000011001000000001010000011001001
LEFT INSTRUCTION CYCLE---------->
AC=00000000000000000000000000000000000000010
MBR=00000000000000000000000000000000000000010
PC=1
MAR=000011001000
IR=00000001
IBR=00000101000011001001

RIGHT INSTRUCTION CYCLE---------->
AC=00000000000000000000000000000000000000101
MBR=00000000000000000000000000000000000000011
PC=2
MAR=000011001001
IR=00000101

INSTRUCTION ---------->17
00000000000000000000010000100000011001010
RIGHT INSTRUCTION CYCLE---------->
AC=00000000000000000000000000000000000000101
MBR=00000000000000000000000000000000000000101
PC=2
MAR=000011001010
IR=00100001

INSTRUCTION ---------->18
00000001000011001001001000010000011001000
```

```
00000000000000000000010000100001100101O
RIGHT INSTRUCTION CYCLE--------->
AC=00000000000000000000000000000000000101
MBR=00000000000000000000000000000000000101
PC=2
MAR=000011001010
IR=00100001

INSTRUCTION --------->18
00000001000011001001001000010000011001000
LEFT INSTRUCTION CYCLE--------->
AC=00000000000000000000000000000000000011
MBR=00000000000000000000000000000000000011
PC=3
MAR=000011001001
IR=00000001
IBR=00100001000011001000

RIGHT INSTRUCTION CYCLE--------->
AC=00000000000000000000000000000000000011
MBR=00000000000000000000000000000000000011
PC=4
MAR=000011001000
IR=00100001

INSTRUCTION --------->19
00000001000011001010001000010000011001001
LEFT INSTRUCTION CYCLE--------->
AC=00000000000000000000000000000000000101
MBR=00000000000000000000000000000000000101
PC=4
MAR=000011001010
IR=00000001
IBR=00100001000011001001

RIGHT INSTRUCTION CYCLE--------->
AC=00000000000000000000000000000000000101
MBR=00000000000000000000000000000000000101
PC=5
MAR=000011001001
IR=00100001

INSTRUCTION --------->20
00000000000000000000000011010000000000000
RIGHT INSTRUCTION CYCLE--------->
PC=0
MAR=000000000000
IR=00001101

INSTRUCTION --------->21
00000000000000000000000000000000000000000

5th element of fibonacci is 5
```