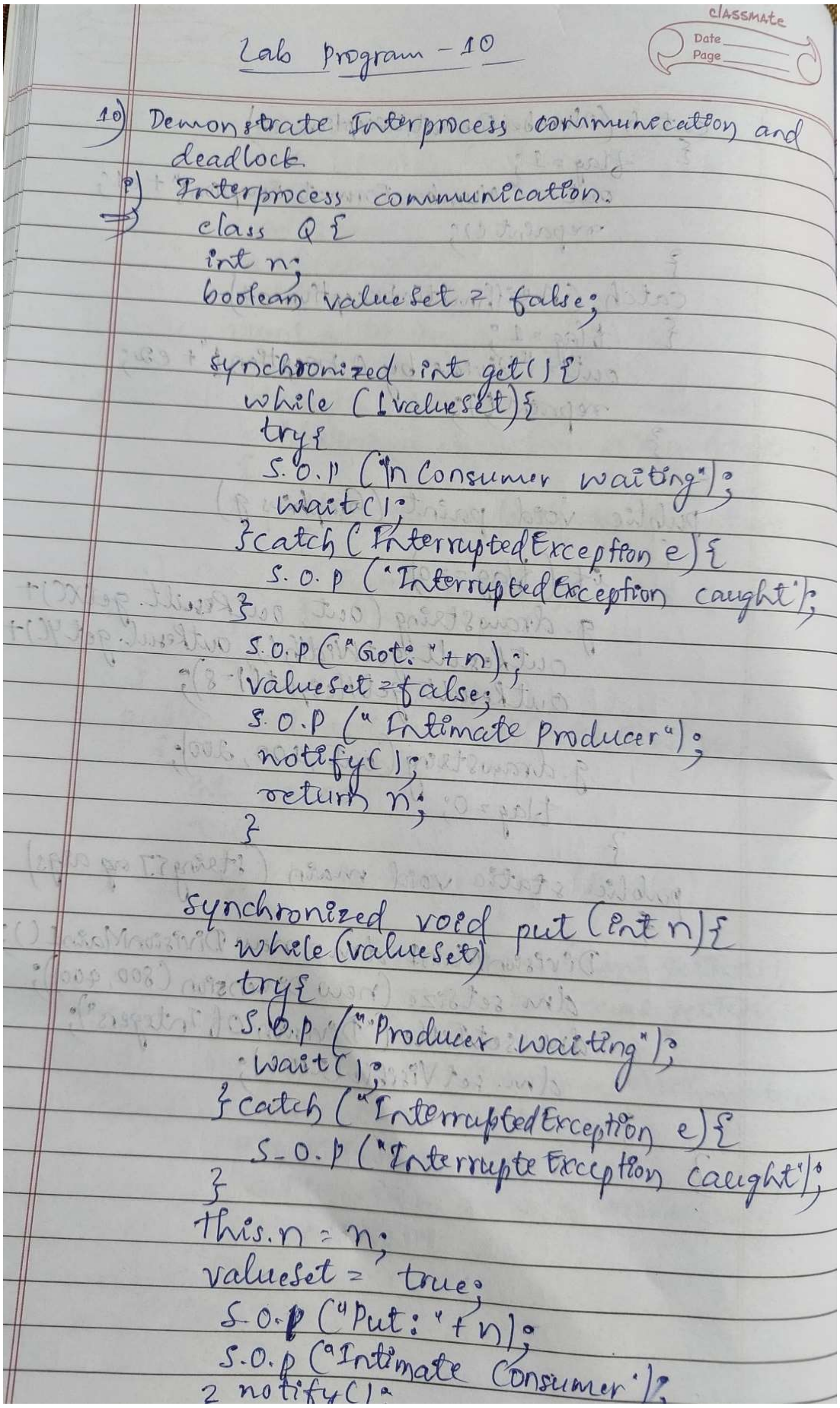
PROGRAM 10 :

Demonstrate Inter process Communication and deadlock

1. Demonstration of Inter process Communication

   Observation Writeup:



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Lab Program - 10

10) Demonstrate Interprocess communication and deadlock.

i) Interprocess communication.

```
⇒ class Q {
    int n;
    boolean valueSet ?. false;

    synchronized int get() {
      while (!valueset){
        try{
        S.O.P ("In Consumer waiting");
         wait();
      }catch (InterruptedException e){
         S.O.P ("InterruptedException caught");
      }
       S.O.P ("Got: "+n);
       valueset = false;
       S.O.P (" Intimate Producer");
       notify();
       return n;
      }

   synchronized void put (int n){
      while(valueset)
      try{
      S.O.P ("Producer waiting");
      wait();
     }catch ("InterruptedException e){
        S.O.P ("InterrupteException caught");
     }
    this.n = n;
    valueset = true;
     S.O.P ("Put: "+n);
     S.O.P ("Intimate Consumer");
    2 notify();
catch (NumberFormatException e1)
{   flag = 1;
    out = "Number Format Exception!" + e1;
    repaint();
}
catch (ArithmeticException e2)
{   flag = 1;
    out = "Divide by 0 Exception!" + e2;
    repaint();
}
}
public void paint (Graphics g)
{
    if (flag == 0)
    g.drawString (out, outResult.getX()+
      outResult.getWidth(), outResul.getY()+
      outResult.getHeight()-8);
    g.drawString (out, 100, 200);
    flag = 0;
}
public static void main (String[] ~~ag~~ args)
{
    DivisionMain1 dm = new DivisionMain1();
    dm.setSize (new Dimension (800, 400));
    dm.setTitle ("Division Of Integers");
    dm.setVisible (true);
}
}
```

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Page ______

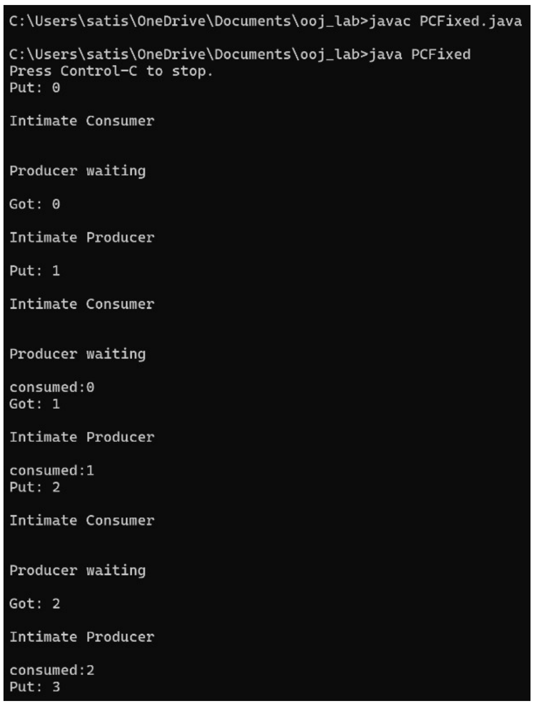
```
new Consumer(q);
    S.O.P ("Press Control-C to stop.");
  }
}
```

Soft copy of the program :

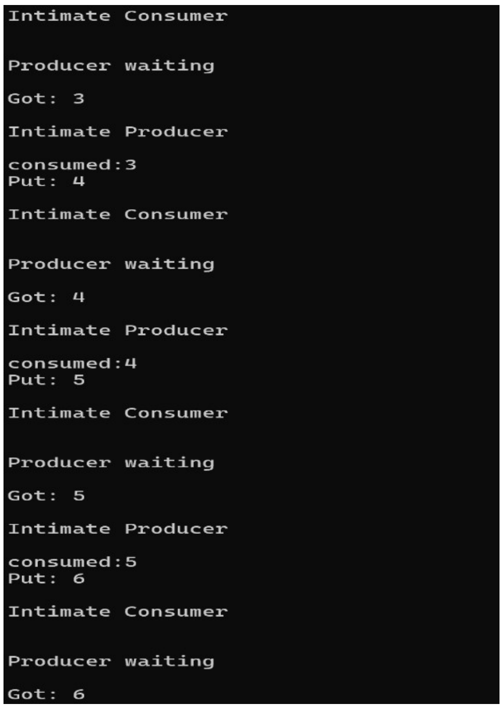
```
class Q {
int n;
boolean valueSet = false;

synchronized int get() {
while(!valueSet)
try {
System.out.println("\nConsumer waiting\n");
wait();
} catch(InterruptedException e) {
System.out.println("InterruptedException caught");
}
System.out.println("Got: " + n);
valueSet = false;
System.out.println("\nIntimate Producer\n");
notify();
return n;
}

synchronized void put(int n) {
while(valueSet)
try {
System.out.println("\nProducer waiting\n");
wait();
} catch(InterruptedException e) {
System.out.println("InterruptedException caught");
}
this.n = n;
valueSet = true;
System.out.println("Put: " + n);
System.out.println("\nIntimate Consumer\n");
notify();
}
}

class Producer implements Runnable {
Q q;
Producer(Q q) {
this.q = q;
new Thread(this, "Producer").start();
}
public void run() {
int i = 0;
while(i<15) {
q.put(i++);
```

```java
}
}
}

class Consumer implements Runnable {
Q q;
Consumer(Q q) {
this.q = q;
new Thread(this, "Consumer").start();
}
public void run() {
 int i=0;
while(i<15) {
int r=q.get();
System.out.println("consumed:"+r);
i++;
}
}
}

class PCFixed {
public static void main(String args[]) {
Q q = new Q();
new Producer(q);
new Consumer(q);
System.out.println("Press Control-C to stop.");
}
}
```

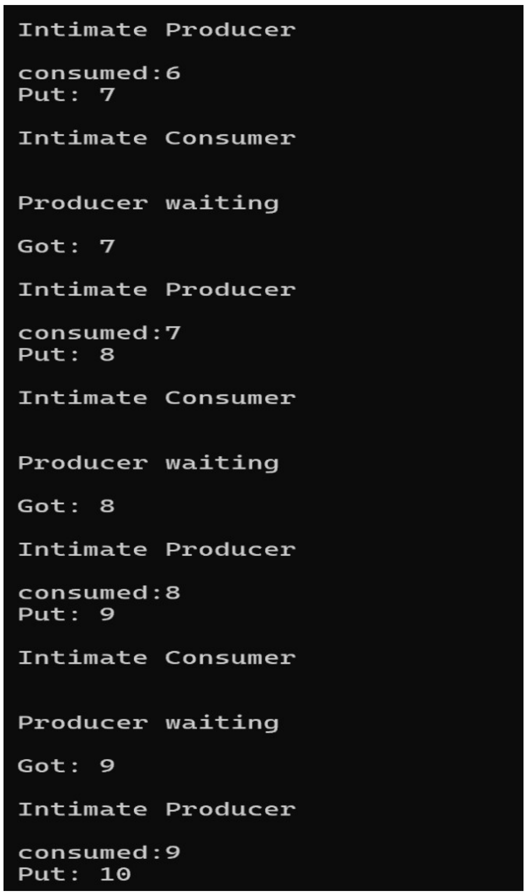
Output:



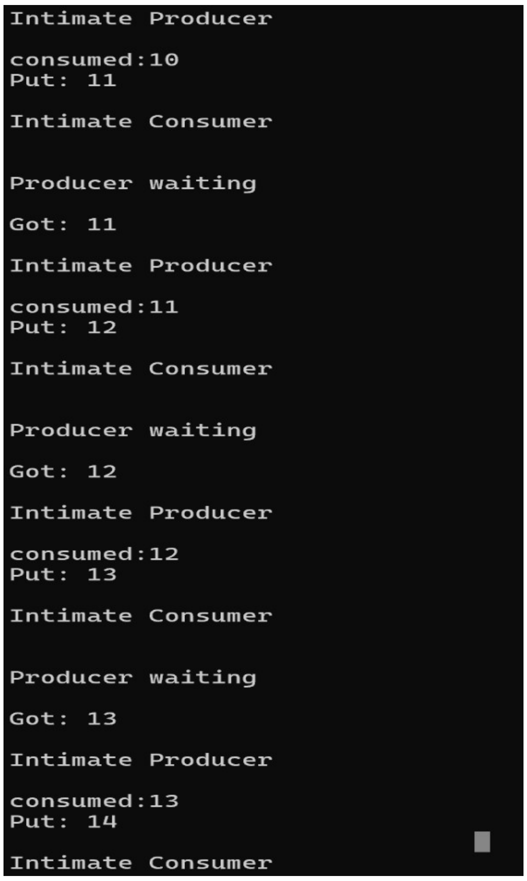
```
C:\Users\satis\OneDrive\Documents\ooj_lab>javac PCFixed.java

C:\Users\satis\OneDrive\Documents\ooj_lab>java PCFixed
Press Control-C to stop.
Put: 0

Intimate Consumer


Producer waiting

Got: 0

Intimate Producer

Put: 1

Intimate Consumer


Producer waiting

consumed:0
Got: 1

Intimate Producer

consumed:1
Put: 2

Intimate Consumer


Producer waiting

Got: 2

Intimate Producer

consumed:2
Put: 3
```



```
Intimate Consumer


Producer waiting

Got:  3

Intimate Producer

consumed:3
Put:  4

Intimate Consumer


Producer waiting

Got:  4

Intimate Producer

consumed:4
Put:  5

Intimate Consumer


Producer waiting

Got:  5

Intimate Producer

consumed:5
Put:  6

Intimate Consumer


Producer waiting

Got:  6
```



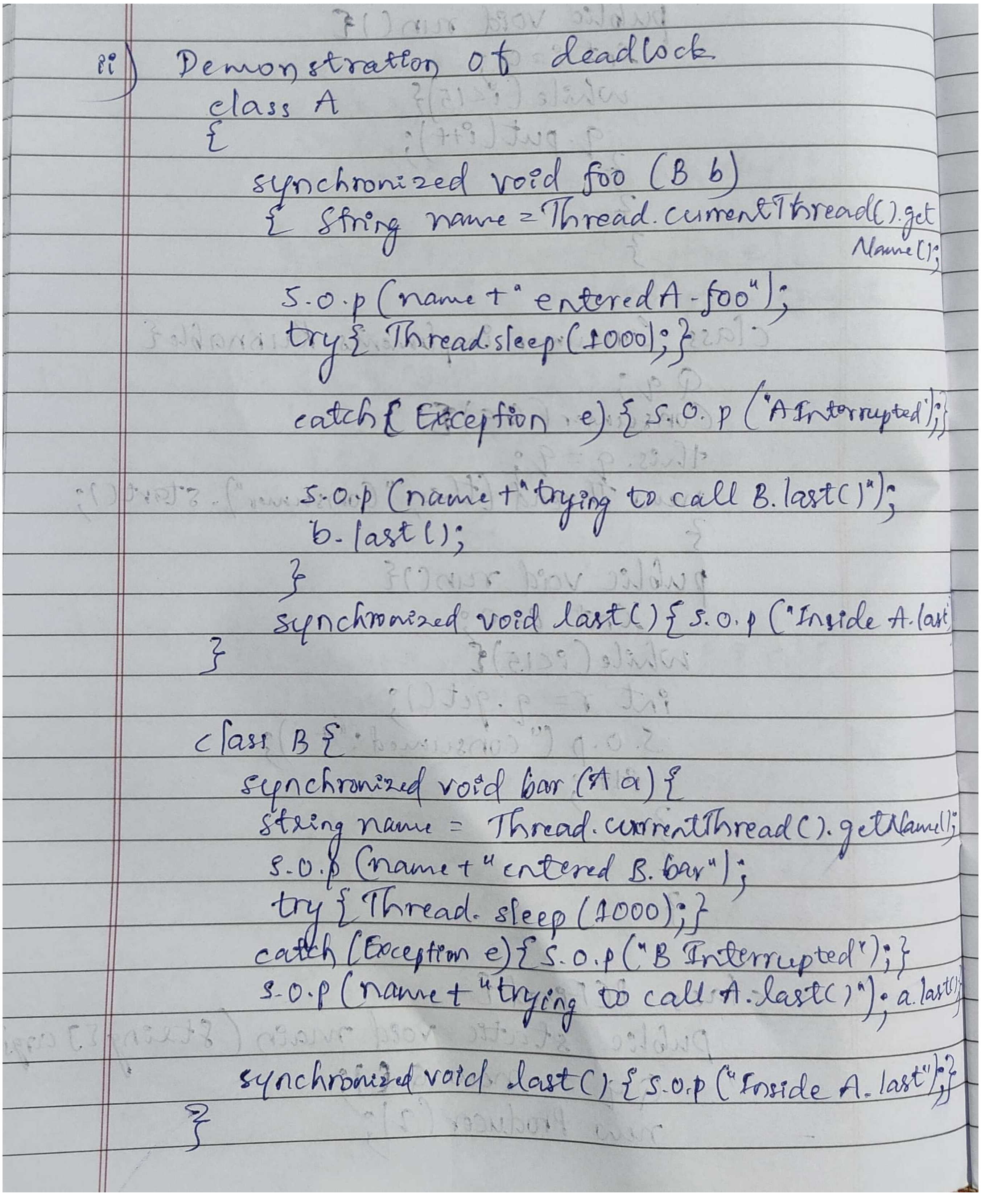
```
Intimate Producer

consumed:6
Put:  7

Intimate Consumer


Producer waiting

Got:  7

Intimate Producer

consumed:7
Put:  8

Intimate Consumer


Producer waiting

Got:  8

Intimate Producer

consumed:8
Put:  9

Intimate Consumer


Producer waiting

Got:  9

Intimate Producer

consumed:9
Put:  10
```



```
Intimate Producer

consumed:10
Put:  11

Intimate Consumer


Producer waiting

Got:  11

Intimate Producer

consumed:11
Put:  12

Intimate Consumer


Producer waiting

Got:  12

Intimate Producer

consumed:12
Put:  13

Intimate Consumer


Producer waiting

Got:  13

Intimate Producer

consumed:13
Put:  14

Intimate Consumer
```

2.Demonstration of Deadlock

Observation Writeup:



ii) Demonstration of deadlock

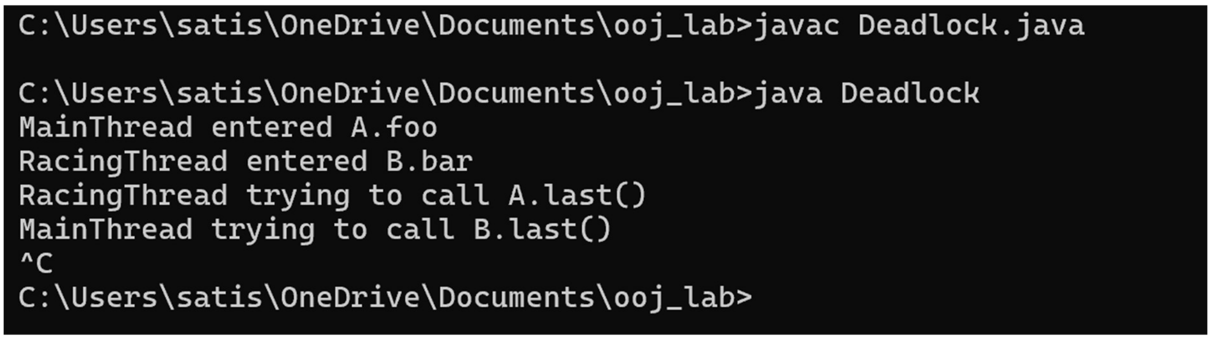
```
class A
{
    synchronized void foo (B b)
    { String name = Thread.currentThread().get
                                        Name();
      S.o.p (name + " entered A.foo");
      try{ Thread.sleep (1000); }
      catch{ Exception e) { S.o.p ("A Interrupted");}

      S.o.p (name + " trying to call B.last()");
      b.last();
    }
    synchronized void last() { S.o.p ("Inside A.last
}

class B {
  synchronized void bar (A a) {
    String name = Thread.currentThread().getName();
    S.o.p (name + " entered B.bar");
    try { Thread.sleep (1000);}
    catch (Exception e) { S.o.p ("B Interrupted");}
    S.o.p (name + " trying to call A.last()"); a.last();

  synchronized void last() { S.o.p ("Inside A.last"); }
}
```

```
class Deadlock implements Runnable
{
   A a = new A(); B b = new B();
   Deadlock (){
    Thread. currentThread(). setName ("MainThread");
    Thread t = new Thread (this, "RacingThread");
      t. start (); a. foo(b);
        s.o.p ("Back in main thread");
      }
   public void run(){ b. bar(a);
        s.o.p (" Back in other thread");
      }
   public static void main(string [] args){
      new Deadlock();
     }
}
```

Soft copy of the program :

```java
 class A

{
  synchronized void foo(B b)
   { String name = Thread.currentThread().getName();
      System.out.println(name + " entered A.foo");
      try { Thread.sleep(1000); }
      catch(Exception e) { System.out.println("A Interrupted"); }
      System.out.println(name + " trying to call B.last()"); b.last(); }
      synchronized void last() { System.out.println("Inside A.last"); }
}

 class B {
   synchronized void bar(A a) {
   String name = Thread.currentThread().getName();
   System.out.println(name + " entered B.bar");
   try { Thread.sleep(1000); }
catch(Exception e) { System.out.println("B Interrupted"); }
System.out.println(name + " trying to call A.last()"); a.last(); }
synchronized void last() { System.out.println("Inside A.last"); }

}


class Deadlock implements Runnable
 {
  A a = new A(); B b = new B();
  Deadlock( ) {
    Thread.currentThread().setName("MainThread");
    Thread t = new Thread(this, "RacingThread");
     t.start(); a.foo(b); // get lock on a in this thread.
     System.out.println("Back in main thread");
   }
 public void run() { b.bar(a); // get lock on b in other thread.
  System.out.println("Back in other thread");
  }
public static void main(String args[]) { new Deadlock(); }
}
```

Output:



```
C:\Users\satis\OneDrive\Documents\ooj_lab>javac Deadlock.java

C:\Users\satis\OneDrive\Documents\ooj_lab>java Deadlock
MainThread entered A.foo
RacingThread entered B.bar
RacingThread trying to call A.last()
MainThread trying to call B.last()
^C
C:\Users\satis\OneDrive\Documents\ooj_lab>
```