实验报告三

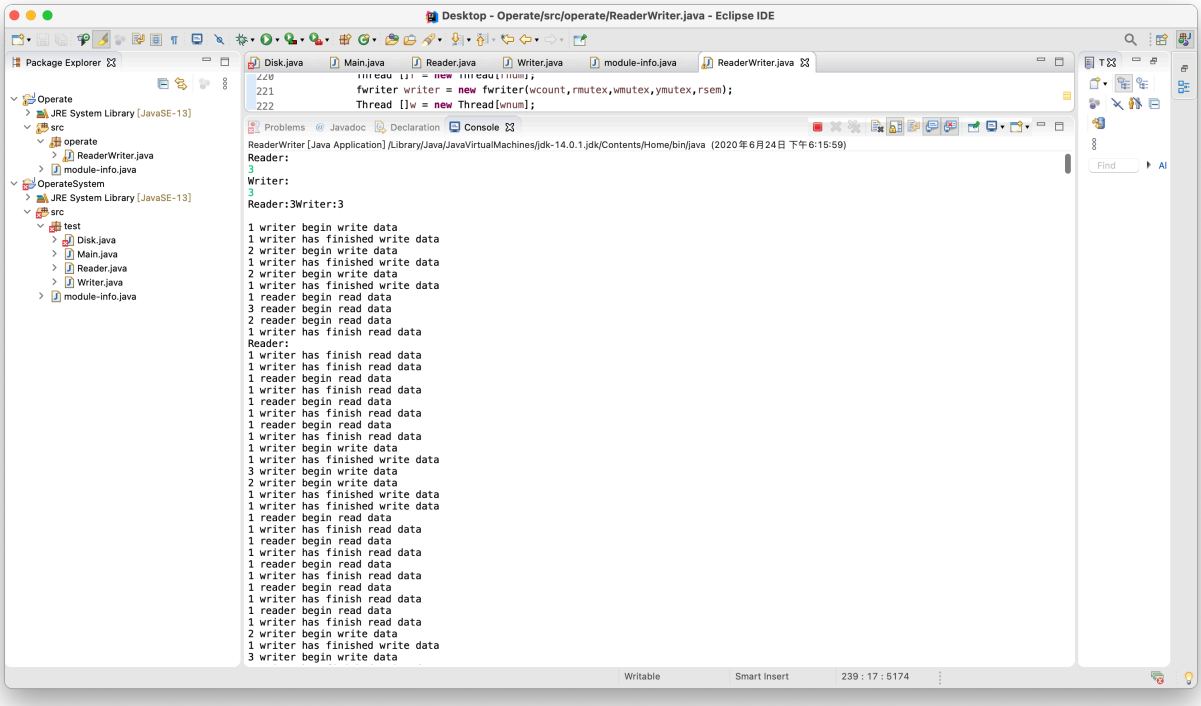
题目：用JAVA语言的同步方法解决读者/写者问题，要求写者优先

目的：认识读写问题中写优先的合理性，能采用同步方法实现。

要求：编写一个含有同步方法的类，其中含有四个同步方法start_read, finish_read, start_write, finish_write。

说明：读者使用方法：{start_read, 读操作, finish_read}; 写者使用方法：{start_write, 写操作, finish_write}。创建若干个读者和若干个写者，执行上述操作，并输出当前访问数据的读者或写者数量。

结果：



代码：

```
package operate;
import java.util.*;


class Semaphore{
    int value;
    public Semaphore(int v){
        this.value = v;
    }
    public synchronized void p(){
        value = value-1;
        if(value<0){
            try {
                wait();
            } catch (InterruptedException e) {
                e.printStackTrace();
            }
        }
    }
    public synchronized void v(){
        value = value+1;
        if(value<=0){
            this.notifyAll();
        }
    }
}
```

```
    public Reader(int c,Semaphore r,Semaphore w){
        this.count = c;
        this.rmutex = r;
        this.wmutex = w;
    }
    public void run(){
        while(true){
            rmutex.p();
            if(count == 0) wmutex.p();
            count++;
            rmutex.v();
            System.out.println(count+" begin read data");
            rmutex.p();
            count--;
            System.out.println("1 reader has finished  reading data");
            if(count == 0) wmutex.v();
            rmutex.v();
            try {
                Thread.sleep(1000);
            } catch (InterruptedException e) {
                e.printStackTrace();
            }

        }
    }
}
```

```
class Writer implements Runnable{
    Semaphore wmutex;
    int wnumber;
    public Writer(Semaphore w){

        this.wmutex = w;
    }
    public void run(){
            while(true){
            wmutex.p();
            System.out.println("writer "+"begin write data");
            System.out.println("1 writer finish write data");
            wmutex.v();
            try {
                Thread.sleep((long) (Math.random()*1000));
            } catch (InterruptedException e) {
                e.printStackTrace();
            }
            }
    }
}
```

```
82  class freader implements Runnable{
83      int count;
84      int rnumber;
85      int z;
86      Semaphore rmutex;
87      Semaphore wmutex;
88      Semaphore zmutex;
89      Semaphore rsem;
90      public freader(int c,Semaphore r,Semaphore w,Semaphore z,Semaphore z1){
91          this.count = c;
92          this.rmutex = r;
93          this.wmutex = w;
94          this.zmutex = z;
95          this.rsem = z1;
96          }
97      public void run(){
98          while(true){
99          zmutex.p();
100         rsem.p();
101         rmutex.p();
102         count++;
103         if(count == 1) wmutex.p();
104         wmutex.v();
105         rmutex.v();
106         rsem.v();
107         zmutex.v();
108         System.out.println(count+" reader"+" begin read data");
109         rmutex.p();
110         count--;
```

```
111             System.out.println("1 writer has finish read data");
112             if(count == 0) wmutex.v();
113             rmutex.v();
114             try {
115                 Thread.sleep((long) (Math.random()*1000));
116             } catch (InterruptedException e) {
117                 e.printStackTrace();
118             }
119             }
120
121     }
122         }
123     class fwriter implements Runnable{
124         int wcount;
125         Semaphore rmutex;
126         Semaphore wmutex;
127         Semaphore ymutex;
128         Semaphore rsem;
129         int wnumber;
130         public fwriter(int c,Semaphore r,Semaphore w,Semaphore y,Semaphore z1){
131             this.rmutex = r;
132             this.wmutex = w;
133             this.ymutex = y;
134             this.rsem = z1;
135
136         }
public class ReaderWriter{
    public static void main(String[] args){
        while(true){
        Scanner sc = new Scanner(System.in);
        System.out.println("Reader:");
        int rnum = sc.nextInt();

        if(rnum<0|rnum>10){
            System.out.println("Error!");
            continue;
        }
        System.out.println("Writer:");
        int wnum = sc.nextInt();
        System.out.println("Reader:"+rnum+"Writer:"+wnum);
        if(wnum<0|wnum>10){
            System.out.println("Error!");
            continue;
        }
        System.out.println(" ");
        int first = 2;
        if(first<1|first>2){
            System.out.println("Error!");
            continue;
        }
```

```
if(first==1){
 int count = 0;
Semaphore rmutex = new Semaphore(1);
Semaphore wmutex = new Semaphore(1);
Reader reader = new Reader( count,rmutex,wmutex);
Thread []r = new Thread[rnum];
Writer writer = new Writer(wmutex);
Thread []w = new Thread[wnum];
int b[] = new int[wnum];
for(int i=0;i<rnum;i++){
    int c = 0;
    r[i] = new Thread(reader);
    r[i].start();
    c++;
    }
for(int dcount=0;dcount<wnum;dcount++){
    int d = 0;
    b[d]=dcount+1;
    w[dcount] = new Thread(writer);
    w[dcount].start();
    d++;
}
}
```

```
if(first==2){
    int count = 0;
    int wcount = 0;
   Semaphore rmutex = new Semaphore(1);
   Semaphore wmutex = new Semaphore(1);
   Semaphore ymutex = new Semaphore(1);
   Semaphore rsem = new Semaphore(1);
   Semaphore zmutex = new Semaphore(1);
   freader reader = new freader( count,rmutex,wmutex,zmutex,rsem);
   Thread []r = new Thread[rnum];
   fwriter writer = new fwriter(wcount,rmutex,wmutex,ymutex,rsem);
   Thread []w = new Thread[wnum];
   int b[] = new int[wnum];
   for(int dcount=0;dcount<wnum;dcount++){
       int d = 0;
       b[d]=dcount+1;
       w[dcount] = new Thread(writer);
       w[dcount].start();
       d++;
   }
   for(int i=0;i<rnum;i++){
       int c = 0;
       r[i] = new Thread(reader);
       r[i].start();
       c++;
```