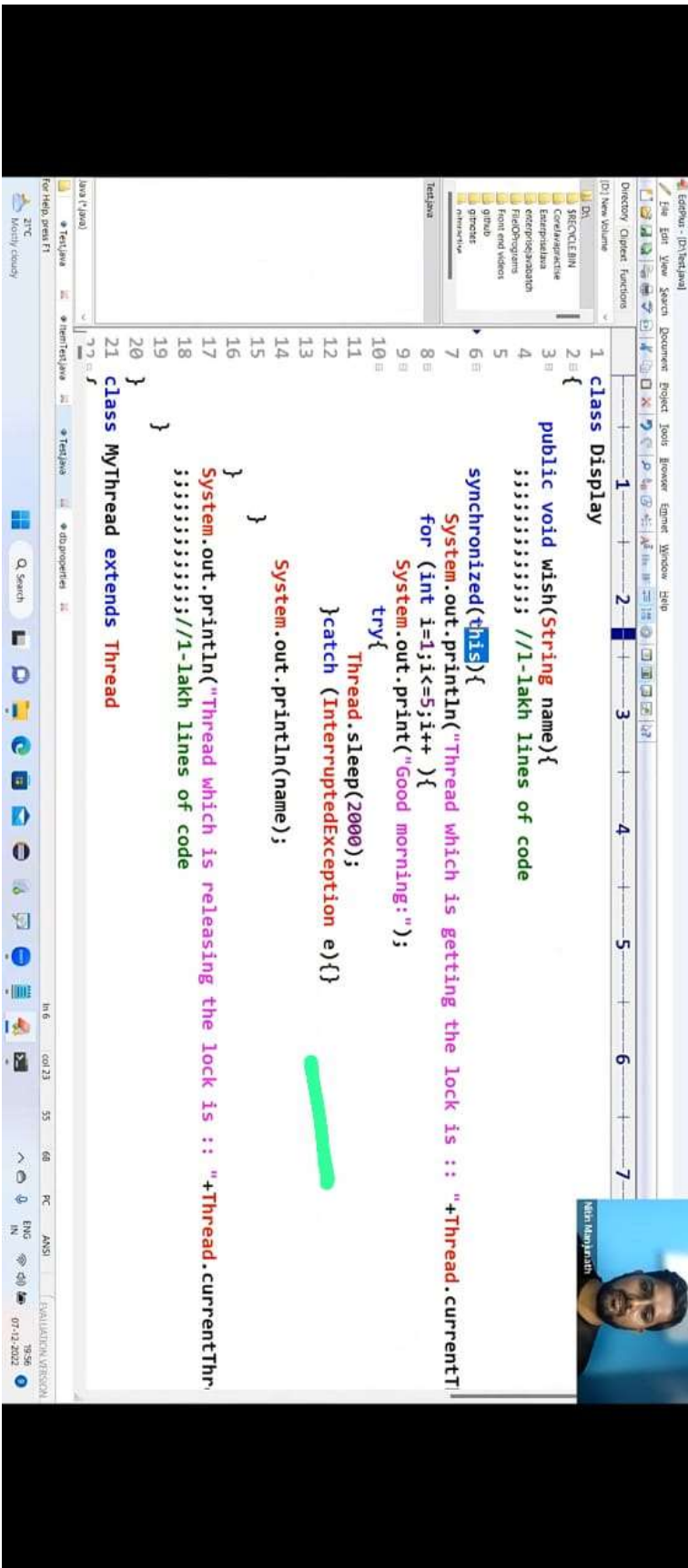


Java Multithreading Part5



The screenshot shows an IDE with the following code:

```
1 class Display
2 {
3     public void wish(String name){
4         ;;;;;;;;;; //1-lakh lines of code
5     }
6     synchronized(this){
7         System.out.println("Thread which is getting the lock is :: "+Thread.currentThread().getName());
8         for (int i=1;i<=5;i++){
9             System.out.print("Good morning:");
10            try{
11                Thread.sleep(2000);
12            }catch (InterruptedException e){}
13        }
14        System.out.println(name);
15    }
16 }
17
18 System.out.println("Thread which is releasing the lock is :: "+Thread.currentThread().getName());
19 ;;;;;;;;;; //1-lakh lines of code
20 }
21 class MyThread extends Thread
22 {
23     ;;;;;;;;;;
24 }
```

A green highlight is under the line `Thread.sleep(2000);` in the `wish` method of the `MyThread` class.

Editor - [D:\test\java]

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Directory Object Functions

[D:] New Volume

1 class Display

2 {

3 public void wish(String name){

4 ;;;;;;;;;;;;;; //1-lakh lines of code

5

6 synchronized(Display.class){

7 System.out.println("Thread which is getting the lock is :: "+Thread.currentThread().getName());

8 for (int i=1;i<=5;i++){

9 System.out.print("Good morning: ");

10 try{

11 Thread.sleep(2000);

12 }catch (InterruptedException e){}

13

14 System.out.println(name);

15 }

16 }

17 System.out.println("Thread which is releasing the lock is :: "+Thread.currentThread().getName());

18 ;;;;;;;;;;;;;; //1-lakh lines of code

19 }

20 }

21 class MyThread extends Thread

22 {

23

24 }

25 }

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```
31 @Override
32 public void run(){
33     d.wish(name);
34 }
35 }
36
37 public class Test {
38     public static void main(String[] args){
39
40         Display d1 = new Display();
41         Display d2 = new Display();
42
43         MyThread t1= new MyThread(d1, "yuvvi");
44         MyThread t2= new MyThread(d2, "dhoni");
45
46         t1.setName("yuvvi thread");
47         t2.setName("dhoni thread");
48
49         t1.start();
50         t2.start();
51     }
}
```

4

Two threads can communicate each other with the help of

- a. notify()
- b. notifyAll()
- c. wait()

notify()=> Thread which is performing updation should call notify(),so the waiting thread will get notification so it will continue with its execution with the updated items.

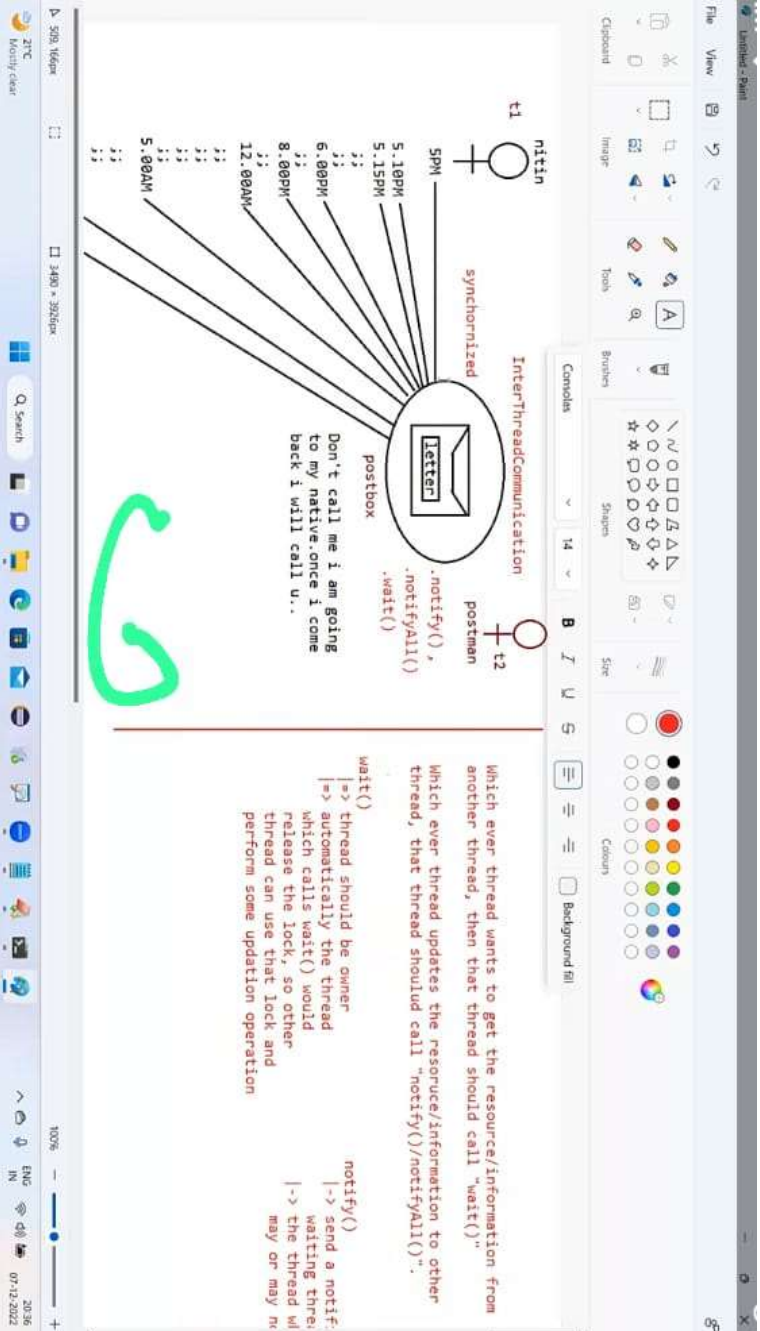
wait() => Thread which is expecting notification/ updation should call wait(), immediately the Thread will enter into waiting state.

wait(),notifyAll(),notify() is present in Object class, but not in Thread class why?

=> Thread will call wait(),notify(),notifyall() on any type of objects like Student, Customer, Engineer.

If a thread wants to call wait(), notify()/notifyall() then compulsorily the thread should be the owner of the object otherwise it would result in "IllegalMonitorStateException".

We say thread to be owner of that object if thread has lock of that object.
It means these methods are part of synchronized block or synchronized method, if we try to use outside synchronized area then it would result in RuntimeException called "IllegalMonitorStateException".




```
D:\>javap java.lang.Object
Compiled from "Object.java"
public class java.lang.Object {
    public java.lang.Object();
    public final native java.lang.Class<?> getClass();
    public native int hashCode();
    public boolean equals(java.lang.Object);
    protected native java.lang.Object clone() throws java.lang.CloneNotSupportedException;
    public java.lang.String toString();
    public final native void notify();
    public final native void notifyAll();
    public final native void wait(long) throws java.lang.InterruptedException;
    public final void wait(long, int) throws java.lang.InterruptedException;
    public final void wait() throws java.lang.InterruptedException;
    protected void finalize() throws java.lang.Throwable;
    static {};
}
```

D:\>

T

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We say thread to be owner of that object if thread has **lock of that object**.

It means these methods are part of synchronized block or synchronized method, if we try to use outside synchronized area then it would result in `RuntimeException` called "`IllegalMonitorStateException`".

if a thread calls `wait()` on any object, then first it immediately releases the lock on that object and it enters into waiting state. if a thread calls `notify()` on any object, then he may or may not release the lock on that object immediately. Except `wait()`, `notify()`, `notifyAll()` lock can't be released by other methods.

Note::

`yield()`, `sleep()`, `join()` => can't release the lock.

`wait()`, `notify()`, `notifyAll()` => will release the lock, otherwise interthread communication can't happen.

Once a Thread calls `wait()`, `notify()`, `notifyAll()` methods on any object then it releases the lock of that particular object but not all locks it has.

Method prototype of `wait()`, `notify()`, `notifyAll()`

1. `public final void wait() throws InterruptedException`

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Q Search



Method prototype of wait(),notify(),notifyAll()

1. public final void wait()throws InterruptedException
2. public final native void wait(long ms)throws InterruptedException
3. public final void wait(long ms,int ns)throws InterruptedException
4. public final native void notify()
5. public final void notifyAll()



Interview Question

=====

Method like wait(),notify(),notifyAll() are present inside Object class, y not in Thread class?

Thread will call wait(),notify(),notifyAll() on Objects like PostBox,Stack,Customer,Student,....

=> obj.wait(),obj.notify(),obj.notifyAll()

These methods should be available for every object in java,if the method has to be available for every object in java then those methods should come from "Object" class.

07.12.2022, multithreading images - Print

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2024

07.12.2022

Life Cycle of Thread

new/scan

start()

Ready/Runnable

if TS allocate CPU

Running

if null method completes

dead

Another waiting state to get lock

if waiting thread gets lock

waiting state

if waiting thread gets notification if time expires if waiting thread got interrupted

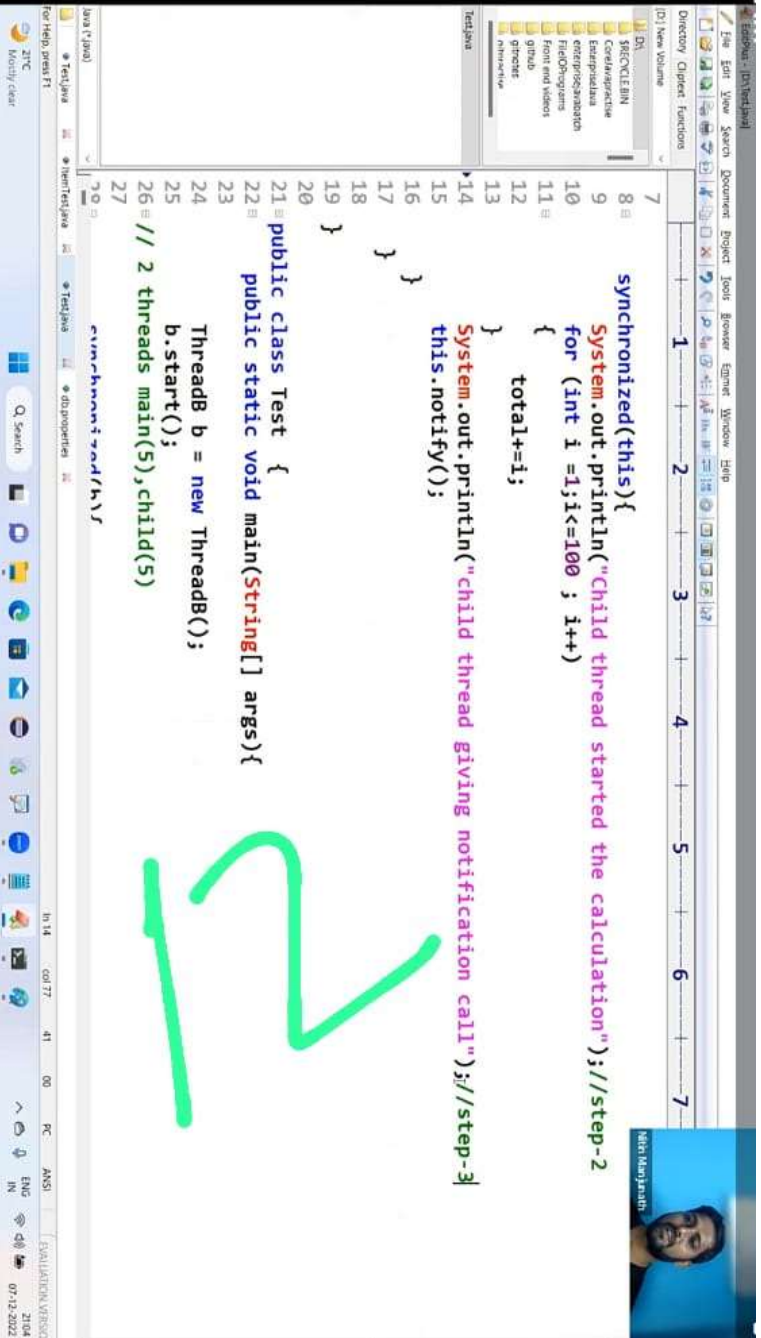
obj.wait();

obj.wait(100);

obj.wait(100,10);

MyThread t=new MyThread();

10



Command Prompt

D:\>javac Test.java

D:\>java Test

main thread calling wait() method

Child thread started the calculation

child thread giving notification call

main thread got notification call

5050

D:\>

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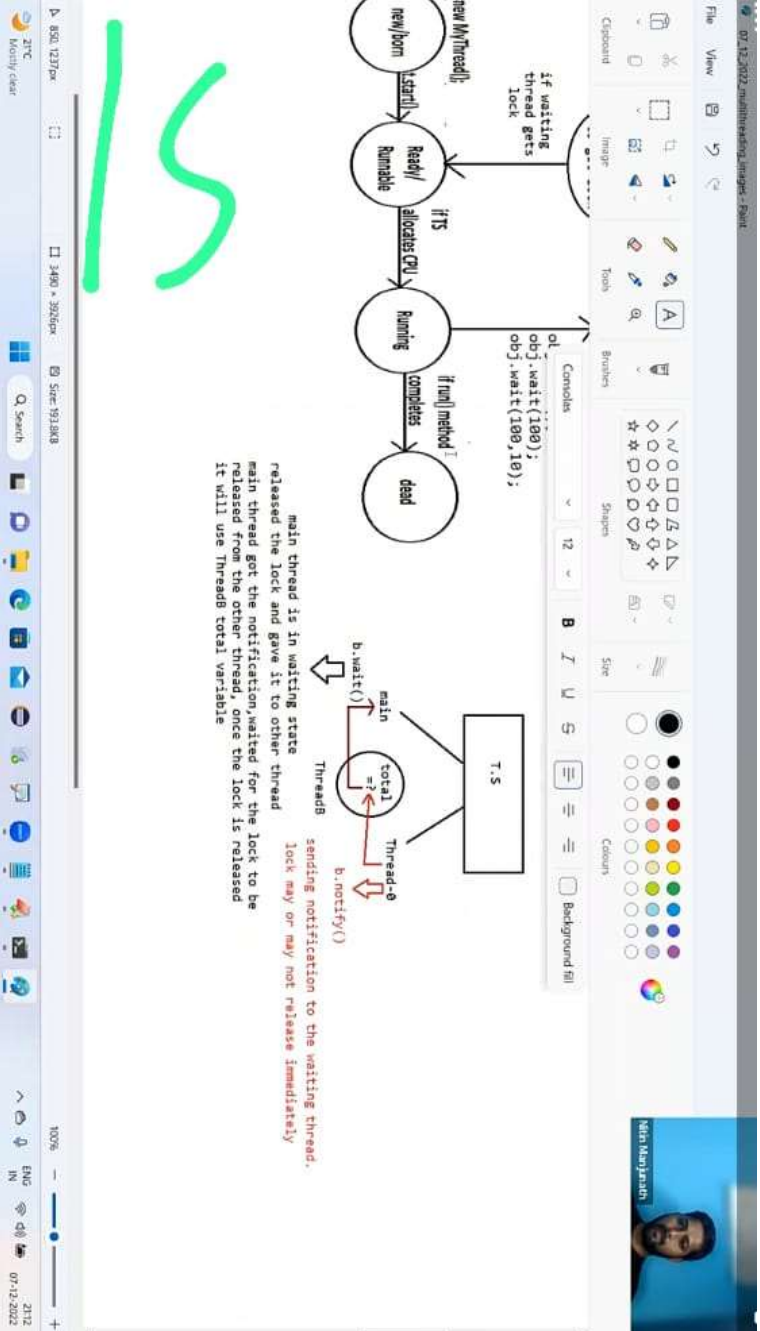
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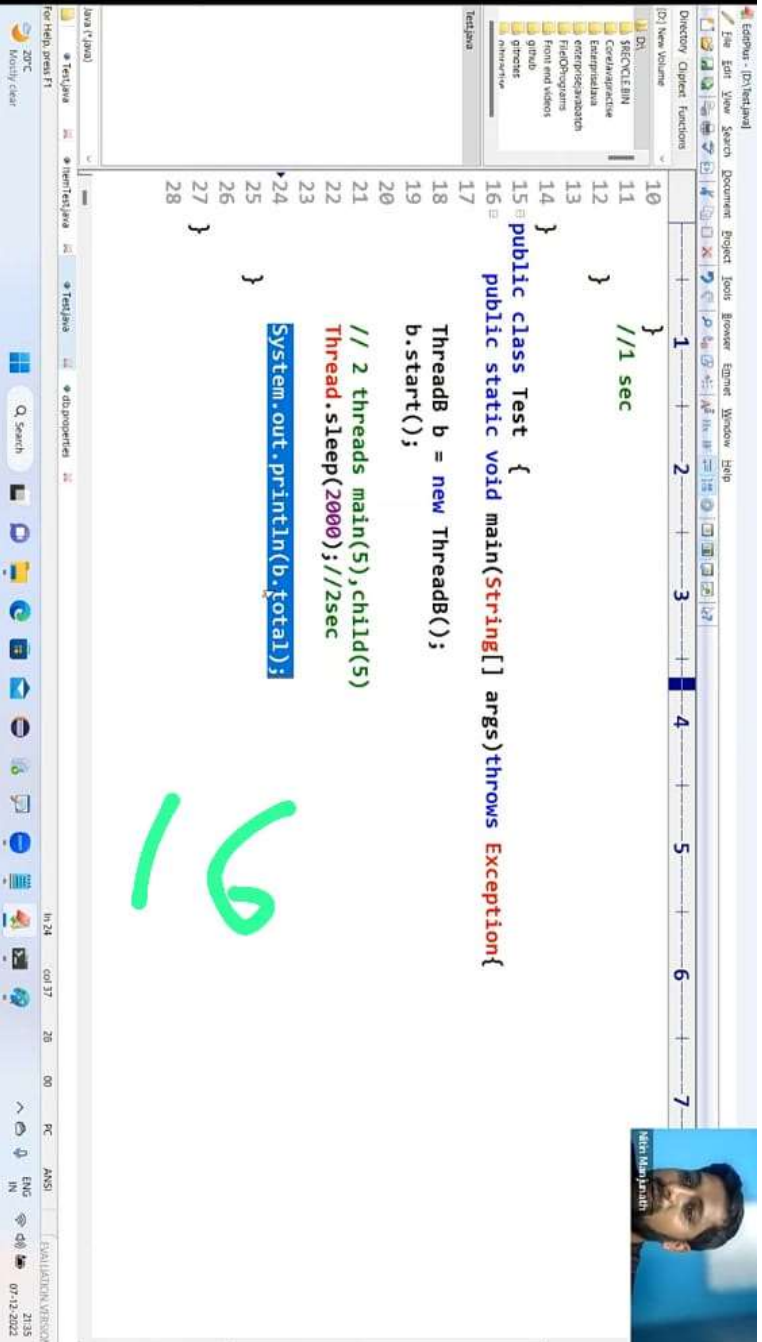


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File Edit View

```
System.out.println(b.total);
```

```
}
```

```
}
```

A. stmt-1

if i replace with Thread.sleep(10000) then thread will enter into waiting statement but within 1ms only the updation value is ready.

with in 10 sec if the updation is not ready, then we should not use Thread.sleep(10000)

B. stmt-2

if i replace with b.join(), then main thread will enter into waiting state, then child will execute for loop, till then main thread has to wait.

main thread is waiting for updation result.

```
for (int i=0; i<=100 ; i++){
```

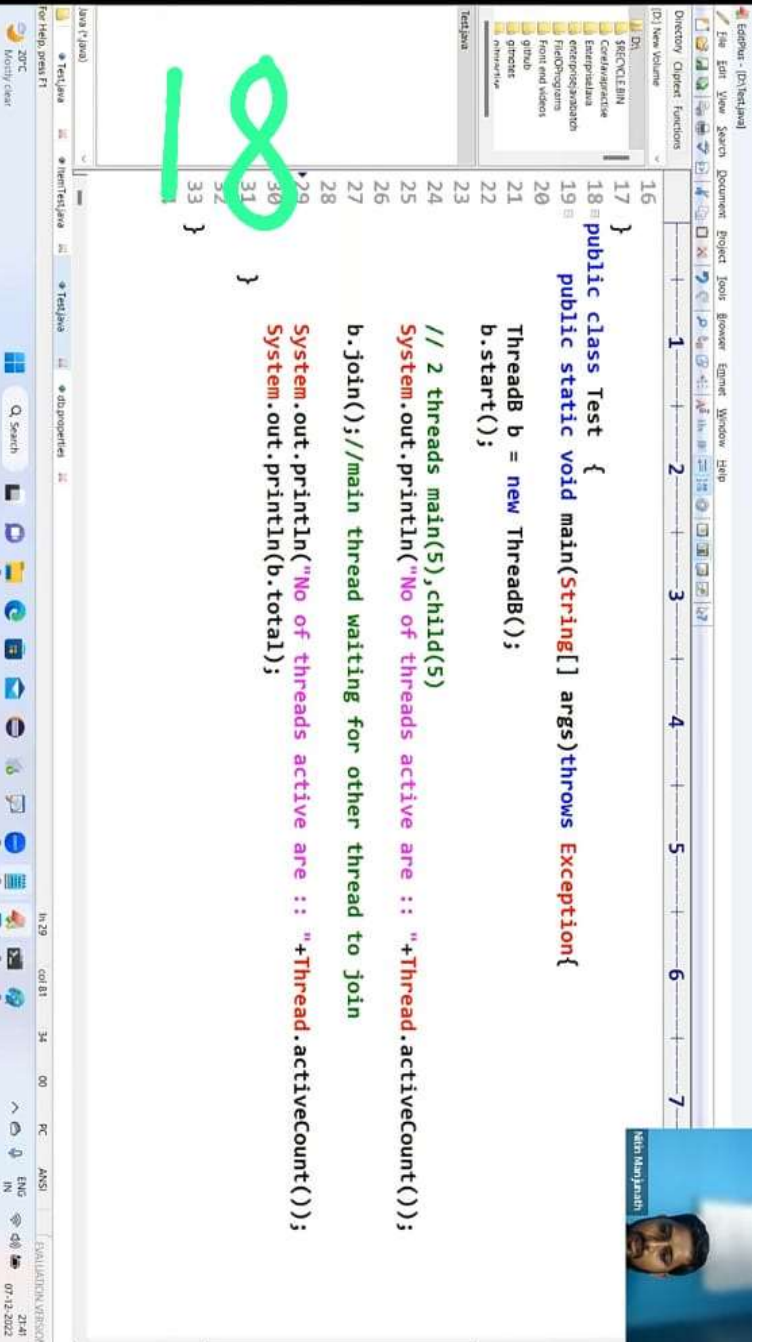
```
total+=i;
```

```
}
```

```
//1cr lines of code is available
```

main thread has to wait till 1 cr lines of code, y main thread should wait for the complete code to finish.





```
16 }
17 }
18 public class Test {
19     public static void main(String[] args) throws Exception{
20
21         ThreadB b = new ThreadB();
22         b.start();
23
24         // 2 threads main(5), child(5)
25         System.out.println("No of threads active are :: "+Thread.activeCount());
26
27         b.join();//main thread waiting for other thread to join
28
29         System.out.println("No of threads active are :: "+Thread.activeCount());
30         System.out.println(b.total);
31     }
32 }
33 }
```

81