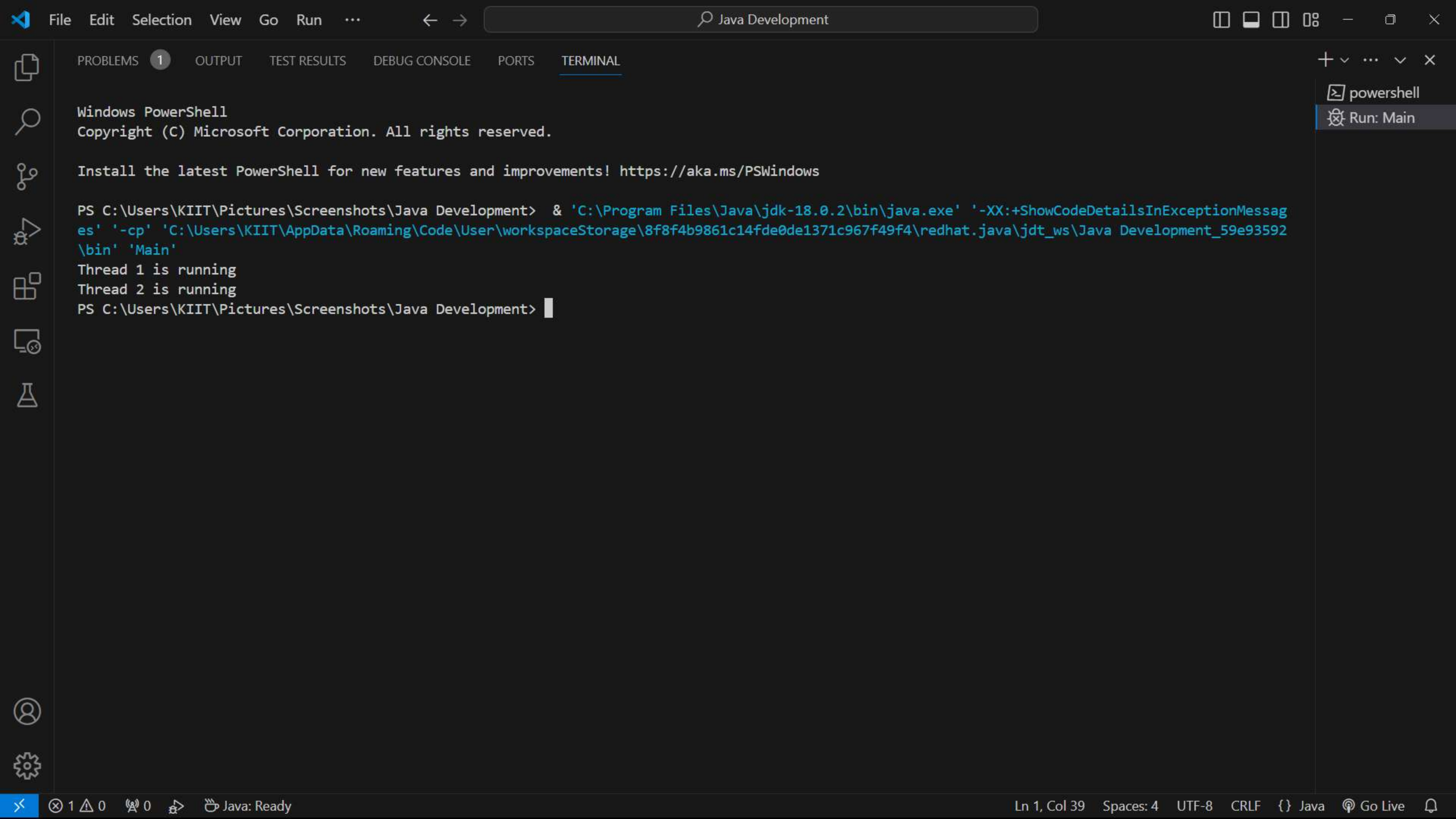
EXTRA QUESTIONS PDF P2

Q1

```java
import java.util.concurrent.Semaphore;
public class Main {
    Run | Debug
    public static void main(String[] args) {
        Semaphore semaphore = new Semaphore(permits:1);

        Thread thread1 = new Thread(() -> {
            try {
                semaphore.acquire();
                System.out.println(x:"Thread 1 is running");
                Thread.sleep(millis:2000);
            } catch (InterruptedException e) {
                e.printStackTrace();
            } finally {
                semaphore.release();
            }
        });

        Thread thread2 = new Thread(() -> {
            try {
                semaphore.acquire();
                System.out.println(x:"Thread 2 is running");
                Thread.sleep(millis:2000);
            } catch (InterruptedException e) {
                e.printStackTrace();
            } finally {
                semaphore.release();
            }
        });
        thread1.start();
        thread2.start();
    }
```


File Edit Selection View Go Run ···
Java Development
PROBLEMS 1 OUTPUT TEST RESULTS DEBUG CONSOLE PORTS TERMINAL
powershell
Run: Main
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.
Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows
PS C:\Users\KIIT\Pictures\Screenshots\Java Development> & 'C:\Program Files\Java\jdk-18.0.2\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\KIIT\AppData\Roaming\Code\User\workspaceStorage\8f8f4b9861c14fde0de1371c967f49f4\redhat.java\jdt_ws\Java Development_59e93592\bin' 'Main'
Thread 1 is running
Thread 2 is running
PS C:\Users\KIIT\Pictures\Screenshots\Java Development>
1 0 0 Java: Ready
Ln 1, Col 39 Spaces: 4 UTF-8 CRLF Java Go Live

File Edit Selection View Go Run Terminal Help

Java Development

Main.java

Main.java > Main > main(String[])

```java
public class Main {
    Run | Debug
    public static void main(String[] args) {
        CyclicBarrier barrier = new CyclicBarrier(parties:3);

        Thread thread1 = new Thread(() -> {
            try {
                System.out.println(x:"Thread 1 is waiting at the barrier");
                barrier.await();
                System.out.println(x:"Thread 1 has crossed the barrier");
            } catch (InterruptedException | BrokenBarrierException e) {
                e.printStackTrace();
            }
        });

        Thread thread2 = new Thread(() -> {
            try {
                System.out.println(x:"Thread 2 is waiting at the barrier");
                barrier.await();
                System.out.println(x:"Thread 2 has crossed the barrier");
            } catch (InterruptedException | BrokenBarrierException e) {
                e.printStackTrace();
            }
        });

        Thread thread3 = new Thread(() -> {
            try {
                System.out.println(x:"Thread 3 is waiting at the barrier");
                barrier.await();
                System.out.println(x:"Thread 3 has crossed the barrier");
            } catch (InterruptedException | BrokenBarrierException e) {
                e.printStackTrace();
            }
        });

        thread1.start();
        thread2.start();
        thread3.start();
    }
```

Q2

1 0 0 Java: Ready Ln 5, Col 45 Spaces: 4 UTF-8 CRLF {} Java Go Live

File Edit Selection View Go Run ··· Java Development

PROBLEMS 1 OUTPUT TEST RESULTS DEBUG CONSOLE PORTS TERMINAL

powershell
Run: Main

```
Windows PowerShell
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Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\Users\KIIT\Pictures\Screenshots\Java Development>  & 'C:\Program Files\Java\jdk-18.0.2\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages'
 '-cp' 'C:\Users\KIIT\AppData\Roaming\Code\User\workspaceStorage\8f8f4b9861c14fde0de1371c967f49f4\redhat.java\jdt_ws\Java Development_59e93592\bin'
'Main'
Thread 1 is running
Thread 2 is running
PS C:\Users\KIIT\Pictures\Screenshots\Java Development>  c:; cd 'c:\Users\KIIT\Pictures\Screenshots\Java Development'; & 'C:\Program Files\Java\jdk-
18.0.2\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\KIIT\AppData\Roaming\Code\User\workspaceStorage\8f8f4b9861c14fde0de13
71c967f4
                                                >  c:; cd 'c:\Users\KIIT\Pictures\Screenshots\Java Development'; & 'C:\Program Files\Java\jdk-
18.0.2\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\KIIT\AppData\Roaming\Code\User\workspaceStorage\8f8f4b9861c14fde0de13
71c967f49f4\redhat.java\jdt_ws\Java Development_59e93592\bin' 'Main'
Thread 3 is waiting at the barrier
Thread 2 is waiting at the barrier
Thread 1 is waiting at the barrier
Thread 1 has crossed the barrier
Thread 3 has crossed the barrier
Thread 2 has crossed the barrier
PS C:\Users\KIIT\Pictures\Screenshots\Java Development>
```

File Edit Selection View Go Run ··· Java Development

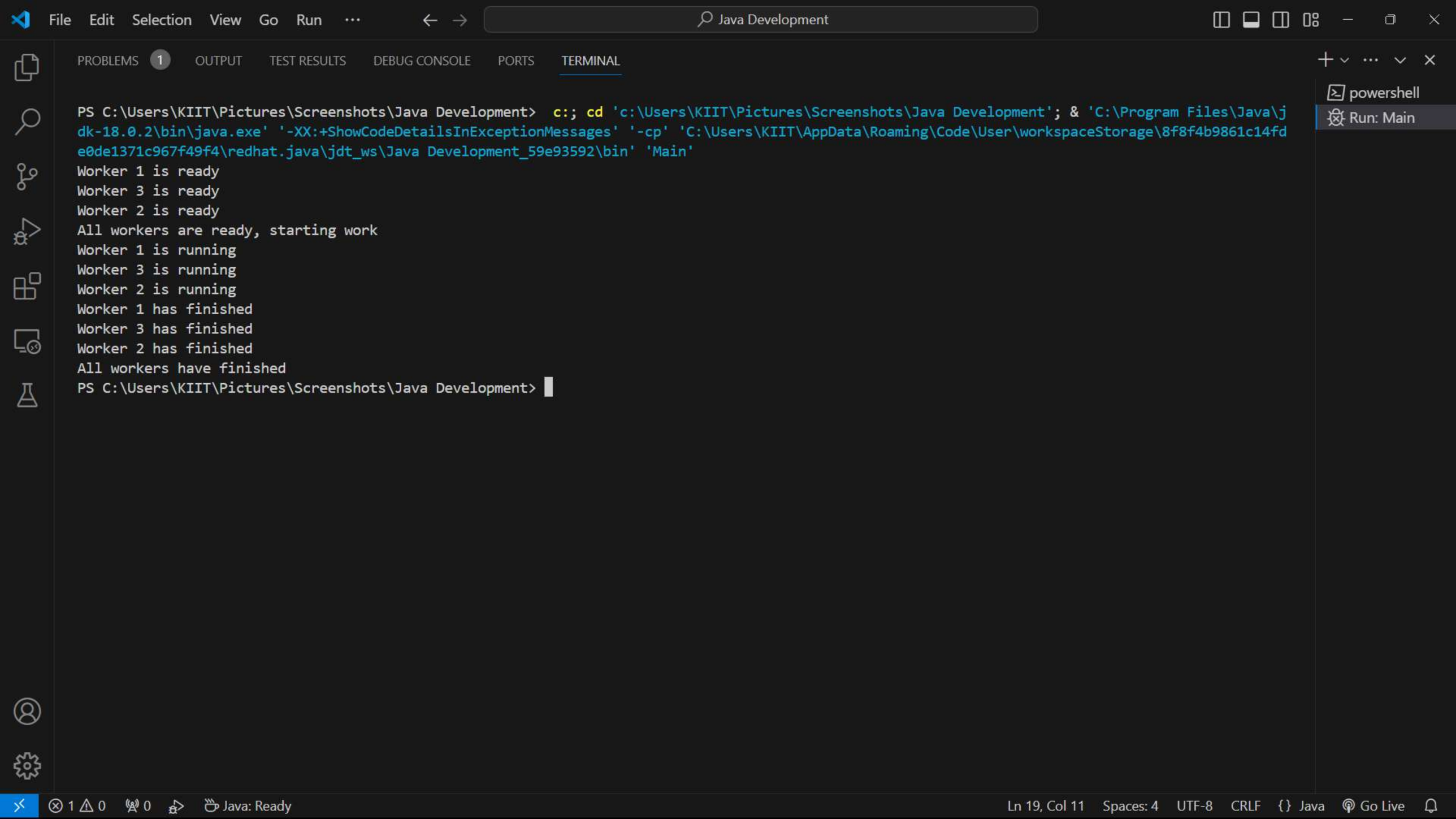
Main.java

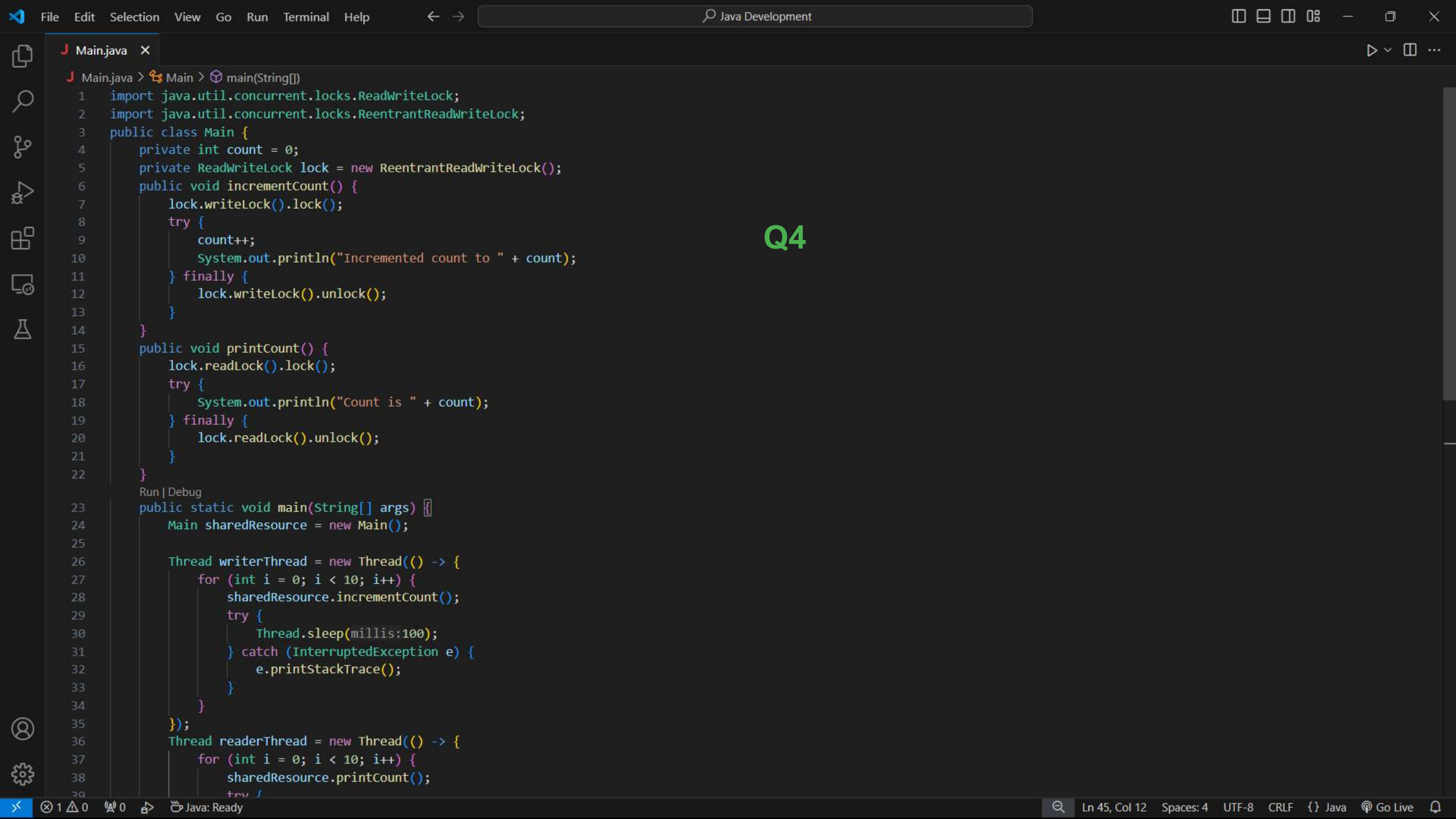
Main.java > Main > main(String[])

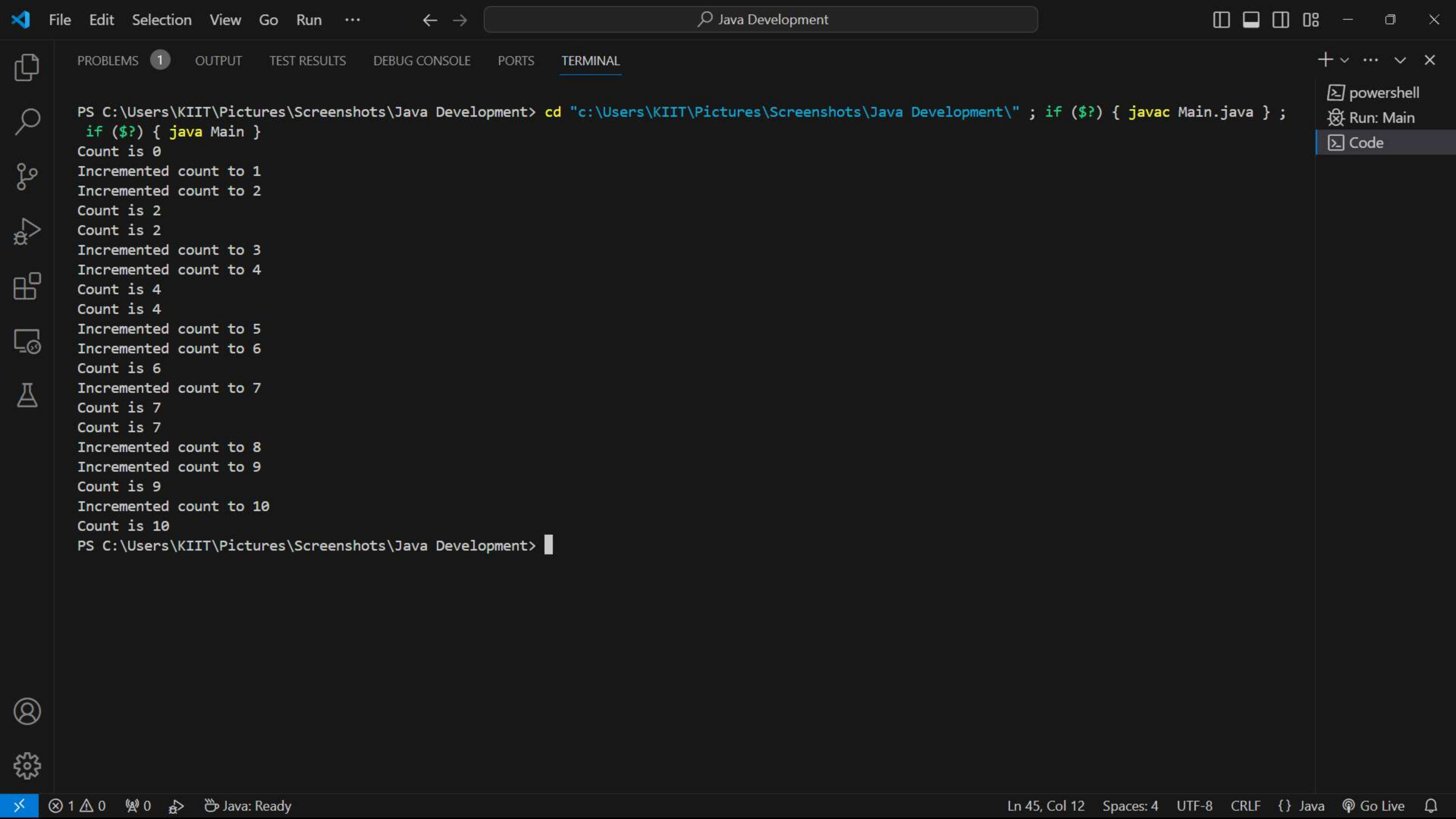
```java
import java.util.concurrent.CountDownLatch;
public class Main {
    Run | Debug
    public static void main(String[] args) throws InterruptedException {

        CountDownLatch startLatch = new CountDownLatch(count:1);
        CountDownLatch finishLatch = new CountDownLatch(count:3);

        Runnable worker = () -> {
            try {
                System.out.println(Thread.currentThread().getName() + " is ready");
                startLatch.await();
                System.out.println(Thread.currentThread().getName() + " is running");
                Thread.sleep(millis:2000);
                System.out.println(Thread.currentThread().getName() + " has finished");
                finishLatch.countDown();
            } catch (InterruptedException e) {
                e.printStackTrace();
            }
        };
        new Thread(worker, name:"Worker 1").start();
        new Thread(worker, name:"Worker 2").start();
        new Thread(worker, name:"Worker 3").start();

        Thread.sleep(millis:1000);
        System.out.println(x:"All workers are ready, starting work");
        startLatch.countDown();

        finishLatch.await();
        System.out.println(x:"All workers have finished");
    }
}
```

Q3

1 0 0 Java: Ready Ln 19, Col 11 Spaces: 4 UTF-8 CRLF {} Java Go Live


File Edit Selection View Go Run ···
Java Development
PROBLEMS 1 OUTPUT TEST RESULTS DEBUG CONSOLE PORTS TERMINAL
powershell
Run: Main
PS C:\Users\KIIT\Pictures\Screenshots\Java Development> c:; cd 'c:\Users\KIIT\Pictures\Screenshots\Java Development'; & 'C:\Program Files\Java\jdk-18.0.2\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\KIIT\AppData\Roaming\Code\User\workspaceStorage\8f8f4b9861c14fde0de1371c967f49f4\redhat.java\jdt_ws\Java Development_59e93592\bin' 'Main'
Worker 1 is ready
Worker 3 is ready
Worker 2 is ready
All workers are ready, starting work
Worker 1 is running
Worker 3 is running
Worker 2 is running
Worker 1 has finished
Worker 3 has finished
Worker 2 has finished
All workers have finished
PS C:\Users\KIIT\Pictures\Screenshots\Java Development>
Java: Ready
Ln 19, Col 11 Spaces: 4 UTF-8 CRLF { } Java Go Live


File Edit Selection View Go Run Terminal Help
Java Development
Main.java
Main.java > Main > main(String[])
import java.util.concurrent.locks.ReadWriteLock;
import java.util.concurrent.locks.ReentrantReadWriteLock;
public class Main {
private int count = 0;
private ReadWriteLock lock = new ReentrantReadWriteLock();
public void incrementCount() {
lock.writeLock().lock();
try {
count++;
System.out.println("Incremented count to " + count);
} finally {
lock.writeLock().unlock();
}
}
public void printCount() {
lock.readLock().lock();
try {
System.out.println("Count is " + count);
} finally {
lock.readLock().unlock();
}
}
Run | Debug
public static void main(String[] args) {
Main sharedResource = new Main();
Thread writerThread = new Thread(() -> {
for (int i = 0; i < 10; i++) {
sharedResource.incrementCount();
try {
Thread.sleep(millis:100);
} catch (InterruptedException e) {
e.printStackTrace();
}
}
});
Thread readerThread = new Thread(() -> {
for (int i = 0; i < 10; i++) {
sharedResource.printCount();
Q4
Java: Ready
Ln 45, Col 12
Spaces: 4
UTF-8
CRLF
Java
Go Live


File Edit Selection View Go Run ···
Java Development
PROBLEMS 1 OUTPUT TEST RESULTS DEBUG CONSOLE PORTS TERMINAL
powershell
Run: Main
Code
PS C:\Users\KIIT\Pictures\Screenshots\Java Development> cd "c:\Users\KIIT\Pictures\Screenshots\Java Development\" ; if ($?) { javac Main.java } ;
if ($?) { java Main }
Count is 0
Incremented count to 1
Incremented count to 2
Count is 2
Count is 2
Incremented count to 3
Incremented count to 4
Count is 4
Count is 4
Incremented count to 5
Incremented count to 6
Count is 6
Incremented count to 7
Count is 7
Count is 7
Incremented count to 8
Incremented count to 9
Count is 9
Incremented count to 10
Count is 10
PS C:\Users\KIIT\Pictures\Screenshots\Java Development>
1 0 0 Java: Ready
Ln 45, Col 12 Spaces: 4 UTF-8 CRLF Java Go Live

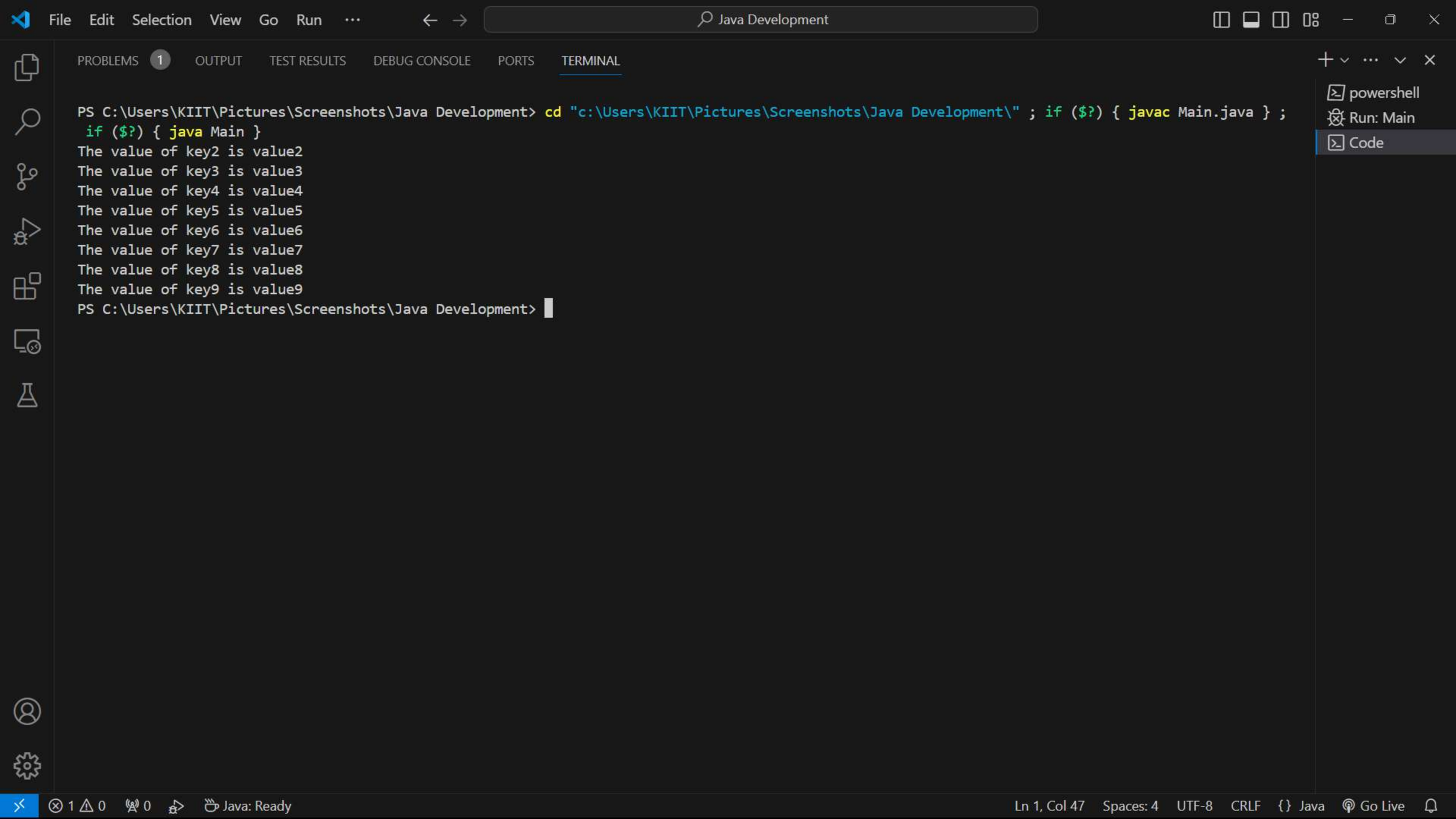
File Edit Selection View Go Run ··· Java Development

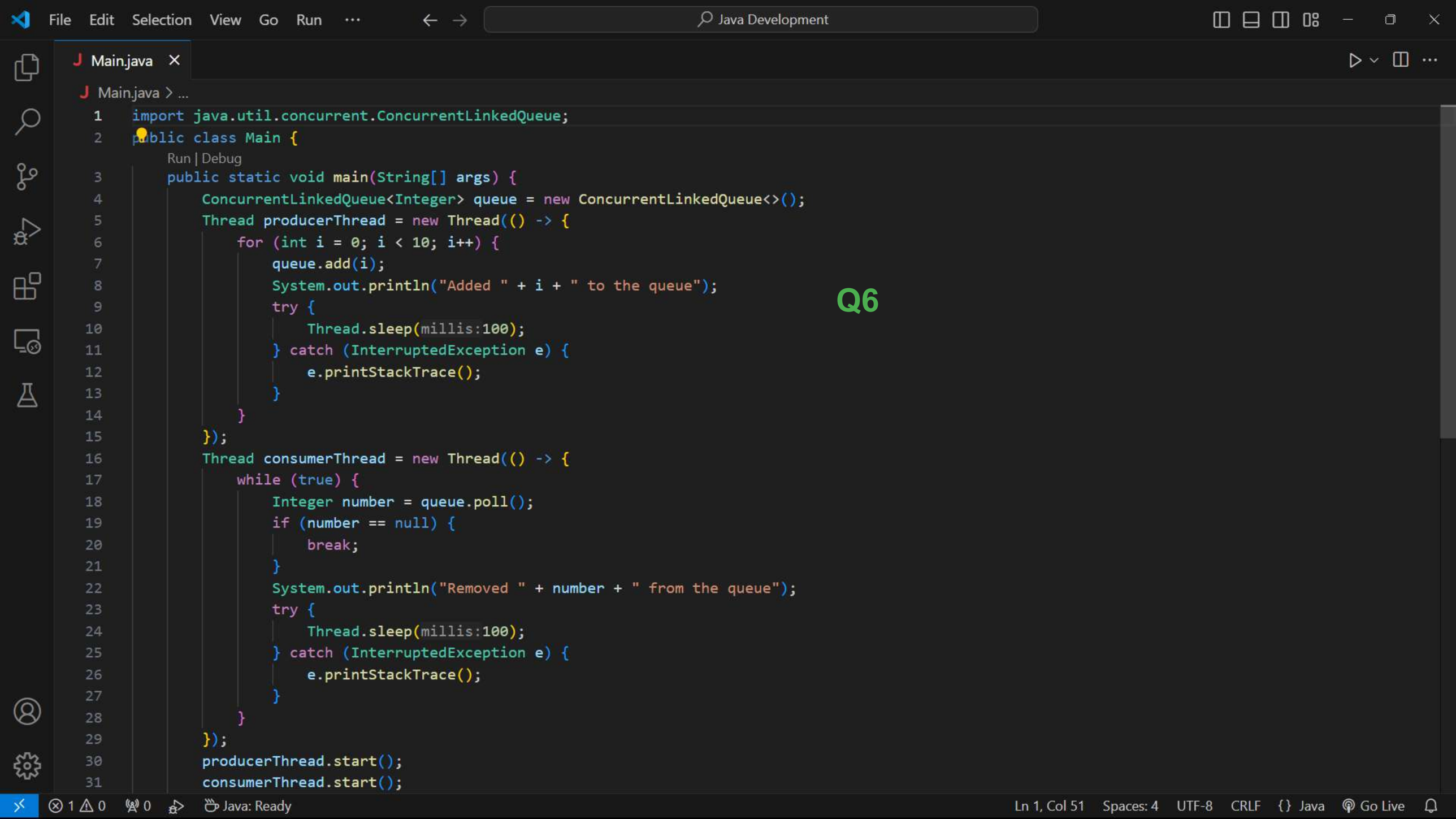
Main.java

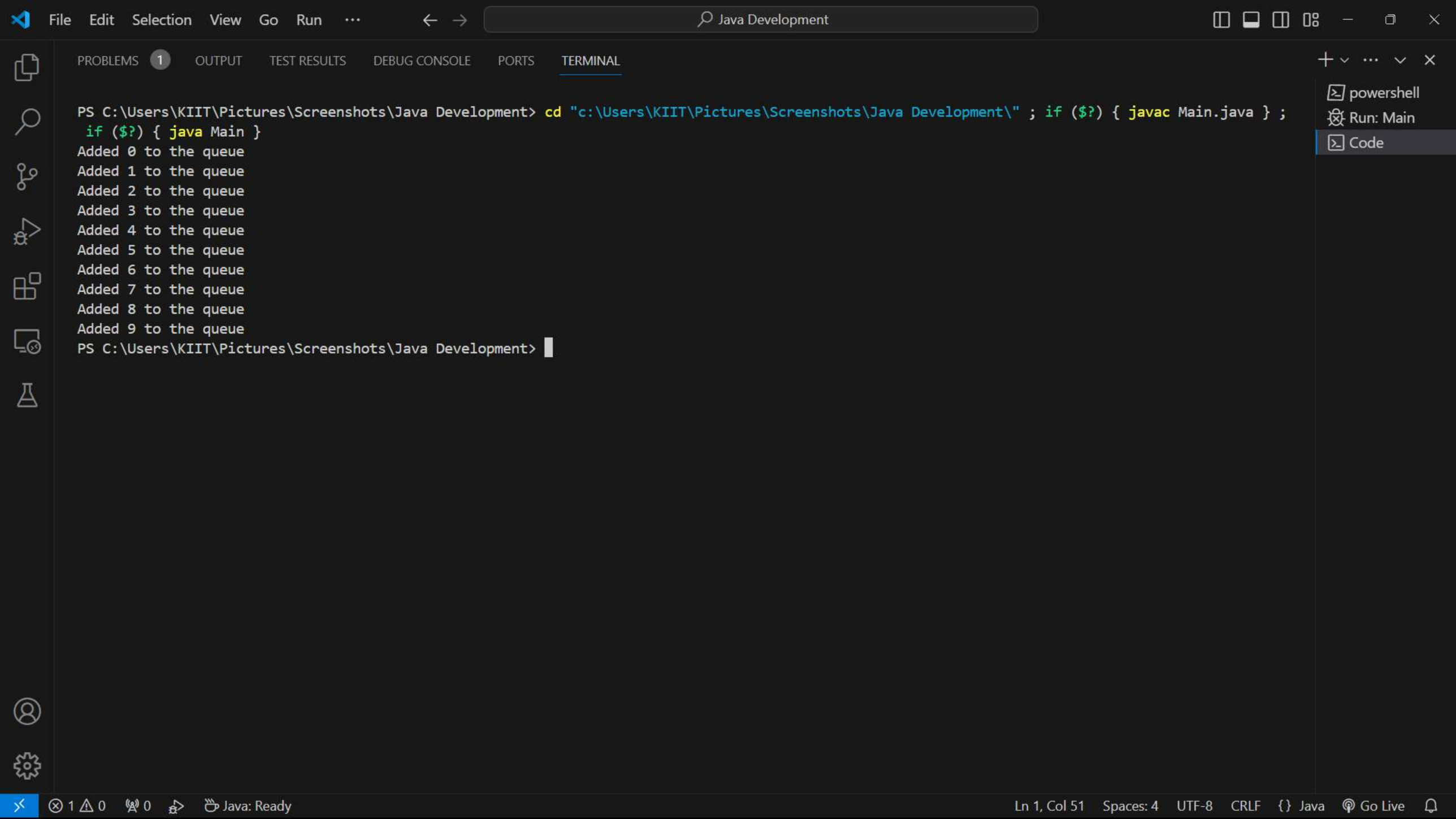
Main.java > ...

```java
import java.util.concurrent.ConcurrentHashMap;
public class Main {
    Run | Debug
    public static void main(String[] args) {
        ConcurrentHashMap<String, String> map = new ConcurrentHashMap<>();
        Thread writerThread = new Thread(() -> {
            for (int i = 0; i < 10; i++) {
                map.put("key" + i, "value" + i);
                try {
                    Thread.sleep(millis:100);
                } catch (InterruptedException e) {
                    e.printStackTrace();
                }
            }
        });
        Thread readerThread = new Thread(() -> {
            for (int i = 0; i < 10; i++) {
                String key = "key" + i;
                if (map.containsKey(key)) {
                    System.out.println("The value of " + key + " is " + map.get(key));
                }
                try {
                    Thread.sleep(millis:100);
                } catch (InterruptedException e) {
                    e.printStackTrace();
                }
            }
        });
        writerThread.start();
        readerThread.start();
    }
}
```

Q5


File Edit Selection View Go Run ···
Java Development
PROBLEMS 1 OUTPUT TEST RESULTS DEBUG CONSOLE PORTS TERMINAL
PS C:\Users\KIIT\Pictures\Screenshots\Java Development> cd "c:\Users\KIIT\Pictures\Screenshots\Java Development\" ; if ($?) { javac Main.java } ;
if ($?) { java Main }
The value of key2 is value2
The value of key3 is value3
The value of key4 is value4
The value of key5 is value5
The value of key6 is value6
The value of key7 is value7
The value of key8 is value8
The value of key9 is value9
PS C:\Users\KIIT\Pictures\Screenshots\Java Development>
powershell
Run: Main
Code
Java: Ready
Ln 1, Col 47 Spaces: 4 UTF-8 CRLF Java Go Live


File Edit Selection View Go Run ···
Java Development
Main.java
Main.java > ...
import java.util.concurrent.ConcurrentLinkedQueue;
public class Main {
Run | Debug
public static void main(String[] args) {
ConcurrentLinkedQueue<Integer> queue = new ConcurrentLinkedQueue<>();
Thread producerThread = new Thread(() -> {
for (int i = 0; i < 10; i++) {
queue.add(i);
System.out.println("Added " + i + " to the queue");
try {
Thread.sleep(millis:100);
} catch (InterruptedException e) {
e.printStackTrace();
}
}
});
Thread consumerThread = new Thread(() -> {
while (true) {
Integer number = queue.poll();
if (number == null) {
break;
}
System.out.println("Removed " + number + " from the queue");
try {
Thread.sleep(millis:100);
} catch (InterruptedException e) {
e.printStackTrace();
}
}
});
producerThread.start();
consumerThread.start();
Q6
1 0 0
Java: Ready
Ln 1, Col 51
Spaces: 4
UTF-8
CRLF
Java
Go Live


File Edit Selection View Go Run ···
Java Development
PROBLEMS 1 OUTPUT TEST RESULTS DEBUG CONSOLE PORTS TERMINAL
powershell
Run: Main
Code
PS C:\Users\KIIT\Pictures\Screenshots\Java Development> cd "c:\Users\KIIT\Pictures\Screenshots\Java Development\" ; if ($?) { javac Main.java } ;
if ($?) { java Main }
Added 0 to the queue
Added 1 to the queue
Added 2 to the queue
Added 3 to the queue
Added 4 to the queue
Added 5 to the queue
Added 6 to the queue
Added 7 to the queue
Added 8 to the queue
Added 9 to the queue
PS C:\Users\KIIT\Pictures\Screenshots\Java Development>
Java: Ready
Ln 1, Col 51 Spaces: 4 UTF-8 CRLF Java Go Live

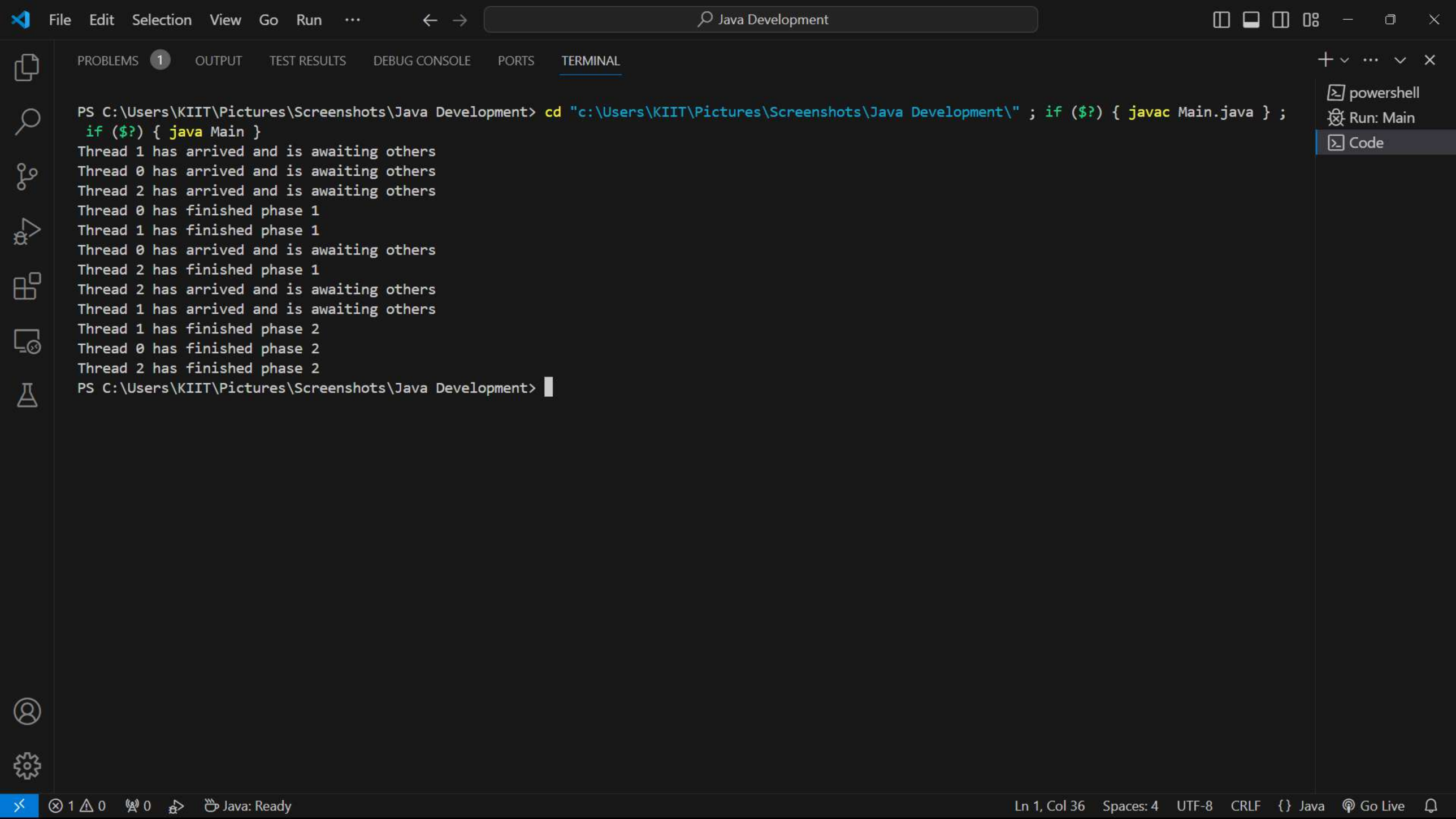
File Edit Selection View Go Run ··· Java Development

Main.java

```java
import java.util.concurrent.Phaser;
public class Main {
    Run | Debug
    public static void main(String[] args) {
        Phaser phaser = new Phaser(parties:3);
        for (int i = 0; i < 3; i++) {
            Thread thread = new Thread(new Task(phaser), "Thread " + i);
            thread.start();
        }
    }
}
class Task implements Runnable {
    private Phaser phaser;
    public Task(Phaser phaser) {
        this.phaser = phaser;
    }
    @Override
    public void run() {
        System.out.println(Thread.currentThread().getName() + " has arrived and is awaiting others");
        phaser.arriveAndAwaitAdvance();
        System.out.println(Thread.currentThread().getName() + " has finished phase 1");

        System.out.println(Thread.currentThread().getName() + " has arrived and is awaiting others");
        phaser.arriveAndAwaitAdvance();
        System.out.println(Thread.currentThread().getName() + " has finished phase 2");
    }
}
```

Q7

Java: Ready Ln 1, Col 36 Spaces: 4 UTF-8 CRLF Java Go Live


File Edit Selection View Go Run ···
Java Development
PROBLEMS 1 OUTPUT TEST RESULTS DEBUG CONSOLE PORTS TERMINAL
powershell
Run: Main
Code
PS C:\Users\KIIT\Pictures\Screenshots\Java Development> cd "c:\Users\KIIT\Pictures\Screenshots\Java Development\" ; if ($?) { javac Main.java } ;
if ($?) { java Main }
Thread 1 has arrived and is awaiting others
Thread 0 has arrived and is awaiting others
Thread 2 has arrived and is awaiting others
Thread 0 has finished phase 1
Thread 1 has finished phase 1
Thread 0 has arrived and is awaiting others
Thread 2 has finished phase 1
Thread 2 has arrived and is awaiting others
Thread 1 has arrived and is awaiting others
Thread 1 has finished phase 2
Thread 0 has finished phase 2
Thread 2 has finished phase 2
PS C:\Users\KIIT\Pictures\Screenshots\Java Development>
Java: Ready
Ln 1, Col 36 Spaces: 4 UTF-8 CRLF Java Go Live

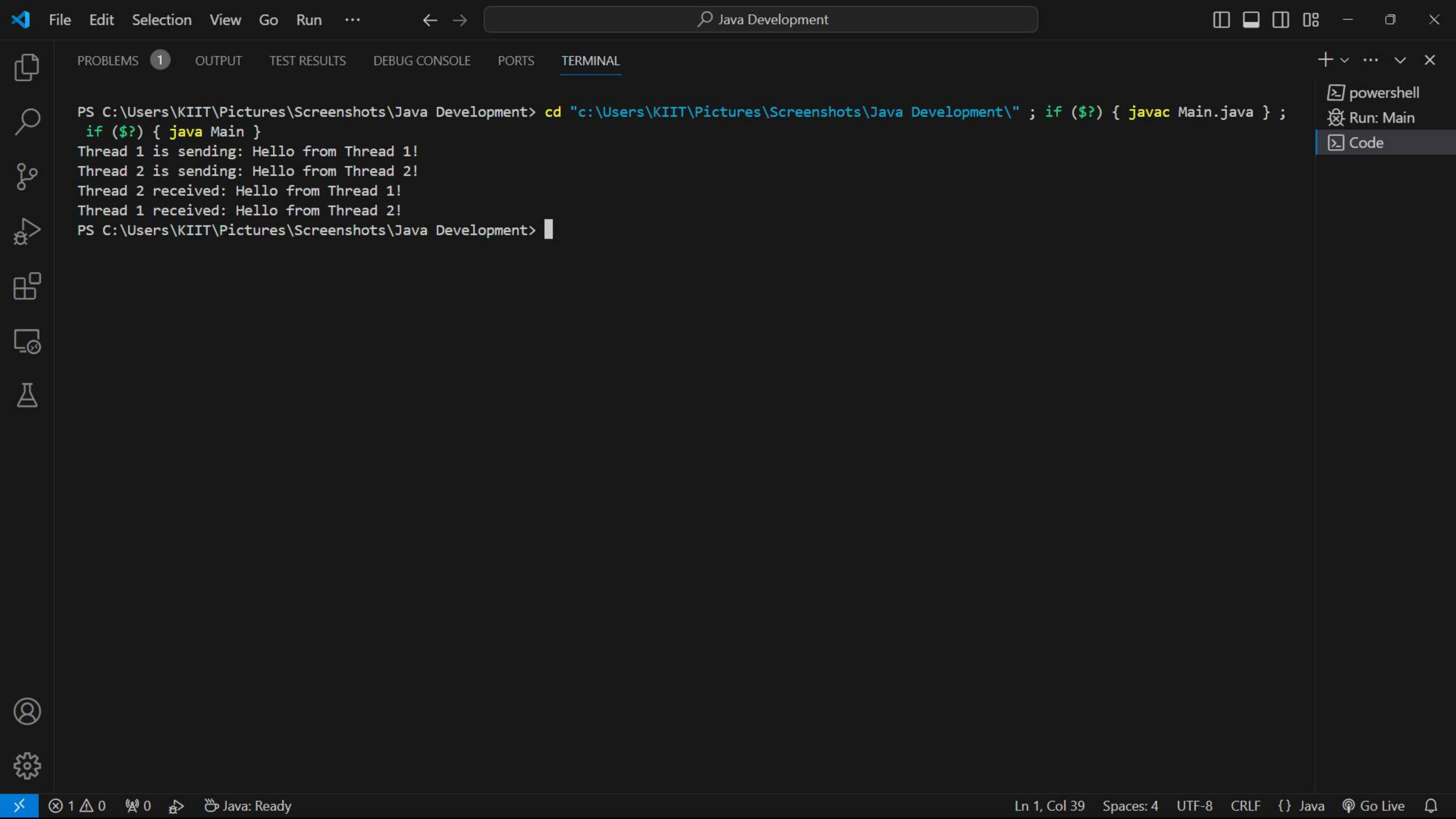
File Edit Selection View Go Run ··· Java Development

Main.java

Main.java > ...

```java
import java.util.concurrent.Exchanger;
public class Main {
    Run | Debug
    public static void main(String[] args) {

        Exchanger<String> exchanger = new Exchanger<>();

        // Thread 1
        new Thread(() -> {
            try {
                String message = "Hello from Thread 1!";
                System.out.println("Thread 1 is sending: " + message);

                message = exchanger.exchange(message);
                System.out.println("Thread 1 received: " + message);
            } catch (InterruptedException e) {
                e.printStackTrace();
            }
        }).start();

        // Thread 2
        new Thread(() -> {
            try {
                String message = "Hello from Thread 2!";
                System.out.println("Thread 2 is sending: " + message);

                message = exchanger.exchange(message);
                System.out.println("Thread 2 received: " + message);
            } catch (InterruptedException e) {
                e.printStackTrace();
            }
        }).start();
```

Q8


File Edit Selection View Go Run ···
Java Development
PROBLEMS 1 OUTPUT TEST RESULTS DEBUG CONSOLE PORTS TERMINAL
PS C:\Users\KIIT\Pictures\Screenshots\Java Development> cd "c:\Users\KIIT\Pictures\Screenshots\Java Development\" ; if ($?) { javac Main.java } ;
if ($?) { java Main }
Thread 1 is sending: Hello from Thread 1!
Thread 2 is sending: Hello from Thread 2!
Thread 2 received: Hello from Thread 1!
Thread 1 received: Hello from Thread 2!
PS C:\Users\KIIT\Pictures\Screenshots\Java Development>
powershell
Run: Main
Code
Java: Ready
Ln 1, Col 39 Spaces: 4 UTF-8 CRLF Java Go Live

File Edit Selection View Go Run ··· Java Development

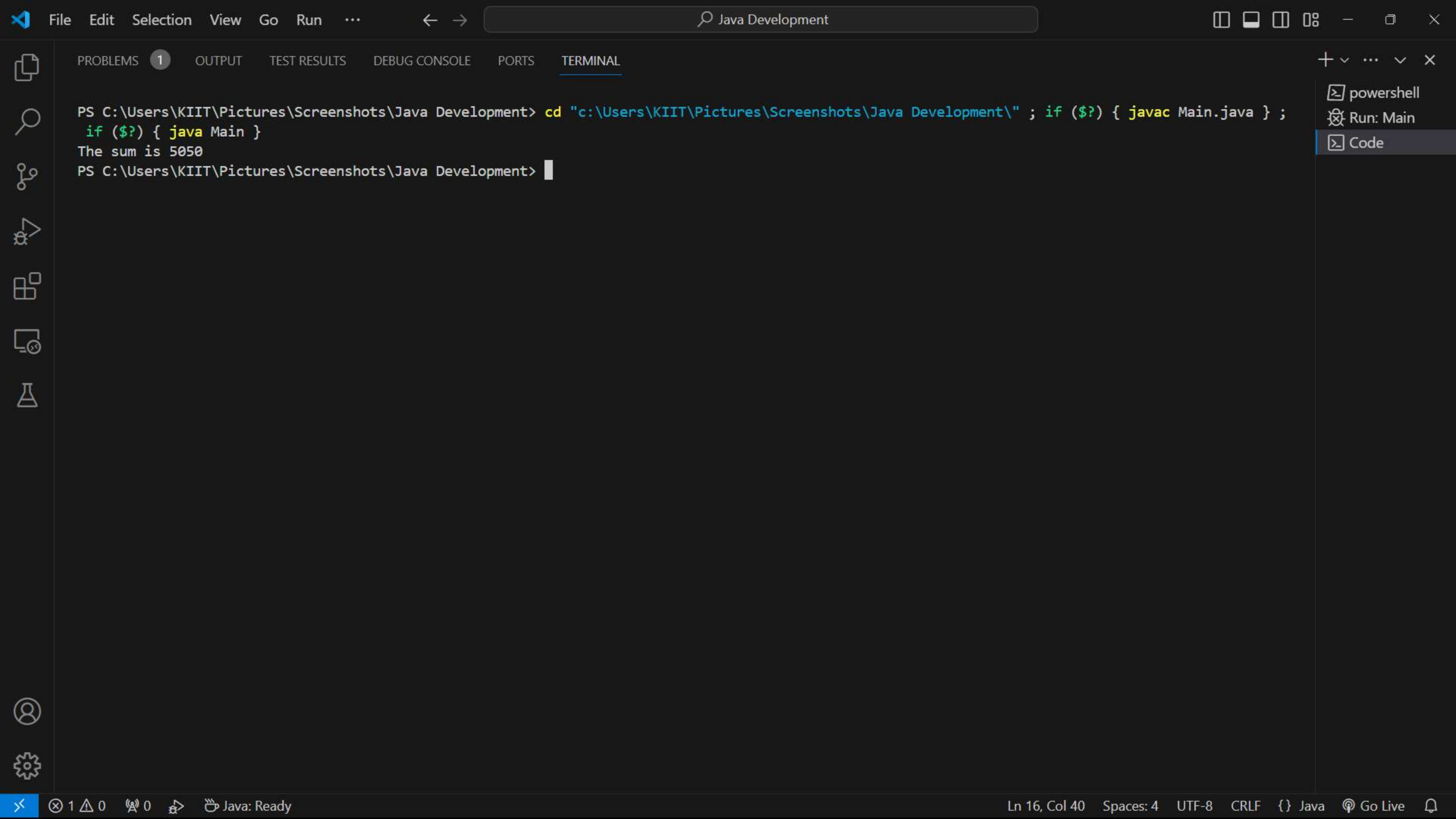
Main.java

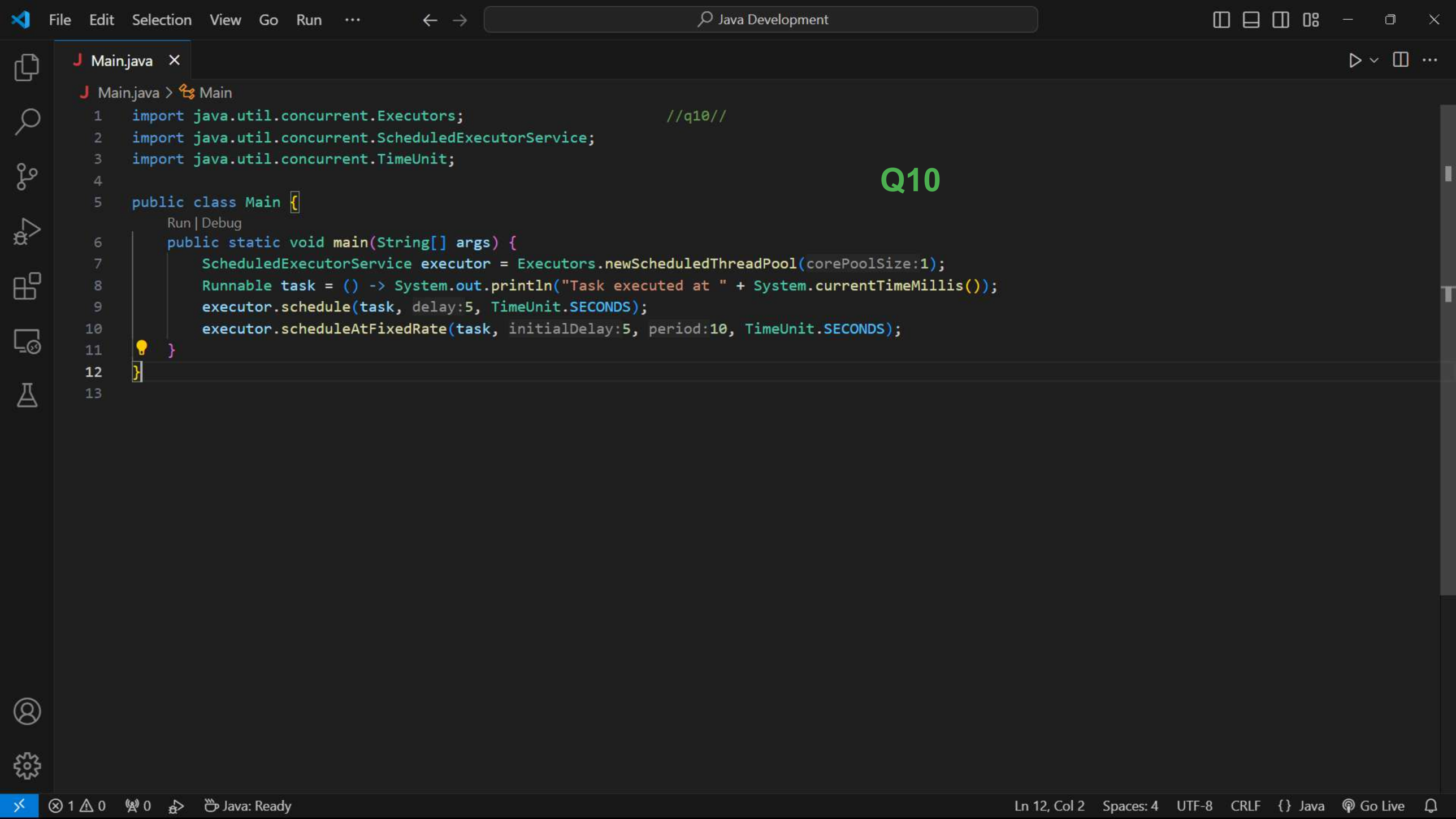
Main.java > Main > main(String[])

```java
import java.util.concurrent.Callable;
import java.util.concurrent.FutureTask;
import java.util.concurrent.ExecutionException;

public class Main {
    Run | Debug
    public static void main(String[] args) {
        Callable<Integer> task = () -> {
            int sum = 0;
            for (int i = 1; i <= 100; i++) {
                sum += i;
            }
            return sum;
        };
        FutureTask<Integer> futureTask = new FutureTask<>(task);

        new Thread(futureTask).start();
        try {
            Integer result = futureTask.get();
            System.out.println("The sum is " + result);
        } catch (InterruptedException | ExecutionException e) {
            e.printStackTrace();
        }
    }
}
```

Q9

1 0 0 Java: Ready Ln 16, Col 40 Spaces: 4 UTF-8 CRLF {} Java Go Live


File Edit Selection View Go Run ···
Java Development
PROBLEMS 1 OUTPUT TEST RESULTS DEBUG CONSOLE PORTS TERMINAL
PS C:\Users\KIIT\Pictures\Screenshots\Java Development> cd "c:\Users\KIIT\Pictures\Screenshots\Java Development\" ; if ($?) { javac Main.java } ;
if ($?) { java Main }
The sum is 5050
PS C:\Users\KIIT\Pictures\Screenshots\Java Development>
powershell
Run: Main
Code
Java: Ready
Ln 16, Col 40 Spaces: 4 UTF-8 CRLF Java Go Live


File Edit Selection View Go Run ···
Java Development
Main.java
Main.java > Main
1 import java.util.concurrent.Executors; //q10//
2 import java.util.concurrent.ScheduledExecutorService;
3 import java.util.concurrent.TimeUnit;
4
5 public class Main {
Run | Debug
6 public static void main(String[] args) {
7 ScheduledExecutorService executor = Executors.newScheduledThreadPool(corePoolSize:1);
8 Runnable task = () -> System.out.println("Task executed at " + System.currentTimeMillis());
9 executor.schedule(task, delay:5, TimeUnit.SECONDS);
10 executor.scheduleAtFixedRate(task, initialDelay:5, period:10, TimeUnit.SECONDS);
11 }
12 }
13
Q10
Java: Ready
Ln 12, Col 2 Spaces: 4 UTF-8 CRLF { } Java Go Live

File Edit Selection View Go Run ··· Java Development

PROBLEMS 1 OUTPUT TEST RESULTS DEBUG CONSOLE PORTS TERMINAL

powershell
Run: Main
Code

```
PS C:\Users\KIIT\Pictures\Screenshots\Java Development> cd "c:\Users\KIIT\Pictures\Screenshots\Java Development\" ; if ($?) { javac Main.java } ;
 if ($?) { java Main }
The sum is 5050
PS C:\Users\KIIT\Pictures\Screenshots\Java Development> cd "c:\Users\KIIT\Pictures\Screenshots\Java Development\" ; if ($?) { javac Main.java } ;
 if ($?) { java Main }
Task executed at 1710623338208
Task executed at 1710623338212
Task executed at 1710623348205
Task executed at 1710623358208
Task executed at 1710623368197
```