Design & Analysis of Algorithms Laboratory

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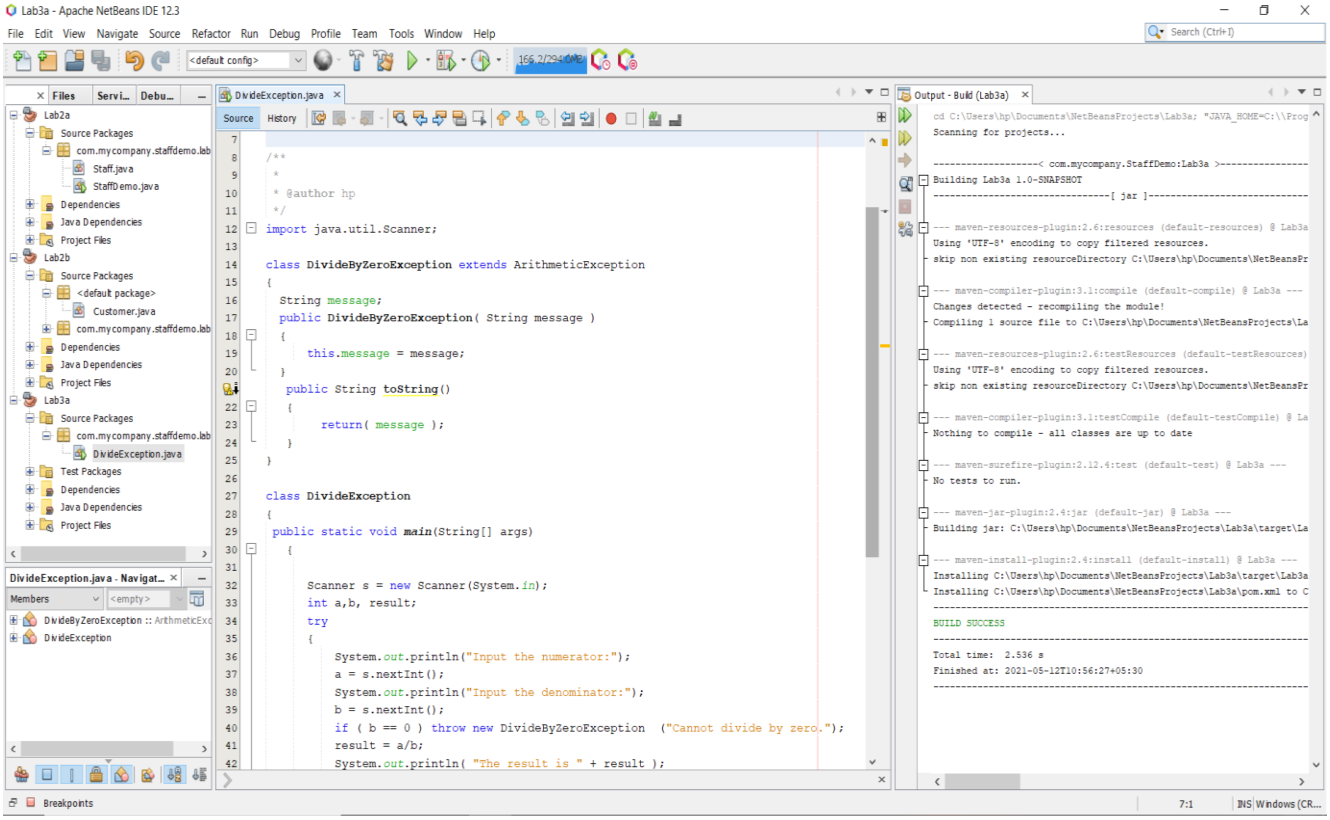
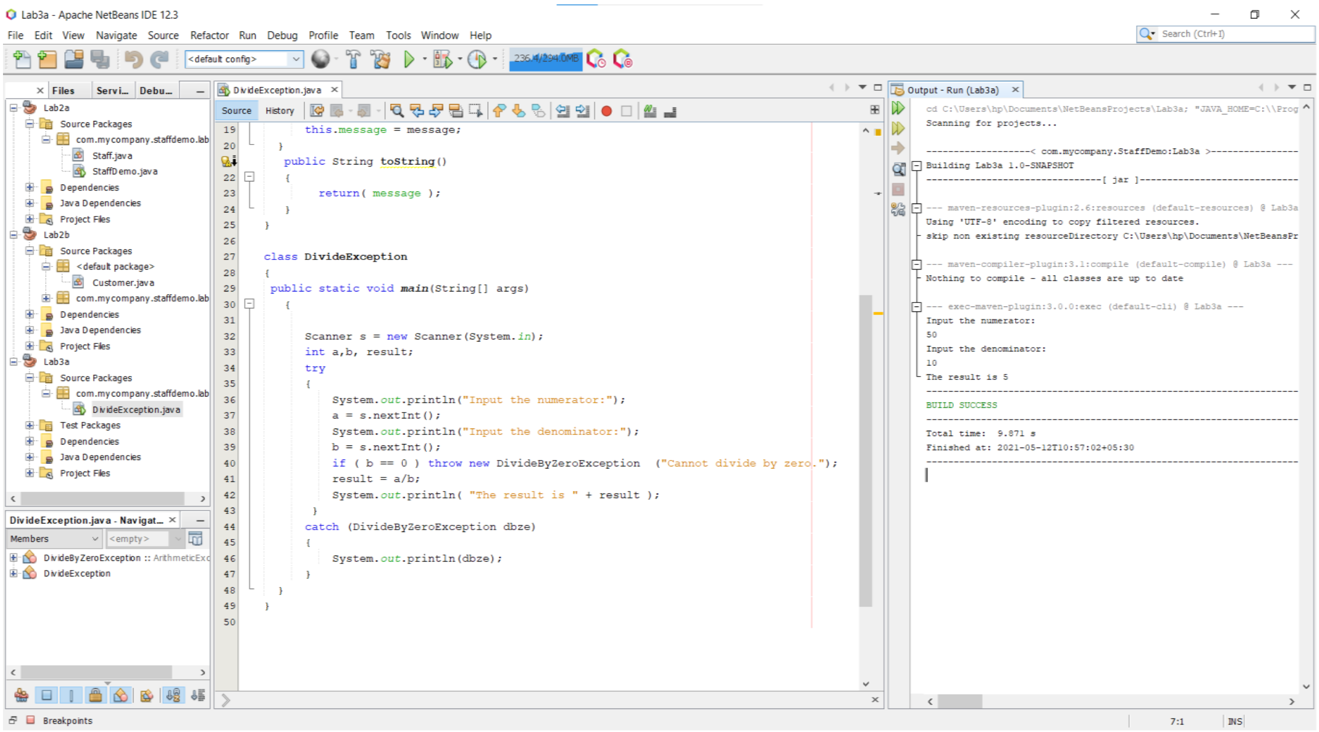
Semester: 4
Section: A

3.a. Write a Java program to read two integers a and b. Compute a/b and print, when b is not zero. Raise an exception when b is equal to zero.



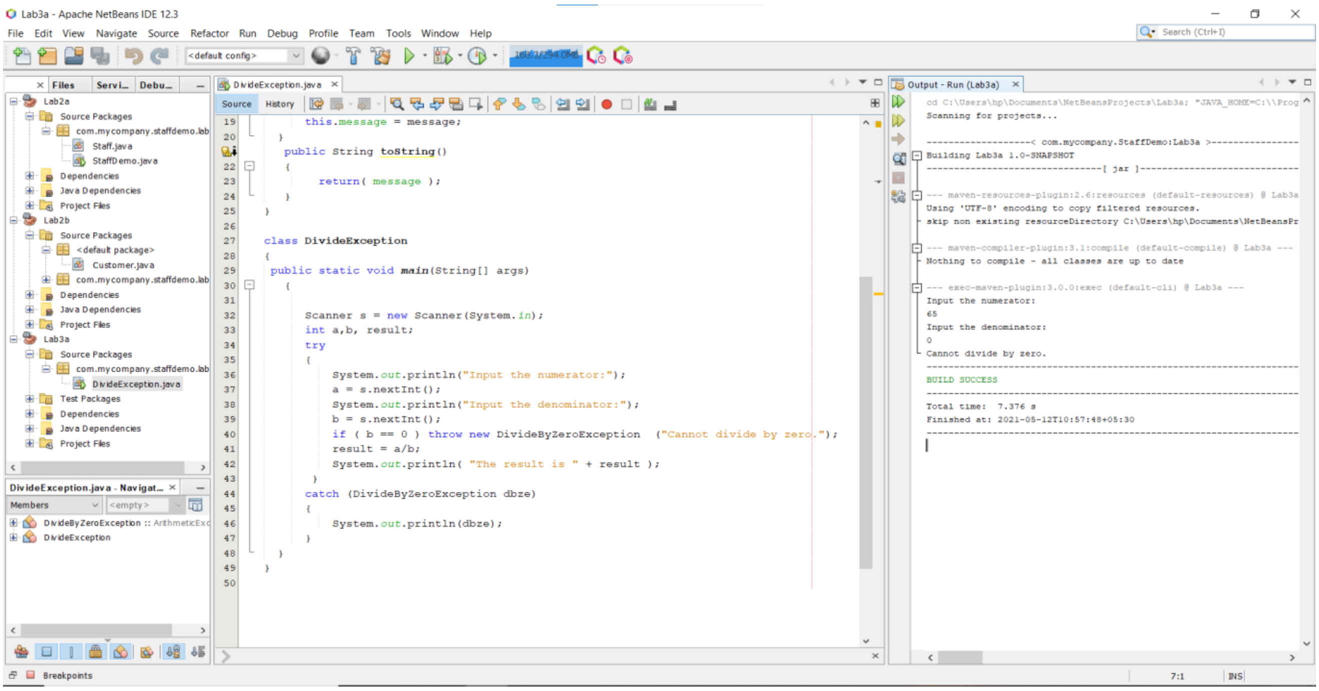
```java

/**
 *
 * @author hp
 */
import java.util.Scanner;

class DivideByZeroException extends ArithmeticException
{
  String message;
  public DivideByZeroException( String message )
  {
      this.message = message;
  }
   public String toString()
   {
       return( message );
   }
}

class DivideException
{
 public static void main(String[] args)
   {

      Scanner s = new Scanner(System.in);
      int a,b, result;
      try
      {
          System.out.println("Input the numerator:");
          a = s.nextInt();
          System.out.println("Input the denominator:");
          b = s.nextInt();
          if ( b == 0 ) throw new DivideByZeroException  ("Cannot divide by zero.");
          result = a/b;
          System.out.println( "The result is " + result );
```

```
cd C:\Users\hp\Documents\NetBeansProjects\Lab3a; "JAVA_HOME=C:\\Prog
Scanning for projects...

-------------------< com.mycompany.StaffDemo:Lab3a >----------------
Building Lab3a 1.0-SNAPSHOT
--------------------------------[ jar ]-----------------------------

--- maven-resources-plugin:2.6:resources (default-resources) @ Lab3a
Using 'UTF-8' encoding to copy filtered resources.
skip non existing resourceDirectory C:\Users\hp\Documents\NetBeansPr

--- maven-compiler-plugin:3.1:compile (default-compile) @ Lab3a ---
Changes detected - recompiling the module!
Compiling 1 source file to C:\Users\hp\Documents\NetBeansProjects\La

--- maven-resources-plugin:2.6:testResources (default-testResources)
Using 'UTF-8' encoding to copy filtered resources.
skip non existing resourceDirectory C:\Users\hp\Documents\NetBeansPr

--- maven-compiler-plugin:3.1:testCompile (default-testCompile) @ La
Nothing to compile - all classes are up to date

--- maven-surefire-plugin:2.12.4:test (default-test) @ Lab3a ---
No tests to run.

--- maven-jar-plugin:2.4:jar (default-jar) @ Lab3a ---
Building jar: C:\Users\hp\Documents\NetBeansProjects\Lab3a\target\La

--- maven-install-plugin:2.4:install (default-install) @ Lab3a ---
Installing C:\Users\hp\Documents\NetBeansProjects\Lab3a\target\Lab3a
Installing C:\Users\hp\Documents\NetBeansProjects\Lab3a\pom.xml to C
--------------------------------------------------------------------
BUILD SUCCESS
--------------------------------------------------------------------
Total time:  2.536 s
Finished at: 2021-05-12T10:56:27+05:30
--------------------------------------------------------------------
```



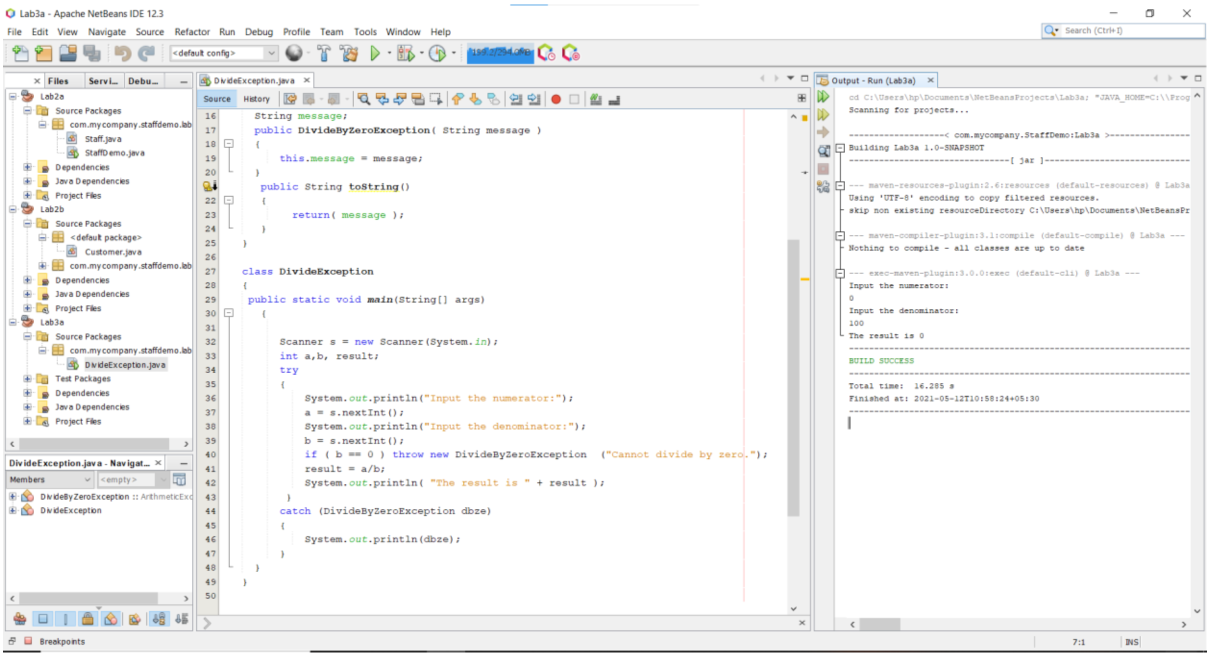
```java
            this.message = message;
        }
        public String toString()
        {
            return( message );
        }
    }

    class DivideException
    {
     public static void main(String[] args)
        {

            Scanner s = new Scanner(System.in);
            int a,b, result;
            try
            {
                System.out.println("Input the numerator:");
                a = s.nextInt();
                System.out.println("Input the denominator:");
                b = s.nextInt();
                if ( b == 0 ) throw new DivideByZeroException  ("Cannot divide by zero.");
                result = a/b;
                System.out.println( "The result is " + result );
             }
            catch (DivideByZeroException dbze)
            {
                System.out.println(dbze);
            }
        }
    }
```

```
cd C:\Users\hp\Documents\NetBeansProjects\Lab3a; "JAVA_HOME=C:\\Prog
Scanning for projects...

-------------------< com.mycompany.StaffDemo:Lab3a >----------------
Building Lab3a 1.0-SNAPSHOT
--------------------------------[ jar ]-----------------------------

--- maven-resources-plugin:2.6:resources (default-resources) @ Lab3a
Using 'UTF-8' encoding to copy filtered resources.
skip non existing resourceDirectory C:\Users\hp\Documents\NetBeansPr

--- maven-compiler-plugin:3.1:compile (default-compile) @ Lab3a ---
Nothing to compile - all classes are up to date

--- exec-maven-plugin:3.0.0:exec (default-cli) @ Lab3a ---
Input the numerator:
50
Input the denominator:
10
The result is 5
--------------------------------------------------------------------
BUILD SUCCESS
--------------------------------------------------------------------
Total time:  9.871 s
Finished at: 2021-05-12T10:57:02+05:30
--------------------------------------------------------------------
```



```java
            this.message = message;
        }
        public String toString()
        {
            return( message );
        }
    }

    class DivideException
    {
     public static void main(String[] args)
        {

            Scanner s = new Scanner(System.in);
            int a,b, result;
            try
            {
                System.out.println("Input the numerator:");
                a = s.nextInt();
                System.out.println("Input the denominator:");
                b = s.nextInt();
                if ( b == 0 ) throw new DivideByZeroException  ("Cannot divide by zero.");
                result = a/b;
                System.out.println( "The result is " + result );
             }
            catch (DivideByZeroException dbze)
            {
                System.out.println(dbze);
            }
        }
    }
```

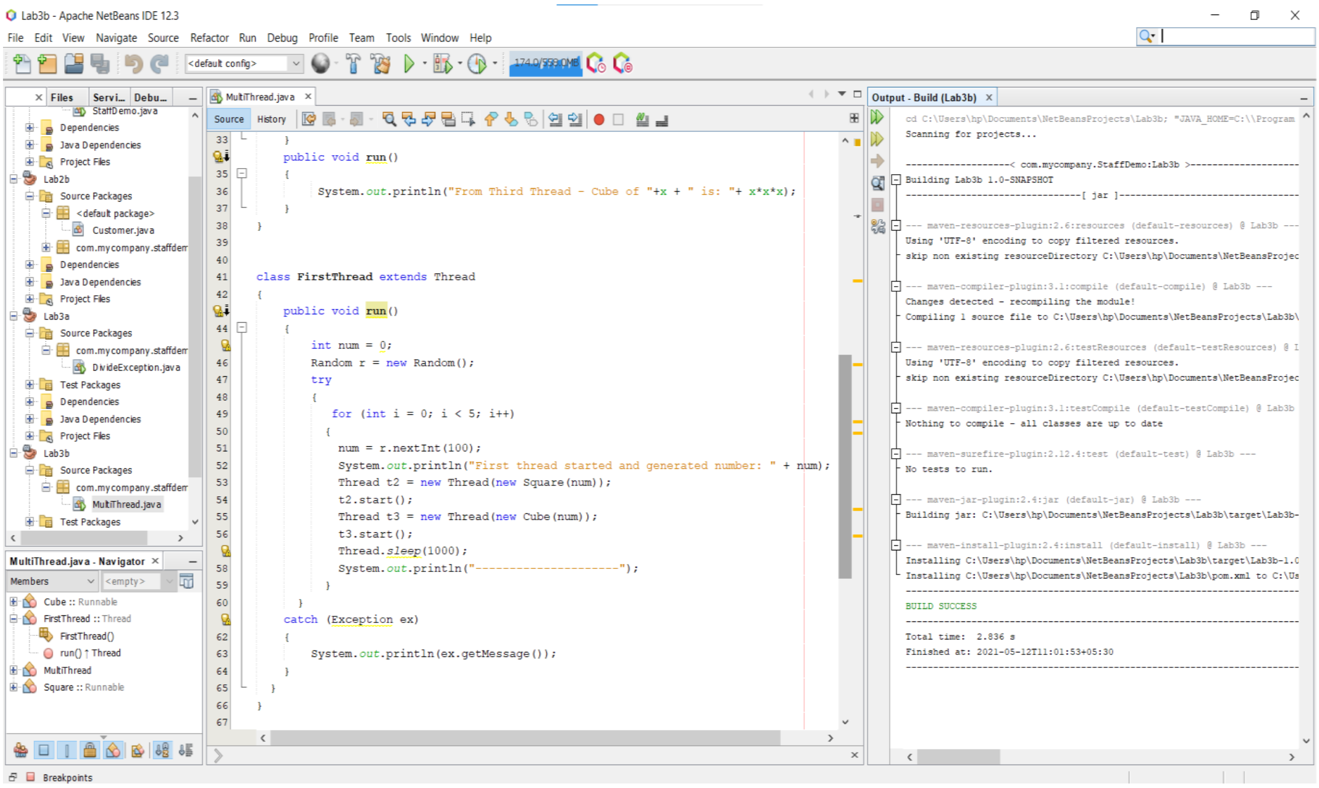
```
cd C:\Users\hp\Documents\NetBeansProjects\Lab3a; "JAVA_HOME=C:\\Prog
Scanning for projects...

-------------------< com.mycompany.StaffDemo:Lab3a >----------------
Building Lab3a 1.0-SNAPSHOT
--------------------------------[ jar ]-----------------------------

--- maven-resources-plugin:2.6:resources (default-resources) @ Lab3a
Using 'UTF-8' encoding to copy filtered resources.
skip non existing resourceDirectory C:\Users\hp\Documents\NetBeansPr

--- maven-compiler-plugin:3.1:compile (default-compile) @ Lab3a ---
Nothing to compile - all classes are up to date

--- exec-maven-plugin:3.0.0:exec (default-cli) @ Lab3a ---
Input the numerator:
65
Input the denominator:
0
Cannot divide by zero.
--------------------------------------------------------------------
BUILD SUCCESS
--------------------------------------------------------------------
Total time:  7.376 s
Finished at: 2021-05-12T10:57:48+05:30
--------------------------------------------------------------------
```


Lab3a - Apache NetBeans IDE 12.3
File Edit View Navigate Source Refactor Run Debug Profile Team Tools Window Help
DivideException.java
Source History
Output - Run (Lab3a)
DivideException.java - Navigator
Breakpoints

```java
    String message;
    public DivideByZeroException( String message )
    {
        this.message = message;
    }
     public String toString()
     {
         return( message );
     }
}

class DivideException
{
 public static void main(String[] args)
   {

       Scanner s = new Scanner(System.in);
       int a,b, result;
       try
       {
           System.out.println("Input the numerator:");
           a = s.nextInt();
           System.out.println("Input the denominator:");
           b = s.nextInt();
           if ( b == 0 ) throw new DivideByZeroException  ("Cannot divide by zero.");
           result = a/b;
           System.out.println( "The result is " + result );
        }
       catch (DivideByZeroException dbze)
       {
           System.out.println(dbze);
       }
   }
}
```

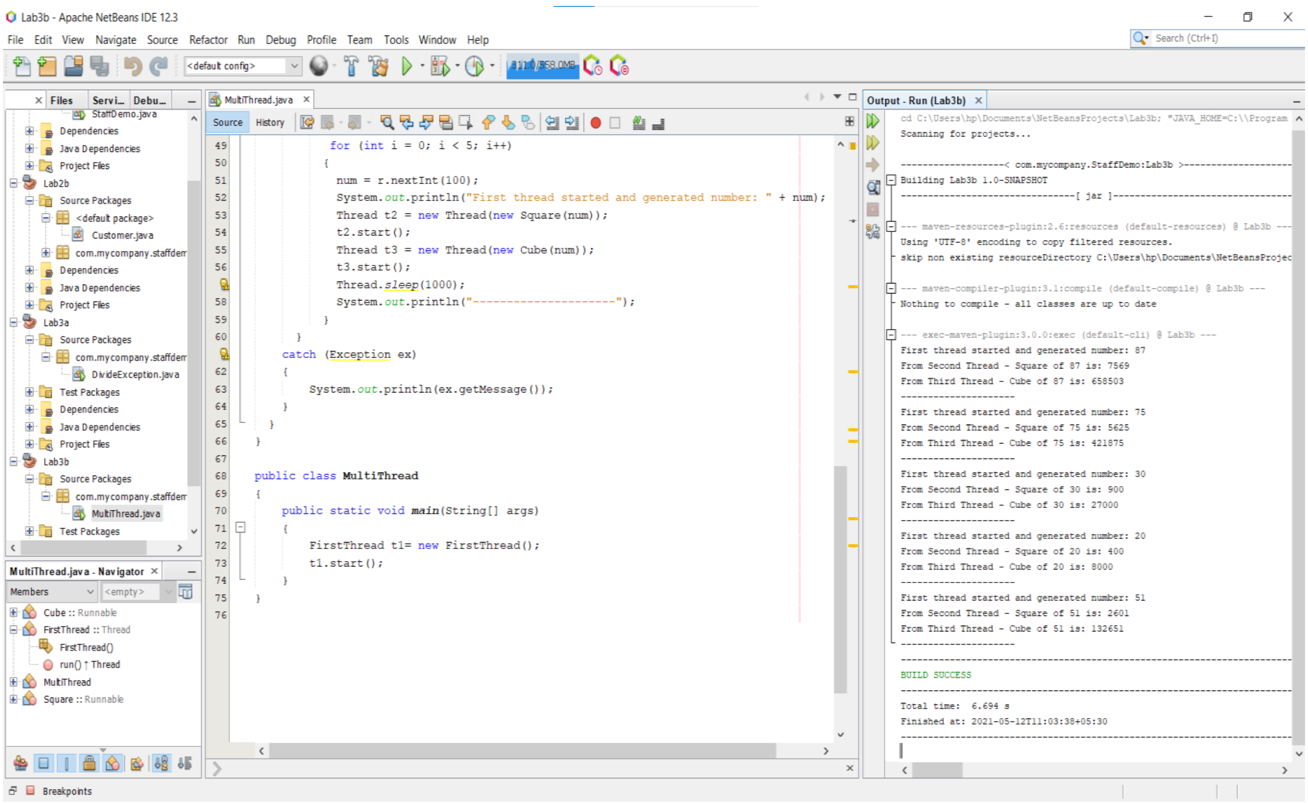
```
cd C:\Users\hp\Documents\NetBeansProjects\Lab3a; "JAVA_HOME=C:\\Prog
Scanning for projects...

------------------< com.mycompany.StaffDemo:Lab3a >----------------
Building Lab3a 1.0-SNAPSHOT
--------------------------------[ jar ]-----------------------------

--- maven-resources-plugin:2.6:resources (default-resources) @ Lab3a
Using 'UTF-8' encoding to copy filtered resources.
skip non existing resourceDirectory C:\Users\hp\Documents\NetBeansPr

--- maven-compiler-plugin:3.1:compile (default-compile) @ Lab3a ---
Nothing to compile - all classes are up to date

--- exec-maven-plugin:3.0.0:exec (default-cli) @ Lab3a ---
Input the numerator:
0
Input the denominator:
100
The result is 0
--------------------------------------------------------------------
BUILD SUCCESS
--------------------------------------------------------------------
Total time:  16.285 s
Finished at: 2021-05-12T10:58:24+05:30
--------------------------------------------------------------------
```

b. Write a Java program that implements a multi-thread application that has three threads. First thread generates a random integer for every 1 second; second thread computes the square of the number and prints; third thread will print the value of cube of the number.


Lab3b - Apache NetBeans IDE 12.3
File Edit View Navigate Source Refactor Run Debug Profile Team Tools Window Help
MultiThread.java
Source History
Output - Build (Lab3b)
MultiThread.java - Navigator
Breakpoints

```java
    }
    public void run()
    {
        System.out.println("From Third Thread - Cube of "+x + " is: "+ x*x*x);
    }
}


class FirstThread extends Thread
{
    public void run()
    {
        int num = 0;
        Random r = new Random();
        try
        {
         for (int i = 0; i < 5; i++)
         {
          num = r.nextInt(100);
          System.out.println("First thread started and generated number: " + num);
          Thread t2 = new Thread(new Square(num));
          t2.start();
          Thread t3 = new Thread(new Cube(num));
          t3.start();
          Thread.sleep(1000);
          System.out.println("--------------------");
         }
      }
    catch (Exception ex)
    {
        System.out.println(ex.getMessage());
    }
  }
}
```

```
cd C:\Users\hp\Documents\NetBeansProjects\Lab3b; "JAVA_HOME=C:\\Program
Scanning for projects...

------------------< com.mycompany.StaffDemo:Lab3b >--------------------
Building Lab3b 1.0-SNAPSHOT
--------------------------------[ jar ]-------------------------------

--- maven-resources-plugin:2.6:resources (default-resources) @ Lab3b ---
Using 'UTF-8' encoding to copy filtered resources.
skip non existing resourceDirectory C:\Users\hp\Documents\NetBeansProjec

--- maven-compiler-plugin:3.1:compile (default-compile) @ Lab3b ---
Changes detected - recompiling the module!
Compiling 1 source file to C:\Users\hp\Documents\NetBeansProjects\Lab3b\

--- maven-resources-plugin:2.6:testResources (default-testResources) @ L
Using 'UTF-8' encoding to copy filtered resources.
skip non existing resourceDirectory C:\Users\hp\Documents\NetBeansProjec

--- maven-compiler-plugin:3.1:testCompile (default-testCompile) @ Lab3b
Nothing to compile - all classes are up to date

--- maven-surefire-plugin:2.12.4:test (default-test) @ Lab3b ---
No tests to run.

--- maven-jar-plugin:2.4:jar (default-jar) @ Lab3b ---
Building jar: C:\Users\hp\Documents\NetBeansProjects\Lab3b\target\Lab3b-

--- maven-install-plugin:2.4:install (default-install) @ Lab3b ---
Installing C:\Users\hp\Documents\NetBeansProjects\Lab3b\target\Lab3b-1.0
Installing C:\Users\hp\Documents\NetBeansProjects\Lab3b\pom.xml to C:\Us
----------------------------------------------------------------------
BUILD SUCCESS
----------------------------------------------------------------------
Total time:  2.836 s
Finished at: 2021-05-12T11:01:53+05:30
----------------------------------------------------------------------
```



```java
                for (int i = 0; i < 5; i++)
                {
                  num = r.nextInt(100);
                  System.out.println("First thread started and generated number: " + num);
                  Thread t2 = new Thread(new Square(num));
                  t2.start();
                  Thread t3 = new Thread(new Cube(num));
                  t3.start();
                  Thread.sleep(1000);
                  System.out.println("--------------------");
                }
            }
        catch (Exception ex)
        {
            System.out.println(ex.getMessage());
        }
    }
}

public class MultiThread
{
    public static void main(String[] args)
    {
        FirstThread t1= new FirstThread();
        t1.start();
    }
}
```

```
cd C:\Users\hp\Documents\NetBeansProjects\Lab3b; "JAVA_HOME=C:\\Program
Scanning for projects...

------------------< com.mycompany.StaffDemo:Lab3b >-------------------
Building Lab3b 1.0-SNAPSHOT
--------------------------------[ jar ]---------------------------------

--- maven-resources-plugin:2.6:resources (default-resources) @ Lab3b ---
Using 'UTF-8' encoding to copy filtered resources.
skip non existing resourceDirectory C:\Users\hp\Documents\NetBeansProjec

--- maven-compiler-plugin:3.1:compile (default-compile) @ Lab3b ---
Nothing to compile - all classes are up to date

--- exec-maven-plugin:3.0.0:exec (default-cli) @ Lab3b ---
First thread started and generated number: 87
From Second Thread - Square of 87 is: 7569
From Third Thread - Cube of 87 is: 658503
--------------------
First thread started and generated number: 75
From Second Thread - Square of 75 is: 5625
From Third Thread - Cube of 75 is: 421875
--------------------
First thread started and generated number: 30
From Second Thread - Square of 30 is: 900
From Third Thread - Cube of 30 is: 27000
--------------------
First thread started and generated number: 20
From Second Thread - Square of 20 is: 400
From Third Thread - Cube of 20 is: 8000
--------------------
First thread started and generated number: 51
From Second Thread - Square of 51 is: 2601
From Third Thread - Cube of 51 is: 132651
--------------------
------------------------------------------------------------------------
BUILD SUCCESS
------------------------------------------------------------------------
Total time:  6.694 s
Finished at: 2021-05-12T11:03:38+05:30
------------------------------------------------------------------------
```