Don Bosco Institute of Technology, Kurla(W)
Department of Electronics and Tele-Communication Engineering
ECL304 - Skill Lab: C++ and Java Programming
Sem III
2021-22

Lab Number:	**11**
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Roll No:	**39**

Title:

1. Write a program in java if a number is less than 0 and greater than 10 it generates the user-defined exception "out of range". Else it displays the square of the number.
2. Write a program in java to enter the number. If the first and second number is not entered it will generate the exception. Also, divide the first number with the second number and generate the arithmetic exception.

Learning Objective:

Students will be able to implement user-defined exceptions

Learning Outcome:

Understanding the exception handling concept and making the programming interface error-free.

Course Outcome:

ECL304.3	Articulate exception handling methods.

Faculty: Ms. Deepali Kayande

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Theory:

- **What is exception handling and how is it achieved in JAVA?**

Ans: 1. Exception is defined as a problem that arises during the execution of a program. When an Exception occurs the normal flow of the program is disrupted and the program/Application terminates abnormally, which is not recommended, therefore these exceptions are to be handled.
2.There is a difference between the terms error and exception. An Error indicates serious problem that a reasonable application should not try to catch. Exception indicates conditions that a reasonable application might try to catch.
3. Java exception handling is managed with the help of the following keywords: try, catch, throw, throws, and finally. Program statements that we as programmers think can raise exceptions are contained within a try block. If an exception occurs within the try block, it is thrown. The code can catch this exception (using catch block) and handle it.
4.Every try block should be immediately followed either by a class block or finally block. A catch statement involves declaring the type of exception you are trying to catch. If an exception occurs in protected code, the catch block (or blocks) that follows the try is checked. If the type of exception that occurred is listed in a catch block, the exception is passed to the catch block much as an argument is passed into a method parameter.
5. The finally block follows a try block or a catch block. A finally block of code always executes, irrespective of occurrence of an Exception. Using a finally block allows you to run any clean-up-type statements that you want to execute, no matter what happens in the protected code.
6. The main advantage of exception handling is to maintain the normal flow of the application. An exception normally disrupts the normal flow of the application; that is why we need to handle exceptions.
7. There are mainly two types of exceptions: checked and unchecked. An error is considered as the unchecked exception. However, according to Oracle, there are three types of exceptions namely: Checked Exception, Unchecked Exception and Error.
8. The java.lang.Throwable class is the root class of Java Exception hierarchy inherited by two subclasses: Exception and Error. The hierarchy of Java Exception classes is given below:

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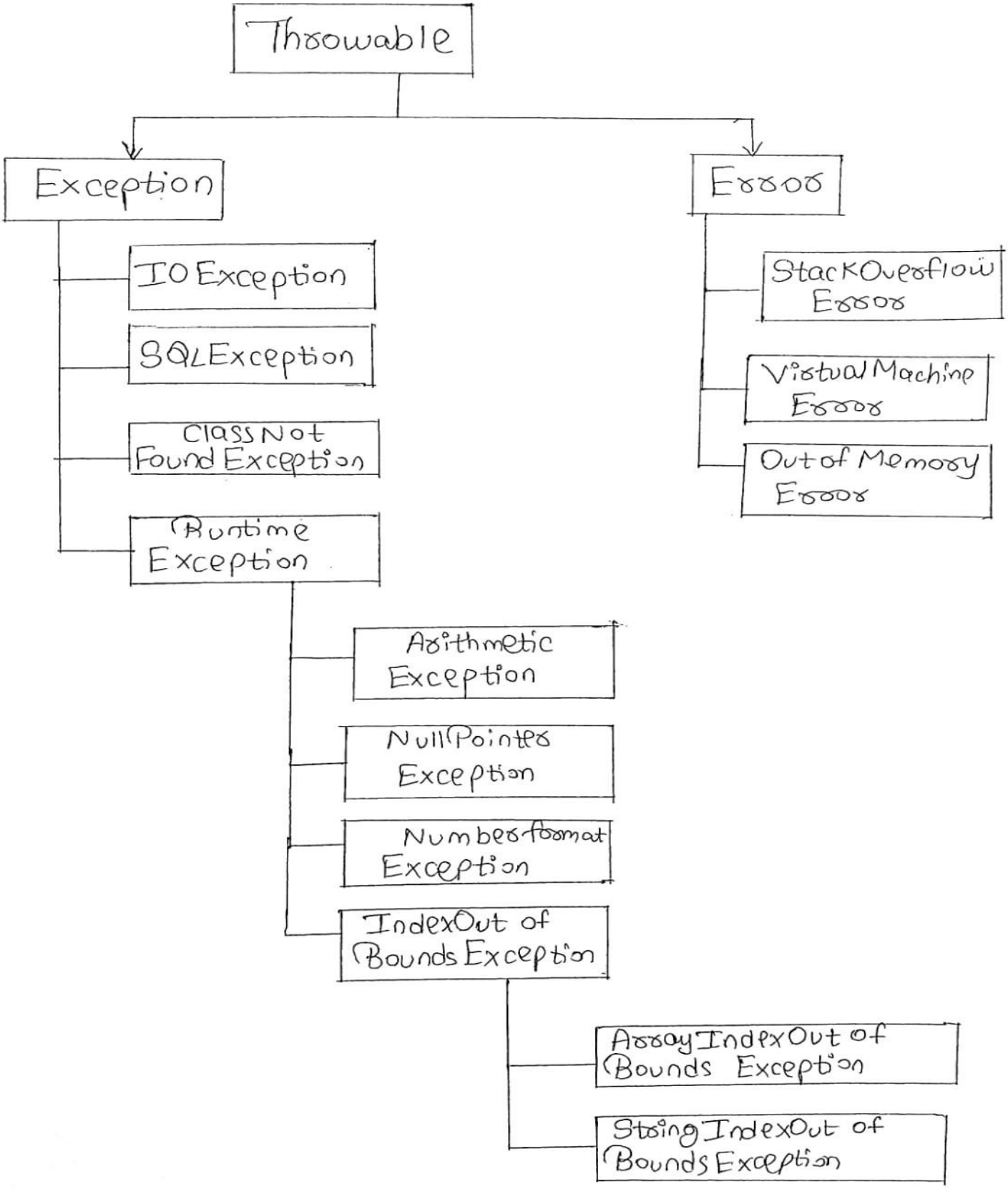


- **Explain user defined exceptions in java?**

Ans: 1. Java user-defined exception is a custom exception created and throws that exception using a keyword 'throw'. It is done by extending a class 'Exception'. An exception is a problem that arises during the execution of the program. In Object-Oriented Programming language, Java provides a powerful mechanism to handle such exceptions. Java allows to create own exception class, which provides own exception class implementation. Such exceptions are called user-defined exceptions or custom exceptions.

2. There are advantages in using these user-defined exceptions; it allows users to throw an exception which wants user wants to mean. Users can also reuse any existing application; any piece of code that catches exception deals with a possibility of actual exception was not thrown by code but by some other third-party code.

3. User Defined Exception or custom exception is creating your own exception class and throws that exception using 'throw' keyword. ... There is no need to override any of the above methods available in the Exception class, in your derived class.

4. We will consider an example of the user defined exceptions as follows:

```
class myException1 extends Exception
{
public String toString()
{
return "User-Defined Exception";
}
public static void main(String... ar)
{
myException1 ob= new myException1();
try
{
```

```
        throw ob;
}
catch(myException1 e)
{
        System.out.println("Exception handled - "+ e);
}
}
}
```

5. In this code we have created our own exception class by extending the Exception class, which is the mother of all exception classes. Next, we will throw our exception out of a try block and catch it within a catch block, by using the throw keyword.

1. **Write a program in java if a number is less than 0 and greater than 10 it generates the user-defined exception "out of range". Else it displays the square of the number.**

- **Algorithm:**

1. We have created a class named outofRangeException which is inheriting the class Exception. Inside this class we have declared a string variable named display.
2. Then in the main function we take a number from user and store it.
3. We then check whether the number is less than zero or greater than 10 and if it is we display the message telling the user to enter a number within the confined range.
4. If the user enters a number from the range 0 to 10 including 0 and 10, we will display the square of the entered number.

- **Program:**

/*Write a program in java if a number is less than 0 and greater than 10 it generates the user-defined exception "out of range". Else it displays the square of the number.*/

```
package javaprogramming3;

import java.util.Scanner;



@SuppressWarnings({ "serial", "unused" })
class outofRangeException extends Exception{
String display;
public outofRangeException( String display) {
	this.display=display;
}

}

public class Lab11_1 {
public static void main(String[] args)  {
	Scanner in= new Scanner(System.in);
	{
		try {
		int num1 = 0;
		System.out.println("Enter any number: ");
```

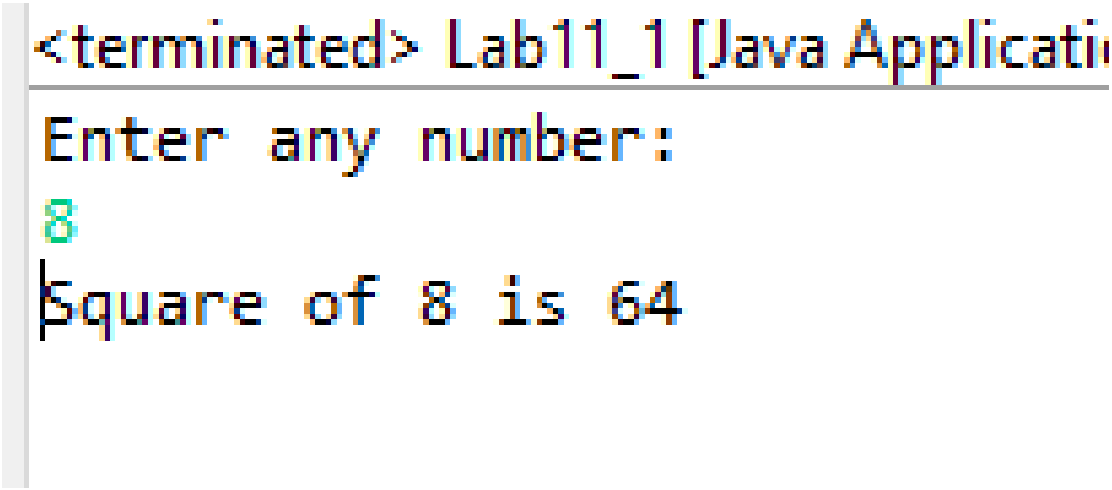
```
num1=in.nextInt();


if(num1<0|| num1>10)

throw new outofRangeException ("Enter a number between the valid range which is  from 0 to 10");

{

int num2=num1*num1;

System.out.println("Square of " +num1+ " is " +num2);

}

}

catch(Exception xyz) {

System.out.println(xyz);

System.out.println("Out of Range!");

}

}



}

}
```

- **Input:** 1) For checking the range from 0 to 10 we enter num1=8

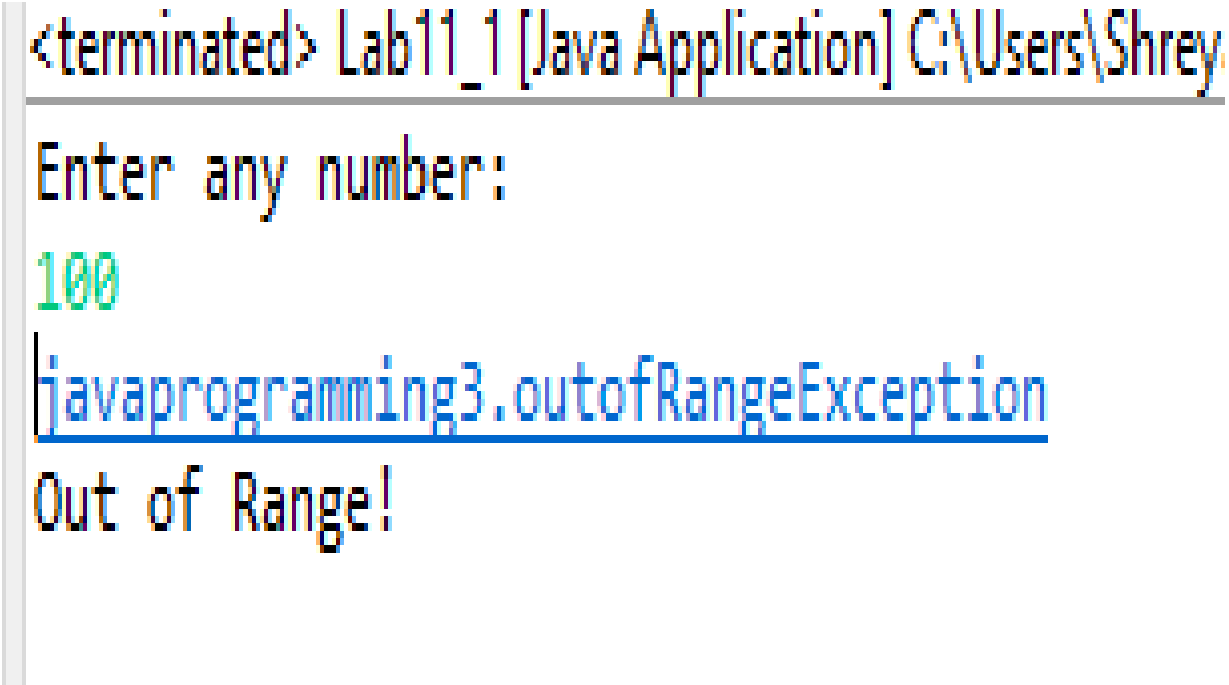
  2) For checking the range out of 0 to 10 we enter num1=100

➢ **Output:**

1)


<terminated> Lab11_1 [Java Applicati
Enter any number:
8
Square of 8 is 64

2)


<terminated> Lab11_1 [Java Application] C:\Users\Shrey
Enter any number:
100
javaprogramming3.outofRangeException
Out of Range!

2. **Write a program in java to enter the number. If the first and second number is not entered it will generate the exception. Also, divide the first number with the second number and generate the arithmetic exception.**

- **Algorithm:**

1. In the main function we will take two numbers form user and store it.
2. Then in try block we are using the if condition to check when both n1 and n2 are zero we display that the numbers should be non zero.
3. If user enters the second number as zero we will display that the n2 cant be zero as we can't divide by zero.
4. If the user enters both the values as non zero numbers, we will display the division of the two numbers.

- **Program:**

```
/*Write a program in java to enter the number. If the first and second number
is not entered it will generate the exception. Also, divide the first number
with the second number and generate the arithmetic exception.*/

package javaprogramming3;

import java.util.Scanner;

public class Lab11_2 {

public static void main(String[] args) {
        @SuppressWarnings("resource")
```

```
        Scanner in= new Scanner(System.in);
        int n1,n2;
        System.out.println("Enter number 1 :");
        n1=in.nextInt();
        System.out.println("Enter number 2 :");
        n2=in.nextInt();
        try
        {
        if(n1==0 && n2==0) {
        throw(new Exception("Please enter non zero numbers"));
        }
        if(n2==0) {
        throw(new Exception("n2 should not be zero as we cannot divide by
zero"));
        }
        int n3=n1/n2;
        System.out.println("After Division we get "+n3);
        }
        catch(Exception abc)
        {
        System.out.println(abc);
        }
}
}
```

- **Input:**

1) For 1st case we will take n1=0 and n2 =0 for generating the exception when both the numbers entered by the user are zero.

2) For 2nd case we will take n1=10 and n2=0 for generating the exception when user enters second number as 0 and we cannot divide by zero.

- **Output:**

1)

```
<terminated> Lab11_2 [Java Application] C:\Users\Shreyas\.p2\pool\p
Enter number 1 :
0
Enter number 2 :
0
java.lang.Exception: Please enter non zero numbers
```

2)

```
<terminated> Lab11_2 [Java Application] C:\Users\Shreyas\.p2\pool\plugins\org.eclipse.justj.openj
Enter number 1 :
10
Enter number 2 :
0
java.lang.Exception: n2 should not be zero as we cannot divide by zero
```