Usman Institute of Technology

Department of Computer Science

Course Code: SE312

Course Title: Software Construction and Development

SPRING 2024

Lab 10

Fault Tolerance in Java

Objective: Constructing a fault tolerant program by implementing exception handling techniques.

Student Information

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Assessment

Marks Obtained	
Remarks	
Signature	

HOME TASK:

1. Write a program that meets the following requirements:

   • Creates an array with 10 randomly chosen integers.

   • Prompts the user to enter the index of the array, then displays the corresponding element

   value. If the specified index is out of bounds, display the message Out of Bounds.

   (ArrayIndexOutOfBoundsException)

CODE:

```
package com.company;

import java.util.Random;
import java.util.Scanner;

public class task1 {
    public static void main(String[] args) {
        // Create an array with 10 randomly chosen integers
        int[] array = new int[10];
        Random random = new Random();
        for (int i = 0; i < array.length; i++) {
            array[i] = random.nextInt(100); // Random integers between 0 and
99
        }

        // Print the array for reference
        System.out.println("Array elements:");
        for (int num : array) {
            System.out.print(num + " ");
        }
        System.out.println();

        // Prompt the user to enter the index of the array
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the index of the array (0-9): ");

        try {
            int index = scanner.nextInt();
            // Display the corresponding element value
            System.out.println("Element at index " + index + ": " +
array[index]);
        } catch (ArrayIndexOutOfBoundsException e) {
            // Display the message if the specified index is out of bounds
            System.out.println("Out of Bounds");
        } catch (Exception e) {
            // Handle any other exceptions
            System.out.println("Invalid input. Please enter an integer
between 0 and 9.");
        }
```

```
//          scanner.close();
    }
}
```

OUTPUT:

```
"D:\Java SDK\bin\java.exe" "-javaagent:D:\IntelliJ\IntelliJ IDEA Commu
------------------------ OUTPUT TASK - 1 ------------------------
Array elements:
86 16 55 6 10 22 15 34 93 70
Enter the index of the array (0-9): 42
Out of Bounds
```

```
"D:\Java SDK\bin\java.exe" "-javaagent:D:\IntelliJ\IntelliJ IDEA Communi
------------------------ OUTPUT TASK - 1 ------------------------
Array elements:
91 79 23 69 3 33 40 89 27 84
Enter the index of the array (0-9): 3
Element at index 3: 69
```

2. Suppose you are developing a game for kids in which they are learning the division operation in math. Your game will take input from kids (2 integers) and then perform the division and displays the answer. Think and apply exception handling in this scenario. For e.g. Arithmetic Exception might occur here. Also suppose, this game has the limitation that it only performs division between integers so if it gets a decimal number as input, it throws an exception stating that the input is invalid, please give integer number etc.

CODE:

```
package com.company;
import java.util.InputMismatchException;
import java.util.Scanner;

public class task2 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        try {
            System.out.println("Welcome to the Division Game!");
            System.out.print("Enter the first integer: ");
            int dividend = scanner.nextInt();
            System.out.print("Enter the second integer: ");
            int divisor = scanner.nextInt();
```

```
            if (divisor == 0) {
                throw new ArithmeticException("Division by zero is not
allowed.");
            }

            if (dividend % divisor != 0) {
                throw new IllegalArgumentException("The result is not an
integer. Please enter valid integers.");
            }

            int result = dividend / divisor;
            System.out.println("The result of " + dividend + " divided by " +
divisor + " is: " + result);
        } catch (InputMismatchException e) {
            System.out.println("Invalid input. Please enter integers only.");
        } catch (ArithmeticException e) {
            System.out.println("Arithmetic Error: " + e.getMessage());
        } catch (IllegalArgumentException e) {
            System.out.println("Invalid Input: " + e.getMessage());
        }
    }
}
```

OUTPUT:

```
------------------------ OUTPUT TASK - 2 ------------------------
Welcome to the Division Game!
Enter the first integer: 10
Enter the second integer: 20
Invalid Input: The result is not an integer. Please enter valid integers.

Process finished with exit code 0
```

```
"D:\Java SDK\bin\java.exe" "-javaagent:D:\IntelliJ\IntelliJ
Welcome to the Division Game!
Enter the first integer: 20
Enter the second integer: 10
The result of 20 divided by 10 is: 2

Process finished with exit code 0
```