Joseph Camacho-Terrazas
Exception Handling in JAVA
10/03/2020

For this assignment we had to take an Ada program for grade distribution and convert it to Java. We then had to change the input loop so that the frequency was only updated in the exception handler. To accomplish this, I used a try-catch in the input loop. It first checked if the input was less than 0 or greater than 100. If it was it would throw an ArithmeticException and print the error message. If the user ended text input, it would catch the NumberFormatException and print a message. Finally, if the input was valid, it would throw an IOException and run the updateFrequency method to add to the frequency array.

```
/*
*Joseph Camacho-Terrazas
*10/02/2020
*Input: A grade
*Output: The distribution of the grades among the given limits
*Preconditions: The user must enter a grade within the range 0-
89. The user must enter -1 to stop the input and print the distribution.
*Postcondition: The limits and their frequencies will be properly printed and for
matted.
*/

import java.io.IOException;
import java.util.ArrayList;
import java.util.Scanner;
import java.util.Collections;

public class grade_distribution {

    //Create array lists for grade limits and frequency counters
    private ArrayList<Integer> limits = new ArrayList<>();
    private ArrayList<Integer> frequencies = new ArrayList<>();

    public static void main(String[] args) {

        Scanner reader = new Scanner(System.in);
        //Create an array to store input grades
        ArrayList<Integer> grades = new ArrayList<Integer>();
        //Create a grade_distribution object
        grade_distribution Distribution = new grade_distribution();

        //Read in grades, will stop input loop when -1 is typed
        int input = 0;
        System.out.println("Enter in grades. Type -1 to end input.");
```

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```
        do{
            try {
                input = Integer.parseInt(reader.nextLine());

                if(input != -1){
                    //Throw ArithmeticException if input is out of bounds
                    if(input < 0 || input > 100) {
                        throw new ArithmeticException();
                    }
                    //Throw IOException to add to frequency array
                    else {
                        throw new IOException();
                    }
                }
            //Handle cases of out-of-bounds input, text input, and valid input
            } catch (ArithmeticException e) {
                System.out.println("Error -
- new grade: " + input + " is out of range.");
            } catch (IOException i) {
                Distribution.updateFrequency(grades, input);
            } catch (NumberFormatException n) {
                System.out.println("Invalid input, please input integers only!");
            }
        }while(input != -1);

        //Print the final output
        Distribution.printFrequency();
    }

    //Constructor creates arraylists for the limits and sets all frequency counte
rs to 0
    public grade_distribution(){
        Collections.addAll(limits, 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 101);
        Collections.addAll(frequencies, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0);
    }

    public void updateFrequency(ArrayList<Integer> gradeList, int userInput){
        //Add valid user input to grade arraylist
        gradeList.add(userInput);

        //Loop through grade limits list and check the grade against each range
        for(int i = 0; i < limits.size() -1 ; i++){
            if(userInput >= limits.get(i) && userInput < limits.get(i + 1)){
                //Add to appropriate frequency counter
```

```
                frequencies.set(i, frequencies.get(i) + 1);
            }
        }
    }

    //Print out the frequency table
    public void printFrequency(){
        System.out.println(String.format("%-2s %-20s %-
20s", "", "Limits", "Frequency"));

        for(int i = 0; i < frequencies.size(); i++){
            System.out.print(String.format("%-10d %-
15d", limits.get(i), limits.get(i+1) - 1));
            System.out.println(frequencies.get(i));
        }
    }
}
```

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```
jterrazas@babbage:~/Documents/programs/CS 471/Program5/Programming5> java grade_distribution
Enter in grades. Type -1 to end input.
0
9
10
19
20
29
30
39
40
49
50
59
60
69
70
79
80
89
90
100
15
36
67
68
99
95
-2
Error -- new grade: -2 is out of range.
101
Error -- new grade: 101 is out of range.
text
Invalid input, please input integers only!
-1
   Limits               Frequency
0          9              2
10         19             3
20         29             2
30         39             3
40         49             2
50         59             2
60         69             4
70         79             2
80         89             2
90         100            4
```