Exception Handling in Java
IFT 194: Lab 6

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Summary

View the source of this document on GitHub.

Exceptions aren't always errors

For this section we're given a class `CountLetters` (cf. Figure 1) that reads a word from the user and prints the number of occurrences of each letter in the word. However, we're of course not guaranteed to *only* get letters, so it will throw an error if we provide any other input.

```java
package lab_6;

import java.util.Scanner;

public class CountLetters
{
    public static final char[] ALPHABET = "abcdefghijklmnopqrstuvwxyz".toCharArray();
    public static final int ALPHABET_LENGTH = ALPHABET.length;

    public static void main(String[] args)
    {
        try (var scnr = new Scanner(System.in)) {
            int counts[] = new int[ALPHABET_LENGTH];
            String input;
            final int bias = 'a';

            //do {
                System.out.print("Enter a single word (letters only): ");
                input = scnr.nextLine();

                // Ensure the input is only letters with regex
                //if (!input.matches("[a-zA-Z]*")) {
                //    System.out.println("*** Error: Please enter only letters");
                //    continue;
                //}

            //    break;
            //} while (true);

            {
                int i = 0;

                try {
                    // Subtract
                    for (char c : input.toLowerCase().toCharArray())
                        counts[c - bias]++;

                    // Print spectrum
                    for (; i < ALPHABET_LENGTH; ++i)
                        if (counts[i] != 0)
                            System.out.printf("%c: %d\n", ALPHABET[i], counts[i]);
                } catch (ArrayIndexOutOfBoundsException ex) {
                    System.out.printf(
                        "*** Error: Please enter only letters, received \"%c\"\n", counts[i]);
                }
            }
        }
    }
}
```

Figure 1: CountLetters.java

You may also uncomment the loop containing the call to `scnr.nextLine`, which uses a regular expression to ensure the input contains only a certain set of characters.

Placing Exception Handlers

In this section we're given a class `ParseInts` in Figure 2 for parsing a line of text containing integers (hopefully).

```java
package lab_6;

import java.util.Scanner;

public class ParseInts
{
    public static void main(String[] args)
    {
        try (var scnr = new Scanner(System.in)) {
            int val = 0, sum = 0;
            String line;

            System.out.print("Enter a line of text: ");
            line = scnr.nextLine();

            String[] values = line.split(" ");
            for (String number : values)
                sum += Integer.parseInt(number);

            System.out.printf("The sum of the integers on this line is: %d", sum);
        }
    }
}
```

Figure 2: ParseInts.java

However, as it stands this program is extremely frail. For example, if I input a string "`20 56`", we receive the following output.

```
Enter a line of text: 20 56
The sum of the integers on this line is: 76
```

On the other hand, adding a single space to the beginning of the input, let alone a character that is not a number, produces a disastrous result.

```
Enter a line of text:  55 66
Exception in thread "main" java.lang.NumberFormatException: For input string: ""
  at java.base/java.lang.NumberFormatException.forInputString(Unknown Source)
  at java.base/java.lang.Integer.parseInt(Unknown Source)
  at java.base/java.lang.Integer.parseInt(Unknown Source)
  at ift_labs/lab_6.ParseInts.main(ParseInts.java:18)
```

Throwing Exceptions