

Programming III

Laboratory 1

Objectives

- Familiarize with programming environment (Eclipse)
- Developing simple programs that using: command line arguments parsing, transformation of String objects, usage of random numbers generators
- Working with `String` class
- Working with arrays/matrixes in Java. `Arrays` class

Exercises

1. Display to standard output the message “Hello word!”
2. Display to standard output all parameters passed on command line of a java program.
3. Calculate the biggest common divisor of two numbers a and b that are passed like arguments on command line. Use a static function to implement the biggest common divisor.
4. Simulate the dice throwing action, for a n numbers of times (n is passed like argument on command line) using the random number generator from: a) `Math` class b) `Random` class
5. Create an array, a , containing n numbers random generated. The dimension of the array, n , is passed like argument on command line. Resolve the following requests using `Arrays` class from Java library:
 - a) Display the array, a .
 - b) Sort the array and display the sorted array, a .
 - c) Find if a value, x , is contained in the array, a .
 - d) Copy a subarray of the array, a , in a new array, the start and stop indexes for coping are random generated.
6. Get a sentence like an argument from command line and resolve the following requests:
 - a) Find how many words are in the sentence. A word can be separated by one ore multiple spaces or tabs.
 - b) Count the numbers of palindrome words from the sentence
 - c) Display the last 10 characters from the sentence.
 - d) Transform the sentence to uppercase and lowercase.
 - e) Find if a substring is present in the sentence.
 - f) Convert the sentence based on the following rule each vocal is replaced with vocal'p'vocal. Ex: i -> ipi, a->api
7. Execute the following code sequence and explain the obtained results.

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

```

        System.out.println(new String("test").equals("test"));

        System.out.println(new String("test") == "test");

        System.out.println(new String("test") == new String("test"));

        System.out.println("test" == "test");

        System.out.println("test" == "te" + "st");

        System.out.println("test" == "!test".substring(1));

    }
}

```

Supplementary Exercises

1. Calculate $n!$ for a number n that is passed like argument on command line. The factorial will be calculated only for numbers n that satisfies the following condition $0 \leq n \leq 12$.
2. Write a program that verifies if a number passed like command line argument is a palindrome.
3. Write a program that displays at standard output the first n terms of Fibonacci sequence: $a_0 = a_1 = 1, a_n = a_{n-1} + a_{n-2}$. The number n is passed like argument on command line.
4. Use functions to resolve the following problem. Initialize with constant values two arrays a and b of real numbers. Construct and display:
 - a) The matrix m where the matrix elements are calculated in the following way

$$m[i,j]=a[i]*b[j]$$
 - a) The vector v where the vector elements are calculated in the following way

$$v[i]=\min\{a[i], b[i]\}$$