Level	M1
Course	Java introduction
Subject	Lab Work 1
Duration	

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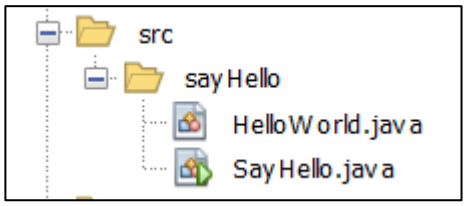
HEI·ISEN·ISA

***Objective**: Very basic programming skills needed here, it consists in simple C programing in a Java environment. The aim is to:*

- *remember how to use loops,*
- *get information from keyboard,*
- *discover how to create new methods,*
- *use command line arguments.*

Preliminaries

- Check that you have the correct version of Netbeans installed in your computer
  - Try to create a new Java project: File→New Project
  - Under Category select Java → Java with Ant → Java Application then select the "Next" option.
  - Choose a project name (for example LW1) and make sure the Checkbox "Create Main Class" is selected. Then select the "Finish" option.
- For the Lab, you need to create a first class whose name is identical to your project name; this class will contain the main method and may contain implementations of additional functionalities in separate method.
- For each exercise below, create a new class in the same project.
  In this class you are asked to develop the required functionality.
- To test your program. In the main method create an instance of your exercise and from the object call the appropriate method.




```java
public class HelloWorld {
    public void display(){
        System.out.println("Hello World!");
    }
}
```

```java
package sayHello;

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

        HelloWorld exercise0 = new HelloWorld();
        exercise0.display();
    }
}
```

```
run:
Hello World!
BUILD SUCCESSFUL (total time: 0 seconds)
```

Also when applying modifications, do not delete your code, just comment it.

Exercise 1:

Write a program that evaluates the root of a quadratic equation (ax^2+bx+c)
(for this first exercise we consider the values a, b and c hard-coded)

For example:

- $2x^2 - x - 6$ (a=2, b=-1 and c=-6) has two roots : $x_1 = -1{,}5$ and $x_2 = 2$
- $9x^2 - 6x + 1$ (a=9, b=-6 and c=1) has a unique root $x_1 = 0{,}333$ (one third)
- $x^2 + 3x + 10$ (a=1, b=3 and c=10) has no root

Exercise 2:

Write a method that return a lowercase version of a given character given as parameter
The method has to work whatever the given character.

Exercise 3:

Write a program that evaluates "n!" in three different way:

- By using a for loop
- By using a while loop
- By using a recursive method

Exercise 4:

Write a method that takes two parameters:

- an array of int values
- a boolean value which indicates if we want to sort the array in ascending order (boolean value *true*) or in descending order (boolean value *false*)

The method prints the original array and the sorted array, and return the sorted array.

Exercise 5:

Declare a Scanner attribute in your class (not in a method) called *keyboard.*
Invite the user to write some text, then count the number of vowels, consonants and spaces.

Exercise 6:

Add two attributes of *int* type in your class called *width* and *height*.
Write a method that prints a rectangle, the values are given by the user (positive integers).
For example:

```
What are the width and height values :
12
4
+----------+
+          +
+          +
+----------+
BUILD SUCCESSFUL (total time: 3 seconds)
```

```
What are the width and height values :
12
1
At least 1 value is too low to print a rectangle
BUILD SUCCESSFUL (total time: 4 seconds)
```

Exercise 7:

Create a method taking into parameter the "command line arguments" array *args* from the main method.
Configure your project to receive "Albert Einstein 1879" in arguments
(Run → Set project configuration → Customize… → Arguments)
Use the appropriate String methods in order to print on the screen "EINSTEIN Albert, 144 years old". The 144 value is calculated.

Exercise 8:

Modify your program arguments from the previous exercise to receive an unknown number of integers as arguments (for example: 2 4 4 12 17 20 9 14).
Print on the screen all the numbers (as integers not Strings), the sum and the mean.

Exercise 9:

For this exercise, create a new project called Hangman (refers to the Hangman's game)

- Another player will enter the secret word
- For each proposed letter, we print on the screen the word by replacing hidden letters by a special character (".", "_", "*", …). This character has to be configurable.
- Let's consider the secret word is "PROGRAMING", and the player found the 'R' and the 'G', the word "_ R _ G R _ _ _ _ G" has to be print.
- If the proposed letter does not belong to the secret word, the remaining trials is decremented, in the limit of 10 possible mistakes (configurable also in order to anticipate different difficulty of gameplay).
- The game is over when either the secret word is found or the maximum number of trials is reached.