University of Zurich[UZH]

s.e.a.l. software evolution & architecture lab

Informatics I – EProg HS15

Exercise 1

1 Task: Hello World

1.1 Learning Objectives

1. Install Java Development Kit (JDK)
2. Create, compile, and execute Java classes

1.2 Assignment

a) Install JDK and Editor

Download the current version of the Java SE (Standard Edition) Development Kit (JDK) and install it[1]. If you have troubles during the installation this tutorial may help. You can find additional information about the installation on Windows systems here. Afterwards, install any text editor with syntax highlighting[2].

b) Create and execute Program

Copy the code for the two classes listed below into two separate text files and store them under the name <classname>.java (i.e. `HelloWorld.java`). Use one of the suggested text editors or an editor of your choice. Compile the two classes and execute the test driver[3] `HelloWorldTest`.

```
1 public class HelloWorld {
2
3    /**
4     * Simply prints "Hello World" to the console.
5     */
6    public void printHelloWorld() {
7       System.out.println("Hello World!");
8    }
9 }
```

Listing 1: `HelloWorld` class

[1] The current version is JDK 8 Update 60 (8u60). Mac OS X already includes a pre-installed JDK

[2] E.g. JEdit, Sublime Text, Notepad++, Vim, Emacs, TextWrangler, etc.

[3] A test driver is a class that implements a `main`()-method (entry point to each program) and whose main purpose is to test objects of classes

```java
public class HelloWorldTest {

   /**
    * Entry point for a Java program. Creates a HelloWorld object and
    * calls printHelloWorld() on it.
    */
   public static void main(String[] args) {
      HelloWorld myHelloWorldObject = new HelloWorld();
      myHelloWorldObject.printHelloWorld();
   }
}
```

Listing 2: Test driver `HelloWorldTest` for testing the `HelloWorld` class

1.3 Remarks

1. If you have problems solving this exercise, consider doing the online module of Task 4 first.

a) Programm Modification

Let the program print another text than "Hello World!".

2 Task: Cuboid

2.1 Learning Objectives

1. Read and comprehend source code
2. Test programs with a test driver
3. Be able to change program logic

2.2 Assignment

a) Create Cuboid

Copy the code below into a separate text file as you did in task 1. The variables `lenght`, `width`, and `height` store the respective attributes of a cube. The method `printVolume()` computes the volume of this cube and prints it to the console. Your task is to create a test driver to test this behavior.

```
1  /**
2   * Represents a cuboid.
3   */
4  public class Cuboid {
5     private int length = 50;
6     private int width = 30;
7     private int height = 10;
8
9     /**
10     * Calculates the volume of this cuboid
11     * and prints the result to the console.
12     */
13    public void printVolume() {
14       System.out.print("The volume of this cuboid is ");
15       System.out.println(length * width * height);
16    }
17 }
```

Listing 3: `Cuboid` class

b) Program Modification

After you have successfully executed the program, try to extend it such that it is able to compute and print the surface of the cube (analogous to the volume). Hint: both the `Cuboid` class and test driver need to be adapted.

3 Task: Code Comprehension

3.1 Learning Objectives

1. Comprehension of primitive data types
2. Understand arithmetic expressions and type conversion
3. Practice reading and comprehension of source code

3.2 Assignment

a) Type Conversion

Values of which data types can be assigned to a variable of another data type without the need of explicit type casting? Complete the following assignment-compatibility table:

```
byte ->          ->          ->          ->          -> double
char ->          ->          ->          -> double
```

b) Arithmetic Expressions and Operations

1. Complete Table 1:

Mathematic expression	Expression in Java
$rate^2 + delta$	
$\frac{10-a}{bc}$	
$=$	

Table 1: Arithmetic expressions in Java

2. Show three different ways to subtract 1 from an integer (`int`) variable.

c) Code Snippets

Which of the following eight code snippets are syntactically correct and what is the output in those cases? Motivate your answers and especially explain unexpected results.

```
1 int x = 20;
2 int y = 10;
3 System.out.println(x + y++);
4 System.out.println(y);
```

Listing 4: Snippet 1

```
1 byte x = 125;
2 byte y = 5;
3 x = (byte)(x + y);
4 System.out.println(x);
```

Listing 5: Snippet 2

```
1 short x = 128;
2 byte y = (byte)x;
3 System.out.println(y);
```

Listing 6: Snippet 3

```
1 byte x;
2 short y = 120;
3 x = y;
4 System.out.println(x);
```

Listing 7: Snippet 4

```
1 short x;
2 byte y = 120;
3 x = y;
4 System.out.println(x);
```

Listing 8: Snippet 5

```
1 char t = 't';
2 System.out.println((long)t);
3
4 t = 84;
5 System.out.println(t);
6
7 t = '9';
8 System.out.println((int)t);
```

Listing 9: Snippet 6

```
1 System.out.println(1/4);
2 System.out.println(1/4d);
3 System.out.println((double)(1/4));
4 System.out.println((double)1/4);
5 System.out.println(1.0/4);
```

Listing 10: Snippet 7

```
1 double x = 3;
2 double y = 29;
3 System.out.println(x / (y % ++x));
```

Listing 11: Snippet 8

4 Task: Online Module

4.1 Learning Objectives

1. Learn fundamental terms of software development and understand the basic development process
2. Being able to write, compile, and execute a simple Java program
3. Understand and correct simple compilation errors

4.2 Assignment

1. Work through the eLearning Module 1 in OLAT. To do so, register for the course *INF_15_HS Informatik I* and click on the eLearning link in the navigation bar.
2. After finishing the self-study, solve the self test to check your knowledge.