Lesson 2. Data and Operators in Java

Data types and variables

1) Which data type would you use to represent the following values?
   a) Child age
   b) Employee salary
   c) Whether somebody has children or not
   d) Apartment letter

2) Define a Java variable named `NewLine` storing the *new line* character. Print it.

3) Declare two `float` variables (`x` and `y`) and assign them values 2.5 and 5.4 (with separated declaration and initialization)

4) Declare two `float` variables (`x` and `y`) and assign them values 2.5 and 5.4 (declaration and initialization in the same sentence)

5) Find the errors in the following Java sentences:

a)
```
int a, b, c
a = 0
```

b)
```
System.out.println('ab');
```

c)
```
System.out.println( (3 + 2) - 1) );
```

d)
```
int a = 3.2;
```

e)
```
float a = 2.1;
int c = a;
```

f)
```
int i = 10;
float b;
i = b;
```

g)
```
int x;
{
  x = 10;
}
System.out.println(x);
```

h)
```
boolean a, b;
a = false, b = true;
```

i)
```
int x;
x = 1;
r = x + 1;
```

j)
```
String s = 'This is a string';
```

Arrays

6) Declare an array to store the following data, in such a way that the array *mirrors* the structure of the data (initialization is not required):

   E.g.: The names of the people living a building with 4 floors and 5 apartments (1 person per apartment)

```
int [][] peopleInTheBuilding = new int[4][5];
peopleInTheBuilding[0][1] = "John Lennon";
peopleInTheBuilding[0][2] = "George Harrison";
…
```

   (According to the definition, "John Lennon" is living in floor 0, apartment 1.)

   a) The results of the sports-lottery (*quiniela*) (1 day, 15 results)
   b) The results of the sports-lottery (1 season of 38 match days, each one with 15 results)
   c) The results of the sports-lottery (10 seasons, each one with 38 match days)
   d) The name of the people in a hospital. The hospital has 5 floors, each one with 20 rooms, and each room with two patients.
   e) The painting in the figure of exercise 8.

Operators

7) Find the value of the variable result after executing the following sentences:

```
int a;
int b;
int result;

a)    a = 4;
      b = 12;
      result = a + b / 3;

b)    a = 3;
      a = a + 3;
      b = 2;
      result  = a - b;

c)    a = 2;
      b = a + 1;
      a = b + 2;
      result = a + b + a;
      result = -result;

d)    a = 3;
      b = 11;
      result = (b % a) + 1;

e)    a = 3;
      b = a++;
      result = 1;
      result += a - b;
```

```
f)    String s = "jjj";
      String t = "xxx";
      String result2 = s + s + t;
```

8) Write an application that displays a box, an oval, an arrow and a diamond using asterisks (*), as follows:

9) Develop a Java program that reads a temperature value in Celsius degrees from the keyboard and transforms it to Fahrenheit degrees. The program must print the two values in the form: *X Celsius degrees are Y Fahrenheit degrees*.

   (Remember: $\frac{F-32}{9} = \frac{C}{5}$)

10) Develop a Java program to calculate the following statistical parameters of three values x_1, x_2, x_3 read from the keyboard. Print the results.
    a) Mean: $\mu = \frac{(x_1+x_2+x_3)}{3}$
    b) Variance: $\sigma^2 = \frac{(x_1-\mu)^2 + (x_2-\mu)^2 + (x_3-\mu)^2}{3}$
    c) Standard deviation: $\sigma = \sqrt{\sigma^2}$

11) Develop a Java program to exchange the values of two integer variables (e.g.: if x is equal to 10 and y is equal to 5, at the end of the program, x must be equal to 5 and y equals to 10). (Initialize the variables in the code; do not read from the keyboard.)

12) Using only the programming techniques you learned in this lesson, write an application that calculates the squares and cubes of the numbers from 0 to 10 and prints the resulting values in table format, as shown below.

number	square	cube
0	0	0
1	1	1
2	4	8
3	9	27
4	16	64
5	25	125
6	36	216
7	49	343
8	64	512

9	81	729
10	10	1000

13) Develop a Java program that reads the three coefficients (a, b, c) of a 2nd grade polynomial ($ax^2 + bx + c = 0$) and obtains and prints the values of x.

(Remember: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$)

What happens when *a* is equal to 0?

14) Develop a Java program that, given an integer value representing a number of seconds, transform it to an expression in hours, minutes, and seconds (e.g. 3680 seconds are 1 hour, 1 minute, and 20 seconds).

Programming – Grado en Ingeniería Informática

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