

# Programming I - Laboratory lessons 2,3

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October 11th, 2021.

In Java, all variables must have a specified data type.

- Data types: int (int mynumber = 7), boolean (mytrue = false), char (myletter = 'A').
- Arithmetic in JAVA is simple: +, -, \*, /—dividing, % congruences (checking is some number divisible by another number) and more.
- Boolean operators: ||||, &&, !
- Statements: if, if/else, if /else if/else
- Switch: allows us to check equality of a variable or expression with a value that does not need to be a Boolean
- Loops: while, for, do-while.

# Strings

In Java, string is basically an object that represents sequence of char values. Java String class provides a lot of methods to perform operations on string such as `compare()`, `concat()`, `equals()`, `split()`, `length()`, `replace()`, `compareTo()`, `intern()`, `substring()` etc.

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There are two ways to create String object:

- By string literal (ex. `String s="string1";`)
- By new keyword (ex. `String s=new String("string2");`)

One of things that we will use is about string is `charAt()`. Here is one example:

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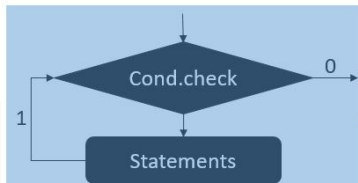
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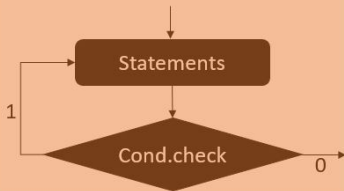
String1: "Welcome to Koper"

- Count number of letter/char "e" in *string1*.
- By using some of predefined methods for manipulation with strings, create new string, string2: "We come to Koper."



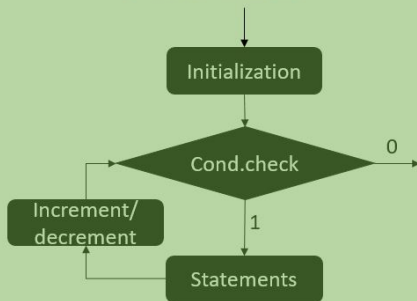
**WHILE - LOOP**

**DO WHILE - LOOP**



## LOOPS

**FOR - LOOP**



# if - then - else statement

Go back to last exercise from lab.work 1 and now add if - statement where condition is given as:

*if (sum of two pages is greater then third page of triangle)*

*→ count area of triangle,*

*otherwise*

*→ print message with uncorrect sides length of triangle.*

```
if (condition) {  
  //block of the code to be executed if condition  
  is TRUE  
}
```

```
if (condition) {  
  //block of the code to be executed if condition is TRUE  
}  
else{  
  //block of the code to be executed if condition is FALSE  
}
```

```
if (condition1) {  
  // block of code to be executed if condition1 is true  
}  
else if (condition2) {  
  // block of code to be executed if the condition1 is false and condition2 is true  
}  
else {  
  // block of code to be executed if the condition1 is false and condition2 is false  
}
```

IF – THEN – ELSE  
Statement

## Exercise 2

### Exercise

*Implement program that will count if given year is Leap Year*

For example, program should return TRUE if the given year is Leap year otherwise FALSE. Some of Leap years are: 2020, 1980 .. and some of them are not, such as: 2100, 1900, 1234 ...

```
function isLeapYear(year)
    if((year%4 is 0)AND(year%100 is not 0))OR(year%400 is 0)
        then TRUE
    else FALSE
```

In computing, the modulo operation (%) returns the remainder or signed remainder of a division, after one number is divided by another (called the modulus of the operation).

Example:  $55\%4 = 3$  since  $55 = 52 + 3 = 4 \times 13 + 3$ .



# More about loops

$A_{11}$	$A_{12}$	$A_{13}$	$A_{14}$	$A_{15}$	$A_{16}$
$A_{21}$	$A_{22}$	$A_{23}$	$A_{24}$	$A_{25}$	$A_{26}$
$A_{31}$	$A_{32}$	$A_{33}$	$A_{34}$	$A_{35}$	$A_{36}$
$A_{41}$	$A_{42}$	$A_{43}$	$A_{44}$	$A_{45}$	$A_{46}$
$A_{51}$	$A_{52}$	$A_{53}$	$A_{54}$	$A_{55}$	$A_{56}$
$A_{61}$	$A_{62}$	$A_{63}$	$A_{64}$	$A_{65}$	$A_{66}$

```
*
*  _ _ _ _
* * _ _ _ _
* * * _ _ _
* * * * _ _
* * * * * _
* * * * * *
```

$$A_{i j}$$

$i$  – rows

$j$  – columns

# More about loops

## Exercise 3

```
*
* *
* * *
* * * *
* * * * *
* * * * * *
```

A

```
* * * * *
* * * *
* * * *
* * *
* *
*
```

B

```
* * * * *
* * * *
* * * *
* * *
* *
*
```

C

```
*
* *
* * *
* * * *
* * * * *
* * * * *
```

D

# More about loops

## Exercise 3

E F G

```
* * * * * * * * * * * * * * * *
*           *      *           *
*           *      *           *
*           *      *           *
*           *      *           *
* * * * * * * * * * * * * * * *
* * * * * * * * * * * * * * * *
*           *      *           *
*           *      *           *
*           *      *           *
*           *      *           *
* * * * * * * * * * * * * * * *
```

H I

# Exercise 4

## Exercise

*Create program that will count (product, sum, divide, difference) of two numbers - some kind of calculator (you can use double, and have opportunity to product floating point number.) (Hint: Use switch).*

## Syntax:

```
switch(expression) {  
    case x:  
        // code block  
        break;  
    case y:  
        // code block  
        break;  
    default:  
        // code block }
```

## EXAMPLE:

```
switch(operation) {  
    case "sum":  
        System.out.print(value);  
        break;  
    default:  
        System.out.print("Wrong value!"); }
```

# Exercise 5

## Exercise

*Implement program that will count Factorial of integer  $n$ .*

$$n! \stackrel{DF}{=} n \cdot (n-1) \cdot (n-2) \cdots 3 \cdot 2 \cdot 1, \quad 0! \stackrel{DF}{=} 1, 1! \stackrel{DF}{=} 1.$$

*Use for-loop and while-loop. Print every step and give a user opportunity to insert number  $n$ .*

Example:

Insert number  $n$ : 5

On step 1 factorial of number 5 is: 1

On step 2 factorial of number 5 is: 2

On step 3 factorial of number 5 is: 6

On step 4 factorial of number 5 is: 24

On step 5 factorial of number 5 is: 120