

Java

Introduction

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Java-Kurs

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Overview

1. Proceeding
2. Your first program
 - Hello World!
 - Setting up IntelliJ IDEA
3. Basics
 - Some definitions
 - Calculating
 - Text with Strings

About this course

Requirements

- You know how to use a computer
- Please bring your computer with You
- Maybe already knowledge in programming languages?

Proceeding

- There will be 14 lessons
- Each covers a topic and comes with exercises

Some resources

- You can ask your tutor
- Join the Auditorium group
`http://auditorium.inf.tu-dresden.de`
- StackOverflow, FAQs, Online-tutorials, ...
- Official documentation
`https://docs.oracle.com/javase/8/`
- mailinglist `programmierung@ifsr.de`
- Cyberspace (wednesday 5./6. DS)
- Material-Repository
`https://github.com/LeonardFollner/java-lessons`

About Java

Pros:

- Syntax like C++
- Strongly encourages OOP
- Platform-independent (JVM)
- Very few external libraries
 - > Easy to use and very little to worry about

About Java

Cons:

- A lot of unnecessary features in the JDK
- Slower than assembly
- No multi-inheritance
- Weak generics
- Mediocre support for other programming paradigms
 - > Neither fast, small nor geeky

Hello World

DEMO

Creating your Working Environment

Open the Terminal

```
1  mkdir myProgram
2  cd myProgram
3  touch Hello.java
4  vim Hello.java
5
```


Hello World!

This is an empty JavaClass. Java Classes always start with a capital letter

```
1 public class Hello {  
2  
3 }  
4
```

Hello World!

This is a small program printing *Hello World!* to the console:

```
1 public class Hello {  
2     public static void main(String[] args) {  
3         System.out.println("Hello World!");  
4     }  
5 }  
6
```

How to run your program

save your program by pressing 'esc', then ':w' exit vim by typing ':q' (and hit return) then:

```
1  javac Hello.java
2  java Hello
3
```

Hello World in an IDE

DEMO

Receive a copy of IntelliJ IDEA

IntelliJ IDEA is a powerful IDE¹, e.g. for Java.

- You can download IntelliJ IDEA at <https://www.jetbrains.com/idea/>
- Get an Ultimate-License at <https://www.jetbrains.com/student/>
- Use JetBrains IDEs for all programming languages

Eclipse is free and open-source, but less powerful.

¹Integrated Development Environment

Comments

```
1 public class Hello {  
2     // prints a "Hello World!" on your console  
3     public static void main(String[] args) {  
4         System.out.println("Hello World!");  
5     }  
6 }  
7
```

You should always comment your code.
Code is read more often than it is written.

- `//` single line comment
- `/*` comment spanning multiple lines `*/`

Code concepts

```
1 public class Hello {
2     // Calculates some stuff and outputs everything on the
3     console
4     public static void main(String[] args) {
5         int x;
6         x = 9;
7         int y = 23;
8         int z;
9         z = x * y;
10
11         System.out.println(z);
12     }
13 }
```

Code concepts

```
1 public class Hello {  
2     // Calculates some stuff and outputs everything on the  
3     console  
4     public static void main(String[] args) {  
5         System.out.println(9 * 23);  
6     }  
7 }
```


Primitive data types

Java supports some primitive data types:

boolean a truth value (either **true** or **false**)

int a 32 bit integer

long a 64 bit integer

float a 32 bit floating point number

double a 64 bit floating point number

char an ascii character

void the empty type (needed in later topics)

About the Semicolon

```
1 public class Hello {  
2     // prints a "Hello World!" on your console  
3     public static void main(String[] args) {  
4         System.out.println("Hello World!")@\textcolor{red}{\  
texttt{;}}@  
5     }  
6 }  
7
```

Semicolons conclude all statements.

Blocks do not need a semicolon.

Blocks

```
1 public class Hello @\textcolor{red}{\texttt{\{\}}}@  
2 // prints a "Hello World!" on your console  
3 public static void main(String[] args) {  
4     System.out.println("Hello World!");  
5 }  
6 @\textcolor{red}{\texttt{\{\}}}@  
7
```

Everything between { and } is a *block*.

Blocks may be nested.

Naming of Variables

- The names of variables can begin with any letter or underscore. Usually the name starts with small letter.
- Compound names should use CamelCase.
- Use meaningful names.

```
1 public class Calc {  
2     public static void main(String[] args) {  
3         int a = 0; // not very meaningful  
4         float myFloat = 5.3f; // also not meaningful  
5         int count = 7; // quite a good name  
6  
7         int rotationCount = 7; // there you go  
8     }  
9 }  
10
```

Calculating with *int* I

```
1 public class Calc {  
2     public static void main(String[] args) {  
3         int a; // declare variable a  
4         a = 7; // assign 7 to variable a  
5         System.out.println(a); // prints: 7  
6         a = 8;  
7         System.out.println(a); // prints: 8  
8         a = a + 2;  
9         System.out.println(a); // prints: 10  
10    }  
11 }  
12
```

After the first assignment the variable is initialized.

Calculating with *int* II

```
1 public class Calc {  
2     public static void main(String[] args) {  
3         int a = -9; // declaration and assignment of a  
4         int b; // declaration of b  
5         b = a; // assignment of b  
6         System.out.println(a); // prints: -9  
7         System.out.println(b); // prints: -9  
8         a++; // increments a  
9         System.out.println(a); // prints: -8  
10    }  
11 }  
12
```

Calculating with *int* III

Some basic mathematical operations:

Addition $a + b;$

Subtraction $a - b;$

Multiplication $a * b;$

Division $a / b;$

Modulo $a \% b;$

Increment $a++;$

Decrement $a--;$

Calculating with *float* I

```
1 public class Calc {  
2     public static void main(String[] args) {  
3         float a = 9;  
4         float b = 7.5f;  
5         System.out.println(a); // prints: 9.0  
6         System.out.println(b); // prints: 7.5  
7         System.out.println(a + b); // prints: 16.5  
8     }  
9 }  
10
```


Calculating with *float* II

```
1 public class Calc {  
2     public static void main(String[] args) {  
3         float a = 8.9f;  
4         float b = 3054062.5f;  
5         System.out.println(a); // prints: 8.9  
6         System.out.println(b); // prints: 3054062.5  
7         System.out.println(a + b); // prints: 3054071.5  
8     }  
9 }  
10
```

Float has a limited precision.

This might lead to unexpected results!

Mixing *int* and *float*

```
1 public class Calc {  
2     public static void main(String[] args) {  
3         float a = 9.3f;  
4         int b = 3;  
5         System.out.println(a + b); // prints: 12.3  
6         float c = a + b;  
7         System.out.println(c); // prints: 12.3  
8     }  
9 }  
10
```

Java converts from **int** to **float** by default, if necessary.
But not vice versa.

Strings

A String is not a primitive data type but an object.
We discuss objects in detail in the next section.

```
1 public class Calc {  
2     public static void main(String[] args) {  
3         String hello = "Hello World!";  
4         System.out.println(hello); // print: Hello World!  
5     }  
6 }  
7
```

Concatenation

```
1 public class Calc {  
2     public static void main(String[] args) {  
3         String hello = "Hello";  
4         String world = " World!";  
5         String sentence = hello + world;  
6         System.out.println(sentence);  
7         System.out.println(hello + " World!");  
8     }  
9 }  
10
```

You can concatenate Strings using the `+`. Both printed lines look the same.

Strings and Numbers

```
1 public class Calc {  
2     public static void main(String[] args) {  
3         int factorA = 3;  
4         int factorB = 7;  
5         int product = factorA * factorB;  
6         String answer =  
7             factorA + " * " + factorB + " = " + product;  
8         System.out.println(answer); // prints: 3 * 7 = 21  
9     }  
10 }  
11
```

Upon concatenation, primitive types will be replaced by their current value as *String*.

Summary

What we learned today:

- How to write our first program
- How to execute our first program
- How to do basic calculations
- How to work with strings