

Java

Tooling, variables and basic control flow

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Overview

1. Recap
2. Tooling
3. Warm Up
4. Deep dive into variables
5. Boolean
... and the basics of control flow

Recap

Recap 1/3

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

Recap 2/3

```
1 import java.util.Scanner;
2 public class Talk {
3     public static void main (String[] args) {
4         Scanner scanner = new Scanner(System.in);
5         System.out.println("Hi, how old are you?");
6         int age = scanner.nextInt();
7         int age2 = age + 5;
8         System.out.println("In 5 years, you'll be " + age2);
9     }
10 }
```

Tooling

What we need...

What tools do we actually need to develop JAVA?

- texteditor (Notepad)
- compiler (javac)
- Java Virtual Machine (java)

What we want...

For easy programming we want to have

- supporting (intelligent) editor with
 - direct control of a compiler
 - auto start of the application after compilation
 - debugger (later)

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For easy programming we want to have

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 - direct control of a compiler
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- Visualstudio Code

<https://code.visualstudio.com/>



What is Visual Studio Code (VS Code)

- fundamentally its just an editor
- but it can be extended with add-ons
- add-ons allow for example
 - syntax highlighting
 - code completion
 - debugging features

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Let's take a look at VS Code...

Setting up VS Code

In our course we will use the following VS Code setup:

- install VS Code on your system
`https://code.visualstudio.com/`
 - local installation (see instructions on the website)
 - or portable ... download the .zip archive, extract it and create a folder "data" inside the VS Code - Folder
- open Visual Studio Code
- click on the four squares on the left hand side (extensions)
- search for *java* and install the *Extension Pack for Java*

Warm Up

Warm Up Task

Task

- Open visual studio code and create a new file *calculator.java*
- write a class *Calculator* with the basic framework of a java application (see code below)
- read in two numbers and add them

```
1 import java.util.Scanner;  
2 public class Calculator {  
3     public static void main (String[] args) {  
4         /* add your code here and use operations like  
5            * + ... addition  
6            * - ... subtraction \  
7            * * ... multiplication  
8            * / ... devision  
9            */  
10    }  
11 }
```

calculator.java

Deep dive into variables

Deep Dive: Variables

Java knows many different **types** of variables.

You should know the following variable types:

Name	Example	Definition
int	<code>int i = 3261;</code>	Whole numbers (-2,147,483,648 to 2,147,483,647)
float	<code>float f = 0.420f</code>	Floating point numbers up to 7 decimal digits
boolean	<code>boolean b = false;</code>	Binary state - True or False
char	<code>char c = 'a';</code>	Single character or ASCII code

Deep Dive: Variables

Java knows many different **types** of variables.

Good to know but not really important

Name	Example	Definition
byte	byte b = 11;	Whole numbers (-128 to 127)
long	long l = 31L;	Whole numbers (very big)
double	double d = 43.23d;	Like float - just twice as precise
short	short s = 423;	Whole numbers (-32,768 to 32,767)

Basic mathematical operations

You can use these basic operations when working with
`int`, `float` (`,` `long`, `double`, `short`)

Addition	<code>a + b;</code>
Subtraction	<code>a - b;</code>
Multiplication	<code>a * b;</code>
Division	<code>a / b;</code>
Modulo	<code>a % b;</code>
Increment	<code>a++;</code>
Decrement	<code>a--;</code>

Try it yourself

```
1 int a = 9*4; // = 36
2 int a = 9+4; // = ??
3 int a = 9%4; // = ??
4 int a = 9/4; // = ??
```

```
1 float a = 9*4; // = ??
2 float a = 9+4; // = ??
3 float a = 9%4; // = ??
4 float a = 9/4; // = ??
```

```
1 int i = 30000 * 2; // = ??
2 short s = 30000 * 2; // = ??
```

Task

Play around with different variable types.

What are the boundaries of the types?

Try it yourself

```
1 int a = 9*4; // = 36
2 int a = 9+4; // = ??
3 int a = 9%4; // = ??
4 int a = 9/4; // = ??
```

```
1 float a = 9*4; // = ??
2 float a = 9+4; // = ??
3 float a = 9%4; // = ??
4 float a = 9/4; // = ??
```

```
1 int i = 30000 * 2; // = ??
2 short s = 30000 * 2; // = ??
```

Variable types have different sizes!

```
1 incompatible types: possible lossy conversion from int to
   short
```

Boolean

... and the basics of control flow

Boolean and boolean algebra

```
1 boolean b = true || false;
```

- With booleans, we can make logical decisions and control how our code “flows”.
- Without booleans, code would be boring and always do the exact same thing.

Boolean and boolean algebra

```
1 boolean b = true || false;
```

A boolean can only be *true* or *false*

```
1 boolean a = false;  
2 boolean b = true;
```

- What do we need booleans for?
 - to control how our program flows
 - to make decisions
- **conditions** are booleans

Conditions and if-statements

- What do we use conditions and **if-statements** for?
 - to execute different code depending on the value of the condition

```
1 if(condition) {  
2     // do something cool!  
3 }
```

Conditions and if-statements

- What do we use conditions and **if-statements** for?
 - to execute different code depending on the value of the condition

```
1 if(condition) {  
2     // do something cool!  
3 }
```

- conditions need to evaluate to *true* so the code inside ... is executed

```
1 if(true) {  
2     // ...the code...  
3 }
```

Conditions and if-statements

Conditions can be *boolean* variables

```
1 boolean myBoolean = true;  
2 if(myBoolean) {  
3     // do something cool!  
4 }
```

Or comparisons

```
1 int i;  
2 ...  
3 if(i > 10) {  
4     // do something cool!  
5 }
```

Conditions and comparisons

We can compare variables to each other using comparison operators

- the result is a *boolean*

```
1 1 < 3
2 3 > 2
3 3 <= 3
4 1 >= 1
5 1 == 1
6 1 != 2
```

Conditions and comparisons

We can compare variables to each other using comparison operators

- the result is a *boolean*

```
1 1 < 3
2 3 > 2
3 3 <= 3
4 1 >= 1
5 1 == 1
6 1 != 2
```

We also can use comparisons as conditions

```
1 int a = 3;
2 int b = 11;
3 if(a < b) {
4     System.out.println("a is smaller than b!");
5     System.out.println("Condition is true!");
6 }
```

Conditions and comparisons

We can also define **else** cases

```
1 int age = 12;
2 int minAge = 18;
3 if(age >= minAge) {
4     System.out.println("Come on in!");
5 } else {
6     System.out.println("You're too young.");
7 }
```

What does this program do?

Try it yourself

Task 1 [easy]

Write a program that prints a text out when a condition is *true*

Task 2 [medium]

Write a program that prints the absolute difference of two int a, int b.

a=7, b=9 → 2

a=9, b=7 → 2

Task 3 [hard]

Remember the size of different data types? e.g short and int?

Write a program that prints the product (*) of two short only if the product does not exceed the limit of short (32,767) only using variables of type short.

That's it!

- Be encouraged to keep working on the tasks
- Feel free to reach out
 - to send your results
 - to tell me about problems you ran into

Next lesson

- loops
- Objects
- classes & methods
- more practical examples!

Self study

For those of you who are bored because you can finish the tasks much quicker than others challenge yourself!

You can find other tasks at

<https://ein-christoph.github.io/java-tud/self-study.html>

Caution!

The tasks you'll be confronted with in INLOOP are for people already knowing the basics of Java. Do not worry if you can not solve the tasks right now. You will be able to after this course!