



# Assignment 1

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TA lecture, *Informatics II D-BAUG*  
March 11, 2014

- 1 Introduction
- 2 Demos
  - Eclipse Installation
  - Java Installation
  - Hello World Program
- 3 Quiz
  - Matlab vs. Java
  - Computerarchitecture
  - Java Programming
- 4 Questions

March 11, 2014

Informatics II, D-BAUG 2 / 31

## Introduction

- Name
- Years/semesters at ETH?
- Home Town
- Mail address
- Mobile number
- "Work field"
  - Research topic
  - Master thesis
  - Bachelor thesis
- Hobbies
- ...

March 11, 2014

Informatics II, D-BAUG 3 / 31

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March 11, 2014

Informatics II, D-BAUG 4 / 31

## Eclipse Installation

- Live Demo
- By request ...
- On a students laptop ...

March 11, 2014

Informatics II, D-BAUG 5 / 31

## Java Installation

- Live Demo
- By request ...
- On a students laptop ...

March 11, 2014

Informatics II, D-BAUG 6 / 31

## Hello World Program

- Live Programming
- By request ...

March 11, 2014

Informatics II, D-BAUG 7 / 31

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- 2 Demos
  - Eclipse Installation
  - Java Installation
  - Hello World Program
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  - Matlab vs. Java
  - Computerarchitecture
  - Java Programming
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March 11, 2014

Informatics II, D-BAUG 8 / 31

## Matlab vs. Java

Would you use Matlab or Java for the following tasks?

- ➊ Larger project which code will be modified and reused.
- ➋ Complex matrix computations for your masters thesis.
- ➌ Project with 7 people working on at the same time.
- ➍ Free software that everybody should be able to download and run.
- ➎ Software which can be used intuitively, with a nice GUI.
- ➏ Program for a mobile phone.
- ➐ Object oriented code project.

## Matlab vs. Java

Would you use Matlab or Java for the following tasks?

- ➊ Larger project which code will be modified and reused.
  - Java offers better reusability.
- ➋ Complex matrix multiplications for your masters thesis.
  - Easier with Matlab because of a huge set of prepared libraries
- ➌ Project with 7 people working on at the same time.
  - Usually better with java
- ➍ Free software that everybody should be able to download and run.
  - Matlab is proprietary, you have to use java for free software.

## Matlab vs. Java

Would you use Matlab or Java for the following tasks?

- ➎ Software which can be used intuitively, with a nice GUI.
  - Intuitive software is easier to achieve in java.
- ➏ Program for a mobile phone.
  - There's no Matlab environment on mobile phones, while java is supported very often.
- ➐ Object oriented code project.
  - Java is object oriented which aids code structure, readability and reusability.

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  - Eclipse Installation
  - Java Installation
  - Hello World Program
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- ➍ Questions

## Main Memory

- ➊ What is Main Memory?
- ➋ Whats a bit?
- ➌ Whats a byte?
- ➍ How many states can a byte have?
- ➎ What is main memory used for?
- ➏ How do you access it?

## Main Memory

- ➊ What is Main Memory?
  - A series of bits of storage
- ➋ Whats a bit?
  - A single bistable storage cell
  - It is either 0 (false) or 1 (true)
- ➌ Whats a byte?
  - A series of 8bits

## Main Memory

- ➍ How many states can a byte have?
  - A byte can have 256 different states
  - 00000000, 00000001, 00000010, ... 11111111
- ➎ What is main memory used for?
  - It represents the state of a program.
- ➏ How do you access it?
  - Every storage cell (e. g. 1Byte) has its own address.

## Processor

- ➊ What does a processor?
- ➋ Name an example of a processor instruction

## Processor

- ➊ What does a processor?
  - It runs through the machine code of a program and fulfills these small steps of work.
- ➋ Name an example of a processor instruction:
  - Load a value from main memory into a register
  - Add two registers and store the result in a register
  - ...

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- ➋ Demos
  - Eclipse Installation
  - Java Installation
  - Hello World Program
- ➌ Quiz
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  - Computerarchitecture
  - Java Programming
- ➍ Questions

## Java, Virtual Machine

- ➊ Is the code of a java program platform dependent?
- ➋ And a compiled java program?
- ➌ How does the virtual machine work?

## Java, Virtual Machine

- ➊ Is the code of a java program platform dependent?
  - Nope, it runs on a virtual machine (VM).
  - The VM takes the same code on every platform (Linux, Mac, Win, Mobile, ...)
- ➋ And a compiled java program?
  - Java programs are compiled to bytecode (sort of a generic machine code).
  - Bytecode is still platform independent.
- ➌ How does the virtual machine work?
  - Basically it simulates a generic processor.

## Precedence & Associativity

Translate the following into pascal code into java:

```

1 IF (i <> 0) AND (j DIV j = 10) THEN
2 BEGIN
3     ....
4 END;
```

## Precedence & Associativity

### Pascal:

```

1 IF (i <> 0) AND (j DIV j = 10) THEN
2 BEGIN
3     ...
4 END;
```

### Java:

```

1 if (i != 0 && j/i == 10)
2 {
3     ...
4 }
```

## Precedence & Associativity

```
1 if (i != 0 && j/i == 10) {...}
```

- Defined by the syntax, java needs brackets after the "if".
- Inside of the brackets precedence defines the order at which statements are evaluated.

## Precedence & Associativity

These two lines give the same result.

```

1 if (i != 0 && j/i == 10) {...}
1 if ((i != 0) && ((j/i) == 10)) {...}
```

## Commutativity

- Addition in java is not always commutative.
- Addition for Strings results in a **concatination**, which is **not commutative**.
- When adding ints to Strings, java converts the numbers into Strings
- What's the result (str1, str2, str3) of the following assignments?

```
String str1 = "a " + 10;
String str2 = 10 + "a";
String str3 = "a " + 10 + 20;
```

## Commutativity

```
String str1 = "a " + 10;
String str2 = 10 + "a";
String str3 = "a " + 10 + 20;
```

- str1 becomes "a 10"
- str2 becomes "10 a"  
str1 is clearly not equal to str2
- str3 becomes "a 1020"  
Therefore addition of strings is **left associative**

## Increment & Decrement

- Especially in for-loops it's common to use a short form of **increment** and **decrement**.
- Feel free to always use the simple and clear forms like "i = i + 1;". The speed gain is usually extremely small or even non existant.

### Pascal:

```
INC(i); // increment: i := i + 1;
DEC(i); // decrement: i := i - 1;
```

## Increment & Decrement

### Pascal:

```
INC(i); // increment: i := i + 1;
DEC(i); // decrement: i := i - 1;
```

### Java:

```
int a = ++i // increment and return new value:
i = i + 1; int a = i; // same result
```

```
int a = i++ // increment and return old value:
int a = i; i = i + 1; // same result
```

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## Any questions?

- Feedback?
- Wishes?
- Hopes?
- ...

## Good Luck

