



Assignment 1

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

Introduction

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

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Eclipse Installation

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

Java Installation

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

Hello World Program

- Live Programming
- By request ...

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Matlab vs. Java

Would you use Matlab or Java for the following tasks?

- 1 Larger project which code will be modified and reused.
- 2 Complex matrix computations for your masters thesis.
- 3 Project with 7 people working on at the same time.
- 4 Free software that everybody should be able to download and run.
- 5 Software which can be used intuitively, with a nice GUI.
- 6 Program for a mobile phone.
- 7 Object oriented code project.

Matlab vs. Java

Would you use Matlab or Java for the following tasks?

- 1 Larger project which code will be modified and reused.
 - Java offers better reusability.
- 2 Complex matrix multiplications for your masters thesis.
 - Easier with Matlab because of a huge set of prepared libraries
- 3 Project with 7 people working on at the same time.
 - Usually better with java
- 4 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?

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

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Main Memory

- 1 What is Main Memory?
- 2 Whats a bit?
- 3 Whats a byte?
- 4 How many states can a byte have?
- 5 What is main memory used for?
- 6 How do you access it?

Main Memory

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

Main Memory

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

Processor

- 1 What does a processor?
- 2 Name an example of a processor instruction

Processor

- 1 What does a processor?
 - It runs through the machine code of a program and fulfills these small steps of work.
- 2 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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Java, Virtual Machine

- 1 Is the code of a java program platform dependent?
- 2 And a compiled java program?
- 3 How does the virtual machine work?

Java, Virtual Machine

- 1 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, ...)
- 2 And a compiled java program?
 - Java programs are compiled to bytecode (sort of a generic machine code).
 - Bytecode is still platform independent.
- 3 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

