



Introducing
C++

Ettore
Speziale

Introduction

Hello C++

Complex
Numbers

Java to C++

Bibliography

Introducing C++

Ettore Speziale

Politecnico di Milano



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What is C++?

By Many People

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Common knowledge:

- an object-oriented extension of C
- a low-level language
- a language to make programmers crazy

Fact:

Computing Languages Ranking [6]

Position	Language	Rating
1	Java	17.050
2	C	16.523
3	C#	8.653
4	C++	7.853

Note:

- HotSpot JVM is written in C++



What is C++?

A Deeper look

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Design goals:

- start from C
- add start-of-the-art features
- aiming at achieving **abstraction** without loosing **performance**

As result:

- a complex language – nobody knows C++
- a complete language – expose different programming paradigms



What About its Family?

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C is suited for high-performance system software:

- not suited for modern applications – abstraction is needed

Try using Java:

- partially solve the abstraction problem
- significant performance overhead

C++ is for both **performance** and **abstraction**:

- LLVM [5] – compiler library
- QT [4] – GUI library
- id Tech 4 [3] – game engine
- ...



Important Alerts

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We require good knowledge of:

Paradigm

- imperative
- object-oriented

Language

- C
- Java

We will start from here!

Syntax is very similar!

C++ is **complex**:

- gcc error messages are not very friendly, so ...
- always turn on your brain when programming, and ...
- think before coding



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Hello C++

Files

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Showing code on slides is both boring and error-prone, so I will use as much as possible `vi` and the shell. All sources are available on the course site. They are heavily commented. On slides there are only some tips.

“Talk is cheap, show me the code” [7]

A Java-to-C++ translation table is available at slides end.

- `hello-c-world.cpp`: C++ contains a large part of C
- `hello-c-cpp-world.cpp`: more-proper C++ syntax
- `hello-cpp-world.cpp`: real C++



Hello C++

Flow

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The first two examples are easy to understand:

- the first is C
- the second is using the C++ syntax

The third example is more complex, because it used some advanced concepts:

- streams
- operator overloading

But after the next section, it will be very easy to understand.



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“Talk is cheap, show me the code” [7]

A Java-to-C++ translation table is available at slides end.

- `complex-java.cpp`: Java-like class
- `complex-java-cpp.cpp`: more C++
- `complex-cpp.cpp`: Completely in C++



Complex Numbers

Flow

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Starting from `complex-java.cpp`:

- using C++ like Java is not effective

C++ specific features allows to write **better** code:

- constructor initialization
- operator overloading
- ...

In order to get real C++, you need to know streams:

- now you can understand `hello-cpp-world.cpp`



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Java Concepts

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Java shares many concepts with C++:

- both are object-oriented
- both are C-based
- ...

Here is an **incomplete** translation table from Java to C++:

- a **namespace** allows to organize types, classes, variables, and functions into containers. They are very similar to Java packages
- the Java statement **import** allows to import symbols defined in a package in current translation unit. In C++, **namespaces** are imported using the import **namespace** statement



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