02393 Programming in C++

Module 1: An Overview of C++

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Course plan

Module no.	Date	Topic	Book chapter*
0 and 1	31.08	Welcome & C++ Overview	1
2	07.09	Basic C++ and Data Types	1, 2.2 – 2.5
3	14.09	*LAB DAY*	*C++ Practice*
4	21.09	Data Types	2
5	28.09	Libraries and Interfaces	3
6	05.10	Classes and Objects	4.1, 4.2 and 9.1, 9.2
7	12.10	Templates	4.1, 11.1
		Autumn break	
8	26.10	Inheritance	14.3, 14.4, 14.5
9	02.11	**Guest lecture** & *LAB DAY*	*Previous exams*
10	09.11	Recursive Programming	5
11	16.11	Linked Lists	10.5
12	23.11	Trees	13
13	30.11	Conclusion & *LAB DAY*	*Exam preparation*
	05.12	**Exam**	

* Recall that the book uses some ad-hoc libraries (e.g., for strings and vectors). We will use standard libraries

Outline

What is C++?

C++ is a **general-purpose programming language** that **extends C**

- Created by **Bjarne Stroustrup** (beginnings: 1979)
- Now regulated by **ISO C++ Standard Committee** (C++98, C++03, . . . , C++20, . . .)

Unique combination of:

- **high-level features** (e.g., object oriented and generic programming)
- **low-level features** (manual memory management, memory pointers)

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C++ vs. **Rust**

- Object-oriented, less advanced types, more mature, bigger ecosystem

Live coding begins now!

I will now show C++ in action, by using an **online C++ editor and compiler**

http://cpp.sh/

(there are other similar websites you can try)

Try to follow along — and raise your hand and ask questions if something is unclear!

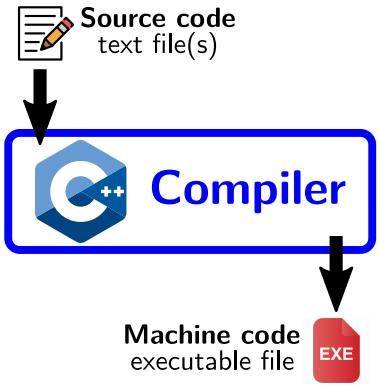
NOTE: for the next lectures, you will **need to install C++ on your computer!**

- We'll get back to it later today

An overview of C++ programs

- **The structure of a C++ program**
  - `#include` directives, the `main` function, user-defined functions
- **Simple input/output**
  - `cin`, `cout`
- **Variables, values, and types**
  - `string`, `int`, `double`, `float`
- **Expressions**
  - Some numeric and boolean operators and math functions
- **Statements**
  - `if`, `while`, `for`

C++ compiler(s)



A **C++ compiler** is a program that:

1. reads **source code** from one or more text files
2. generates an **executable file** containing machine code

You can use **any text editor** to write the source code

- . . . but maybe you want **syntax highlighting** at least

There are **many C++ compilers** with various **differences**:

- different compatibility with **C++ language standards**
- different **usage options**
- different **error messages**

Recommendation for this course

Microsoft Visual Studio Code
with C/C++ extension

+

GNU Compiler Collection
(which includes the C++ compiler g++)

Both multi-platform & open source. g++ **is standard-compliant** and is **used on CodeJudge**

See instructions on DTU Learn

Lab time & homework

Tasks:

1. **Install Visual Studio Code and GCC (g++) on your computer**
   - Follow the instructions on DTU Learn
   - If you have trouble, ask for help
   - **Mac OS users**: you may have a compiler called g++ that is **not** GCC. It should be OK...

2. **Try the first weekly assignment on your computer and on CodeJudge**
   - The assignment description is available on DTU Learn
   - Goal: check your C++ installation and familiarise with CodeJudge
   - **Don't worry if you don't get all exercises right :-)**