Thomas

00 Introduction

C23 - Advanced algorithms and programming

Hochschule für Technik und Wirtschaft Berlin
University of Applied Sciences

Introduction

Motivation

Advanced algorithms and programming

Objectives

- Know key data structures and algorithms
  (partially builds on course C21 – Algorithms, data structures and complexity)
- Gain practical experience in using data structures and algorithms

Objectives

- Know the features of a powerful programming language and be able to use it
- Be able to run software project in teams

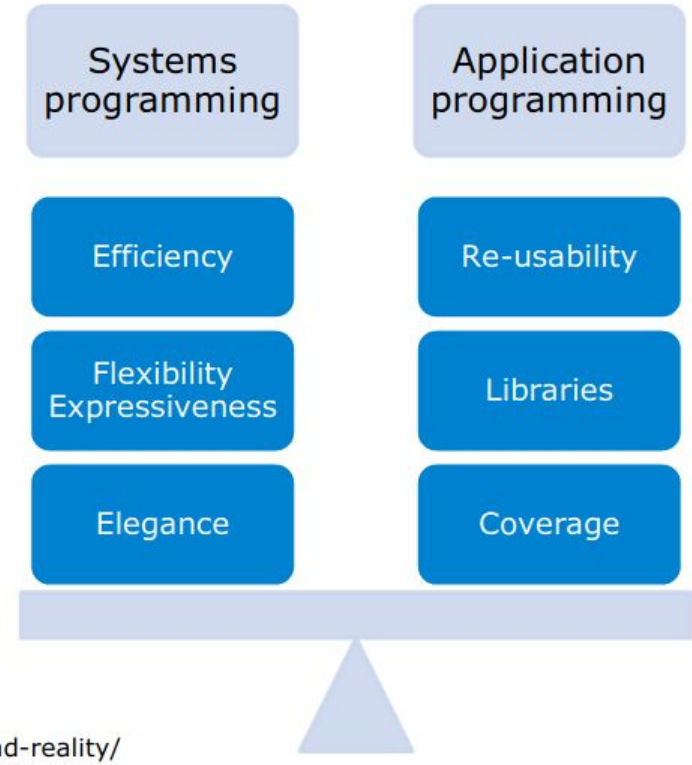
Introduction

Motivation

C++

- Initially created in 1979 (Bjarne Stroustrup)
- Constantly evolving and widely used

- Used in…
  - → Application programming
  - → Systems programming



Further information on C++ in embedded systems:
https://www.embedded.com/modern-c-in-embedded-systems-part-1-myth-and-reality/

Organisation

Lectures

Lecture - Flipped Classroom

Screencast for following week will be uploaded every Tuesday evening on **moodle**.
Every Tuesday 9:45 in room C 253 **discussion** of uploaded lecture and **exercises**.
Weekly **quiz** (ca. 20min) on moodle - deadline is the day before the lecture.

Lab session

Individual **exercises** on predefined programming problems.
Exercices can also be done outside of **lab** sessions.
Individual **support** during lab sessions.

Communication

Information flow (both directions) on moodle.

Organisation

Exercises for lab session

Distribution and **Submission** via Moodle/VPL (Virtual Programming Lab).

Completion required within **2** weeks after exercices date.

Automated detailed **evaluation** (0...100 points).

Exercice “passed” if >= 50% points achieved, else exercise must be **corrected** and **resubmitted**.

Passed exercices are a **prerequisite** for **admission** to the exam.

Passed **Quiz** (100%) is required for **admission** to the exam.

Organisation

Project work

Distribution and via Moodle (textual task description).

Submission via Moodle (.zip file).

Source code (.h, .cpp) and additional information as required (UML, test results).

Completion “voluntary”; submission no later than 2 weeks after the end of the **1st** PZR (even if the exam is written in the 2nd PZR)

Individual submission.

Detailed evaluation (0...100 points), non-submission = 0 points.

30/40% of the **final grade** is based on the evaluation of project.

Organisation

Exam

1 PZR: 25.01.21

2 PZR: TBD

90 minutes

Open book - everything is allowed even your electronic devices (but no communication platforms..)

Paper exam **TBC**

Working environment

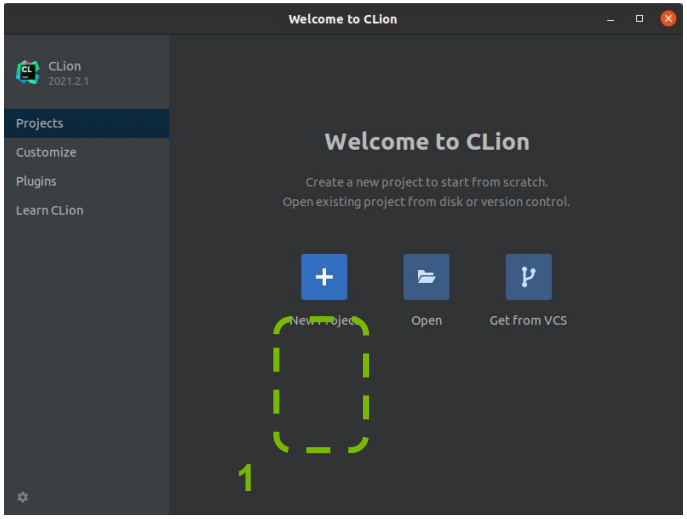
Jetbrains Clion - Getting started (1)

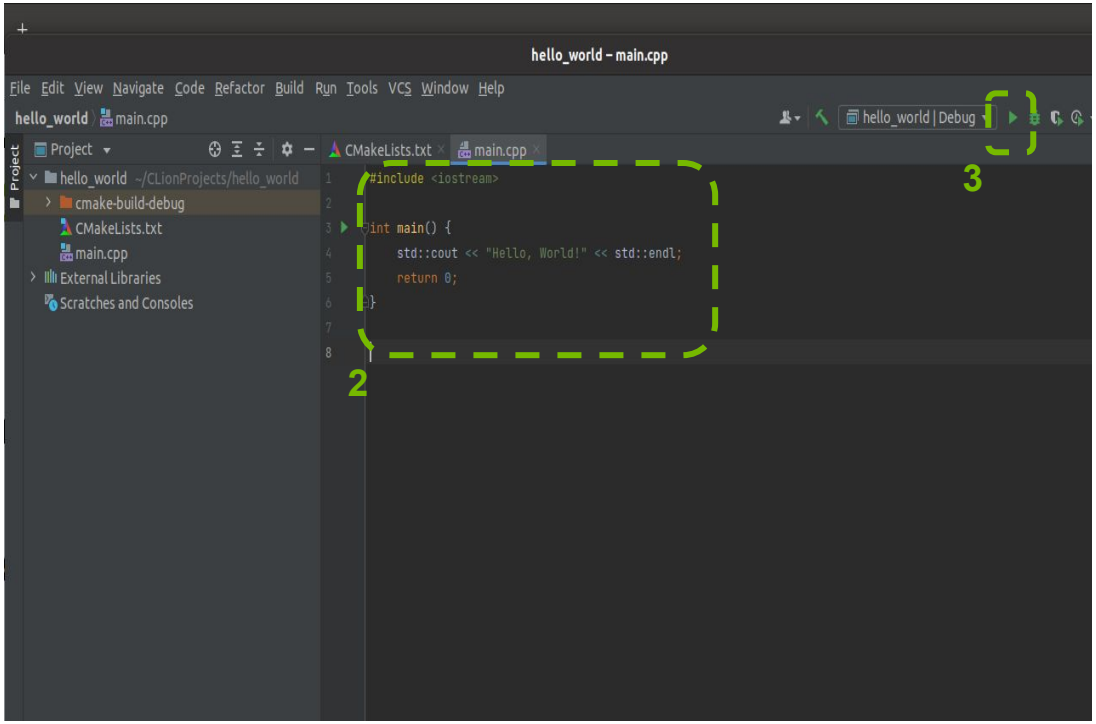
Clion is the suggested working environment for this course.

Free licence for students: https://www.jetbrains.com/community/education/#students

Cross - Plattform.

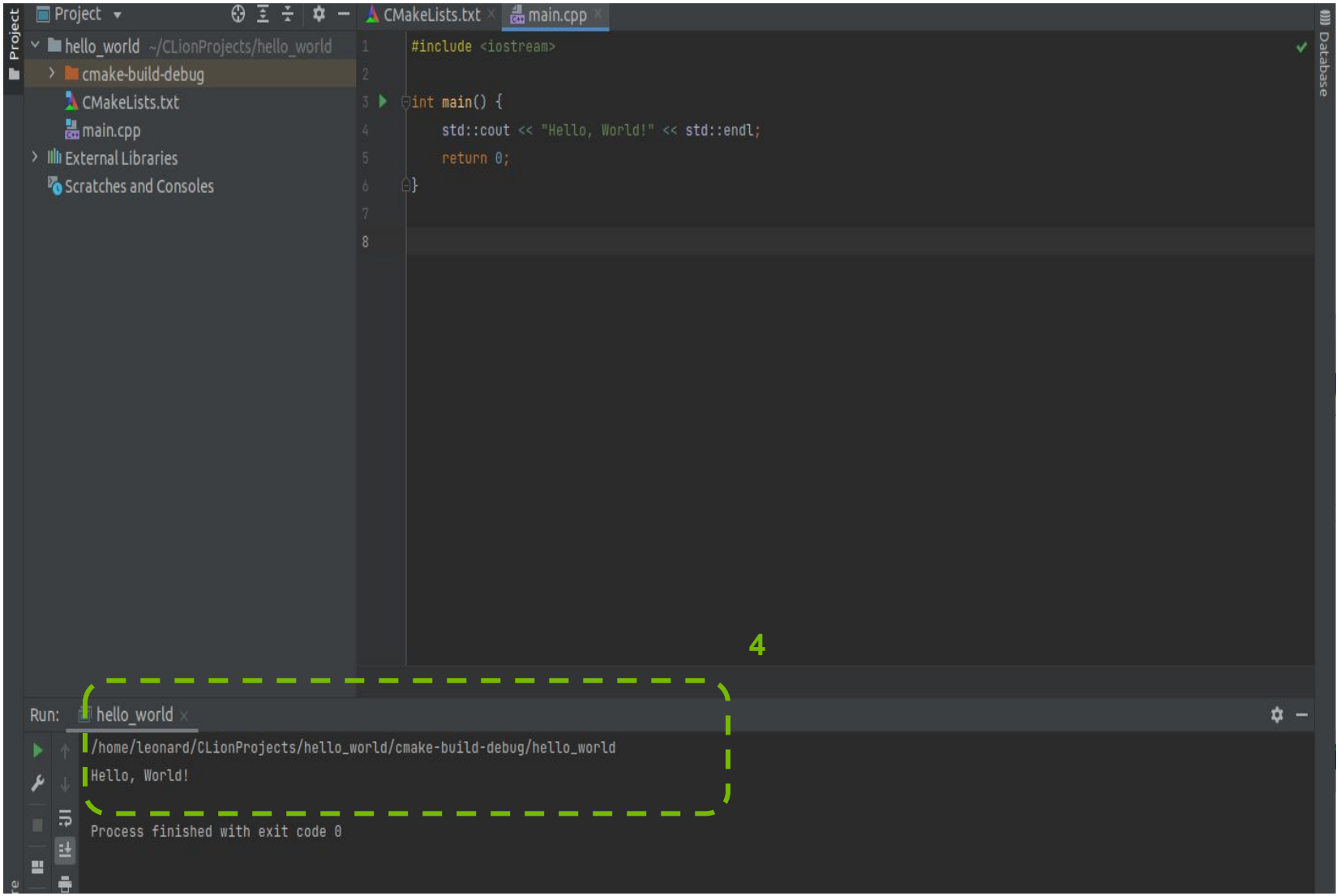
Create your first HelloWorld project…





Working environment

Jetbrains Clion - Getting started (2)

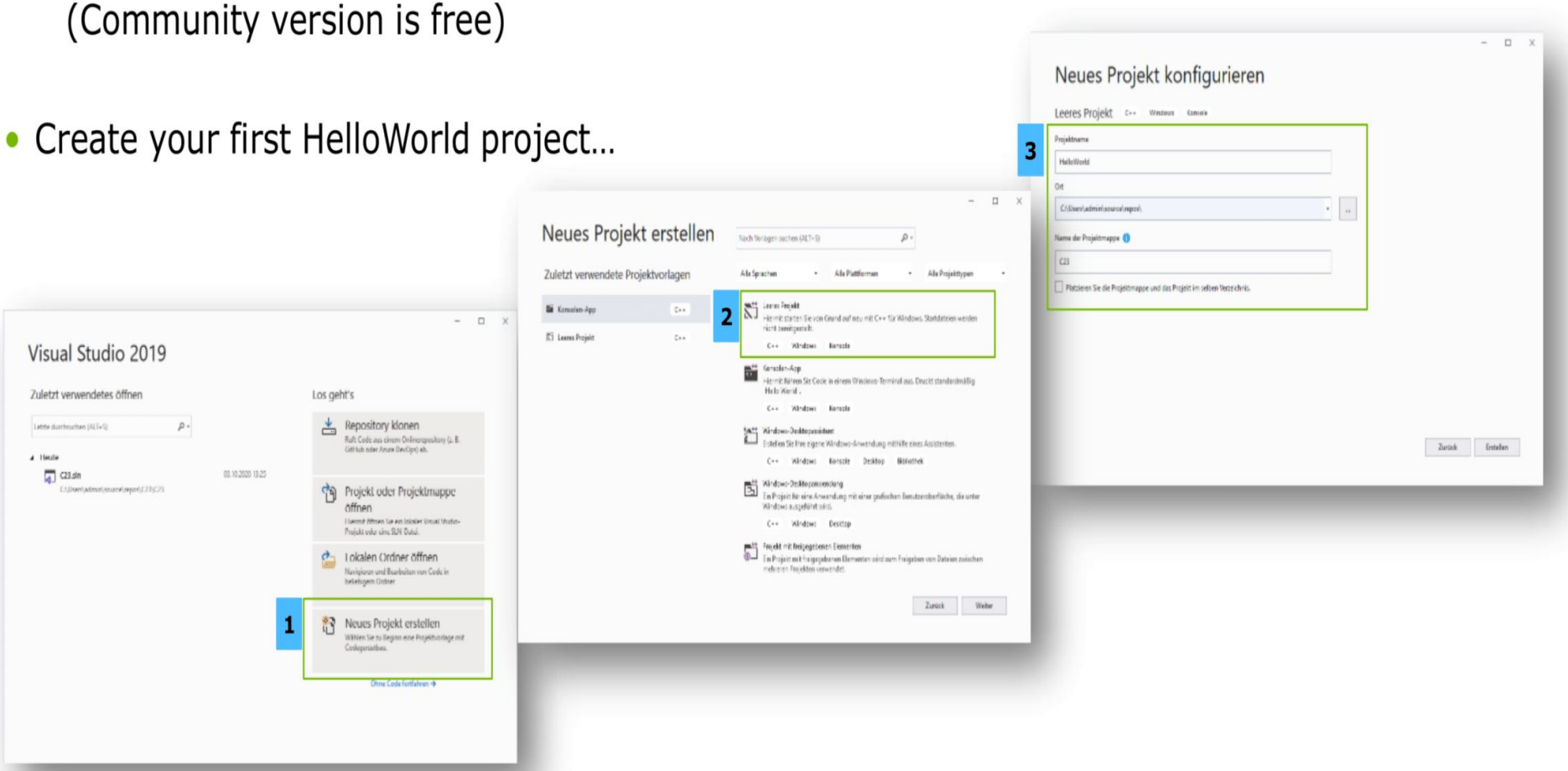


Working environment

Visual Studio 2019 – Getting started (1)

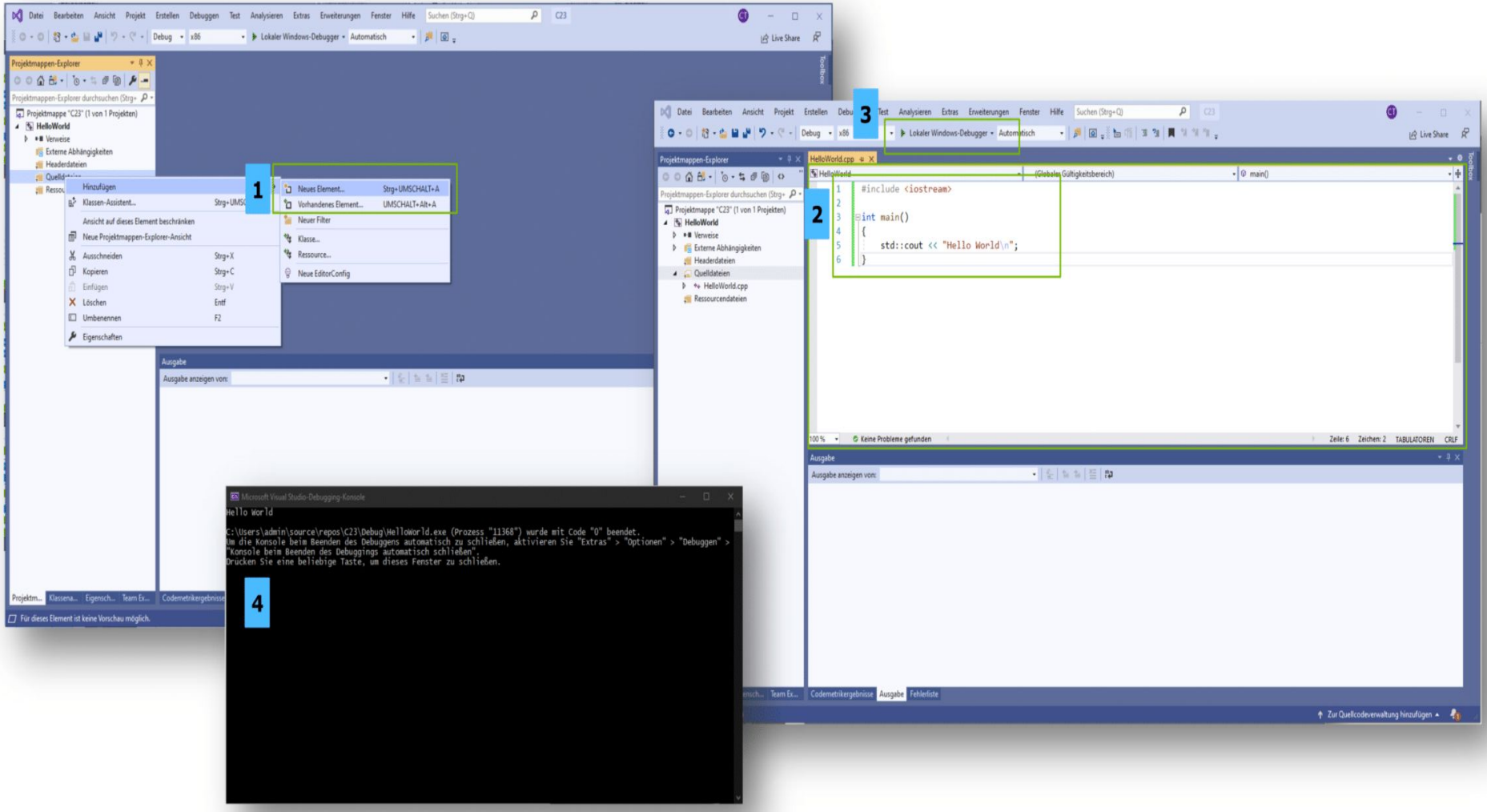
- VSC++ is the suggested working environment for this course
  - Download from https://visualstudio.microsoft.com/de/downloads/ (Community version is free)

- Create your first HelloWorld project…



Working environment

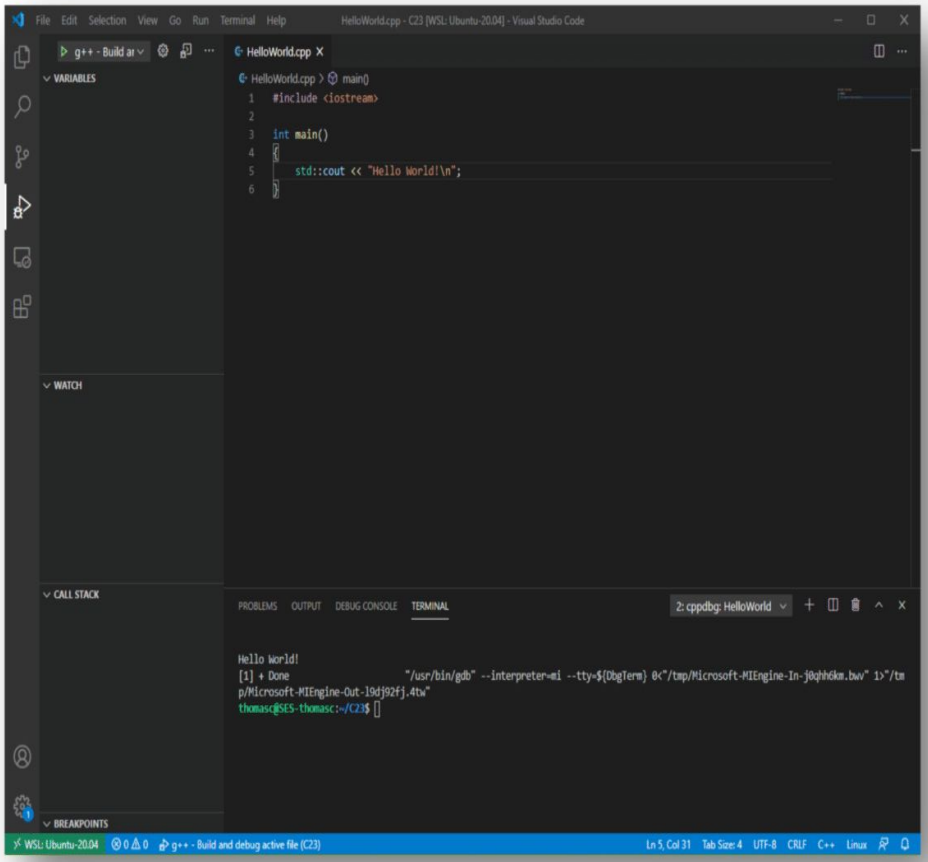
Visual Studio 2019 – Getting started (1)



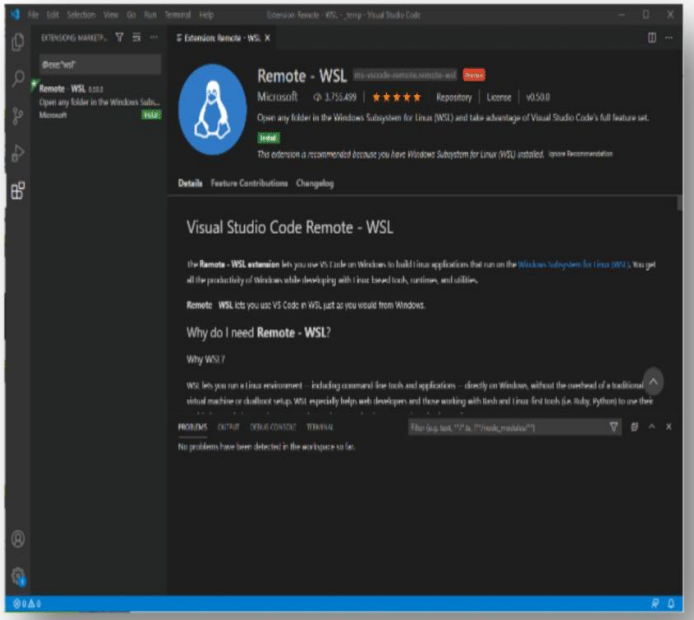
Working environment

Visual Studio Code

- On Linux, Windows and Mac, Visual Studio Code is a (very) good alternative



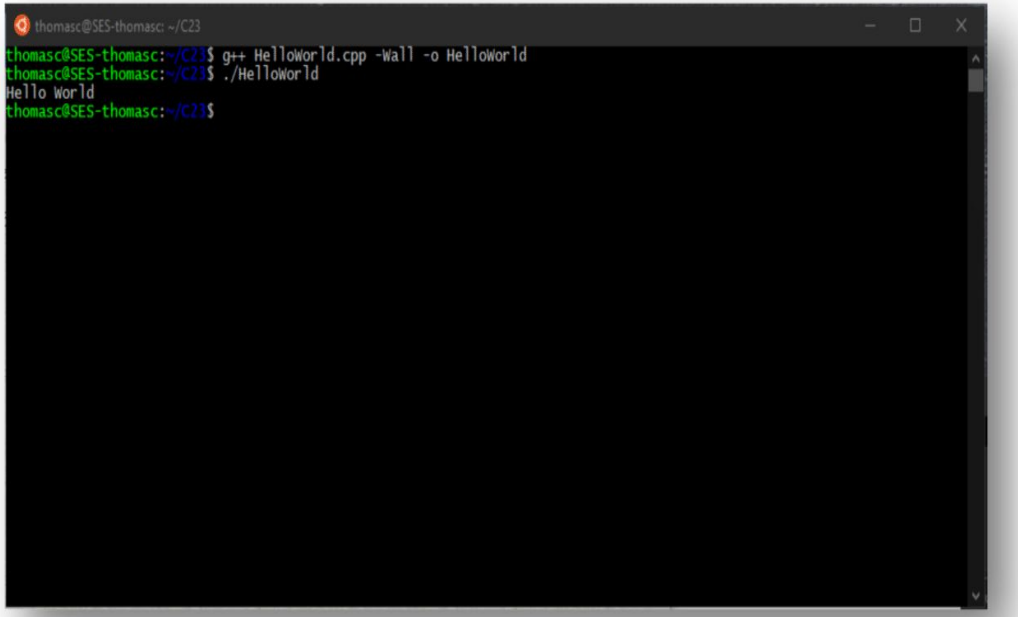
- Download from https://code.visualstudio.com/download
- Try Visual Studio Code Remote to cross-compile for Linux using WSL



Working environment

g++

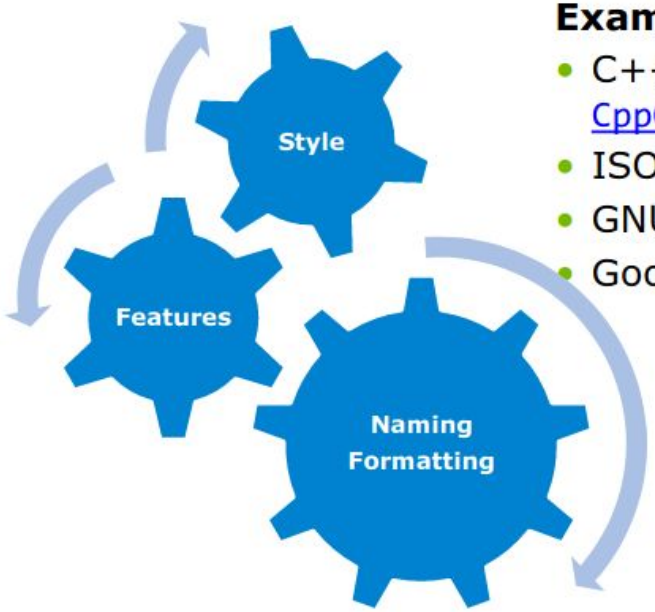
- On Linux, you might want to use plain g++ (for purists only)
  - Runs also on Linux subsystem under Win10
  - Getting g++ / gdb installed and editing files might be challenging



Organization
Programming guidelines

Programming Guidelines (Coding Guidelines)

- Required to ensure consistency and readability of code in larger teams



Examples:

- C++ core guidelines: https://github.com/isocpp/CppCoreGuidelines/blob/master/CppCoreGuidelines.md
- ISO: https://isocpp.org/wiki/faq/coding-standards
- GNU: https://gcc.gnu.org/wiki/CppConventions
- Google: https://google.github.io/styleguide/cppguide.html

Book:

- *Sutter & Alexandrescu: C++* Coding standards: 101 Rules, Guidelines, and Best Practices

Programming guidelines in the course

- See . pdf on Moodle

www.htw-berlin.de