Department I - C Plus Plus

Modern and Lucid C++ Advanced for Professional Programmers

Week 0 – Introduction

Thomas Corbat / Felix Morgner
Rapperswil, 22.02.2021
FS2021

HSR
HOCHSCHULE FÜR TECHNIK
RAPPERSWIL
FHO Fachhochschule Ostschweiz

IFS
INSTITUTE FOR
SOFTWARE

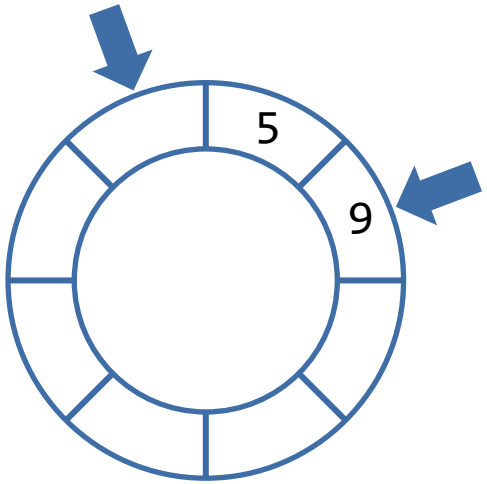
- **4 Credits (2h Vorlesung / 2h Übungen pro Woche)**
- **Testate**
  - Gruppenarbeit 2-3 Studierende
  - 2 von 3 Abgaben müssen bestanden sein (Zeitpunkt wird bei Bedarf noch angepasst)
  - Keine Note
  - Zulassungsbedingung für die Prüfung
- **Prüfung**
  - 120 Minuten
  - Open Book (Ausnahme alte Prüfungen oder Abschriften davon)

- **Neu: Alle Unterlagen auf Gitlab**
  - https://gitlab.ost.ch/ifs/cpla
  - Mit Azure AD kann über den OST-Account eingeloggt werden
- **Austausch von nicht öffentlichen Inhalten über MS-Teams oder Skipte-Server:**
  - MS Teams
  - https://skripte.hsr.ch/Informatik/Fachbereich/C++_Advanced/CplA/
- **Arbeitsumgebung**
  - Aktueller Compiler (GCC 10): Windows MinGW von MSYS2 oder https://nuwen.net/mingw.html
  - Cevelop Version 1.14.1 (www.cevelop.com)
- **An Oster- und Pfingstmontag kein Unterricht: Montag 05.04.2021 und 24.05.2021**

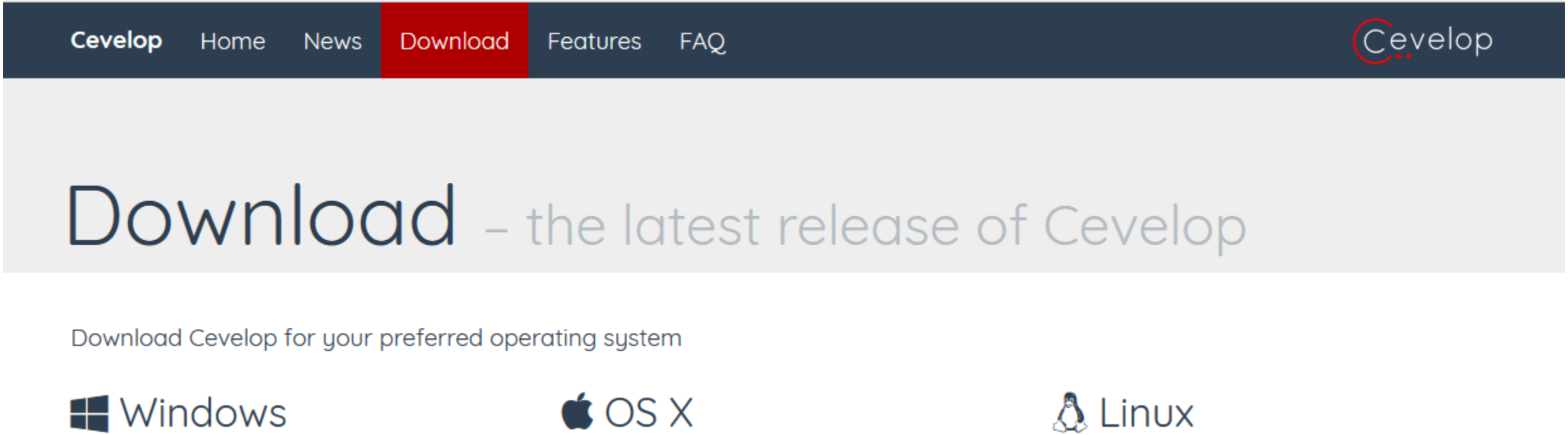
- **What is your motivation?**
- **What are your expectations?**

- Short refresh of C++ topics (Today)
- Move semantics and type deduction
- Primitive memory management
- Compile-time C++
- Multi-Threading / Memory Model
- Networking
- Advanced Libraries/Development
- Whole Value Types
- Core Guidelines
- Build Systems

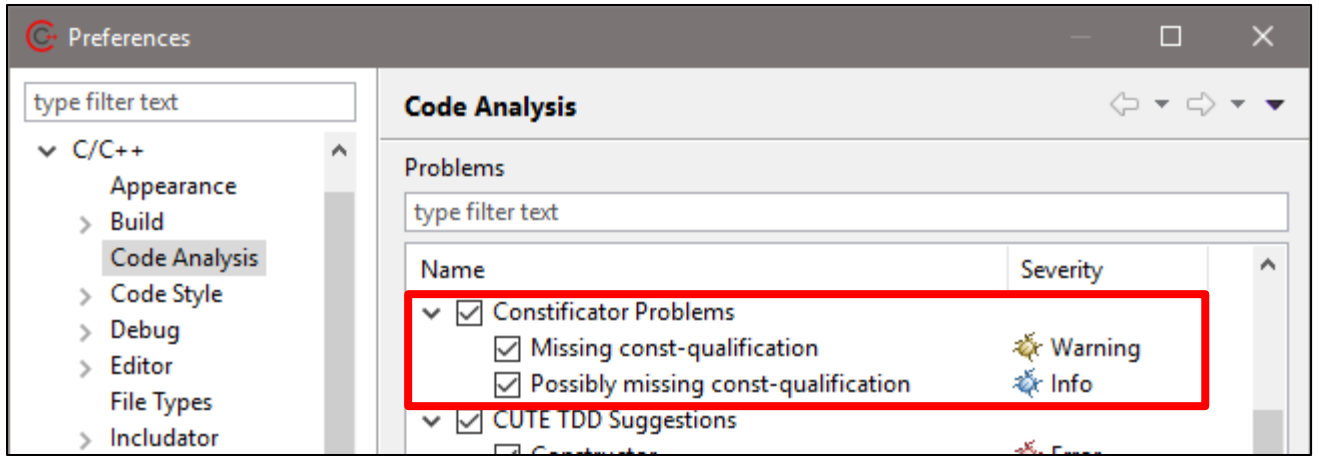
- **Typical tasks known from C++**
- **One specific exercise that will be part of several exercises**
  - Bounded Buffer
  - Start with a simple `std::array`-based version that will be extended during the semester
  - Parts of it will be Testat



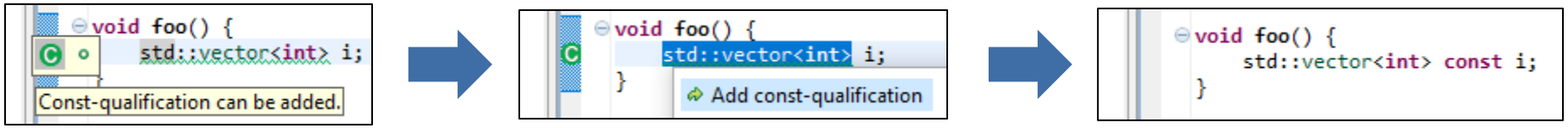
- **Get Cevelop**
  - at https://www.cevelop.com/download
- **With plug-ins Constificator and Stylechecker preinstalled**
  - For additional plug-ins (already configured in Cevelop): https://www.cevelop.com/update/latest

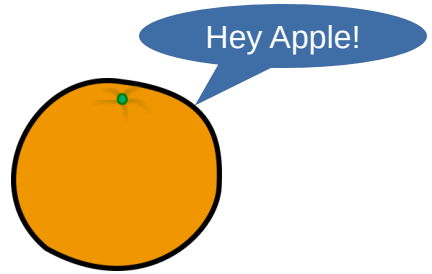


- **Constificator**
  - If activated



  - Makes suggestions about missing const qualifiers





- **It annoys you in the first place!**
  - When you have multiple `ASSERT`s in your test cases

```
void thisIsATest() {
    ASSERTM("start writing tests", false);
    ASSERTM("Only one ASSERT per test", true);
}
```

A test should only contain one assert.

  - When you use `std::cin`/`std::cout` outside of the main function

```
void foo() {
    std::cout << "output";
}
```

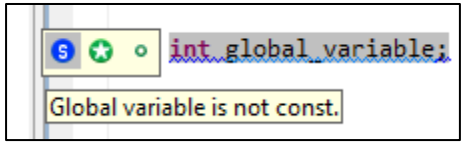
Cin/Cout should only be used inside the main function

  - When there are issues with your include guard

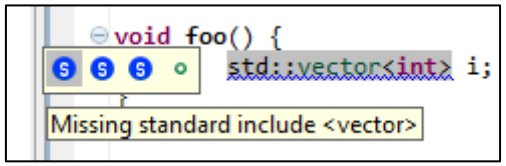
```
#ifndef SRC_HEADER_H
#define SRC_HEADER_H
-
#endif /* SRC_HEADER_H */
```

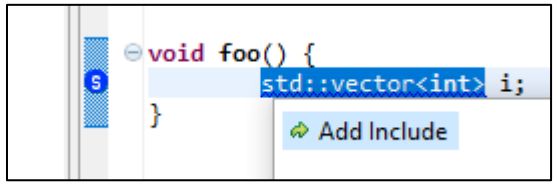
Header files should have an include guard for symbol HEADER_H_.

- **and reports...**
  - ... global non-const variables

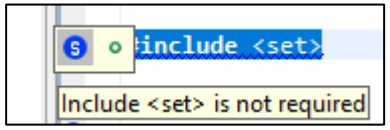


  - ... missing includes of Standard Library headers and provides a resolution!

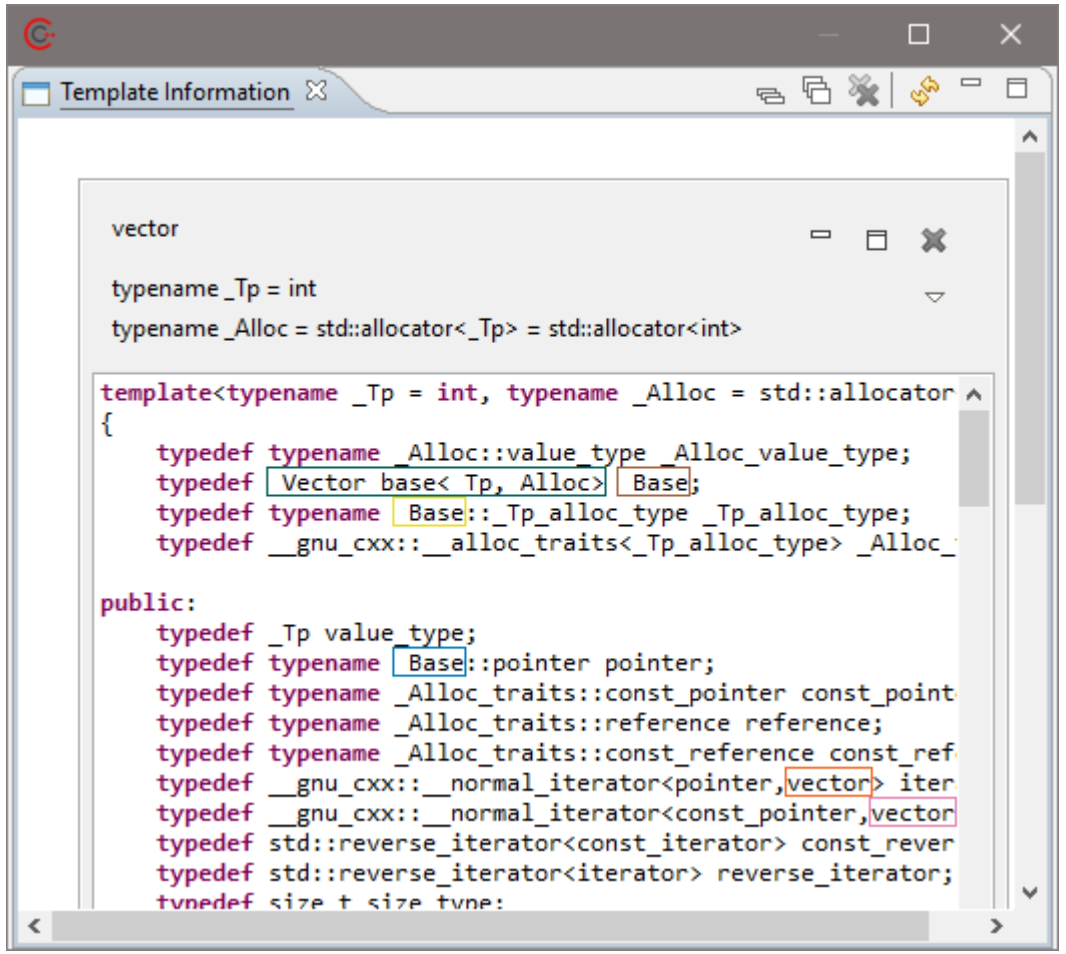




  - ... unused includes of Standard Library headers



- **Template Instance Visualization**



- **You might encounter several bugs in Cevelop and its plug-ins (more than in CPI)**
  - We are using modern and sophisticated features of C++17, which are not completely supported yet

```
template<typename First, typename Second>
void printPair(std::ostream & out, std::pair<First, Second> const & p) {
    auto [f, s] = p;
    out << "first: " << f << " second: " << s;
}

int main() {
    std::pair p = std::make_pair(42, "answer"s);
    printPair(std::cout, p);
}
```

- **When in doubt ask your compiler**
- **When in more doubt ask several compilers**
  - http://melpon.org/wandbox
  - https://gcc.godbolt.org/