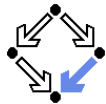


Object-Oriented Programming in C++

(Course “Computer Systems”)

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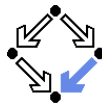
Overview

A continuation of the course “Programming” in the last semester.

- **Last semester:** procedural (“imperative”) programming in C++.
 - Focus on organization of control flow.
 - Passive entities (“data”) processed by active entities (“functions”).
 - Programs organized as sets of functions.
- **This semester:** object-oriented programming in C++.
 - Focus on organization of data.
 - “Classes” combine data and functions to “objects”.
 - Programs organized as sets of classes.

Modern approach to “programming in the large”.

Example



```
struct Date {
    int day;
    int month;
}

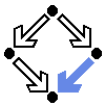
static void print(Date d)
{
    cout << d.day << "."
        << d.month << ".";
}

Date d;
d.day = 24;
d.month = 12;
print(d);
```

```
class Date {
private:
    int day;
    int month;
public:
    Date(int d, int m) {
        day = d;
        month = m;
    }
    void print() {
        cout << day << "."
            << month << ".";
    }
}

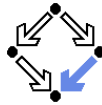
Date d = Date(24, 12);
d.print();
```

Topics



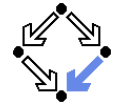
- **Classes:** combining data and functions.
 - Classes versus records (“structs”).
 - Construction, destruction, assignments.
 - Static members versus non-static members.
- **Inheritance:** building class hierarchies.
 - Classes and subclasses.
 - Virtual functions and overriding.
 - Abstract classes, interfaces, frameworks.
- **Templates:** type-generic (“polymorphic”) programming.
 - Function templates.
 - Class templates.
- **The C++ Standard Library:** reusing existing functionality.
 - Basic features (I/O, numerics, etc).
 - Containers, iterators, and algorithms.

Organization



- **Lecture:** concepts and examples.
 - Slides, blackboard, online demonstrations.
- **Assignments:** moderate programming exercises.
 - 6 assignments are given.
 - Results to be submitted within 2 weeks.
 - Tutors: Andreas Müller, Mikhael Yuditsky.
 - See the course site for the dates of the meetings offered every week.
- **Grades:** based on final exam and assignments.
 - Final exam (50%): concepts and very small programming tasks.
 - Assignments (50%): best 5 results are evaluated.
 - Both exam and assignments have to be positive.
- **Literature:** any good C++ book will do for this course.
 - Ray Lischner: "C++ in a Nutshell", O'Reilly, 2003.

Moodle Course

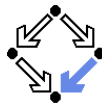


Central point for electronic communication.

- Register as a participant in the Moodle course.
 - All forum messages will be sent as emails to registered participants.
- Submit assignments via Moodle.
 - No email submissions are accepted.
- Post general questions in the "course forum".
 - Answered by Wolfgang Schreiner.
- Post assignment-specific questions in "assignment forum".
 - Answered by one of the tutors.

<http://www.risc.uni-linz.ac.at/people/schreine/courses/ss2010/compsys>

C++ Software

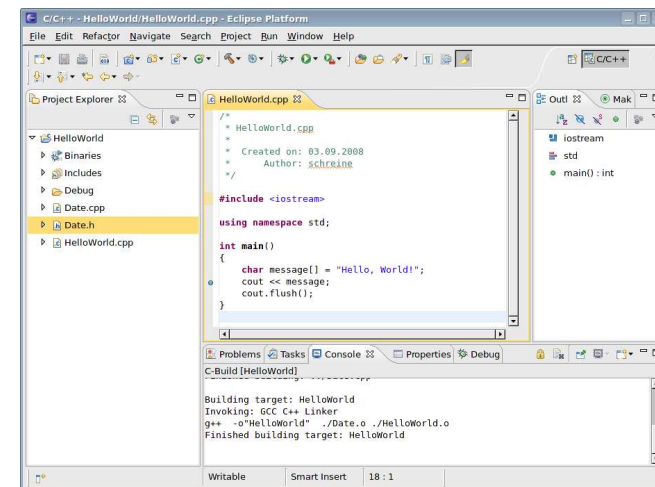
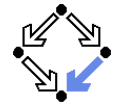


Any C++ compiler and program editor will do for this course.

- **Eclipse IDE for C/C++ Developers**
 - <http://www.eclipse.org/downloads>
- **GNU/Linux:** The GNU C++ Compiler.
 - Debian: `apt-get install g++`
- **Windows:** MinGW and MSYS.
 - <http://www.mingw.org>
 - <http://max.berger.name/howto/cdt>

A decent IDE makes program development much more productive.

Eclipse IDE for C/C++ Developers



Eclipse Debug View

