02393 Programming in C++

Before we start:

If you feel ill, go home
Keep your distance to others
Wash or sanitize your hands
Disinfect table and chair
Respect guidelines and restrictions

02393 Programming in C++
Module 1: Introduction

Lecturer:

Alceste Scalas

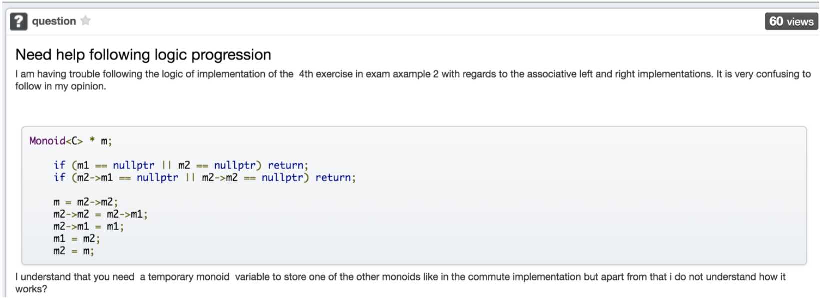
(Slides based on previous versions by Andrea Vandin, Alberto Lluch Lafuente, Sebastian Mödersheim)

Course Information

- Read http://kurser.dtu.dk/course/02393
- Keep an eye on CampusNet:
  https://cn.inside.dtu.dk/cnnet/element/623043
  - ★ Slides and examples for the lectures
  - ★ Assignments and their solutions
  - ★ The course book
  - ★ How to set up the recommended editor (Visual Studio Code)
  - ★ Other useful links
- Please use **MS Teams** during the lectures to watch the live stream, raise hands, ask questions, request TA help
  - ★ Join code: **vu3yvsd**
- Please use **Piazza** for questions about C++ and assignments (**other students may want to help or see the answers**):
  https://piazza.com/dtu.dk/fall2020/02393

Piazza Forum

An example of nice interaction among students



question

60 views

Need help following logic progression

I am having trouble following the logic of implementation of the 4th exercise in exam axample 2 with regards to the associative left and right implementations. It is very confusing to follow in my opinion.

```
Monoid<C> * m;

    if (m1 == nullptr || m2 == nullptr) return;
    if (m2->m1 == nullptr || m2->m2 == nullptr) return;

    m = m2->m2;
    m2->m2 = m2->m1;
    m2->m1 = m1;
    m1 = m2;
    m2 = m;
```

I understand that you need a temporary monoid variable to store one of the other monoids like in the commute implementation but apart from that i do not understand how it works?

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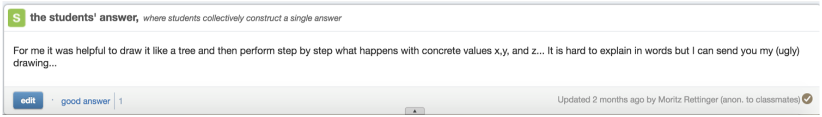

S **the students' answer,** *where students collectively construct a single answer*

For me it was helpful to draw it like a tree and then perform step by step what happens with concrete values x,y, and z... It is hard to explain in words but I can send you my (ugly) drawing...

Updated 2 months ago by Moritz Rettinger (anon. to classmates)

Piazza Forum

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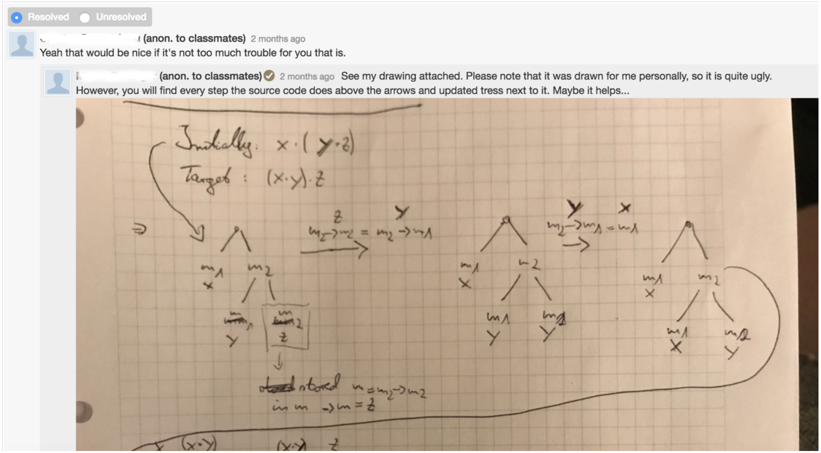


[✓ Resolved] Unresolved

[redacted] (anon. to classmates) 2 months ago
Yeah that would be nice if it's not too much trouble for you that is.

[redacted] (anon. to classmates) ✓ 2 months ago See my drawing attached. Please note that it was drawn for me personally, so it is quite ugly. However, you will find every step the source code does above the arrows and updated tress next to it. Maybe it helps...

Learning Objectives http://kurser.dtu.dk/course/02393

A student who has met the objectives of the course will be able to:

- select and use data types
- define and construct data structures and functions, including recursive, dynamic data structures and recursive functions
- use principles of structured program design and methods
- describe and use containers and iterators
- construct and demonstrate generic functions and classes (templates)
- use and define classes with encapsulation and constructors
- use pointers and arrays with memory management
- develop projects organized in multiple header and source files
- explain and apply the principles of abstract data types
- analyze and compare the complexity of different data structures and algorithms
- explain the C++ runtime system
- **discuss C++-related issues in a clear and concise way, possibly using on-line platforms**

Evaluation

- **Weekly assignments**
  - To be handed in via **CodeJudge** at https://dtu.codejudge.net/02393-e20/assignments
  - See deadlines on CodeJudge
  - automatically tests your code, gives you a chance to fix bugs
  - use TAs support
- **Exam**
  - Similar to the assignments
  - Date: 07/12/2019
    - Time & location: TBD
    - In the previous years it has been at 9 AM at Ballerup campus
  - Duration: 4 hours, all aid allowed
- **Evaluation**
  - Grade: Pass / Fail
  - Exam and assignments contribute to the grade
  - Roughly: if your exam is borderline but you did most assignments well, you pass.

Tentative Lecture Plan

#	Date	Topic	Book chapter *
1	01.09	Introduction	
2	08.09	Basic C++	1
3	15.09	Data Types	2
4	22.09	Data Types / Libraries and Interfaces	2 / 3
5	29.09	Libraries and Interfaces	3
6	06.10	Classes and Objects	4.1, 4.2 and 9.1, 9.2
		Autumn break	
7	20.10	Templates	4.1, 11.1
8	27.10	LAB DAY	Old exams
9	03.11	Inheritance	14.3, 14.4, 14.5
10	10.11	Recursive Programming	5
11	17.11	Linked Lists	10.5
12	24.11	Trees	13
13	01.12	Exercises & Summary	
	07.12	Exam	

* Recall that the book uses sometimes ad-hoc libraries that are slightly different with respect to the standard libraries (e.g., strings and vectors).

Lab Day on 27/10

- No slides or new material
- You will be able to work 4 hours on old exams

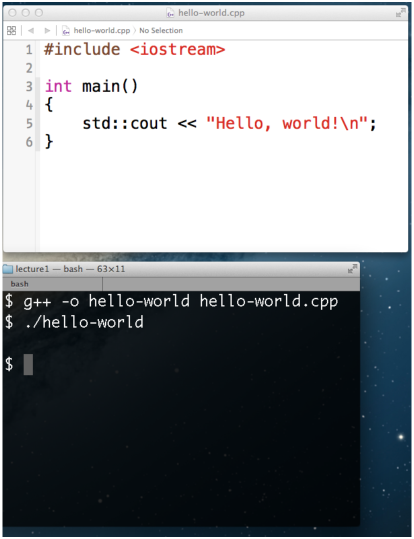
Course Materials

- Stanford Course Reader by S. Roberts, J. Zelenski:
  Programming Abstractions in C++
  - ★ Available in Inside
  - ★ We will often relate to this book, use its exercises . . .
  - ★ the book uses sometimes ad-hoc libraries that are slightly different with respect to the standard libraries (e.g. strings and vectors).

Ideas for an Effective Course: Live Programming

- Live programming
  - Not much code on slides.
  - Instead: developing a program/example during the lecture
  - We may make small exercises together in the lecture
    - please bring your laptops to the lecture

Live Programming



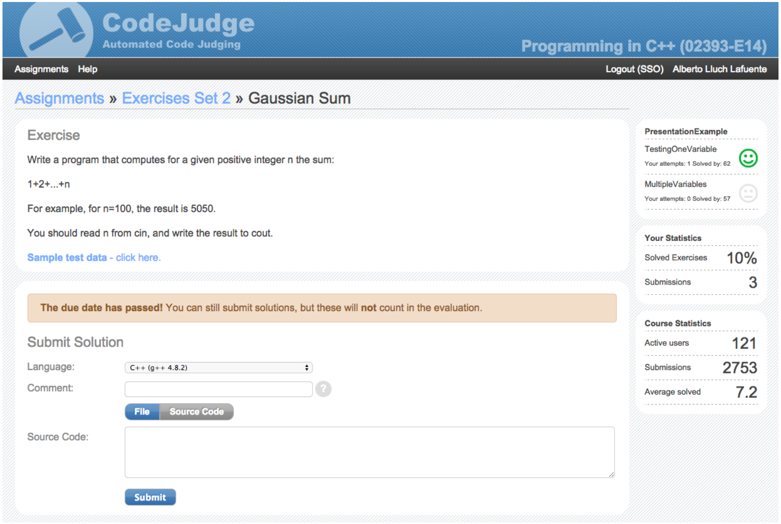
```cpp
#include <iostream>

int main()
{
    std::cout << "Hello, world!\n";
}
```

```
$ g++ -o hello-world hello-world.cpp
$ ./hello-world

$ 
```

CodeJudge



Assignments » Exercises Set 2 » Gaussian Sum

Exercise

Write a program that computes for a given positive integer n the sum:

1+2+...+n

For example, for n=100, the result is 5050.

You should read n from cin, and write the result to cout.

Sample test data - click here.

The due date has passed! You can still submit solutions, but these will **not** count in the evaluation.

Submit Solution

Language:	C++ (g++ 4.8.2)
Comment:	
Source Code:	

PresentationExample

TestingOneVariable
Your attempts: 1 Solved by: 62

MultipleVariables
Your attempts: 0 Solved by: 57

Your Statistics

Solved Exercises	10%
Submissions	3

Course Statistics

Active users	121
Submissions	2753
Average solved	7.2

Before the next lecture. . .

. . . you can try a **demo weekly assignment** (`ex01.pdf`)

- See under "File sharing" in the course page on CampusNet — https://cn.inside.dtu.dk/cnnet/element/623043

NOTE: The aim of this demo assignment is to get ready with your C++ installation and to acquire some familiarity with CodeJudge. Do not worry if you are not able to get all exercises right

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DTU

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