Hacking the C and C++ Programming Languages

Lecture 1

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Top 5 Programming Languages

- According to IEEE Spectrum (2018):

1. Python.
2. C++.
3. Java.
4. C.
5. C#.

These languagens are in **high demand** by the **industry**!

Given a programming lang. you know, how do you describe your programming skills?

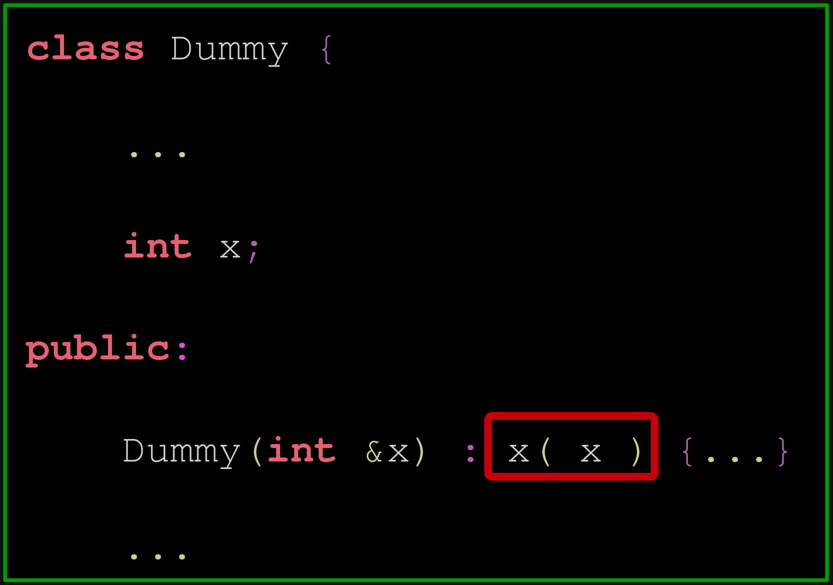
- Expert.
- Proficient.
- Good.
- Regular.
- If it does not compile in the first try, I start procrastinating...

Assuming the C lang., answer...

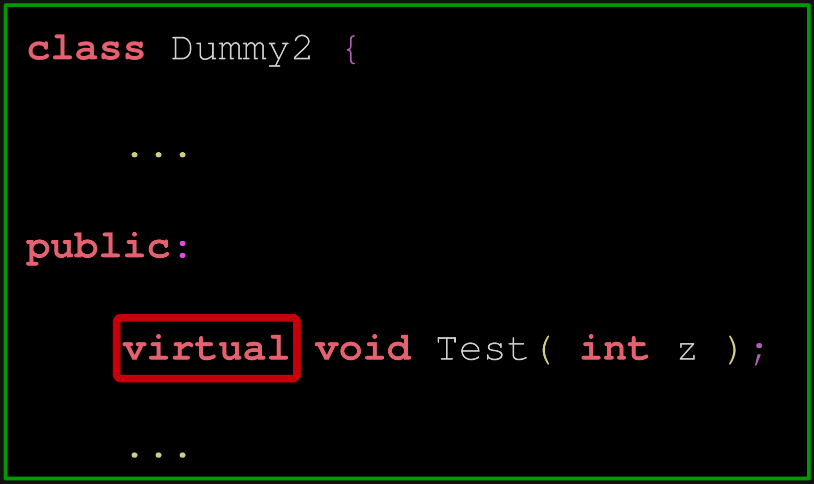
- You have found a bug in your program. How do you usually **debug** code?
- What does "**`undefined reference to`**" means?
- What does "**`external`**" do to functions and variables?
- What do the following **qualifiers** mean:
  - **`const`**.
  - **`inline`**.

With respect to C++, answer...

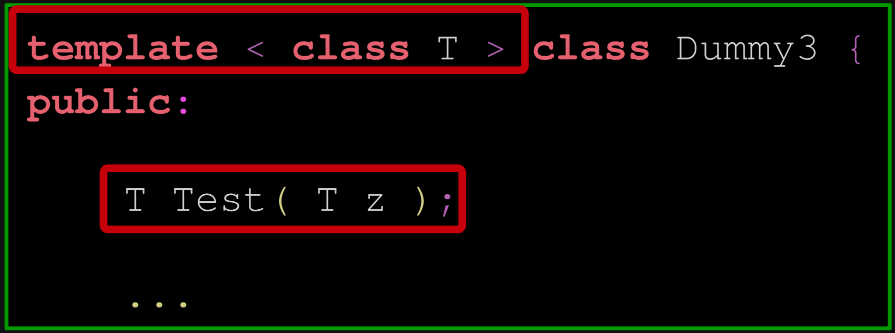
- What is this? When it should (n't) be used in code?



```
class Dummy {

    ...

    int x;

public:

    Dummy(int &x) : x( x ) {...}

    ...
```



```
class Dummy2 {

    ...

public:

    virtual void Test( int z );

    ...
```



```
template < class T > class Dummy3 {
public:

    T Test( T z );

    ...
```

Basic vs. Advanced Knowledge

- The **basic knowledge** of a language **allows** for the development of a **large number** of programs.
- However, solely the **basic knowledge** very frequently **prevents** one from:
  - Exploring **advanced capabilities** available in the **language** and the **platform**.
  - **Understanding** the **advantages** or **limitations** of a **language** with respect to others.
  - **Understanding** sophisticated **code** developed by **skilled developers**.
  - Among others.

This Course

- **This course aims at dissecting the C / C++ programming languages, allowing for the conscious use of some of their advanced features.**
- Despite the fact that we will use C/C++, the main concepts and practices discussed along this course certainly can be applied to whatever programming language you choose to **learn** or to **work with**!

Course Outline

- The C programming language.
- Memory management.
- Compilation and linking.
- The C++ programming language.
- Classes and objects.
- Inheritance.
- Memory management.
- Templates.

Background

- **Computer architecture** basics.
- **Algorithms.**
- **C Programming Language** basics.
- **Data structures.**

To **pass** this course...

- **Attend** classes regularly and participate.
- **Understand** the concepts.
- **Do** the assignments.
- **Participate**.

To **fail** this course...

- **Do not attend** classes regularly and participate.
- **Do not understand** the concepts.
- **Don't do** the assignments.
- **Don't participate**.

Grading Policy

- Student's will be evaluated individually according to the following formula:

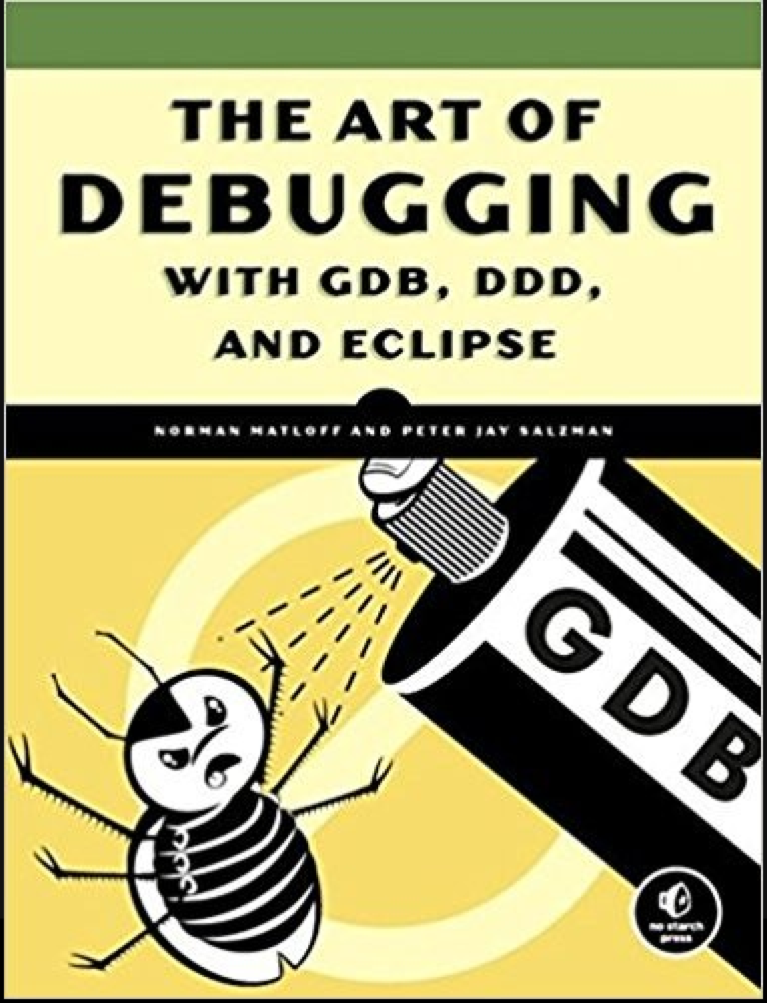
$$FG=\left(\frac{(A1+A2+\cdots+An)}{n}\times 90\%\right)+(P\times 10\%)$$

Where:

- An = Assignment n (1 ≤ n < ∞).
- P = Participation.
- FG = Final Grade.

Bibliography

The Art of Debugging with GDB, DDD, and Eclipse. Norman Matloff and Peter Jay Salzman.



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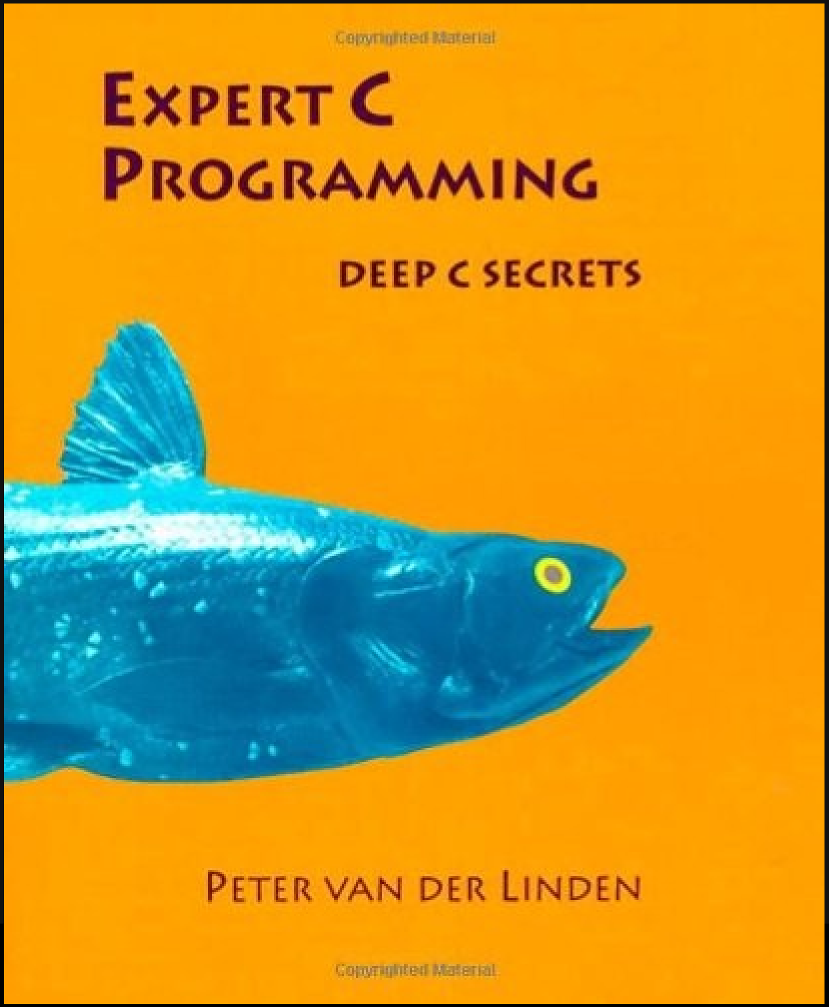
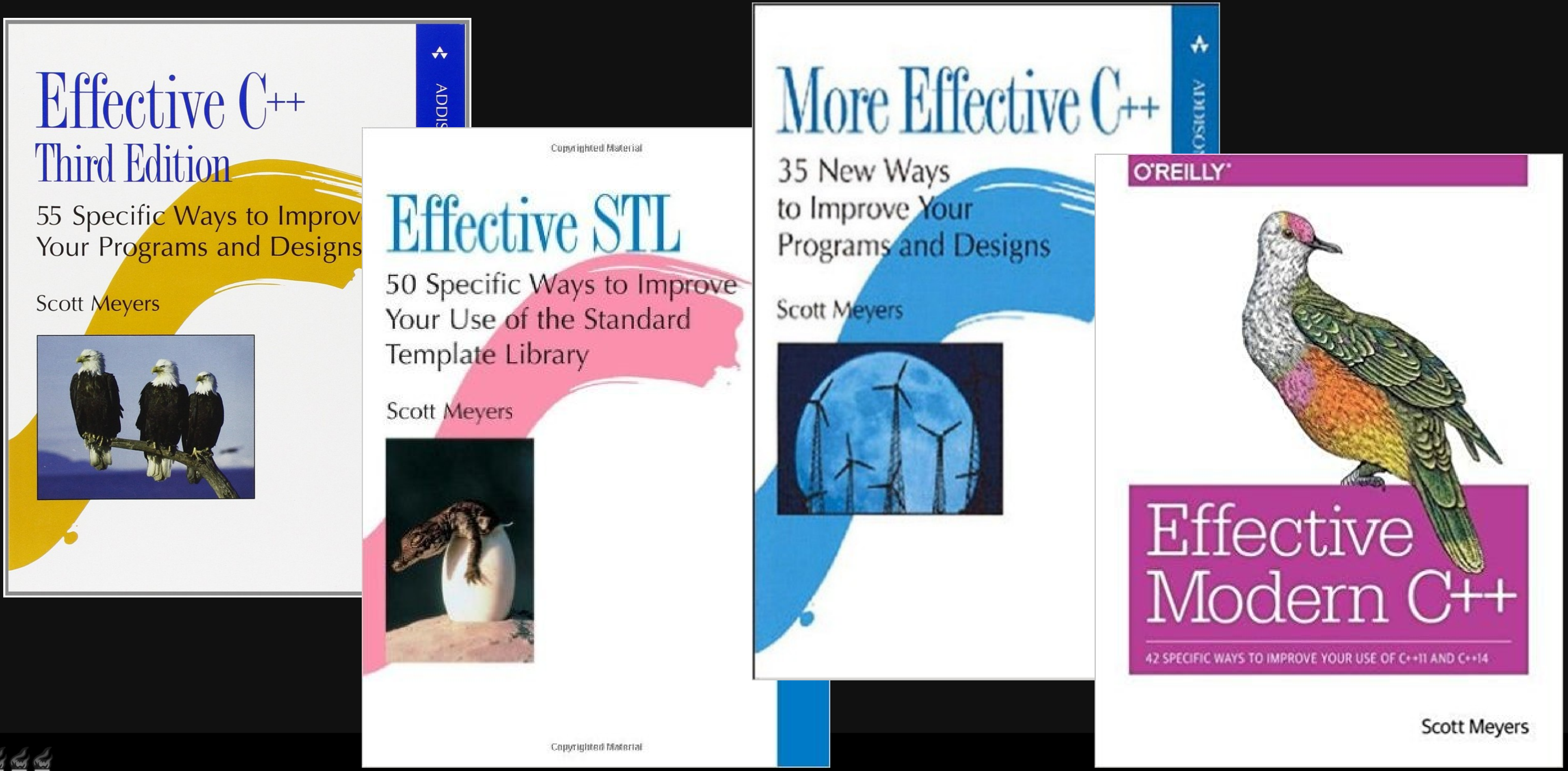
Expert C Programming: Deep Secrets. Peter van der Linden.



Bibliography

Effective C++, **Effective STL**, **More effective C++** and **Effective Modern C++**. Scott Meyers.



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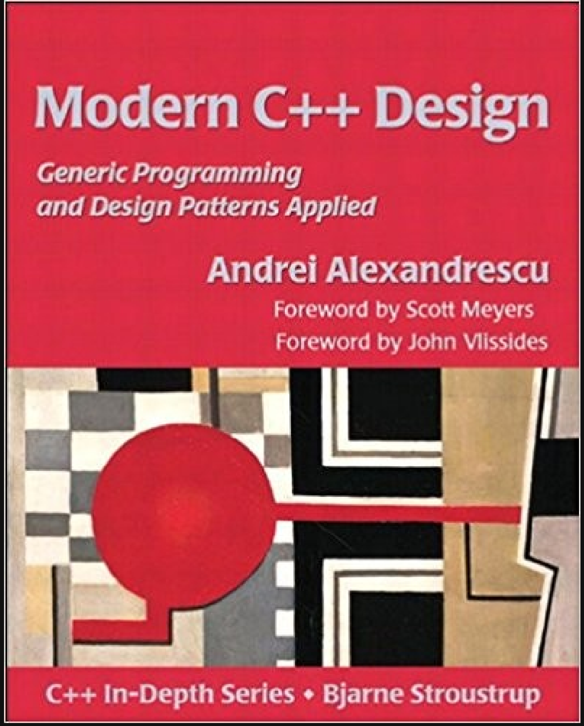
Modern C++ Design: Generic Programming and Design Patterns Applied. Andrei Alexandrescu.


Modern C++ Design
Generic Programming
and Design Patterns Applied
Andrei Alexandrescu
Foreword by Scott Meyers
Foreword by John Vlissides
C++ In-Depth Series • Bjarne Stroustrup

… and selected articles and papers.

Useful Tools

- Text editor:

  vi, vim, gedit, etc.
- C / C++ compiler:

  GCC.
- IDE:
  - Eclipse CDT + GCC.
  - Etc.
- Misc tools:

  Binutils.

Our Website

All relevant stuff will be available on the Virtual Classroom on SIGAA!

The **student** is **responsible** for keeping his **contact** info **up to date** on **SIGAA**!