

# C++ Club UK

Gleb Dolgich

2019-08-22

# Introducing the Rule of DesDeMovA (1/4)

Blog post by Peter Sommerlad

<https://blog.safecpp.com/2019/07/01/initial.html>

[https://accu.org/content/conf2014/Howard\\_Hinnant\\_Accu\\_2014.pdf](https://accu.org/content/conf2014/Howard_Hinnant_Accu_2014.pdf)

Rule of Zero:

*Code that you do not write cannot be wrong.*

# Introducing the Rule of DesDeMovA (2/4)

C++ now

2019  
MAY 6-10  
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Peter Sommerlad

Rule of DesDeMovA

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03:54

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Do you Remember: What Special Member Functions Do You Get?

3

What you write	What you get					
	default constructor	destructor	copy constructor	copy assignment	move constructor	move assignment
nothing	defaulted	defaulted	defaulted	defaulted	defaulted	defaulted
any constructor	not declared	defaulted	defaulted	defaulted	defaulted	defaulted
default constructor	user declared	defaulted	defaulted	defaulted	defaulted	defaulted
destructor	defaulted	user declared	defaulted (!)	defaulted (!)	not declared	not declared
copy constructor	not declared	defaulted	user declared	defaulted (!)	not declared	not declared
copy assignment	defaulted	defaulted	defaulted (!)	user declared	not declared	not declared
move constructor	not declared	defaulted	deleted	deleted	user declared	not declared
move assignment	defaulted	defaulted	deleted	deleted	not declared	user declared

Howard Hinnant's Table: [https://ericniebler.com/2014/05/04/Howard-Hinnant\\_Accu\\_2014.pdf](https://ericniebler.com/2014/05/04/Howard-Hinnant_Accu_2014.pdf)

Note: Declaring the defaulted special members denoted with a (!) is a bug in the standard.

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# Introducing the Rule of DesDeMovA (3/4)

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Rule of DesDeMovA: T&& operator=(T&&) noexcept=delete;

6

What you write	DesDeMovA		Rule of if				Destructors defined		Deleted		Move Assignment	
	default constructor		copy constructor	move constructor	move assignment		copy constructor	move constructor	move assignment		copy constructor	move assignment
nothing	defaulted		defaulted	defaulted	defaulted		defaulted	defaulted	defaulted		defaulted	defaulted
any constructor	not declared		defaulted	defaulted	defaulted		defaulted	defaulted	defaulted		defaulted	defaulted
default constructor	user declared	defaulted	defaulted	defaulted	defaulted		defaulted	defaulted	defaulted		defaulted	defaulted
destructor	defaulted	user declared	defaulted (!)	defaulted (!)	not declared	not declared	defaulted	defaulted	defaulted		defaulted	defaulted
copy constructor	not declared	defaulted	user declared	defaulted (!)	not declared	not declared	defaulted	defaulted	defaulted		defaulted	defaulted
copy assignment	defaulted	defaulted	defaulted (!)	user declared	not declared	not declared	defaulted	defaulted	defaulted		defaulted	defaulted
move constructor	not declared	defaulted	deleted	deleted	user declared	not declared	defaulted	defaulted	defaulted		defaulted	defaulted
move assignment	defaulted	user declared	deleted	deleted	not declared	deleted	defaulted	defaulted	defaulted		defaulted	defaulted

Howard Hinnant's Table: [https://ericniebler.com/2014/hinnant\\_hinnant\\_2014.pdf](https://ericniebler.com/2014/hinnant_hinnant_2014.pdf)


Note: Getting the defaulted special members denoted with a (!) is a bug in the standard.

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# Introducing the Rule of DesDeMovA (3/4)


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Rule of DesDeMovA


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Summary  7

1. Rule of Zero
2. Rule of DesDeMovA (no copy, no move for SBRM/RAII and OO-Base classes)
3. Rule of Unique Resource Managers (move-only, no copy)
4. Rule of Five for Resource Managers with Value Semantics, or other really special cases



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## strong\_typedef - Create distinct types for distinct purposes

Article by Anthony Williams

[https://www.justsoftwaresolutions.co.uk/cplusplus/strong\\_typedef.html](https://www.justsoftwaresolutions.co.uk/cplusplus/strong_typedef.html)

[https://github.com/anthonywilliams/strong\\_typedef](https://github.com/anthonywilliams/strong_typedef)

```
1 using transaction_id =  
2     jss::strong_typedef<struct transaction_tag, std::string>;  
3  
4 bool is_a_foo(transaction_id id)  
5 {  
6     auto &s = id.underlying_value();  
7     return s.find("foo") != s.end();  
8 }
```

<https://www.cycfi.com/2019/07/photon-micro-gui/>

[https://www.reddit.com/r/cpp/comments/ccq9pn/elemental\\_c\\_gui\\_library/](https://www.reddit.com/r/cpp/comments/ccq9pn/elemental_c_gui_library/)

# C++ libraries for data visualization

- ▶ VTK <https://vtk.org/>
- ▶ ROOT <https://root.cern.ch/>
- ▶ matplotlib-cpp <https://github.com/lava/matplotlib-cpp>
  - ▶ matplotlib (Python) <https://matplotlib.org/>
- ▶ QCustomPlot (QT, GPL/commercial) <https://www.qcustomplot.com/>



<http://cppcast.com/2019/07/robert-maynard/>

[https://www.reddit.com/r/cpp/comments/c9bpxb/cppcast\\_cmake\\_and\\_vtk\\_with\\_robert\\_maynard/](https://www.reddit.com/r/cpp/comments/c9bpxb/cppcast_cmake_and_vtk_with_robert_maynard/)

## CMake line by line - creating a header-only library

<http://dominikberner.ch/cmake-interface-lib/>

[https://www.reddit.com/r/cpp/comments/c8ty2h/a\\_line\\_by\\_line\\_explanation\\_how\\_to\\_create\\_a/](https://www.reddit.com/r/cpp/comments/c8ty2h/a_line_by_line_explanation_how_to_create_a/)

<https://github.com/bernedom/Sl>

Professional CMake: A Practical Guide, 4th ed., CMake 3.15

<https://crascit.com/professional-cmake/> \$30

# OSes built using C++

https:

[//www.reddit.com/r/cpp/comments/cho1qb/are\\_there\\_any\\_oses\\_built\\_using\\_c/](https://www.reddit.com/r/cpp/comments/cho1qb/are_there_any_oses_built_using_c/)

- ▶ TempleOS
- ▶ Haiku
- ▶ Google Fuchsia
- ▶ IncludeOS
- ▶ DistortOS (RTOS)
- ▶ Symbian OS (Dead)
- ▶ SerenityOS

This is a C++17 class library for using the Single Instruction Multiple Data (SIMD) instructions in modern microprocessors.

<https://www.agner.org/optimize/blog/read.php?i=1013>

<https://github.com/vectorclass/version2> (Apache 2.0)

Manual [https://github.com/vectorclass/manual/blob/master/vcl\\_manual.pdf](https://github.com/vectorclass/manual/blob/master/vcl_manual.pdf)

# Approval tests (1/2)

Also known as **Golden Master Tests** or **Snapshot Testing** (locking down current behaviour)

- ▶ CppOnSea 2019 - Clare Macrae - Quickly testing legacy code  
<https://youtu.be/dtm8V3TIB6k>
  - ▶ Slides <https://slideshare.net/ClareMacrae>
  - ▶ CppCast with Clare Macrae <https://cppcast.com/clare-macrae/>
    - ▶ r/cpp [https://www.reddit.com/r/cpp/comments/ckzc11/cppcast\\_approval\\_tests\\_with\\_clare\\_macrae/](https://www.reddit.com/r/cpp/comments/ckzc11/cppcast_approval_tests_with_clare_macrae/)
- ▶ Code <https://github.com/approvals/ApprovalTests.cpp> (Apache 2.0)
- ▶ Approval Tests Library - Capturing Human Intelligence [available for Java, C#, VB.Net, PHP, Ruby, Node.JS and Python] <https://approvaltests.com/> by Llevelyn Falco
  - ▶ Supports Catch, Catch 2, Google Test, Okra
- ▶ Mutation tests: sabotage the code
  - ▶ Mutate++ [https://github.com/nlohmann/mutate\\_cpp](https://github.com/nlohmann/mutate_cpp)

## Books

- ▶ Modern C++ Programming with Test-Driven Development, by Jeff Langr [[Safari Books Online](#)]
- ▶ Your Code as a Crime Scene, by Adam Tornhill [[Safari Books Online](#)]
- ▶ Software Design X-Rays, by Adam Tornhill [[Safari Books Online](#)]

## Tools

- ▶ OpenCoverage <https://github.com/OpenCppCoverage>
- ▶ BullseyeCoverage <https://www.bullseye.com>

- ▶ Implementation <https://github.com/kokkos/mdspan> (BSD 3-Clause)
  - ▶ Intro <https://github.com/kokkos/mdspan/wiki/A-Gentle-Introduction-to-mdspan>
  - ▶ r/cpp [https://www.reddit.com/r/cpp/comments/cl127i/mdspan\\_productionquality\\_reference\\_implementation/](https://www.reddit.com/r/cpp/comments/cl127i/mdspan_productionquality_reference_implementation/)
- ▶ Kokkos <https://github.com/kokkos/kokkos>
- ▶ Multi-dimensional strided array views in Magnum <https://blog.magnum.graphics/backstage/multidimensional-strided-array-views/>
- ▶ P0009R9 **mdspan**: A Non-Owning Multidimensional Array Reference <http://wg21.link/p0009r9>
- ▶ CppCast with Bryce Adelstein Lelbach <https://cppcast.com/bryce-lelbach-mdspan/>



**Tony Van Eerd** @tvaneerd

```
try {  
    return vec.at(index);  
}  
catch (std::out_of_range const &) {  
    return -1;  
}
```

I just saw this in a code review and was going to claim it inefficient, but darn [@CompileExplore](#) proved me wrong again. (IIRAC\*) All compilers turn it into an if check on the bounds.

\*Read ASM

11h • 11/07/2019 • 22:56







**Simon Brand** @TartanLlama

Threw every C++ proposal title in history into a recurrent neural network and some sound surprisingly legit

```
Introducing the Proposal for an Resumable memory related initialization from string_user enuming_values
Integer C++ Function (Revision 9)
Fixing The Konates of Capture
feature_lock_view-expressions
GENDA, Tiny Proposed Regrogish to Standard Library
Transparentic atomic operations (rev. 3)
Editor's Report for Deprecate Vector Technical Specification and Allocation
Containers for Parflock Points
std::function without a requirement and optimization for the C++2 Defects Record
Propose-a the Generic Memory Modification
Equalized Interaction for the Model Proposal for P0107R2
Introduce types in computing and string_that in C++
Contract Design Aliation for be Business
Gegropage initialization finesy policies in point memory scheduler be_rodng_robot and enumerations
Reflection of noexcepts in C++20
std:::haluter_tokence_related (revision 1)
Meeting Not C++
Parallellative Intermate() and unlumbing_cip
What madened: Propose-tight member of Painfreacted Default
Lookup Asiomation TS
```

2d • 16/07/2019 • 20:07 •

