

C++ Club Meeting Notes

Gleb Dolgich

2018-12-20

Guaranteed Copy Elision Does Not Elide Copies

VCBlog post by Simon Brand :: Reddit

Continuing the theme of C++ misnomers, value categories are not categories of values; they are characteristics of expressions.

1. A *glvalue* (generalized lvalue) is an expression whose evaluation determines the identity of an object, bit-field, or function.
2. A *prvalue* is an expression whose evaluation initializes an object or a bit-field, or computes the value of an operand of an operator, as specified by the context in which it appears.
3. An *xvalue* is a glvalue that denotes an object or bit-field whose resources can be reused (usually because it is near the end of its lifetime).
4. An *lvalue* is a glvalue that is not an xvalue.
5. An *rvalue* is a prvalue or an xvalue.

That's a better name for this feature. Not guaranteed copy elision.

Deferred temporary materialization.

CppCon 2018: Victor Ciura: Enough string_view to Hang Ourselves (1/8)

YouTube

Convenience Conversions (and Gotchas)

- `const char *` automatically converts to `std::string` via constructor (*not explicit*)
- `const char *` automatically converts to `std::string_view` via constructor (*not explicit*)
- `std::string` automatically converts to `std::string_view` via conversion operator
- can construct a `std::string` from a `std::string_view` via constructor (*explicit*)

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CppCon 2018: Victor Ciura: Enough string_view to Hang Ourselves (2/8)



The image shows Victor Ciura, a man with glasses and a beard, wearing a pink shirt, standing on a stage and gesturing with his hands while speaking.

VICTOR CIURA

**Enough string_view
to Hang Ourselves**

string and string_view

⚠ Don't use `std::string_view` to initialize a `std::string` member !

If you know that you're ultimately going to create a `std::string`
make the whole *call chain* use `std::string`
don't mix-in `std::string_view` along the way.

🚫 `string_view` → `string` → `string_view` → ... → `std::string`
(maybe a string literal)

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CppCon.org

CppCon 2018: Victor Ciura: Enough string_view to Hang Ourselves (3/8)

The slide is from CppCon 2018 in Bellevue, Washington. It features a video feed of Victor Ciura speaking, a title card, and a sidebar with links to his blog post and the CppCoreGuidelines.

Lifetime profile v1.0

<https://herbsutter.com/2018/09/20/lifetime-profile-v1-0-posted/>

```
void example_2_6_2_1()
{
    std::string_view s = "foo"s;      // A
    s[0]; // ERROR (lifetime.3): 's' was invalidated when
          // temporary "foo"s' was destroyed (line A)
}
```

 CppCoreGuidelines

<https://github.com/isocpp/CppCoreGuidelines/blob/master/docs/Lifetime.pdf>

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VICTOR CIURA

Enough string_view to Hang Ourselves

Lifetime profile v1.0

NEW

<https://herbsutter.com/2018/09/20/lifetime-profile-v1-0-posted/>

```
<source>:7:5: warning: passing a dangling pointer as argument [-Wlifetime]
    s[0];                                // ERROR (lifetime.3): 's' was invalidated when
    ^
<source>:6:32: note: temporary was destroyed at the end of the full expression
    std::string_view s = "foo"s;           // A
    ^
1 warning generated.
Compiler returned: 0
```

clang -Wlifetime

CppCoreGuidelines

<https://github.com/isocpp/CppCoreGuidelines/blob/master/docs/Lifetime.pdf>

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std::string_view cheatsheet

Lifetime with `std::string_view` (C++17)
`std::string_view` isn't a drop-in replacement
for `const std::string&`

```
std::string str() {  
    return std::string("long_string_helps_to_detect_issues");  
}
```

<code>const std::string& s = str(); std::cout << s << '\n';</code> lifetime extended prints the correct result	<code>std::string_view sv = str(); std::cout << sv << '\n';</code> lifetime not extended prints nonsense
--	--

`const lvalue reference` binds to `rvalue` and provides lifetime extension. But there is no lifetime extension for `std::string_view`.

For short strings this issue might be hard to detect due to short string optimization (SSO). The problem becomes obvious with longer (dynamically allocated) strings.

2018 Victor Ciura @walletfox

Enough string_view to Hang Ourselves

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std::string_view is a borrow type

Borrow types are essentially “borrowed” references to existing objects.

- they lack ownership
- they are *short-lived*
- they generally can do without an *assignment operator*
- they generally appear only in *function parameter lists*
- they generally *cannot be stored in data structures or returned safely* from functions (no ownership semantics)

<https://quuxplusone.github.io/blog/2018/03/27/string-view-is-a-borrow-type/>

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std::string_view is a borrow type

`string_view` is perhaps the first “mainstream” **borrow type**.

BUT:

`string_view` is **assignable**: `sv1 = sv2`

Assignment has **shallow** semantics (of course, the viewed strings are *immutable*).

Meanwhile, the comparison `sv1 == sv2` has **deep** semantics.

<https://quuxplusone.github.io/blog/2018/03/27/string-view-is-a-borrow-type/>

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CppCon 2018: Victor Ciura: Enough string_view to Hang Ourselves (8/8)



The image shows Victor Ciura, a man with glasses and a bald head, wearing a light orange shirt and a lanyard, speaking at a podium during a presentation. He is gesturing with his right hand. The background is a dark stage with a screen showing the CppCon logo.

Simple rules for borrow types

Borrow types must appear **only as function parameters** and **for-loop control variables**.

We can make an **exception** for function **return types**:

- a function may have a borrow type as its return type
(the function must be **explicitly annotated** as returning a potentially dangling reference)
- the result returned **must not be stored** into any named variable,
except a function parameter or for-loop control variable

<https://quuxplusone.github.io/blog/2018/03/27/string-view-is-a-borrow-type/>

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Enough string_view to Hang Ourselves

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MSVC class layout (1/3)



Timothy Lochner
@tloch14

One of the best, and least known features of MSVC, is /d1reportAllClassLayout

Even works in Godbolt: [godbolt.org/z/
PAZzx1](https://godbolt.org/z/PAZzx1)

(thanks [@rob_brink](#) for the continual reminder that it exists) [pic.twitter.com/
eYeQfVnKf1](https://pic.twitter.com/eYeQfVnKf1)

```
1 struct test
2 {
3     int blah;
4     float blah2;
5     float expectPaddingAfterThis;
6     float* lolcakes;
7     int* anotherPointer;
8 };
9
```

MSVC class layout (2/3)



Timothy Lochner
@tloch14

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(thanks [@rob_brink](#) for the continual reminder that it exists) [pic.twitter.com/
eYeQfVnKf1](https://pic.twitter.com/eYeQfVnKf1)

```
class test      size(32):
    +---
0     | blah
4     | blah2
8     | expectPaddingAfterThis
     | <alignment member> (size=4)
16    | lolcakes
24    | anotherPointer
    +---
```

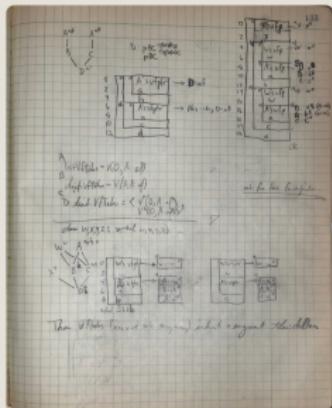
MSVC class layout (3/3)



Jan Gray @jangray

13h

@tloch14 @kenpex @rob_brink V0
(09/90) 😊



Simon Zeni @Bl4ckb0ne

9h

@tloch14 @rob_brink The same works
on linux with pahole!
godbolt.org/z/jPeCM2



Andrew Gresyk @andrew_gres...
@tloch14 @rob_brink + /
d1reportSingleClassLayout<name>

Conan, vcpkg or build2?

Reddit

- ▶ Pragmatic choice: vcpkg or Conan (they work today and are complete enough)
- ▶ Pragmatic no-brainer choice: vcpkg (it's the simplest and it have more packages ready)
- ▶ Pragmatic but need finer control choice: Conan (it gives more options)
- ▶ (Very) Long term choice: Build2 (shows great promises because it uses a coherent model...)
- ▶ Ideal choice (from the future): help SG15 (the group reflecting on tools vs C++) define interfaces for build systems and dependency managers so that your choice is not impacted by your dependencies choices.

Improving C++ Builds with Split DWARF

Article

```
1 | $ g++ -c -g -fPIC -fPIC main.cpp -o main.o  
2 | $ g++ main.o -o app
```

Having some fun with higher-order functions

- ▶ Article by Barry Revzin
- ▶ Boost.HOF

Compile-time raytracer by Tristan Brindle

- ▶ [Code](#)
- ▶ [Reddit](#)

Iterators: What Must Be Done?

- ▶ Article

Google C++ Style Guide is No Good

- ▶ Article by Eugene Yakubovich

Unlike C++ Core Guidelines that try to explain how to use the language effectively, GSG is about forbidding the use of certain features.

- ▶ Reddit

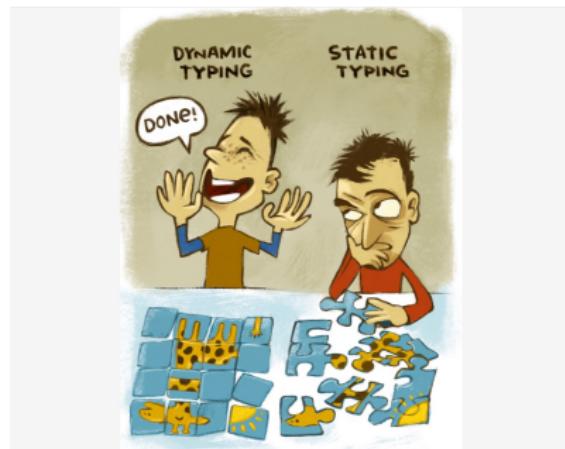
There are issues with the google c++ style guide, but this article is bad. It is basically just finding contrived cases where you have to use questionable constructs, or willfully misinterpreting the document.

Twitter



Kolja Wilcke
@01k

static vs dynamic #illustration
pic.twitter.com/nDgR8RGdPq



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Dmitry Sviridkin
@Nekrolm

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@Nekrolm C11 — Rogue One

1d