static operator[]

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Table of Contents

Revision History..........................................................................................................................1
  R1 ............................................................................................................................................1
  R0 ............................................................................................................................................1
Introduction .................................................................................................................................1
Motivation and Scope ..................................................................................................................2
Impact On the Standard ..............................................................................................................3
Design Decisions .........................................................................................................................3
Technical Specifications ............................................................................................................3
Acknowledgements ....................................................................................................................3
References..................................................................................................................................3

Revision History

R1
  • Bump the multidimensional subscript feature test macro version number.

R0
  • First proposed

Introduction
Both the static operator() proposal and the multidimensional operator[] proposal mention that operator[] should also be static. This paper proposes to make operator[] consistent with operator() in this regard.
Motivation and Scope

P2128 Multidimensional subscript operator had this to say on the subject of a static operator[]:

static operator[]

Our proposal does not support static operator[] declaration, but we would not oppose such a proposal.

We do recommend it should be consistent with the call operator, as is explored in P1169R0.

This author agrees these should be consistent and uniform, both from a useability and a teachability point of view.

Looking at the latest revision of P1169 static operator(), it mainly talks about EWG88:

This idea was previously referenced in [EWG88], which reads:

In c++std-core-14770, Dos Reis suggests that operator[] and operator() should both be allowed to be static. In addition to that, he suggests that both should allow multiple parameters. It’s well known that there’s a possibility that this breaks existing code (foo[1, 2] is valid, the thing in brackets is a comma-expression) but there are possibilities to fix such cases (by requiring parens if a comma-expression is desired). EWG should discuss whether such unification is to be strived for.

Discussed in Rapperswil 2014. EWG points out that there are more issues to consider here, in terms of other operators, motivations, connections with captureless lambdas, who knows what else, so an analysis paper is requested.

There is a separate paper proposing multi-argument subscripting [P2128R3] already, with preexisting code such as foo[1, 2] already having been deprecated.

Again, this author agrees that operator[] and operator() should both be static.
**Impact On the Standard**
The impact is minimal. Most of the changes added for static operator() involve lambdas and library wording, neither of which is applicable to static operator[]. Specifically, the only library feature at this time having multidimensional subscript operator support is P0009 MDSPAN, and that library does not take advantage of a static operator[].

**Design Decisions**
Stay as close as possible to the behavior of member function operator().

**Technical Specifications**
Wording relative to N4910 Working Draft, Standard for Programming Language C++:

[over.sub]p1:
A subscripting operator function is a member function named operator[] that is a non-static member function.

[tab:cpp.predefined.ft]:
__cpp_multidimensional_subscript 202110L 202211L

**Acknowledgements**
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**References**
P2128R6 Multidimensional subscript operator, Mark Hoemmen, Daisy Hollman, Corentin Jabot, Isabella Muerte, Christian Trott

P1169R4 static operator(), Barry Revzin, Casey Carter

EWG88 [tiny] Uniform handling of operator[] and operator()


N4910 Working Draft, Standard for Programming Language C++, Thomas Köppe