

Future of OpenMP API

Technical and Organizational Update

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The webinar will start shortly after the top of the hour. Stay tuned!

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OpenMP Architecture Review Board

The mission of the OpenMP ARB (Architecture Review Board) is to standardize directive-based multi-language **high-level parallelism** that is **performant, productive and portable**.

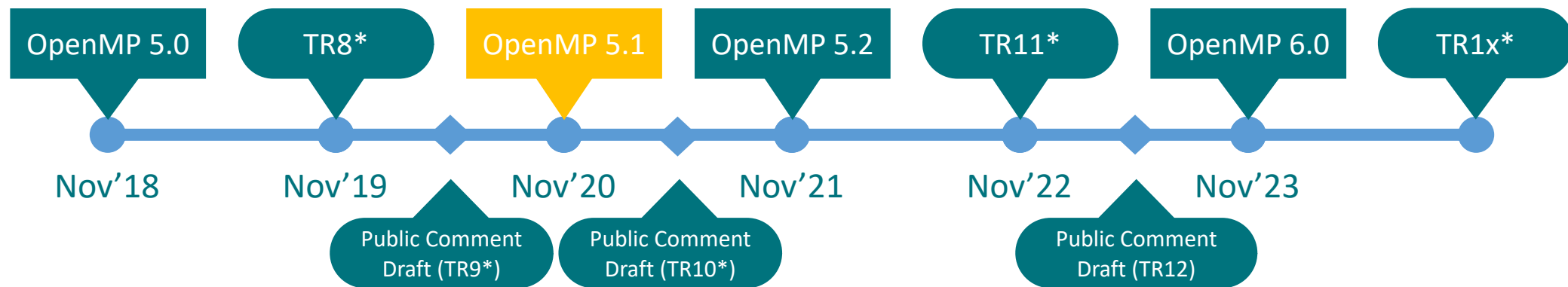
The OpenMP API moves common (domain) approaches into an industry standard.



OpenMP Roadmap

■ OpenMP has a well-defined roadmap:

- 5-year cadence for major releases
- One minor release in between
- OpenMP 5.2 was added as a second minor release before OpenMP version 6.0
- (At least) one Technical Report (TR) with feature previews in every year



* Numbers assigned to TRs may change if additional TRs are released.

Development Process of the Specification

- Modifications to the OpenMP specification follow a (strict) process:

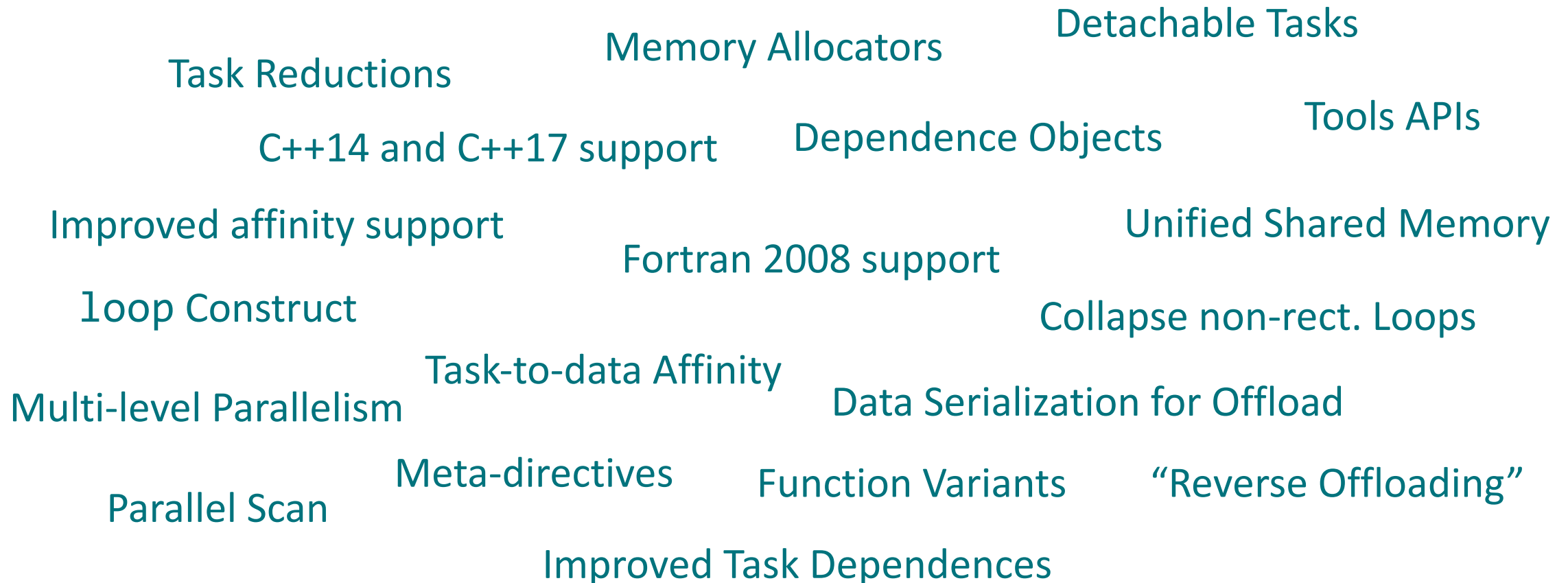


- Release process for specifications:



OpenMP Version 5.0

■ New powerful features to improve programmability



OpenMP Version 5.1

■ Even more new powerful features to improve programmability

C++ attribute specifiers
 dispatch Directive
 interop Directive
 Task Reductions
 Memory Allocators
 Detachable Tasks
 C++20 support
 Assume Directive
 C++14 and C++17 support
 Dependence Objects
 Tools APIs
 Improved affinity support
 error Directive
 Unified Shared Memory
 Fortran 2008 support
 Loop Construct
 Initial Fortran 2018 support
 Collapse non-rect. Loops
 Task-to-data Affinity
 Data Serialization for Offload
 Multi-level Parallelism
 Meta-directives
 Function Variants
 "Reverse Offloading"
 Parallel Scan
 masked Directive
 Improved Task Dependences
 Loop-Transformation Directives

OpenMP Version 5.2 is Coming Soon

- Will be released in November 2021, comment draft much sooner
- Will improve specification of OpenMP syntax
 - Ensuring syntax of directives and clauses is well-specified and consistent
 - Ensuring restrictions are consistent and not just implied by syntax
 - Deprecating one-off syntax choices and other inconsistencies
 - Makes C++ attribute syntax a first-class citizen
- Automating generation of large portions of specification
 - Section headers and directive and clause formats
 - Cross references and more?
- Many other many minor improvements
- Regularization of format specifications will eventually support generation of grammar and quick reference guides directly from specification

OpenMP Version 6.0 and Beyond

- Removal of features that were deprecated in 5.0, 5.1 or 5.2
- Continued improvements to device support
 - True support for using multiple devices
 - Extensions of deep copy support (serialize/deserialize functions)
- More support for memory affinity and complex hierarchies
- Task-only or free-agent threads
- Spawning tasks for other teams (event-driven parallelism and more)
- Deeper support for descriptive and prescriptive control
- Support for pipelining, other computation/data associations; data-flow?

OpenMP API Specification



- PDF and HTML available at <https://www.openmp.org/specifications/>
- You can also save your printer ink and get the full specification as a paperback book!
 - Always have the spec in easy reach.
 - Includes the entire specification with the same pagination and line numbers as the PDF.
 - Available at a near-wholesale price.
 - Get yours at Amazon at <https://link.openmp.org/book51>

ARB Members



Membership Structure

ARB Member	<ul style="list-style-type: none">■ Highest membership category■ Participation in technical discussions and organizational decisions■ Voting rights: organizational topics■ Voting rights: technical topics (tickets, TRs, specs)
ARB Advisor & ARB Contributor	<ul style="list-style-type: none">■ Contribute to technical discussions■ Voting rights: technical topics (tickets, TRs, specs)

Your organization can join and influence the direction of OpenMP.
Interested? Contact me at ceo@openmp.org.

Community Interaction



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The OpenMP API specification for parallel programming

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17th International Workshop on OpenMP

15-17 September 2021 | University of Bristol, UK.

CALL FOR PAPERS - DEADLINE: 14 MAY

Latest News





**OpenMP ARB**
@OpenMP_ARB
CSC - IT Center for Science,
Finland has joined the

Summary

- The OpenMP API versions 5.0 and 5.1 were a major leap forward
- The OpenMP API version 5.2 will improve quality of specification
- The OpenMP API versions 6.0 and later will add significant features
- OpenMP is a modern directive-based programming model
 - Multi-level parallelism supported (coprocessors, threads, SIMD)
 - Task-based programming model is the modern approach to parallelism
 - Powerful language features for complex algorithms
 - High-level access to parallelism; path forward to highly efficient programming



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