

State of OpenMP & Outlook on OpenMP 4.1

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Plan for OpenMP specifications

- OpenMP Tools Interface Technical Report
 - Released in March 2014
 - Working towards adoption in 5.0
- OpenMP 4.1
 - TR3: Initial Comment Draft: Changes adopted by SC14
 - Final Comment Draft: Released in July
 - Will be (mostly) finished next week, released by SC15
- OpenMP 5.0
 - Targeting release for SC17 (somewhat ambitious)
 - Committing to release by SC18
 - Plan to release intermediate TR(s) annually

Philosophy for OpenMP specifications

- Annual full specification TRs
 - Changes adopted over last year
 - Provided clear guidance to begin implementations of next release
 - Only changes to adopted content: major issues found in implementing and using the documented material
- Major releases
 - Address several major open issues for OpenMP
 - Do not break existing code unnecessarily
 - Targeting release four to five year cycle
- Minor releases
 - Clarifications and errata to existing specification
 - At most one or two major issues
 - May include a few other small new features
 - Do not break existing code
 - Typically two years after major release

OpenMP 4.1 will include many refinements to recent additions

- 92 tickets have been passed
 - Many refinements to device support
 - Reflects improved efficiency due to LaTeX conversion
- Many clarifications and minor enhancements
 - Handled several items from Fortran 2003 list
 - SIMD and tasking extensions and refinements
 - Reductions for C/C++ arrays and templates
 - Runtime routines to support cancelation and affinity
- Some new features have been added
 - Support for *doacross* loops
 - Can divide loop into tasks with `taskloop` construct
- Many clarifications and minor corrections

4.1 substantially improves device support

- Unstructured data mapping
- Asynchronous execution
- Scalar variables are firstprivate by default
- Improvements for C/C++ array sections
- Device runtime routines: allocation, copy, etc.
- Clauses to support device pointers
- Ability to map structure elements
- New combined constructs
- New way to map global variables (`link`)

Many other refinements to recent additions in 4.1

- Many clarifications and minor enhancements
 - SIMD extensions
 - Thread affinity policies
 - SIMD and SIMD parallel loop chunk size control
 - Support for `if` clause on combined/composite constructs
 - Grammar for `OMP_PLACES`
- Reductions for C/C++ arrays
- Improved support for C++ reference types
- Continues to increase Fortran 2003 support
 - Ten limitations will remain until 5.0
- Task priorities
- New terms to simplify discussion of new features

More significant topics are being considered for OpenMP 5.0

- Updates to support latest C/C++ standards
- More tasking advances (support for event loops)
- Continued improvements to device support
- Performance and debugging tools support
- Interoperability and composability
- Locality and affinity
- General error model
- Transactional memory
- Additional looping constructs and refinements

Help us shape the future of OpenMP

- OpenMP continues to grow
 - 26 members currently
 - More welcome, suggestions encouraged
- You can contribute to our releases
- Attend IWOMP, become a cOMPunity member
- Changes to OpenMP membership types expected
 - Multiple membership levels with different dues rates
 - Please let us know if you would be interested

