OpenMP 4.5 and Beyond – Webinar part 1
Overview

• Wednesday, June 28th, 2017

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Overview: OpenMP 4.5 Update

• Released at SC’15
• Many refinements to device support
• Clarifications and minor enhancements, including:
  – Reductions for C/C++ arrays
  – Runtime routines to support cancelation and affinity
• Some new features have been added
  – Support for doacross loops
  – Divide loop into tasks with taskloop construct
OpenMP 4.5 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)
OpenMP 4.5 has many other refinements to recent additions

- Many clarifications and minor enhancements
  - SIMD extensions
    - SIMD and SIMD parallel loop chunk size control
  - Addition of schedule modifiers: simd, monotonic, nonmonotonic
  - Clarifications of thread affinity policies
  - Grammar for OMP_PLACES
    - Support for if clause on combined/composite constructs
- Hints for locks and critical sections
- Continues to increase Fortran 2003 support
  - Ten limitations remain until 5.0
- Task priorities
- Improved support for C++ reference types
- Compiler support: http://www.openmp.org/resources/openmp-compilers/
OpenMP 5.0 Preview -- TR4 released November 2016

• Major new feature is performance tool support (TR2+)

• Some significant extensions to existing functionality
  – Support for task reductions, including on `taskloop` construct
  – Implicit `declare target` directives and other verbosity reducing changes

• Many clarifications and minor enhancements, including:
  – Use of any C/C++ `lvalue` in `depend` clauses
  – Addition of `depend` clause to `taskwait` construct
  – Addition of conditional modifier to `lastprivate` clause
  – Permits `declare target` on C++ classes with virtual members
  – Clarification of `declare target` C++ initializations
Memory Management --- TR5 released November 2016

• Language features for managing memory on systems with heterogeneous memories.

• Main Concepts:
  – Memory Spaces --- Represents memory resources
  – Memory Traits --- {Location, Distance, Bandwidth, Latency, Persistence, etc}
  – Allocator Traits
  – Allocator and Directives APIs
OpenMP 5.0 will significantly extend TR4 & TR5

• OpenMP 5.0 is scheduled to be released by SC18
  – TR6 (TBD – SC’17) will document most additions for 5.0

• Main Topics for 5.0
  – Memory locality, affinity and working with complex memory hierarchies
  – Updates to support latest C/C++ standards, completion of Fortran 2003
  – Continued improvements to device support and tasking, including:
    • Deep copy for mapped variables; Improved support for multiple devices
    • Unshackled threads, major extensions for task dependences
  – Interoperability and composability
  – Debugging tools support
Help us shape the future of OpenMP

• Connect with the SOLLVE project --- WBS# 1.3.1.15
  – Complete our survey on the confluence site!
  – Application engagement via shared milestones for FY17,18,19

• OpenMP continues to grow
  – 28 members currently

• You can contribute to our now planned annual TR or complete specification releases

• Attend IWOMP, become a cOMPunity member

• Become a member in the OpenMP ARB
  – OpenMP membership types will become more accessible
  – Please let us know if you would be interested