OpenMP* 4 Support in Clang* / LLVM*

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Clang*: An Excellent C++ Compiler.

• LLVM*: “Collection of modular and reusable compiler and toolchain technologies”
  • Created by Chris Lattner and Vikram Adve at UIUC*
  • Developed by Apple*, Google*, Intel, IBM*, Sony*, ARM*, …
• Clang: “…a new C, C++, Objective C and Objective C++ front-end for LLVM compiler”
  • First to implement full C++11 (and now C++14) support
• Open source under “UIUC” BSD-style license
…That Is Late To OpenMP* Party

• Driving forces behind Clang/LLVM are not interested in OpenMP and HPC in general

• Development of OpenMP support started in late 2012
  • First by AMD* and Intel
  • Now ANL*, IBM*, Micron*, Pathscale*, TI* and UoHouston* are involved
  • Proprietary (non open-source) implementations existed before

• Available at clang-omp.github.com…
  • Based on clang/llvm 3.5 release

• …but not in Clang/LLVM trunk yet
  • OpenMP 3.1 support planned for llvm 3.6
OpenMP 4.0: Already Here!

- Everything implemented…
  - Including tasking enhancements, pragma omp simd
  - x86, x86-64, POWER®, ARM® supported
  - Again, in github only; plan to upstream in time for llvm 3.7 release
- …with one big exception: offloading
  - Both design and implementation are under development
- Pragma omp simd
  - Feature complete (in github), basic functionality (in trunk)
  - Vectorizer tuning under development
  - Available in clang/llvm 3.5 (-Xclang -fopenmp=libiomp5)
- Intel OpenMP Runtime Library
  - Open-sourced under the same license as LLVM; openmp.llvm.org
  - OpenMP 4.0 fully supported
You Are Welcome!

- Help with development
  - Code, tests, bug reports
- Use OpenMP-enabled clang!
  - Get performance boost
  - Report your results to us
  - Influence future developments
  - Innovate on top of what we did
- clang-omp.github.com, openmp.llvm.org
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