CRAY THE SUPERCOMPUTER COMPANY

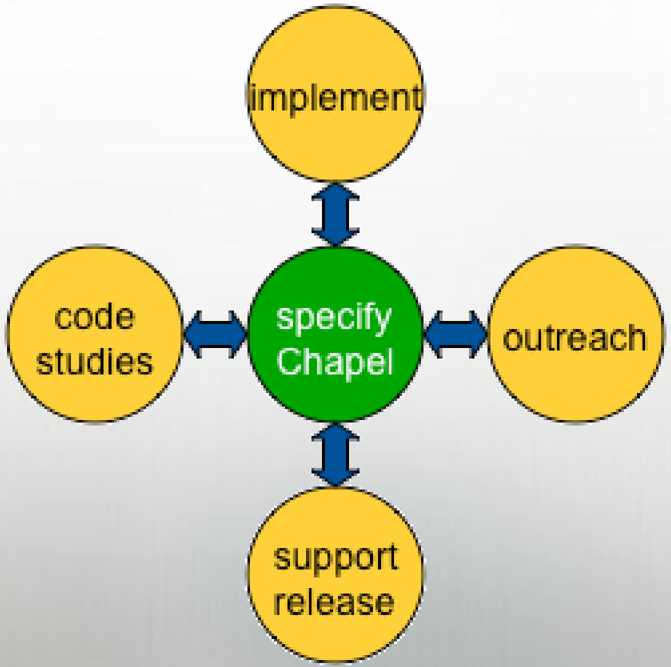
Chapel: Project Overview

Outline

- What we do
- Project Status
- Who we are

Chapel Work

- Chapel Team's Focus:
  - specify Chapel syntax and semantics
  - implement open-source prototype compiler for Chapel
  - perform code studies of benchmarks, apps, and libraries in Chapel
  - do community outreach to inform and learn from users/researchers
  - support collaborators and users of code releases
  - refine language based on all these activities



Implementation Status -- Version 1.3.0

In a nutshell:

- Most features work at a functional level
- Many performance optimizations remain

This is a good time to:

- Try out the language
- Give us feedback to improve the language
- Use Chapel for parallel programming education
- Use Chapel for non-performance-critical projects

In evaluating the language:

- Try to judge it by how it should *ultimately* perform rather than how it does today
  - lots of low-hanging fruit remains, as well as some challenges

“I Like Chapel, how can I help?”

- Let people know that you like it and why
  - your colleagues
  - your employer/institution
  - Cray leadership

- Help us evolve it from prototype to production
  - contribute back to the source base
  - collaborate with us
  - help fund us to grow the team
  - help us get from “How will Cray make Chapel succeed?” to “How can we as a community make Chapel succeed?”

Join Our Team

- Cray:

Brad Chamberlain

Sung-Eun Choi

Greg Titus

Lee Prokowich

Vass Litvinov

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- External Collaborators:

Albert Sidelnik

Jonathan Turner

Srinivas Sridharan

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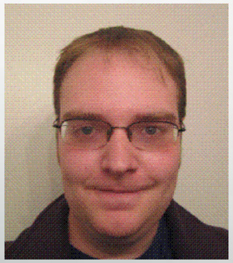
You?

- Interns:

Jonathan Claridge

Hannah Hemmaplardh

Andy Stone

Jim Dinan

Rob Bocchino

Mack Joyner

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We Are Hiring

Currently:

- Jr. SW Eng. doing R&D on targeting next-generation nodes
  - GPUs, tiled architectures, scratchpad memories, manycore, …

Upcoming:

- Hopefully more this year

Select Collaborations

- **ORNL/Notre Dame** (Srinivas Sridharan, Jeff Vetter, Peter Kogge): Asynchronous software transactional memory over distributed memory
- **UIUC** (David Padua, Albert Sidelnik, Maria Garzarán): CPU-GPU computing
- **Sandia** (Kyle Wheeler, Rich Murphy): Chapel over Qthreads user threading
- **BSC/UPC** (Alex Duran): Chapel over Nanos++ user-level tasking
- **Argonne** (Rusty Lusk, Rajeev Thakur, Pavan Balaji): Chapel over MPICH
- **CU Boulder** (Jeremy Siek, Jonathan Turner): Interfaces, concepts, generics
- **U. Oregon/Paratools Inc.** (Sameer Shende): Performance analysis with Tau
- **U. Malaga** (Rafael Asenio, Maria Gonzales, Rafael Larossa): Parallel file I/O
- **PNNL/CASS-MT** (John Feo, Daniel Chavarria): Cray XMT tuning
- (your name here?)

Collaboration Ideas (see chapel.cray.com for more details)

- memory management policies/mechanisms
- dynamic load balancing: task throttling and stealing
- parallel I/O and checkpointing
- exceptions; resiliency
- language interoperability
- application studies and performance optimizations
- index/subdomain semantics and optimizations
- targeting different back-ends (LLVM, MS CLR, …)
- runtime compilation
- library support
- tools: debuggers, performance analysis, IDEs, interpreters, visualizers
- database-style programming
- (your ideas here…)

Chapel Team's Next Steps

- Expand our set of supported distributions
- Continue to improve performance
- Continue to add missing features
- Expand the set of codes we are studying
- Expand the set of architectures we are targeting
- Support the public release
- Continue to support collaborations and seek out new ones
- Continue to expand our team

Questions?