Parallel Programming in Chapel: The Cascade High-Productivity Language

Chapel Team, Cray Inc.

PRACE Autumn School: October 25th, 2010
What is Chapel?

- A new parallel programming language
  - Design and development led by Cray Inc.
  - Initiated under the DARPA HPCS program

**Overall goal:** Improve programmer productivity

- Improve the **programmability** of parallel computers
- Match or beat the **performance** of current programming models
- Support better **portability** than current programming models
- Improve the **robustness** of parallel codes

- A work-in-progress
Chapel's Implementation

• Being developed as open-source at SourceForge

• Licensed as BSD software

• **Target Architectures:**
  • multicore desktops and laptops
  • clusters of commodity processors
  • Cray architectures
  • systems from other vendors
  • (more recently: CPU+GPU hybrids)
Today's Goals

- Introduce you to the Chapel language in-depth
- Give you experience...
  ...using the Chapel compiler
  ...writing Chapel code
- Get your feedback on Chapel
- Point you toward resources for future reference
Who Are You?

- Name
- Institution
- Role (student, postdoc, professor, researcher, ...)
- Favorite Programming Languages
- Parallel Programming Models (MPI, OpenMP, ...)

PRACE Autumn School 2010: Parallel Programming in Chapel
Rough Schedule

11:00 – Welcome
11:05 – Background
11:30 – Language Basics
12:00 – Data Parallelism
12:30 – Hands-On I
13:00 – Lunch
14:30 – Task Parallelism
15:00 – Locales and Domain Maps
15:30 – Summary and Sample Codes
16:00 – Hands-On II