Introduction to Chapel: 
a Next-Generation HPC Language

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What is Chapel?

- A new parallel language being developed by Cray Inc.
- Part of Cray’s entry in DARPA’s HPCS program

**Main Goal:** Improve programmer productivity

- Improve the *programmability* of parallel computers
- Match or improve upon the *performance* of current prog. models
- Provide better *portability* than current programming models
- Improve *robustness* of parallel codes

- Target architectures:
  - multicore desktop machines
  - clusters of commodity processors
  - Cray architectures
  - platforms from other vendors

- A work in progress
The Chapel Team

- Brad Chamberlain
- Steve Deitz
- Samuel Figueroa
- David Iten
- Lee Prokowich

- Interns
  - Robert Bocchino (’06 – UIUC)
  - James Dinan (’07 – Ohio State)
  - Mackale Joyner (’05 – Rice)
  - Andy Stone (’08 – Colorado St)

- Alumni
  - David Callahan
  - Roxana Diaconescu
  - Shannon Hoffswell
  - Mary Beth Hribar
  - Mark James
  - John Plevyak
  - Wayne Wong
  - Hans Zima

Goals For Today

- Provide an overview of next-generation HPC languages
- Introduce you to the Chapel language in depth
- Give you experience…
  …using the Chapel compiler
  …writing Chapel code
- Get your feedback on the language and compiler
- Point you toward resources to use after today
- Look for collaboration opportunities
Who are You?

- Affiliation: academia, industry, lab, other
- Favorite language(s)
- Familiarity with C/C++/Java
- Interest in next-generation HPC languages/Chapel
- What you hope to get out of this tutorial

Rough Schedule

9:00  – Welcome
9:15  – Chapel Background
9:30  – Base Language
10:00 – Coffee Break
10:15 – Task Parallelism
11:15 – Break
11:30 – Data Parallelism
12:30 – Lunch
14:00 – Locality and Affinity
14:30 – Status and Future Directions
15:00 – Coffee Break
15:15 – Hands-on Session
17:00 – Break
17:15 – Hands-on Session (continued)
19:00 – Done