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Faculty Summit 2012

ADVANCING THE STATE OF THE ART

Teaching Parallel Computing Nationwide and Beyond via NSF/XSEDE

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17 July 2012

www.cs.berkeley.edu/~demmel/Teaching_Parallel_Computing_July2012.pptx

Outline, and a little history

- CS267 – UC Berkeley's annual graduate parallel computing course
  - Based on "7 dwarfs of parallel computing"
- ParLab – funded by Microsoft, Intel, …
  - By "mining" applications, grew to short list of "parallel patterns", basis of ParLab proposal
  - Added 3 day Parallel Bootcamp
- XSEDE - NSF cyberinfrastructure
  - Responsible for management, training, …
  - Will broadcast above courses, others, nationwide

What do CSE and commercial applications have in common ?

HPC

Structured Grid
Dense Matrix
Sparse Matrix
Spectral (FFT)

N-Body
MapReduce

Unstructured Grid

CS267 – Applications of Parallel Computing

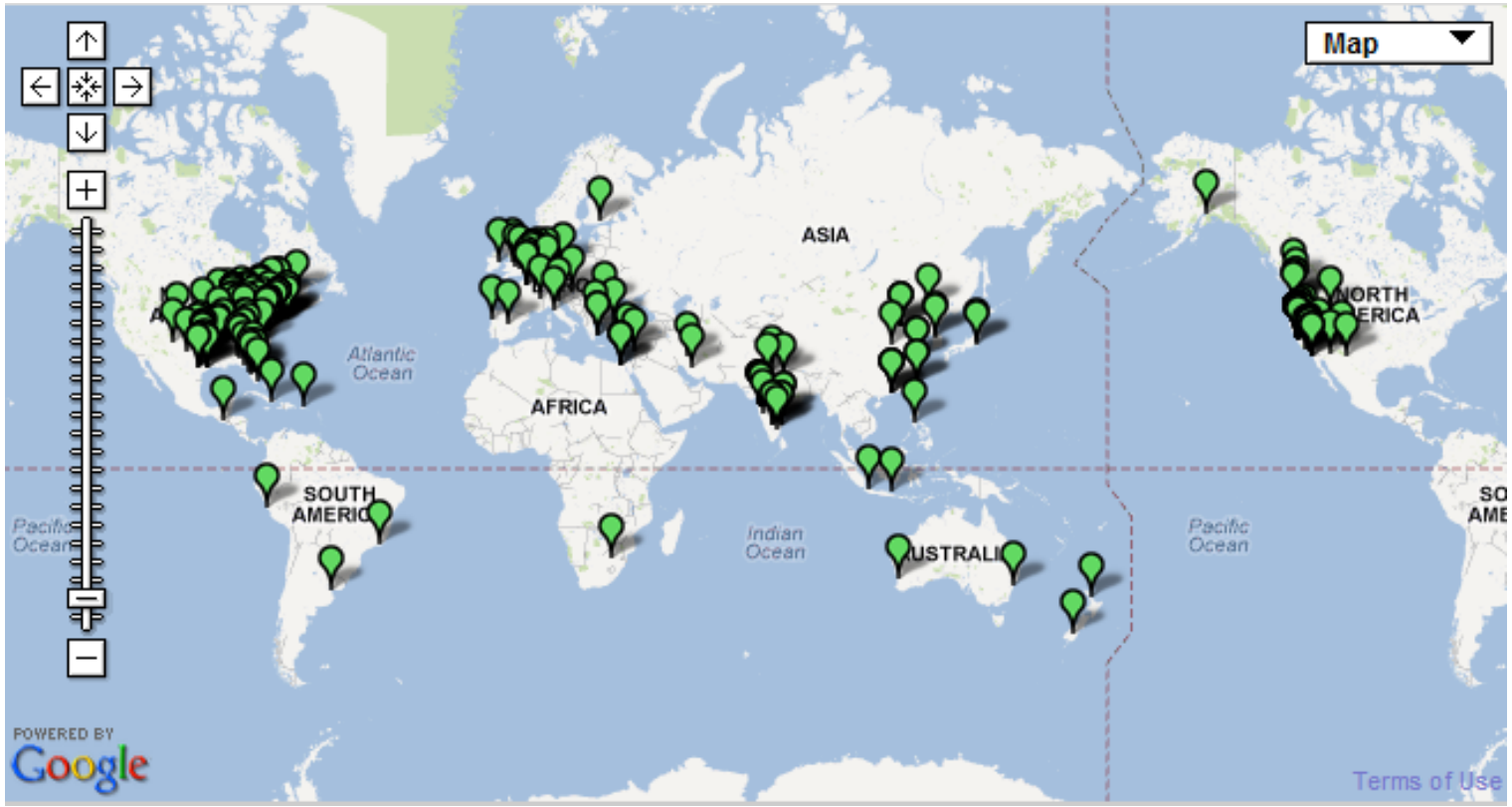
- Graduate course, on-line each spring semester
  - XSEDE will offer it starting Fall 2012
  - Students from many depts., undergrads too
- (Some) topics
  - Recognizing, using patterns, their algorithms
  - Shared memory (OpenMP, pThreads), distributed memory (MPI), PGAS (UPC), GPU (CUDA), cloud
  - Tools: debugging, performance, autotuning, frameworks …
  - Exciting apps: Climate, astrophysics, material science …
- Homework: matmul, particle simulation, knapsack
  - Autograder under construction

Example CS267 class projects

- Parallel web search engine
- Content based image recognition
- Faster molecular dynamics, applied to Alzheimer's Disease
- Better speech recognition via a faster "inference engine"
- Faster algorithms to tolerate errors in new genome sequencers
- Faster simulation of marine zooplankton population
- Electronic structure calculations
- Sharing cell-phone bandwidth for faster transfers
- See webpages for others

Where do Bootcamp attendees come from (2009-2011)?

- 991 attendees, half on-site, half remote
- 680 academic attendees, from 142 universities
- 281 industrial attendees , from 102 companies/labs



More courses, information

- Parallel Bootcamp – Aug 15-17, 2012
  - parlab.eecs.berkeley.edu/2012bootcamp
  - Microsoft: homework available as NsfPPC
    - Thanks to Juan Vargas, Matej Ciesko, Jan Ciesko
- CS267
  - www.cs.berkeley.edu/~demmel/cs267{_Spr12}
  - Spring (live) and Fall (video via XSEDE)
- CS194 – Engineering Parallel Software
  - Kurt Keutzer, upper division undergrad
  - Similar philosophy, based on custom video game
- ACTS Workshop – Aug 14-17, 2012
  - acts.nersc.gov – advanced HPC tools, offered by DOE/NERSC
- XSEDE: www.xsede.org

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