

Petaflops Algorithms

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An Introduction to the Issues

- **The concurrency challenge.**
 - » Little's Law implies that 10^7 to 10^8 concurrent threads must be found in algorithms running on petaflops systems.
- **Hierarchical algorithms.**
- **Latency tolerant algorithms.**
- **Bandwidth-friendly algorithms.**
- **Numerical accuracy issues.**
- **Numerical scalability.**
 - » Computational work scales as n^4 , while memory scales as n^3 .
 - » Can we break the link between grid size and time step size?
- **Exploring trade-offs in the space of algorithm variants.**



Session Presentations

- **Adolfy Hoisie:** *Performance and Scalability Modeling of Applications on Petaflops-Scale Architectures.*
- **Vipin Kumar:** *Algorithm Scalability Issues in Petaflops Architectures.*
- **David Keyes:** *The Next Four Orders of Magnitude in PDE Simulation Performance.*
- **Rupak Biswas:** *The Feasibility of Adaptive Unstructured Computations on Petaflops Systems.*
- **Anthony Drummond:** *The UCLA Earth System Model: Performance, Scalability and Computational Challenges.*
- **Jake Maizel:** *Some Petaflops Challenges from Biomedical Research.*

