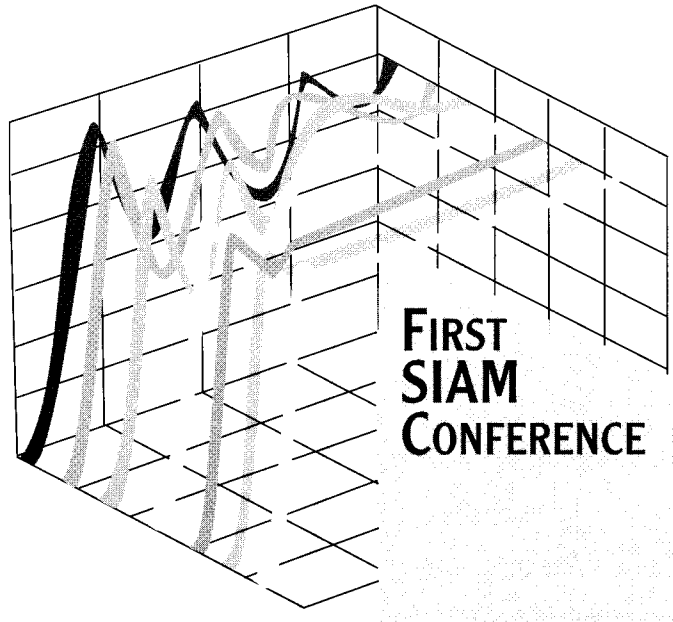
Final Program and Abstracts



SEPTEMBER 21-24, 2000

Conference Themes

The themes of the 2000 conference include, but are not limited to:

- Advanced Discretization Methods
- Chemical Engineering
- Combustion
- Computational Biology
- Computational Chemistry
- Graduate CS&E Programs
- Internet Modeling and Reliability
- Mechanics
- Ocean Modeling
- Optimization
- Partial Differential Equations and Computational Applications
- Problem-Solving Environments
- Software Engineering
- Systems and Uncertainty
- Visualization and Computer Graphics
- Weather Prediction

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MS49

PC Clusters: Performance Comparisons in NT and Linux Environments

We have implemented a PC cluster consisting of 32 dual 400 MHz Pentium I processor Compaq ProLiant servers. We compared the performance of the NAS Parallel Benchmarkprograms on this cluster under Linux and NT environments. We find that for a given task, performance is affected by many factors, including compilers, MPI implementations, and net rk device drivers.

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MS49

The Advanced Cluster Computing Consortium

The Advanced Cluster Computing Consortium was formed in 1999 to plan, implement, and maximize the performance of industry-standard software, systems and tools for high performance computing. This presentation will discuss how Cornell ved from a "big iron" proprietary HPC environment to industry standard clusters, hy NT/Windows 2000 was selected as the operating system, and the challenges and successes moving to a Windows 2000 24x7 production environment.

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MS49

High Throughput Computing on Distributively Owned Computing Resources

Today, powerful computing capabilities are found on office desks, on laboratory shelves or on racks. These abundant resources are managed by commodity software and are interconnected by fast networks. We will discuss the challenges we face in transforming "communities" of distributively owned commodity hardware and software into productive computing environments. The talk is based on our experience with the Condor high throughput system and our involvement in efforts to develop computational grids

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MS49

High Performance Computing with Commodity Clusters

High performance Intel processors, low latency high bandwidth interconnects, robust operating systems and compilers have made it possible to construct commodity clusters that produce supercomputer levels of computational performance. The Alliance 256 processor IA-32 Windows NT cluster is an MPI machine for production scientific computing and significant work is also being done with clustered Linux systems. Performance and operational information on the clustering work will be presented.

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MS50

High-order Combined Compact Schemes for Ocean Modeling and Simulation

We derive a series of combined compact difference (CCD) schemes (standard, nonuniform, staggered) for numerical ocean modeling and simulation. The major features of the CCD schemes are: combination of the first and second derivatives, implicit, sixth-order accuracy, and inclusion of boundary values. We develop a twin-tridiagonal method for calculating derivatives and a triple-tridiagonal method for solving partial difference equation. We show the improvement of ocean numerical models using the CCD scheme.

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MS50

Compact ADI Method for 2D and 3D Heat Equations

A compact alternating direction implicit (ADI) method has been developed for solving 2d and 3D heat equations. In this study, the second-prder derivatives with respect to space are discretized using the high-order compact finite differences. The Peaceman-Rathford ADI method is then employed to develop a new ADI scheme for solving 2D heat equations. It is shown by the discrete Fourier analysis that this new ADI scheme is onconditionally stable. The method is then generalized to the 3D case and an unconditionally stable compact Douglas ADI scheme is obtained. The method is illustrated by a numerical example.

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