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Features:

HPC Users Hold Dialogue Meetings in Europe

The 19th and 20th HPC User Forum meetings, held in Bologna and Zurich last week and co-sponsored by HPCwire, brought together more than 100 U.S. and European participants to discuss leading-edge research, market dynamics and vendor strategies. Local hosts for the meetings were CINECA (Bologna) and ETH (Zurich). Vendor-sponsors included Cray, Dell, Hewlett Packard, IBM, Intel, Lenovo and Sun Microsystems.

Attendees were welcomed by IDC's Earl Joseph, executive director of the HPC User Forum, and by Steering Committee Chairman Paul Muzio, who is VP-Government Programs for Network Computing Services, Inc. and Support Infrastructure Director of the Army High Performance Computing Research Center (AHPCRC). Other participating Steering Committee members were Paul Buerger, OSC; Steve Finn, BAE Systems; Jim Kasdorf, PSC; and Robert Singleterry, NASA Langley.

Sanzio Bassini, CINECA, welcomed attendees to the Bologna meeting. CINECA plans to install a 5,000-core Opteron blade system and a 1024-core HP blade system that will rank high on the Top500 list. About half of CINECA'S utilization is from industry/private organizations, half from academia and national research agencies.

Earl Joseph gave an HPC Market Update, noting that the market grew 94 percent since 2002 and 24 percent in 2005 to reach \$9.2 billion. HP and IBM are virtually tied for first place, with Dell number three. Cluster performance now fits many job sizes. Price continues to be the key driver, but many buyers will pay up to 20 percent extra for special features. He invited everyone to attend the ISC 2006 conference in Dresden. IDC included the conference brochure in everyone's handouts.

Mario Caponnetto explained the use of CFD to design Luna Rossa, Italy's challenger for the America's Cup yacht race. With CFD, you can model flow better than experimentally, both in calm water and waves. Luna Rossa V was launched in Valencia in March. After 16 races, Luna Rossa is first.

Sukumar Chakravathy, Metacomp, discussed CFD analysis of the American Challenger rocket car, which aims to recapture the world land-speed vehicle record for the U.S. This vehicle has much in common with a rocket and an airplane, a few things in common with a car. The code used is CFD++ from Metacomp.

Martin Walker (Bologna) and Frank Baetke (Zurich) said Hewlett Packard is focusing primarily on high-growth segments, i.e., Linux clusters. HP is addressing the cooling challenge with an advanced heat exchanger called Sidewinder and is leveraging its inkjet technology expertise to selectively cool the hottest parts of printed circuit boards.

Catalin Morosanu stressed Intel's strong commitment to HPC, noting that 333 of the Top 500 systems are based on Intel. The company plans to launch its next platform, Woodcrest, very soon, and in July will launch Montecito, which doubles Itanium performance per socket (dual core) while reducing power consumption.

Arthur Thomas, Swiss Institute of Bioinformatics, reviewed the Vital-IT Project, a world-class HPC center dedicated to the life sciences, based on a joint venture between academic and industrial partners

(Intel, HP, Oracle). Vital-IT will promote new collaborations with industry and conduct important R&D.

Claude Arlandini said CILEA is a consortium of 10 universities in the Milan-Lombardy region that offers a wide choice of IT services to academia, the public administration sector and industry. CILEA has a strong commitment to life sciences research.

Bruno Finzi discussed Luna Rossa tonnage rules and tank tests, reviewing the historical development of the boat classifications since the mid-1800s and related rules.

Jim Kasdorf reviewed biocomputing at the Pittsburgh Supercomputing Center, noting that the National Resource For Biomedical Supercomputing hosts leading-edge research in HPC and the life sciences while also offering training, education and publications.

Alessandro Curioni explained IBM's emerging architectures for life sciences. Blue Gene/L is enabling breakthrough research in projects such as Blue Brain, and real applications are starting to be run on the Cell architecture.

Torsten Schwede, University of Basel and Swiss Institute for Bioinformatics, discussed virtual screening on Dengue virus proteins using the SwissBioGrid. PC desktop Grids provide a huge untapped resource. The licensing schemes for most commercial software are not suitable for Grids. Other issues: ensuring data integrity on distributed resources; non-intrusiveness of the application (not harming anyone else's computer); and numerical stability in heterogeneous environments.

Attendees were especially impressed with Paul Muzio's review of AHPARC's dynamic mesh generation modeling the flight dynamics of a hummingbird, which may someday make it possible to build small unmanned aerial vehicles (UAVs) with similar flight characteristics. Muzio also showed simulations of fluid flow around a parachute opening and blood flow membrane pump-based artificial heart, both based on dynamic meshes.

Anders Dellson, Mitronics, reported that applications are already written for the Mitron Virtual Processor, which runs the applications in FPGAs. A BLAST/bioinformatics package will soon be available on SGI systems and will be ported to other platforms.

Hans Mewes, MIPS Munich Information Center for Protein Sequences, said his organization is computing very large bioinformatics tasks using distributed resources, and storing the data in their database called SIMAP.

Nico Sanna said CASPUR's main activity is providing users with a set of high performance codes that have been optimized. CASPUR's approach is CPU-oriented: increasing the flow from memory to CPUs to get the best performance.

Roberto Ansaloni (Bologna) and Ulla Thiel (Zurich) reported that Cray had 38 percent growth in 2005, gained several new European customers, and had a record year in Japan. Major European customers include CSCS, AWE, CINECA, ICM/Warsaw University, and INM-Spain.

Anna Tramontano, CRS4 and "La Sapienza" University (Rome), discussed CRS4, a technology and bioinformatics center in southern Sardinia. CRS4 conducts research and also hosts collaborations with industry.

Robert Singleterry, NASA Langley, stressed that many codes used by engineers do not parallelize easily, and that the trend toward using slower processors in parallel systems is detrimental to engineering work. He reviewed NASA research on the effects of space radiation on astronauts.

Filippo Castiglione, IAC-CNR (Rome), discussed the ImmunoGrid, a distributed network being used for large-scale simulation of the immune system. Among other work, the organization is doing advanced simulation of the HIV-1 virus.

Carlo Nardone (Bologna) and Ulrich Klar (Zurich) reviewed Sun's plans for implementing "proximity computing" as part of the company's DARPA HPCS proposal. Proximity computing overlaps chips so they can communicate at high speed without wires over micrometer distances.

Paolo Cartoni, SISSA (International School For Advanced Studies), discussed molecular simulation approaches to proteins involved in neurodegenerative diseases, using the example of Parkinson's disease to explain the methodology.

Opening the Zurich meeting, Dr. Andreas Dudler said ETH Zurich promotes simulation and modeling as a third way of doing science, and handles enormous amounts of research data guarantees access to this data.

Artem Oganov, ETH Zurich, discussed USPEX, an evolutionary algorithm for crystal structure prediction, noting that to date it has had a 100 percent success rate. He presented multiple examples illustrating this success.

David Cremese, IBM, said Blue Gene/L is allowing scientists to overlap evaluation of physical models for the first time (multiple time scales, multi-physics). CPMD achieved 110.4 TF on a 64-rack Blue Gene/L with good scaling (58 percent).

Felix Schuermann, EPFL, summarized the Blue Brain Project, a collaboration with IBM aimed at increasing understanding of the human brain. The project started in July 2005, involves people from around the world, and has already scaled to the first 12-neuron recordings (simultaneous).

Tom Tabor said his firm publishes HPCwire, GRIDtoday and HPC books, along with hosting events. Coverage of the European market has increased markedly. Coming this year: HPCwire Radio; Daily News Alerts; and the book "HPC Contributions to Society II: The Impact Of The Cluster Revolution."

John Biddiscombe reviewed parallel visualization projects at CSCS. Most use ParaView, which is built on the VTK toolkit. The Pelton Project is an industrial collaboration to improve Pelton's turbines and their CFD simulations. CSCS recently joined SPHERIC (flow, turbulence simulations).

Petros Koumoutsakos, ETH Zurich, discussed his group's large-scale simulations using particles. The group produced the Parallel Particle Mesh (PPM) library, an easy-to-use, efficient infrastructure for particle-mesh simulations on parallel computers.

Paul Buerger explained the notion of "blue collar computing" at the Ohio Supercomputer Center, which aims to make computational methods and HPC more broadly available. OSC is involved in partnerships with research and commercial organizations. The Ralph Regula School for Computational Science provides training.

Michael Resch said the NEC SX-8 system at HLRS has 75 percent utilization and has averaged 2.5 TF sustained performance (30-35 percent of peak) over 60 projects. Porsche is happy with the Opteron-based Cray XD1 system at HLRS.

Earl Joseph reviewed the "Study of ISVs Serving the HPC Market: The Need for Better Application Software," which IDC did with the Council on Competitiveness. The study can be downloaded without charge at www.compete.org. He invited the HPC community to future HPC User Forum meetings: September 18-20, 2006 (Denver, Colorado); October 26-27, 2006 (Manchester, UK); February/March 2007 (India); and October 2007 (Stuttgart).

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