CSU ISTeC Distinguished Lecturer

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In cooperation with
the Department of Electrical and Computer Engineering
and the Department of Computer Science

An Overview and Trends in High Performance Computing

Jack Dongarra
University Distinguished Professor of Computer Science
University of Tennessee

Thursday, May 2, 2002
2:00 pm
Lory Student Center, Room 224-226

In this talk we will look at how High Performance computing has changed over the last 10-years and look toward the future in terms of trends. In addition, we advocate `Computational Grids' to support `large-scale' applications. These must provide transparent access to the complex mix of resources - computational, networking, and storage - that can be provided through the aggregation of resources. The vision is of uniform, location independent, and transient access to the computational, catalogued data, instrument system, and human collaborator resources of contemporary research activity in order to facilitate the solution of large-scale, complex, multi-institutional / multidisciplinary data and computational based problems.

Short Biography:

Jack Dongarra holds an appointment as University Distinguished Professor of Computer Science in the Computer Science Department at the University of Tennessee. He specializes in numerical algorithms in linear algebra, parallel computing, the use of advanced-computer architectures, programming methodology, and tools for parallel computers. Other current research involves the development, testing and documentation of high quality mathematical software. He was involved in the design and implementation of the open source software packages EISPACK, LINPACK, the BLAS, LAPACK, ScaLAPACK, Netlib, PVM, MPI, NetSolve, ATLAS, PAPI, and Harness; and is currently involved in the design of algorithms and techniques for high performance computer architectures. He is a Fellow of the AAAS, ACM, and IEEE and a member of the National Academy of Engineering.

Refreshments will be served.

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ECE and CS Seminar

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Three Tools to Help with Cluster and Grid Computing: ATLAS, PAPI, and Netsolve

Jack Dongarra
University Distinguished Professor of Computer Science
University of Tennessee

Thursday, May 2, 2002
11:00 am
Engineering Building, Room E204

In this talk we will look at some methods for generating automatically fast robust numerical kernels for numerical operations called ATLAS and methods for measuring the performance on today's processors called PAPI. ATLAS is a software package that will automatically generate highly optimized numerical kernels for our commodity processors. As the underlying computing hardware doubles its speed every eighteen months, it often takes more than a year for software to be optimized or "tuned" for performance on a newly released CPU. Users tend to see only a fraction of the power available from any new processor until it is well on the way to obsolescence.

The Performance API (PAPI) project specifies a standard application programming interface (API) for accessing hardware performance counters available on most modern microprocessors. These counters exist as a small set of registers that count Events, occurrences of specific signals related to the processor's function. Monitoring these events facilitates correlation between the structure of source/object code and the efficiency of the mapping of that code to the underlying architecture.

Finally we will look at a system, called Netsolve that allows users to access computational resources, such as hardware and software, distributed across the network. This project has been motivated by the need for any easy-to-use, efficient mechanism for using computational resources remotely. Ease of use is obtained as a result of different interfaces, some of which do not require any programming effort from the user. Good performance is ensured by a load-balancing policy that enables Netsolve to use the computational resource available as efficiently as possible. Netsolve offers the ability to look for computational resources on a network, choose the best one available, solve a problem (with retry for fault-tolerance) and return the answer to the user.

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