

Cray Research Software



The Benefits of Software Leadership

As the world's leading supplier of large-scale supercomputers, Cray Research has long understood that powerful hardware systems alone cannot meet the requirements of the most demanding scientific and engineering organizations. Equally powerful, robust software is needed to turn supercomputers into indispensable productivity tools for the sophisticated government, commercial, and academic user communities.

That's why Cray Research is also the pre-eminent global supplier of high-end supercomputing software, devoting half of its technical staff and R&D investment to software innovation.

Together Cray and Silicon Graphics represent the world's leading high-performance computing company. As a subsidiary of Silicon Graphics, Cray will continue its mission, maintain its leadership, and set both the hardware and software standard for high-end supercomputing.

The Demands of High-End Supercomputing

Cray® supercomputer systems often reside in the technical data centers of large public- and private-sector organizations. They serve as the central computing resources for mission-critical work such as national weather forecasting or product development, handling the around-the-clock workload demands of hundreds of simultaneous users, while fully interoperating with computing resources from Cray Research, Silicon Graphics, and other vendors in customer networks.

In these demanding environments, where multimillion-dollar projects are at stake, reliability, resource management, single job performance, complex multijob throughput, and high-bandwidth data management are critical. To Cray Research, these “must-have” requirements have been a way of life for more than 20 years.

Cray Research’s unrivaled data center experience has driven our continued high-end supercomputing leadership. Over time, Cray has continually reset the standard for supercomputer performance and operating system capabilities to meet the increasing demands of large technical computing organizations. No other vendor can match Cray’s expertise in establishing and maintaining the strong customer relationships required to meet these changing demands.

“WE ARE VERY HAPPY WITH OUR CRAY SYSTEM, AND WE ARE EXCEEDINGLY HAPPY WITH THE LEVEL OF SUPPORT THAT WE RECEIVE. THE SUPPORT IS AS IMPORTANT AS THE SYSTEM ITSELF.”

Neil Pfeiffer
Senior Technical Specialist
Raytheon Aircraft Company

“IF YOU TALK TO THE TOP END USERS IN THE WORLD, THEY WANT TO BUY SUPERCOMPUTERS FROM CRAY.”

Debra Goldfarb
Analyst
International Data Corporation

“UNICOS IS VIEWED AS ONE OF THE MOST RELIABLE SYSTEMS WITHIN THE ENGINEERING COMMUNITY AT BOEING. ITS RELIABILITY IS SOMETHING OUR ENGINEERS CAN DEPEND ON. THEY CAN SCHEDULE COMPUTING WORK AND KNOW IT’S GOING TO BE UP AND RUNNING.”

Barry Sharp
Lead Software Engineer
Boeing Information and Support Services



What Does It Take to Serve High-End Supercomputing?

High-end supercomputer customers demand far more than simply a fast hardware system at an attractive price. These sophisticated organizations expect their supercomputer vendors to anticipate their needs, to take manageable risks with innovative technology—in short, to exhibit leadership.

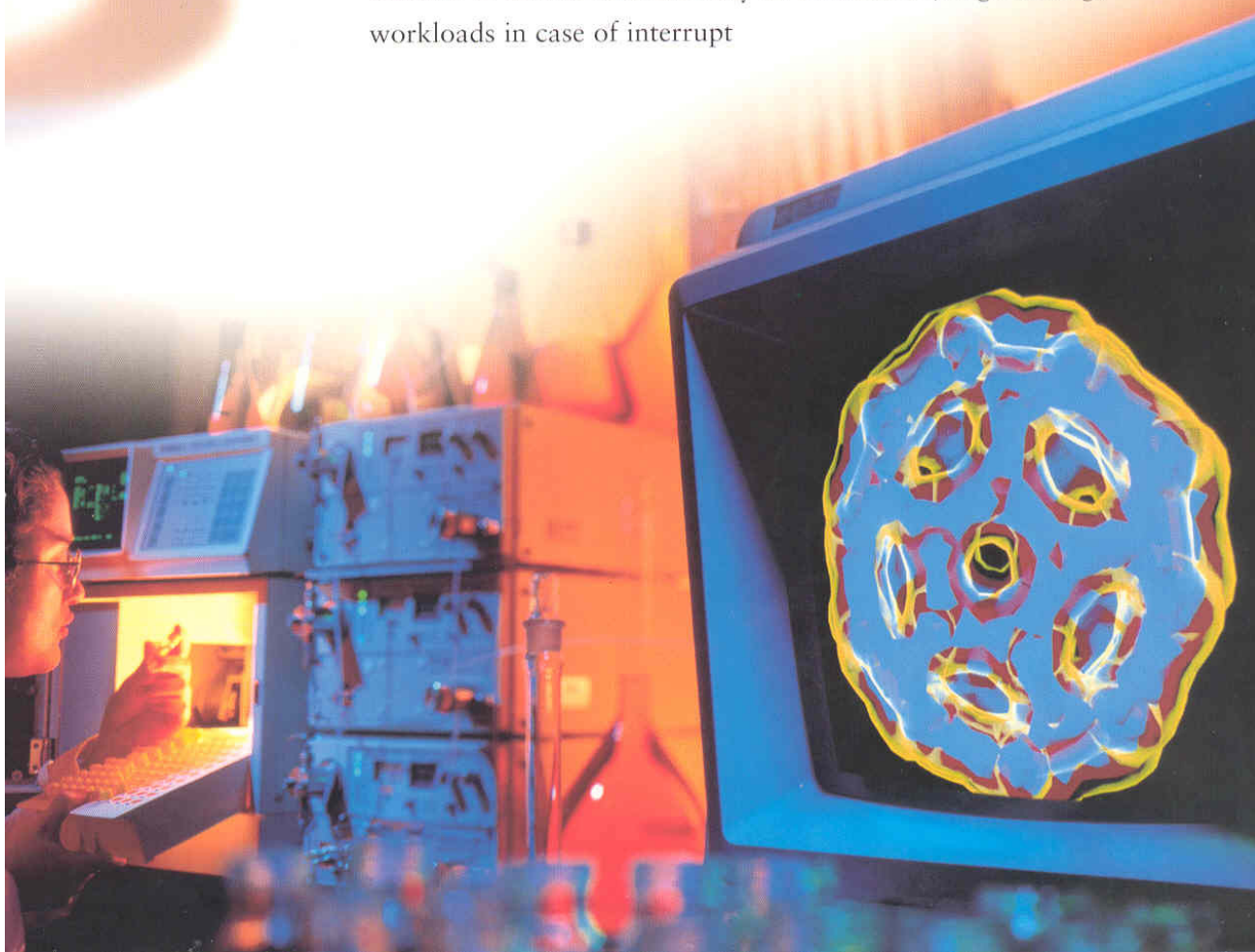
Cray Research has always done that. For example, Cray was at the forefront of the UNIX® revolution when, in 1984, Cray introduced the UNICOS® operating system (OS), the first parallel, 64-bit UNIX System V-based OS. The UNICOS OS quickly became the standard for supercomputing environments. Through ongoing technical innovation and close alliances with its customers, UNICOS remains the undisputed leader among high-end supercomputer operating systems. Cray is a software pioneer responsible for:

- Delivering the first full Fortran 90 compiler
- Implementing automatic parallel processing and large-sized memories
- Introducing scalable, distributed operating systems
- Developing “open supercomputing”—moving supercomputing into an open-standards environment
- Advancing high-performance computing standards such as the C programming language extensions for scientific computing

Data Center Quality

Cray data center-level software offers unmatched capabilities and quality including:

- High availability—Cray systems running the UNICOS OS typically run for longer than a year without interruption
- Efficient scheduling of high-priority, complex workloads for mission-critical projects
- Effective resource management, including resource allocation, tracking, and accounting features that make it easy to manage complex workloads
- Efficient workload distribution within the supercomputer system and across heterogeneous networks using the Cray Network Queuing Environment™ (NQE) software, which ensures access to system and network resources and “meters out” these resources to match a site’s unique needs, delivering the best computing performance at the lowest cost
- The industry’s most extensive automatic checkpoint/restart features to ensure recoverability of unfinished (long-running) workloads in case of interrupt



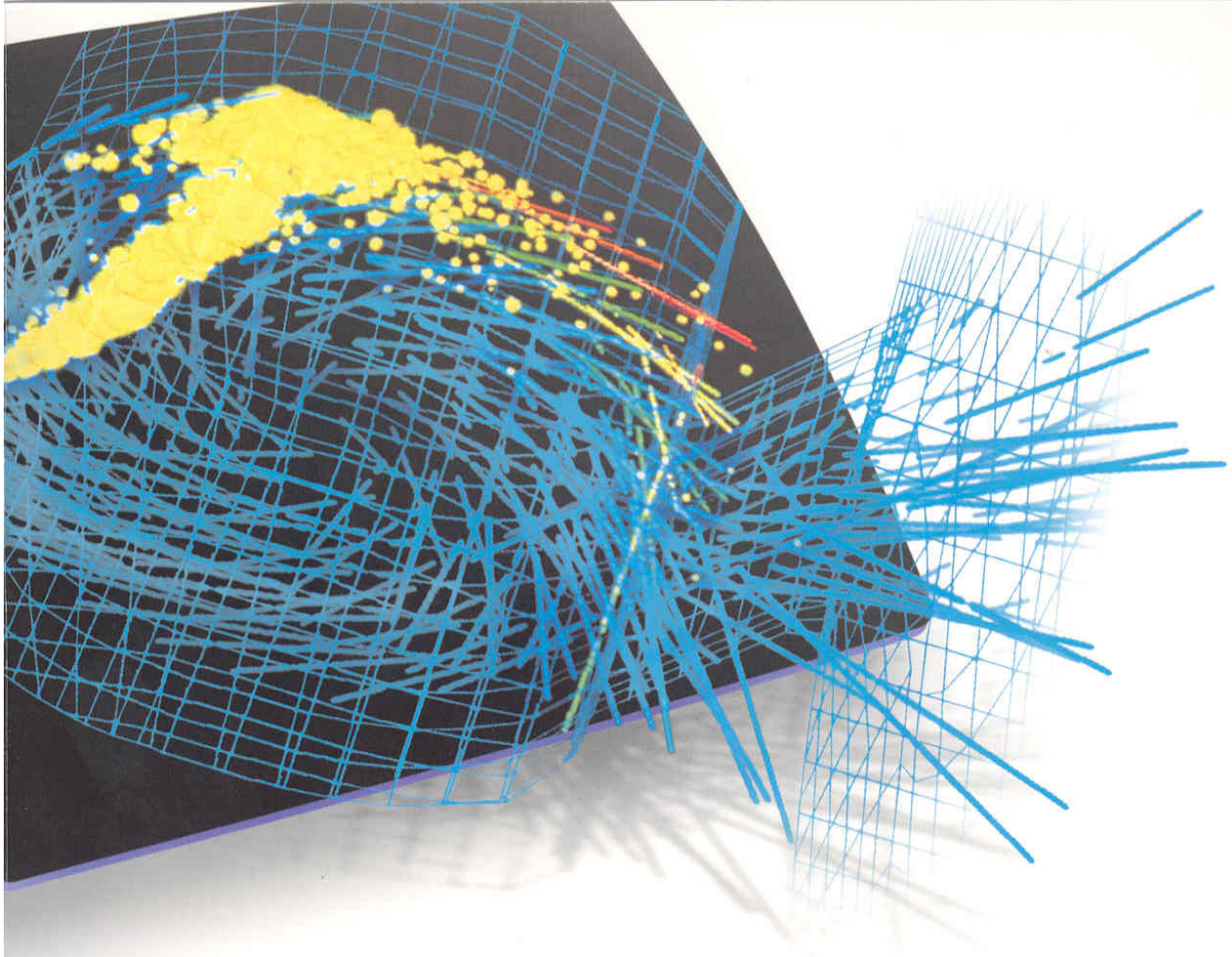


High Performance

High performance is the hallmark of supercomputing. The Cray name is synonymous with providing efficient, industry-leading performance on individual applications and in throughput environments supporting hundreds of applications.

An essential element of performance is parallel processing, and Cray supercomputing systems running the UNICOS OS have featured parallel processing capabilities since 1984. Today, Cray systems scale from a few processors to thousands. Well-designed scalable operating systems and programming environments are the keys to extracting parallel performance. Cray Research is unrivaled in delivering parallel performance to end users, largely because of our innovative high-performance software that includes:

- A multithreaded kernel for Symmetric Multiprocessing (SMP) computer architectures, which reduces the parallel processing overhead by allowing multiple processors to execute the kernel simultaneously
- A distributed OS for highly scalable parallel systems that efficiently scales local services with the number of processors
- Industry-leading Fortran, C, and C++ optimizing compilers
- Innovative programming tools with expert-system capabilities to simplify high-performance application development
- Industry-leading I/O libraries that deliver maximum I/O bandwidth to applications



High-Bandwidth Data Management

In the blink of an eye, industry-leading Cray supercomputing systems can generate data equivalent to the five million books in the New York Public Library. Managing such massive data has become a critical issue for high-end supercomputer users. Cray Research has addressed these needs with Data Migration Facility (DMF) software, a unique hierarchical storage management system that increases user productivity and lowers operating costs by stretching computer resources to accommodate explosive data growth. Cray DMF transparently moves files between disk and secondary mass storage, maintaining a site-specified amount of free disk space. This promotes efficient use of disk space, ensuring that the system's most active files reside either on line or are quickly accessible to users and applications. DMF can:

- Manage a complex data set comprising millions of files per Cray system
- Manage multiple terabyte (TB) files
- Easily manage overall data of up to 200TB (the largest Cray installation is more than one petabyte)
- Support data bandwidth speeds of up to 2TB moved daily and tape bandwidth speeds of more than 15MB/second

The World's First Binary-Compatible

Desktop-to-Teraflops

Over the next four years, Silicon Graphics/Cray Research—together the world's premier high-performance computer company—plans to deploy the world's first binary-compatible product line that extends from desktop products to multi-teraflops supercomputers. This unified architecture will combine the very best hardware and OS technologies of Silicon Graphics/Cray Research distributed memory scalable parallel (also called MPP), parallel vector, and Scalable Shared-memory Multiprocessing (S2MP™) systems—which today lead in every system class. The unified product line will be based on MIPS®, S2MP and the merger of Cray UNICOS and Silicon Graphics® IRIX™ operating environments. Critical to the product line is the evolution of an OS with unprecedented scalability for the highest performance and a high-end software environment providing reliability, “production” quality and comprehensive data center resource management. Advanced programming

environments and binary compatibility across the product line assure availability of a broad range of technical computing applications. As this exciting development progresses, high-end supercomputer users can rest assured of the Silicon Graphics/Cray commitment to protecting customers' software, peripheral and applications investments and to carrying them forward into the future.

Cray Research, a subsidiary of Silicon Graphics, Inc., is based in Eagan, Minnesota, a suburb of Minneapolis/St. Paul. Cray engineering, development, and manufacturing facilities are in Chippewa Falls, Wisconsin, and Mountain View, California. Cray sells its products through the Silicon Graphics sales force.

For more information, please contact your Silicon Graphics sales representative at a local Silicon Graphics office.



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