Introducing the CRAY Y-MP Computer System

The CRAY Y-MP computer system sets a new standard in supercomputer performance. Continuing the tradition of balanced computing performance established by the CRAY X-MP series of computer systems, the CRAY Y-MP system represents the latest in Cray Research multiprocessing technology. The CRAY Y-MP system provides users with eight central processing units (CPUs) — twice the number available on the largest CRAY X-MP systems — and 32 million 64-bit words of central memory. In addition, the CRAY Y-MP system includes as a standard feature a 128-million-word SSD solid-state storage device, providing fast added memory to tackle exceptionally large problems (with 256- and 512-million-word SSD models available as options).

The CRAY Y-MP computer system retains all of the important features of the CRAY X-MP series, including gather/scatter and compressed index vector instructions, flexible hardware chaining, and dedicated registers for interprocessor communication and control. But the CRAY Y-MP system surpasses the capabilities of the CRAY X-MP series with greater power through new technology and design innovations, including a six-nanosecond clock cycle.
A single module in the CRAY Y-MP system contains a complete CPU, along with logic for memory conflict resolution, I/O channels, and semaphore registers. Users can assign each of the CRAY Y-MP system’s eight CPUs to a separate job, or harness any number of CPUs to operate concurrently on the same job. This multiprocessing option can reduce dramatically the time needed to solve the largest, most complex problems, opening new avenues of research to scientists and engineers.

Each of the 32 memory modules in the CRAY Y-MP system contains one million 64-bit words of bipolar, random-access memory. The interleaved multiprocessor memory features single-bit error correction/double-bit error detection (SECDED) logic. The memory also features built-in conflict resolution hardware to minimize delays and maintain the integrity of simultaneous memory bank conflicts.

The input/output capabilities of the standard Cray I/O Subsystem (IOS) complement the CRAY Y-MP CPUs and enable fast, efficient data access and processing. One IOS is standard with CRAY Y-MP systems, and a second can be connected to accommodate greater I/O needs. The IOS is an integral part of the CRAY Y-MP design and acts as a data distribution point for the mainframe.

Additional data storage capacity is provided by the Cray SSD solid-state storage device, a fast random-access device suitable for use with CRAY Y-MP computer systems. System performance is enhanced by the exceptionally high transfer rates and short data access times of the SSD. Transfer rates of 100 to 1000 Mbytes/sec per channel and access times of under 25 microseconds can be achieved between an SSD and a CRAY Y-MP system. The DS-40 disk subsystem and DD-49 disk drives, high-density magnetic storage devices, also complement and balance the increased computational power of the CRAY Y-MP system. Each of the four DD-40 disk storage units in a DS-40 disk subsystem provides 5.2 Gbytes of storage. A DD-49 disk storage unit provides 1.2 Gbytes of storage.

CRAY Y-MP system software features the proprietary Cray operating system UNICOS, as well as a vectorizing Fortran compiler and an extensive set of Fortran, multitasking, and scientific library routines and program- and file-management utilities. Cray Research also offers scalar optimizing and vectorizing C and Pascal compilers, the Cray CAL assembler, and parallel-processing tools featuring source code maintenance, debugging, editing, dynamic and static analysis, and conversion aids. In addition, hundreds of application programs are available for CRAY Y-MP systems to solve problems in aerospace and automotive engineering, chemical and physical research, petroleum exploration and recovery, electronic design, and other areas of scientific research and engineering. All UNICOS and Fortran software developed for CRAY X-MP computer systems is accommodated by the CRAY Y-MP system, thus protecting user software investments.

Cray Research provides versatile connectivity for CRAY Y-MP systems, enabling the systems to be integrated into networks that comprise a variety of other vendors’ computer systems. Cray Research currently provides network gateway support for IBM, CDC, DEC, Unisys, and Honeywell systems. In addition, multiple front-end systems can be configured with CRAY Y-MP systems by using channel adapters such as Network Systems Corporation’s HYPERchannel, Computer Network Technology’s LANdor, and similar network adapters. Digital Equipment Corporation offers a VAX Supercrcomputer Gateway that provides a high-performance direct connection between the DEC VAXcluster environment and the CRAY Y-MP system.

The CRAY Y-MP computer system reflects Cray Research’s commitment to provide researchers around the world with the most advanced computing solutions. Increasingly high levels of multiprocessing, abundant I/O capability, and very large, fast-access memory make CRAY Y-MP computer systems the tool of choice for leading-edge research and industrial production computing. The balanced capabilities, reliable hardware and software, and comprehensive customer support that Cray Research provides ensures that CRAY Y-MP system users will derive the most illuminating, precise, and profitable results.