CRAY
THE SUPERCOMPUTER COMPANY

# Cray XMT™ Supercomputer

## Cray XMT Supercomputer Overview

**The Cray XMT supercomputing system is a scalable massively multithreaded platform with globally shared memory architecture for large-scale data analysis and data mining.**

The system is purpose-built for parallel applications that are dynamically changing, require random access to shared memory and typically do not run well on conventional systems. Multithreaded technology is ideally suited for tasks such as pattern matching, scenario development, behavioral prediction, anomaly identification and graph analysis.

- Architected for Large-scale Data Analysis
- Exploits the scalable Cray XT™ infrastructure
- Scales from 24 to over 8000 processors providing over one million simultaneous threads and 64 terabytes of shared memory
- Separately dedicated compute, service and I/O nodes
- Incorporates custom Cray Threadstorm™ multithreaded processor using AMD Torrenza Open Socket technology

### Architectural Overview

The Cray XMT system was architected to leverage Cray's MPP system design to create a scalable, reliable and economical multithreaded supercomputing platform. The design is based on a Cray MPP compute blade but utilizes AMD Torrenza Innovation Socket technology to populate the AMD Opteron sockets with custom Cray Threadstorm chips developed for multithreaded processing. A single Cray Threadstorm processor can sustain 128 simultaneous threads and is connected with up to 8 GB of memory that is globally accessible by any other processor in the system.

Each Cray Threadstorm processor is directly connected to a dedicated Cray SeaStar2™ interconnect chip, resulting in a high bandwidth, low latency network characteristic of all Cray systems. This allows the Cray XMT platform to scale from 24 to over 8000 processors providing over one million simultaneous threads and 64 terabytes of shared memory.

As another technology using the Cray XT™ infrastructure, the Cray XMT platform includes separate AMD Opteron™-based service blades can be configured for I/O, login, network or system functions and can also provide scalar processing for applications that are best served by a combination of scalar and multithreading technologies.

The Cray XMT system runs an operating system which distributes a multithreaded kernel to the compute blades and standard Linux on the service and I/O blades. This allows the compute nodes to focus on the application without being hampered by system administrative functions.

### Programming Environment

The Cray XMT programming environment includes advanced program analysis tools for software development and tuning:

- C and C++ compilers
- Automatic parallelization
- STL and common math libraries
- Cross compiler on Linux processors
- gcc/g++ on Linux nodes
- Cray Apprentice2™ for compiler analysis and performance visualization

# Cray XMT Specifications

| | |
|---|---|
| **CPU** | 500 MHz Single 64-bit Cray Threadstorm Processor |
| | 128 Threads per processor |
| | 4 or 8 GB per processor |
| | Opteron socket 940 compatible |
| | Low Power 30 Watt Design |
| | 96 CPUs per cabinet (max), 8024 CPUs per system (max) |
| **I/O** | XMT I/O is controlled by specialized service nodes based on the AMD Opteron processor. |
| | I/O uses PCI-X interfaces associated with service nodes. |
| | 2 Gb/s Fiber Channel disk interfaces to DDN and Engenio RAID systems. |
| | 1 GbE and 10GbE network connections. |
| **Cray XMT Software** | The Cray XMT system runs an operating system which distributes a multithreaded kernel (MTK) to the compute blades and runs SuSE Linux on the service and I/O blades.<br>This allows the compute nodes to focus on the application without being hampered by system administrative functions. |
| **MTK Operating System** | Monolithic OS that provides a global shared memory view of the system<br>API is based on BSD 4.4 with Cray extensions. |
| **Compilers** | C/C++ optimizing compiler developed by Cray to target the XMT instruction set architecture<br>Aggressive automatic parallelization capability. |
| | Support for various hierarchies of parallelization.<br>Within a single processor<br>Across multiple processors |
| | Support for XMT extensions to ease parallel programming<br>sync, future variables<br>future statements<br>pragmas |
| | Tightly integrated with debugging and performance analysis tools |
| **Power** | 15 - 22.5 kW (15.3 - 22.9 kVA) per cabinet, depending on configuration.<br>80 AMP at 200/208VAC (3 Phase & Ground), 63 AMP at 400 VAC (3 Phase, Neutral & Ground) |
| **Cooling Requirement** | Air Cooled, Air Flow: 3000 cfm (1.41 m3/s), Intake: bottom, Exhaust: top.) |
| **Dimensions (Cabinet)** | H 80.50 in. (2045 mm) x W 22.50 in. (572 mm) x D 56.75 in. (1441 mm) |
| **Weight (Maximum)** | 1529 lbs per cabinet (694 kg) |
| **Acoustical Noise Level** | 75 dba at 3.3 ft (1.0 m) |
| **Regulatory Compliance** | UL 60950-1, CAN/CSA – C 22.2 No 60950–1, CB Scheme Investigation to IEC/EN 60950-1 |
| **Safety** | FCC Class A, DOC Class A, VCCI Class, CISPR 22, EN 50022 Class A, AS/NZS 3548, EN 50082-1, EN 61000-3-2, EN 61000-3-3, Statskontoret 26.2 Category 1 IEC/EN 60950-1 FCC Class A, DOC Class A, VCCI Class, CISPR 22, EN 50022 Class A, AS/NZS 3548, EN 50082-1, EN 61000-3-2, EN 61000-3-3, Statskontoret 26.2 Category 1 |


Technical specifications on this page are subject to change without notice.