

Aurora. Some have more power™



Intelligent Performance	Intel® Xeon® 5600 series CPUs – Solid State Disk – Programmable accelerator
Scalability	166GFLOPS/Node – 42TeraFLOPS/rack – 1PetaFLOPS in 24 racks
Unified Network Architecture	60Gbps 3D torus – QDR Infiniband – Sub μ s memory to memory latency
Computational Efficiency	Synchronization networks – Reconfigurable network processor
Energy Efficiency	Liquid cooling – As much as 60% energy savings
Compatibility	Full x86 compatibility – Optimized MPI libraries
Reliability	ServNet® – No moving parts
Availability	Redundant – Hot Swap – Zero knowledge replacement

**Intelligent Performance:** Intel® Xeon® 5600 series CPUs – Solid State Disk – Programmable accelerator

Each Aurora node card provides two Intel® Xeon® 5600 series processors and up to 24GB of DDR3 memory and a performance of up to 166GFLOPS. An Intel® Solid State Disk with up to 160GB provides local storage for the fastest and most reliable checkpointing and application I/O. Extra acceleration and customization is possible thanks to the on-node, high performance programmable accelerator.

**Scalability:** 166GFLOPS/Node – 42TeraFLOPS/rack – 1PetaFLOPS in just 24 racks

Aurora has a modular design: one rack delivers 42TeraFLOPS and consists of 8 chassis, each delivering 5.25TeraFLOPS. The exceptional computational density of Aurora permits the deployment of very large systems with a very small footprint: for instance, a 1PetaFLOPS installation requires just 24 Aurora racks.

**Unified Network Architecture:** 60Gbps 3D torus – QDR Infiniband® – Sub μ s memory to memory latency

The Unified Network Architecture merges a 60Gbps 3D torus with a 40Gbps switched topology. The key components are the programmable network processor for the 3D torus and the Infiniband® adapter for the switched, QDR network.

The Unified Network Architecture permits automatic or user-optimized traffic routing of MPI traffic and the offloading of dedicated protocols (such as SAN, monitoring).

**Computational Efficiency:** Synchronization networks – Reconfigurable network processor

Three independent synchronization networks (system, sub-domain and local) preserve efficiency at Petascale by guaranteeing that the communications and the scheduling of all nodes are automatically handled.

The reconfigurable network processor allows alternative communication protocols and routing schemes.

**Energy Efficiency:** Liquid cooling – As much as 60% energy savings

All Aurora modules (node cards, power infrastructure, controller modules) are liquid cooled, permitting a very high computational density and dramatically lowering the total cost of ownership. Direct liquid cooling cuts operating costs being much more efficient and compact compared to traditional air and air-liquid hybrid approaches. Aurora liquid cooling infrastructure is fully integrated, for the highest level of compatibility with existing data centers.

**Compatibility:** Full x86 compatibility – Optimized MPI libraries

Aurora minimizes porting time and costs by providing full x86 compatibility thanks to the adoption of the Intel® Xeon® 5600 series CPUs. Aurora supports the full set of MPI libraries: most HPC codes compile and execute at very high efficiency even without system specific optimization.

**Reliability:** ServNet® – No moving parts

Aurora has been designed to provide the highest level of reliability: all critical system components are redundant. Liquid cooling and solid state storage eliminate vibrations and moving parts. Temperature of components is finely controlled and kept within optimal range for maximum reliability.

**Availability:** Redundant – Hot Swap – Zero Knowledge Replacement

Petascale installations must comply with the highest levels of availability. Aurora provides fine control and predictive capabilities over component behavior with dedicated and standard interfaces (IPMI, ServNet®). ServNet® provides a fully independent system monitoring and control infrastructure.

Nodes support Zero Knowledge Replacement, where stateless nodes are automatically configured by location (slot) aware user-programmable logic. The physical substitution of nodes is a snap thanks to hot-swap capabilities.

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