

Atipa Polaris Select HPC Cluster Series

The fast path to workload-optimized hardware and software for scientific simulation and modeling

Simulation and modeling applications, including computer-aided engineering (CAE), computational fluid dynamics (CFD), and computational chemistry are designed to run on scalable, high-performance computing (HPC) clusters. To support those applications at scale, modern HPC systems require multi-core processors, high-bandwidth fabrics, and broad input/output (I/O) capabilities. Because of the complexity and variety of technologies available on the market, assembling an HPC system can be time consuming, requiring substantial effort for research, evaluation, and deployment. In addition, integration and configuration of selected components can impact the performance of the solution. The level of expertise required to properly configure the combined solution can intimidate small and medium organizations. Even larger enterprises considering the benefits of HPC clusters must weigh the time and effort it takes to ramp up capabilities. These barriers slow down adoption of HPC clusters even though the return on the investment (ROI) can be significant.

Atipa Polaris Select HPC clusters are verified Intel® Select Solutions for Simulation and Modeling, providing a fast path for purchasing and deploying a cluster for simulation and modeling workloads. Intel® Select Solutions for Simulation and Modeling consist of a pre-validated selection of components designed to meet the demands of HPC applications and workflows. These systems provide the capabilities and agility needed to support a range of different workloads and reduce or eliminate the need for multiple single-purpose systems. In addition, the performance of key system characteristics is verified for Intel® Select Solutions for Simulation and Modeling at both the node and cluster level.

Atipa Polaris Select HPC clusters take the guesswork out of buying and deploying, and they put the focus squarely where it needs to be: on using the cluster for higher productivity and better performance. Key benefits of investing in Atipa Polaris Select HPC clusters include:

Simplified evaluation	Fast and easy deployment	Workload-optimized performance
<p>New workload integration is a key area where IT managers spend more and more time and money sorting through endless options, searching for optimal solutions. As verified Intel® Select Solutions, Atipa Polaris Select HPC clusters have tightly specified hardware and software components to eliminate guesswork and speed decision-making.</p>	<p>With pre-defined settings and rigorous system-wide tuning, Atipa Polaris Select HPC clusters are designed to increase efficiency in IT's testing process, speed time to service delivery, and increase confidence in solution performance.</p>	<p>Intel® Select Solution configurations are designed to replicate or exceed benchmark-performance threshold for the workload and are built on the latest Intel® architecture foundation including the recently-launched 2nd Generation Intel® Xeon® Scalable platforms.</p>

Piece-of-mind with performance-validated Atipa Polaris Select HPC clusters

Atipa Polaris Select HPC clusters are Intel® Select Solutions taking workload optimization to a new level, with configurations built in conformance with the Intel® HPC Platform Specification (Intel® HPS) and verified to exploit performance advantages of technologies enabled by 2nd Generation Intel® Xeon® Scalable processors. The solutions deliver optimized performance for Message Passing Interface (MPI)-based simulation and modeling applications registered with Intel® HPS. Supportability is also addressed with the inclusion of Intel® Cluster Checker, which provides expert systems advice for administrators to use in keeping a cluster functioning.

Atipa Polaris Select HPC clusters:

- Are performance-optimized for highly scalable simulation and modeling applications that use MPI libraries
- Reduce the time required to evaluate, select, purchase, deploy, configure, and support a workload-appropriate solution
- Improve delivery and uptime through simplified deployment and advanced diagnostics tools
- Are compatible with the Intel® HPC Platform Specification application catalog

Inside Atipa Polaris Select HPC clusters for simulation and modeling

Atipa Polaris Select HPC Solutions for Simulation and Modeling comprise several key hardware and software components.

Compute

Atipa Polaris Select HPC Solutions use the Intel® Xeon® Gold 6226 processor or a higher model Intel® Xeon® processor. Intel® Xeon® Gold 6226 processors offer 12 cores to deliver exceptional

performance for compute and data-intensive workloads. Optionally, Intel® Xeon® Platinum processors—with up to 28 cores—can be used to meet the most challenging compute needs.

Second Generation Intel® Xeon® Scalable processors feature significant enhancements that benefit HPC applications, higher clock frequencies, increased memory bandwidth and capacity, Intel® Advanced Vector Instructions 512 (Intel® AVX-512), and Intel® Deep Learning Boost (Intel® VNNI).

Fabric

Intel® Omni-Path Architecture provides 100 gigabits per second (Gbps) bandwidth and a low-latency, next-generation fabric for HPC clusters. The 48-port switch chip delivers a 33 percent increase in density over the traditional 36-port switch ASIC historically used for InfiniBand networking, which reduces the number of required switches. Intel® Omni-Path Architecture also reduces cabling-related costs, power consumption, space requirements, and ongoing system maintenance requirements. These advancements can lower fabric costs by up to 61 percent.¹

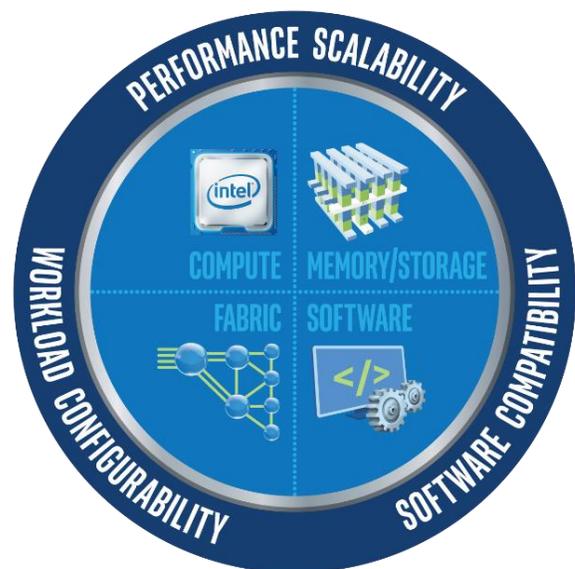


Figure 1. Intel® HPC Platform Specification delivers balanced HPC through tighter integration of compute, memory, storage, fabric, and software.

Intel® HPC Platform Specification (Intel® HPS)

The Intel® HPS specification provides an architectural foundation that enables development and deployment of a wide variety of high-performance, compute- and data-intensive workloads. Its standards-based programmability allows engineers to run diverse workloads on a broadly available, common infrastructure. Intel® HPS enables organizations to achieve high performance with flexibility, scalability, balance, and portability.

Configurations for Atipa Polaris Select HPC Solutions for Simulation and Modeling

Table 1 shows the minimum hardware configuration of Atipa Polaris Select HPC Solutions as validated for Intel® Select Solutions for Simulation and Modeling. To refer to a solution as an Intel® Select Solution, a solution must meet or exceed the defined minimum configuration.

Table 1. The minimum hardware configuration details for Atipa Polaris Select HPC Clusters as validated for Intel® Select Solutions for Simulation and Modeling.

INGREDIENT	ATIPA POLARIS SELECT HPC SOLUTIONS
PLATFORM	Dual-socket server platform
PROCESSOR	2 x Intel® Xeon® Gold 6226 processors (2.7 GHz, 12 cores/24 threads), or a higher model Intel® Xeon® Scalable processor
MEMORY	96 GB (12 x 8 GB 2,666-MHz 288-pin DDR4 RDIMM) 2 GB memory per processor core and all memory channels populated
LOCAL STORAGE	240GB Intel® SDD DC S4510
MESSAGING FABRIC	1 x Intel® Omni-Path Architecture, single-port Peripheral Component Interconnect Express* (PCIe*) 3.0 x16 adapter, 100 Gbps
MANAGEMENT NETWORK	Integrated 1 gigabit Ethernet (GbE)
SOFTWARE	CentOS or Red Hat Enterprise Linux 7.4 or higher Phoenix Cluster Management Suite by Atipa Technologies Intel® Cluster Runtime Performance Libraries Intel® Cluster Checker 2019 Intel® Parallel Studio XE 2019 Cluster Edition (Recommended, not required)

Technology Selections for Intel Select Solutions for Simulation and Modeling

In addition to the Intel® Xeon® processor-based hardware foundation, Intel® Omni-Path Architecture, and Intel® HPS, other technologies provide further performance gains:

- Intel® AVX-512:** Boosts performance for the most demanding computational workloads, with up to double the number of floating point operations per second (FLOPS) per clock cycle, compared to previous-generation Intel processors.
- Intel® Cluster Checker:** Inspects more than 100 characteristics related to cluster health. Intel® Cluster Checker examines the system at both the node and cluster level, making sure all components work together to deliver optimal performance. It assesses firmware, kernel, storage, and network settings and conducts high-level tests of node and network performance using the Intel® MPI Library benchmarks, STREAM, the High-Performance LINPACK (HPL) benchmark, the High-Performance Conjugate Gradients* (HPCG*) benchmark, and other

benchmarks. Intel® Cluster Checker can be extended with custom tests, and its functionality can be embedded into other software.

- **Intel® Cluster Runtimes:** Supplies key software runtime elements that are required on each cluster to ensure optimal performance paths for applications. Intel® runtime performance libraries, including Intel® Math Kernel Library (Intel® MKL) and Intel® MPI Library, deliver excellent performance optimized for clusters based on Intel® architecture.
- **Phoenix Cluster Management Suite:** Provides a complete HPC cluster management software stack developed by Atipa Technologies. The software stack includes node provisioning tools, resource management, I/O clients, development tools, and a variety of scientific libraries. Phoenix brings together the best open source cluster management applications and a full suite of command line utilities to deliver a fully-functional clustering environment.

Simplify and Speed Up Deployments of HPC Clusters for Simulation and Modeling

Atipa Polaris Select HPC solutions are verified Intel® Select Solutions for Simulation and Modeling that combine 2nd Generation Intel® Xeon® Scalable processors with Intel® Omni-Path Architecture, Intel® HPS, and other Intel® technologies. The combined hardware and software components deliver optimized performance for MPI-based

simulation and modeling applications in a single comprehensive, verified solution. Intel® Select Solutions provide an accelerated, simplified path to unlocking the full performance benefits of the 2nd Generation Intel® Xeon® Scalable processor family. These solutions help customers adopt the right system for their needs, with verified hardware and software configurations for targeted HPC workloads that reduce evaluation time and speed deployment, helping more users realize the benefits of HPC.

Intel® Xeon® Scalable Processors

- Offer high scalability for enterprise data centers
- Deliver performance gains for virtualized infrastructure compared to previous-generation processors
- Achieve exceptional resource utilization and agility
- Enable improved data and workload integrity and regulatory compliance for data center solutions
- The family includes Intel® Xeon® Bronze processors, Intel® Xeon® Silver processors, Intel® Xeon® Gold processors, and Intel® Xeon® Platinum processors.



Learn More

Atipa HPC Products and Solutions: <https://www.atipa.com>

Intel® Xeon® Scalable Processors: <https://www.atipa.com/2nd-gen-intel-xeon-scalable-procs>

Intel® Omni-Path Architecture: <https://www.atipa.com/intel-omni-path>

Intel® Parallel Studio XE: <https://www.atipa.com/intel-parallel-studio-xe>

Intel® Select Solutions: <https://www.intel.com/selectsolutions>

Intel® HPC Platform Specification: <https://www.intel.com/content/www/us/en/high-performance-computing/hpc-platform-specification.html>



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