



ParaStation Modulo

Powering the Future of Modular Supercomputing

Addressing HPC, AI, and QC Challenges

Today's High-Performance Computing (HPC) and Artificial Intelligence (AI) environments face unprecedented challenges in scalability, heterogeneity, and operational efficiency. ParaStation Modulo by ParTec is a comprehensive, cutting-edge supercomputing software suite designed to overcome these challenges. Our software suite enables supercomputing environments to achieve peak performance, reliability, and flexibility in heterogeneous and modular systems at the Exascale level.

Scalability & Cluster Management

Managing large clusters with heterogeneous components and minimizing downtime is complex. System admins need reliable ways to provision, update, customize thousands of nodes at scale.



Ensuring System Health

Component failures, system errors and misconfigurations can compromise productivity and cause significant delays in job execution, especially in large-scale, modular systems.



Efficient Issue Tracking

Managing and resolving system-level issues across multiple modules and nodes can be overwhelming, particularly in distributed or hybrid environments.



Communication For Dynamic Workloads

Low-latency, high-bandwidth communication across modular, heterogeneous systems is essential for Exascale computing but is challenging in federated networks and for highly dynamic workloads.



ParaStation ClusterTools

An image-based node management approach allows for rolling updates and minimal downtime. It integrates seamlessly with tools for efficient configuration management.

ParaStation HealthChecker

Automated integrity checks with non-destructive testing, reporting, and a self-recovering "checkbot" that brings offline nodes back online whenever possible.

ParaStation TicketSuite

Thanks to seamless integration with ClusterTools and HealthChecker, TicketSuite centralizes all issue tracking and escalation in one interface dedicated to the system at the customer's site.

ParaStation MPI

An MPI runtime library with optimized low-level, point-to-point communication and support for the PMIx standard, enables high performance for malleable workloads and evolving workflows.

Why ParaStation Modulo?

ParaStation Modulo has been pivotal in the evolution of the dynamic Modular System Architecture (dMSA) since its inception in the DEEP project and continues to evolve toward Exascale. It's a holistic software suite optimized for managing and executing large-scale, modular workloads, making it essential for today's Exascale HPC environments.

ParaStation Modulo is ideal for federated, modular systems that evolve over time, providing a uniform management plane for modules from multiple vendors. This ability to manage modules with diverse hardware components under a single system management interface greatly simplifies the complexity of Exascale computing.



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Beyond Managing Complexity

ParaStation Modulo goes beyond solving immediate HPC issues; it future-proofs systems to grow and adapt to new technologies, such as quantum, without major overhauls. By meeting the demands of Exascale and modular systems with a software suite that is modularity-aware, scalable, and highly integrated, ParaStation Modulo provides HPC environments with:

- **Reliability:** Reduced system downtime and failures, maximizing system utilization for uninterrupted performance
- **Scalability:** Seamless third-party component integration, adapts to new hardware, supports the continued evolution of Exascale architectures
- **Efficiency:** Centralized issue tracking enables faster resolution and smoother operations across teams
- **Flexibility:** Seamless resource scaling and flexible resource reallocation for dynamic, malleable workloads

Proven Success

ParaStation Modulo powers some of Europe's most advanced supercomputers, underscoring its proven success in modular architectures: JURECA (TOP500 #43, Green500 #8 in June 2021) and JUWELS (TOP500 #7, Green500 #3 in Nov 2020) exemplify the power of dynamic modular supercomputing. MeluXina (TOP500 #36, Green500 #4 in June 2021) highlights the competitiveness and sustainability of European technology on the global stage. Finally, ParaStation Modulo will be integrated into the management stack of JUPITER – the first European Exascale HPC system, currently being installed at Jülich Supercomputing Centre (JSC).



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About ParTec

ParTec AG specializes in the development and manufacture of AI supercomputers based on its modular High-Performance Computing (HPC) and Artificial Intelligence (AI) systems and quantum computers (QC) as well as the associated system software ParaStation Modulo and QBridge. The company's range of services also includes consulting and support throughout the development, construction, and operation of these modern systems.



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