Why PBS Professional?

- Proven for over 20 years
- Thousands of customers worldwide
- Voted #1 HPC Software by HPCWire readers
- Built by HPC people for HPC people — Altair Knows HPC
- Million-core scalability and end-to-end resilience
- Flexible plugin framework to meet complex requirements with ease
- Unparalleled security with EAL3+ certification and support for SELinux
- Fast, powerful scheduling with power and topology awareness and GPU / Xeon Phi support
- Global support with local experts in 48 offices across 22 countries

"PBS beat the competition in both **performance and flexibility**... Altair really knows HPC."
— NCI

"The product's flexibility, and the company's **expertise and support**, is simply unparalleled.""
— Fujitsu

"Around **$200,000 in energy savings** per year."
— US Army (RDECOM)

"Altair's **expertise and dedication** to success is u**nbeatable**."
— Weizmann Institute

PBS Works is a division of △ Altair

PBS Professional®
Industry-leading HPC workload management and job scheduling

The **trusted leader** in high-performance computing (HPC) workload management, PBS Professional efficiently schedules HPC workloads across all forms of computing infrastructure. Easily **scaling to support systems of any size** – from clusters to the largest supercomputers – PBS Professional ensures you receive the **maximum value** from your hardware and software investments.

Customers choose PBS Professional to:

- Improve performance with a fast, powerful, reliable workload manager
- Reduce costs by optimizing hardware, software and power use
- Get first-rate technical support with personal, one-on-one attention
- Maximize user productivity and ensure SLAs are met
- Ensure cloud readiness with a product proven for public and private clouds
- Gain peace of mind with an established commercial leader known for excellent service and customer care

- Simplify HPC and cluster administration
- Ensure the highest level of security – only PBS Pro offers EAL3+ certification and SELinux/MLS support
- Gain the flexibility to meet complex custom requirements
- Implement business priorities by ensuring the most important jobs run first and complete on time
- Reduce risk by minimizing – and automatically recovering from – hardware failures

New in 13.0:

- **Million-core scalability** – tested to 50,000+ nodes
- **Fast, reliable startup** of huge MPI jobs – tested at tens of thousands of MPI ranks; minimizes delays caused by faulty nodes
- **Fast throughput** – supports 1,000,000+ jobs per day
- **cgroups eliminate resource contention** – jobs run faster and don't interfere with each other or the OS*
- **Comprehensive health check framework** monitors your health check script behavior – either checks run or node is marked down
- **Expanded hook events** for even more plugin extensibility and customization
- **More policy controls** to better match your business needs

- **Expanded scheduling priority formula** with full math functions (e.g., sqrt(), ceil(), ...), conditional expressions, and a threshold for job start eligibility
- **Fine-grained targeting** for preemption, configurable at the queue level (admin controlled)
- **General fairshare formula** enables accruals per-Q, license sharing, time-of-day, power use, even combinations of these
- **Expanded support:** Intel MPI and MPICH2 on Windows; UNC paths for stdin, stdout, and file staging on Windows; SLES 12 and RHEL 7
- **Custom resources** can be created directly using qmgr, without the need to restart the server
- **Long job and reservation names** supported

Key Features & Benefits

- Shrink-to-fit jobs boost utilization, especially before planned system outages – one supercomputing center recovered 800,000+ idle CPU hours in just a few months

- GPU / co-processor scheduling prioritizes use and manages access to all types of accelerators (nVidia, AMD) as well as the Intel® Xeon Phi™ coprocessor

- Estimated job start times enable you to plan your workflows and meet deadlines

- Backfill TopN scheduling eliminates wasted cycles without delaying top priority work

- Dynamic provisioning automatically changes OS to match changing workload demands

- Submission filtering "hooks" to change/ augment capabilities on-site, on-the-fly

- Topology-aware scheduling optimizes task placement for all HPC network topologies (InfiniBand, SGI, Cray, IBM, GigE etc.), improving application performance and reducing network contention

- Job arrays allow for maximum throughput to schedule, execute and manage unlimited jobs.

- User, group, and project limits to implement fine-grained policy adjustments

- Plugins for "execution events" to easily support health checks, 3rd party integrations and site-specific customizations*

- Tunable scheduling formula defines any policy, including on-the-fly "exceptions"

- Green Provisioning™ for automatic resource shutdown/restart to conserve energy (proven to lower one customer's energy use by up to 30%)

- User customizable "runjob hooks" ensure allocation management limits are strictly enforced

- Advance resource reservations guarantees resources for recurring needs

- Heterogeneous MPI allocations (e.g. 64GB mem for rank 0, but only 1 GB for others) reduce memory waste

- Job status with history (via "qstat –x"), so you never lose track of jobs

- Python is available everywhere allowing one script to be used across all architectures

- Preemption and checkpointing allows you to immediately run high-priority work

The PBS Works Suite

HPCwire's 2014 "Best HPC Software" suite includes PBS Professional plus:

- **PBS Analytics** for job reporting and accounting

- **Compute Manager** for remote job submission, monitoring and management

- **Display Manager** for remote visualization

- **Software Asset Optimization** for right-sizing license investments

Learn more at www.pbsworks.com

Technical features

GPU and coprocessor (Xeon Phi) scheduling	Heterogeneous clusters	Standing reservations	Checkpoint / restart
Scheduling formula	Kerberos	Eligible time	Job arrays
Fairshare	Age-based scheduling	Metascheduling via peer scheduling	Topology-aware scheduling
OS provisioning	License scheduling	Preemption	Job history (qstat –x)
Web services	Extensible plugin framework ("hooks")	Dynamic resources	Multi-core
Job dependencies	Estimated job start times	Interactive jobs	Backfill TopN
24x7 online community	Beyond petaflops scalability	User / group / project limits	"Shrink-to-fit" jobs
On-demand licensing	Green provisioning™	$restrict_user	Cross domain solutions
Fail-over	Hybrid jobs (MPI+OpenMP)	MPI integrations	Power-aware scheduling
Policy-based scheduling	Over-subscription	EAL3+ security	Node health monitoring

Supported Platforms

PBS Professional supports all major platforms and operating systems.

acer   Bull   CRAY THE SUPERCOMPUTER COMPANY   Dell   FUJITSU   hp   IBM   Microsoft   Windows 8 Compatible   ORACLE   redhat   sgi   suse

△ Altair

For more information about PBS Professional, visit **www.pbsworks.com** to request a quote or view a demo.

*Limited availability -- ask Altair about implementing this capability at your site.