

# Oil & Gas: Delivering Powerful Solutions for Your HPC Environment

High-performance computing (HPC) is vital to staying competitive in the oil & gas industry, especially for upstream exploration and development. Exascale-level computing and data analytics are not only being driven by established areas of study such as seismic processing and reservoir simulation, but also by growing disciplines including computational fluid dynamics (CFD) and geomechanics.

“Altair looked at the configuration of our cluster and suggested a way to use our Gigabit Ethernet switch that would take greater advantage of our two internal networks. They did all the customizations we needed to run our jobs efficiently, and drew on their engineering expertise to make creative suggestions. They are problem solvers.”

– Alessandro Ciani, General Electric



## Meeting the Oil & Gas Industry's Technical Computing Needs

To maximize user productivity, oil & gas companies need HPC resources operating reliably around the clock. In addition, the systems need to be easy to use, manage, and scale, while still being cost-effective. The Altair PBS Works™ suite of HPC tools offers state-of-the-art solutions that are built to address these challenges.

Altair has a long history of supporting the HPC community with rock-solid workload management and supporting software tools. Altair's clients, which include Chevron, ConocoPhillips, GE, Saudi Aramco, Schlumberger, and the Oil and Natural Gas Consortium, have received tremendous benefits from the PBS Works suite.

Altair PBS Works is an integrated suite of HPC tools that provides a simple yet comprehensive solution set for oil & gas.

## Altair PBS Professional™

PBS Professional is the industry-leading, commercial-grade HPC workload and resource management solution, running on many Top500 systems. PBS Professional scales to support hundreds of thousands of processors — from clusters to the largest HPC systems — guaranteeing maximum value from oil & gas computing investments.

### For customers who want to:

- Use a reliable solution that just works. PBS Professional keeps large jobs running, automatically detecting failed nodes and rescheduling around them, to deliver results as quickly as possible.
- Focus on the work at hand. PBS Professional provides a single, easy-to-use interface to all computing resources.
- Be confident in the security of their workloads. PBS Professional is the only workload management solution to be EAL3+ certified.

### Key features & benefits include:

- GPU and co-processor scheduling prioritizes use and manages access to all types of accelerators (NVIDIA, AMD) as well as the Intel® Xeon Phi™ co-processor, with full access control and accounting.
- Green Provisioning™ provides the ability to schedule jobs in a manner that minimizes the use of power and electricity on execution nodes.
- Job arrays allow for maximum throughput to schedule, execute, and manage unlimited jobs.
- User-, group-, and project-specific limits to implement fine-grained policy adjustments.
- Industrial-grade, highly optimized implementation of industry-accepted POSIX Batch standard.
- Broad platform support: Linux, UNIX, and Windows.
- Extensive scheduling options to maximize performance, including peer-to-peer, backfilling, fair-share, formula-based, and preemptive scheduling for time- and resource-critical workloads.
- Plugin framework provides for extensive user customization, including integrating with allocation management to ensure limits are strictly enforced.

### Altair Access™

Access is an intuitive, easy-to-use portal for researchers and engineers. With a reimagined interface and user-centric approach, Access enables scientists, engineers, and researchers to focus on core activities and spend less time learning how to run applications and moving data around.

### For customers who want to:

- Use a simple, powerful, and consistent interface for submitting and monitoring jobs on remote clusters, cloud, and other resources.
- Run solvers, view progress, manage data, and use 3D remote visualization via web and desktop.
- Collaborate easily from multiple locations by viewing and editing application data without having to download it.
- Visualize big data files remotely without file downloads.
- Be more efficient with easy and accessible data collaboration tools.
- Optimize resource utilization by consolidating hardware and software centrally.
- Allow engineers to take corrective action without downloading huge results files for running jobs.

### Altair Control™

Control is an HPC administrator's control center for managing, optimizing, and forecasting HPC resources. It's an easy-to-use web application with seamless cloud bursting capabilities, along with advanced analytics to support data-driven planning and decision-making.

### For customers who want to:

- Use a single pane of glass to configure, deploy, monitor, burst, manage, troubleshoot, analyze, and tune.
- Configure default WLM server and security settings, and manage queues, resources, resource defaults, and limits.
- Run simulations to perform what-if analysis.
- View HPC resource usage charts and simulation results.
- Burst jobs to the cloud and dynamically add or remove nodes based on demand.
- Deploy an HPC appliance in both public and private clouds.

### The PBS Works Suite

PBS Works also includes Altair Accelerator™ and Altair Accelerator Plus™ for enterprise job scheduling, the Altair FlowTracer™ flow analysis platform, Altair Allocator™ for software license management, Altair Monitor™ for real-time license monitoring and management, Altair SAO to visualize and analyze global software inventories, and Altair Hero™, the industry's only end-to-end hardware emulation enterprise job scheduler.

### Solve oil & gas challenges in the cloud with Altair HyperWorks Unlimited:

HyperWorks Unlimited is a state-of-the-art private cloud appliance available in both physical and virtual formats, offering unlimited use of all Altair software. Powered by PBS Professional, Altair's HyperWorks Unlimited appliances provide users with a secure cloud-based platform — either on-premises or off-premises — to run, monitor, and manage their simulations.

### For customers who:

- Seek infinite exploration of Altair's software. HyperWorks Unlimited contains unlimited in-device HWU licenses for massive virtual exploration.
- Need a single vendor. HyperWorks Unlimited reduces operational expenses in setting up and supporting HPC infrastructure and software.
- Want an innovative pricing model. HyperWorks Unlimited is leased to customers, shifting HPC investments from capital expense to operational expense.
- Want a fully integrated, plug-and-innovate HPC cluster. HyperWorks Unlimited is delivered as a turnkey system, loaded with Altair's software applications and HPC tools for simplified deployment. Installation takes only hours, not days or weeks.
- Look for third-party solver support. The HyperWorks Unlimited appliance's open architecture allows third-party solvers to be fully integrated for a monthly fee on a BYOL (bring-your-own-license) model.

### Key Software Integrations

PBS Professional is integrated with several key oil & gas software providers including CMG, Emerson, Halliburton Landmark, Paradigm, Petroleum Experts, Rock Flow Dynamics, and Schlumberger.

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To learn more about Altair solutions for the oil & gas industry visit [pbsworks.com/oil-gas](https://pbsworks.com/oil-gas)