

PBS Works: The Trusted Suite for HPC Workload Management

Victor Wright, HPC Account Specialist April 7, 2014



Overview



\$270M Est.



In 1985 as a product design consulting company

Today ...

A global software, services & technology leader with 48 offices in 20 countries and 5,000 customers worldwide





\$100M

'85

Innovation Intelligence®





28

Years of Innovation

48

Offices in 20 Countries

2050

Employees Worldwide

Customers



Aut	tomotive	Aerospace	Heavy Equipment	Government	Life/Earth Sciences	Consumer Goods	Energy
Ford	GM	BAE SYSTEMS	ALSTOM JOHN DEERE	Argonne Arional Lasguages	■ BASF The Classical Company	HUAWEI CAHON	Chevron
CHRYSLER	HONDA	(BOEING	CATERPILLAR"	≈ AIST 😭	Adecco Abbott	Henkel (hp) 3M	Schneider Bectric
mazzoa	TOYOTA	GE Aircraft Engines	KOMATSU TAYA TAYA STEEL	V 1	BAYER DOW	(intel) IN FUITSU	ER PETROBRAS
НУППОВІ		GENERAL EADS	Фнітасні BOMBARDIER	U.S. AJR PORCE DLR	Fresenius Medical Care	TESCO xerox	ConocoPhillips SK holdings
		BOMBARDIER Honeywell	NIPPON STEEL 中国铁建	OAK NASA	MERCK	⊕ LG ★ Quanta Computer	TOTAL
⊚нітасні	MISURGH	LOCKHEED MARTIN	が NORINCO MOHEITO	National Research	VALE	lenovo @ BOSCH NEC	Schlumberger
Å MAGNA		Lufthansa	AMUTSUMISMI OSHNOSH	Council Canada	sanofi aventis Das Wichtigste irt die Gerundheit	PHILIPS Microsoft QU POND	Reliance Industries Limited
VOLVO	AISIN	FINMECCANICA	TOCHU DOOSAN	Sandia National Laboratories	lyondellbasell	EMERSON SUZUKI MOTOROLA KIRIN	ExonMobil
PEUGEOT	FAW	Raytheon	CSIC ArcelorMittal	NAVEEA	accenture High performance. Delivered.	TOSHIBA Panasonic TOSHIBA Panasonic FLEXTRONICS	SIEMENS
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Altair Knows HPC



Altair is the only company that...

Makes HPC tools

PBS Works™

Develops HPC applications

HyperWorks[®]

and uses HPC application to solve real problems!

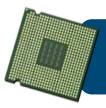
ProductDesign



We know how to give companies the cost-effective resources needed to create market-leading products and drive business growth

Current HPC Trends

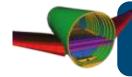




GPUs and Co-processors



Green Computing / Power Management



Big Data



Cloud Computing



Exascale

HPC Workload Management Needs



Job and Resource Scheduling

Web-based Job Submission & Management

Topology-aware End-to-end Allocation scheduling availability management Policy-based Limitless Comprehensive scheduling scalability system monitoring Cloud **Energy-efficient** First-rate security scheduling certifications enablement Flexible hooks Global expert Simple, powerful framework **GUIS** support

Remote Results Visualization

Analytics & Reporting

PBS Works Suite



- Increase Productivity
- Meet HPC Goals
- Reduce Expenses

Easy to Use

Hard to Break

Do More (with less)

Keep Track and Plan

Open Architecture



SCHEDULE | PRIORITIZE | SCALE



Compute Manager

RUN | MONITOR | MANAGE



Display Manager

VISUALIZE | ACCESS | COLLABORATE



PBS Analytics

VIEW | OPTIMIZE | FORECAST

Allocation Management

COMPUTE | STORAGE | BUDGET

SAO

VISUALIZE | ANALYZE | OPTIMIZE

PBS Professional



HPC Job Scheduling & Workload Management Faster time-to-results, better throughput and utilization

- Scalability and Reliability: Desktops to Clouds
- Within the TOP 3 Job Scheduling Tools (as published by IDC)
- Policy-driven Scheduling
- Accelerator Scheduling (e.g. MIC, GPGPU, FPGA)
- Green Provisioning[™] for Power Management
- Topology-aware Scheduling
- EAL3+ Security Certified
- Extensible Plugin Framework
- Mature and Reliable Technology



NASA's Workload Manager of Choice for All NAS HPC Resources

~200k cores scheduled by PBS Professional

Without its flexibility, it wouldn't have been able to handle what we're doing.

- NASA Ames

Compute Manager



HPC App-aware Cloud Portal Tuned for End-Users Simplify HPC services – no IT degree needed

- Single "pane of glass" for HPC work
 (zero client install browser only)
- Drag-and-drop input decks to submit HPC work (custom options auto-populate)
- Watch progress & view intermediate results while jobs are running
- Post-process and visualize remote results (e.g., graph energies) without moving files
- Even fix inputs "in place" and re-run (without re-uploading big input files)
- · Secure, unified access, anywhere... anytime



I push enter and my jobs run; results come back when they're done.

Major Automotive OEM

Display Manager



Remote Visualization of Big Data within a Single Portal Visualize Your Datasets for Rapid Collaboration and Innovation

- Consolidate hardware and software resources
- A secure and traceable way to access their intellectual property
- Easy and accessible collaboration tools for globalized infrastructure
- Reduces software maintenance and deployment costs
- Instantaneous application invocation
- Flexible application resource allocation
- Allows for instant collaboration on large volumes of data through a simple interface, anywhere & anytime



PBS Analytics



HPC Accounting & Analytics Portal Visualize Historical Usage for Optimized Returns on HPC Investments

- Allocate Costs & Plan for Future Capacity
- Visualize Workload & Historical Usage
- Data Drill-down to Underlying Data
- Filter by Project, App, User, Group, Queue, Host, ...
- · Canned reports out-of-the-box, and customize your own
- Aggregate data from multiple PBS Professional servers
- Analyze historical data as far back as PBS Pro 5.3
- Slideshow Mode for Continuous Display (in Lobby)
- Export to Customer Billing System



Maximizing our license utilization means we don't have to buy a new license, set up another workstation, and hire another engineer to keep up with demand.

Trelleborg

Allocation/Accounting Management System



- Uniquely supports multiple compute, storage and budget (\$) resources
- Manages resource grants, quotas, budgets, limits, etc.
- Implements complex business logic
- Handles charge-back for used resources
- Reporting tools
 - Real-time reporting of accounting/allocation data
- Soon to be integrated with OpenStack cloud environment
- New capabilities/benefits
 - Single point of managing quotas across all storage systems
 - Daily stakeholder usage reports
 - Daily project usage reports
 - Single accounting system to manage complete environment



What is Software Asset Optimization (SAO)?





 A rapidly deployed business analytics solution to visualize, analyze and optimize the utilization of enterprise software licenses

For More Information



- Get the latest news from PBS Works
 - www.pbsworks.com/
- Find out about Altair's HPC Cloud offerings
 - www.altair.com/cloud/
- Learn more about Altair
 - www.altair.com/
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