



Altair

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PBS Works™

## **PBS Works: The Trusted Suite for HPC Workload Management**

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**HPC**  
USER FORUM

# Overview

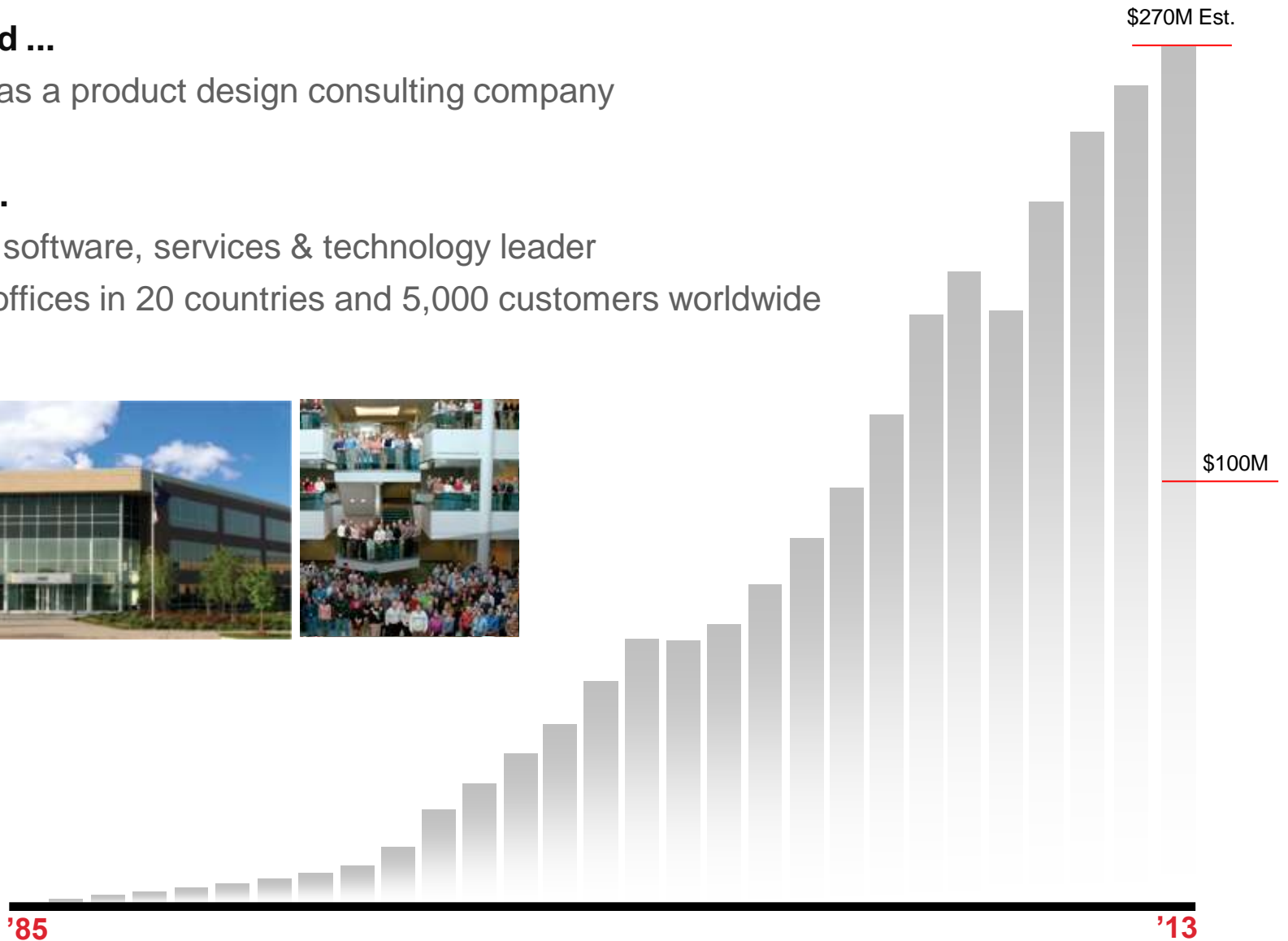


## Founded ...

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





# 28

Years of Innovation

# 48

Offices in 20 Countries

# 2050

Employees Worldwide

# Customers



Automotive	Aerospace	Heavy Equipment	Government	Life/Earth Sciences	Consumer Goods	Energy

5,000 customers worldwide

## 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***

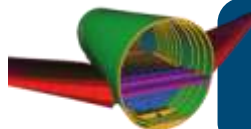
## Current HPC Trends



GPUs and Co-processors



Green Computing / Power Management



Big Data

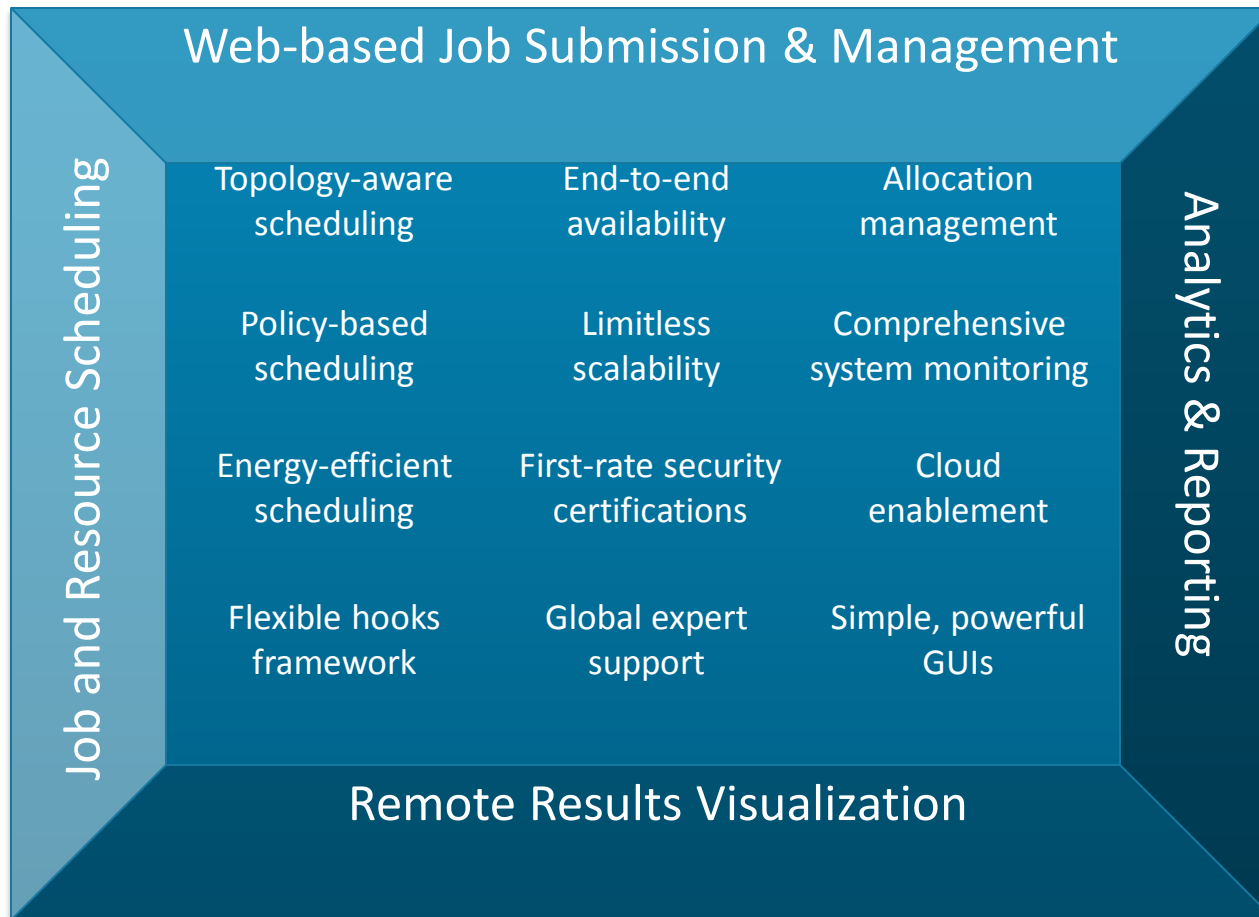


Cloud Computing



Exascale

# HPC Workload Management Needs





# 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

## PBS Professional

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



## 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



**Visualize | Access | Collaborate**

## 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

**Visualize | Analyze | Optimize**

## Coming Soon: PBS Professional 13.0



- **Enhanced features:**

- Scalability – on the road to exascale
  - Support for millions of cores, million+ jobs per day
  - Huge, fast MPI job start
  - Fast throughput on short jobs
  - Accelerated job dispatch rate
  - Reduced latency
- Flexibility – expanded hook events to enable even more plugin extensibility and customization
- Usability – it will be even easier to use and administer PBS Pro with these customer-driven enhancements
- Scheduler – finer-grained and more generalized scheduling controls

- **Find out more at SC14!**

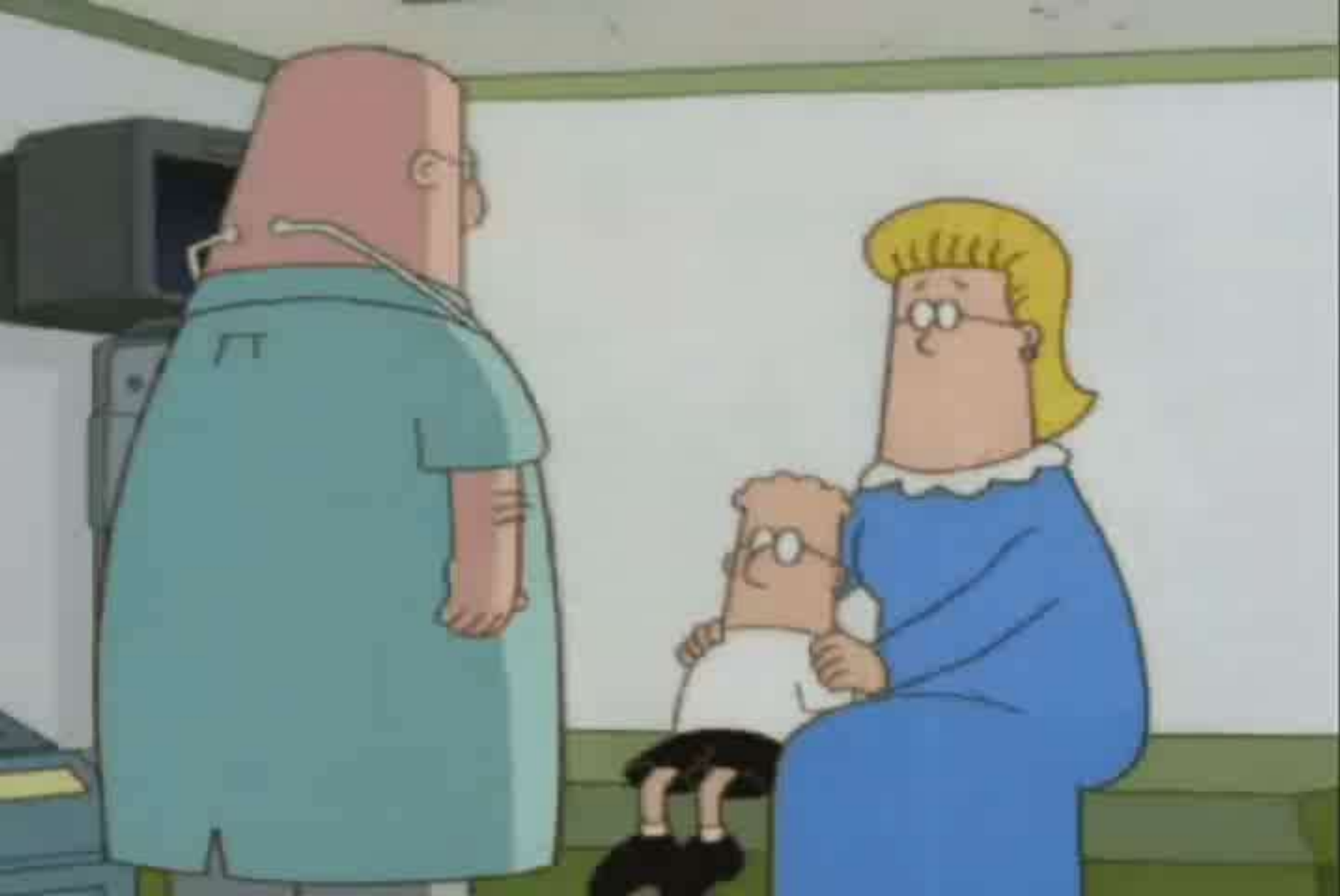
- Request a briefing or demo for feature details



## For More Information

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- **Get the latest news from PBS Works**
  - [www.pbsworks.com/](http://www.pbsworks.com/)
- **Find out about Altair's HPC Cloud offerings**
  - [www.altair.com/cloud/](http://www.altair.com/cloud/)
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For the Dilbert in all of us.