IT'S YOUR CHOICE: OPEN SOURCE OR COMMERCIAL HPC SOFTWARE

SIX POINTS TO CONSIDER WHEN WEIGHING THE PROS AND CONS

△ ALTAIR

THE CRITICAL ROLE OF HPC

Across all industries, high-performance computing (HPC) plays a critical role. Without it, modern product design simply would not be possible.

HPC is used to simulate real-world outcomes and optimize designs in all sectors, from manufacturing to electronic design to financial services to life sciences.

With more complex designs, increased competition, and shorter product cycles, there is more pressure than ever to deliver higher-quality results faster and at a lower cost. **Organizations compete based on the effectiveness of their HPC.**


HPC IS A FORCE MULTIPLIER

HPC investments can have a dramatic impact on the bottom line. According to Hyperion Research, in a study of **763** successful HPC projects, organizations realized an average revenue increase of **$507** per dollar invested in HPC.

Each dollar invested in HPC generated approximately **$47** in profit. The average investment per innovation was **$2.6M**.

Financial Return Per Dollar Invested in HPC
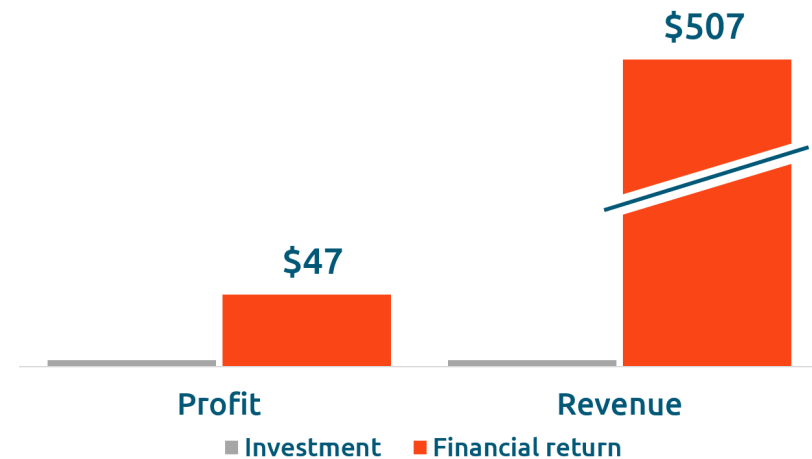
Source: Hyperion Research, Economic models linking HPC and ROI -Latest Results – See ROI Slide Deck

OPEN SOURCE FUELS INNOVATION

Open-source software (OSS) celebrates principles such as open exchange, collaborative participation, transparency, and meritocracy.

At their best, open-source projects are **agile, well-supported, and responsive to changing user requirements**. Customers benefit from high-quality, freely available software.

Altair is a major supporter of open-source software and collaboration with efforts that include **Altair Exchange**, **OpenPBS**, and **OpenRadioss**.

BUT IT ALSO CARRIES RISKS

For active, well-supported projects, open-source software can be of high value, but not every project fits these categories. Open-source projects can also carry significant risks to the business:

- Projects that may whither and die
- Excessive project forking/fragmentation
- Instability and quality concerns
- Lagging feature sets
- Lack of documentation and QA controls
- Commercial/IP risks

The trick is to balance the risks and rewards and make an informed decision about where best to deploy OSS software.

WORKLOAD MANAGEMENT

The Key to HPC Effectiveness

In HPC cluster deployments, workload managers play a critical role. Unlike other components in the HPC software stack, workload management directly impacts multiple drivers of cost and productivity, including:

- ✓ Scalability
- ✓ Workload throughput
- ✓ Resource allocation
- ✓ Infrastructure and software license utilization
- ✓ Engineering and research productivity
- ✓ Ensuring deadlines are met

The benefits of effective HPC workload management flow straight to the **bottom line**.

While open-source workload management may make sense in some settings, in commercial environments, it is important to carefully weigh the **pros and cons**.

SIX CONSIDERATIONS WHEN EVALUATING THE PROS AND CONS OF OPEN-SOURCE VS. COMMERCIAL WORKLOAD MANAGEMENT SOFTWARE

#1 CLUSTER ADMINISTRATION

Efficient cluster administration translates into a more productive HPC environment.

Open-source workload managers are often more challenging to manage than their commercial counterparts.

Administrators may need to work around missing or incomplete features, limited diagnostics, poor documentation, challenging upgrade paths, or a lack of technical support.

Commercial environments are generally easier to manage with better tools, integrations, quality assurance practices, and documentation.

#2 RESOURCE USE EFFICIENCY

Even small efficiency improvements can drive outsized productivity gains and cost savings.

Whether you are operating on-premises or in the cloud, maximizing the use of expensive infrastructure resources and software licenses is critical.

In industries such as EDA, the cost of software licenses and design talent greatly outweighs any potential savings from deploying free software.

Commercial schedulers can help boost resource use efficiency with capabilities such as cloud bursting, enabling pay-per-use models, license-aware scheduling, GPU sharing, and advanced scheduling and resource-sharing policies.
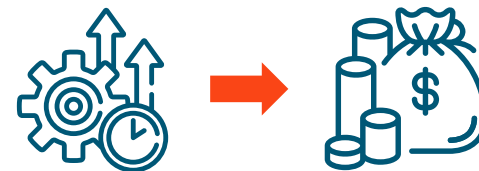
#3 DEV, INTEGRATION & QA COSTS

Open-source workload management can result in a variety of hidden, ongoing costs.

While some open-source projects are complete, others may lack the functionality typically required by large organizations, such as web interfaces, remote visualization tools, reporting and monitoring tools, and cloud adapters.

If organizations are not careful, they can find themselves in the software development business absorbing costs related to development, integration, and ongoing maintenance and quality assurance.

While commercial software is more expensive, these significant ongoing costs are borne by the software vendor.
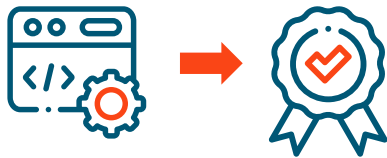
#4 BUILDING FEATURES IN-HOUSE

Having the flexibility to modify software sounds good in theory, but it carries significant risks.

A benefit of OSS is that if a feature is missing, organizations can contribute to the open-source project or fork a new project tailored to their unique requirements.

While this sounds easy enough, it requires developers with specialized skills. Organizations may rely on a single skilled in-house developer or consultant to build and support the required functionality. Sometimes called the "hit by a bus" problem, organizations can find themselves in trouble if key individuals leave the organization or lose interest.

This represents a considerable source of risk and potential downstream costs for large organizations.

#5 SUPPORT AND HELP DESK COSTS

When time is money, SLAs matter. In production, hotfixes and patches may be required urgently.

While community support is available for open-source workload managers, it typically depends on the availability and goodwill of community experts.

In commercial settings where time is money, relying on volunteers is a risky strategy.

Problems in production settings are often complex and time-critical and may only show up at scale or under specific circumstances.

Staffing an in-house help desk with employees or contractors to support open-source software is typically more expensive and yields poorer SLAs than simply purchasing a commercial support agreement.
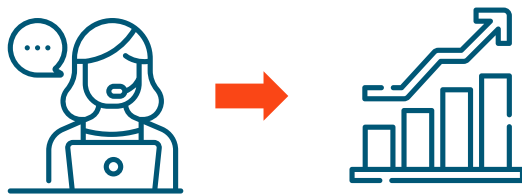
#6 AVOIDING DOWNTIME

Open-source software can increase both planned and unplanned downtime.

When a workload manager is unavailable, the entire HPC environment grinds to a halt. With open-source software, activities such as upgrades and migrations can be particularly risky. Open-source developers tend to be more interested in building new features than performing quality assurance and thoroughly testing upgrade procedures.

In a recent study sponsored by Panasas, Hyperion Research estimates that the daily cost of HPC downtime can range from less than USD **100K to over 1M per day**.[1]

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[1] Source: Hyperion Research study details the importance of TCO for HPC storage buyers.

COMMERCIAL WORKLOAD MANAGEMENT DELIVERS SIGNIFICANT RETURNS

REDUCING COSTS

Commercial workload management software can reduce total cost of ownership (TCO).

While free, open-source software is fine in some environments, commercial software can actually save money over the medium and long term.

Using a financial model developed by Altair, organizations can estimate the relative cost of deploying, supporting, and maintaining open-source software vs. commercial workload managers.

While estimates vary, a detailed analysis by Altair suggests that an HPC facility with 40 users and 3.5 administrators and support staff can save approximately **$350K** annually with commercial workload management.

ACCELERATING INNOVATION

Even more importantly, commercial workload management drives productivity.

Investments in HPC can deliver a **47x ROI**. Given the importance of HPC to most organizations, workload management is a poor place to economize.

A commercial scheduler delivering a **5-10%** improvement in performance or productivity can drive literally **millions** of bottom-line impacts.

With a better, more reliable HPC infrastructure, organizations can compete more effectively and outperform their competitors.
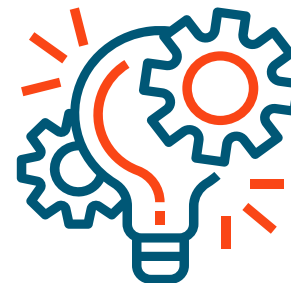
WORKLOAD MANAGEMENT TAILORED TO YOUR BUSINESS NEED

Comprehensive workload management offerings

Altair supports the broadest range of high-quality commercial workload management solutions in the industry, with high-performance schedulers tailored to multiple industries and workloads:

- Altair® PBS Professional® – Industry-leading scheduler for HPC and high-throughput computing
- Altair® Grid Engine® – Distributed resource management and optimization
- Altair® Accelerator™ – Fast, high-throughput scheduling for EDA

Customers can expand capabilities with an extensive array of add-on products including Altair® Access™, Altair Mistral™, Altair Breeze™, Altair® Control™, and many others.

Learn more

To learn more about Altair HPC solutions, visit
http://altair.com/hpc