



ENTERPRISE SOFTWARE LICENSE MANAGEMENT GUIDE



INTRODUCTION

For organizations of all kinds, spending on enterprise software is on the rise. Organizations face various software management challenges, including managing vendors, tracking license expiration, managing costs, and ensuring compliance.

According to Gartner® Research, enterprise spending on software is forecast to reach \$1 trillion by 2024.¹ As software consumes a more significant percentage of total IT spending, many large organizations are introducing software asset management (SAM) programs to manage software investments more effectively and recycle and reuse licenses to minimize costs.

The challenges are especially acute when managing specialized engineering software in areas such as computer-aided design (CAD) and computer-aided engineering (CAE) where software tools are both expensive and critical to productivity. Engineering organizations have unique complexities that include:

- Large numbers of floating licenses from multiple vendors
- Both interactive and batch-based tool usage
- Contention for high-value licenses among groups and across geographies
- The need to interface with HPC workload managers to throttle and allocate limited high-value software licenses based on policies appropriate to the business

This guide explains some of the challenges of enterprise software asset management and optimization, focusing on issues unique to engineering environments. It also offers suggestions on best practices and practical tips to help organizations better manage and optimize their software spend.



Enterprise spending on software is forecast to reach \$1 trillion by 2024.

Gartner Forecasts Worldwide IT Spending to Grow 8% in 2024, October 18, 2023 — <https://www.gartner.com/en/newsroom/press-releases/2023-10-18-gartner-forecasts-worldwide-it-spending-to-grow-8-percent-in-2024>

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SOFTWARE ASSET MANAGEMENT

A Strategic Imperative

Enterprise software management is a growing concern for organizations of all sizes. According to Gartner® Research, enterprise software spending is expected to reach \$1,042 billion in 2024, a 13.8% increase over 2023 estimates.¹ Moreover, software expenditures are the fastest-growing segment of IT spending, outpacing other IT segments, including data center systems and services. Large organizations often have hundreds of software products in their portfolios, making managing costs and vendors a significant challenge.

The issue for manufacturers is that software licenses are core to their competitiveness and productivity, making software a risky area to try and economize. Despite the difficulties, there are compelling reasons to focus on software asset management.

- According to earlier Gartner Research, organizations can reduce spending on software by as much as 30% by using software asset management (SAM) tools and embracing best practices.² Organizations frequently purchase software with too many unused features or fail to recycle licenses, so tracking usage, right-sizing software portfolios, and ensuring that licenses are optimally used can pay large dividends.
- Another area of concern is compliance. With vendor audits on the rise, the cost of noncompliance with software license agreements can be significant. According to NPI, financial penalties in the 7- to 8-figure range are not uncommon.³
- Capacity planning is essential for large enterprises. Organizations that have an accurate handle on their spending and utilization of software licenses and can project future needs are in a better position when it comes time to negotiate enterprise license renewals with vendors.

Significant Business Benefits

Organizations that manage enterprise software assets effectively enjoy several advantages. They can:

- Reduce enterprise software spending as a percentage of revenue, improving their competitive posture.
- Identify and correct software-related issues that may be impacting overall cost and productivity, such as excessive denials, license hogging, or unusually long user sessions.
- Plan capacity more effectively, ensuring adequate software resources are allocated appropriately and available for critical projects.
- Reduce business risk by ensuring compliance and minimizing the time and effort associated with software license audits.

COMMON CUSTOMER CHALLENGES

Effective Software Management is Easier Said Than Done

Despite the incentives, managing enterprise software assets is difficult. Organizations frequently find themselves overspending on software and misallocating resources. Despite high spending levels on software licenses, organizations often experience shortages that impact productivity.

In large organizations, departments frequently make independent spending decisions, complicating central management. Mergers and acquisitions result in new vendor relationships and added complexity in inventorying assets and tracking usage. Specific challenges include:

- Challenges forecasting demand, managing allocation, and planning capacity
- Challenges managing vendors, license allocation, and license expiration
- Tracking denials accurately and understanding their impacts on the business
- Tracking license consumption and usage for chargeback accounting purposes
- Issues with licenses, including vendor downtime, denials, unusually long sessions, and more
- Diverse vendor licensing schemes place constraints on how licenses can be used, further complicating management and compliance

License Management Silos

Perhaps the most significant challenge in multi-vendor software environments is the sheer diversity of license management frameworks. ISVs use a variety of license managers to meter access to their software. Organizations can find themselves managing dozens of different licensing tools, each with its own interfaces, command line tools, file formats, and license metrics. With multiple siloed tools, getting a consolidated view of license usage enterprise-wide can be exceptionally challenging.

Interest in managing software costs is high. Spending on IT asset management and SAM tools grew 17.8% between 2021 and 2022.

Gartner Research Market Guide for Software Asset Management Tools, October 2023 — <https://www.gartner.com/en/documents/4801731>

LICENSE MANAGEMENT 101

How License Managers Work

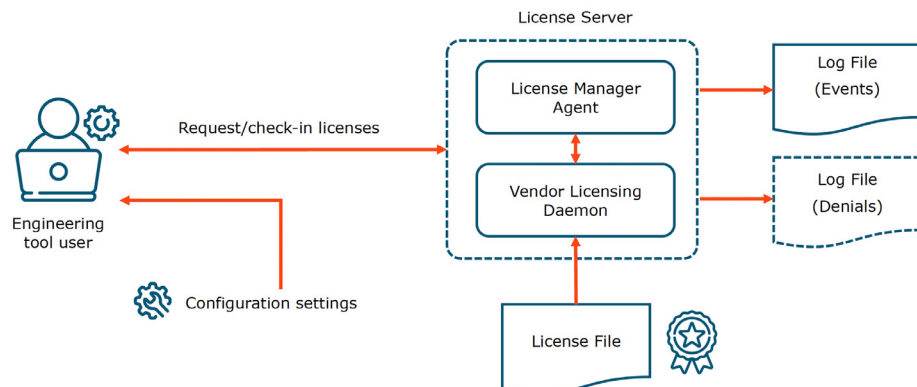
To appreciate the challenge, it is helpful to understand how license managers work. While implementations vary by vendor, most license managers use a client-server architecture and share the following characteristics.

License files - The licenses that organizations are entitled to are typically encoded in a human-readable license file. While formats vary, license files list specific tools and software features, quantities and entitlements, tokens, and license expiration dates.

License agents - License agents (or daemons) are installed on physical or virtual machines that act as license servers. A license agent reads the license file and usually monitors a specific TCP/IP port for client license requests. For licenses where specific quantities are available, each time a client checks out a license, the agent decrements its internal count of available licenses. When all licenses are checked out and a client makes a new request for a license, the agent will respond with a denial, and further licenses will be unavailable until licenses are returned to the license server via a license check-in operation.

Log files - License management frameworks typically provide detailed logs for every license request, recording details such as a timestamp, the feature(s) requested, the client host or IP address, and the user making the request. Denials may be logged to a separate file. License usage can be determined by parsing events in these log files. For example, the duration of a license checkout by a specific user can be determined by looking for license checkout and check-in events from the same user coming from the same IP address or host.

Client-side libraries and configuration settings - Software tools are designed to work with particular license managers. When a tool starts, it typically reads configuration information from a local file or environment variable listing available license servers, including their hostname or IP address and the port number the license agent is listening on. License agents are a potential single source of failure, and in some cases license servers are configured redundantly, with each client configured to connect to two or more license servers. If a license server is down or unreachable, a client requests a license feature from an alternate server.



Diverse Licensing Models

Software vendors have become creative in terms of how software is licensed. Reporting that reflects the licensing models' different software vendors use is critical for ensuring compliance.

A non-exhaustive list of different software licensing models:

- User-based licensing, where software is allocated to named users
- User subscriptions, where named users are entitled, and fees are calculated based on usage
- Concurrent licensing (aka floating licenses), with simultaneous user access software in a networked environment up to a threshold (common in engineering applications)
- Node-locked licenses (aka device licenses) where software is licensed to run on a particular device
- Geo-bounded licenses, a form of concurrent licensing where entitlements are restricted to a particular geographic area
- Enterprise and site licenses, where unlimited access to particular license features may be available to an organization up until an expiration date
- Organizations may also run desktop applications that do not draw their entitlements from license servers and require additional tools to monitor and inventory desktop application usage⁴



DIVERSE LICENSING MODELS

Licensing models are fraught with complexity, and the infrastructure they run on is constantly changing, SAM tools are hard-pressed to address all requirements. For example, the SAM tools used to manage a SAP environment differ significantly from those required to manage software-as-a-service (SaaS) applications or enterprise applications from Microsoft, Oracle, or IBM. Monitoring tools need to handle a diverse set of asset classes over the full license management lifecycle.

Tools used to manage specialized engineering software in areas such as computer-aided design (CAD), computer-aided engineering (CAE), and electronic design automation (EDA) have even more unique requirements. These tools typically need to measure usage patterns and denials, identify waste, and establish policies to optimize engineering and specialty software spend. For this reason, enterprise customers must look for SAM tools designed to meet their particular needs.⁵

Tools used to manage specialized engineering software have unique requirements.

Gartner Market Guide for Software Asset Management Tools, October 3, 2023 — <https://www.gartner.com/en/documents/4801731>

ENGINEERING ENVIRONMENTS BRING UNIQUE CHALLENGES

Managing and Optimizing Software Assets in CAE Environments

Software tools are critical in engineering design and simulation environments to ensure product quality, manufacturability, meeting durability goals, and achieving time-to-market objectives. These organizations must continually develop better, more innovative designs with ever-shorter product cycles.

Engineers frequently run design and simulation tools 24x7 in large-scale compute environments to achieve this. They must wring every ounce of productivity from their software tools and compute infrastructure. Manufacturers compete based on the efficiency of their high-performance computing (HPC) infrastructure and their ability to maximize return on assets.

Among the factors that make software management more challenging in engineering design and simulation environments are:

- Specialized tools are often expensive, exhibiting high cost per feature and seat. This makes it essential that licenses are used efficiently, shared appropriately, and not wasted.
- Engineering problems are inherently multidisciplinary, involving many software tools (i.e., structural mechanics, dynamic analysis, computational fluid dynamics, electromagnetics, digital and analog circuit simulation, etc.).
- Engineering environments need to support both batch and interactive workloads. Given the high cost of design talent, minimizing job turnaround times and wait times for licenses to become available is essential.
- Critical metrics such as denials in HPC batch environments require special consideration from analysis tools. While denials are obvious for interactive tools, with batch workloads, denials manifest as stalled processes in a running job, effectively wasting compute hardware that could have been used by another job. This makes it more complex in engineering and HPC settings to identify the root cause of productivity issues.

Diverse License Management Frameworks

Because engineering environments require specialized design and simulation tools from multiple vendors, organizations inevitably end up with multiple frameworks for license management. A partial list of license management tools commonly deployed in engineering environments is provided below:

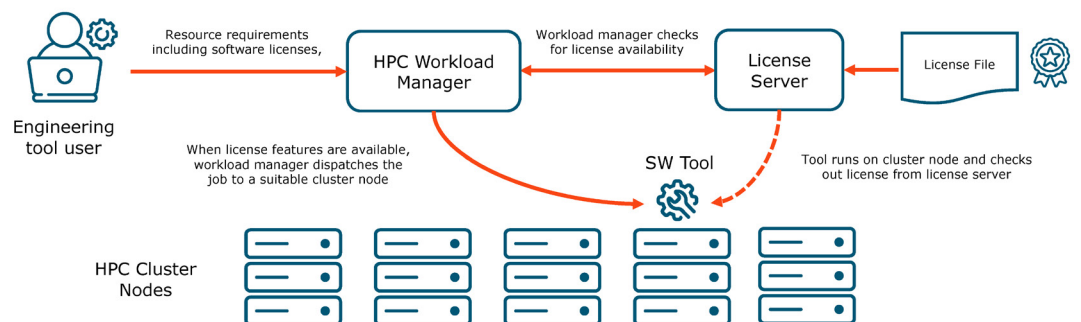
- Altair License Server (ALS)
- FlexNet Publisher
- BetaCAE
- DSLS (Dassult Systèmes)
- Animator V4/GNSLS
- IBM Rational ClearCase
- Zoo
- Integraph SPLM
- IBM LUM (license use management)
- LSTC License Manager
- Reprise License Manager (RLM)
- Sentinel RMS
- Sentinel HASP
- Altium
- LICMAN (T-Systems)
- OrcaFlex
- Gemalto
- Automation Studio
- CodeMeter
- Mathematica
- SlimD
- ArborText
- Hexagon ISL
- OLicense

Working with HPC Workload Managers

A unique aspect of engineering and simulation environments is the widespread use of HPC workload managers to scale compute capacity and optimize hardware and software asset utilization.

License management and workload management are inextricably linked in design environments. Workload management and software optimization tools must be integrated and designed to work together.

HPC workload managers support many types of scheduling, from MPI parallel jobs to interactive jobs to fairshare policies to license-aware scheduling with advanced reservations. These scheduling policies are frequently combined.



In batch environments, workload managers interact with license servers to ensure licenses are available before dispatching jobs to cluster nodes. This enables workload managers to enforce site policies and control which users and organizations can access software licenses and under what circumstances. Many of the world's top technology companies use a license-first scheduling strategy to increase the number of computing jobs that can be executed across a finite resource set.

1. A user submits a job specifying infrastructure and software resource requirements.
2. The scheduler checks with the license server for license feature availability.
3. The workload manager schedules the job, assuming licenses and suitable infrastructure are available.
4. If resources are unavailable, the job is queued until resources become available.
5. Similarly, if licenses are unavailable, the scheduler should avoid automatically provisioning cloud instances until such time as licenses are available to avoid unnecessary spending.

Once resources and licenses are available, the job is dispatched, and the software tool checks out license features from the license server as usual.



SOLUTION REQUIREMENTS



An open, multi-vendor architecture

In engineering environments, SAM solutions must support multiple vendor license management frameworks and provide a normalized view of license usage data.



Real-time license monitoring

Tools should provide real-time visibility into how license assets are deployed by vendor, user, and group and clearly identify issues such as long-running sessions and feature saturation.



Built-in reporting

Reports should include information about license usage over time, heatmaps, vendor and feature rankings, and summary reports aggregated by vendor, feature, user, host, and time.



Advanced usage analytics

Analytics features that extend basic reporting and employ more involved aggregations are also required, enabling analysts to answer business-level questions about software usage.



Support for organizational hierarchies

The system must know about organizational structures and geographic locations to correctly attribute usage to different departments, regions, user assignments, and shifts.



Cost analytics and soft limits

Users need the ability to analyze actual costs by user and organization against budgets, considering cost by license feature while using soft limits to track peak usage and cost overruns against pre-allocated budgets.



Denials management

SAM tools must be sophisticated enough to distinguish real denials from denials unrelated to capacity (i.e., lack of entitlement, impatient users, and feature or vendor "hopping").



Real-time alerting

Tools should provide proactive alerting about unusual situations, non-responsive license servers, excessive denials, unusually long sessions, pending feature expirations, and unusual patterns.



Predictive analytics and "what-if" analysis

Organizations need tools to predict how varying license counts will affect performance, whether license counts should be increased or decreased, and how scheduling adjustments such as limiting checkout times or the length of user sessions may affect consumption.



IT and GDPR compliance

SAM tools should aid organizations in monitoring and reporting license usage to ensure compliance with vendor agreements while protecting personally identifiable information (PII).

BEST PRACTICES FOR SAM

Managing and Optimizing Software Assets in CAE Environments

Implementing initiatives for software asset optimization can be challenging. While the potential rewards are high in terms of productivity and cost reduction, efforts often fail. Gartner observes that SAM tool users are sometimes disappointed with results owing to issues with SAM tool data output and a lack of internal skills.⁶ Some recommendations to help ensure a successful SAM initiative are provided below:

Don't boil the ocean - Large organizations have diverse enterprise software management needs — from ERP licenses to SaaS entitlements to Office365 or Google Workspace licenses. Be sure to understand your motivations and agree on key goals to avoid mission creep and “boiling the ocean”. For example, motivations might be achieving specific cost-reduction goals, implementing project-based accounting or surviving future software audits.

Secure an executive sponsor - In large organizations, optimizing software assets cuts across lines of business, geographies, and business functions. Ensuring success depends on the support of a C-level executive who can help arbitrate conflict and effect change organization-wide.

Establish a program office - SAM can yield substantial financial returns, but it requires a sustained effort. SAM initiatives need a charter and a program office with a clear place in the org chart. Ensure that Finance, IT, and teams responsible for procurement and vendor renewals are jointly invested and accountable to ensure the program's success.

Establish clear success metrics - Establish realistic and achievable goals for the initiative and closely monitor key metrics. Metrics may include spending by vendor and feature, average license utilization, denial rates, licenses reused or recycled, and the number of unused licenses as a percentage of total licenses.

Select suitable SAM tools - Ensure that you select SAM tools appropriate to your environment. Manufacturers may operate a dozen or more license management frameworks, and your chosen tool will need to interface with them to gather, normalize, and aggregate usage statistics. Tools must be flexible, scalable, and have advanced reporting and tracking features. They must also be easy to use, implement, and maintain.

Establish a regular reporting regime - Keep lines of business engaged with regular reporting demonstrating progress in achieving your project goals. Establish goals for continuous improvement year over year and express the benefits in financial terms to clearly demonstrate the SAM program's ongoing positive impacts on the business.

Recognize that SAM and HPC scheduling are tightly coupled - A unique aspect of engineering environments is that software typically runs on distributed computing environments managed by HPC workload managers. Because of this, HPC scheduling policies and license management are closely linked. The HPC infrastructure teams that manage engineering software and hardware infrastructure will be critical partners in your SAM initiative.

Assemble the right team - Recognizing the factors above, you will need a cross-functional team that includes members representing finance, IT architecture, CAE software, and HPC infrastructure engineering. Engaging external consultants and vendors with subject matter experience is helpful, but do not rely entirely on external vendors. Look for external partners and vendors that can help as your needs evolve.



WORKING WITH ALTAIR

Managing and Optimizing Software Assets in CAE Environments

Altair brings unrivaled experience to the field of software asset management and is uniquely qualified to assist with your SAM initiatives, with multiple solutions including [Altair® Software Asset Optimization \(SAO\)](#) and [Altair® Monitor™](#). Altair offers several unique capabilities:

- Broad knowledge and experience in engineering and HPC means Altair understands each organization's unique requirements and challenges.
- Altair's solutions are production-proven. Altair has over a decade of experience deploying license management solutions, many successful customer engagements, and massive global deployments.
- Altair is 100% open, supporting dozens of third-party license managers across all engineering disciplines, from structural analysis to computational fluid dynamics to bioinformatics to electronic design automation.
- Altair provides data and predictive analytics solutions, including [Altair® RapidMiner®](#), delivering the tools and talent required to address the unique data management challenges related to license usage analytics. Organizations can also leverage advanced visualization solutions such as [Altair® Panopticon™](#) to easily create visual interfaces and give decision-makers the information they need to make business decisions based on the latest data.
- Finally, as a leading provider of HPC workload management solutions, including [Altair® PBS Professional®](#), [Altair® Grid Engine®](#), and [Altair® Accelerator™](#), Altair brings unique experience to license optimization in large-scale distributed environments and understands how schedulers, license managers, and software asset management tools interact to maximize value.

Altair brings significant professional services capabilities to help you achieve your software license analytics goals. Requirements may range from simple software usage tracking to advanced analytics, denials, and predictive analytics. Implementation times will vary depending on the number of vendor daemons, license managers, and the organization's size. A basic SAM implementation for a few vendor daemons, including data collection agents, can be completed in just a few hours.

CONCLUSION

Effectively managing and optimizing software assets is critical in large organizations. This is particularly true in engineering and scientific domains.

By implementing a software asset management program and suitable software tooling, organizations can:

- Right-size their software portfolios based on accurate data
- Tune current configurations and guide capacity planning
- Ensure license assets are optimally utilized
- Improve customer experience and enhance engineering productivity and competitiveness
- Reduce costs and improve profitability
- Improve security by running the latest software and avoid compliance-related risks

To learn more, please visit altair.com/contact-us.

Altair is a global leader in computational science and artificial intelligence (AI) that provides software and cloud solutions in simulation, high-performance computing (HPC), data analytics, and AI. Altair enables organizations across all industries to compete more effectively and drive smarter decisions in an increasingly connected world – all while creating a greener, more sustainable future.

For more information, visit www.altair.com

REFERENCES

1. [Gartner Forecasts Worldwide IT Spending to Grow 8% in 2024](#), October 18, 2023.
2. Gartner Research, [Cut Software Spending Safely with SAM](#).
3. [Top 5 Software Compliance Issues](#), NPI Financial, July 2021.
4. This kind of monitoring can be achieved using solutions such as [Altair® Desktop Software Usage Analytics™ \(DSUA\)](#), usually deployed as a complement to SAM software.
5. In their [2023 Market Guide for Software Asset Management Tools](#), Gartner segments SAM tools into four distinct categories: (1) Traditional SAM tools, (2) SAM tools for SAP, (3) SAM Tools for engineering and speciality software, and (4) SAM tools for SaaS.
6. See [Market Guide for Software Asset Management Tools](#) – October, 2023.