IBM Platform Computing

IBM Platform LSF product family

Powerful, comprehensive workload and resource management for high-performance technical computing

IBM

Highlights

- Optimize resource utilization and reduce costs
- Increase throughput for faster time to results
- Improve user and administrator productivity
- Save compute cycles with intelligent data management

Across enterprises of all sizes, application capabilities and data volumes continue to grow significantly, driving the need for more compute capacity and high-performance management and analysis tools. Even in traditional high-performance computing (HPC) environments, multiple compute silos, uneven processing, design cycle leaks and delayed results are common.

Facing increasingly restrictive economic pressures, organizations are looking for better ways to improve IT performance, reduce infrastructure costs and expenses, and meet the demand for faster time to solution and market.

To be successful in this environment, organizations need focused technical computing management solutions and software that help create, integrate and manage shared distributed computing environments to accelerate application performance, improve infrastructure flexibility and reduce time to results.

Manage complexity

The IBM® Platform™ LSF® product family is a powerful workload management platform for demanding, distributed and mission-critical HPC environments. It provides a comprehensive set of intelligent, policy-driven scheduling features that enable you to make the most of all your compute infrastructure resources and ensure optimal application performance (see Figure 1). A highly scalable and available architecture allows you to schedule complex workloads, and manage up to petaflop-scale resources.

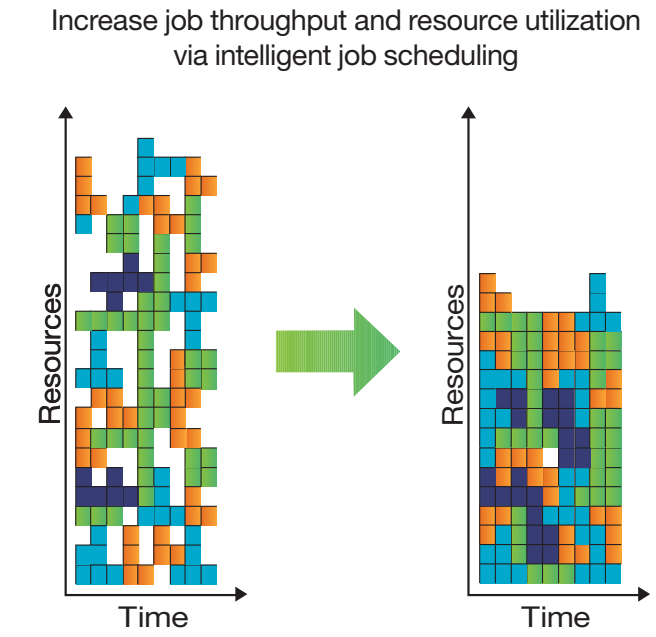

Figure 1. Intelligent scheduling in Platform LSF helps make optimum use of resources.

Platform LSF provides the capabilities to manage and accelerate workload processing across heterogeneous resources in cluster, grid and HPC cloud environments. It is comprised of a comprehensive set of intelligent scheduling policies to ensure the right resources are automatically allocated to the right jobs, for maximum application performance and efficiency.

Better, faster and smarter computing

The Platform LSF product family helps you ensure that all available resources are fully utilized by enabling you to take advantage of all technical computing resources, from application software licenses to unused network bandwidth. You can manage and accelerate workload processing and intelligently schedule and guarantee the completion of workloads across a distributed, shared IT environment, while using all HPC resources—regardless of operating system or architecture.

Complete
- Advanced, feature-rich workload and resource management
- Robust set of add-on features
- Integrated application support

Powerful
- Policy-, energy- and resource-aware scheduling
- High-throughput scheduling for optimal performance
- Advanced self-management

Flexible
- Heterogeneous platform support
- Policy-driven
- Command-line interface (CLI), web services, application programming interfaces (APIs)

Scalable
- Thousands of concurrent users and millions of jobs
- Virtualized pool of shared resources
- Flexible control with multiple policies

"The Platform LSF environment has allowed us to increase the number of virtual engineering simulations needed to build the fastest and most aerodynamically efficient car possible. Its robust and scalable solution enables us to leverage fully our growing investments in engineering IT infrastructure. With Platform Computing technology behind us, we are confident that we can continue our rise up the rankings over the next few seasons."

—Steve Nevey, Business Development Manager, Red Bull Technology

Reduce operational and infrastructure costs

Platform LSF helps reduce total cost of ownership (TCO) by providing optimal management and greater flexibility, visibility and control of job scheduling. This enables IT to improve the service provided to stakeholders. By helping to ensure optimal utilization of existing IT infrastructures, more work is done with fewer resources, reducing additional hardware and administration costs.

Improve productivity and resource sharing

Platform LSF lets you fully utilize hardware and application resources, whether they are down the hall or halfway around the globe. By improving utilization, resources are more readily available, helping you get more work done in a shorter amount of time.

Leverage investments in existing resources

Platform LSF pools resources and manages application workloads across highly distributed environments—from single and local departmental clusters to a globally dispersed, multi-cluster infrastructure to HPC cloud environments. It allows you to distribute workloads to any mix of hardware systems including desktops, servers and supercomputers.

A family that grows as you grow

Optional add-ons extend Platform LSF to provide a complete set of workload management capabilities, all designed to work together to address your high-performance computing needs (see Figure 2).

- IBM Platform Application Center
- IBM Platform Process Manager
- IBM Platform Data Manager for LSF

- IBM Platform License Scheduler
- IBM Platform RTM
- IBM Platform Analytics
- IBM Platform Session Scheduler
- IBM Platform Dynamic Cluster

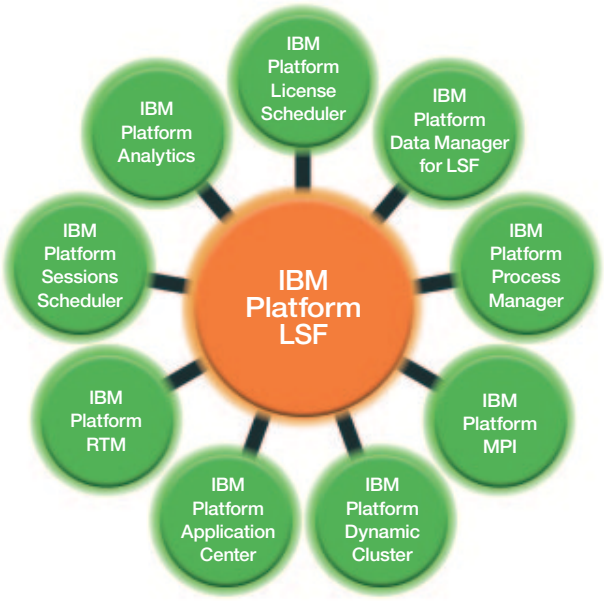

Figure 2. The broad Platform LSF family includes a rich set of available add-on products.

IBM Platform Application Center: Application-centric interface

IBM Platform Application Center simplifies HPC by making it easier for users to run applications without having to write scripts. Scripting guidelines and application templates simplify job submission, reduce setup time and minimize operation errors. The web-based interface enables remote job monitoring, easy access to job-related data and the capability to easily perform basic operations such as stopping, suspending, resuming or re-queuing jobs through a web browser. Platform Application Center is based on IBM WebSphere®, which provides high performance, scale-out capability and high availability.

IBM Platform Process Manager: Design and run complex workflows

IBM Platform Process Manager enables advanced users to design engineering computational processes, capturing and protecting repeatable best practices. Documented flows hide complexity and boost user productivity. Workflow steps and dependencies are documented using an intuitive graphical interface, allowing you to automate lengthy, repetitive tasks that are prone to human error. When combined with Platform Application Center, the complexity of these processes can be hidden behind an easy-to-use interface.

IBM Platform Data Manager for LSF: Intelligently stage and manage data

Using IBM Platform Data Manager for LSF, you can cost-effectively manage the huge amounts of data regularly transferred back and forth in HPC environments. Leveraging the underlying file transfer infrastructure you already have in place, you can use Platform Data Manager to automate data transfer within and between Platform LSF clusters and to and from the cloud. Transfers are handled in an out-of-band manner to eliminate wasted compute cycles. Platform Data Manager also provides a smart managed cache that allows you to reuse transferred data and avoid duplication, eliminating wasted disk space. Centralized visibility and control make it easy to prioritize transfers on a job or project basis.

IBM Platform License Scheduler: Optimize application licenses

With IBM Platform License Scheduler, you can manage and optimize application license usage between sites and projects by allocating licenses based on an established distribution policy. You can also optimize performance and sharing where licenses are primarily shared between clusters, and then between projects within clusters. A reporting function with an intuitive,

web-based console enables license usage to be monitored in real time, simplifying license-sharing and helping to improve productivity and increase overall access to license resources. License Scheduler includes support for FlexNet and Reprise License Manager (RLM) license managers.

IBM Platform RTM: Report, track and monitor

IBM Platform RTM is an operational management environment for Platform LSF. Updated dashboards provide comprehensive reports that support the day-to-day administrative tasks associated with managing single and multiple Platform LSF cluster environments and Platform LSF performance monitoring and monitoring of FlexNet and RLM licenses. Platform RTM provides timely information on the current status of your HPC environment to help improve decision making, reduce costs and increase service levels. Extensive online help facilities enable organizations to get started more quickly and to easily customize Platform RTM to suit their needs.

IBM Platform Analytics: Analyze business decisions

IBM Platform Analytics is a business decision solution for Platform LSF environments that employs online application processing (OLAP) techniques to correlate long-term historical data from HPC clusters and grids for data-driven analysis and decision making. You can utilize the pre-configured dashboards or construct your own in order to quickly answer questions about your HPC infrastructure and applications. With better insight into your HPC data center environment, you can identify and quickly remove bottlenecks, spot emerging trends and plan capacity more effectively.

IBM Platform Session Scheduler: Schedule high-throughput, low-latency workloads

IBM Platform Session Scheduler is designed to work with Platform LSF to provide high-throughput, low-latency scheduling in environments that run high-volumes of short-duration jobs and where users require faster and more predictable job turnaround times.

IBM Platform Dynamic Cluster: Create flexible, dynamic HPC clouds

IBM Platform Dynamic Cluster turns static Platform LSF clusters into dynamic, shared cloud infrastructure. By automatically changing the composition of clusters to meet ever-changing workload demands, service levels are improved and organizations can do more work with less infrastructure. With smart policies and numerous features such as live job migration and checkpoint-restart, Platform Dynamic Cluster enables improved utilization, better reliability and increased productivity, while dramatically reducing administrator task load.

Why IBM Platform Computing?

IBM Platform Computing™ brings leading cluster, grid and HPC cloud management software to the IBM Technical Computing portfolio. These offerings accelerate time to results for compute- and data-intensive applications running on distributed technical and analytics computing environments for workloads as diverse as real-time analytics, business simulations, product design analysis and risk management—applications that exemplify the smarter computing era.

Platform Computing technical and HPC applications fuel product development, critical business decisions and breakthrough science in financial services, manufacturing, digital media, oil and gas, life sciences, government, research and education. More than 2,500 clients—including 23 of the top-30 largest global enterprises—use Platform Computing solutions.

By combining software from Platform Computing with IBM Technical Computing solutions, IBM can better serve enterprise clients that are turning to high-performance technical computing to accelerate time to results, improve infrastructure utilization and reduce operating costs—no matter what hardware they have installed.

For more information

To learn more about the IBM Platform LSF product family, please contact your IBM marketing representative or IBM Business Partner, or visit: **ibm.com**/systems/platformcomputing/products/lsf

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IBM Platform LSF

Powerful, comprehensive high-performance technical computing workload manager

Highlights

- Improve administrative productivity with a comprehensive set of workload management capabilities
- Grow with a flexible, high performing, scalable architecture
- Accelerate time-to-results with high throughput scheduling

IBM® Platform™ LSF® manages and accelerates high performance computing (HPC) workloads across distributed compute environments. It provides a comprehensive set of intelligent scheduling capabilities that help make sure the right resources are automatically allocated to the right jobs for maximum application performance and efficiency. With a comprehensive set of intelligent and policy-driven scheduling features, powerful management features and unparalleled scalability, Platform LSF helps you maximize the use of heterogeneous resources, ensuring that resource allocation is always aligned to business priorities while reducing costs and accelerating time-to-results.

Improve administration

Platform LSF pools resources and manages application workloads across highly distributed environments—from single and local departmental clusters to a globally dispersed, multi-cluster infrastructure to HPC clouds—helping IT administrators work more effectively. Rather than relying on a single cluster administrator, Platform LSF provides the flexibility to delegate administrators at multiple levels through the organization. By enabling project managers and business owners to control their own group membership and resource allocation policies, users enjoy better service and the burden on cluster administrators is substantially reduced.

With Platform LSF changes can be made any time on-the-fly without the need to re-start cluster services. This means that you no longer have to wait for scheduled maintenance periods to make configuration changes to your HPC resources. This “live” reconfiguration capability boosts productivity, and minimizes downtime while allowing you to react more swiftly to changing business priorities.

Smart scheduling policies

Platform LSF provides flexible scheduling capabilities, ensuring that resources are allocated to users, groups and jobs in a fashion consistent with your service level agreements (SLAs), improving resource utilization and user productivity. These policies include:

- Fair share, preemptive, backfill and SLA scheduling
- High throughput scheduling
- Multicluster scheduling
- Topology-, resource-, and energy-aware scheduling
- Core and Memory Affinity
- Flexible data handling
- Advanced reservations
- Multi-level administration and job access controls
- Support for NVIDIA GPU and Intel Xeon Phi accelerators
- Tightly integrated with IBM Platform MPI and IBM Parallel Environment

An environment that grows as you grow

A family of optional add-ons helps ensure that Platform LSF is highly scalable, expanding in both size and capability.

- **IBM Platform Application Center**: A rich environment for building easy-to-use application-centric web interfaces, simplifying job submission, management and remote visualization.
- **IBM Platform Process Manager**: A powerful interface for designing complex engineering computational processes, capturing repeatable best practices which can be leveraged by other users.
- **IBM Platform RTM**: A flexible, real-time dashboard for monitoring global workloads and resources.
- **IBM Platform Analytics**: An advanced tool for visualizing and analyzing massive amounts of workload data for improved decision-making.
- **IBM Platform License Scheduler**: A license management tool which enables policy-driven allocation and tracking of commercial software licenses.
- **IBM Platform Session Scheduler**: A high-throughput low-latency scheduling solution for IBM Platform LSF environments
- **IBM Platform Dynamic Cluster**: An innovative cloud management solution that transforms static, low utilization clusters into dynamic, shared cloud resources.

Why IBM?

IBM Platform Computing™ brings leading cluster, grid and HPC cloud management software to the IBM Technical Computing portfolio. Designed to accelerate time-to-results for compute and data-intensive applications, the Platform Computing applications fuel product development, critical business decisions and breakthrough science in a wide range of industries. More than 2,500 clients—including 23 of the top 30 largest global enterprises—use Platform Computing solutions.

For more information

To learn more about the IBM Platform LSF, please contact your IBM representative or IBM Business Partner, or visit the following website: **ibm.com**/platformcomputing

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