

IBM Spectrum LSF

Powerful workload and resource management for mission-critical, high-performance computing



Highlights

- Optimize resource utilization and reduce costs
- Achieve faster time to results with up to 150 times greater throughput¹
- Drive performance at scale to new levels
- 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 time to 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® Spectrum 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 (Figure 1). A highly scalable and available architecture allows you to schedule complex workloads, and manage up to petaflop-scale resources.

Increase job throughput and resource utilization via intelligent job scheduling

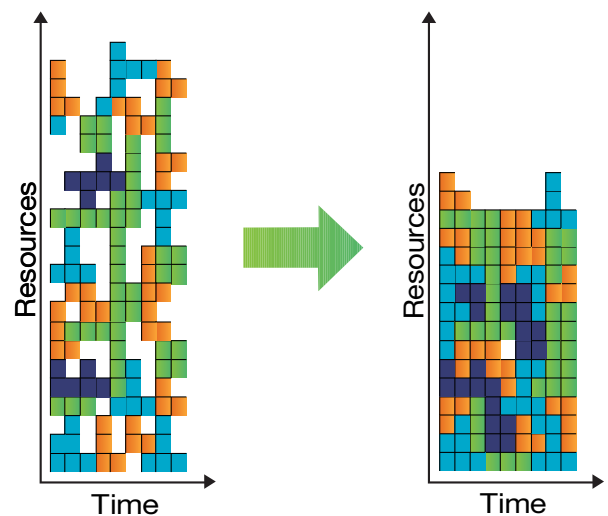


Figure 1. Intelligent scheduling in IBM Spectrum LSF helps make optimum use of resources.

IBM Spectrum LSF provides the capabilities to manage and accelerate workload processing across heterogeneous resources in cluster, grid and HPC cloud environments. Intelligent scheduling policies help ensure the right resources are automatically allocated to the right jobs for maximum application performance and efficiency. An intuitive interface shows changes in job states in real time, allowing you to take action to address problems as they happen.

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
-

Improve responsiveness and performance

IBM Spectrum LSF delivers superior repeatable performance at large scale for more predictable run times and faster time to results. Reductions in job dispatch, scheduling and communication overhead improves the amount of time for a job to be executed. Increased scalability and efficiency allows IBM Spectrum LSF to support larger numbers of jobs and larger array operations.

“IBM Spectrum LSF handles the scheduling intelligently, boosting overall performance and utilization, while IBM Spectrum LSF RTM offers us a macro-level view into the lifetime of our tools and flows memory, run time, process and thread counts, enabling us to triage any pain points and optimize software integration.”

—Michael Kazda, Senior Software Engineer at IBM EDA

A utilization-driven dispatch feature automatically determines the minimum run time needed to meet a high utilization rate across the cluster. If a job finishes before the minimum run time, IBM Spectrum LSF can immediately dispatch another job without having to wait on a scheduling cycle. With utilization less dependent on scheduling intervals, IBM Spectrum LSF can more efficiently manage complex workloads and diverse needs at scale.

Enable better, faster and smarter computing

The IBM Spectrum LSF product family helps you ensure 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 broad range of operating systems and architectures.

Reduce operational and infrastructure costs

IBM Spectrum LSF helps reduce total cost of ownership (TCO) by providing optimal management and greater flexibility, visibility and control of job scheduling. Advanced schedule capabilities make it possible to operate a high utilization, which translates into lower operating costs. By helping to ensure optimal utilization of existing IT infrastructures, more work is done with fewer resources, reducing additional hardware and administration costs.

Increase productivity and resource-sharing

IBM Spectrum LSF lets you fully utilize hardware and application resources. Regardless of where the work is submitted from, the workload manager schedules and dispatches it to the most eligible compute node or cluster. By improving utilization, resources are more readily available, helping you heighten productivity and efficiency.

Enhance the user experience

Visualization tools in IBM Spectrum LSF help bring greater clarity and understanding to complex workflows by helping users more easily determine why jobs are pending and when jobs should run. A simplified pending-reasons summary reveals the single main reason a job is pending in a particular queue or application. If desired, users can drill down in the reason message for a more detailed explanation.

Sophisticated simulation techniques help better predict start times in batch jobs, enabling you to plan workflows to meet deadlines. A pending-time feature allows you to specify a job pending limit at the job queue or application level. It also lets you separate pending jobs into eligible and ineligible categories to better track pending times.

Leverage investments in existing resources

IBM Spectrum 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.

Robust administrative and analytical tools help improve lifecycle management of your HPC systems. These capabilities include the ability to see as you scale with enterprise-class analytics for workload, license and resource utilization. These tools can find quantifiable, data-driven answers to bottom-line questions that affect both day-to-day operations and future HPC investments.

A family that grows as you grow

IBM Spectrum LSF is packaged to support clients on their HPC journey from small clusters to large, distributed computing environments, on premises and in the cloud.

IBM Spectrum LSF Suite for Workgroups and IBM Spectrum LSF Suite for HPC deliver complete HPC management solutions for organizations running compute environments for science and engineering. Both feature the following capabilities:

- Cluster management and deployment
- Powerful, yet simple workload management
- Web-enabled job management
- Support for Linux on IBM POWER8® Little Endian, x86

IBM Spectrum LSF Community Edition is a no-charge, fully-integrated solution for HPC featuring cluster provisioning and management, workload scheduling, an application-centric portal and an MPI library. Get more details [here](#).

Optional add-ons extend IBM Spectrum LSF to provide a complete set of workload management capabilities, all designed to work together to address your HPC needs (Figure 2).

- IBM Spectrum LSF Analytics
- IBM Spectrum LSF Application Center
- IBM Spectrum LSF Process Manager
- IBM Spectrum LSF Data Manager
- IBM Spectrum LSF License Scheduler
- IBM Spectrum LSF RTM
- IBM Spectrum LSF Session Scheduler

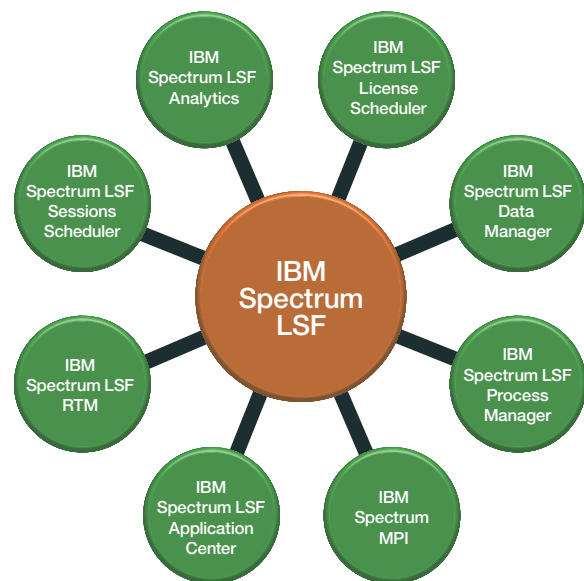


Figure 2. The broad IBM Spectrum LSF family includes a rich set of available add-on products.

IBM Spectrum LSF Analytics: Analyze business decisions

IBM Spectrum LSF Analytics is a business-decision solution for IBM Spectrum 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 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 Spectrum LSF Application Center: Application-centric interface

IBM Spectrum LSF Application Center simplifies HPC by making it easier for users to run applications without having to write scripts. Scripting guidelines and application templates streamline job submission, reduce setup time and minimize operation errors. The web-based interface enables remote job monitoring, quick 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. IBM Spectrum LSF Application Center is based on IBM WebSphere®, which provides high performance, scale-out capability and high availability.

IBM Spectrum LSF Process Manager: Design and run complex workflows

IBM Spectrum LSF 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. Integration with IBM Spectrum LSF Application Center provides a constant web-based environment to create, edit and monitor workflows.

IBM Spectrum LSF Data Manager: Intelligently stage and manage data

Using IBM Spectrum LSF Data Manager, 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 IBM Spectrum LSF Data Manager to automate data transfer within and between IBM Spectrum LSF clusters, and to and from the cloud. Transfers are handled in an out-of-band manner to eliminate wasted compute cycles. IBM Spectrum LSF 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 Spectrum LSF License Scheduler: Optimize application licenses

With IBM Spectrum LSF 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. IBM Spectrum LSF License Scheduler includes support for FlexNet and Reprise License Manager (RLM) license managers.

IBM Spectrum LSF RTM: Report, track and monitor

IBM Spectrum LSF RTM is an operational management environment for IBM Spectrum LSF. Updated dashboards provide comprehensive reports that support the day-to-day administrative tasks associated with managing single and multiple IBM Spectrum LSF cluster environments. IBM Spectrum LSF 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 IBM Spectrum LSF to suit their needs.

IBM Spectrum LSF Session Scheduler: High-throughput, low-latency workloads

IBM Spectrum LSF Session Scheduler is designed to work with IBM Spectrum 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.

Why IBM?

IBM Spectrum Computing offers a comprehensive portfolio of software defined infrastructure solutions designed to help your organization deliver IT services in the most efficient way possible, optimizing resource utilization to speed time to results and reduce costs. These offerings help maximize the potential of your infrastructure to accelerate your analytics, HPC, Hadoop, Apache Spark and cloud-native applications at any scale, extract insight from your data and get higher-quality products to market faster.

Whether deployed in a data center or on the cloud, IBM Spectrum Computing solutions are widely viewed as the systems software of choice for technical and HPC applications, including computationally and data-intensive design, manufacturing, financial analytics, business and research applications. The core value of the portfolio is simplifying and accelerating high-performance simulations and analysis to help you uncover insights into your business, products and science.

For more information

To learn more about IBM Spectrum LSF, contact your IBM marketing representative or IBM Business Partner, or visit: ibm.com/systems/spectrum-computing/products/lfs



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¹ “HPC Workload Management Tools: A Competitive Benchmark Study,” Edison Group, ibm.com/services/forms/signup.do?source=stg-web&S_PKG=ov26443



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