

# UFM-LSF Converged Data Center Workload Management Solution

Increase Fabric Workload capacity with UFM and Platform LSF

With the widespread adoption of HPC clusters and enterprise cloud operations come requirements for improved management, as well as application performance assurance and isolation.

In addition, not all applications are equal when it comes to latency requirements and their importance towards meeting business objectives.

Traditional solutions separate the scheduling and the fabric resource management into two separate domains, wrongly assuming that the fabric is a flat, static and underutilized resource that has no relation to the workloads.

Consequently, fabric resources are not adjusted to allow isolation between applications and optimization of I/O and switching capabilities. The result is that converged fabrics that interconnect multiple applications over the same wires often suffer from intermittent application performance and application contention.

When application slowdown occurs, there is no mechanism in place to analyze and understand the root cause of the contention, meaning that areas of over- or under-utilization within the network cannot be improved over time. While the scheduler is aware of the server compute resources to the greatest detail, it does not have visibility into the fabric resources in service of the workloads without integration with the fabric resource manager.

In HPC cluster and enterprise cloud environments, the fabric must be dynamically tuned and provisioned to assure optimal performance, traffic-aware routing, application isolation, fabric capacity assurance and Quality of Service (QoS) on a fabric-wide basis. The solution is a mechanism that links the workload manager and the fabric

resource manager to allow predictable, QoS-based concurrent workload performance over the converged fabric.

Mellanox and Platform Computing have built an integrated solution for managing resources in cloud and enterprise data center environments that spans compute, I/O, network, and applications. The solution consists of the Platform LSF workload management software, Mellanox's innovative Unified Fabric Manager™ (UFM™) software, and Mellanox's smart fabric switching solutions. Based on an open architecture, it can be easily extended and customized by users.

With this integrated solution, users can double overall workload throughput and reduce fabric application latency. Mellanox UFM and Platform LSF work together to adjust the run time of fabric resources as they are placed in the server farm for execution. For example, high-priority applications can be granted high fabric priority to assure they are not negatively impacted by an application with lower priority. An example would be the resolution of the classical contention between MPI-based traffic and storage traffic.

The solution enables users to:

- Automate fabric optimization to increase application performance
- Prioritize network and I/O resources to match application requirements
- Assure network isolation between workloads

**Platform  
Computing**

## HIGHLIGHTS

### SOLUTION DETAILS

- The solution is composed of several integrated building blocks:
  - Platform LSF
  - Mellanox Ethernet or InfiniBand switches and gateways
  - Mellanox Unified Fabric Manager™ (UFM™) Software

- Correlate fabric monitoring with application workload performance

**Unified Fabric Manager™ (UFM™) Software**

UFM is a central fabric resource management and monitoring solution that:

- Automatically discovers fabric resources
- Automatically provisions fabric resources to maximize performance and reduce congestion according to application priorities
- Isolates workload from security and contention prevention
- Monitors fabric resources and traffic in real-time
- Provides a console for central administration and fabric-wide maintenance

UFM enables users to model application and job requirements, and automatically configure the fabric to fit the application layout and unique requirements. For example, UFM can dynamically control routing decisions, configure QoS and congestion management policy, configure Mellanox’s unique switch-based collective offload, and partition fabric resources. As a result, performance increases significantly, congestion and latency is reduced by a factor of ten, and resources can be isolated and prioritized according to user needs.

UFM incorporates a smart correlation and monitoring engine that constantly monitors statistics from hosts, adapters, switches, and third-party applications. The data is filtered, analyzed, and translated to valuable application-level statistics that can be used to identify application bottlenecks, fabric health and problem root cause.

By integrating UFM with LSF, the fabric can be managed as a dynamic resource enabling higher productivity and workload throughput. At the same time, UFM can monitor the fabric and assure that there are no undetected

bottlenecks. Optimizing fabric resource allocation to the application workloads and traffic patterns is key to the converged data center and the private enterprise cloud. The seamless integration of these two market-leading products enables data center managers to sustain policies and service levels that were previously impossible to manage.

**Platform LSF**

Platform LSF, the industry-leading workload management solution for high performance computing (HPC) environments, schedules batch and interactive workload for compute- and data-intensive applications in cluster and grid environments. Architected for large scale, complex, and mission critical high performance computing environments Platform LSF enables organizations to:

- Maximize utilization of existing IT infrastructure so more work is done with fewer resources
- Improve user productivity enabling them to run more jobs, faster
- Develop better products and services with faster, higher quality, more reliable results

Its unique fault-tolerant architecture allows it to schedule complex and elastic workloads, manage high performance computing resources and reliably support high performance computing systems at the petaFLOPS scale. Platform LSF can also be used with other resource management systems like SLURM and Cray ALPS.

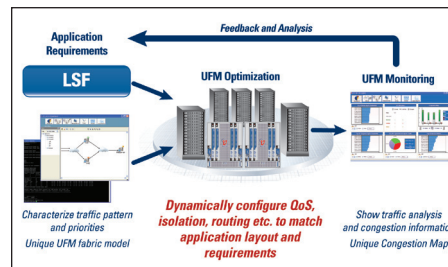


Figure 1. UFM and LSF Integrated Solution



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