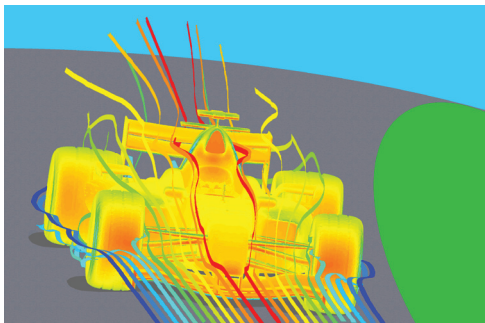


# Platform™

## Optimize your FLUENT® environment with Platform HPC Management Software



### Benefits

- Reduced simulation time
- Improved productivity
- Reduced physical prototyping
- Simplified parallel job management
- Reduced IT costs
- Improved project-based accounting
- Optimized use of software licenses
- Easy Web based access to solvers

Let Platform Computing help you get the most out of your FLUENT computing environment

Contact your Platform sales or services representative today for more information on Platform LSF

### Accelerating FLUENT CFD Simulations

ANSYS, Inc. is a global leader in the field of computer-aided engineering (CAE). The FLUENT® software from ANSYS is a popular tool for flow modeling in industries such as Aerospace & Defense, Automotive Manufacturing, Consumer goods manufacturing and Healthcare. In applications where design performance is determined by the behaviour of fluids, FLUENT software helps customers increase efficiencies, lower design and manufacturing costs and improve product quality.

For complex CFD problems including modeling of turbulence, moving and deforming objects, reacting flows and acoustic modeling, engineers can simply never have enough compute power. The fidelity of CFD simulations are a function of mesh sizes and timesteps, and simulation accuracy scales with the amount of compute power that can be brought to bear. This appetite for compute power makes FLUENT an ideal candidate for deployment on a grid computing environment.

Platform LSF provides engineering and research institutions with the ability to manage large numbers of FLUENT sequential or parallel jobs more effectively. Platform LSF ensures that hardware assets are optimally used and provides sophisticated reporting and monitoring facilities to help cluster administrators gain insight who is using what resources when. Platform LSF provides FLUENT users with scheduling flexibility and ensures that long running jobs need not be re-started from the beginning in the event of host failures.

To simplify running FLUENT software and other popular CAE applications on shared cluster environments, Platform offers Platform LSF tailored specifically to the needs of large CAE environments. In addition to providing everything needed to run FLUENT sequential, shared memory parallel (SMP) and distributed parallel workloads more effectively, Platform LSF also includes a web portal which has been pre-integrated and tested with FLUENT. This interface allows organizations to provide simple web-based job submission and management interface for FLUENT simulations, reducing the learning curve for engineers. By providing a simplified interface to the CAE environment, HPC data center managers remove potential sources of operator error and retain better control of their environment. Platform LSF is packaged in such a way as to allow FLUENT users to be up and running using the web-based portal quickly and easily.

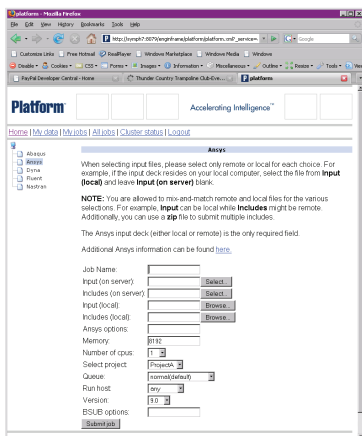
For organizations running FLUENT software along with other simulators, Platform LSF provides an ideal solution. It simplifies the configuration and use of a distributed computing environment while making the entire environment more efficient. The solution includes access to Platform's quality telephone technical support so that customers can focus on running their CFD simulations rather than worry about details related to cluster configurations. For those customers requiring a deeper level of integration or enhanced support, Platform engineers are available to assist you with the build out of your own CFD simulation environment and compute portal.

### Platform LSF

Platform LSF for advanced management of CAE jobs has an easy to use web-based portal for FLUENT and other CAE applications. Platform LSF includes a collection of Platform developed XML web templates and integration scripts designed specifically for use with Fluent solvers as well as other simulation tools. While Platform LSF and FLUENT support a variety of different operating systems, hardware platforms and MPI implementations, Platform has specifically tested and documented FLUENT using the HP® MPI, Intel® MPI and Platform MPI implementations. Platform has also tested and documented the submission of FLUENT sequential, Shared Memory Parallel (SMP), and Distributed Parallel jobs to Platform LSF through both the command line interface as well as the web portal.

## Features Include:

- Comprehensive project and user-based reporting and accounting helping site administrators to understand exactly how resources are being used
- Fair-share scheduling capabilities intended to ensure that one user or group cannot monopolize the compute resources on a shared cluster
- Seamless management of parallel and sequential jobs allowing MPI based jobs to start automatically on compute nodes meeting resources requirements without the need to pre-select hosts
- Sophisticated scheduling policies that respect relative user and project priorities and support features such as advanced reservation and scheduling policies that can vary according to the time of day or day of week



Using Platform LSF, site administrators benefit from “best practices” related to FLUENT implementations and ensure that resources are shared between multiple projects optimally in accordance with configurable site policies. The use of the web portal enables collaborative engineering with remote teams, simplifies the handling of temporary scratch storage (which is a key issue for CAE environments), and supports multiple engineers running large numbers of simulation jobs.

## How the Integration Works

With Platform LSF, FLUENT users have the choice of running FLUENT solvers in two different ways. They may elect to run solvers via the command line using wrapper scripts, or as an alternative they may wish to manage their FLUENT jobs through the provided web interface.

## Running and managing FLUENT software through the web portal

CAE environments already using FLUENT will have their own in-house developed scripts used to run FLUENT solvers as well as other commercial and open-source simulators. Designed with just these environments in mind, the web portal makes it easy to incorporate these scripts. The web portal is a framework level solution that allows customers to quickly and easily build a branded web-portal and provide a user-friendly contextual interface. By hiding the complexity of the scripts used to invoke FLUENT from end-users, and by providing non-system administrators with simple web based access to monitor and control their own jobs, cluster administrators can provide a better level of service to their CFD users while simultaneously decreasing technical support requirements.

Platform LSF includes application integration scripts for FLUENT sequential, SMP and distributed parallel solvers and provides examples of how they typically run in Platform LSF environments. It also provides documentation on advanced features of the FLUENT integration with Platform LSF such as the checkpoint and restart functionality. The same level of technical documentation is provided for other popular CAE applications, including the ANSYS® structural analysis software. Using the web-portal, customers can be up and running quickly and easily with their own multi-application compute portal.

Through the simplified web interface, engineers can focus on their own simulations rather than worrying about the semantics and complex command lines associated with various tools, scripts and job control mechanisms. While each simulation runs in it's own logical container, intermediate files can be viewed dynamically via the portal. This facility provides engineers with visibility to how their simulations are progressing and allows them to package and download files of interest.

## Running FLUENT software from scripts or the command line

The documentation and scripts provided by Platform LSF provide examples of how FLUENT solvers can be run standalone or using one or more of the provided MPI implementations. By contrasting how FLUENT solvers are run directly from the command line with how those same solvers can be run in a Platform LSF environment, cluster administrators will see exactly how Platform's engineers recommend that wrapper scripts be written.

The documentation and scripts provided by Platform LSF show how long running MPI simulations can be made to checkpoint under the control of the Platform LSF scheduler. Platform also provides necessary enhancements to the supplied scripts to allow distributed parallel jobs using Intel's MPI to run properly with SSH.

In addition to the various command line options provided to FLUENT users by the “bsub” facility, Platform LSF also provides the scripts required for submitting checkpointable jobs to Platform LSF. With the scripts and executables in place, any FLUENT job managed by Platform LSF will respond to the Platform LSF native commands for managing checkpointable applications including “bchkpnt” and “brestart”.

## Platform LSF

### Supported Hardware

- Intel® EM64T
- AMD® AMD64

### Supported OSs and Cluster Stacks

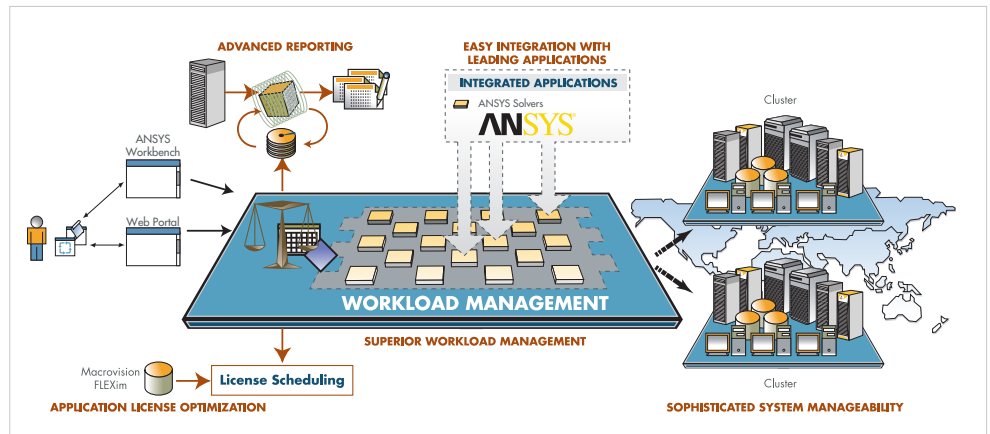
- Microsoft Windows 2000, 2003, XP
- Linux RHEL 3.0, 4.0, 5.x
- Platform OCS – DE, Red Hat HPC Solution

### Supported LSF versions

- Platform LSF version 6.1, 6.2
- Platform LSF version 7

### MPI Implementations

- MVAPICH 0.9.4
- Intel MPI
- LAM/MPI 7.0.3
- MPICH-GM 1.2.5.10
- MICH-P4 1.2.5
- Totalview 6.7.0-1
- IBM AIX 5L PSSP 3.4 and 3.5
- IBM PE 3.2 and 4.1 on AIX 5.1 and 5.2 respectively
- Platform MPI



When running parallel jobs under the control of Platform LSF, it will automatically select optimal hosts for the job and will run the job under the LSF Parallel Application Manager (PAM). The PAM collects resource usage metrics from parallel jobs and propagates control signals to the tasks comprising the parallel job. Advanced host selection facilities in Platform LSF including the "span" and "ptile" directives allowing MPI parallel jobs to be distributed across hosts in a manner that makes sense depending on the capabilities of each physical host computer. Platform LSF is designed to ensure that large scale parallel jobs can be run reliably, simplifying the management of parallel FLUENT environments.

## FLUENT software and Platform Open Cluster Stack (OCS)

Until recently, for sites running Linux, organizations were left to select their own Linux cluster deployment and management solutions from a myriad of choices. Linux and the open source software movements have accelerated the unbundling of cluster building blocks, which include industry standard hardware, operating systems, cluster systems and workload management. The openness and flexibility of an unbundled software solution stack affords choice of hardware, but eliminates single source vendor responsibility. As a result, it has been expensive and risky for users to deploy and manage Linux clusters using open source components.

Platform OCS enables a new class of users by simplifying Linux cluster deployment and management. Backed by global 24x7 enterprise support, Platform OCS is a modular and hybrid stack that transparently integrates open source and commercial software into a single consistent cluster operating environment. System Administrators seeking to provision and easily manage a Linux computing environment to run CFD services such as FLUENT or other cluster-based CAE services can benefit from the rich functionality of Platform OCS to simplify maintenance and reduce cost of ownership as the cluster grows.

Features	Benefits
Automated Allocation of Compute Nodes	Optimal compute nodes are selected automatically by Platform LSF based on each job's resource requirements, and available host resources (including built-in and user defined resources)
Parallel Job Support	<ul style="list-style-type: none"> <li>List of MPI hosts is generated at run-time rather than being statically configured making the system tolerant of MPI hosts being unavailable.</li> <li>Platform LSF allows large scale parallel/MPP FLUENT jobs to be controlled easily and captures resource usage information using Platform's unique Parallel Application Manager (PAM)</li> </ul>
Checkpoint / Restart Functionality	<ul style="list-style-type: none"> <li>By having the LSF cluster manage the Checkpoint / Restart process, long running MPI jobs are made more reliable. Whereas the failure of an individual node would normally cause an MPI job to terminate, Platform LSF can detect failures and re-queue a parallel job automatically while avoiding problematic host. The ability to restart execution from the last checkpoint saves significant time and effort.</li> </ul>
Reporting and Metering	<ul style="list-style-type: none"> <li>Platform LSF in addition to its own reporting facilities supports the addition of sophisticated reporting "add-ons" from Platform that allow IT managers and Engineering department managers track and report on key metrics related to the environment</li> </ul>
Web-based Job Submission and Management	<ul style="list-style-type: none"> <li>Platform LSF includes the web-portal, pre-configured and optimized for FLUENT environments. Using the compute portal, local or remote users can submit FLUENT input decks or collections of decks comprising a design or experiment directly to the cluster and monitor the scheduling and execution of their jobs on the compute cluster in real-time</li> </ul>
Policy Management	<ul style="list-style-type: none"> <li>Platform LSF provides sophisticated mechanisms to allocate computing resources by user, by department or by project. These policy management mechanisms help ensure that critical projects get done on time and that inexperienced users cannot inadvertently monopolize the cluster during busy periods with long running jobs</li> </ul>

## Platform LSF Support

Platform offers an array of support, professional services and consulting services aimed at helping you get the most out your Platform LSF investment and be up and running with FLUENT software as quickly as possible.

Features	Benefits
24x7 hotline support	<ul style="list-style-type: none"> <li>Provides access to continuous support for production critical issues with a response time of less than one hour for severity 1 &amp; 2 issues.</li> <li>Minimizes downtime, saving time and money</li> <li>Ensures maximum performance and availability of your Platform software and grid computing investment</li> </ul>
eSupport	<ul style="list-style-type: none"> <li>Allows you to submit, monitor and update support tickets on-line</li> <li>Offers flexibility and gives you more control of the issue resolution process</li> <li>Coming soon: On-line access to our extensive knowledge base, FAQs and Technical Notes</li> </ul>
Support Mailing List Subscription	<ul style="list-style-type: none"> <li>Patch and Product updates e-mailed to you on a monthly basis</li> <li>Security Alerts sent as security issues arise</li> <li>Notification of major issues of concern to our customers</li> </ul>
Software Upgrades	<ul style="list-style-type: none"> <li>With new features and functions, you will always have access to cutting-edge technologies and industry leading-functionality</li> <li>Access to performance and reliability enhancements ensures that your investment in Platform products will be maintained</li> </ul>

# Platform™

Platform Computing is a pioneer and the global leader in High Performance Computing (HPC) management software. The company delivers integrated software solutions that enable organizations to improve time-to-results and reduce computing costs. Many of the world's largest companies rely on Platform to accelerate compute or data intensive applications and manage cluster and grid systems. Platform has over 2,000 global customers and strategic relationships with Dell™, HP, IBM®, Intel®, Microsoft®, Red Hat® and SAS®, along with the industry's broadest support for HPC applications. Building on 16 years of market leadership, Platform continues to define the HPC market. Visit [www.platform.com](http://www.platform.com).

**World Headquarters**  
Platform Computing Inc.  
3760 14th Avenue  
Markham, Ontario  
L3R 3T7 Canada  
Tel: +1 905 948 8448  
Fax: +1 905 948 9975  
Toll-free tel: 1 877 528 3676  
[info@platform.com](mailto:info@platform.com)

**Sales - Headquarters**  
Toll-free tel: 1 877 710 4477  
Tel: +1 905 948 8448

**North America**  
New York: +1 646 290 5070  
San Jose: +1 408 392 4900  
Detroit: +1 248 359 7820

**Europe**  
Basingstoke: +44 (0) 1256 883756  
London: +44 (0) 20 7977 1480  
Paris: +33 (0) 1 41 10 09 20  
Düsseldorf: +49 2102 61039 0  
Munich: +49 89 517397 52  
Oslo: +44 1256 883756  
[info-europe@platform.com](mailto:info-europe@platform.com)

**Asia-Pacific**  
Beijing: +86 10 82276000  
Xi'an: +86 029 87607400  
[asia@platform.com](mailto:asia@platform.com)  
Tokyo: +81(0)3-6302-2901  
[info-japan@platform.com](mailto:info-japan@platform.com)  
Singapore: +65 6307 6590  
[lliew@platform.com](mailto:lliew@platform.com)

For more information, visit [www.platform.com](http://www.platform.com)

ANSYS, ANSYS Workbench, AUTODYN, CFX, FLUENT and any and all ANSYS, Inc. brand, product, service and feature names, logos and slogans are registered trademarks or trademarks of ANSYS, Inc. or its subsidiaries in the United States or other countries. The Platform OCS product includes software developed by the Rocks Cluster Group at the San Diego Supercomputer Center at the University of California, San Diego and its contributors. Platform and LSF are registered trademarks of Platform Computing Corporation. All other logo and product names are the trademarks of their respective owners, errors and omissions excepted. Printed in Canada.

Copyright © 2008 Platform Computing Corporation. The symbols © and ™ designate trademarks of Platform Computing Corporation or identified third parties. All other logos and product names are the trademarks of their respective owners, errors and omissions excepted. Printed in Canada. Platform and Platform Computing refer to Platform Computing Corporation and each of its subsidiaries. 110308

Note regarding Platform OCS 4.4.0: This product includes software developed by the Rocks Cluster Group at the San Diego Supercomputer Center at the University of California, San Diego and its contributors.