

Customer Success Story

MTU Aero Engines keeps priority jobs on track with Platform LSF®

Customer

MTU Aero Engines

Industry

Industrial Manufacturing
– Aerospace

Challenges

- Maximize existing HPC infrastructure to handle an average of 3,000 jobs per day (occasionally up to 15,000) from commercial and in-house applications
- Maintain balance between high server utilization and ensuring priority jobs are processed when needed

Solution

Platform LSF

Business Results

- Platform LSF ensures that high priority jobs have sufficient resources reserved even though the cluster is running at near full capacity
- MTU Aero Engines is able to defer purchase of some 150 CPUs with the fairshare prioritization and scheduling capabilities of Platform LSF

“Platform LSF lets us balance out usage so that there are free slots for those who really need them.”

Axel Philipp
Platform LSF Administrator,
MTU Aero Engines

MTU Aero Engines is Germany's leading manufacturer of commercial and military engines. The company continuously seeks to expand its leading-edge position and requires best-of-breed software to help it accomplish this goal.

MTU Aero Engines has a large Linux cluster in Germany and a smaller one at a subsidiary in North America. Around 150 users submit an average of 3,000 jobs a day to their High Performance Computing (HPC) environment. Most of the CPUs, sourced from a variety of vendors, are dual or quad core, though some old single core CPUs remain. The company maintains a mix of different size hosts (memory, number and type of CPUs) because some of the applications used on the cluster cannot take advantage of the newer multi-core CPUs because of memory bandwidth issues, others request big amounts of memory. Platform LSF 7, which the company is moving to, has a number of features that help utilize this heterogeneous environment.

Platform LSF is a key component of Platform's HPC infrastructure software solution offering. Platform LSF intelligently schedules parallel and serial workloads to solve engineering problems, while utilizing an organization's available computing resources at maximum capacity and capability.

Like many engineering firms, MTU Aero Engines works its clusters around the clock. Every CPU is tapped for as much compute power as can possibly be extracted. Engineers submit jobs from commercial applications like ABAQUS, and MSC.Nastran as well as from several applications written in-house. The most important of these is a fluid dynamics application which accounts for around 90% of the usage of the cluster.

Priority Jobs get Through Despite Heavy Load

Axel Philipp, the Platform LSF Administrator at MTU Aero Engines, estimates that the utilization rate of the 1,400 CPUs in the main cluster averages at around 80% over a typical year. Some months see usage top 90%. Platform LSF is fundamental to

enabling MTU Aero Engines to maintain such high usage rates. But this is not the only thing that interests Philipp in Platform LSF. "With Platform LSF we can achieve high utilization while still getting free slots for those who really need them," states Philipp. "That is what I need Platform LSF for – to do fairshare scheduling to prioritize jobs and pre-empt those that are less important." This function allows Philipp to reserve resources for users who submit the high priority jobs. If there are no free slots available when a high priority job comes through, Platform LSF pre-empts lower-priority jobs, resuming them when compute resources are again available.

It often happens that once people taste the incredible amounts of computing power that HPC clusters offer, they simply want more." If I did not have Platform LSF to prioritize jobs, people would use up all the available processing power and the really important jobs would have to wait," adds Philipp.

Balancing Competing Interests

Getting the high priority jobs through is vital, but so is ensuring everyone else gets their rightful time on the cluster. A special queue that has a fifteen minute runtime limit allows users to submit lower priority jobs and run them for a few minutes to see if they have any problems that might cause them to crash. Once it is established that the jobs are clean, they are resubmitted and then rescheduled to run overnight.

Separate queues are also set up for in-house and commercial licenses. Philipp explains that commercial licenses get higher priority because of their high cost. "They are very expensive, so we need to make sure that they are being used when needed," he comments.

While most of the jobs submitted to the cluster are long running, Platform LSF also allows Philipp to accommodate requests for quick jobs. "We reserve some licenses during the day time for short queues so that the users can get their 20-minute jobs through quickly," he says. In this way, the competing interests are all provided for.

Saving Costs and the Environment

One of the key benefits of Platform LSF is that it allows MTU Aero Engines to defer the acquisition of more hardware until absolutely necessary. Philipp estimates that MTU Aero Engines would need "at least 10% more hardware capacity without the scheduling possibilities of Platform LSF." That translates into some 150 fewer cores, a tangible financial benefit.

Delaying the cost of purchasing additional blades is beneficial in itself, but it also saves the company the cost of powering and cooling those extra CPUs. In today's environmentally conscious world advanced users in a number of industries, including the manufacturing industry, are starting to see the ways HPC infrastructure provides direct benefits like resource sharing, multi-core optimization, green measurement, provisioning and dispatching.

Platform LSF plays a role in enabling MTU Aero Engines to continue designing and manufacturing top quality engines in a way that allows the company to fulfill all of its users' computing needs as well as defer costs while doing so.



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