



EFFICIENT HPC ENABLES RESEARCH

QUEEN MARY UNIVERSITY OF LONDON MAXIMIZES HPC CLUSTER PERFORMANCE

About the Customer

Globally recognized for pushing the boundaries of research and innovation, Queen Mary University of London (QMUL) is one of the United Kingdom's leading higher education institutions, with 5 campuses in London plus sites across Europe and Asia. Queen Mary's high-performance computing cluster supports a student and research community of over 2,000 users in all disciplines, such as astronomy, computational chemistry, bioinformatics, computer science, engineering, mathematics and statistics, and clinical research.



Upon deploying Altair Grid Engine, the impact was immediate. We now experience consistently high usage from our HPC cluster and have gained new flexibility that will take us into the future.

Simon Butcher, Head of
Research Applications, Queen
Mary University of London



The HPC cluster comprises 5,000 InfiniBand-interconnected cores (270 compute nodes including GPU nodes for machine learning) and 2PB of high-performance storage running hundreds of commercial and open-source applications including Gaussian, MATLAB, Ansys, Stata, and genomics applications, plus singularity containers for reproducible research.

The University needed a future-ready enterprise-grade HPC workload orchestration solution backed by solid support and expertise

Their Challenge

At the heart of QMUL's HPC cluster was an open-source fork of Grid Engine called "Son of Grid Engine." Simon Butcher, head of research applications, says the previous workload scheduler presented **performance-impacting bugs that impaired cluster usability**. "The scheduler could not cope with applications that submit thousands of short jobs, which resulted in lengthy response times for our users." Parallel MPI tasks often remained running in orphaned states, causing other jobs to underperform. A bug caused bash variables to potentially crash the scheduler. Ultimately students and researchers were no longer able to run their preferred software. "**We needed a robust solution that could take us forward and allow our researchers to run any application type**," says Butcher.

Our Solution

Having eliminated offerings that were cost-prohibitive, migration-intensive, or lacked support, QMUL selected Altair® Grid Engine® for its **rich features, high performance, large installed base, expert support, and easy upgrade path**. The migration was "painless" and was performed as a phased approach during a concurrent HPC upgrade to RedHat CentOS 7, installation of new nodes, and a major storage upgrade. Consistently high resource usage was realized immediately, conservatively estimated as equaling the cost of at least a couple of nodes. Butcher appreciates the software's features and functionality. "Altair's cgroups implementation is excellent at constraining misconfigured jobs from impacting other users with jobs running on the same node," he says. "Our previous scheduler wasted a lot of precious memory resources." Altair's RSMAP functionality allows GPUs to be fully integrated into queues as selectable resources. Applications can now submit short-running jobs without impact, and **users can run all types of applications**.

Results

Queen Mary University of London is well positioned to **expand the capabilities of their HPC cluster** as they continue to embrace excellence and innovation. "We have great confidence in the stability and performance of Altair Grid Engine," says Butcher, who points out that open-source Grid Engine users may not fully realize the benefits they're missing: "Your investment in HPC infrastructure is considerable. You can maximize the potential of your cluster by many orders of magnitude with Altair Grid Engine. And **the upgrade path is truly straightforward**."