HERIOT WATT UNIVERSITY

casestudy

Esteem extends pioneering oil & gas research at Heriot-Watt University's Institute of Petroleum Engineering with High Performance Computing (HPC) solution

Heriot-Watt University's Institute of Petroleum Engineering runs a research programme, the Edinburgh Time-Lapse Project (ETLP), which relies heavily on data that has been provided by industry sponsors, such as BP and Shell. The Institute recognised that its IT infrastructure could no longer provide the processing power or storage space that the research team needed for accessing and storing vital information for its pioneering research.

Managing technology, enabling business

The University required a specialist High Performance Computing partner to facilitate a solution that focused on scalability, availability and rapid deployment while fulfilling the requirement of providing 100 terabytes of disk space to archive data. Following consultation with systems integrator, Esteem Systems, the Institute asked Esteem to design and implement a High Performance Computing (HPC) Cluster based on Oracle (Sun) technology. With the solution now in place the Institute benefits from:

- Industry leading processing that reduces computational processing times
- Reduced costs, and increased availability for large volumes of critical data
- Flexibility to cope with growth in processing and storage requirements as the needs of researchers increase

The Institute of Petroleum Engineering

Edinburgh-based Heriot-Watt University is recognised internationally as a centre for high calibre research and teaching innovation. The Institute of Petroleum Engineering (IPE), a specialised centre for providing fundamental research in the oil and gas industry, is a key sector of the University and was awarded top level grades in the most recent Research Assessment Exercise. The Institute also provides internationally respected teaching and training and has the largest Petroleum Engineering (PE) programme in the UK.

PE relies heavily on a wide range of research projects; one of which is the Edinburgh Time-Lapse Project (ETLP). This project specialises in the development of analysis tools for quantitative interpretation of 4D seismic data. With strong emphasis on the integration of seismic and reservoir engineering, ETLP aims to build a suite of interpretative tools that help companies, such as BP and Shell, achieve a high-resolution dynamic reservoir characterisation. The ETLP consortium is in its fourth phase of research which will finish in June 2012.

Delivering higher levels of performance

Working with growing amounts of data, the IPE was frustrated with the limited processing power of its existing IT. Built around eight networked servers, the solution was adequate in the earlier phases of the project, but as it matured, the amount of archived data increased dramatically and became ineffective, considerably slowing productivity. This became problematic for the system's users (PHD students and Fellow Associates at the University), who needed to access, save and archive fundamental information, key to their ongoing research. In response to the frustrations caused by the previous system, the Institute secured a budget from project sponsors to build a HPC Cluster with Storage.

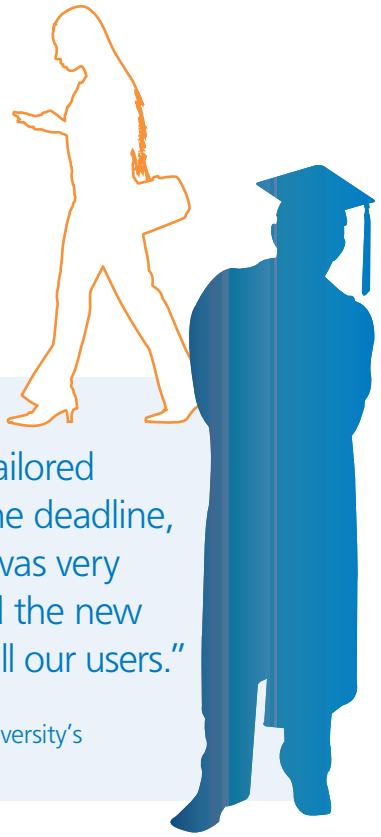
Dr Ian Chisholm, Director of Computing at Heriot-Watt University's Institute of Petroleum Engineering, explains, "We needed a solution that would provide world class performance and data storage in order to ensure our researchers remain at the forefront of research in the oil and gas sector.

"Ensuring the ETLP team's environment of study is as professional as their academic work was also a key focus for me. I wanted to ensure they had effective resources that would enable them to carry out their research without any hindrance. Therefore it was essential that we had an IT system that matched our needs exactly."

esteem

ORACLE Platinum Partner

HERIOT WATT UNIVERSITY



Services

Services provided by Esteem include strategic consultancy, design, implementation and installation as well as ongoing support and maintenance.

Hardware

- 2 management nodes, 4 lustre file servers
- 56 compute nodes, each with two quad-core AMD CPUs
- 100TB of raw disk space

Software

- Lustre Parallel Filesystem
- Alces HPC Stack for Linux including cluster management software, compilers and debuggers

"Esteem's ability to build and integrate a tailored solution off-site and implement it within the deadline, all with minimal downtime for our team, was very impressive. The transition was smooth and the new solution has made a significant impact on all our users."

Dr Ian Chisholm, Director of Computing at Heriot-Watt University's Institute of Petroleum Engineering

Engineering a relationship

Data processing and storage were key objectives for IPE and there was also a need for scalability. Esteem therefore focussed its solution on a high performance processing and storage solution tailored to the IPE's specific requirements.

Following an extremely competitive selection process, Esteem was awarded the contract and was given a 60-day deadline to design, build and implement the HPC Cluster with Storage.

"Esteem's proposal was extremely impressive and really outshone its competitors. They demonstrated they could design a tailored, balanced infrastructure that would fulfil our requirements exactly and provide ongoing support after the roll out," says Chisholm.

"Esteem took time with us to understand our needs and ensured that the architecture was flexible and balanced to suit our specific requirements. The excellent relationship between Esteem and Oracle has meant that we've had the full support of Oracle throughout the project and they're continuing to offer us support now that the solution is implemented."

Build and implementation

Working in partnership with Oracle, Esteem designed and built the HPC Cluster based on 56 compute nodes, each with two quad-core AMD CPUs and Alces' HPC software suite. Using Oracle technology, Esteem boosted storage capacity by integrating a subsystem based on Lustre parallel file-system. This was specifically designed to vastly improve performance throughout the HPC facility and eliminate bottlenecks when accessing data from the system.

The build took place at Esteem's integration centre in Wetherby and was finished within three weeks. The infrastructure was delivered to site at the University's campus in Edinburgh, with an Esteem engineer on hand to provide expertise, advice and support during the roll out. Esteem's history in providing technology to the higher education sector and experience in delivering HPC solutions, enabled a successful infrastructure build.

Chisholm comments, "Esteem's ability to build and integrate a tailored solution off-site and implement it within the deadline, all with minimal downtime for our team, was very impressive. The transition was smooth and the new solution has made a significant impact on all our users. In fact, I think the stress levels have dropped for everybody at the IPE."

Seeing the benefits

Heriot-Watt University's IPE now benefits from increased storage space and gives the team of researchers faster access to electronic resources through the new HPC facility, vital to the success of the ETLP programme. Through enhanced processing powers, IT performance has vastly improved, reducing user login and data computation times, and providing quick access to archived data.

Chisholm says, "Esteem understood the need to increase our IT system's speed and storage space so our team can continue to undertake new research for the oil and gas industry. We simply can't afford to have bottlenecks in our system, we need to be able to concentrate on our work without worrying about whether our data servers were able to keep up. Thanks to Esteem, this is exactly what we have. We are now able to work far more efficiently and ensure our research capabilities can continue to expand."

With Esteem's ongoing support for the IPE's HPC facility, maximum performance is ensured while still allowing staff to retain control over the system.

"We now have a secure future proof infrastructure that allows for scalability. We expect the amount of data processed will grow tenfold over the next three years of its life, and providing a scalable solution that can accommodate this was a key part of Esteem's mission, which has been successfully achieved," concludes Chisholm.

T 01937 861000 F 01937 841234 esteem.co.uk

Rofta House Rudgate Thorp Arch Wetherby Leeds LS23 7QA

INVESTORS IN PEOPLE

esteem