



The Rise of Cloud Computing

New technologies enable reservoir modeling in the cloud.

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In just a few short years, cloud computing has had an enormous effect on technology users' daily lives. Much of users' personal data is stored on the cloud, many friendships and social media tools interact via the cloud, and the most powerful applications can now be run on simple "thin client" terminals such as tablets or smartphones.

Inevitably, these changes in users' personal day-to-day lives also are being seen in the business world, with a huge rise in the number of industrial applications hosted on the cloud.

Many companies are enjoying the cost savings and operational agility advantages of moving their data and business processes from expensive and high-maintenance physical servers to multiple virtual servers in the cloud. International Data Corp. (IDC), for example, predicts that worldwide cloud-managed infrastructure and managed services revenue will reach \$653 million in 2014 and \$2.5 billion by 2018.

Yet what of the oil and gas sector and the potential for cloud computing-based collaboration to accelerate time to first oil, optimize reservoir management, and reduce asset and operating costs?

According to IDC, "There has been an uptick in adoption of cloud services by oil and gas companies as cloud suppli-

ers are able to overcome barriers such as the need for security, high availability and bandwidth." IDC also estimated that information technology (IT) spending in oil and gas will increase to \$49.4 billion by 2016.

It's clear that the cloud is on many people's radars in the oil and gas sector, where reliable and timely data transmission is critical to safe and profitable operations. One process that is particularly suited to cloud computing is reservoir modeling.

Opportunities and challenges

Reservoir modeling can be ideally suited to cloud-based computing. First, there are reservoir modeling's collaboration requirements. For many operators, reservoir modeling is the standard platform for mapping, understanding and predicting oil and gas reservoir behavior, not only at the exploration and seismic interpretation phase but also into operations where the reservoir model can be updated in real time.

This means that the reservoir model is of relevance to a broad number of people, from vice presidents of exploration and seismic interpreters to reservoir and production engineers and senior management. The collaborative nature of the cloud, where users can access models via thin client devices anytime

and anywhere, is particularly attractive in making reservoir models accessible throughout the operator organization.

A second reason why the cloud is such a potentially good fit for reservoir modeling is the increased need for computing power. Operators today often are faced with sparse and poor-quality seismic data and the need to generate countless realizations and reservoir scenarios to reduce uncertainty and gain a clearer picture of the subsurface.

Such complex and intensive processes require immense amounts of compute power—involving multiple clusters of computers—with the drawbacks of high costs of ownership, complex IT infrastructures and a lack of integration.

Against this backdrop and as an alternative, cloud computing brings the scalability benefits of clusters with none of their downsides. The benefits include elastic capacity of data, computer power on demand, almost no maintenance costs and significantly reduced capex.

Finally, it's important to mention security. The user needs to distinguish between public and private clouds and look at the developments that have seen just as robust security being put in place for the cloud as one would for internal IT servers.

Bringing practical benefits to the end user

It's with these issues and challenges in mind that Emerson is teaming up with Canadian-based Calgary Scientific, which focuses on web and collaboration enablement technologies, to enable reservoir modeling end users to experience the practical benefits of cloud-based computing in their day-to-day operations.

Calgary Scientific has its heritage in medical imaging, a sector well known for its rigorous demands in regard to user access, visually rich data, privacy, security and scalability and where medical images are responsible for a growing portion of the world's data.

In medical imaging, Calgary Scientific has developed a cloud-based collaboration platform that preserves companies' investments in existing applications without the need to rewrite existing code. The platform also transfers business applications via a thin layer of additional code to a web-based and mobile applications environment. Users will then have the flexibility to access their data from remote servers, whether those servers are on-premises, private, hybrid or public clouds.

In the medical industry, increasingly powerful scanners are creating more slices of data at higher resolutions, and cloud-based applications are resulting in improved collaboration, faster image access and improved care while saving both time and money.

So can these benefits be transferred to the oil and gas sector and reservoir modeling?

In partnering with Calgary Scientific, Emerson is developing a new cloud-based viewer that will enable users to access and interpret reservoir models within Emerson's reservoir

modeling software, Roxar RMS. Access will be via all thin client devices including tablets, laptops, netbooks and smartphones.

The viewer will sit at the front end of RMS, with users able to visualize results from any of the software's 20 integrated modules, which cover everything from seismic interpretation and structural model building to 3-D gridding, petrophysical modeling, well planning and uncertainty modeling.

Typical applications for this new solution include using reservoir models as presentation tools while on the move, securing feedback from senior management or simply having the flexibility to share reservoir models with other parties outside the direct modeling team. This leads to the "democratization" of reservoir modeling to where it is no longer a niche, specialist domain but accessible throughout the operator organization.

In terms of security, whether working with an internal team or external partner, all modeling data remain secure on servers that the organization controls. The original data are never duplicated or moved to devices that, by design, are mobile and therefore prone to loss or theft. Access is controlled at the application level, giving only authorized users the flexibility to choose the device best suited to their role and situation.

The new cloud-based interface uses the same tools and data that users are already familiar with, allowing any project—new or old—to benefit from this new capability. All existing models can be securely hosted on any cloud, private or public, and gain these benefits immediately.

Other cloud-computing benefits

There are many other benefits cloud computing can bring to reservoir modeling.

For example, it can help develop a much more integrated, effective and seamless workflow with no time lags between applications. There are no costly and time-consuming data transfers, and data and tools are not locked into high-powered workstations. With cloud computing, reservoir modelers can enjoy flexible, real-time collaboration across different projects and are able to access information from a single, truly scalable system.

A cloud-based infrastructure also can act as a repository for expertise and knowledge, a means of enforcing best practices and an enabler in fostering greater productivity from reservoir asset teams, which are crucial in today's environment.

A new revolution

Cloud computing has the potential to usher in a revolution in the oil and gas sector in terms of how it handles, interprets and shares reservoir models and how it increases accessibility across the asset team.

The result will strengthen reservoir modeling's position as a vital and mainstream business process, quantifying uncertainty, reducing risk and improving reservoir management decision-making. ■