SEG
SOCIETY OF EXPLORATION GEOPHYSICISTS

SEISMIC IMAGING ON CLOUD
3-4 August 2021
Virtual Workshop

Cloud processing: just the beginning of the storm?

Mark Skinner, Shearwater GeoServices

Introduction

The debate of why to move to cloud and when it makes sense to seems to be ubiquitous, but the question is asked uniquely by each organization depending on their starting point. Factors including a company's compute needs, either for processing or data management, business constraints in place including legal and financial restrictions, the readiness of the cloud offer at the time the question is asked and a company's strategy, in combination with a wide range of other pushes and pulls leads to cloud adoption taking place at a widely varied pace. Here we consider why it is a simple decision for some and much tougher for others and then explore opportunities that are opened up when cloud is adopted.

Discussion

2020 was without question a tough year for the seismic sector. The global pandemic, on top of international oil trade battles, reduced the cash available to be spent by the oil and gas operators and subsequentially the revenue flow to the seismic service sector was restricted. In general, we saw operators further tighten belts and need to be more flexible when considering cost effective solutions. Such market conditions can present opportunities for new business models. Service companies with large infrastructure and sunk costs might be expected to cut expenditure and manage operations carefully, using what they have. Smaller, and growing companies with less sunk cost or committed liability infrastructure to use, will also be reluctant to make long term financial commitments and may prefer operational expenditure in preference to capital expenditure. Cloud computing offers a good business fit for compute requirements that need flexibility and the ability to rapidly meet demand.

Cloud was perhaps first considered excitedly by the seismic service companies more than a decade ago. Amazon had released their Elastic Compute Cloud product in 2006. The HPC experts from seismic service companies and from operators with internal seismic processing departments quickly found that at that time cloud wasn't generally ready for us. Early on we saw development of business tools in the cloud and that solutions for companies with needs for huge numbers of small transactions were well catered for, but our large scale imaging and modelling challenges were blighted by challenges with code that had been optimized for specific infrastructure and internal cloud hub network connectivity reported as too slow. This experience has left a lasting impression, often we still hear that we need our own dedicated computer centers to serve our needs and that cloud computing is not suited to the seismic sector. There is still a strong place for on-prem options, but cloud has matured significantly in recent times and now offers a very wide level of functionality with more varied hardware and infrastructure that will work for us.

The business of cloud has also evolved. In the same way we may expect computer hardware costs to reduce year-on-year, we have seen cloud offerings from the major providers and some smaller players become of real commercial interest. We do need to be smart about how we select what we use from cloud providers and be clever with choices to enable best cost efficiency weighed up with the other usual important project criteria of timing, but it can be a highly efficient offer and at a time of extreme cost sensitivity, this is opportune.

Opportunity

Cloud famously offers massive flexibility with regards to resources, and of course you pay for what you use, so ramping up is fast and ramping down can be done without decommissioning costs. On its own cloud isn't a silver bullet to reduce project timing, but alongside geophysical advances, AI and ML, it can play an important part in expediting turnaround.

Access to data is simplified with cloud, contractors can receive data from their customers, or even access data in their customers cloud accounts with the appropriate identity management. Results, both intermediate and final, can be delivered quickly and efficiently to customers, even at times when working from home is enforced. Cloud is also a strong fit to the need for collaborative working. It can enable traditional file sharing solutions, but service companies can also allow their customers access in unprecedented ways. Clients G&G teams can be given permission to share data in the same environment as the processing geophysicists using the same tools, without need for installation of local hardware or software.

The cloud story isn't complete yet. Cloud hubs are strategically placed around the globe. This enables seismic service providers to set up processing centers in new locations without material start-up costs. Regional cloud hubs alongside "WeWork" style office arrangements give flexibility to geophysicists to work in a way previously unachievable. We do however still find challenges in some locations where data sovereignty regulations restrict data from leaving a country which do not overlap with existing cloud hubs.

Remaining Challenges

While we readily use the small word "cloud" it is of course vast in the range of what it can describe. Operators and contractor's adoption of cloud is inconsistent, and as described above, this is of course understandable. An important mantra of data management is to avoid unnecessarily moving or duplicating data, and solutions for cloud should follow this. To maximize the value of using cloud, seismic service providers will need to flexible. We need to think about taking applications to data not data to applications as was historically required. Cloud is not homogeneous, geophysical processing software development needs to be able to cope with this with minimal bespoke adaption. Processing geophysicists will need to not only be experts with seismic but also educated in the differing cloud types in order to squeeze every drop of value out of the cloud.