PGS EMPOWERS GEOPHYSICS IN THE CLOUD WITH AMD EPYC™ CPUS

Better price-performance, more flexibility and energy efficiency with AMD EPYC processor-powered Google Cloud instances

AMD
EPYC

Imaging and visualizing the marine subsurface using seismic data is an extremely compute-intensive process. One of the leading companies specializing in this task is Norway-headquartered PGS. When the company's considerable on-premises HPC infrastructure needed updating, PGS turned to Google Cloud and found that instances powered by AMD processors delivered the best price-performance for its workloads.

Compute-intensive subsurface imaging

"PGS is a global geophysical company that acquires offshore seismic data and uses vast amounts of compute to transform that into an image of the earths subsurface," says Louis Bailleul, Chief Enterprise Architect, PGS. "This is a large problem. The survey size can be thousands of square kilometers, producing petabytes of data. The math required to transform the acquired data into useful images is also complex, requiring a huge amount of computing power. So historically we've been using on-premises supercomputers."

"Most recently, we employed Cray XC30 and XC40 systems," continues Bailleul. "Our biggest cluster ever was in 2014. When it was introduced, it was 17th on the top 500 list. We also use a lot of commodity nodes. Our biggest data centers have 2-3,000 of those, and we still currently have 3,000 machines running in Houston."

Refreshing infrastructure this powerful is exceedingly capital intensive, so PGS wanted to take a different direction with its next upgrade. "Back in 2018, we were at the point where our supercomputers needed renewal," says Bailleul. "We wanted to limit the CapEx expenditure as much as possible."

"We get the result we need for 20 percent less cost by switching from N1 and N2 to AMD EPYC CPU-powered N2D instances."

Louis Bailleul, Chief Enterprise Architect, PGS

Initially, the plan was to keep 80 percent of the utilization on-premises and use the cloud for a 20 percent burst capacity.

"We wanted to see if this was achievable," says Bailleul. "So, in 2019 we took some workloads we had run on-premises and moved them to the cloud. This did what we wanted but wasn't great for cost efficiency. But because it was a burst mode for 20 percent extra capacity, with the baseline of our compute still intended to be running on-premises, this was okay. So, in 2019 we signed a cloud agreement with Google Cloud."

This plan changed drastically in 2020, partly because of the global pandemic. "We decided to turn our idea on its head and go with a renewal of most of the compute into the cloud instead of on-premises, moving from a CapEx to an OpEx model," says Bailleul. "We went from 20 percent in the cloud to 80 percent in the cloud. The decision was based on how our trial had shown us what was and wasn't working in the cloud in terms of economics. We had an idea how we could re-engineer our application stack to run efficiently on cloud infrastructure."

PGS initially tried competitor-based instances because that was what was available from Google Cloud at the time. But when AMD EPYC processor-powered instances arrived, it was easy to try them too. "With the cloud, you can choose the platform you want with just a few configuration clicks," says Bailleul. "This made it very easy for us to experiment and understand the cost differences between the different platforms. Google Cloud was very helpful, giving us early access to AMD EPYC CPU-based N2D instances." These proved to be exactly what PGS was looking for.

Better price-performance with AMD EPYC CPU-powered instances

"We had good feedback about the 2nd Gen AMD EPYC CPU-powered instances," says Bailleul. "The 3rd Gen AMD EPYC CPU was starting to come out, so we were able to test that ahead of the run-out too. On average, for most workloads, the N2D instances had a better price performance no matter the generation. It was more marked with the 3rd Gen AMD EPYC processor, but it was already evident with the 2nd Gen."

This convinced PGS that switching over would be cost effective. "We targeted our eight biggest applications first, which represented 80 percent of our workload. We entirely re-engineered those applications and moved them over by May 2022. Now we're looking at the rest of the migration, around 50 applications, which is the other 20 percent."

Initially, PGS had deployed Intel-based N1 and N2 Google Cloud instances. "The price-performance was satisfactory," says Bailleul. "But as we experimented with other types and shapes, we saw that we could get even more benefit out of the cloud platform from AMD. We get the result we need for 20 percent less cost by switching from N1 and N2 to AMD EPYC CPU-powered N2D instances."

PGS now uses an average of 20-25,000 instances and 500,000 vCPUs in its cloud fleet, but at peak times the deployment has hit 52,782 instances and over 1.2 million vCPUs. The instances comprise a mix of n2d-standard and n2d-highmem shapes. "We are very bursty by nature," says Bailleul. "This is why the cloud is extremely appropriate for us. With our previous on-premises equipment, running a 1,000,000 equivalent vCPU workload took weeks to complete. We can now do that in days."

Greater flexibility and greener power

"We have a lot of added benefits," continues Bailleul. "Our primary target was moving to OpEx. But we also gained flexibility. Before, we were locked into a single platform. Now we have the flexibility to choose what makes sense for the workload based on the different shape and type of instances. This makes the cost efficiency optimization extremely precise compared to what we could do previously."

"We will definitely be looking at the next generation AMD EPYC processors as soon as they are available to us in Google Cloud."

Louis Bailleul, Chief Enterprise Architect, PGS

"Another huge benefit is that our previous on-premises Cray supercomputers consumed about 3MW of power," adds Bailleul. "That was coming directly from an electricity grid over which we had no control. But moving into Google Cloud, we could specify the Iowa data center, which uses 97 percent nearly all clean energy.[1] This is a great step towards making our HPC a greener environment."

"The last big benefit was the opportunity to modernize how we were operating our HPC," concludes Bailleul. "Our on-premises platform was designed over 10 years ago. Going to the cloud provided a very good opportunity for us to revisit the design and make things more efficient."

"Since September 2022, we have decided to go 100 percent cloud with a target of 2025," says Bailleul. "We also bought a small on-premises cluster of AMD EPYC CPU-powered servers for development purposes. We are targeting 100 percent cloud, but we do have locations, such as our survey vessels, where it's more challenging to go cloud first, but we are exploring options."

"The large core count of AMD EPYC processors coupled with the big bump in memory bandwidth are the main drivers for the cost efficiency."

Louis Bailleul, Chief Enterprise Architect, PGS

"AMD EPYC processors help us drive our costs down," says Bailleul. "The large core count of AMD EPYC processors coupled with the big bump in memory bandwidth are the main drivers for the cost efficiency. This accelerates our transition, because by bringing costs down we can afford to re-engineer our workloads more effectively. We will definitely be looking at the next generation AMD EPYC processors as soon as they are available to us in Google Cloud."

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Ramform Hyperion seismic vessel
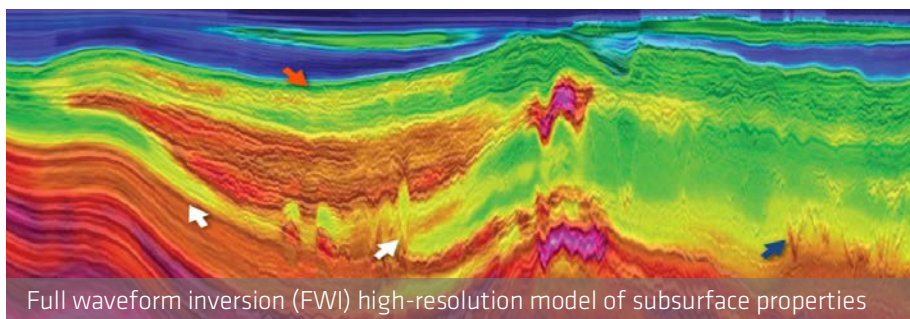
Full waveform inversion (FWI) high-resolution model of subsurface properties

About PGS

PGS is a global geophysical company that gathers offshore survey data and uses vast cloud compute to image the earth. Geophysics is a key enabler for energy security and transition. PGS supports the search for affordable and sustainable energy for all. In collaboration with industry, society, and authorities, the company advances marine subsurface knowledge for evolving energy needs. The company was founded in Norway in 1991, and now owns eight offshore seismic survey vessels, with three main offices in London, Houston, and its Norwegian headquarters in Oslo. For more information visit pgs.com.

About Google Cloud

Google Cloud, offered by Google, is a suite of cloud computing services that runs on the same infrastructure that Google uses internally for its end-user products, such as Google Search, Gmail, file storage, and YouTube. The platform was founded in 2008 and is now used across over 200 countries. Services include cloud infrastructure, security infrastructure, data warehousing, and both hybrid and multi-cloud environments. Revenue surpassed $1 billion per quarter in 2018 and the platform had five million paying customers by the end of the year. For more information visit cloud.google.com.

About AMD

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