

## IBM, NVIDIA, Stone Ridge Technology Set Record in High Performance Computing in Oil & Gas

Billion-cell simulation shatters previous published results using one-tenth the power and 1/100th of the space

Results achieved in 92 minutes with 60 IBM POWER processors and 120 GPU accelerators, smash previous published record of 20 hours using thousands of processors

ARMONK, N.Y., April 25, 2017 /[PRNewswire](#)/ -- IBM (NYSE: [IBM](#)) and [Stone Ridge Technology](#) today announced a performance milestone in reservoir simulation designed to help improve efficiency and lower the cost of production. Working with [NVIDIA](#), the companies shattered previous published results using one-tenth the power and 1/100th of the space. The news demonstrates the ability of NVIDIA GPUs to simulate one billion cell models in a fraction of the published time, while delivering 10x the performance and efficiency than legacy CPU codes.

The breakthrough achievement used [60 Power processors](#) and 120 GPU accelerators shattering the previous supercomputer [record](#) which used over a 700,000 processors. The results aim to transform the price and performance for business critical High Performance Computing (HPC) applications for simulation and exploration.

Energy companies use reservoir modeling to predict the flow of oil, water and natural gas in the subsurface of the earth before they drill to figure out how to more efficiently extract the most oil. A billion-cell simulation is extremely challenging due to the level of detail it seeks to provide. Stone Ridge Technology, maker of the ECHELON petroleum reservoir simulation software, completed the billion-cell reservoir simulation in 92 minutes using 30 IBM Power Systems S822LC for HPC servers equipped with 60 POWER processors and 120 NVIDIA® Tesla™ P100 GPU accelerators.

"This calculation is a very salient demonstration of the computational capability and density of solution that GPUs offer. That speed lets reservoir engineers run more models and 'what-if' scenarios than previously so they can have insights to produce oil more efficiently, open up fewer new fields and make responsible use of limited resources" said Vincent Natoli, President of Stone Ridge Technology. "By increasing compute performance and efficiency by more than an order of magnitude, we're democratizing HPC for the reservoir simulation community."

"This milestone calculation illuminates the advantages of the IBM POWER architecture for data intensive and cognitive workloads." said Sumit Gupta, IBM Vice President, High Performance Computing, AI & Analytics. "By running ECHELON on [IBM Power Systems](#), users can achieve faster run-times using a fraction of the hardware. The previous [record](#) used more than 700,000 processors in a supercomputer installation that occupies nearly half a football field. Stone Ridge did this calculation on two racks of IBM Power Systems machines that could fit in the space of half a ping-pong table."

This latest advance challenges perceived misconceptions that GPUs could not be efficient on complex application codes like reservoir simulators and are better suited to simple, more naturally parallel applications such as seismic imaging. The scale, speed and efficiency of the reported result disprove this preconception. The milestone calculation with a relatively small server infrastructure enables small and medium-size oil and energy companies to take advantage of computer-based reservoir modeling and optimize production from their asset portfolio.

Billion cell simulations in the industry are rare in practice, but the calculation was accomplished to highlight the performance differences between new fully GPU based codes like the ECHELON reservoir simulator and equivalent legacy CPU codes. ECHELON scales from the cluster to the workstation and while it can simulate a billion cells on 30 servers, it can also run smaller models on a single server or even on a single NVIDIA P100 board in a desktop workstation, the latter two use cases being more in the sweet spot for the energy industry.

"The energy industry was among the first to adopt GPUs for numerical modeling, using them to accelerate seismic processing," said Marc Hamilton, Vice President of Solutions Architecture and Engineering at NVIDIA. "They are now making a powerful impact on reservoir simulation, and we expect this to drive further efforts to utilize GPUs for other computationally intense workflows in the oil and gas sector."

This latest breakthrough showcases the ability of [IBM Power Systems](#) with NVIDIA GPUs to achieve similar performance leaps in other fields such as computational fluid dynamics, structural mechanics, climate modeling and others that are critically used throughout the manufacturing and scientific community.

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