Ansys, Baker Hughes, and Oak Ridge National Laboratory Set New Supercomputing Record on AMD Instinct GPUs

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Ansys Fluent solvers powered by AMD Instinct GPUs reduce simulation run time by 96%, unlocking transformative possibilities for high-fidelity CFD analysis

/ Key Highlights

- Baker Hughes solved a 2.2-billion-cell axial turbine simulation with Ansys Fluent® fluid simulation software and 1,024 AMD Instinct™ MI250X graphics processing units (GPUs) on the world's first exascale supercomputer at the Oak Ridge National Laboratory
- Leveraging GPUs on exascale supercomputing systems accelerates computation, allowing for rapid iterations that shorten design-to-market timelines
- The collaboration marks a breakthrough in computational fluid dynamics (CFD) simulation, delivering unprecedented accuracy and speed for designing high-performance machinery in a virtual environment

PITTSBURGH, April 1, 2025 /PRNewswire/ -- Ansys (NASDAQ: ANSS) today announced groundbreaking results from the largest commercial Fluent CFD simulation ever run on AMD Instinct™ MI250X GPUs. Leveraging the power of the Frontier exascale supercomputer, powered by AMD EPYC™ CPUs and Instinct GPUs, Ansys and energy company Baker Hughes scaled Fluent to 1,024 GPUs, offering unparalleled insight into aerothermal physics at large operating pressures. By pairing physical tests with virtual ones, Ansys simulation helps customers achieve faster design cycles and optimizes development costs.

Traditional CFD methods involve lengthy development cycles and high costs for validating designs under extreme conditions. Exascale supercomputing systems supercharge computation, allowing for rapid iterations that shorten design-to-market timelines across applications. The combination of advanced hardware and leading multiphysics simulation software is pivotal for optimizing the development of turbine engines, power generation, mechanical drives, and more.

Baker Hughes uses Ansys Fluent to support the design of its next-generation gas turbines and other turbomachinery equipment to improve energy conversion efficiency and ultimately, reduce carbon footprints. Using the Frontier exascale supercomputer maintained by the Department of Energy's Oak Ridge National Laboratory, Baker Hughes and Ansys ran a 2.2-billion-cell axial turbine stator simulation to identify critical flow and turbulence structures during the development phase.

When comparing this to methods that utilize over 3,700 CPU cores, Baker Hughes and Ansys reduced the overall simulation run time from 38.5 hours to just 1.5 hours using 1,024 AMD Instinct MI250X GPUs. This record-breaking scaling allows for faster design iterations and more accurate predictions, capable of unlocking more sustainable technologies and products.

The advancements in the Fluent GPU solver also offer significant benefits to small and medium-sized businesses (SMB) operating on smaller GPU systems. With the solver's improved computational efficiency and scalability, SMBs can achieve high-fidelity simulations without needing access to exascale resources.

"By scaling high-fidelity CFD simulation software to unprecedented levels with the power of AMD Instinct GPUs, this collaboration demonstrates how cutting-edge supercomputing can solve some of the toughest engineering challenges, enabling breakthroughs in efficiency, sustainability, and innovation," said Brad McCredie, senior vice president, Data Center Engineering, AMD.

"Ansys works with top-tier hardware partners like AMD to deliver robust infrastructure, empowering our customers to run complex simulations with minimal constraints," said Shane Emswiler, senior vice president of products at Ansys. "Our advanced GPU-enabled solvers can boost simulation speeds, allow for very high-fidelity simulation, and enhance scalability — helping our customers develop superior products in much shorter timelines."

/ About Ansys

Our Mission: Powering Innovation that Drives Human Advancement™

When visionary companies need to know how their world-changing ideas will perform, they close the gap between design and reality with Ansys simulation. For more than 50 years, Ansys software has enabled innovators across industries to push boundaries by using the predictive power of simulation. From sustainable transportation to advanced semiconductors, from satellite systems to life-saving medical devices, the next great leaps in human advancement will be powered by Ansys.

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