Zeleros Bolsters Engineering Productivity with Rescale on AWS HPC

Case study

Executive Summary

Zeleros, a startup developing an innovative hyperloop system to revolutionize ground travel, optimized the quality and efficiency of its simulations with high performance computing (HPC) on Amazon Web Services (AWS). Migrating HPC workloads to AWS bolstered Zeleros' capabilities, while the Rescale platform for HPC automation further optimized the company's performance and productivity. The combination of Rescale and AWS HPC enabled Zeleros to achieve faster computational fluid dynamics (CFD) simulations at a fraction of the cost, streamline workflows for sustainable growth, and integrate innovation across the company.

Team innovation outpaced local computing capabilities

At Zeleros, Dynamics Engineer Federico Lluesma was charged with managing the development of hyperloop model simulations to test and perfect definitive attributes of the company's prototype and ensure real-world performance. As Lluesma led the team in designing these increasingly innovative and complex aerodynamics simulations, he quickly realized that the company's local computing capabilities lacked the flexibility to accommodate the changing requirements for simulations and modeling. He also observed significant impediments to productivity, including scarcity of on-premises computing capacity as computers were fully occupied by a single simulation. In search of a solution that could comprehensively enhance and support their process, the Zeleros team turned to AWS for cloud-based HPC.

Pictured: Scaled-down demonstrator on exhibit in Valencia

Rescale and AWS HPC accelerate simulations from one week to one day

With HPC on AWS, the Zeleros team found the scalability, flexibility, and memory required to develop their simulations. Using the Rescale HPC automation platform—which is built for hybrid and cloud HPC, and geared specifically for companies in the R&D phase—Zeleros was able to further optimize AWS services. Engaging Rescale significantly transformed the capabilities of the Zeleros team. In addition to application lifecycle management that streamlined software configuration and licensing updates, Rescale's automation support unlocked new simulations that had been impossible to execute. By transitioning from their local HPC system to Rescale on AWS HPC, the team's turnaround time for aerodynamic simulations was instantly reduced from one week to one day. "In some ways, the time we saved was infinite," Lluesma said. "We are doing simulations that we could not do before. For aerodynamics specifically, our engineers have reached a level of performance that teams in other fields have not yet achieved. And just by unblocking a computer, we're able to run several cases in parallel."

Pictured: Zeleros team gathered at headquarters

Headquarters: Valencia, Spain
Industry: Transportation, Engineering
Founded: 2016

About Zeleros

Unprecedented in the realms of speed, cost, and energy efficiency, Zeleros executed early innovations in ground transportation design, which won the SpaceX at Hyperloop Pod Competition, a global competition organized by Elon Musk.

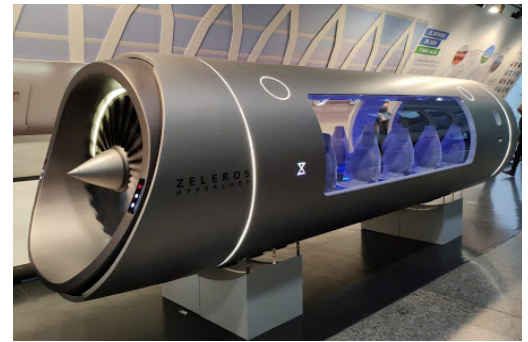*"In some ways, the time we saved was infinte. We are doing simulations that we could not do before."*

— Federico Lluesma
Dynamics Engineer, Zeleros

Pre-defined command lines simplify HPC onboarding

With varying levels of HPC experience across the company, initial attempts to run simulations through a command line interface proved to be tedious and time consuming. Rescale significantly reduced complexity for all users and enhanced team-wide efficiency by providing Zeleros with pre-set command lines on a graphical user interface. "You go from the complicated command line, to the user-friendly Rescale way," Lluesma said. "For new users, this kind of HPC simulation with AWS and Rescale is far better." The new interface allowed users to bypass a previous need for a terminal connection and manual entry, significantly reducing the learning curve for the growing team of new HPC users at Zeleros.

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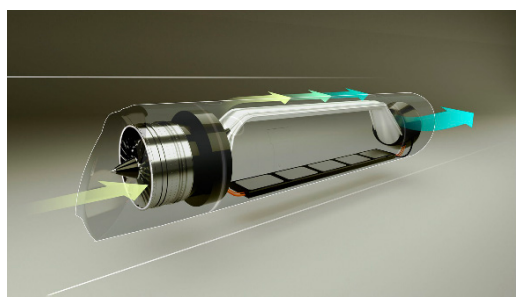
— Federico Lluesma
Dynamics Engineer,
Zeleros

"By using Rescale to simplify and optimize their HPC applications on AWS, Zeleros demonstrates what's really possible when given access to the best tools and hardware available."

— Garrett VanLee
Product Marketing Manager,
Rescale

A more reliable, adaptable, and performant workflow

The team at Zeleros was losing a significant amount of time benchmarking to find the appropriate HPC instance for each simulation. With the engagement of Rescale, the team was able to easily identify the optimal instance for their respective tasks with ease. Rescale streamlined hardware selection and optimization according to a range of key specifications including memory and workload (i.e. aerodynamics, electromagnetics, propulsion, etc.). The breadth of AWS capabilities, capacity, and instance choices enabled the team to multitask and run several simulations simultaneously. This bolstered in-house productivity by liberating computer capacity for multiple uses at any given time. By running their HPC workloads in the cloud, the team's newfound productivity was resilient to the challenges caused by the COVID-19 pandemic, allowing for consistent workflow and access to an omnipresent workspace.

Pictured: Simulation of Zeleros vehicle airflow

Endless possibilities for aerodynamic simulations and beyond

The flexibility, scalability, and user-friendliness of Rescale on AWS HPC has allowed Zeleros to run significantly more aerodynamics simulations and fortify the pace and precision of the startup's innovations in ground travel. With its new capabilities, the startup is also positioned to run simultaneous simulations for a variety of other essential workloads, including electromagnetics and dynamics. With their new, significant transformation in HPC infrastructure and productivity, the Zeleros team plans to grow their partnership with Rescale and AWS. "We are pleased to support Zeleros' goals to pioneer the future of transportation," said Product Marketing Manager at Rescale, Garrett VanLee. "By using Rescale to simplify and optimize their HPC applications on AWS, Zeleros demonstrates what's really possible when given access to the best tools and hardware available."

rescale

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About Rescale

Rescale is high performance computing built for the cloud to empower engineers while giving IT security and control. From supersonic jets to personalized medicine, industry leaders are bringing new product innovations to market with unprecedented speed and efficiency with Rescale, a cloud platform delivering intelligent full-stack automation and performance optimization. IT leaders use Rescale to deliver HPC-as-a-Service with a secure control plane to deliver any application, on any architecture, at any scale on their cloud of choice.