



OVERVIEW

Six Nines designed and implemented an automated solution for a U.S.-based luxury electric automaker in order to deploy an extremely complex, highly scalable Hybrid High Performance Compute (HPC) environment on Amazon Web Services (AWS). The solution, which enables the automaker's team of engineers to run ANSYS Computational Fluid Dynamics (CFD) simulations for designing and building innovative new car models, utilizes AWS compute-optimized instances, orchestrated by the Amazon EnginFrame HPC Solution.

CHALLENGES

The automaker's design engineers needed to exponentially increase their scalability in order to run extremely complex and capacity-demanding CFD simulations used for designing and building luxury electric vehicles. The company's pre-existing on-premises clusters were expensive, difficult to manage and a source of contention for the automaker's design engineers, prohibiting their speed of innovation. They needed to be able to run HPC jobs on AWS using ANSYS CFD, which enables engineers to make better, faster decisions across the widest range of CFD simulations. In order to accelerate time-to-market and optimize costs, the company needed a team of AWS HPC experts to design and architect a Hybrid HPC deployment that could run seamlessly between their on-premises and cloud HPC resources.

SOLUTION

With almost ten years of experience designing and deploying HPC solutions and environments on AWS that scale beyond 100,000 cores, Six Nines' team of HPC experts were able to evaluate, prescribe and architect a Hybrid HPC environment to meet the company's CFD needs. To begin, Six Nines reviewed and evaluated the automaker's existing cluster configuration and consulted with its team of design engineers in order to generate a prescriptive POC within a milestone-based timeline. The customer needed to rapidly scale an ephemeral cluster with 500-2000 EBS-optimized compute nodes with enhanced networking. Six Nines leveraged best-in-class tools, including AWS' myHPC solution, to enable the engineers to run ANSYS CFD for delivering accurate quantitative predictions of fluid interactions and trade-offs. Six Nines built out the automaker's reference architecture, VPN and the myHPC solution, and integrated it into the AWS environment. To achieve this, Six Nines installed and configured the HPC applications, confirmed the Scheduler configuration and created an AMI using a running Amazon Elastic Compute Cloud (Amazon EC2) node that passed validation tests. Additionally, Six Nines created a small HPC cluster to confirm that jobs could be passed, storage mount-points were available and that cluster nodes were communicating effectively using test data. After running successful tests utilizing the customer's code on a single node, Six Nines automated the deployment of a larger cluster. Following successful tests on a 500-node c4.8xlarge cluster using Spot Instances, Six Nines handed over the environment to the customer for additional roll-out across their product engineering organization.

RESULTS

Six Nines successfully architected and implemented a Hybrid HPC deployment that runs seamlessly between the luxury automaker's on-premises and cloud HPC resources. AWS myHPC provides a secure GUI front-end so the engineer doesn't have to script out the job submission commands, and the infrastructure used is automatically torn down at the end of the job. Thanks to the infinite number of cores available on AWS, there's no contention on the database, minimal wait time to submit jobs and significant cost savings per HPC job run compared to the previous on-premises cluster. As a result, the company is now able to scale without limits or worries about capacity and the number of jobs in their queue, enabling the automaker's advanced-level engineers to focus on innovating and creating new design and model features that are disrupting the modern automotive industry.

AWS SERVICES USED

- Amazon EC2
- Amazon Simple Storage Service (Amazon S3)
- Amazon Elastic Block Store (Amazon EBS)
- MyHPC Solution (EnginFrame and DCV Remote Visualization)
- Elastic Load Balancing
- AWS Application Load Balancer
- AWS CloudFormation
- Amazon EC2 Auto Scaling
- AWS Key Management Service (AWS KMS)
- AWS Lambda Serverless Applications
- AWS X-Ray

SIX NINES EXPERTISE

- HPC
- ANSYS Computational Fluid Dynamics (CFD)
- Automation
- AWS DevOps Competency



Premier
Consulting
Partner

DevOps Competency

Microsoft Workloads
Competency

Solution Provider

WHY SIX NINES?

Six Nines IT is an AWS Partner Network (APN) Premier Consulting Partner and AWS Solution Provider specializing in helping businesses migrate to the cloud responsibly. A member of the APN since its inception, Six Nines has successfully migrated hundreds of customers across all industries to the cloud and offers an unparalleled combination of speed, agility, experience, and proprietary solutions to deliver accelerated solutions and a rapid time-to-value. The Oakland-based company combines old-school, on-premises IT roots together with deep expertise and a laser focus on all things AWS – including a core concentration on High Performance Computing and Microsoft Workloads (AWS Microsoft Workload Competency and AWS DevOps Competency) – to deliver bespoke solutions that are individually tailored to meet customers' unique needs throughout the cloud lifecycle.

