Hardware-in-the-Loop Collaboration for AV Development

Hardware-in-the-Loop (HiL) simulation is essential to develop safe autonomous and advanced driver assistance systems (ADAS) in vehicles. HiL simulation requires both replay of petabytes of captured real-world sensor data and high-fidelity environmental simulation, while using hardware-based test systems. This demo showcases a hybrid HiL architecture, combining an AWS data lake on Amazon S3, Dell EMC Isilon low-latency high-performance storage, and a National Instruments PXI HiL system.

Collaboration

The architecture enables AV customers to benefit from unlimited scale of AWS cloud infrastructure including compute and storage. AV sensor data processed and stored on AWS is streamed to Isilon which is on-prem. Isilon provides low-latency, high-throughput streaming of sensor data or synthetic scene data to/from NI HiL PXI system. Monodrive software running on NI PXI streams data to/from AV compute HW to test autonomous vehicle algorithms.

Dell EMC’s Isilon is an ADAS development-proven Enterprise NAS solution that bridges the gap between public cloud and on-prem HiL testing. Recorded field data from ADAS sensors can be replayed in the lab to simulate driving and increase test repeatability and test coverage. Timing in replay applications is critical, and the National Instruments replay systems provide extremely accurate timing and synchronization to ensure that your perception algorithms get sensor data just as it occurred in the real world.

Learn More: https://aws.amazon.com/automotive/
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AWS Services and Benefits

AWS delivers an integrated suite of services (AWS Batch and EKS) that provides everything needed to quickly and easily build and manage HPC clusters in the cloud to run the even the most compute-intensive AV workloads. Amazon EC2 offers a wide range of compute instances for AV workloads.

AV customers can harness the power of AWS to run millions of simulations faster than real-time to test, train, and validate AV projects at scale. AWS offers tiered storage through Amazon S3, high-speed network through AWS Direct Connect, and AWS Snowball for data ingestion.

About: National Instruments

For more than 40 years, NI has developed high-performance automated test and automated measurement systems to help you solve your engineering challenges now and into the future. Our open, software-defined platform uses modular hardware and an expansive ecosystem to help you turn powerful possibilities into real solutions.

About: Dell EMC

Dell Technologies is a unique family of businesses that helps organizations and individuals build their digital future and transform how they work, live, and play. The company provides customers with the industry’s broadest and most innovative technology and services portfolio spanning from edge to core to cloud.

About: Amazon Web Services (AWS)

For 13 years, Amazon Web Services has been the world’s most comprehensive and broadly adopted cloud platform. AWS offers over 175 fully featured services for compute, storage, databases, networking, analytics, robotics, machine learning and artificial intelligence (AI), Internet of Things (IoT), mobile, security, hybrid, virtual and augmented reality (VR and AR), media, and application development, deployment, and management from 69 Availability Zones (AZs) within 22 geographic regions. Millions of customers—including the fastest-growing startups, largest enterprises, and leading government agencies—trust AWS to power their infrastructure, become more agile, and lower costs.

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