

Paving the Road to Cloud for Autonomous Driving Development

BENEFITS

- High-speed, low latency connection to the public cloud for AI / ML / DL and SiL / MiL testing
- High-speed connectivity to on-prem storage for HiL testing
- Global multi-cloud sensor and sensor metadata management
- Centralized global sensor metadata database for scenario generation
- Single-tenant storage for enhanced security
- Durable, persistent cloud attached storage with up to 6-9s availability
- Fast and simple multi-cloud access
- Scale on demand without adding complexity
- Long-term archiving options without vendor lock-in
- Meet archive recovery SLAs with maximum flexibility
- End-to-end managed service
- Simple, cost-effective pay-as-you-go pricing
- 24x7 support

Multi-Cloud Data Services for Dell EMC PowerScale (enabled by Faction)

While once the domain of automotive startups only, public clouds are gaining focus from Tier-1 suppliers (Tier-1s) and Original Equipment Manufacturers (OEMs) seeking to leverage cloud services for Advanced Driver Assistance Systems/Autonomous Driving (ADAS/AD) development. However, the wrong cloud strategy can lead to short- and long-term challenges such as inability to meet performance requirements, high long-term operating costs, vendor lock-in, and data compliance and control issues.

To avoid these challenges, automotive organizations should utilize a “data first” approach when developing their cloud strategy. This approach places the needs of data, and the value derived from that data as a top priority. This approach enables the company to separate those workloads where public cloud benefits from those where it creates hurdles.

Dell Technologies offers a cloud-enabled solution that is tailored to ADAS/AD workloads, and designed to avoid major surprises while delivering durable, reliably cloud-attached storage that is scalable, highly available, and architected to deliver the flexibility needed to optimize costs for managing ADAS/AD Sensor data – whether an OEM, Tier-1 or even a start-up.

Enabling a new approach to cloud consumption

Multi-Cloud Data Services for Dell EMC PowerScale (enabled by Faction) enables users to centralize their ADAS/AD sensor data on performant Dell EMC file storage as a managed service. This service makes data available to the user’s on-prem. Dell EMC PowerScale storage and multiple public-cloud providers simultaneously.

High-speed, low latency connections to Amazon Web Services, Microsoft Azure and Google Cloud Platform give automotive teams an on-demand cloud consumption model for both compute workloads and storage, while delivering high performance and scalability. This solution is ideal for securely moving or deploying ADAS/AD workloads, including AI/ML/DL, Software-in-the-Loop (SiL) and Model-in-the-Loop (MiL) testing into the public cloud for sensor fusion training, system-level validation and software development, while still making the data accessible to/from on-prem data centers for Hardware-in-the-Loop (HiL) testing.

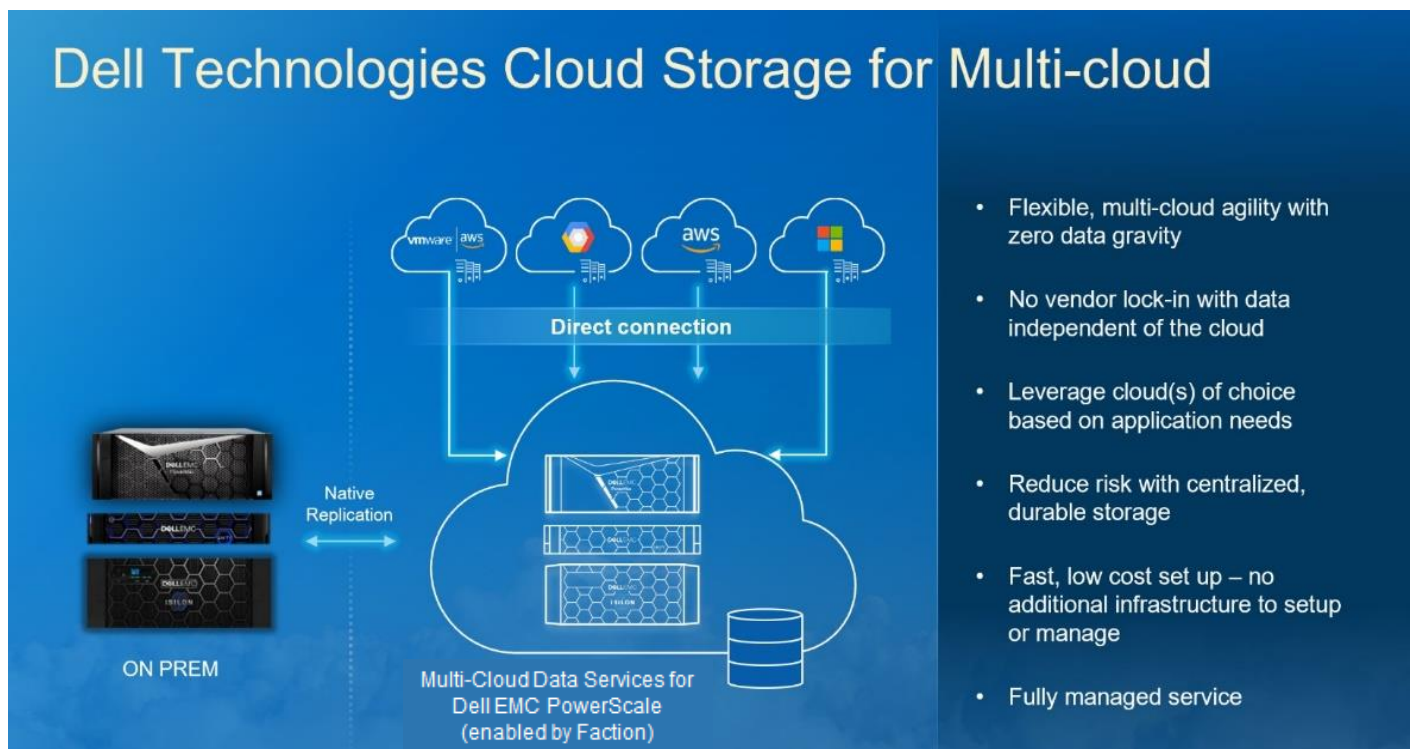
Public cloud: Toll road ahead

Public cloud providers offer great promise for reducing cost – and even offer free or low-cost data ingress to make the transition easy. Among their many services, cloud providers offer immediate and flexible access to powerful GPUs and CPUs, as well as on-demand resources for common ADAS/AD workloads like analytics, AI/ML/DL, Software- and Model-in-the-Loop (SiL, and MiL) testing and validation. However, once your data is in the cloud, providers typically charge a heavy toll for data egress, and with ADAS/AD data growth measured in petabytes per day, data portability becomes impractical. This model can lead to vendor lock-in scenarios, where it becomes economically infeasible to move data away from a certain cloud provider. Furthermore, with service-level agreements (SLAs) requiring that data be kept on archive for decades, there's little reason for public-cloud providers to lower prices when they know they hold all the cards – and your data.



Enabling multi-cloud across the workflow

Multi-Cloud Data Services for Dell EMC PowerScale (enabled by Faction) enables a true multi-cloud approach to cloud services consumption. Featuring unique technology that delivers identical data mountpoints, with identical address ranges, this service allows multiple public clouds to access the same data simultaneously. This provides greater flexibility to validation engineers and project managers as they can leverage cloud resources based on availability, performance, reliability or even spot pricing. For example, In the morning, you can run SiL tests on AWS. That afternoon, if AWS pricing is high because of limited availability, you can switch and continue your testing on Azure, without having to move large amounts of data. This solution empowers you to dynamically select the right provider based on current needs and introduce real-time competition between cloud providers.



Multi-Cloud Data Services for Dell EMC PowerScale (enabled by Faction) can help you:

- **Empower engineers:** Public cloud providers offer a range of unique services beyond simple compute offerings -- including simulation environments, analytics and AI/ML/DL toolsets. This has created a natural competition between providers to continue improving and expanding their services. With Multi-Cloud Data Services for Dell EMC PowerScale, engineers have the agility to take advantage of the most innovative services available, regardless of the cloud provider. Data can be shared simultaneously across multiple public clouds without the need to copy data locally. This means engineers can leverage AI tools from one vendor while simultaneously using analytics tools from another vendor – on the same exact data.
- **Burst workloads to cloud:** Last minute project changes and spikes in demand for IT resources can create challenges for developers and IT personnel. Multi-Cloud Data Services for Dell EMC PowerScale can help avoid costly project slowdowns or added pressure on IT by making it easy to move peak workloads into the public cloud temporarily when on-prem. compute resources are either unavailable or unable to meet project requirements. Because your data is available as an NFS mount to multiple providers, there's no need to copy data to the cloud. With such flexibility, it is even possible to run workloads on one provider in the morning, and then switch to another that afternoon – based on compute availability and spot pricing.
- **Simplify early exploration:** New projects mean developers are starting from scratch, unsure of what to do with their data. Multi-Cloud Data Services for Dell EMC PowerScale allows them to leverage the public cloud and try AI services from multiple cloud providers to quickly get insights and characteristics of their data and identify which AI services (algorithms) could ultimately solve the problem. After receiving the results, developers can easily move forward with implementing the algorithm and rolling out large-scale experiments on-prem.
- **Leverage on-prem. HiL testing capabilities:** Critical to the success of ADAS/AD projects is the ability to run HiL testing, where data must be streamed with precise timing as it is connected to physical hardware. The Ultra-low data latency required for this process is not achievable when streamed from virtually any public cloud. The sensor data must be physically closer the physical hardware – which itself must be on-prem. (No public cloud providers to date allow 3rd-party developers to place within the public cloud's data center physical hardware – much less allow physical access to 3rd-party engineers). This presents a challenge – particularly for startups – when sensor data is initially stored on public cloud. Multi-Cloud Data Services for Dell EMC PowerScale makes it simple to copy sensor data between cloud provider environments, the managed service environment and your on-prem hardware. And unlike most public cloud providers, we do not charge for egress fees between the cloud and your on-prem hardware.
- **Maintain long-term data portability:** A major challenge with ADAS/AD is long-term data storage. With lengthy SLAs, often measured in decades, managing long-term financial risk means keeping options open for migrating archived data from one public-cloud vendor to another. Multi-Cloud Data Services for Dell EMC PowerScale gives you the freedom and flexibility to move your data to any cloud. Likewise, should you decide to repatriate your data to on-prem. storage, you can – there are no egress fees. This solution makes your data truly portable and with that portability comes buying power, empowering data owners to negotiate the best rates with each cloud vendor.
- **Meet SLA requirements:** One often overlooked aspect of SLAs is the allowable time restriction for archived data to be recovered and made ready for simulation. Commonly ranging from days to a few months, virtually all OEMs mandate SLAs that span the life of the vehicle, should bugs arise requiring software changes and corresponding re-simulation and validation. Without speedy remediation, such bugs can lead to major negative consequences for the business, including costly mandatory product recalls and even lawsuits. With Multi-Cloud Data Services for Dell EMC PowerScale your critical data sits in cost-effective archive nodes that are transparent to users and in the same cluster with active production data, making it available for re-simulation in minutes – even 20 years after going into archive.

- **Guaranteed single-tenancy:** Unlike public cloud, Multi-Cloud Data Services for Dell EMC PowerScale is single tenant. This provides an added level of security to those that need it and prevents sudden slowdowns caused by other users (“noisy neighbors”) running heavy storage loads on shared storage.
- **Reduce the cost of moving data:** Multi-Cloud Data Services for Dell EMC PowerScale allows you to stream sensor data directly from storage to public-cloud compute with no data ingress fees. Egress fees for data leaving a cloud provider are typically minimal (simulation pass/fail results only, for example) and charged at a direct rate, which is typically far less than wide area network (WAN) fees between public cloud and your on-prem. Storage. Microsoft Azure customers can enjoy free egress and ingress to/from Multi-Cloud Data Services for Dell EMC PowerScale.

ADAS sensor data and metadata management

With today’s vehicles being deployed worldwide, automotive companies must take on the complicated task of collecting, annotating, and managing sensor data globally and securely. This is made even more complicated by varying regional privacy rules, as well as varied legislations restricting sensor data movement - which limits the ability to centralize data -- leading to serious data management challenges. Dell Technologies offers a range of tools and services that can help overcome these and other challenges related to geo-distributed projects. For example, DataIQ enables organizations to discover, classify and track data across multiple heterogeneous storage systems and the cloud, all from a single plane of glass – even if that data cannot leave a specific geography.

Availability and Services

Multi-Cloud Data Services for Dell EMC PowerScale as a flexible consumption model available in 1, 3, and 5-year subscription terms. PowerScale for Multi-cloud is currently available in the United States, United Kingdom, and Germany with the following public cloud providers: AWS, Google Cloud Platform and Microsoft Azure. Visit the first link below for the most current list of supported countries, cloud providers and more.



[Learn More](#) about automotive data storage solutions



[Contact](#) a Dell Technologies Expert