

SOLUTIONS FOR ADAS/AD DEVELOPMENT

Providing the highest performance, ease of use, and lowest total cost of ownership at every stage of the ADAS/AD development lifecycle for achieving Level 5 automation.

SOLUTION BRIEF

Streamlining Data Management for ADAS Systems

Many car manufacturers and their suppliers are aggressively developing and deploying Advanced Driver-Assistance Systems (ADAS) and Autonomous Driving (AD) systems to achieve fully autonomous vehicles. These systems incorporate complex data management, analytics, ML, and AI technologies, which rely heavily on vast amounts of data collected by test cars or environment simulators.

The ADAS/AD system must process hundreds of petabytes of data during the development, and often operate with data distributed between multiple test vehicles, car garages, development centers, and public clouds. The data must be available for efficient and secure access at every location and archived for extended periods to meet legal, regulatory, and research requirements.

An Advanced Reference Architecture Designed for ADAS Systems

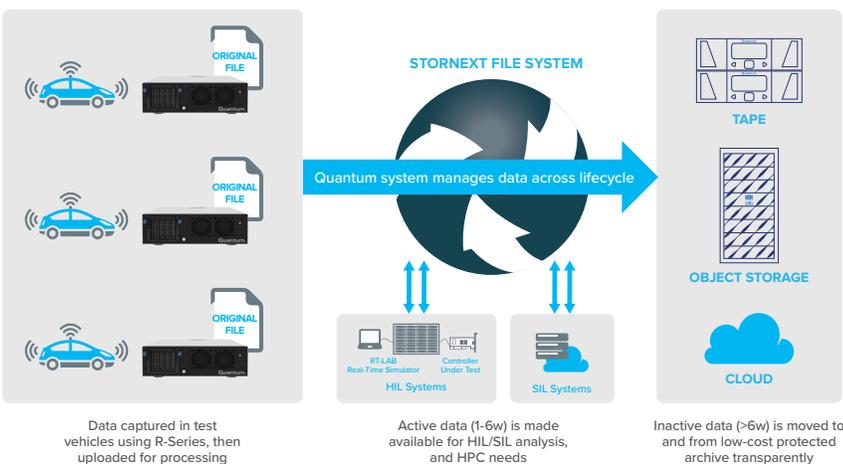
Quantum's reference architecture solution for ADAS data management provides unprecedented scale, performance, and security for every stage of the ADAS/AD development lifecycle.

Quantum R-Series Starting at the edge, Quantum R-Series ruggedized edge storage supports high-speed data capture in vehicle and fast data upload to data centers, where Quantum provides a flexible, multi-tier software-defined storage infrastructure.

StorNext File System Quantum provides a flexible, multi-tier software-defined storage infrastructure controlled by the StorNext® File System – the fastest file system in the industry for video workloads – that can scale from hundreds of terabytes (TB) to multiple zettabytes (ZB) of managed storage capacity. By leveraging StorNext and user-defined policies, data is moved seamlessly across the ultra-fast F-Series NVMe appliances, cost-effective high-capacity QXS™, on-prem ActiveScale™ Object Storage, Scalar® Tape archives, and public cloud repositories while remaining under the same StorNext namespace.

FEATURED BENEFITS

- **Speed Time-to-Market**
Accelerate machine learning development with the world's fastest file system for streaming workloads, so your autonomous / AD programs get to market faster.
- **Enables 100% Utilization of Analytics Infrastructure**
Developing deep-learning ML models relies on a GPU-driven training process that demands very low latency and high-read throughput from the storage infrastructure. Quantum's high-performance storage delivers the performance needed to keep GPUs at full utilization.
- **Lowest Total Cost of Ownership**
Quantum's storage platform places data in the optimal tier for the highest performance or at the lowest cost, so that data sets required in autonomous / AD programs can be stored and protected for many years at a fraction of the cost of competitive alternatives.



ADAS Data Management Workflow

Data Acquisition and Ingest: Test vehicles collect unstructured data captured by various on-board sensors observing the surrounding environment and the driver's actions. A fast ingestion process demands high raw throughput from the storage system.

Data Preparation: This involves removing and transforming low-quality data, performing integrity checks, removing redundant information, and data enrichment with location, weather, time, and other metadata. These tasks perform multiple ETL (Extract, Transform, Load) operations, which require high random I/O data access performance from the storage infrastructure.

ML Model Development: Accurate object detection, identification, classification, localization, and movement prediction is achieved by developing and deploying a variety of deep learning ML models. They rely on a GPU-driven training process that requires very large training data sets and storage infrastructure with very low latency and high read throughput.

Simulation and Validation: After the ML model is developed, its accuracy must be validated through Hardware-in-the-Loop (HiL) / Software-in-the-Loop (SiL) or other similar approaches. Raw sensor data is replayed with thousands of iterations running in parallel. This process is continuously repeated as new models are developed to verify against previously captured data, and requires infrastructure with high-bandwidth parallel data access.

Archiving: Following validation, data is moved to low-cost storage for potential future use, or to meet regulatory and contractual commitments. The storage system should be scalable to support large amounts of data and maintain high security and reliability.

Why Quantum ADAS Data Management Solution

Dynamic Data Auto-tiering for Cost Savings. Dynamic auto-tiering enables 100% utilization of GPU and other analytics resources, allowing speed-to-market at the lowest total cost of ownership. As StorNext automatically moves data to the optimal storage tier, balancing the highest-performing tiers with inexpensive tiers, the overall cost per terabyte is significantly lower than any other solution on the market – including public cloud. This proprietary key differentiator saves our customers potentially millions of dollars while driving speed-to-market.

Designing an Architecture Solution to Meet Your Needs. The Quantum ADAS/AD team works with clients to design, build, and deploy solutions from the ground up. In the Autonomous vehicles industry, there is no standardized architecture or process to meet the needs of every manufacturer of ADAS/AD technology. We work with you as a vested partner to design an architecture that provides the best performance at the lowest cost with an ability to scale to meet your needs tomorrow.

Best-in-class Industry Partners. We realize that you are working to solve challenges that span beyond Quantum's offerings. We've established strategic partnerships with a roster of the best alliance partners in the ADAS/AD business so that we can bring you holistic solutions. Our partners include Nvidia, AWS, Hexagon, AutonomouStuff, SiaSearch, DXC, Aptiv, and many others.

Quantum Has 40+ Years of Unstructured Data Management Expertise. Applying decades of unstructured data management experience, we help customers to streamline their data management, development, and validation processes. By taking a holistic approach and creating an end-to-end architecture that addresses the specific needs, we bring a strongly differentiated solution set to you.

Quantum

Quantum technology, software, and services provide the solutions that today's organizations need to make video and other unstructured data smarter – so their data works for them and not the other way around. With over 40 years of innovation, Quantum's end-to-end platform is uniquely equipped to orchestrate, protect, and enrich data across its lifecycle, providing enhanced intelligence and actionable insights. Leading organizations in cloud services, entertainment, government, research, education, transportation, and enterprise IT trust Quantum to bring their data to life, because data makes life better, safer, and smarter. Quantum is listed on Nasdaq (QMCO) and the Russell 2000® Index. For more information visit www.quantum.com.

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