Win the race to autonomous driving with Red Hat and DXC Technology

The automotive industry is undergoing major changes

The change of pace in the industry means automakers need to invest urgently and wisely in strategic autonomous driving vehicle initiatives or they will not capitalize on this important market transformation. Gartner predicts "many of the most powerful changes expected in the auto industry will happen in the next two to five years."[1] And, "longer term, electric vehicle technologies and autonomous vehicle technologies will dominate the transformation of the auto industry." [2]

Thus, competition in the autonomous vehicle space is heating up, drawing players from other industries, including software technology giants. Many automakers are partnering together or directly with technology and Silicon Valley-based vendors. For example, Chrysler is partnering with Waymo, General Motors with Honda, and Audi with Nvidia. Technology vendors getting into the autonomous driving race include Apple, Cisco, Intel, and Microsoft.

The right software platform is critical to R&D efforts

To provide real-time, no-fail safety and mobility, autonomous driving vehicles need highly secure and reliable networks, applications, and data analytics—all of which are powered by software. Automakers must make appropriate investments in a variety of technologies, and the underlying development platform is vital to this investment strategy.

With the goal of quickly putting fully autonomous vehicles on the road, automakers are hard at work on the research and development (R&D) phase. Data scientists and engineers are collecting, sorting, analyzing, interpreting, simulating, and iterating a vast amount of data for a vehicle to navigate the road accurately without human input. Supporting the development process with the right IT infrastructure is essential.

IT's role in autonomous driving R&D

For long-term success, an automaker's autonomous driving R&D IT platform needs to be:

- **Open source** for ultimate extensibility and integration with state-of-the-art application services and technologies, including artificial intelligence (AI) and machine learning.
- **Agile, scalable, and robust** to accommodate the volume of applications and data needed to drive the analytics for autonomous vehicles, from R&D to pilot projects and commercial adoption.
- **Optimized** to orchestrate the analytics, machine learning, and simulation workloads flexibly and at scale based on resource requirements, including graphics processing unit (GPU), central processing unit (CPU), memory, and storage.
- **Highly secure** to prevent hacking that compromises the integrity of driving and safety features.
- **Elastic** so that it can adapt to workload changes and foster collaboration, innovation, and performance.

1 *Gartner. "Hype Cycle for Connected Vehicles and Smart Mobility, 2019," July 2019.*

2 *Gartner. "Hype Cycle for Connected Vehicles and Smart Mobility, 2019," July 2019.*

Joint Red Hat and DXC Technology solution

DXC Robotic Drive includes Red Hat's enterprise-grade, full-stack, open source IT solutions, giving automakers the technology, management capabilities, and expertise they need to win the race to autonomous driving.

Red Hat and DXC Technology are collaborating with the autonomous vehicle industry by combining an open software platform with emerging technologies—including AI, data analytics, and machine learning—and supporting them with data-driven development capabilities to enable autonomous driving at scale.

DXC Robotic Drive is an end-to-end solution that rapidly evolves the autonomous driving process—from data collection, storage, and analysis to deployment of evolved knowledge. It establishes a data platform and relevant toolkits built with modern technologies based on open source software, allowing fast collection, management, and analysis of massive amounts of vehicle data.

One of the enablers of DXC Robotic Drive is Managed Container Platform-as-a-Service (MCPaaS), powered by Red Hat® OpenShift®. MCPaaS allows IT organizations to build, deploy, and manage containers at scale and in turn run containerized legacy or cloud-native enterprise applications. This fully managed service features built-in operational management capabilities that automate application building, testing, deployment, and scaling. Enterprises can quickly scale out this platform via a self-service portal to support changing business needs. The platform can run on bare metal or virtual networks, as well as private and public clouds. It is supported by several Red Hat technologies:

- Red Hat OpenShift accelerates application modernization and development with an enterprise-grade Kubernetes container platform. It provides full-stack automated operations to manage hybrid cloud and multicloud deployments, allowing IT teams to improve developer productivity and promote innovation.
- Red Hat Enterprise Linux® is an enterprise-grade open source operating system that provides the foundation from which IT can scale existing apps and roll out emerging technologies across bare-metal, virtual, container, and all types of cloud environments.
- Red Hat Virtualization is a complete infrastructure solution for virtualized servers and technical workstations. It provides ease of use, agility, and security for virtualized, resource-intensive workloads and helps organizations optimize their IT infrastructure with better performance.
- Red Hat Ansible® Automation Platform is an open source automation tool for the orchestration of enterprise environments. It helps IT automate tasks like configuration management, provisioning, workflow orchestration, application deployment, and life-cycle management.
- Red Hat Satellite is an infrastructure management product to keep Red Hat Enterprise Linux environments and other Red Hat infrastructure running efficiently with security and compliance.

MCPaaS helps IT organizations quickly realize significant advantages, including:

- **Accelerated application development and deployment.** Achieve faster time to market and shorter release cycles with continuous integration and deployment.
- **High availability and scalability.** Full-stack application management and monitoring ensure service levels of 99.9%. Scale quickly with one-click functionality.
- **Accelerated application transformation.** Speed application modernization with containerization and cloud-native application development services.
- **Increased application security.** Get end-to-end security and compliance visibility when OpenShift Container Platform is combined with DXC's highly secure cloud infrastructure.

- **Platform consistency and independence.** Adopt a single platform that can deploy applications across public, private, and hybrid environments.

The Red Hat and DXC partnership offers comprehensive solutions founded in open source technologies and supported by proven service and automotive industry expertise. Our trusted solutions will help you succeed during this period of intense automotive change.

Case study: Analytics platform integrates AI, underpins autonomous driving development

A premier automaker's autonomous vehicle R&D organization needed a platform that could collect and analyze vast amounts of field data, process advanced AI-based driving simulations and algorithms, and integrate with co-pilot systems. Each test drive generates massive amounts of data gathered by sensors, radar, and cameras. The data is collected under constantly changing conditions that include traffic lights, signage, pedestrians, weather, other vehicles, and navigational data.

All this data needs to be quickly stored, processed, and structured in ongoing cycles. Data scientists and algorithm developers use applications to clean, analyze, simulate, and then refresh the data. This automaker's existing systems could not meet its compute requirements at scale.

DXC's solution creates and supports an analytical platform that meets the R&D team's service level agreement for the development of autonomous driving capabilities. Red Hat enables the analytics and algorithm development infrastructure using Red Hat OpenShift, a highly scalable, flexible, and security-focused container-based platform.

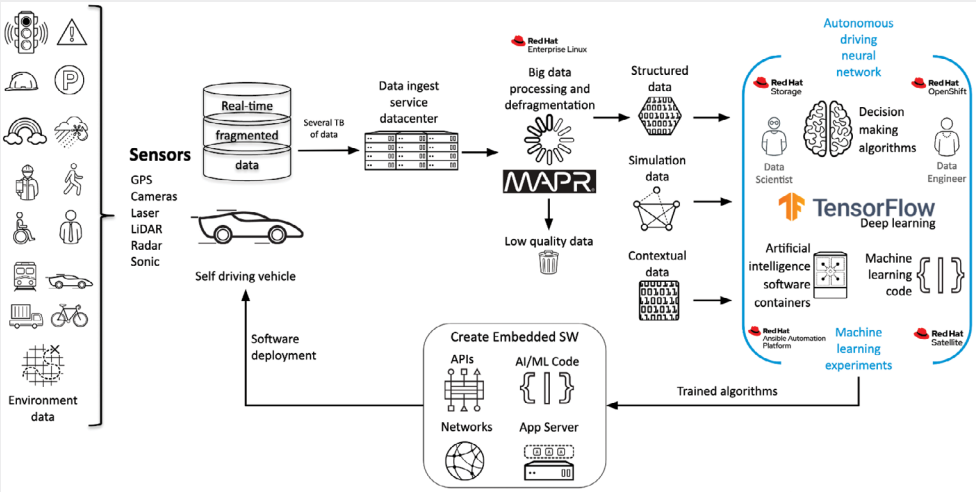

Figure 1. Solution architecture for a global automaker's R&D analytics platform

The MapR Big Data platform and Apache Spark distributed data processing run on Red Hat Enterprise Linux. High-performance computing at scale is provided to allow parallel computing of deep learning algorithms (e.g., using TensorFlow, on large datasets). Containerization lets data scientists and algorithm developers create, manage, and deploy a variety of applications for testing machine learning models. The applications generate embedded software programs or components (APIs, AI codes, etc.) that run decision-making capabilities based on anticipated behaviors. The updated algorithms are then deployed back into the various components of the self-driving car so that it can become safer and successfully navigate more scenarios.

Your keys to autonomous driving success

The combined solution from DXC and Red Hat gives automakers several essential benefits:

- **Accelerates time to market** by reducing "time to analyze" from weeks to hours. The solution uses native vehicle data formats for the data science analytical process. For the algorithm developers and data scientists, the experience is fast and reliable.
- **Maximizes return on investment** during the testing phase. The solution improves efficiency in R&D equipment utilization, computing capacity, and labor resources. It increases the speed of generating algorithms and reduces costs. Deployment and management are also significantly simplified.
- **Scales and extends capacities and technologies** as needed using an open-architecture software platform. The solution fulfills the need for a platform that can handle large volumes of data, including unexpected types of data, while maintaining a highly complex environment.
- **Improves productivity** by embracing DevOps and department-wide collaboration for consistency and efficiency.
- **Improves security of the data and applications** by using an open source, container-based platform.

To learn more about Red Hat and DXC solutions for autonomous driving vehicle development, visit www.dxc.technology/roboticdrive.

About DXC Technology

DXC Technology, the world's leading independent, end-to-end IT services company, manages and modernizes mission-critical systems, integrating them with new digital solutions to produce better business outcomes.

The company's global reach and talent, innovation platforms, technology independence, and extensive partner network enable more than 6,000 private- and public-sector clients in 70 countries to thrive on change. For more information, visit www.dxc.technology.

About Red Hat

Red Hat is the world's leading provider of enterprise open source software solutions, using a community-powered approach to deliver reliable and high-performing Linux, hybrid cloud, container, and Kubernetes technologies. Red Hat helps customers integrate new and existing IT applications, develop cloud-native applications, standardize on our industry-leading operating system, and automate, secure, and manage complex environments. Award-winning support, training, and consulting services make Red Hat a trusted adviser to the Fortune 500. As a strategic partner to cloud providers, system integrators, application vendors, customers, and open source communities, Red Hat can help organizations prepare for the digital future.

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