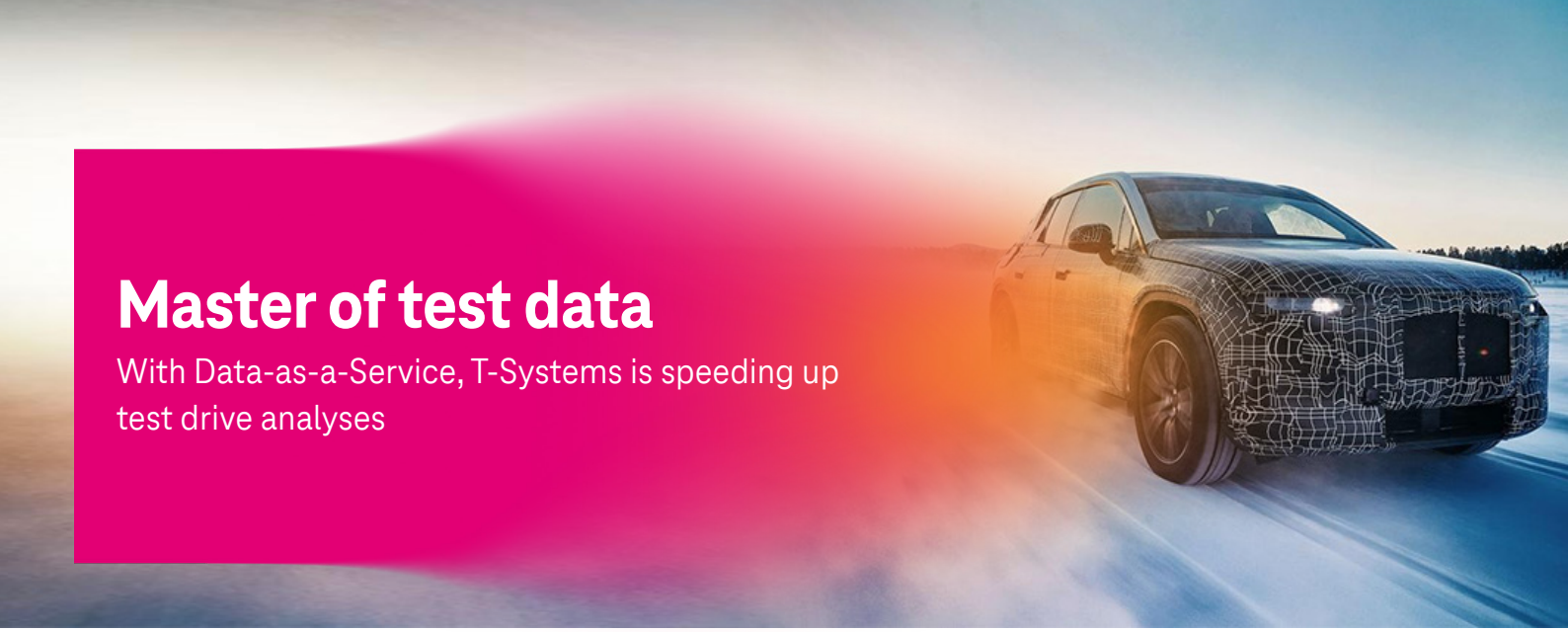

Master of test data

With Data-as-a-Service, T-Systems is speeding up test drive analyses

“Data-driven decisions that previously required a huge workload and a much longer lead time are now possible.”

Bastian Wymar, Portfolio Management Data Intelligence, T-Systems

Many carmakers are convinced that individual mobility will remain a basic human requirement in the future. However, the CASE (Connected, Autonomous, Shared, and Electrified) era is changing the ground rules: Customer experience is becoming the priority. The focus is on sustainability, electric vehicles, and automated driving, as well as the potential offered by digitalization. All of these drivers are having a huge influence on the way in which cars are developed. In modern vehicles, driver assistance systems and online value-added services are becoming increasingly efficient, while vehicle electronics, onboard sensors, and bus systems are becoming more and more complex and are collecting more and more data. On test drives, it is important to analyze this data intelligently in order to meet very strict quality requirements further down the line during series production. Mercedes-Benz AG – with its focus on services and the development, production, and sale of cars and vans – is just one carmaker that found existing systems for collecting test drive data had reached their limits.

At a glance

Development engineers and IT departments have joined forces with T-Systems to create a future-proof end-to-end solution that is setting new standards for the sector. It is based on an intelligent combination of a central cloud and decentralized edge resources. T-Systems has submitted a patent application for a new type of software called Big Data Signal Processing, which runs on big data clusters of edge computers and makes the local analysis of highly complex, extensive measurement data up to 40 times faster. The local resources are connected to a central cloud for uniform, central access to the local clusters (federated Spark).

- Data transcoding of machine signals
- Up to 90 percent data compression rate
- Measurement data available within a few hours
- Data analysis up to 40 times faster
- End-to-end solution: network, cloud, edge, applications

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Reference in detail

The challenge

The test drives for endurance testing are one of the milestones in vehicle development. The engineers in the development departments specify the exact types of data to be recorded for these. Carmakers send a whole range of prototypes for new models to different test routes at the same time – to both deserts and permanent ice zones – to examine their behavior using a three-shift pattern. These handmade vehicles include extensive measurement technology to record the behavior of the different components (including the software) during the endurance test. During one shift, approx. 10 to 100 GB of data accrues in all sorts of data formats. Once the test drive has finished, the data is transferred from the car to a data warehouse and measurement data management system. The engineers at the development sites receive the raw data via file shares and copy it to local file systems. This process not only results in considerable data redundancy, it also takes a lot of time: It can take several days for the engineers to gain access to the measurement results. If errors are then detected, the cars and drivers have already gone to different places. That makes it extremely time-consuming and costly to reproduce the tests. The situation is further complicated by the current trends toward electric vehicles and automated driving, which are increasing the volumes of data recorded to TB levels. T-Systems has developed a new process to reduce the data provision time in the future.

The solution

T-Systems is winning customers over with a high-performance end-to-end solution that optimizes the entire process and allows “data as a service” to be used. The core components of the solution are edge computing resources, a central cloud platform, the Big Data Signal Processing software, which is compatible with Hadoop/Spark, and the federated Spark system based on it. After the test drive, the measurement data (signals) is transferred to big data clusters via Wi-Fi.These are in the edge computing resources that are permanently installed at the test sites.They are managed and operated by T-Systems.Big Data Signal Processing (BDSP) is also installed locally on the systems.BDSP pre-processes the measurement data, i.e., the different data formats collected are transcoded into standard big data formats.And this is precisely the point: It enables processing to be up to 40 times faster for decoding and subsequent analyses than when using conventional tools.That‘s because BDSP allows parallel interpretation of the measurement results recorded from distributed, binary, or textual trace files.In practice, the volume of data is reduced by up to 90 percent.BDSP also supports signal resampling and tagging and has an API for connecting to other systems.The edge part of the solution is complemented by a central cloud with a federated Spark system.This system enables engineers to access the measurement data – regardless of where it is located. The federated Spark system automatically identifies data for the developers.However, the developers not only find the right data, but also trigger the corresponding analyses on the edge servers via the cloud. That means that only instructions and results have to be transferred between the test sites and developers‘ workplaces, rather than the complete raw data sets as in the past.This avoids the need for a costly expansion of the MPLS network.The solution also scores points for security: The measurement data is already encrypted when it is stored in the vehicle and remains highly encrypted and secure at all times.This also applies to the transport layers, including the transport protocols between the vehicle and edge resources as well as to network access points.

Customer benefit

With the new system, Mercedes-Benz is gaining a groundbreaking and future-proof platform that significantly speeds up work for development engineers and enables a faster time-to-market. The engineers at development sites can now gain access to measurement data within a few hours. On the one hand, they can start working with the measurement results immediately, and on the other hand, they can identify errors directly, allowing them to arrange a repeat of the test drive. This is bringing them closer to testing and reducing development cycles. The new solution has yet another benefit: Detailed measurement plans and precise specifications for the measurement data to be recorded are no longer needed. The engineers have access to the entire measurement data set at all times and can analyze it at a later date if specific questions arise. This creates tangible cost advantages and contributes toward sustainability. The number of test drives is falling and the tests are becoming more efficient – allowing data-driven decision-making, which was only possible with a huge workload and much longer lead time in the past. The engineers can continue using their tried-and-trusted systems and also utilize different tools from the big data community, as the integrated API makes it easy to connect to BDSP. The API also offers another benefit: It now allows the actual use of the recorded data to be analyzed. On top of everything, the introduction of the new architecture is making it easier for carmakers to collaborate with suppliers and to control the data. Until now, suppliers received the raw data for their analyses and had to return their completed analyses back to the original equipment manufacturers (OEMs). Now it is possible for the suppliers to process these analyses directly on the carmakers‘ systems, so the raw data no longer has to leave the plant.

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