Volkswagen supports computer-aided engineering with a modern operating system

To simplify operating system management for its research and development (R&D) engineers, Volkswagen migrated from UNIX to Red Hat Enterprise Linux for Workstations, a stable, supported platform for resource- and graphics-intensive workloads, such as aerodynamics analysis and crash test simulations. Close to 1,000 engineers in Volkswagen R&D now use Red Hat Enterprise Linux for computer-aided engineering (CAE) to support the latest professional graphics processing units (GPUs) and access the high volumes of memory needed for powerful processing. Standardizing on Red Hat Enterprise Linux also helps the automaker's third-party vendors ensure their software is compatible and certified to meet Volkwagen's security and performance needs.

Software

Red Hat® Enterprise Linux® for Workstations

Red Hat Technical Account Management

Wolfsburg, Germany

Headquarters

Automotive

Around **116,000** group employees

Benefits

▶ Gained responsive foundation to support resource-intensive computer-aided engineering

▶ Improved third-party software compatibility with Red Hat certification

▶ Simplified security compliance and maintenance

"We always use the latest and greatest hardware, including the latest professional GPUs. Red Hat Enterprise Linux for Workstations can meet the demands of those new components."

Gunther Mayer
Integration Specialist,
CAE-Integration, R&D,
Volkswagen

Simplifying operating system complexity to support modern automotive engineering

At German automotive manufacturer Volkswagen, research and development (R&D) engineers rely on computer-aided engineering (CAE) for many of their tasks, from analyzing aerodynamics during vehicle development to simulating the impact of a collision. These tasks require powerful workstations to run analytics and provide graphical outputs.

"CAE replaced pen, pencil, and calculator for engineering calculations. In addition, running physical crash tests with real cars that were very costly was time-consuming, because you had to build a new car for each test. With CAE, you can run a crash simulation on your workstation, then analyze the data to inform design improvements, " said Gunther Mayer, Integration Specialist, CAE-Integration, R&D, Volkswagen.

In the early days of CAE, Volkswagen's team of around 300 R&D engineers ran their simulations on a variety of UNIX desktops—including Silicon Graphics (SGI) IRIX, IBM AIX, Oracle Solaris, and HP-UX—as well as CAE products and tools from close to 100 vendors. These vendors used a variety of Linux distributions, making quality control and assurance more difficult.

As simulations became more advanced, however, this complexity affected productivity. Volkswagen sought a solution that would provide more robust workstation capabilities.

"Over time, crash test models have become more detailed. Today, photorealistic simulations show what happens inside the car in very fine detail," said Mayer. "Good graphics are required and in turn, hardware acceleration and reliability. We needed a 64-bit operating system with enterprise support."

Meeting workstation performance demands with stable, supported Linux

After exploring potential operating systems, including 64-bit Microsoft Windows, Volkswagen's R&D engineering team chose Red Hat Enterprise Linux for Workstations, a version optimized for high-performance, graphically intensive workloads like CAE.

"We decided early to standardize on Red Hat Enterprise Linux because it was stable and offered commercial support," said Mayer. "Security updates were built in, and we could call Red Hat or raise a ticket if there was an issue. It also has a long lifecycle, like many of our automotive applications, so we could easily keep any legacy version up to date for our engineers to run two - or even five-year-old applications if needed."

Volkswagen migrated 300 workstations, as well as tools and applications, from UNIX to Red Hat Enterprise Linux to support various processes across a range of departments, from crash simulations to computational fluid dynamics (CFD) for aerodynamics testing. In the years since its initial deployment, more than 1,000 engineers in Volkswagen R&D now use Red Hat Enterprise Linux for Workstations.

A Red Hat Technical Account Manager (TAM) provides consistent, ongoing support for the company's CAE Linux client team, such as collaborative troubleshooting sessions using a screen-sharing approach for complex challenges. "Talking to an expert is far better than learning ourselves through errors. We just explain what we want to do, and our TAM shows us different approaches and their advantages and disadvantages," said Mayer.

"By uniting on one stable, supported Linux distribution, we know we can work together internally and with our vendors to replicate and resolve any issues."

—

Oliver Langner
Application Manager,
Group IT,
Volkswagen

Delivering powerful processing to support innovative automotive engineering

Gained responsive foundation to support resource-intensive computing

Support for large amounts of RAM was a deciding factor in Volkswagen R&D's choice of an operating system—and remains important as processing and other needs change. Its engineers needed an operating system that supported not only powerful CPUs from Intel and AMD but also large amounts of memory. The Red Hat Enterprise Linux for Workstations devices that Volkswagen R&D runs today offer a massive 768 GB of RAM.

"We always use the latest and greatest hardware, including the latest professional GPUs," said Mayer. "Red Hat Enterprise Linux for Workstation can meet the demands of those new components. The 64-bit Windows workstations lacked the memory needed for our simulations' OpenGL [Open Graphics Library] graphics."

Improved third-party software compatibility

To ensure compatibility of all of the third-party software products used by its engineers, Volkswagen R&D set up a workgroup with other industry contributors and automotive software providers to standardize on Red Hat Enterprise Linux.

"Because we need reliable, production-ready technology, we now only install software from vendors who have tested and certified on Red Hat Enterprise Linux," said Mayer. "Many of them were already running in our UNIX environment, so it was fairly easy for them to port their software and work with Red Hat to gain certification. The certification program is important for our R&D work."

Focusing on a single Linux distribution avoids duplication of efforts to prepare different versions for different vendors, but also makes troubleshooting faster and easier.

"By uniting on one stable, supported Linux distribution, we know we can work together internally and with our vendors to replicate and resolve any issues," said Oliver Langner, Application Manager, Group IT, Volkswagen.

Simplified security compliance and maintenance

Initially, Volkswagen's IT department worried about the security quality of using a Linux distribution, but the R&D team quickly demonstrated how Red Hat Enterprise Linux helped them meet all security compliance requirements.

"Red Hat provides confirmed security patches for any bugs or vulnerabilities that we can apply quickly," said Mayer. "Then Red Hat Enterprise Linux for Workstations lets us send the IT department a complete list of all of the security patches installed for faster verification."

Expanding Linux benefits to new users and third-party vendors

The R&D team's success with Red Hat Enterprise Linux for Workstations has attracted new users at Volkswagen, including software developers who have added various Python tools and packages and Group Innovation, a user group developing artificial intelligence (AI) data models.

Volkswagen continues exploring new versions of the operating system as they are introduced, including some initial migrations from Red Hat Enterprise Linux 7 to version 8 and starting to build a version 9 client image, to take advantage of the latest features and enhancements.

"Going forward, we see the adoption of a unified CAE Linux client based on Red Hat Enterprise Linux for Workstations across other brands within the Volkswagen Group, such as our server department as well as externally with software vendors,"
said Langner.

About Volkswagen

The Volkswagen Group, with headquarters in Wolfsburg, Germany, is one of the world's leading automobile manufacturers and the largest carmaker in Europe. The Group comprises 12 brands from seven European countries: Volkswagen Passenger Cars, Audi, SEAT, ŠKODA, Bentley, Bugatti, Lamborghini, Porsche, Ducati, Volkswagen Commercial Vehicles, Scania, and MAN. The passenger car portfolio ranges from small cars to luxury-class vehicles. Ducati offers motorcycles. In the light and heavy commercial vehicles sector, the products range from pick-up trucks to buses and heavy trucks. Every weekday, 671,205 employees around the globe produce on average 44,567 vehicles, are involved in vehicle-related services, or work in other areas of business. The Volkswagen Group sells its vehicles in 153 countries. https://www.volkswagenag.com/

About Red Hat Innovators in the Open

Innovation is the core of open source. Red Hat customers use open source technologies to change not only their own organizations, but also entire industries and markets. Red Hat Innovators in the Open proudly showcases how our customers use enterprise open source solutions to solve their toughest business challenges. Want to share your story? Learn more.

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 develop cloud-native applications, integrate existing and new IT applications, and automate and manage complex environments. A trusted adviser to the Fortune 500, Red Hat provides award-winning support, training, and consulting services that bring the benefits of open innovation to any industry. Red Hat is a connective hub in a global network of enterprises, partners, and communities, helping organizations grow, transform, and prepare for the digital future.

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