



Audi

Audi has selected SUSE® Linux Enterprise Server from Novell® as the platform for its two latest high-performance computing clusters. Optimised for the advanced AMD* Opteron* processor, SUSE Linux Enterprise Server together with the AMD Opteron Processor delivers excellent performance at low cost, helping Audi to stay at the leading edge of car design.

Overview

AUDI AG, headquartered in Ingolstadt, Germany, is one of the world's leading prestige car manufacturers. With more than 52,000 employees, the company produces and sells more than 829,000 vehicles annually under the Audi and Lamborghini brands. Its commitment to technical innovation and excellence guides the creation of every Audi vehicle, from compact hatchbacks to Le Mans race cars.

Challenge

Audi has a history of technical leadership that stretches back more than a century. In addition to ensuring comfort, high performance and low fuel consumption, continual innovations help the company to lead the market in safety. Three of the ten cars featured in the Top Safety Picks 2006 from the US-based Insurance Institute for Highway Safety are Audi models.

To accelerate design cycles and minimise physical prototyping costs, Audi makes intensive use of computer-aided engineering (CAE), including crash simulation, virtual wind tunnels and other computational fluid

dynamics (CFD) models. With engineers always striving to improve the detail and accuracy of modelling, there is constant pressure on the IT function to deliver more computing power.

Solution

Audi runs several large clusters of servers for high-performance computing, leasing the hardware on three-year contracts and replacing it upon the expiry of each lease. When the company invited tenders for two separate solutions—one in crash simulation and one in aerodynamics and CFD—the operating system in each winning bid was SUSE Linux Enterprise Server.

The crash simulation cluster, supplied by Linux Networkx*, is running specialist third-party software on 130 servers with AMD Opteron processors. The aerodynamics and CFD cluster, supplied by IBM*, also runs SUSE Linux Enterprise Server, on 80 dual-Opteron servers.

For both clusters a series of benchmarks were defined. Vendors were asked to meet or exceed the required performance at the

Audi at a glance:

Technologically advanced luxury car manufacturer

■ Industry:

Automotive

■ Location:

Germany

■ Solutions:

SUSE Linux Enterprise Server

■ Results:

- Higher performance for complex computer-aided engineering systems
- Greater detail and speed in computer-based prototyping, for improved vehicle design
- Low cost of ownership; excellent stability and ease of system setup and management within a heterogeneous high performance computing environment

“As well as reducing complexity on the software side, our choosing Linux means that we can select the best generic hardware from competing manufacturers—so we can achieve much better price-performance.”

Hans-Ulrik von Bülow

CAE-Methods
AUDI AG



most competitive price possible. Both Linux Networkx and IBM took advantage of the excellent performance offered by SUSE Linux Enterprise Server on the Opteron architecture. The solutions showcase the fact that with Linux*, we have the freedom to select whatever hardware is best suited for each project.

The adoption of Linux for high-performance computing at Audi dates back five years, to a time when the company had several versions of UNIX* running in its data centre. Each version required a separate licensing and support contract with a different vendor, and required the same vendor's proprietary server hardware. By standardising on Linux, Audi has dramatically simplified and reduced its licensing and support overheads, and become hardware independent.

Audi runs another distribution of Linux alongside SUSE Linux. However managing and maintaining the servers for the most part requires only a single skill-set. As well as reducing complexity on the software side, the choice of Linux means that Audi can select the best generic hardware from competing manufacturers—thus achieving a much better price-performance.

The experience with the crash simulation solution was so positive that Audi had no hesitation in choosing SUSE Linux for the aerodynamics and CFD solution. The perception of SUSE Linux is that it is a serious, server-oriented operating system. Audi uses it for extremely demanding applications in a major industrial environment, and is fully confident in its stability.

Results

The improved price-performance delivered by SUSE Linux Enterprise server running on the Opteron architecture helps Audi run more detailed computational models within shorter timeframes. Each design cycle can now include greater detail and more iterations, enabling engineers to optimise their designs without delaying the production start of new vehicles. Ultimately, faster computing translates into better, safer cars that will be more attractive to prospective buyers.

Audi has always paid close attention to every detail of car design, whether streamlining the exterior for improved fuel economy or modelling the airflow around engine components for optimal cooling. By enabling better computational performance, SUSE Linux Enterprise Server is helping Audi to maintain its leadership in the field of numerical simulation.

Both of the new clusters derive part of their power from the optimisation of SUSE Linux for the Opteron architecture. This helped Audi to achieve the required performance using fewer physical servers than would have been possible with other distributions of Linux, for lower total cost of ownership.

SUSE Linux has built up excellent momentum in the CAE sector, in terms of optimisation for Opteron and its close relationship with the major hardware vendors.



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