

HIGH PERFORMANCE COMPUTING PARTNER

Sauber F1 Team moves to a high availability solution

Formula 1 team outsources the operation of its supercomputer environment to HPE

Objective

Achieving the highest possible uptime for the team's supercomputing platform

Approach

Outsourcing operations to HPE Technology Services

IT Matters

- No need to expand in-house IT resources
- No need to develop additional technical expertise

Business Matters

- Full concentration on aerodynamics rather than on the CFD environment
- Powerful CFD platform with very high uptime – 24 hours a day, 365 days a year
- Local account team helps the company maintain a close working relationship with HPE



For the Sauber F1 Team, computational fluid dynamics simulations are the key to ensuring that their Formula 1 cars are aerodynamically efficient. The complex calculations behind these simulations are performed using a supercomputing solution from HPE, based on the Moonshot system. HPE is also responsible for operating the solution – ensuring that the Sauber F1 Team has reliable access to the environment 24 hours a day, 365 days a year.

Challenge

Highly available supercomputer environment

In Switzerland, Peter Sauber is a sporting legend. He founded Sauber Motorsport in 1970 and oversaw the team's entry into the Formula 1 series in 1993. Performance is everything in Formula 1. Not only in terms of the speed of the vehicles on the racetrack, but also in terms of efficient development. The Sauber F1 Team recognised this factor as a key competitive advantage very early on and so has always relied heavily on ICT to support its engineers – primarily using technology from its partner, Hewlett Packard Enterprise (HPE). This partnership gives the Sauber F1 Team access to the latest technologies from HPE.

“For us, it was clear right from the start that we didn’t want to manage the new supercomputer environment ourselves. We want to focus on making our cars as efficient as possible, not on keeping our IT systems up and running. By outsourcing this job to HPE, we no longer need to provide the workforce or build up the expertise in-house.”

– Francesco Del Citto, senior CFD engineer, Sauber F1 Team

It uses the company’s high-tech solutions for a variety of processes, including computer assisted flow analyses using computational fluid dynamics (CFD). These analyses work in a similar way to testing in state-of-the-art wind tunnels, ensuring that the aerodynamics of all of the components of the Sauber F1 Team’s cars are highly optimised. But although these CFD calculations make so many time-consuming and expensive wind tunnel tests superfluous, they can be very complex and so require incredibly powerful computers or supercomputers.

A few months ago, the Sauber F1 Team decided to introduce a new supercomputer environment, comprising workload-optimised HPE ProLiant Moonshot servers and the latest Gen9 server blades. This high-performance computing cluster is specially designed to meet the Sauber F1 team’s unique performance and regulatory requirements, and its incredibly high performance levels and efficiency benefit both the staff in its CFD department and, of course, the vehicle itself.

There’s one thing you have to bear in mind with this sport: a Formula 1 car – unlike a regular car – is never finished. Around 70 per cent of it is changed during a season. This includes side panels, rear wings and front wings.

In order to ensure that competition between the Formula 1 teams remains fair, the Fédération Internationale de l’Automobile (FIA) has put in place strict regulations in terms of the maximum output of the computers used for CFD simulations, measured in teraflops (billions of floating-point operations per second).

But for the Sauber F1 Team, this limit is no longer a barrier to progress: “By introducing the Moonshot system, we have been able to double our throughput per teraflop, so we can, in principle, perform double the number of simulations – all while spending 33 per cent less on electricity,” says Francesco Del Citto, senior CFD engineer at the Sauber F1 Team.

As well as this efficiency, the high availability of the new supercomputer solution is also extremely important to the Sauber F1 Team: “We have to be able to carry out CFD calculations 24 hours a day, 365 days a year to test new components,” explains Del Citto. “And that’s not just quickly testing the aerodynamic performance of the components during the season or race weekends, but also when we’re developing the new vehicle before the season starts. If the system were to fail for just a few hours each day, we would have a huge problem on our hands.” The Sauber F1 Team normally runs its simulations on the Moonshot environment as batch jobs. Other tasks run on the HPE ProLiant BL 460c Gen9 servers within the cluster.



The Sauber F1 Team also faces an additional challenge in that it is not the only company using its CFD calculations. The team also provides them to third party customers, and they too expect the IT environment to be highly available. All this means that the high performance cluster is generally operating at 95 per cent capacity.

Solution

Cluster operated by HPE Technology Services

To ensure that the entire high-performance computing cluster environment benefits from the highest uptimes possible, the Sauber F1 Team relies on its integrated redundancy functionalities and HPE Technology Services, which operates the system as part of an outsourcing agreement.

“For us, it was clear right from the start that we didn’t want to manage the new supercomputer environment ourselves. We want to focus on improving the aerodynamic performance of our cars, not on keeping the IT systems up and running,” says Del Citto. “The HPE solution looked ideal for us as the company would also support the entire CFD infrastructure.”

The decision to go with HPE followed a selection process during which the Sauber F1 Team compared the different options for both data centre housing (i.e. having the hardware stored by an IT service provider) and outsourcing the operation of the solution.

The unique approach taken by HPE combined both of these concepts: HPE Technology Services is responsible for keeping the supercomputing cluster up and running, but the equipment is all kept at the Sauber F1 Team’s site in Hinwil near Zurich.

Advantages

No in-house staff or expertise required

“By outsourcing this job of managing the CFD environment to HPE, we no longer need to provide the workforce or build up the expertise in-house,” explains Del Citto. HPE experts have the technical expertise needed to manage the components on all levels – from the infrastructure to the operating system to the middleware software.

HPE also has its own service company which ensures that the platform is kept running around the clock, seven days a week. This service is provided by a local support team of HPE employees, all of whom are well trained in the Sauber F1 Team’s business processes and its unique technical features. They monitor the environment constantly with a passive monitoring system, which they also use to carry out regular active system checks. If an error occurs, HPE Technology Services resolves it and gets the system up and running again.

Customer at a glance

Application

Computational fluid dynamics (CFD) software

Hardware

- HPE ProLiant M350 server
- HPE Moonshot 1500 chassis
- HPE ProLiant SL230s server
- HPE ProLiant BL460c Gen9 server

Software

- CentOS Linux operating environment

HPE services

- HPE Technology Services:
HPE Datacenter Care Operational Support Services (OSS)
- HPE Financial Services

These services are mainly provided remotely from the HPE Swiss office, but the HPE experts can get to the Sauber F1 Team's site quickly if needed – to replace defective hardware, for example.

The team provides all levels of support to the Sauber F1 Team's employees – from level one where simple errors and hardware defects are resolved and level two where more in-depth specialist knowledge is required, up to level three where specific experts are called in to assist in solving the problem. HPE also integrates the partners from which it sources third party components into its support process.

Reactions to errors within 30 minutes

Different service level agreements apply depending on the severity of the error. But HPE promises to react to all errors and begin finding a solution within just 30 minutes. The Sauber F1 Team can have faulty hardware replaced within four hours, which is more than sufficient when you take into account the level of redundancy built into the system.

HPE also provides another central service in the form of preventative monitoring. This helps the company to ensure that the platform is kept up to the latest standards throughout its entire lifecycle and its configurations and parameterisations are adapted and optimised to meet changing requirements. Any potential problems with the system can be investigated and solutions developed. These preventative measures dramatically reduce the risk of the system failing.

All activities are coordinated and managed by the local account team, who work closely with the Sauber F1 Team. Service meetings are held every three months, during which the companies use reports to analyse the services provided. The meetings are also used to plan future activities, adjustments and further developments.

Close, personal relationship with the local account team

One example of this are the annual maintenance checks carried out on the wind tunnel, during which the cooling system which also cools the supercomputer environment has to be switched off. To cope with this, HPE first ensures that the high performance computing cluster is shut down safely, then uses the time taken to carry out the maintenance to perform redundancy tests on the cluster before restarting it. Del Citto explains that HPE was heavily involved in the planning of this three day project to ensure that the planned maintenance window would not cause the business-critical CFD environment to fail.

“The HPE services meet our technical, organisational and financial requirements perfectly. The team is very reliable and works quickly. We have a very close relationship – a true partnership,” says Del Citto.

“Another positive factor for us is that we have dedicated contact partners in the account team with clear responsibilities, both for customer relations and for technical queries. This makes working together much easier.”

Learn more at
hpe.com/us/en/services.html



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