

McLaren Racing Delivers Double-Digit Performance Improvements

McLaren Racing, a Formula One racing organization, recognizes a double-digit performance increase by deploying edge solutions, computational fluid dynamics (CFD) and high performance computing (HPC).

Customer profile

Automotive | United Kingdom



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Edward Green

Head of Commercial Technology,
McLaren Racing

Business needs

In Formula One racing, seconds count. To maintain a competitive edge, continual, incremental improvements to racecar designs are the key to improving performance throughout the racing season. The team at McLaren relies on edge computing and HPC to power billions of CFD simulations every season and help them shave critical seconds off race times.

Business results

- 300GB of telemetry data captured and processed at the edge by Dell EMC PowerEdge servers.
- Hundreds of millions of race simulations help guide split-second trackside decisions at the edge.
- Billions of CFD simulations over the course of a season enable rapid design changes on racecar components.
- Double-digit increases in CFD performance are delivered using Dell EMC PowerScale storage and Dell EMC PowerEdge servers.

Solutions at a glance

- Dell EMC PowerEdge servers
- Dell EMC PowerScale storage
- Dell EMC OpenManage Enterprise
- Integrated Dell Remote Access Controller (iDRAC)

Formula One racecars burn up the track at an amazing 200 miles per hour (mph) on the straightaways and can even exceed 100 mph on the corners. But in a sport where the difference between winning and losing can be measured in milliseconds, teams of engineers are working around the clock to design a better car.

McLaren's winning strategy is fueled by data, starting at the edge, the point where the data is generated. Each car carries 300 sensors onto the racetrack, and those sensors stream telemetry data back to trackside compute stacks at an enormous rate. Some of the sensors collect data every 60 to 90 seconds — these include data such as lap times — and other sensors collect data at over 100 kilohertz per second for suspension or engine data.

“A session could run upwards of 300 gigabytes,” says Edward Green, Head of Commercial Technology, McLaren Racing. “And over a given season, we end up with billions upon billions of data points, physically from the car. We use all of that data that comes from the car to inform our performance strategy, to inform strategy decisions, to inform how the car is reliable on track. So, you need the enormous amount of compute to deal with all of the sensing telemetry that's coming from the car, and to process it as fast as possible.” To make crucial decisions about the races and the cars, that data needs to be accessed in near-real time by McLaren engineers, both trackside and at Mission Control.

To bring new levels of performance out to the track, McLaren recently updated their trackside telemetry servers with Dell EMC PowerEdge servers. The new systems deliver almost 4.5TB of RAM and close to 400TB of solid-state storage along with the latest generation of processors. Using iDRAC, the team is able to spin up and monitor trackside servers from the main data center. McLaren actually refers to the trackside rack as a third member of the traveling team.

Once the data is captured and analyzed trackside, it's streamed back to the data center at McLaren Mission Control, where it's processed and used for analysis and simulations. According to Green, “The



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team at Mission Control plays a pivotal role. They're analyzing data, finding extra performance, in some cases analyzing live car data in overnight simulations to work out where our correlation might be. And even in the extreme cases, we'll manufacture parts overnight or at the track to add to the car to help boost the performance."

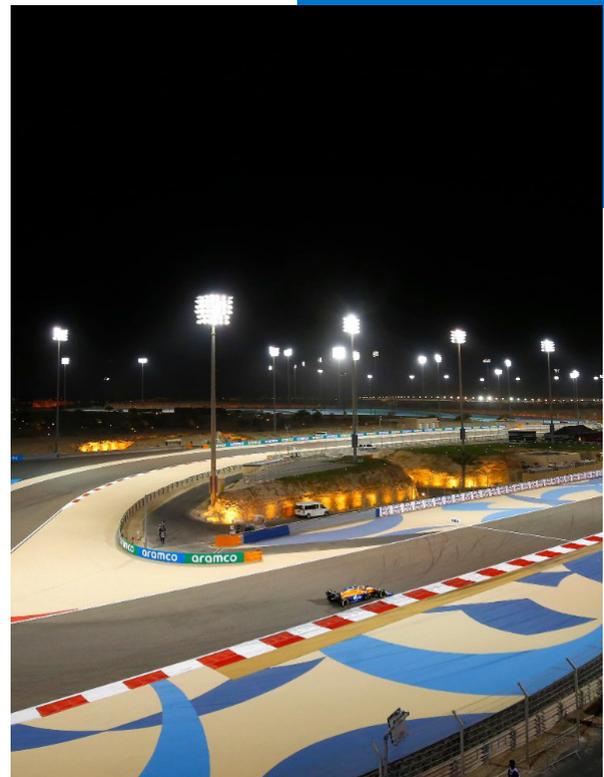
Driven by data

To turn the data into usable information that delivers performance advantages, McLaren relies on HPC, powered by Dell EMC PowerEdge servers. "HPC serves to help us understand strategy calls. We'll simulate hundreds of millions of iterations of the race to understand what might happen if it started raining on a given lap, or if a competitor in front of us was to spin off, or if the safety car was to come out. It helps us augment our decision-making capabilities," explains Green.

"We run equally hundreds of millions, if not billions of simulations each year, to determine things like our best strategy," he continues. "We use HPC to conduct complex CFD studies on the airflows around the digital twin of a proposed part before deciding whether to test it with rapid prototyping with 3D printers ready for wind-tunnel testing," says Green. This enables the team to test a part under various conditions before physically manufacturing it, which saves valuable time and expense.

The CFD analysis helps Green and his team decide which parts to redesign and manufacture, and also helps them analyze the performance of the new parts once they're added to the car.

According to Green, up to 90% of a car will be completely redesigned during the course of one season in order for it to remain competitive. "The car adapts so quickly from not only race to race, but season to season, trying to find those marginal gains and differences through corners is incredibly important. And aerodynamics is one of the key areas which gives you the edge in Formula One."



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Turning data into speed

To turn the data into usable information that delivers performance advantages, McLaren relies on HPC powered by Dell EMC PowerEdge servers and Dell EMC PowerScale storage. According to Green, “The range and diversity in the PowerEdge portfolio has meant that we could hone in and find the absolute right configuration for our HPC cluster. Working closely with the team at Dell Technologies, they’re able to help advise us, and make sure that — of all the different variations that we can choose and pick from — that we get the right setup.”

Storage is critical for HPC performance as well, and Green reports, “On the HPC cluster, we run into the petabytes on Dell EMC PowerScale storage, which can handle those fast head workloads, and can make sure we can get that data back as quickly as possible into the hands of engineers. Working with the team from Dell Technologies on the right and optimal configuration, we’ve seen double-digit percentage increased performance in our CFD cluster.”

He adds, “In a world where CFD time is so tightly restricted, downtime and outages are just not something we want to tolerate. In order to keep the team running, you need to make sure that you can maintain and monitor these platforms very efficiently. PowerEdge and PowerScale allow us to do that.” He especially appreciates the new Dell EMC OpenManage system management technology. It helps the team keep servers up to date and understand the performance, so they can make sure they’re giving the team what they need.

Ready to race

Green sums it up, “Technology plays a pivotal role in the development of a Formula One car. Technology helps us right from the point of design through to the point of analysis, simulation, manufacturing, and ultimately collecting data from the car. Technology provides a common thread to correlate all of those data points together. Dell Technologies has helped us to understand the breadth of capabilities to start to bring together and focus on strategic priorities that are going to set us apart from our competition.”

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