

CUSTOMER:

Scuderia Ferrari
www.ferrari.com

INDUSTRY

Automotive
Formula One Championship

CHALLENGES

- Design and test F1 cars for aerodynamic stability with minimum drag
- Perform virtual race simulations to reduce costs, improve safety, and refine strategies
- Analyze car and driver performance in real-time for race situations

SOLUTION

- High-Performance Computing powered by multi-core AMD Opteron™ 6100 Series processors for Computer Aided Design (CAD), Computational Fluid Dynamics (CFD) simulations, and real-time race telemetry analysis

RESULTS

- Numerous F1 Grand Prix wins with AMD since 2002
- Four F1 World Championships (2002, 2003, 2004, 2007)

AMD TECHNOLOGY

AT A GLANCE

AMD Opteron™ 6100 Series Processors

“Partnering with AMD has been and will be a successful decision that has changed the world of simulation in F1. And this relationship continues with the latest AMD architecture.”

Piergiorgio Grossi

Ferrari Spa, Head IT Gestione Sportiva (F1)



AMD Opteron™ processors help drive Scuderia Ferrari further, faster

Shaping every aspect of Ferrari F1 racing

Ferrari's Formula One (F1) racing team first started working with AMD technology back in 2002, initially with PCs based on AMD Athlon™ processors. Within a few short months, Ferrari's technology team realized that the marriage of computing and competitive car racing would open up new opportunities to refine and redefine their sport.

In 2004, Ferrari added High Performance Computing (HPC) to its IT infrastructure with a supercomputing cluster of commodity featuring AMD Opteron™ processors.

“Technology plays a crucial role in today's F1 environment,” says Piergiorgio Grossi, Ferrari's Head of IT for their F1 racing division. “The whole lifecycle of the F1 car is surrounded by computing activities—from aerodynamics simulations, to the technical design with CAD, down to telemetry and track operations where real-time data are the foundation of our race strategy.”

Today, even the car itself won't start without being connected to a computer. “Our vast majority of notebooks, workstations and servers are based on AMD technology. Our simulation supercomputers are based on AMD Opteron 6100 Series processors,” says Grossi.

The capabilities of these eight-core AMD Opteron processors have helped Ferrari increase their raw compute power, while simultaneously reducing their IT footprint and optimizing energy efficiency. Reducing the team's overall infrastructural expenses offers a particular competitive advantage on the F1 circuit, since the adoption of rules that limit each team's budget and resources.

The balance of speed and safety

Before a new F1 season begins, Ferrari engineers have already put thousands of miles on the odometers of virtual cars fueled by AMD technology. “We crunch a lot of floating point data coming from telemetry, from the wind tunnel, and from the simulators. Typical applications are strategy simulation, aerodynamic simulation, and crash testing,” says Grossi.

The central preoccupation of an F1 team concerns the balance between stability and resistance. Downforce describes a car's ability to hold its line on corners without sliding during a race. The vehicle's aerodynamic design, including wing-like features mounted on the front and tail ends, help create downforce that keeps the car on the track.

At the same time, the car's aerodynamic designers must balance stability with speed, and limit drag from wind resistance. To achieve optimal levels of both performance and safety, Ferrari engineers rely on Computational Fluid Dynamics (CFD) simulations run on an AMD Opteron processor-based supercomputer.

These virtual wind tunnel tests can generate data for variables in vehicle design, race course layout, and weather conditions without actual rubber ever hitting the road.

AMD 

“CFD helps to define the aerodynamics of the car and the flow of the fluids in the engine. Without the help of CFD we would have to physically build every prototype to test for reliability and performance. That in turn would create an unacceptable increase in costs and a drastic decrease in the potential solutions we can consider,” says Grossi.

The team found that eight-core AMD Opteron 6100 Series Processors offered the best performance on Ferrari’s specific CFD applications. “Since our adoption of AMD technology, we’ve been able to consolidate all our simulation solutions on one platform, both in terms of CPUs and operating systems. This is an advantage in terms of knowledge capitalization and in terms of a better level of service to our internal clients.”

Real-time race analysis

During a Grand Prix race, the majority of communications between the car and the pit don’t happen over the radio. Computing sensors throughout the vehicle constantly report data of vital functions such as vibration, suspension performance, oil and tire pressure, and engine temperature.

This critical feed of information gives Ferrari engineers the ability to assist the driver with strategic adjustments that can help improve the car’s performance on the course. Whether it’s calling the car to the pit for a tire change or making a driving style correction that will improve the rate of fuel consumption.

But the raw data from the car’s sensors alone would be of little value without AMD Opteron processor-powered supercomputing support to crunch the numbers in real-time. As Grossi explains, “Our engineers are blind without the telemetry. They cannot predict potential situations of danger for the car and the driver. It is nearly impossible to predict the residual life of a component without computers and simulations before, during, and after the race.”

A formula for success

AMD’s sponsorship of Scuderia Ferrari has evolved into a true technology partnership, with both companies working to continually improve performance and to go further, faster—year after year.

“As a top team we have to take advantage of every available technology and our user experience has changed accordingly. It is important to underline the fact that AMD has always respected the roadmap of their technologies, which makes it possible for us to count on the timeliness of their products. So when they promise to come out with the next generation of multi-core technology, higher frequency CPUs, or energy efficient solutions, we are able to plan accordingly,” says Grossi.

But the relationship between Ferrari and AMD is about much more than sharing physical resources. Both companies embrace a commitment to excellence, a desire to push the boundaries of performance, and a culture of collaboration.

“AMD is also able to give us new opportunities to enhance the benefits we get from computing. The continuous feedback we receive from AMD engineers helps us to tune their technologies to our priorities and requests.

“So far AMD has had the highest performing CPUs for our applications and the use cases. It’s a steady and long-lasting supremacy that we are sure to preserve in the continuation of the technology partnership,” says Grossi.

To learn more about AMD Opteron 6100 Series processors visit: www.amd.com/opteron6000



“Technology has to perfectly fit in our environments and give the best performance. We don’t base our decisions on standard benchmarks but on the results achieved in the real usage conditions.”

Piergiorgio Grossi
Ferrari Spa, Head IT Gestione Sportiva (F1)

