

Official Corporate Partner of
BMW Sauber F1 Team

Success Brief

Performance

Intel® Xeon® processor
5400 series

Motor sports

High-performance computing

“A competitive supercomputer is the key to our success and having Intel as our official corporate partner is very important. It’s helping us roll back the limits all the time.”

Mario Theissen,
BMW Motorsport Director

Intel Supercomputer Albert3 drives BMW Sauber F1 Team ahead

Intel® Xeon® processor 5400 series delivers results on the racing track

At the end of 2005 BMW acquired the Sauber F1 Team. In its debut season the racing outfit finished in fifth place in the Constructor’s Championship – a remarkable gain for a new team. With the support of Dalco AG, its Official Supplier, the team had built a supercomputer called Albert in 2004 to analyse the effects of car aerodynamic design on performance. In late 2006, along with Intel, its Official Corporate Sponsor, the team upgraded its supercomputer to Albert 2. Powered by 512 Intel® Xeon® processor 5100 series with two cores and unveiled in December 2006, Albert 2 had a total of 1,024 processor cores. The computing power it generated helped BMW Sauber F1 team improve performance on the track, thanks to computational fluid dynamics and greater insight into car component design. After a hardware update in early 2007, in spring 2008, the BMW Sauber F1 team upgraded the capabilities of Albert2 to create Intel Supercomputer Albert3, by introducing Intel® Xeon® processors 5400 series with four cores. This delivers peak computing power of 50.7 Tflops or 50,700,000,000,000 computations a second and is a driving force for greater success on the track.

- **Faster performance required.** BMW Sauber F1 Team wanted to enhance the performance of its supercomputer, Albert2, to galvanise its ambition of becoming a leading F1 team.
- **Supercomputer upgrade.** Intel® Xeon® processor 5400 series with four cores was added to Albert2 which created a more powerful Intel Supercomputer, Albert3.
- **Massive power.** Albert3 can produce peak computing power of 50.7 Tflops, so simulations can now be run up to four times faster, which in turn delivers greater design insight when developing racing cars.

BMW Sauber F1 Team was formed at the end of 2005 following a takeover of the existing Sauber F1 team by BMW and BMW’s decision to end its partnership with the Williams’ F1 Team. Since then it has gained some quick and impressive successes such as its first Grand Prix victory at the 2008 Canadian Grand Prix, winning both first and second positions.

However, F1 is intensely competitive, even a tenth of a second can make the difference between winning and losing. With fractions of a second contributing to a team’s overall score, optimal car design is essential. As a result, aerodynamics, braking and engine cooling components are considered crucial. BMW Sauber F1 Team uses Ansys-Fluent* computational fluid dynamic (CFD) software, running on the Linux* operating system, to ensure the best in design.

The CFD software is based on grid models that frequently number more than 100 million cells. As well as helping develop car components, it is also used to produce a visual representation of an air stream to aid in the creation of front and rear wings and to understand why some design components are superior to others.

This software was driven by Albert2, a supercomputer that has 256 nodes powered by Intel® Xeon® processor 5100 series with two cores. In total, Albert2 had 1,024 processor cores and the main memory had capacity of 2,084 GB and maximum computing power of 12.28 TFlops.

Powerful simulations drive the BMW Sauber F1 Team forward

F1 teams traditionally build wind tunnels to assess aerodynamic and component performance. However, the BMW Sauber F1 Team has gained significant measurable value from its computer simulation and places great emphasis on the expanding possibilities it offers. As a result, it decided to upgrade Albert2 by adding Intel® Xeon® processor 5400 series with four cores to deliver even greater computing performance and to create Intel Supercomputer Albert3, a new-generation of supercomputer.

Lift-off

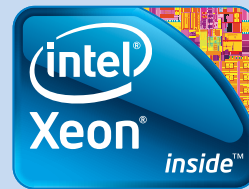
Albert3 has significantly increased computing capability. Three hundred and eighty four nodes, equipped with the Intel® Xeon® processor E5472 series, have been added, so Albert3 now draws on a total of 4,224 processor cores. Its RAM has risen to 8,448 GB and peak computing power to 50.7 Tflops, or 50,700,000,000,000.** To put this in perspective, if the combined population of Munich and Berlin, that is 4.7 million people, spent a year multiplying two eight-digit numbers every three seconds, they would achieve the same computing muscle that Albert3 delivers in one second.

Albert3 is three to four times faster than Albert2 so more simulations can be carried out in a shorter time, while also being more efficient and it is now being used to develop new cars for future seasons.

The team's supercomputers, from Albert1 through to Albert3, have helped BMW Sauber F1 to improve its CFD capabilities significantly. And in light of new regulations that say cars cannot be tested anymore during the season, Albert3 and the powerful simulations it enables become even more important.

Spotlight: BMW Sauber F1 Team

- BMW Sauber F1 Team is a Formula One outfit with bases in Hinwil, Switzerland, and Munich, Germany. The team was formed at the end of 2005.
- It scored two podium finishes and came fifth during the 2006 season, a remarkable achievement in the first season in which BMW was at the wheel. The following year it gained second place in the championship. In 2008 it scored its first Grand Prix victory at the 2008 Canadian Grand Prix, winning both first and second positions.



More benefits have followed the upgrade to Intel® Xeon® processor 5400 series with four cores, including lower IT costs, enhanced IT flexibility, increased ability to meet environmental requirements and increased efficiency. As result of both these benefits and the ability to carry out simulations more quickly, BMW Sauber F1 Team is also planning to upgrade to the Intel® Xeon® processor 5500, developed on Intel's next-generation microarchitecture.

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