

MERCEDES AMG PETRONAS FORMULA ONE™ TEAM

OFFICIAL TEAM PARTNER



AMG
PETRONAS
FORMULA ONE™ TEAM

IT ISN'T CHEATING

BUT IT DEFINITELY FEELS THAT WAY

The MERCEDES AMG PETRONAS Formula One™ Team demands peak performance from every member of its team to continue its record-setting ways.

To push the performance envelope of its IT infrastructure the team chose all-flash arrays from Pure Storage which have delivered blinding speed, unprecedented reliability and availability, and significant savings in operating costs.

BUSINESS TRANSFORMATION

Team members both trackside and at the factory have instant access to critical data used to continually improve racecar performance.

CHALLENGES

Finding new means to efficiently collect, manage and share ever-increasing amounts of data used to improve racecar design and performance. Multi-disciplinary design and engineering requirements stress the team's IT infrastructure in the constant pursuit of incremental improvements to racecar performance. Requires an infrastructure that is portable.

IT TRANSFORMATION

Response time for key database query slashed by 95%.
Time needed to open critical data files cut by two-thirds.
Data center rack space reduced by 68%.
Time required to manage storage lowered by over 90%.

GEO

*Europe, the Middle East
and Africa.*

INDUSTRY

Automotive

COMPANY

MERCEDES AMG PETRONAS

Formula One™ Team

www.mercedesamgf1.com/en/

USE CASE

Business Intelligence – SAP

Database – SQL Server, Oracle

VSI – VMware vSphere

CMS – SharePoint

CAD – CATIA



OFFICIAL TEAM PARTNER



AMG
PETRONAS
FORMULA ONE TEAM



Pure Storage and the Mercedes F1 W07 Hybrid in Barcelona, 2016.

“The three words I’d use to describe Pure Storage are simplicity, performance and support.”

Matt Harris, Head of IT
MERCEDES AMG PETRONAS Formula One™ Team

 **PURESTORAGE®**
Hello Possible™

OFFICIAL TEAM PARTNER



AMG
PETRONAS
FORMULA ONE TEAM

AN UNFAIR ADVANTAGE

Mercedes-Benz is a legendary name in motor racing, beginning in the 1930s, with back-to-back world championships in the mid-1950s. After an absence of many years, Mercedes returned with a factory team in 2010, and once again is making history. The MERCEDES AMG PETRONAS Formula One™ Team has become one of the most successful teams in F1 history, having won drivers' and constructors' titles in 2014 and 2015. Mercedes collected 16 victories each in 2014 & 2015, breaking Ferrari's 2004 total of 15.



To maintain this record-setting pace, technology is an important contributor to the team's success, and its impact is felt in all facets of the operation – from design and prototyping, manufacturing and testing, all the way to trackside during a Grand Prix race. The team has invested tens of millions of dollars in state-of-the-art tools such as computer-aided design and manufacturing (CAD/CAM), visualization, and driver-in-the-loop simulation at its headquarters in Brackley, UK.

Everyone on the team has a singular focus: improving the performance of the two cars they put on the track every two weeks during the F1 season. Incremental improvement is the goal. Shaving even a fraction of a second off the time it takes a car to complete a lap can mean the difference between winning and losing.

The goal of constant improvement is always on the mind of Matt Harris, Head of IT for the MERCEDES AMG PETRONAS Formula One™ Team. "Our role is to support every other member of the team to help them do their job more effectively. Harris is honest about how IT contributes: "We can't do anything to directly make the car go faster but we can make the car stop."

"The simplicity of the solution is brilliant."

The team races two cars a year and the unique conditions of each Grand Prix circuit requires that the cars be modified for each race. "Some companies have a new-product cycle of two or three years. For us, we put a new product out on the track every two weeks," Harris observed.

OFFICIAL TEAM PARTNER



AMG
PETRONAS
FORMULA ONE TEAM

PURE SELECTED TO BOOST PERFORMANCE

In 2014 Harris and his team started to evaluate how changes in the storage infrastructure might contribute to the goal of ever-improving performance. In a process lasting more than a year, the team along with solution provider Response Data Communications “looked at all the storage vendors across the board; every kind of technology,” Harris recalled. “It was a bit daunting at the start but in the end Pure Storage was the easy decision.”

One reason for the choice was the long-term growth path provided by Pure Storage. “We could have made an incremental change to gain some modest improvements but we wanted a step change in performance, something that would last for many years.”

Another reason for the choice was that the team required an infrastructure that was both state-of-the-art and portable. Putting performance-critical

workloads track side each race requires density and reliability. Pure Storage offered the team a solution that mapped perfectly to these business requirements. Harris recalls “The choice was clear once we realized we could eliminate bulky, heavy hardware, improve our performance and actually save money taking the technology with us around the world,” Harris noted.

“Pure Storage’s Evergreen business model removed the anxiety of the traditional storage renewal. It’s a brilliant example of the simplicity you get with Pure and it changes the board-level conversation when trying to propose a new platform,” said Harris. “The typical concerns about future issues – capacity, upgrades, maintenance and how much it will all cost us again – are no longer an issue. We were able to immediately focus on getting the technology in the door and impacting the business as quickly as possible.”

*“Pure Storage future-proofs
us in the long term.”*



OFFICIAL TEAM PARTNER



AMG
PETRONAS
FORMULA ONE TEAM

BENEFITS FROM PURE STORAGE

Since buying its first FlashArray from Pure Storage in 2015, the team has added several more and has moved virtually all its production applications and data onto Pure Storage arrays. This includes Microsoft SQL Server and Oracle databases, CATIA CAD/CAM, SAP, VMware servers, SharePoint and back-office functions along with Cisco UCS in their datacenter.

The ability to run so many different applications on one storage system is a big benefit. Harris observed. “We used to have to add spindles to our spinning-disk system if we needed to boost performance for an application such as SAP. Now we have all of our applications on Pure Storage and they all get the same high level of performance. We’ve eliminated complexity and we’ve eliminated possible points of failure. We now have a single storage infrastructure shared across all platforms, with resiliency built in.”

Once the Pure Storage array was installed, “everybody started to see the benefits. In fact, we saw improvements in areas that we didn’t expect.”

One such area was a frequently used query to a SQL Server database which previously had taken about 4½ minutes to execute. “It now takes 13 seconds simply as a consequence of moving the SQL Server to Pure Storage, nothing else.”

The impact of high-performance storage has also been felt in the frequent and widespread use of data collected from the cars during a race. Each car is fitted with more than 200 physical sensors and the data gathered during a race is carefully scrutinized by team members across multiple design functions to glean all possible insights that could help improve performance, both for the next race and over the long term.

Approximately 400GB of data is collected during each race, a total of 9TB for the entire season. Employees at team headquarters studying this data use a two-step process to extract the information they need. First metadata about the files is

downloaded resulting in a list of available files. Once a file is selected, it is then opened. If that file isn’t the right one, the process must be repeated. This two-step process used to take about 7 minutes. Now it now takes 2½ minutes a reduction approaching 70%. That means team members spend much less time waiting to get access to the data. “And every single minute is precious to us in the context of the limited amount of time we have to prepare between session, in particular between the three sessions in qualifying,” Harris noted.

Among the most data-intensive applications used by MERCEDES AMG PETRONAS Formula One™ Team is computational fluid dynamics (CFD), an essential tool in the design and test process. It’s used to simulate the performance of a part or a design element of the car under race conditions. CFD applications require massive processing power, and can take up to 20 hours to run. Initial testing has show, moving these applications onto Pure Storage has reduced some processing time by up to 15%, “this means that we can run more jobs a week just by changing storage,” Harris noted. “The opportunity to run more design simulations in the same amount of time greatly enhances our ability to improve the car’s performance. Pure Storage is our unfair advantage.”

“The support we receive makes Pure Storage an extension of our team. We don’t have to think about storage anymore.”



OFFICIAL TEAM PARTNER



AMG
PETRONAS
FORMULA ONE TEAM

USING PURE LOWERS OPERATING COSTS

The impact of Pure Storage on the team's operations extends beyond the seven-building campus where design, manufacturing and office operations are carried out. IT equipment must be shipped to the site of each race. By moving to flash arrays from Pure Storage, the size and weight of storage equipment needed at the track has been sharply decreased."

The reliability of Pure Storage arrays is highly prized by the team, as IT equipment at the track must be able to accommodate a wide range of weather conditions and must withstand multiple assembly and disassembly procedures during the course of the season.

As a veteran IT professional, Harris appreciates many aspects of Pure Storage products. "The simplicity of the solution is brilliant. Our storage administrators used to spend in aggregate three days a week on storage issues. Now they spend three hours per week, if that."

The small footprint of the Pure Storage arrays has meant a 68% reduction in data-center rack space, resulting in a savings in operating costs. Harris said, "the support we receive makes Pure Storage an extension of our team. They bring issues to our attention before we are even aware of them. We don't have to think about storage anymore."

The ability of Pure Storage to perform non-disruptive upgrades has also impressed Harris. "When we upgraded our FA-450 arrays to the //m20 and //m70 models we did it on a weekday morning during full production runs. I never would have thought that was possible". Harris concluded, "We're a small IT team, and the amount of data we handle isn't that huge compared to a lot of big companies.

However the data we collect is extremely valuable and helps us maintain a competitive advantage in a short amount of time. IT's pledge is to make that process as fast and reliable as possible. Pure Storage delivers on that promise."



 **PURESTORAGE**[®]
Hello Possible™