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Toyota Motorsport

Toyota Motorsport Shifts into High Gear with EMC Tiered Data Protection

BUSINESS VALUE HIGHLIGHTS

Profile: Toyota Motorsport GmbH, headquartered in Cologne, Germany, is Toyota's Europe-based car racing center responsible for design, manufacturing, and operation of the entire Toyota Formula 1 (F1) racing program.

Challenge: To win races and support advanced racecar development, Toyota Motorsport needed a business continuity strategy that would cost-effectively protect racecar performance, engineering, and operational data throughout its lifecycle.

Business value: EMC Services experts helped Toyota Motorsport design and implement comprehensive replication, backup, recovery, and archiving strategies to better align storage resources with its business processes for more efficient and effective information lifecycle management. As a result, the company has achieved:

- Recovery-time objectives of two hours and zero data loss for its most critical applications
- More than 25 percent reduction in production storage requirements
- 20-40 percent faster backup and restore processes
- Cost savings of 40-52 percent
- Reduced backup and acquisition costs at the high-end storage tier
- More efficient IT operations through automation of data replication, data movement, and backup
- Decreases in the time and costs associated with tape storage

TOYOTA MOTORSPORT EMC ENVIRONMENT

- **Primary Applications:** Microsoft Exchange, SAP, CATIA, ABAQUS, Enigma SmartMove, IXOS EconServer, Oracle, VMware®, file sharing
- **EMC Software:** SRDF/Synchronous, SRDF/Cluster Enabler, Replication Manager, TimeFinder/Mirror, EMC ControlCenter®, MirrorView/Synchronous, SnapSure, NetWorker
- **Storage Infrastructure:** 150 terabytes of EMC storage, including EMC Symmetrix DMX™ networked storage, CLARiiON CX series and Fibre Channel ATA disks, EMC Centera Governance Edition (GE), EMC Celerra Clustered Network Server
- **Processing Environment:** UNIX and Windows servers

When Toyota Motorsport GmbH (TMG), a division of Toyota Motor Corporation, turned its attention to Formula 1 (F1) car racing in 1999, the company knew that it would need an advanced business continuity infrastructure to be competitive with more-established teams. The availability of data acquired from races and testing, and the ability to improve car and racing performance based on the data, were to be a foundation of the F1 program.

Today, a Toyota Motorsport F1 racecar engine isn't started without firing up a laptop computer. Many sensors throughout the engine and chassis feed high volumes of data regarding a number of different parameters, such as oil temperature, brake wear, and engine performance to trackside engineers for analysis. At the end of a race or practice session, engineers download the data to local storage devices and then transmit it to headquarters. As engineers analyze this data, 10 to 15 percent of the car components may change between each race to optimize the car for the upcoming race circuit.

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Thomas Schiller
General Manager, IT
Toyota Motorsport GmbH

During the two-week period between races, data from the previous race is vitally important and must be carefully protected. However, once the next race takes place, a new development cycle begins and a significant percentage of the previous race data becomes irrelevant for the upcoming race. It still is important for ongoing engineering and testing and must be protected, but not necessarily at the same level as the new data.

To address the F1 team's diverse requirements for data availability, Toyota Motorsport turned to EMC® Services to develop and implement a multi-tiered, integrated business continuity strategy using EMC's advanced software and storage solutions.

Thomas Schiller, Toyota Motorsport's General Manager, IT Project Office and Process Administration, said, "Our EMC business continuity infrastructure addresses the full range of our availability requirements from the most stringent to the more moderate. Using information lifecycle management (ILM), we were able to lower our costs while matching the right replication, backup, recovery, and archiving solutions to the appropriate applications. Because this is a more targeted approach, we're saving more than 40 percent per year in overall storage costs and achieving better data availability across the infrastructure. With EMC as our information backbone, we've achieved significant success and competitiveness in Formula 1 racing in a relatively a short time."

EMC speeds design and development of a tiered data protection strategy

Toyota Motorsport launched its business continuity initiative by engaging EMC Services to analyze business processes and requirements. Initial analysis by EMC consultants found that nearly 60 percent of Toyota Motorsport's data had not been used for six months or more. EMC then helped Toyota Motorsport classify its data by importance and develop policies and methods for moving that data to appropriate storage devices depending on class, age, data location, access rate, data protection level, and other parameters. EMC experts also helped Toyota Motorsport structure a storage and software environment that is consistent with IT Infrastructure Library (ITIL) criteria, a standard set of processes and disciplines aimed at improving management and availability of storage-based services to internal clients.

With EMC Services, Toyota Motorsport established diverse tiers of protection, including mirroring of critical application data, advanced disk backup and recovery for both critical and mid-tier applications, and online archiving of data with long-term retention needs. EMC also assisted Toyota Motorsport in establishing service level agreements (SLAs) with each user group within the organization and the storage infrastructure needed to meet them.

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>
> **Thomas Schiller**
> **General Manager, IT**
> **Toyota Motorsport GmbH**

"Unlike other vendors, EMC Services took the time to listen to us and develop a solid understanding of our business continuity requirements," noted Schiller. "Their expertise helped us speed implementation of an infrastructure that takes into account the changing value of the data over its lifetime. As a result, we now have a strategy that delivers the right level of data protection for each class of application and data."

High-end replication protects team's core applications

While a new passenger car development cycle might last as long as 36 months, the turnaround for a new F1 racer is much tighter—typically less than 12 months. In addition, after completing a new F1 racecar, Toyota Motorsport changes major portions of the vehicle every two weeks between races. As a result, the development team cannot afford to lose any data acquired during the design process, software simulations, on the test bench, in the wind tunnel, or out on the track. A delay in data access or data loss during the racing season could mean the difference between simply being on the track and being a contender for the checkered flag.

Toyota Motorsport's core applications, including SAP, Microsoft Exchange, CATIA computer-aided design (CAD), and ABAQUS engineering analysis, are kept on high-end EMC Symmetrix® DMX systems in a storage area network (SAN), as well as a network-attached storage (NAS) environment that is integrated with an EMC Celerra® Clustered Network Server (CNS) gateway. Toyota uses EMC SRDF®/Synchronous (SRDF/S) software to fully

mirror its critical applications, such as SAP, from its primary data center to a separate data center. Toyota accomplishes the same mirroring with clustered Exchange and SQL servers by using EMC SRDF/Cluster Enabler (CE) software.

With EMC TimeFinder®/Mirror software, Toyota Motorsport creates business continuance volumes (BCVs) of Symmetrix production data for backup, recovery, and testing without disrupting online operations. Toyota Motorsport also uses EMC SnapSure™ software to create read-only copies of engineering drawings stored on Celerra several times a day, allowing designers to recall earlier versions.

Schiller explained, "Our business continuity environment has more than met our expectations. Before, recovery of our core applications, such as CAD, took approximately three days and our data loss exposure was more than five percent. Today, our SLAs specify a maximum of two hours for a complete failover to a separate data center, with zero data loss for our most critical environments, including SAP and Exchange. Fortunately, we haven't experienced such disruption. Our failover tests have worked perfectly, providing us with the confidence we absolutely must have in this environment."

"Our operations would dramatically slow and even halt if our critical applications were interrupted. In our SAP environment, for example, we've been able to increase our availability to 99.995 percent. The advanced functionality of EMC's SRDF and TimeFinder family software and high-end Symmetrix systems make this possible."

Economic protection at the mid-tier

To maximize use of high-end storage resources, Toyota Motorsport relies on mid-tier CLARiiON® CX series Fibre Channel systems to store engineering data during various points of the racing season. Once the races begin, a CLARiiON CX series system resides at the track to gather performance and other statistics that are continually analyzed by trackside engineers. After the race is completed, this data is transmitted to the EMC Symmetrix and Celerra storage systems for further analysis.

Once a new race begins, Toyota Motorsport relies on Enigma SmartMove software provided by EMC's partner, Enigma Data Solutions, to move data from one storage tier to another according to user-defined policies. Data from the previous race which no longer requires the advanced functionality and protection of the Symmetrix/Celerra environment, for example, is automatically moved to CLARiiON CX series systems with lower-cost ATA disks. Using EMC MirrorView™/Synchronous software, Toyota Motorsport also synchronously replicates data stored on CLARiiON systems to the other data center.

Schiller noted, "As 90 percent of the engineering data collected during a race and the following two weeks is classified as less than critical once the next race begins, its movement to CLARiiON ATA storage makes economic sense. The data still is readily available at a lower cost per megabyte, and Toyota Motorsport can store more new data on Symmetrix without having to purchase additional high-end capacity. This also allows us to back up our Symmetrix data more quickly because there is simply less of it."

In addition, EMC Replication Manager software has helped simplify the replication process across Toyota Motorsport's Symmetrix and CLARiiON environments. Replication Manager provides an easy-to-use, point-and-click interface that eliminates the manual scripting typically involved in setting up replicas and centralizes access to the entire process—on both the Symmetrix and the CLARiiON systems.

Fifty-two percent savings in storage acquisition costs

In 2003, Toyota Motorsport added EMC Centera™ Governance Edition (GE) content-addressed storage as the data archive layer in its tiered storage environment. Toyota Motorsport uses IXOS EconServer for Microsoft Exchange to move mailbox content that has not been accessed for 30 days from the Symmetrix storage directly to the Centera for long-term archival storage. Policies established using Centera software ensure safe storage and retention of e-mail for the specified length of time. Toyota Motorsport then moves Exchange content not accessed on the Centera after 12 to 18 months to tape.

Schiller commented, "When our aged data no longer needs the high-end capabilities of Symmetrix, we have systems in place to automatically archive this information to our Centera. This shift has allowed us to move more than 25 percent of our production data to Centera. Because we've scaled back our growing backup requirements at the high-end, we've reduced the time to back up our production data by more than 25 percent."

"In addition, we're saving 52 percent in storage acquisition costs because the Symmetrix capacity freed by Centera can be redirected to other needs without buying more storage. Our IT staff productivity has increased with the high degree of automation now in place and Centera's self-managing architecture. It's also much easier and faster for our users to retrieve data stored on Centera compared with finding data backed up on tape."

Centera also plays an important part in keeping historical engineering data—such as bench and road test details of Toyota Motorsport's racecars for any given race—always available through extensive self-checking and data integrity features. As these large sets of data are archived from Symmetrix to Centera, they are eliminated from the regular backup process, again reducing backup and recovery time and storage requirements.

As another layer of protection, Toyota Motorsport also replicates its Centera archives to another Centera located at the separate data center using EMC Centera replication software.

Because these archiving projects have been so successful, Toyota Motorsport plans to transfer historical SAP data to Centera for compliance with German laws and Sarbanes-Oxley regulations.

Backup-to-disk delivers up to 40 percent faster backup and restore process

Even though Toyota Motorsport has greatly reduced its backup requirements by archiving data to Centera, it continually seeks ways to make the backup and recovery process more efficient. Instead of backing up all of its data to tape, Toyota Motorsport is now backing up a growing portion of its data to EMC CLARiiON ATA disk.

"Not only are we saving money by not having to always buy additional tapes," explained Schiller, "but we're saving time, too. Our backup and restore procedures are 20 percent faster than before as a result of deploying EMC backup-to-disk. In fact, we've seen the restore time for one of our Exchange mailboxes improve by 40 percent. During the race season especially, when every minute counts, this improvement is huge. And, we're no longer racing against the clock to get our backups completed before they disrupt our production operations."

Toyota Motorsport uses EMC TimeFinder/Mirror software to create BCV copies of its Exchange data stored on the Symmetrix system. These copies are then backed up to CLARiiON ATA disk using the EMC Data Manager (EDM™) backup and recovery solution. Toyota plans to deploy EMC NetWorker™ software to manage backup-to-disk operations.

"Our production systems are unaffected by the disk-based backup process," said Schiller, "so we get the 24 by 7 availability we need. Our staff is relieved of countless hours because EMC's software automates and centralizes backup and recovery. The software also protects against data corruption and ensures high integrity of backed up data."

Winning with integrated data replication, backup, recovery, and archiving

In the high-pressure atmosphere of an F1 race season, Toyota Motorsport's tiered storage infrastructure ensures that the business always has access to important data and communications. By capturing design and performance data—on the track and test bench—and making it readily accessible for analysis, Toyota Motorsport has quickly vaulted into the top tier of F1 racing. With vital track performance data always on hand, Toyota Motorsport engineers design race simulations for the test bench that accurately reflect real conditions on the road, continually improving the engines and car bodies for the next race.

"EMC's integrated replication, backup, recovery, and archiving solutions have helped us lower our total cost of ownership and ensure the data is always there when needed," said Schiller. "You never know if or when the data from a past race or trial may become the key to a breakthrough in auto design or engineering—and that, plus winning races, is what we're here for."

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