



F5 Relies on MySQL to Improve Performance 1000%



Network Management

Embedded Database: MySQL 5.1

Operating System: Linux 2.6,
CentOS 5.5

Languages: C++ and Java

Hardware: Purpose-built appliance

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Bruce Butterfield

Development Manager, F5



F5 Overview

F5 is the global market share leader in Application Delivery Controllers ([Gartner ADC Magic Quadrant, 2010](#)) whose customers include 41 of the top 50 Fortune 500 companies, the world's top 10 fixed and mobile service providers, 15 of the world's top 15 commercial banks, and more than 16,000 other organizations around the world. Since its inception in 1996, F5 has grown to over 2,000 employees, with operations in over 30 countries, and revenues over \$882 million in 2010.

F5 solutions provide points of control wherever information is exchanged, from client devices and the network to application servers, data storage, and all points in between. This control gives organizations the ability to scale, adapt, and align with changing business demands. F5 relies on MySQL to provide the performance, scalability, flexibility and cost-effectiveness that their customers require from F5 products, including:

- **F5 Big-IP Products:** Local Traffic Manager, Global Traffic Manager, Link Controller, Application Security Manager, WebAccelerator
- **Other F5 Products:** FirePass, Big IP Virtual Edition, Web Accelerator, Application Security Manager, Enterprise Manager

The Business Challenge

Just as F5 products provide insight and control over a company's infrastructure, F5's Enterprise Manager product extends that same level of control to F5 devices, enabling users to centrally manage multiple devices through a single console, cutting both complexity and cost. The Enterprise Manager appliance has over 160 customizable metrics that capture current and historic data from multiple F5 devices. With it, F5 customers gain the ability to quickly respond to changing network conditions. They also gain a lot of performance-related data. Enterprise Manager had been successfully handling these data loads using MySQL with the InnoDB engine as its transactional data store.

The Enterprise Manager development team was creating a new statistical analysis module, called Performance Monitoring Module or “PMM”, with the ability to create real-time statistical graphs. PMM would be a competitive leap ahead for Enterprise Manager and for F5, but only if it could gather thousands of new records per minute as part of a device with hardware that was limited to a single disk. With just the one disk, PMM could handle a maximum of 30 to 50 gigabytes of data and using RAID (redundant array of independent disks) as means of boosting disc I/O (input / output) was not an option. Therefore, the challenge was to find a way to get rid of old data fast enough to insert tens of millions new records daily into the complex schema of a 50 gigabyte database.

The MySQL Solution

Alternatives Considered

“Our experience using MySQL with F5 Enterprise Manager had been very good,” said Bruce Butterfield, Enterprise Development Manager, “and we wanted to use it with PMM, too.” A much earlier iteration of Enterprise Manager had used PostgreSQL but the team had decided to switch to MySQL because they had wanted to use a database backed by an established company, and those sentiments hadn’t changed.

Bruce and his team first tried addressing PMM’s data challenges with MySQL, using a very large index to locate records to delete, but that alone exhausted the lone disc’s processing power. The team also knew that this method offered no guarantee that the deletions would actually collapse and free up rows for new data.

MySQL 5.1 with Partitioning

The team had started to consider using other databases when they learned that MySQL 5.1 had support for data partitioning. With it, PMM could date and time stamp records and then use an algorithm to delete data partitioned by time-stamp interval or “age”. This greatly simplified and improved the data analytics performance and meant that whole tables of partitioned data could be deleted as opposed single records or rows at a time. Using MySQL’s MyISAM storage engine eliminated any transactional overhead, further increasing performance. Bruce and his team found their solution.



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Bruce Butterfield

Development Manager, F5

The Technical Benefits of MySQL

Performance and Scalability

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Multiple Storage Engines

The Enterprise Manager team has taken advantage of MySQL’s multiple storage engines to create a highly tailored solution. “We use the [transactional] InnoDB engine for the front to run queries and MyISAM for the backend to quickly insert data. If MySQL didn’t have partitioning, we would have built a custom storage engine to meet our needs. We liked the fact that that option [to use a custom storage engine] exists and that it is relatively easy to do with MySQL,” said Bruce.

Reliability and Quality

Bruce and his team have been pleased with MySQL’s proven reliability and quality. “We have not had one single sub-case that could be traced back to MySQL,” said Bruce. “We have also been impressed that with new releases, nothing has ever been broken – we have just seen improved features.”

Standards Support

The fact that MySQL is ACID-compliant, uses standard SQL, supports stored procedures and has a strong authorization model was critical to both Enterprise Manager and PMM. The team also valued MySQL’s foreign key support, which saved them from having to put that business logic into the application.

Administration

Bruce summed up MySQL’s administration saying, “We just don’t do a lot of it. MySQL just runs and runs as part of the appliance.” They have been especially happy with the ease of backup with MyISAM: “Simple scripting allows the system to periodically copy the data to an external data store off box.”

The Business Benefits of MySQL

New Product Module, More Competitive, New Market

“MySQL and its ability to partition data is what has made PMM possible, and PMM is what differentiates Enterprise Manager most from competing products. Now we can accommodate the needs of larger customers who have more F5 devices, with more discovered objects, in larger configurations. Without partitioning, these larger customers would have been left with a choice of either collecting all the data from a subset of devices, or collecting a subset of data from all of the devices. The result is that our customers can see utilization levels, where things are failing, and where devices are misconfigured – and through that, greatly improve their ROI,” said Bruce.

F5’s and Customers’ Needs Met

“Our overall experience with MySQL has been extremely positive. MySQL has well-designed processes that provide the capabilities we need, including partitioning. And MySQL Just runs and runs – our customers have never had to reboot.”

Bruce Butterfield

MySQL as an Embedded Database

MySQL Server is a full-featured, easy to use database that over 2000 ISVs, OEMs, and VARs rely on to make their products more competitive, bring them to market faster, and lower their COGs (cost of goods sold).

These ISV and OEM customers choose to use MySQL as an embedded database for its:

- **Low-cost**, up to 90% less than Microsoft SQL Server with features that ensure COGS remain low throughout an application's life cycle. Lower database costs allow vendors to offer their products at a fraction of the cost of competing solutions and the flexibility to appeal to more price-sensitive customers.
- **Cross Platform Flexibility** with support for over 20 platforms providing the freedom to ship products on multiple hardware and operating system combinations and into more markets.
- **High Performance, Reliability and Scalability** to meet the requirements of the most demanding applications, such as Telco and Network management, 24x7. Including a full-featured RDBMS helps to make products more competitive initially and over time as customers’ data needs inevitably increase.
- **Ease-of-Use** with fast installation, configuration and integration so developers can focus on application development, reducing costs and time to market.
- **Zero-administration**, eliminating the need for customers to hire a dedicated DBA or spend any cycles on database administration, and reducing or eliminating costly database-related support calls.

MySQL is ideally suited for:

Software Applications

- Network & Performance Management
- Monitoring Systems
- Content Management
- Healthcare & Practice Management
- Biotech
- Educational Software
- Telecommunications & VoIP

Hardware Appliances

- Networking Equipment
- Routers & Traffic Controllers
- Security Appliances
- Retail Kiosks
- Point-of-Sale (POS) Systems
- Diagnostic Instruments
- Sensory Devices

About MySQL

MySQL is the world’s most popular open source database. Many of the largest and fastest-growing organizations such as FaceBook, Google, Alcatel-Lucent, Symantec and Adobe use MySQL to save time and money powering their products, high-volume Web sites, and critical business systems. Oracle provides commercial licenses, subscriptions, and services for MySQL.

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