Ticketmaster.com Migrated from Microsoft SQL Server to MySQL and Improved Scalability by 400%

Entertainment

Database: MySQL

OS: Red Hat Enterprise Linux

Application Server: Apache

Language: Perl

Hardware: IBM x86 Machines

"We migrated the Event database from Microsoft SQL Server to MySQL for lower costs and higher scalability. Thanks to MySQL, we are able to scale 4 times better while constantly maintaining the replication latency of less than 1 second across our 250 MySQL servers."

Ed Presz
Sr. Director of Database Engineering, Ticketmaster Entertainment

Ticketmaster Overview

Ticketmaster Entertainment, Inc., based in California, USA, is the world leading event ticketing company, which provides ticket sales, ticket resale services, marketing and distribution through www.ticketmaster.com. Established in 1976, Ticketmaster has become one of the largest e-commerce sites on the Internet, and now serves more than 10,000 clients worldwide by selling tickets to consumers for live concerts, professional and college sports teams, museums and theaters. In 2008, Ticketmaster.com sold more than 141 million tickets valued at over $8.9 billion and reached over 69 million on-line members. These amazing results included Ticketmaster's exclusive ticket sales for the 2008 Beijing Olympics Games, whose ticketing activities surpassed that of all other events in the 30-year history of Ticketmaster, such as record-breaking 520,000 tickets sold in a single day and 27 million website visitors in an hour.

The Business Challenge

Ticketmaster.com had been a Microsoft shop, using many of Microsoft's products ranging from Operating Systems (Windows), Web Server (ISS Server) to Database (SQL Server). In 2001, due to the growing popularity of online sales of show and sports tickets, the demand for Ticketmaster.com began to exceed its capacity and caused stability issues. First, the website was unresponsive when the traffic was high, especially during the first few hours of high-demand ticket sales. One potential solution for this problem was building up "read" capacity by adding more read-only servers through replication. However, Microsoft SQL Server replication proved to be very challenging to support the high-traffic in Ticketmaster.com, and inconsistent data was consistently found across replicated servers. In order to make sure that Ticketmaster.com could sustain and serve more customers, the Development Engineering team decided to re-architect the entire website infrastructure, hoping that the redesign would solve the problem completely. This included a complete overhaul of the database design and operational layout by the Database Engineering team.

The MySQL Solution

Obtaining the Open Source Mindset from Citysearch

Ticketmaster Online merged with Citysearch in 1998. Citysearch.com delivered up-to-date information on businesses, from restaurants to hotels, with listings and user reviews. Citysearch was a big open-source software user and deployed the LAMP stack (Linux, Apache, MySQL and Perl/PHP) as its website platform. During the transition, the developer team from Citysearch got merged into the developer team at Ticketmaster.com and brought in the open-source mindset and experience.

Migrate the Event Database to MySQL

There were two major databases at Ticketmaster.com – the "Member" database and the "Event" database. The Member database consisted of all the member profiles and preferences, and it handled the ticket transactions as well. On the other hand, the Event database hosted all the website content, i.e. the details for all the events, including concerts, performing arts and sports games.

Due to the nature of the data, the Event database had the following characteristics: high reads, low updates during busy sale times, and a fairly static database size as new events came in and old events played off. In addition, the database had to replicate very fast while maintaining data integrity to meet the high demand of the website traffic.

Given those requirements, Ticketmaster.com evaluated many databases and decided to move from Microsoft SQL Server to MySQL version 3.23 in 2001 for the following reasons:

- **Low cost:** MySQL is much more cost-effective than proprietary databases
- **High scalability:** MySQL replication is very easy to set up and it replicates data reliably with very low latency
- **High performance:** MySQL excels in read-intensive applications and the response time is lightening fast
- **Ease of implementation:** MySQL gains its popularity and huge installed base for its ease of use. With its clear documentation, even the SQL Server DBAs can start managing MySQL servers easily
- **Leveraging existing skill-set:** developers coming from the Citysearch group had expertise and experience deploying MySQL and InnoDB, so the functionality that Ticketmaster.com required, such as row-level locking and referential integrity, could be implemented quickly

Ticketmaster spent approximately six months migrating the Event database from Microsoft SQL Server to MySQL. The whole process included planning, developing new scripts, re-designing the database schema, and finally converting the database. The initial database conversion itself only took the DBA team two weeks and it was a straightforward process.

Prior to putting MySQL into production, Ticketmaster designed a comprehensive performance testing plan to make sure that MySQL could perform above and beyond the previous database. After completing the benchmarks, the team was extremely satisfied by both the data consistency and the fast response time MySQL delivers.

"MySQL's capability to read fast is critical for Ticketmaster.com, especially during high traffic ticket sales. Without MySQL, we would not be able to sell a single ticket on Ticketmaster.com."

Ed Presz
Sr. Director of Database Engineering, Ticketmaster Entertainment

To benefit from the latest features MySQL offers, the Database team at Ticketmaster has upgraded the MySQL-based Event database twice in the past few years, including an upgrade from MySQL version 3.23 to version 4.0 in 2004 and later to MySQL version 5.0 in 2008. Also, Ticketmaster primarily uses the InnoDB database engine, while deploying MyISAM tables in certain situations such as full-text searching and bulletin board software.

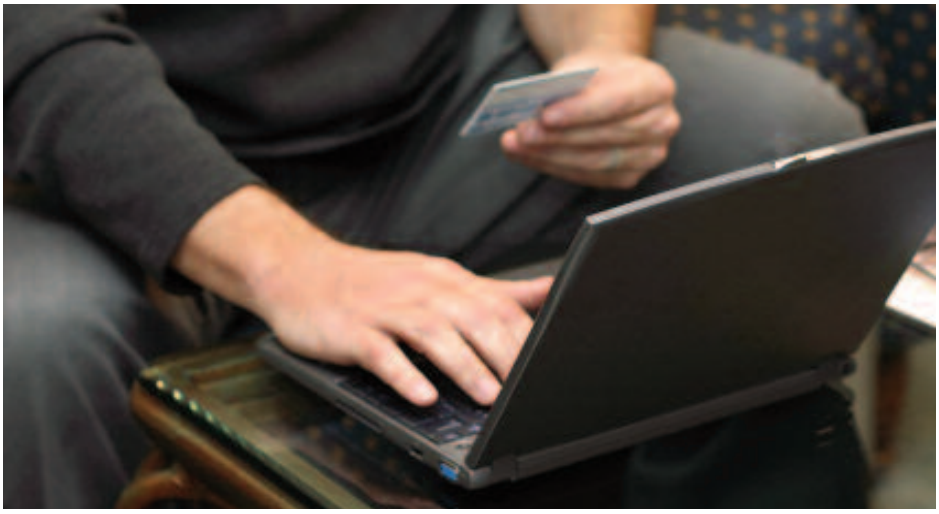
In 2008, six years after the MySQL migration, Ticketmaster.com hosts ticket sales for 120,000 events and 24,000 venues, a 400% increase compared to pre-migration days in 2001. It is MySQL that enables Ticketmaster.com to achieve the 4x scalability, while maintaining the average replication time of less than one second consistently.

More MySQL Deployments at Ticketmaster.com

In addition to the Event database, MySQL also performs other duties at Ticketmaster.com, including:

- **The Branding Database** which provides customized content and layout on the website, i.e. the unique look-and-feel, for major brands. For example, the Los Angeles Dodgers ticket-selling page looks more like its official website and its web pages on MLB.com than a regular Ticketmaster.com page.
- **The Delivery Database** that offers "TicketFast" service. TicketFast allows people who purchase tickets from Ticketmaster.com to simply print out the tickets at home, which is more convenient, flexible and cost-effective compared to the traditional way of receiving tickets via mail.
- **The Seating Chart Database** that provides state-of-art seating information for venues across the globe. Ticketmaster is currently in the process of rolling out new venue seat maps that allow ticket buyers to go to the specific section/seat level to choose the seats they want. All this layout information including images and files is stored in MySQL.

Among the three deployments, the Delivery Database was migrated from Microsoft SQL Server to MySQL, with a total conversion time of 2 months, while the Branding Database and Seating Chart Database were built from the ground up on MySQL.



Another recent development at Ticketmaster is using MySQL to scale out some key Oracle databases to provide fast, read-only reporting environments. This involved implementing third party software, GoldenGate, to replicate between Oracle and MySQL. The goal for this project is to leverage the strength of MySQL replication to off-load production reporting from Oracle and provide read-only environments across the globe.

Currently, Ticketmaster.com has six data centers around the world, including three in the USA, two in the UK and one in China, with over 250 MySQL servers in total. The global distribution of the data centers not only supports local transactions better, but the distributed team also offers 24x7 around-the-clock coverage for all the data centers. Plus, Ticketmaster.com implements multiple MySQL replication topologies for different purposes. Master-Master replication is deployed for high availability, Master-Slave replication achieves scalability, and Master-Slave chain replication is also used in some situations.

Conclusion

For Ticketmaster.com, the overall experience of migrating from Microsoft SQL Server to MySQL is beyond satisfactory. The original concern of using an open-source software faded away with the performance and scalability MySQL offers. The replication between the three data centers in the USA, including Los Angeles, CA, Phoenix, AZ, and Ashburn, VA, is nearly real-time, and the replication between the US and the UK data centers is also seamless. This high performance allows Ticketmaster.com to keep adding more servers and expanding its website capacity easily, with no worries about the latency. Furthermore, the Microsoft SQL Server and Oracle DBAs also made the transition to MySQL smoothly and quickly.

For MySQL's high performance, scalability, cost effectiveness, and ease of use, Ticketmaster.com has selected MySQL as the preferred database. Not only migrating more databases to MySQL and building new applications on it, Ticketmaster also chooses MySQL over other databases for 3rd-party applications.

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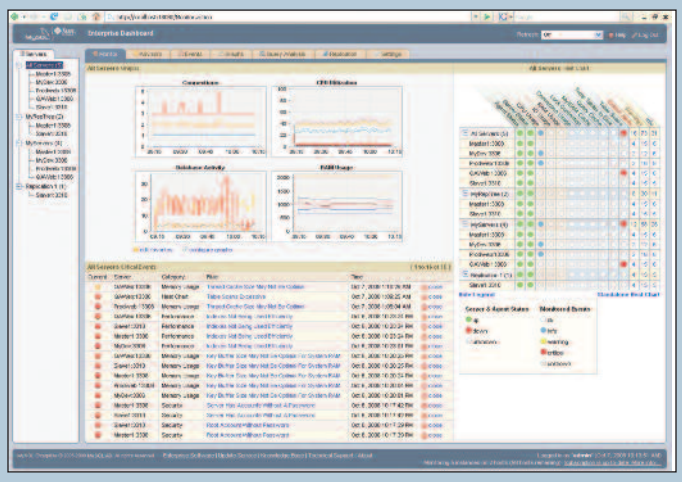

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About MySQL

MySQL is the world's most popular open source database software. Many of the world's largest and fastest-growing organizations use MySQL to save time and money powering their high-volume Web sites, business-critical systems and packaged software – including industry leaders such as Yahoo!, Google, Alcatel-Lucent, YouTube and Zappos.com.

For more information about MySQL, please go to **www.mysql.com/enterprise**

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