# A Guide to MySQL
# for Microsoft Windows

A MySQL® White Paper

**July 2009**

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# Executive Summary

For many years, Microsoft Windows has been the most popular development platform and second most popular production platform for organizations developing MySQL applications. In early 2009 we conducted our annual survey and what we found is that 66% percent of those surveyed used Windows for development and 48% ultimately deployed into production on Windows. For some, this fact may come as a surprise given MySQL's ubiquity as the "M" in the open source Linux, Apache, PHP, Perl and Python (LAMP) stack. However, as we will discover over the course of this paper, MySQL on Windows continues to be a popular choice for independent software vendors, original equipment manufacturers, hosting providers and organizations developing custom web, departmental and enterprise applications.

# Why MySQL on Microsoft Windows?

The popularity of MySQL on Windows remains strong due to the fact that MySQL delivers:

- Lower TCO
- Ease of use
- Reliability
- Performance
- Fully featured database with no functional limitations

Another metric for judging the popularity of MySQL on Windows is to look at the average number of downloads for the MySQL server, tools and connectors for Windows from mysql.com. This number roughly averaged an astonishing 45,000 per day during the first six months of 2009. Finally, in Gartner's recent "Market Share: Relational Database Management System Software by Operating System, Worldwide, 2008" report they found that the growth for RDBMS running on Windows Server grew in 2007-2008 by 17.5%.

# Easy to Deploy

### Minimal Requirements

MySQL supports all the current Windows versions from Microsoft with minimal additional requirements concerning software, hardware, storage or networking. Specifically, you can run MySQL on Windows XP, Windows Vista, Windows Server 2003 and Windows Server 2008. In general, you will need to install MySQL with Administrator privileges, but the MySQL process can run afterwards without any special administrative privileges. Many administrators also choose to run MySQL as a service so that it can be easily stopped and started using the Windows Service Control Manager. The MySQL Administrator tool comes with a Windows Systray application from which you can start, configure and perform other administrative tasks on your MySQL instance. Finally, you will need TCP/IP support, as well as, sufficient local memory and storage to install and run your database.
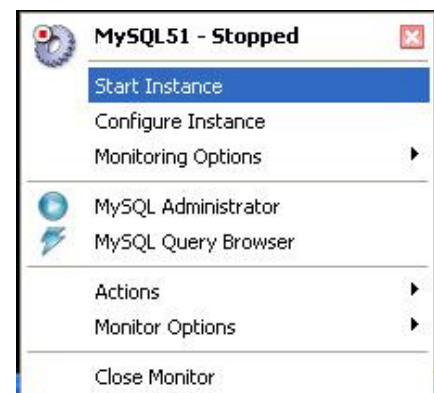


Figure 1: MySQL Systray

## *Easy Installation*

Getting started with MySQL on Windows is a very straight forward process. Unless you require an advanced or customized configuration of MySQL, the wizard driven Automated Installer will get you up and running on Windows in just a couple of minutes. The MySQL for Windows MSI packages can be downloaded from:

http://dev.mysql.com/downloads/.

We should also point out that it is very easy to install and run multiple versions or instances of MySQL on a single box. To run multiple instances, you only need assign each instance a different port to run on, as well as, a unique service name. Managing different versions and instances is very easy and done through either MySQL-supplied interfaces or the standard Windows service manager.
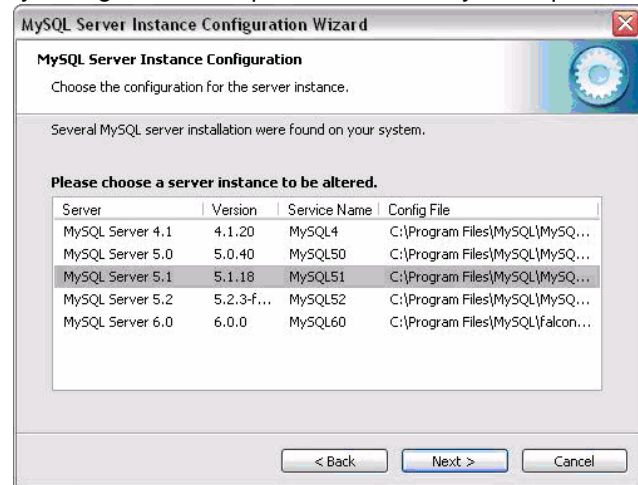


*Figure 2: MySQL Server Instance Configuration Wizard*

For a step-by-step guide on installing MySQL on Windows, please visit:

http://www.mysql.com/why-mysql/white-papers/visual_guide_to_installing_mysql_windows.php

# Easy to Develop

## *MySQL Workbench – Visual Database Design*

It should come as no surprise that our survey this year found MySQL Workbench to be the most popular data modeling tool to use with MySQL on Windows. MySQL Workbench enables a DBA, developer, or data architect to visually design, generate, and manage all types of databases including Web, OLTP, and data warehouse databases. It includes everything a data modeler needs for creating complex ER models, and also delivers key features for performing difficult change management and documentation tasks that normally require much time and effort.
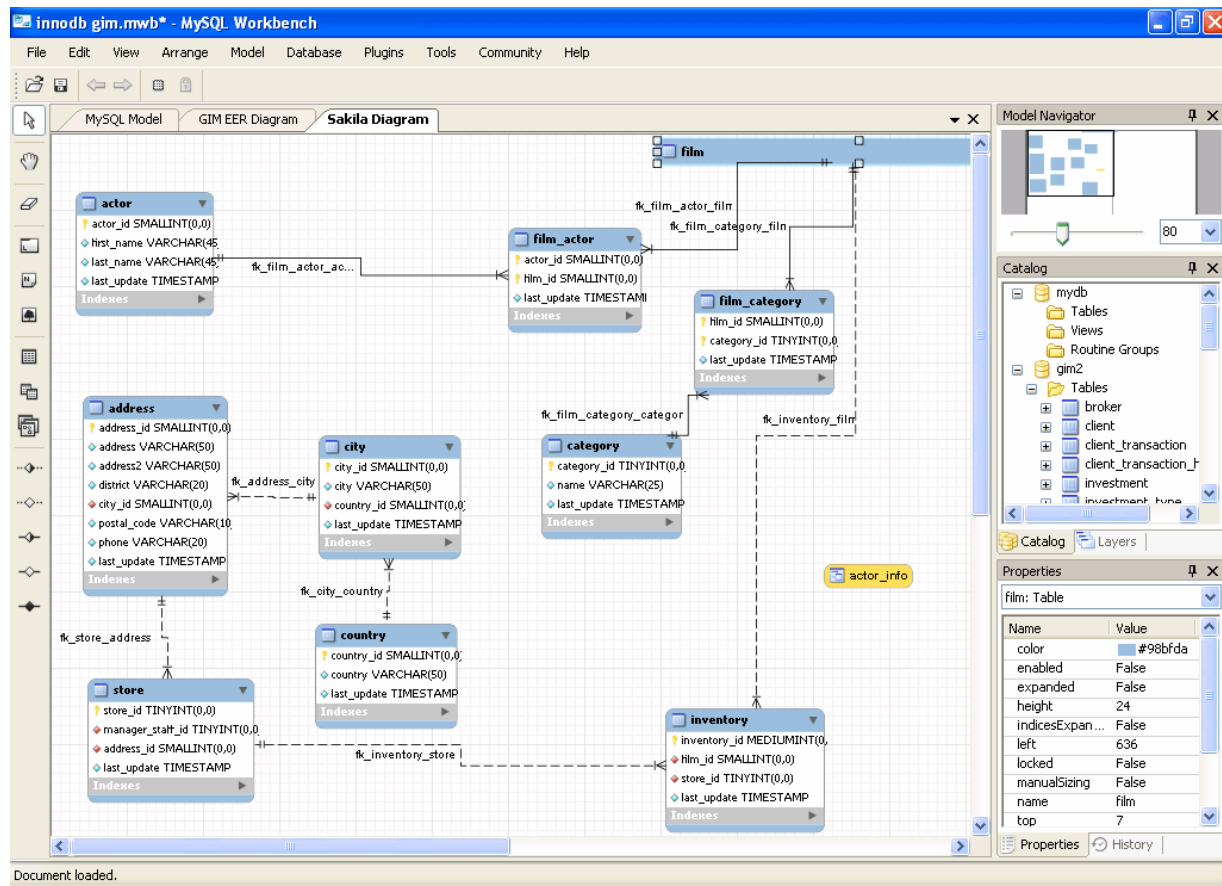
Figure 3: MySQL Workbench

## Visual Database Design

MySQL Workbench simplifies database design and maintenance, automates time-consuming and error-prone tasks, and improves communication among DBA and developer teams. It enables data architects to visualize requirements, communicate with stakeholders, and resolve design issues before a major investment of time and resources is made. It enables model-driven database design, which is the most efficient methodology for creating valid and well-performing databases, while providing the flexibility to respond to evolving business requirements. Model and Schema Validation utilities enforce best practice standards for data modeling, also enforce MySQL-specific physical design standards so no mistakes are made when building new ER diagrams or generating physical MySQL databases.

## Forward and Reverse Engineering

MySQL Workbench provides capabilities for forward engineering of physical database designs. A visual data model can easily be transformed into a physical database on a target MySQL Server with just a few mouse clicks. All SQL code is automatically generated and runs right the first time, which eliminates the normal error-prone process of manually writing complex SQL code. MySQL Workbench also enables you to reverse engineer an existing database or packaged application to get better insight into its database design. Not only can MySQL Workbench forward and reverse engineer existing databases, but it can also import SQL scripts to build models and export models to DDL scripts that can be run at a later time.

**Change Management**

Database change management is a difficult and complex process, which involves maintaining different versions of database schemas and manually modifying existing databases. To help DBAs and developers with change management, MySQL Workbench includes Schema Synchronization and Comparison utilities. A DBA can compare two live databases or a model and a live database and visually see the differences, and also perform a synchronization between a model and a live database or vice versa. Database Documentation

Documenting database designs can be a time-consuming process. MySQL Workbench includes DBDoc that enables a DBA or developer to deliver point-and-click database documentation. Models can be documented in either HTML or plain text format, and includes all the objects and models in a current MySQL Workbench session.

MySQL Workbench is offered in the following Editions:

- **MySQL Workbench Community Edition** — provided under the open source GPL license.
- **MySQL Workbench Standard Edition** — available as a paid annual subscription. It includes additional features that improve developer and DBA productivity.

MySQL Workbench Standard Edition can be purchased online at http://shop.mysql.com

It also bears to note that the newest version of MySQL Workbench, version 5.2 will contain many exciting features, including all the functionality of the previously released MySQL Query Browser. This includes live database querying functionality which will grow to a fully featured SQL IDE.

For more information on what's new in MySQL Workbench 5.2, please visit:

http://dev.mysql.com/workbench/?p=83


## MySQL Connectors


MySQL offers standard database driver connectivity for using MySQL with applications and tools that are compatible with industry standards ODBC and JDBC. This enables MySQL to work easily with standard development tools on Windows, Linux, Macintosh and Unix platforms. Any system that works with ODBC or JDBC can use MySQL. MySQL offers a variety of standardized database drivers regardless of the language choice for your application.

- **Connector/ODBC:** for Windows, Linux, Mac OS X, and Unix platforms.
- **Connector/J:** for Java platforms and development.
- **Connector/Net:** for .NET platforms and development.
- **Connector/MXJ:** MBean for embedding the MySQL server in Java applications.
- **Connector/C++:** for C++ development.
- **Connector/C (libmysql):** A client library for C development
- **MySQL native driver for PHP - mysqlnd:** The MySQL native driver for PHP is an additional, alternative way to connect from PHP 6 to the MySQL Server 4.1 or newer.

Of special interest for organizations developing applications using Microsoft's .Net, we offer **Connector/Net 6.0** which is the latest release of MySQL's fully managed ADO.Net provider to date.

This release contains some exciting features and improvements over previous versions:

- Significant speedups. In many areas, the connector now matches or surpasses the native C

connector.
- Added UDF schema collection
- Better SQL and stored procedure tokenizing. Now all comment types are supported.
- Initial Entity Framework support

Also the Visual Studio integration has been completely overhauled yielding more features in a smaller package. Some of the new features include the following:

- Use of the traditional SQL Server buttons for keys, indexes, etc.
- Ability to generate a change script
- Use of Visual Studio's code editor which includes window splitting and syntax highlighting

# Easy to Manage and Monitor

## MySQL Enterprise Monitor

The MySQL Enterprise Monitor continuously monitors your MySQL servers (running on Windows or any other any other supported platform) and alerts you to potential problems before they impact your system. It's like having a "Virtual DBA Assistant" at your side to recommend best practices to eliminate security vulnerabilities, improve replication, optimize performance and more. As a result, the productivity of your developers, DBAs and System Administrators is improved significantly.
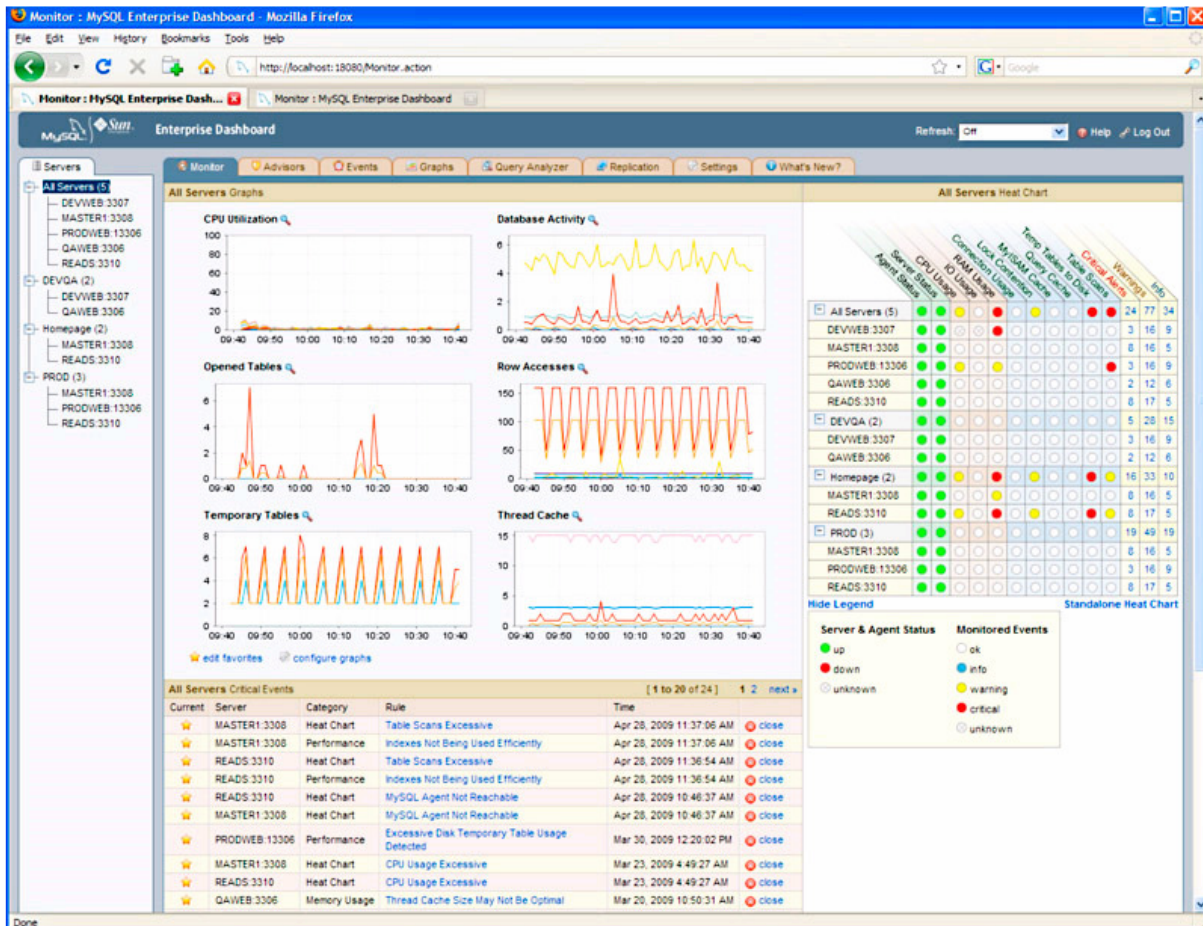
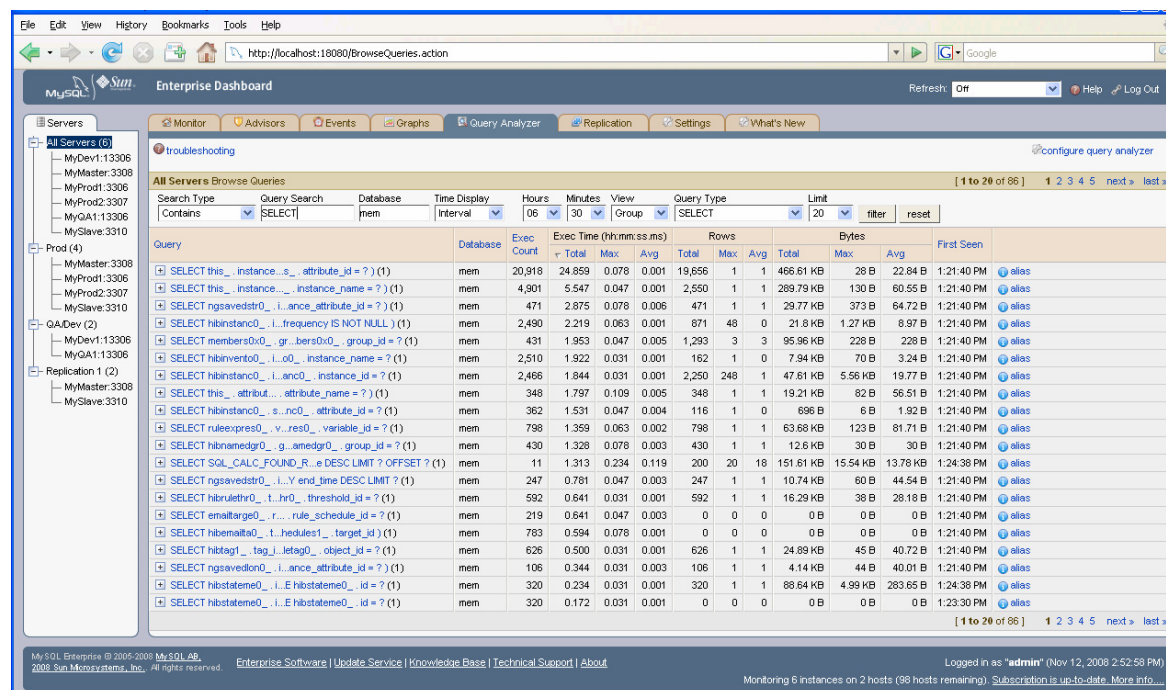*Figure 4: MySQL Enterprise Monitor*

MySQL Enterprise Monitor provides you with the following benefits:

- Get a consolidated view into the health of all your MySQL servers
- Monitor over 600 MySQL and operating system variables with the Enterprise Dashboard
- Monitor MySQL sessions, connections, replication latency and more with 20+ graphs
- Improve application performance with the MySQL Query Analyzer
- Gain immediate visibility into your replication topologies through auto detection and grouping
- View real time master/slave performance using the MySQL Replication Monitor
- Customize the MySQL Enterprise Monitor for your specific needs using customization options
- Get notified of issues before they become costly outages using threshold driven alerts

The MySQL Enterprise Monitor is a distributed web application that is deployed within the safety of your firewall. It is comprised of a centralized Service Manager and lightweight Service Agent this is installed on each monitored MySQL server.

## MySQL Query Analyzer

The MySQL Query Analyzer helps you improve application performance by monitoring query performance and accurately pinpointing SQL code that is causing a slow down. Queries are presented in an aggregated view across all MySQL servers so you can analyze your most expensive code by total executions, total run time, total data size and by using drill downs into sampled executions and EXPLAIN results. With the MySQL Query Analyzer, you can improve the SQL code during active development, and continuously monitor and tune the queries in production.



*Figure 5: MySQL Query Analyzer*

MySQL Query Analyzer provides you with the following benefits:

- Continuously monitor queries running against all your MySQL Servers
- Quickly identify problem queries that impact the throughput of your applications
- View query details in drill down panels to analyze the root cause for performance degradation
- Fine-tune the problematic SQL code to regain peak performance

The MySQL Query Analyzer saves you time and effort in finding and fixing problem queries by providing:

- Aggregated view into query execution counts, run time, result sets across all MySQL servers with no dependence on MySQL logs or SHOW PROCESSLIST
- Sortable views by all monitored statistics
- Searchable and sortable queries by query type, content, server, database, date/time, interval range, and "when first seen"
- Historical and real-time analysis of all queries across all servers
- Drill downs into sampled query execution statistics, fully qualified with variable substitutions, and EXPLAIN results

# Why MySQL Over Microsoft Office Access 2007?

Microsoft Office Access 2007 is a lightweight RDBMS which combines a database with a graphical front end. Microsoft Access is designed for use by non-programmers to build simple applications, which will inherit some limitations that make it impractical for many organizations when compared to MySQL. Specifically for online Web applications, Access is a poor choice as its forms and reports only work on Windows. Therefore, it isn't fair to compare it to an application written in .NET or Java. Also, Access does not provide the scalability and multi-user functionality for applications that need to reach beyond the desktop. At the core of the Access is database is the Access Jet database, which is a file based system. The limitations of Microsoft Office Access are thoroughly described on Microsoft's Access Team Blog at:

http://blogs.msdn.com/access/archive/2006/06/05/access-2007-limits.aspx

Below are a few some reasons to consider deploying MySQL over Access:

- MySQL is a proven, scalable choice for web applications
- You expect your database to be accessible by multiple applications
- You require more interoperability in connectivity between other software components
- You expect to have to support a large number of clients
- Your database will be over 2 GB
- You need excellent performance characteristics
- You require a more robust database security model
- You require cross-platform capabilities
- You need a cost-effective, fully functional database server without artificial restrictions

## *Concurrency*

In general, 255 connections is the functional limit of Access, however, given other factors like the design of the database and resources available, this number can be significantly lower. The maximum number of connections MySQL can support depends on the quality of the thread library on a given platform, on the available RAM and workload characteristics of the application. You should be able to support hundreds more connections with MySQL on Windows.

### File Size Limitations

Currently, Access file sizes are limited to 2 GB. This 2 GB allocation includes all the objects in the database (data, forms, reports, indices, macros, modules, etc.) MySQL itself does not impose any limitations regarding file or database size on Windows.

### Performance

Although there are no head to head benchmarks comparing Microsoft Office Access 2007 and MySQL, the argument can be made that overall MySQL will deliver more scalability and performance based on standalone and comparative benchmarks which show MySQL outperforming many proprietary enterprise edition databases. For example, some published benchmarks include:

- MySQL 5.4 - Up To 90% Faster Query Response Times and Scalability Up to 16-way x86 Servers and 64-way CMT Servers
- MySQL/Sun sets World Record SPECJ Benchmark

These and other benchmarks can be accessed at:

http://www.mysql.com/why-mysql/benchmarks/

# Why MySQL Over SQL Server Express 2008?

Similar to Microsoft Office Access 2007, SQL Server Express is considered an entry level database, aimed at students and for ISV redistribution, yet imposes a variety of technical and licensing limitations you won't find with MySQL. For a complete list of these limitations please visit:

http://www.microsoft.com/sqlserver/2008/en/us/editions-compare.aspx

Below are some key limitations to consider:

### CPUs

1 CPU socket is the maximum supported of SQL Server Express 2008. MySQL has the capability to scale efficiently on 16-way and 64-way systems depending on the chip design.

### Maximum Memory

SQL Server Express 2008 can only address up to 1 GB of RAM. MySQL imposes no such limitation and instead works within the capabilities of the operating system. This means more memory allocation can be made available for connections plus buffers and caches, which means a more responsive database.

### Database Size

SQL Server Express 2008 imposes a limit of 4 GB of user data per database. MySQL imposes no such limitation and can scale to support multi-terabyte configurations.

### Query Analysis - Profiler

The SQL Profiler is not supported by SQL Server Express. As previously discussed, the MySQL Enterprise Monitor has built-in query analysis capabilities via the MySQL Query Analyzer.

### Job Management

SQL Server Express does not support the SQL Server Agent. MySQL natively supports an Event Scheduler as of version 5.1. For more info, please visit:

http://dev.mysql.com/doc/refman/5.1/en/events.html

### Replication

SQL Server Express 2008 offers replication only as a subscriber. MySQL supports both master and slave configurations straight out of the box at no additional cost or limitation.

### Partitioning

SQL Server Express 2008 does not support table partitioning. MySQL 5.1 supports a variety of data partitioning schemes. For more information, please visit:

http://dev.mysql.com/doc/refman/5.1/en/partitioning.html

# Why MySQL Over SQL Server Enterprise Edition?

If you recall, MySQL's three priorities are reliability, performance, and ease-of use, with features only being added when they will strengthen those priorities. That is not to say that at times various esoteric database features will be necessary for an application, but those times are often the exception rather than the rule. For sample of how MySQL stacks up to SQL Server (latest versions of both) from a feature standpoint plus migration strategies, please visit these two resources:

**Why Move To MySQL From Microsoft SQL Server?**
http://dev.mysql.com/tech-resources/articles/move_from_microsoft_SQL_Server.html

**A Practical Guide for Migrating From Microsoft SQL Server to MySQL**
http://www.mysql.com/why-mysql/white-papers/mysql_wp_mssql2mysql.php

# Lower TCO than Microsoft SQL Server 2008

Organizations such as Cox Communications, NASA, Zappos.com and Ticketmaster.com have improved database reliability, performance and TCO using MySQL over proprietary databases.

MySQL reduces the Total Cost of Ownership (TCO) of database software on Windows by:

- Reducing database licensing costs by over 90%
- Cutting systems downtime by 60%
- Lowering hardware expenditure by 70%

- Reducing administration, engineering and support costs by up to 50%

## Comparing Database License Costs
## 3 Year Database TCO
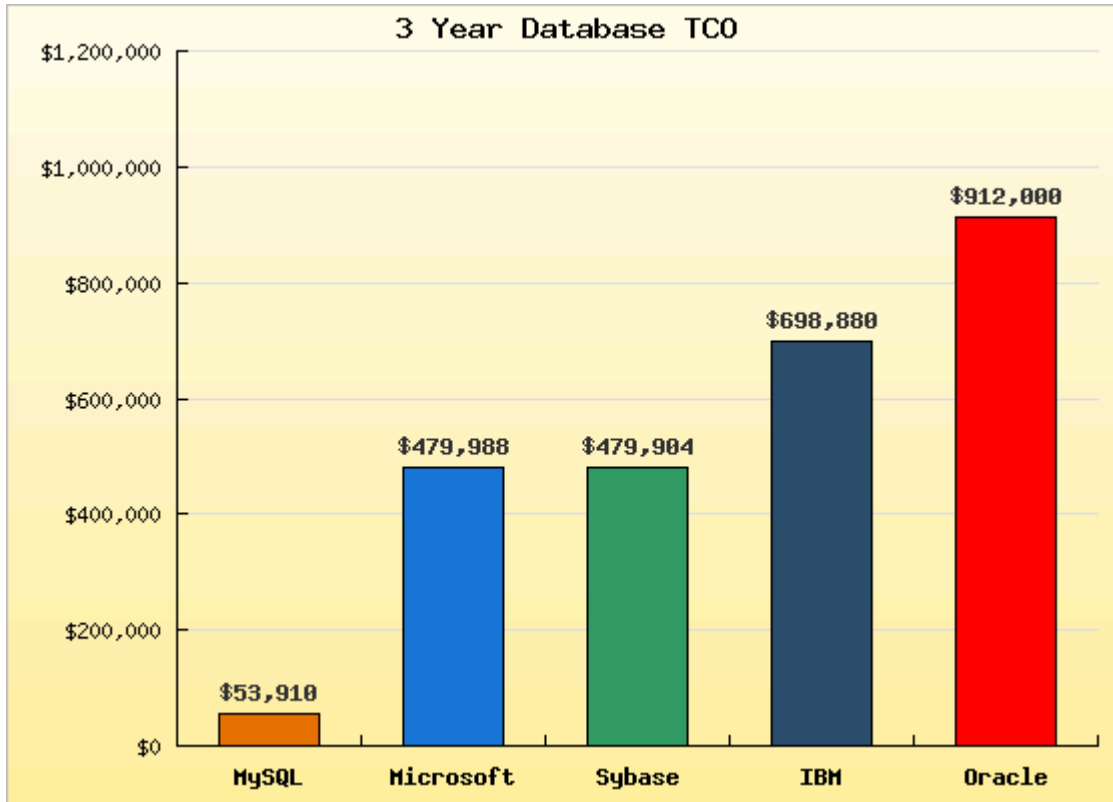


*Figure 6: Example TCO Calculation*

You can calculate your Database TCO Savings using the TCO Calculator at:

http://www.mysql.com/tco/

The TCO Calculator allows you to:

- Define your system configuration such as Database Servers, CPUs, and CPU Cores
- Choose the Database products to compare
- Select the support term

In the default example, your organization can save over $400,000 in three years when comparing MySQL Enterprise Gold with SQL Server Enterprise Edition.

# MySQL on Windows Case Studies

## *Adobe Relies on MySQL to Make Creative Professionals More Productive*

Adobe Systems is one of the largest software companies and is the leading provider of creative tools for print, web, interactive, mobile, video and film. Adobe embeds MySQL into several Adobe Creative Suite 3 components, including Adobe Acrobat CS3, Adobe® Bridge CS3, and Adobe® Version Cue® CS3 so that workgroups can work more efficiently on complex projects. For more information please visit:

http://www.mysql.com/why-mysql/case-studies/MySQL_CaseStudy_Adobe.pdf

## *NetQoS Delivers Distributed Network Management Solution with Embedded MySQL*

NetQoS delivers products and services that enable some of the world's most demanding enterprises to improve network performance. American Express, Barclays, Boeing, Chevron, Cisco, Citrix, DuPont, Sara Lee, and Schlumberger are among the corporations that rely on NetQoS performance management solutions to ensure consistent delivery of business critical applications, monitor application service levels, troubleshoot problems quickly, contain infrastructure costs, and manage user expectations. To find the right embedded database solution to fit its innovative product architecture, NetQoS evaluated everything from flat-files to proprietary databases. NetQoS found that MySQL provided the ideal combination of performance, reliability, and ease of administration on Windows. For more information please visit:

http://www.mysql.com/why-mysql/case-studies/mysql-netqos-casestudy.pdf

For a complete list of case studies and other resources concerning organizations making use of MySQL on Windows, please visit:

http://www.mysql.com/customers/operatingsystem/?id=109

# Conclusion

Windows remains a very popular MySQL development and production platform for ISVs, OEMs and organizations looking to lower the costs associated with developing and deploying databases. In this paper we covered a few of the benefits of choosing MySQL over proprietary databases on the Windows platform. We covered a variety of tools and the interoperability native to MySQL which makes it easy to develop and deploy against. We also looked at how a subscription to MySQL Enterprise can assist in the ongoing management and monitoring of your MySQL Servers. Finally, we looked how MySQL does not impose any functional limitations on the database, ensuring that as your business and technical needs grow, MySQL will be able to scale to meet those needs accordingly.

# Resources

## *White Papers*

http://www.mysql.com/why-mysql/white-papers/

### Case Studies

http://www.mysql.com/why-mysql/case-studies/

### Press Releases, News and Events

http://www.mysql.com/news-and-events/

### Live Webinars

http://www.mysql.com/news-and-events/web-seminars/

### Webinars on Demand

http://www.mysql.com/news-and-events/on-demand-webinars/


# About  MySQL

MySQL is the most popular open source database software in the world. Many of the world's largest and fastest-growing organizations use MySQL to save time and money powering their high-volume Web sites, critical business systems and packaged software -- including industry leaders such as Yahoo!, Alcatel-Lucent, Google, Nokia, YouTube and Zappos.com. At http://www.mysql.com, Sun provides corporate users with commercial subscriptions and services, and actively supports the large MySQL open source developer community.

To discover how Sun's offerings can help you harness the power of next-generation Web capabilities, please visit http://www.sun.com/web.