

MySQL:

Introduction

Features

Benefits

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Introduction

Relational Database Management System

Outcome of Open Source and Free Software

Free

Widely used - Information Systems/embedded systems

Primarily written in C/C++

Available for Linux, Solaris, MS Windows and other Operating Systems

Introduction

Client – Server architecture

MySQL Server

MySQL Client- command line, desktop applications, web applications

A bit of History

Named after co-founder Monty Widenius's daughter, My

mSQL- tweaks and hacks to form MySQL

MySQL AB, now a subsidiary of Sun Microsystems, which holds the copyright to most of the codebase

“AB” part of the company name is the acronym for the Swedish “aktiebolag,” or “stock company”

A bit of History

The name of the MySQL Dolphin (MySQL logo) is “Sakila,” which was chosen by the founders of MySQL AB from a huge list of names suggested by users in their “Name the Dolphin” contest

MySQL Features and Architecture

MySQL: Features

Speed

Multi-threaded architecture: Multiple clients have concurrent access

Query Cache: Cache the results of common queries

Reliability

Ease of use

Command line interface

Graphical tools- Desktop/ Web based

MySQL: Features

Multi-User support

Multiple clients have concurrent access to one (or more) databases simultaneously

Powerful and flexible user privilege system

User and host-based authentication schemes

Scalability

Databases containing 50 million records!

Businesses- Yahoo!, NASA, Google.com

MySQL: Features

Portability

Unix/ Non-Unix: Linux, Solaris, Windows..
Intel x86, Alpha, SPARC, PowerPC

Standards Compliance

MySQL operates in different modes that comply to different SQL standards

Modes: Server SQL modes define what SQL syntax MySQL should support and what kind of data validation checks it should perform

FAQ:

<http://dev.mysql.com/doc/refman/5.0/en/faqs-sql-modes.html>

MySQL: Features

Internationalization

Support for various languages and character sets

Wide Application support

MySQL database driven applications for the Desktop and Web

APIs for: C/C++, Java, PHP, Perl, R
Python...

MySQL: Features

Stored Programs

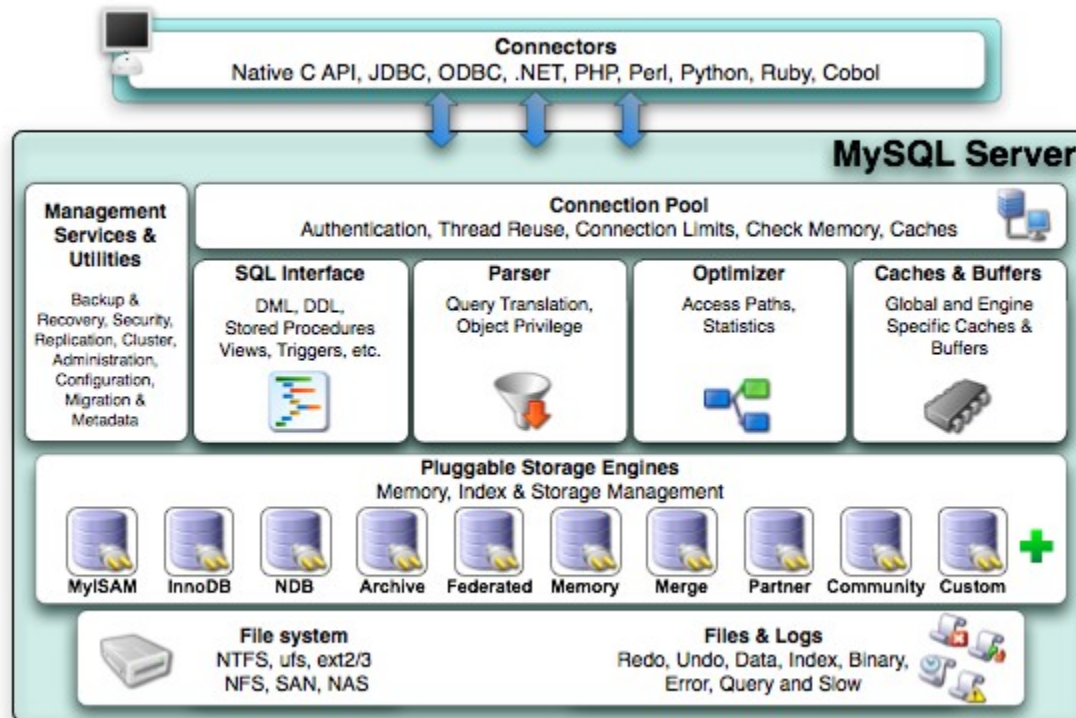
Stored Procedures and functions

Triggers

Views

Event Scheduler

Architecture of MySQL



Architecture of MySQL

Primary Subsystems

Query Engine

- Syntax parser

- Query Optimizer

- Query Cache

- Execution component

Transaction Manager

Buffer manager

Management and Service utilities

Storage Engine

MySQL Storage Engines

Storage Engine: Writes the data to persistent storage

Unique feature of MySQL: Pluggable storage engines

What does this mean?

Level of abstraction between the storage devices / formats and the rest of the MySQL server architecture- lowest layer of the MySQL server

Since it is pluggable, it allows the storage engine to be dynamically loaded/changed at runtime

MySQL Storage Engines

MyISAM

CSV

HEAP

InnoDB

Falcon

Cluster

.

. < *Your own storage engine* >

MySQL Architecture Internals

Kernel threads (if OS supports) and multiple processors, if available

Thread based memory allocation system

Temporary tables- Virtual tables, tables from nested SQL queries are implemented using in-memory hash tables

Installation and Getting Started

Windows, Linux, Solaris

MySQL Downloads

The world's most popular open source database

[Contact a MySQL Representative](#)
[Login](#) | [Register](#)

[MySQL.com](#)
[Developer Zone](#)
[Partners & Solutions](#)
[Customer Login](#)

MySQL Community Server

MySQL Proxy

MySQL Cluster

MySQL Workbench

GUI Tools

Connectors

Previews

Archives

Mirrors

MySQL Downloads

For users or organizations looking to maintain their own solutions. I have:	For businesses, public sector institutions and users looking for the highest reliability in software and services. I desire:
My own method of keeping my systems up to date and am comfortable upgrading and configuring MySQL.	Automated notifications and predictable releases of well-tested updates and upgrades.
Time to monitor and adjust the MySQL settings that will tune, scale and maintain performance.	Proactive, visual notification and advice on maintaining optimal performance.
Experience with database security so that I know when a security breach has occurred.	Continuous monitoring of systems so that I can be alerted to unplanned security changes and vulnerabilities.
Experience designing, setting-up and monitoring the status of MySQL replication.	Replication status monitoring so that I can improve replication design and performance.
Time to identify and resolve technical issues for myself and others.	Fast resolution and committed response times to avoid loss of revenue or critical application access.
Time to design and tune application code, database schemas and dynamic queries for optimal performance.	Access to the most experienced technicians available to resolve my issues quickly.
<i>Take me to the community downloads!</i>	<i>Starting at \$595/server/year Tell me more or Buy Now!</i>

MySQL Community Server

Download »

MySQL Enterprise

Learn More »

30-day Trial »

When it comes to using MySQL, you have choices. Use this grid to help you determine which version [best meets your needs.](#)

Important Platform Support Updates »

MySQL Community Server

Current Release (Recommended)
MySQL 5.0—Generally Available (GA) release for production use

Quick Jump

- ▶ [MySQL Community Server](#)
- ▶ [MySQL Cluster](#)
- ▶ [MySQL Workbench](#)
- ▶ [MySQL Tools](#)
- ▶ [MySQL Proxy](#)
- ▶ [Drivers and Connectors](#)

NetBeans IDE 6.1 with Glassfish and

Community Server V\$ Enterprise

- Free
 - No professional support
 - Ideal for Individual users-developers/students/business having more time than money
- Paid
 - Professional support
 - Ideal for business with more money than time

MySQL Versions

Current Release (Recommended)

MySQL 5.0—Generally Available (GA)
release for production use

Here, I am using MySQL 5.0.67

Upcoming Releases

MySQL 5.1 — Release Candidate release,
Test new features early!

MySQL 6.0 — Alpha

MySQL Maria Preview

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

Installing MySQL on Windows

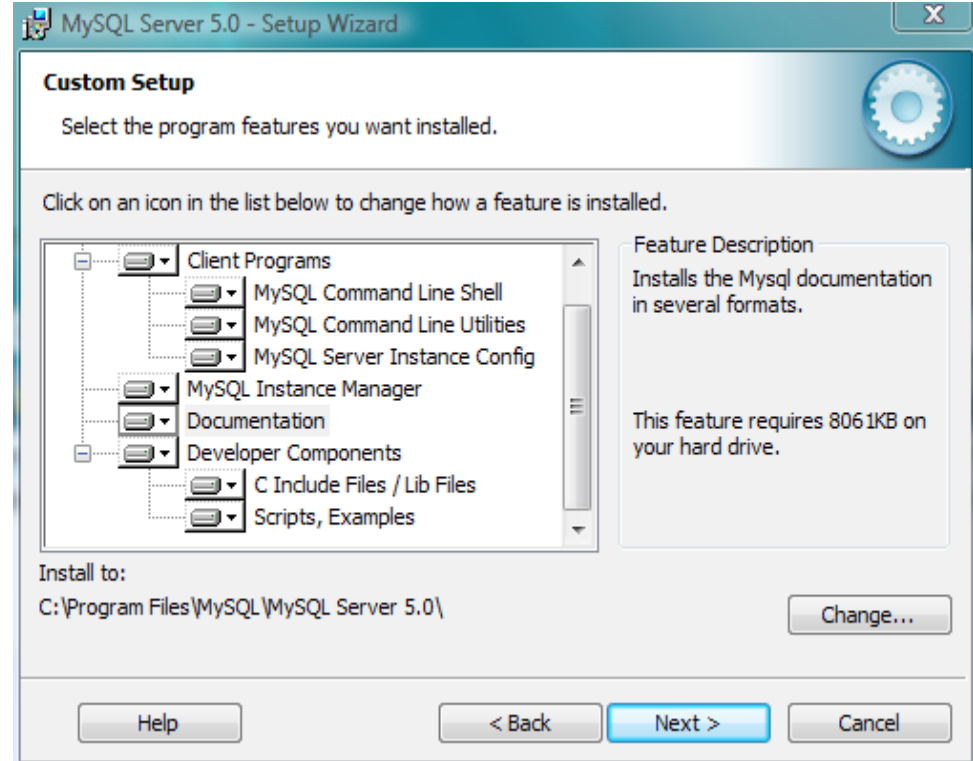
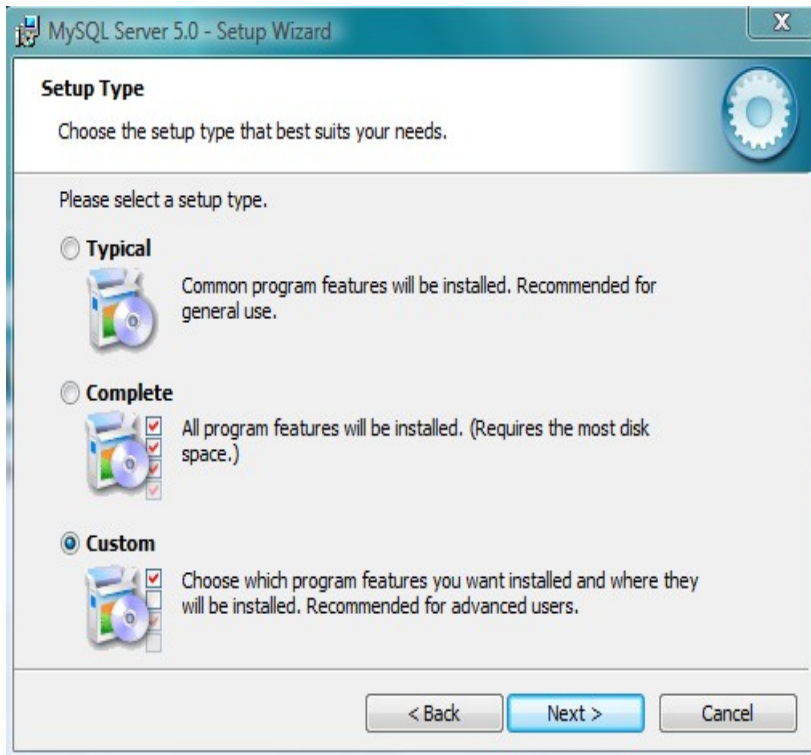
Installing MySQL Server

Download the MySQL installer (Windows ZIP/Setup.EXE, 32/64-bit) from
<http://dev.mysql.com/downloads/mysql/5.0.html#downloads>

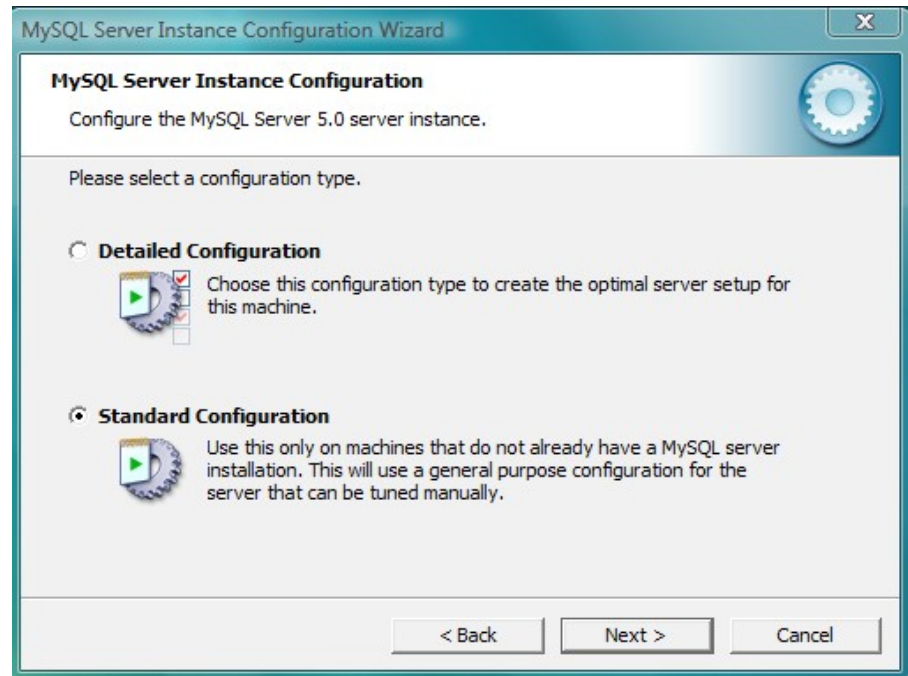
Unzip the file

Start the installer- run setup.exe

Installing MySQL on Windows



Configuring MySQL Server



Configuring MySQL Server


MySQL Server Instance Configuration Wizard

MySQL Server Instance Configuration

Configure the MySQL Server 5.0 server instance.

Please set the Windows options.


Install As Windows Service

 This is the recommended way to run the MySQL server on Windows.

Service Name:

Launch the MySQL Server automatically

Include Bin Directory in Windows PATH

 Check this option to include the directory containing the server / client executables in the Windows PATH variable so they can be called from the command line.

< Back Next > Cancel

MySQL Server Instance Configuration Wizard

MySQL Server Instance Configuration

Configure the MySQL Server 5.0 server instance.

Please set the security options.

Modify Security Settings

 New root password: Enter the root password.

Confirm: Retype the password.

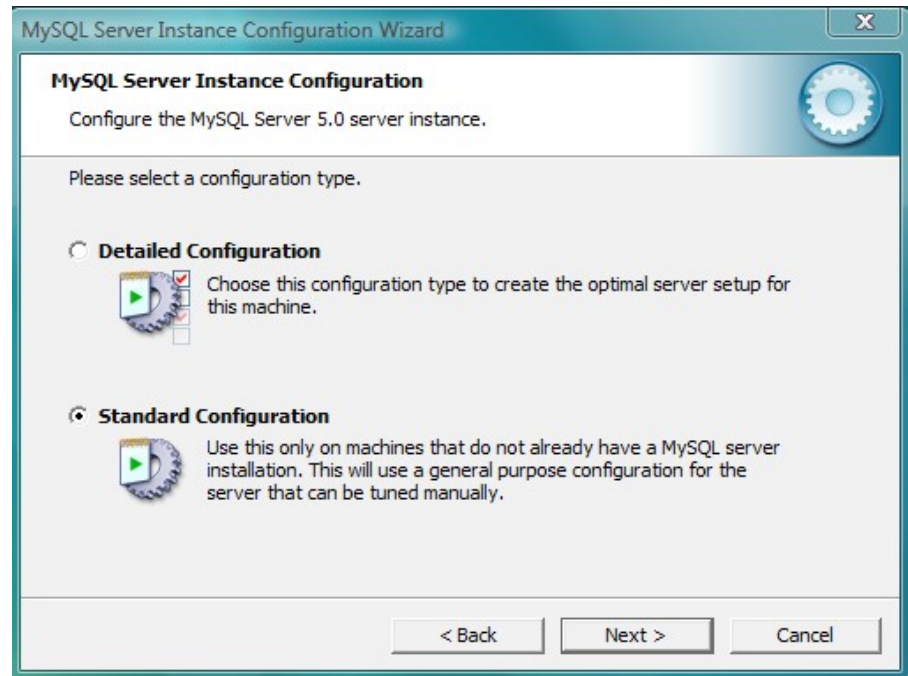
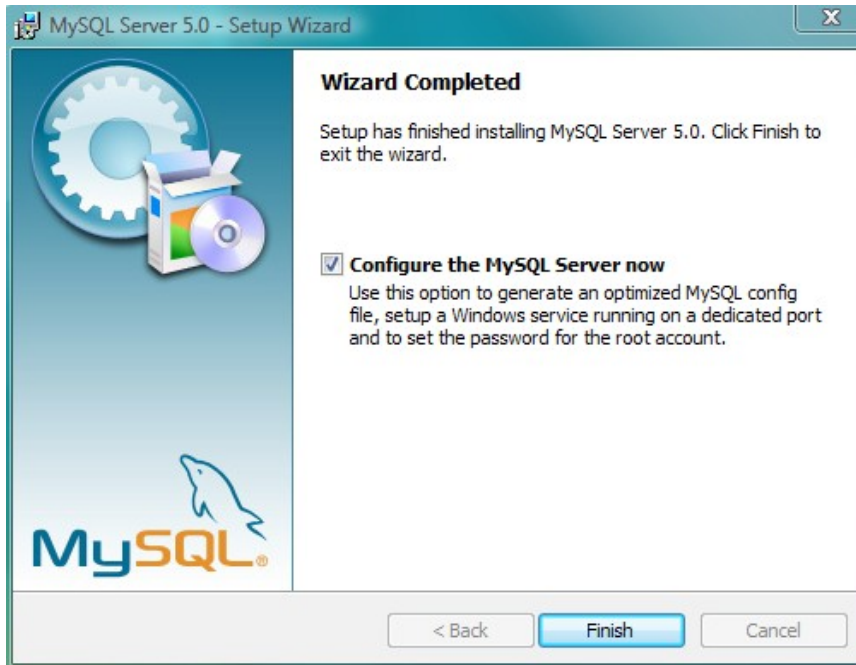
Enable root access from remote machines

Create An Anonymous Account

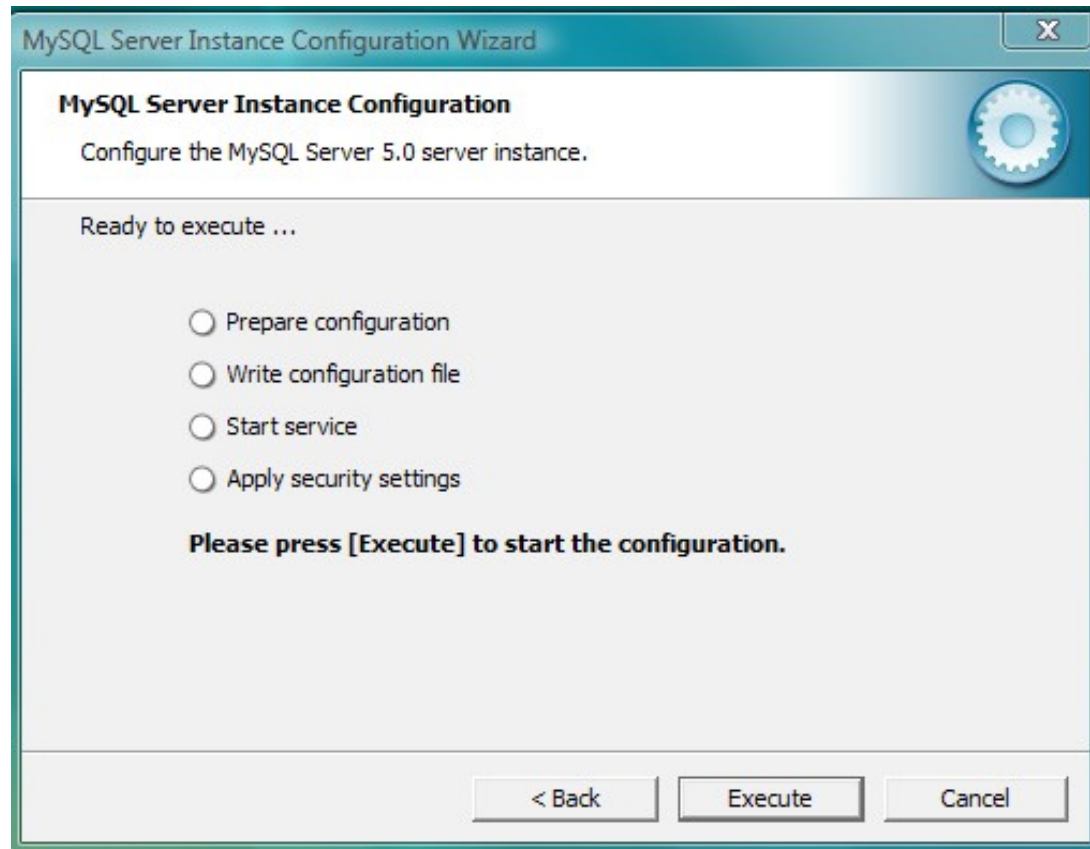
 This option will create an anonymous account on this server. Please note that this can lead to an insecure system.

< Back Next > Cancel

Configuring MySQL Server



Finalizing the Configuration



Installing MySQL on Linux

- Easiest method: Use the Operating System's package management utility
 - apt-get on Ubuntu/Debian
 - apt-get install mysql-server
 - apt-get install mysql-client
 - yum on Fedora
 - yum install mysql-server
 - yum install mysql
- Packages for Red Hat, Ubuntu are available as well and can be installed the native OS commands- rpm, dpkg

Installing MySQL on Open Solaris

On Open Solaris 2008.11

```
pkg install SUNWmysql5
```

```
pkg install SUNWmysql
```

'pkgadd' and 'tar' packages are available from the download site at <http://dev.mysql.com/downloads/mysql/5.0.html#downloads>

Mac OSX, HP-UX, IBM AIX..

Packages are available for download at

<http://dev.mysql.com/downloads/mysql/5.0.html#downloads>

Source Code: Build from scratch

If you want to get dirty with the source code, you may also want to build MySQL server and client from sources available for download at

<http://dev.mysql.com/downloads/mysql/5.0.html#download>

On Unix (Linux, Open Solaris), basic steps

```
./configure
```

```
make; make install
```

Post installation

Windows: new program shortcuts will be added to the Programs menu

MySQL command line client

MySQL Manual

MySQL Server Instance Config Wizard

Linux

- Mysql client programs installed in /usr/bin
- Accessible from the command line using 'mysql', 'mysqladmin', etc

Post installation

Solaris

Client programs installed in /usr/sfw/bin

Accessible from the terminal using the program name:

```
$mysql
```

-
-

Notes on running MySQL

By default, MySQL server runs on port 3306 and the socket file `/tmp/master.sock`

Can be configured to use a different port and/or a different socket file

On Linux/Solaris: `mysqld --port 9090 --socket=/tmp/my.sock`, will start the MySQL server on port 9090 and will use the socket file `/tmp/my.sock`

By, default MySQL client connects the server running on 3306.

To connect to a different port, use `'mysql --port XXX'`

MySQL Programs

Server programs

mysqld : MySQL Server program
'd': daemon

Client programs

mysql- MySQL client
mysqladmin- client for administering a
MySQL server

Other programs:

<http://dev.mysql.com/doc/refman/5.1/en/programs.htm>

Invoking MySQL programs

Type in the program name (followed by options, if any) from the command line/shell

```
$mysql -u root  
mysql>
```

Tutorial

Create a simple Database and populate it with a table

```
mysql> CREATE DATABASE vtu_edusat;
```

```
mysql> USE vtu_edusat;
```

```
mysql> CREATE TABLE t1(
```

```
-> id INTEGER,
```

```
-> name CHAR(20)
```

```
-> );
```

Tutorial

```
mysql> INSERT INTO t1 VALUES( 1, 'foo');  
mysql > INSERT INTO t1 VALUES( 2, 'bar');  
mysql> SELECT * FROM t1;
```

```
+-----+-----+  
| id  | name |  
+-----+-----+  
|  1  | foo  |  
|  2  | bar  |  
+-----+-----+
```

MySQL GUI Tools

Suite of Desktop applications

administration/usage of MySQL instances

Building and Manipulating the data within
MySQL databases

Graphical

You may happily not use the command
line :-)

MySQL GUI Tools

MySQL Administrator

administration tools and utilities to monitor and administer databases, users privileges and data

MySQL Query Browser

Building and testing queries

MySQL Migration Toolkit

Migrate existing database configuration to MySQL (Windows only)

Installing MySQL GUI Tools on Windows

Download the installer for Windows from

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

Once the installation process is over, you will find the following new menu items

MySQL Administrator

MySQL Query Browser

MySQL Migration Toolkit

Installing MySQL GUI Tools on Linux

Ubuntu/Debian

```
apt-get install mysql-admin
```

Fedora

```
yum install mysql-gui-tools
```

Packages for Red Hat Linux and sources are available from

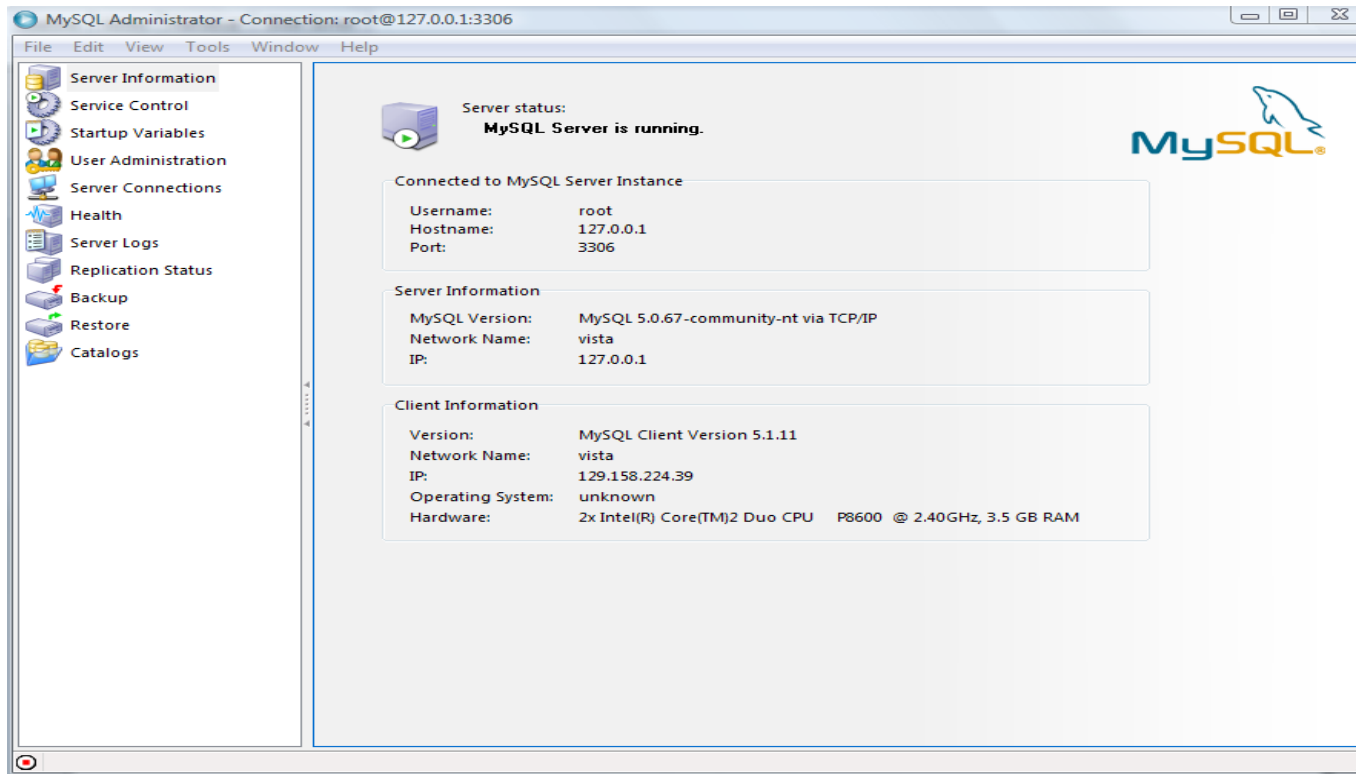
<http://dev.mysql.com/downloads/gui-tools/5.0.html>

Demo

MySQL Administrator

Windows-> Program Menu

Linux → \$mysql-administrator



Demo

MySQL Query Browser

Windows -> Program Menu

Linux -> mysql-query-browser

The screenshot shows the MySQL Query Browser interface. The main window displays the following query and its results:

```
SELECT * FROM information_schema.`TABLES` T;
```

TABLE_CATALOG	TABLE_SCHEMA	TABLE_NAME
NULL	information_schema	CHARACTER_SETS
NULL	information_schema	COLLATIONS
NULL	information_schema	COLLATION_CHARACTER
NULL	information_schema	COLUMNS
NULL	information_schema	COLUMN_PRIVILEGES
NULL	information_schema	KEY_COLUMN_USAGE
NULL	information_schema	PROFILING
NULL	information_schema	ROUTINES
NULL	information_schema	SCHEMATA
NULL	information_schema	SCHEMA_PRIVILEGES
NULL	information_schema	STATISTICS
NULL	information_schema	TABLES
NULL	information_schema	TABLE_CONSTRAINTS
NULL	information_schema	TABLE_PRIVILEGES
NULL	information_schema	TRIGGERS
NULL	information_schema	USER_PRIVILEGES
NULL	information_schema	VIEWS
NULL	mysql	columns_priv
NULL	mysql	db
NULL	mysql	func
NULL	mysql	help_category
NULL	mysql	help_keyword
NULL	mysql	help_relation
NULL	mysql	help_topic
NULL	mysql	host
NULL	mysql	proc

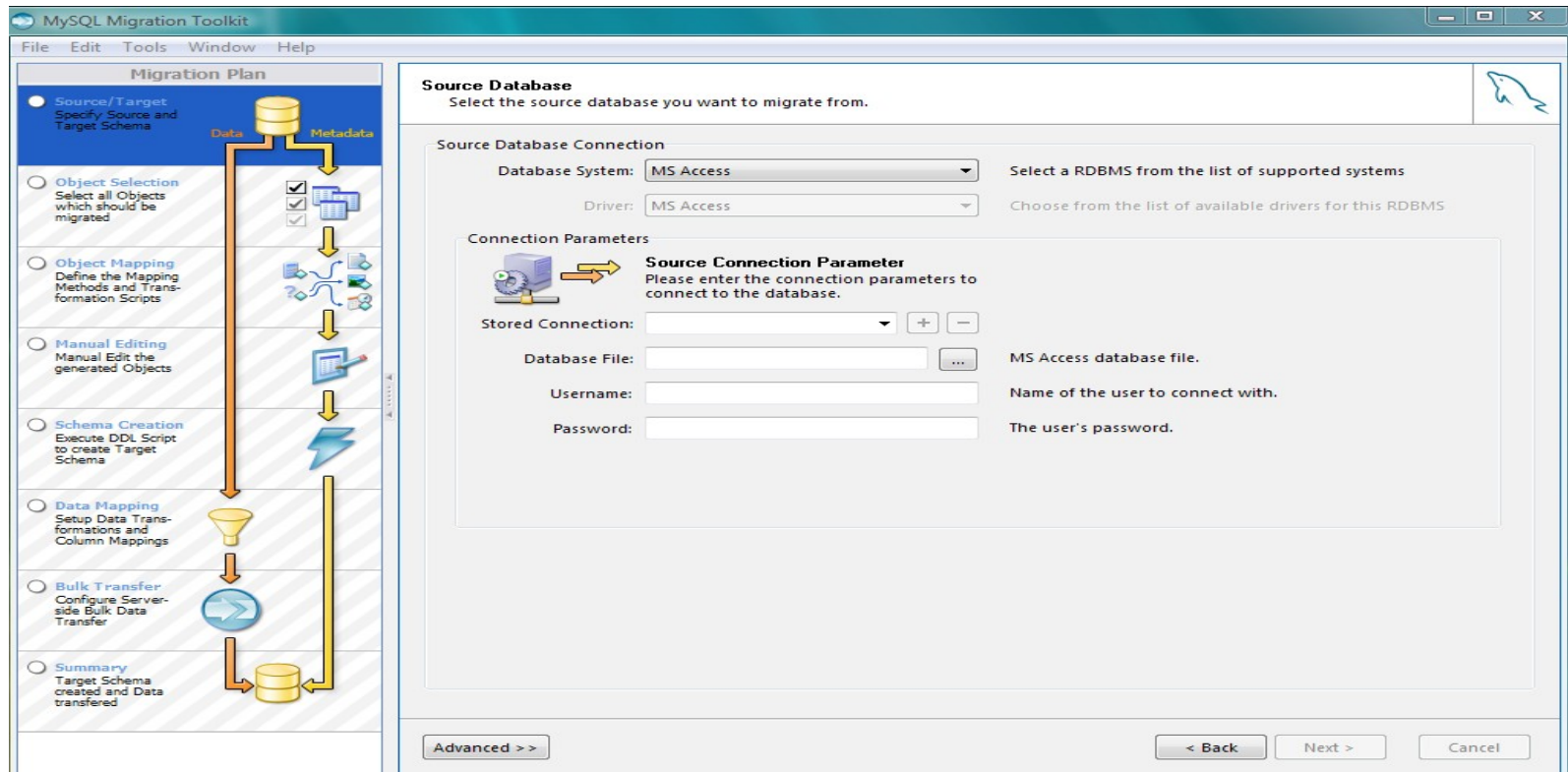
The interface also includes a 'Schemata' panel on the right showing a tree view of the database structure, and a 'Syntax' panel at the bottom right with various SQL syntax options like 'Data Manipulation Statements', 'INSERT Syntax', 'SELECT Syntax', etc.

Demo

MySQL Migration Toolkit

Windows-> Program Menu

Linux → Not Available



Development with MySQL

The 'M' of Web Stacks

LA'M'P, SA'M'P, WA'M'P

L- Linux, S- Solaris, W- Windows
A- Apache, P- PHP/Python/Perl
M- MySQL

Open Solaris Web Stack

<http://www.opensolaris.org/os/project/webstack/>

Database Driven applications with MySQL

Desktop applications

Connectors for C/C++, C#, Java, Python,
PHP, Ruby

Great alternative to MS Access or MS SQL
Server for your database applications

NetBeans simplifies development with MySQL

Use MySQL with Desktop and web-based applications- Java, PHP, Ruby..

Generators for MySQL data snippets for PHP

NetBeans IDE 6.5+

<http://php.netbeans.org>



```
<?php
require_once("Includes
$db = new WishDb;
$wisherId = $db->get_w
fun|
func_get_arg($arg num)
func_get_args()
```


NetBeans simplifies development with MySQL

NetBeans IDE allows you to register a new MySQL server

You can work with MySQL tables from within NetBeans using a nice graphical interface

Refer: <http://www.netbeans.org/kb/> for Help



Doing it with MySQL

What all can you do with MySQL?

Learn RDBMS concepts by using
MySQL- Stored procedures, Triggers..

Develop database driven web and
desktop applications in any language
of your choice

Understand how various database
features like Transactions,
Concurrency management is done by
looking at the source code

What all can you do with MySQL?

Become a contributor!

Do not forget that MySQL is a Open Source project. So you can **CONTRIBUTE** to the product as well!

How?

Fix bugs, Add new features, Write documentation

Getting started with contributing:

<http://forge.mysql.com/wiki/Contributing>

http://forge.mysql.com/wiki/Code_Contribut

Benefits

FREE, as in cost

FREE as in Freedom- Open Source

Wonderful opportunity to understand how a RDBMS works- read the source

Customize MySQL for your needs- embedded applications or an Internet scale web application

Lightweight- doesn't bloat your system

MySQL Resources

Developers: <http://dev.mysql.com>

Downloads:

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

Reference/Manuals:

<http://dev.mysql.com/doc/>

MySQL University:

http://forge.mysql.com/wiki/MySQL_Uni

Planet MySQL:

<http://www.planetmysql.org>

More MySQL Resources

- Printed books:
 - MySQL- The Complete Reference
 - Expert MySQL
 - Understanding MySQL Internals
- Oracle and MySQL compared:
<http://download.oracle.com/docs/cd/E>

Test your MySQL Skills!

Quiz Time!

Get Connected to Sun

Train to Win !

Participate in Open Source Communities

- > Download your SDN form from
 - > <http://elearning.vtu.ac.in/VTU-S>
- > Send it to Sun Microsystems and we will guide you through your first steps in getting connected to Sun

Important URLs

- www.in.sun.com
- www.in.sun.com/training
- <http://netbeans.org>
- www.java.net
- <http://opensolaris.org>

Thank You!

Amit Kumar Saha
<http://blogs.sun.com/amitsaha>

