Agenda

- What is MySQL?
- Installing and Configuring MySQL
- Application/Architecture Considerations
- Developing MySQL Applications
- MySQL on Windows
- MySQL Enterprise Edition
My Experience with MySQL Is……?

✓ I’ve never seen / used MySQL – but really looking forward to learning more …

✓ Downloaded and played around with it but nothing serious …

- Have developed some websites / applications… they seem to work well most of the time …
- DBA team at Facebook keeps bugging me to help …
MySQL is Everywhere

Multiple Platforms

C / C++ / C#

Multiple Languages

MySQL is Everywhere
Installing & Configuring MySQL
MySQL Software
Where to Download?

- MySQL Enterprise
  - Oracle E-Delivery (edelivery.oracle.com)
    - Commercial-licensed servers and add-ons
      - Enterprise Monitor
      - Enterprise Backup
      - Cluster Manager
  - My Oracle Support (support.oracle.com)
    - Latest patch levels for commercial-licensed software

- MySQL Community
  - MySQL Developer (dev.mysql.com)
    - GPL Binaries and Source Code
    - Documentation
  - MySQL Labs (labs.mysql.com)
    - Experimental or preview releases
MySQL Software
Installation Packages

Linux/Unix
- RPM
- Compressed TAR
- Distribution repository

Windows
- MySQL Installer
- ZIP
The MySQL 15 Minutes Rule

“Download, install and start using MySQL in 15 minutes.”
Windows Installer

Full install in 3 minutes!
MySQL Configuration
Overview

- Highly configurable
- Command line options
- Configuration files
  - Plain-text, INI-like files with groups
  - Several configuration files (/etc, $HOME, …)
  - The last value takes precedence
- `<exe> [--verbose] --help` – order of loading files
- SQL interface to get or change configuration parameters
MySQL Configuration
Post Installation

- Where are the configuration files
  - my.cnf: /etc, /etc/mysql, /usr/local/mysql/
  - my.ini: C:\Program Files\MySQL\MySQL 5.6\
- Default configuration may need to be tweaked ...
  - Performance, ...
  - SQL_MODE
  - AUTOCOMMIT
  - ...
MySQL Configuration
Post Installation

- Secure the installation
  - Do not run `mysqld` as ‘root’ (OS superuser or admin)
  - Have separate directories (configuration, data, binary logs, …)
  - Change MySQL server's ‘root’ password
  - Remove default/anonymous accounts
  - In short:
    - Run `mysql_secure_installation` script on Linux/Unix
    - Use Configuration Wizard on Windows (default)
# MySQL Configuration

## Client Programs

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>mysql</td>
<td>Mysql command line/shell for SQL statements</td>
</tr>
<tr>
<td>mysqladmin</td>
<td>Performing administrative operations. You can use it to check the server's configuration and current status, to create and drop databases, and more</td>
</tr>
<tr>
<td>mysqldump</td>
<td>Used to export a database(s) for backup or transfer to another server. The dump contains SQL statements to create tables, populate it with data, or both. Can also generate files in CSV, delimited text, or XML format.</td>
</tr>
<tr>
<td>mysqlimport</td>
<td>Command-line interface to the LOAD DATA INFILE SQL statement.</td>
</tr>
<tr>
<td>mysqlshow</td>
<td>Shows databases exist, their tables, or a table's columns or indexes.</td>
</tr>
<tr>
<td>mysqlslap</td>
<td>A diagnostic program designed to emulate client load for a MySQL server and to report the timing of each stage. It works as if multiple clients are accessing the server.</td>
</tr>
</tbody>
</table>

Application / Architecture Considerations
MySQL Server Components

Storage Engines

- Defines data storage and retrieval
- Defined per regular table
- Most known Storage Engines:
  - InnoDB (default since 5.5)
    - fully transactional, MVCC, FKs
  - MyISAM (default prior to 5.5)
    - NON-transactional, simple
  - NDB/Cluster
    - shared nothing, HA engine with transactional support
    - multi-master support
MySQL Concepts
Database

- Database or Schema
- Current database (per connection)
- Database – a set of files in “the data directory”
- System database (mysql)
- Virtual databases:
  - INFORMATION_SCHEMA
  - PERFORMANCE_SCHEMA
MySQL Concepts
SQL_MODE

- Very important variable
- Affects data consistency!
- It might be remembered …
  - … or it might be not
- Thus: set it once for all in configuration file
- Recommended value is ‘TRADITIONAL’:
  - Equates to: STRICT_TRANS_TABLES, STRICT_ALL_TABLES, NO_ZERO_IN_DATE, NO_ZERO_DATE, ERROR_FOR_DIVISION_BY_ZERO, TRADITIONAL, NO_AUTO_CREATE_USER, NO_ENGINE_SUBSTITUTION
  - Additional options to consider
    - IGNORE_SPACE, ANSI_QUOTES

MySQL authenticates “username@hostname”

- MySQL user ≠ Unix (or Windows) user
- Anonymous users supported (empty username field)
- Hostname can be wildcarded
  - ‘%’ = any host
  - %.mydomain.com or 192.168.1.%

- For example: user1 below is two separate accounts
MySQL Concepts
User authentication - Useful functions

- **SELECT USER()**
  - User name and host name provided by the client

- **SELECT CURRENT_USER()**
  - User name and host name as authenticated by server
MySQL Server Components
Partitioning

- Horizontal partitioning (distribute rows, not columns)
- Partitioning types:
  - List
  - Range
  - Key/Hash
  - Columns
    - List
    - Range
- Sub-partitions are supported
MySQL Server Components

Replication

- One-way, master and slaves
- Asynchronous or Semi-synchronous replication
- Replication formats:
  - Statement-based replication (SBR): propagate SQL statements
  - Row-based replication (RBR): propagate row changes
  - Mixed: SBR or RBR depending on the statement
Developing MySQL Applications
MySQL Workbench

**SQL Development**
Connect to existing databases and run SQL Queries, SQL scripts, edit data and manage database objects.

**Data Modeling**
Create and manage models, forward & reverse engineer, compare and synchronize schemas, report.

**Server Administration**
Configure your database server, setup user accounts, browse status variables and server logs.
MySQL - Standard-based Drivers
Broad Language Support

Oracle Developed
- ADO.NET - Connector/NET
- ODBC - Connector/ODBC
- JDBC - Connector/J
- Python - Connector/Python
- C/C++
  - Connector/C++
  - Connector/C
  - C API - mysqlclient

Community Developed
- Perl - DBD::mysql
- Python - MySQLdb
- Ruby - DBD::MYSQL
- C/C++ - MySQL++
- PHP
  - mysqli, ext/mysqli
  - PDO_MYSQL
  - PHP_MYSQLND

http://www.mysql.com/products/connector/
MySQL User Survey
Top Languages

Which languages do you use to develop your MySQL Applications?

- Java
- PHP
- JavaScript/AJAX
- Perl
- C++
- C
- C#
- Other
- Python
- Visual Basic
- Ruby
- Delphi

(Chart showing percentages for each language in both enterprise and community categories.)
MySQL on Windows
MySQL on Windows

Did you know?

#1 Platform for MySQL ...

✦ Development
✦ Deployment for Community Edition Users
MySQL on Windows

Why?

Lower TCO

Performance and Scalability

Ease of Use and Administration

Cross-Platform Flexibility
MySQL on Windows
Connector/NET Resources

Visual Studio integration

Connector/Net is available for download at:
http://www.mysql.com/downloads/connector/net/

Exploring MySQL in the Microsoft .NET Environment
http://dev.mysql.com/tech-resources/articles/dotnet/index.html

Using MySQL With .NET/C#/Visual Basic/Powershell
http://dev.mysql.com/usingmysql/dotnet/
MySQL Enterprise Edition
MySQL Enterprise Edition

- Oracle Product Certifications/Integrations
- Oracle Premier Support
- Enterprise Backup
- Enterprise Scalability
- Enterprise Security
- Enterprise Monitor with Query Analyzer
- Enterprise High Availability
- Workbench
MySQL Enterprise Edition

Enterprise Monitor

- Consolidated view
- Enterprise Support
  - SNMP
  - LDAP
  - Customizable
- Query Analysis with Correlation Graphs
MySQL Enterprise Monitor
My Oracle Support Integration

- Collect MySQL diagnostics and upload to MySQL Support
- Track MOS SRs from Enterprise Dashboard
MySQL Enterprise Edition
Enterprise Backup

- Online Backup for InnoDB
- Full, Incremental, Partial Backups
  - Compression
  - Scriptable Interface
  - Streaming (Single File)
- Recovery Options
  - Point in Time
  - Full
  - Partial
- Metadata on status, progress, history
- Unlimited Database Size
- Cross-Platform
  - Windows, Linux, Unix
- Certified with Oracle Secure Backup
### MySQL Enterprise Edition

#### Commercial Extensions

<table>
<thead>
<tr>
<th>Security</th>
<th>Authentication</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Support for SSO environments</td>
</tr>
<tr>
<td></td>
<td>• Linux: PAM (Pluggable Authentication Modules)</td>
</tr>
<tr>
<td></td>
<td>• Windows: AD, Native Windows Auth</td>
</tr>
<tr>
<td></td>
<td>• Pluggable Authentication API</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Security</th>
<th>Audit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Policies for logins and/or query activity</td>
</tr>
<tr>
<td></td>
<td>• Dynamically enable/disable audit stream</td>
</tr>
<tr>
<td></td>
<td>• Automatic log rotation based on size</td>
</tr>
<tr>
<td></td>
<td>• Auditing API</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scalability</th>
<th>Thread Pool</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Improves sustained performance and scale as user connections increase</td>
</tr>
<tr>
<td></td>
<td>• Thread Pooling API</td>
</tr>
</tbody>
</table>
MySQL Enterprise Edition
HA - OVM Template for MySQL

- Oracle Linux with the Unbreakable Enterprise Kernel
- Oracle VM
- Oracle VM Manager
- Oracle Cluster File System 2 (OCFS2)
- MySQL Database (Enterprise Edition)

- Pre-Installed & Pre-Configured
- Full Integration & QA Testing
- Single Point of Support**

** Technical support for Oracle Linux and Oracle Virtual Machine requires Unbreakable Linux Network subscription.
MySQL Enterprise Edition
HA - Windows Server Failover Clustering

Technical support for Windows Server Failover Clustering must be sourced from Microsoft.
Summary

Oracle is driving MySQL Innovation

Build your Applications with MySQL using the technology you like most

Rely on MySQL Enterprise Edition For Web & Departmental Applications Across Your Organization
The preceding is intended to outline our general product direction. It is intended for information purposes only, and may not be incorporated into any contract. It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decisions. The development, release, and timing of any features or functionality described for Oracle’s products remains at the sole discretion of Oracle.
Thank you!