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# MySQL Technology Update

**Lars Thalmann**

Development Director, Replication, Backup, Connectors, Utilities

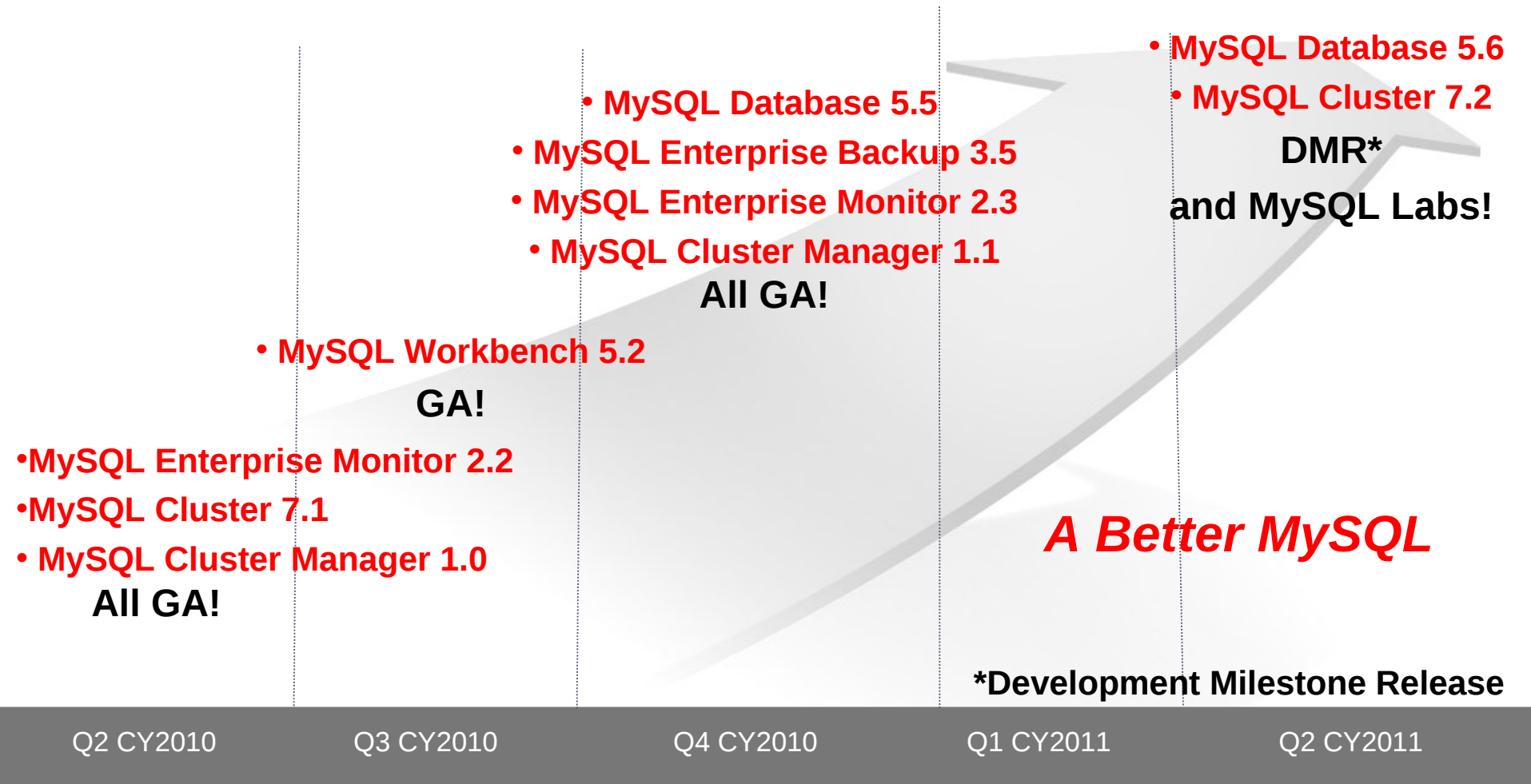
**Johannes Schlüter**

MySQL Connectors Developer



# More Products Releases Than Ever Before

## Continuous Innovation



# MySQL...Free, Open to the Community

- Products Available under the GPL:
  - MySQL Database Community Edition, with all storage engines
  - MySQL Cluster
  - MySQL Workbench Community Edition
  - MySQL Connectors
  - MySQL Proxy
- You Shape The products, We are Listening!
  - Social Media (Oracle MySQL blog, Facebook, Twitter, Forums, MySQL Community Managers...etc)
  - Oracle MySQL ACEs
  - Advisory Boards: Customers & Storage Engine Vendors
  - Contributions encouraged, appreciated, implemented



# MySQL 5.5 – Highest Quality Release Ever



## InnoDB becomes default storage engine

- ACID Transactions, FKs, Crash Recovery

## Improved Performance

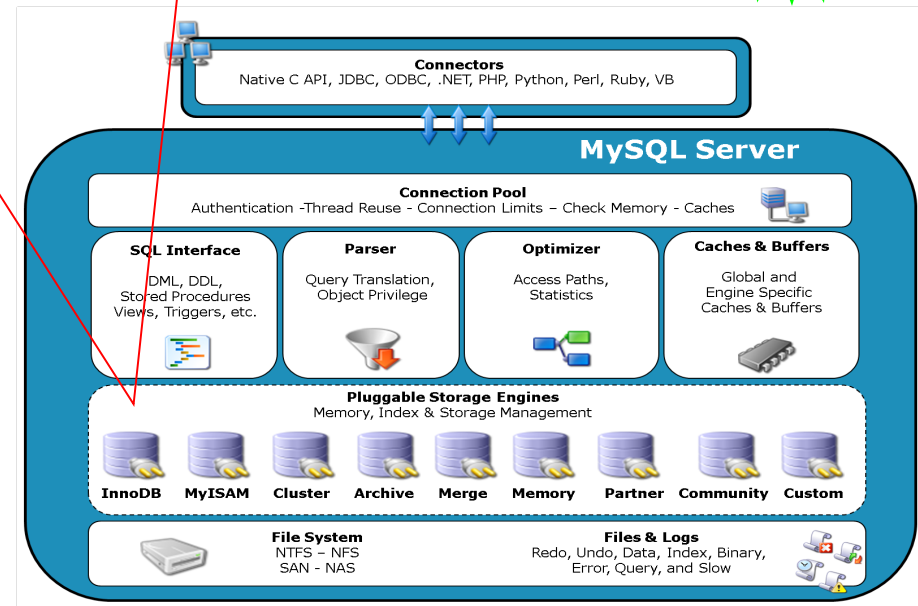
- Enhancements in MySQL DB
- Enhancements in InnoDB
- + 360% over 5.1 on Linux
- + 1500% over 5.1 on Windows

## Improved Availability

- Semi-synchronous Replication
- Replication Heartbeat

## Improved Usability

- SIGNAL/RESIGNAL
- More Partitioning Options
- New PERFORMANCE\_SCHEMA



# A Better MySQL at Oracle

- MySQL & InnoDB: Now One Engineering team
- Largest MySQL Engineering & Support Organization
- Hundreds of Experts, including Core MySQL Engineers plus Oracle Performance and Database Gurus
- Delivering New & Better Products
- Oracle's Investment in MySQL is unmatched

**You're An Expert? We're Hiring!**



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**Download Now!**

**MySQL 5.6**

**Development**

**Milestone Release**



Driving MySQL Innovation



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# MySQL 5.6 – A Better MySQL.



## Better Performance, Scalability, Monitoring

- Optimizer based performance improvements
  - Index Condition Pushdown (ICP)
  - Multi-Range Read (MRR)
  - File sort optimization
- Partitioning
  - Enable explicit partition selection – queries, pruning
  - Enable import/export to/from partitioned tables
- PERFORMANCE\_SCHEMA
  - Table, Index, Waits/Locks, Summaries

DM: Development Milestone Release

[dev.mysql.com/downloads/mysql](http://dev.mysql.com/downloads/mysql)



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# MySQL 5.6 – A Better MySQL.



## Better InnoDB

- Persistent Optimizer Stats
- New INFORMATION\_SCHEMA tables:
  - Metrics table
  - System tables
  - Buffer pool information table
- Split the kernel mutex
- Multi-threaded purge
- Configurable data dictionary cache
- New page\_cleaner thread – for flushing of dirty pages

[dev.mysql.com/downloads/mysql](http://dev.mysql.com/downloads/mysql)



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# MySQL 5.6 – A Better MySQL.



## Better Replication

- Crash-Safe Slaves
- Replication Checksums
- Reduced Binlog size – options for writing full/partial RBR images
- Slave batched update for non-indexed tables
- Time-Delayed Replication
- Informational Log Events
- Remote Binlog Backups
- Server UUIDs

[dev.mysql.com/downloads/mysql](http://dev.mysql.com/downloads/mysql)



Download Now!

Early Access Features

Announced at  
OSCON 2011



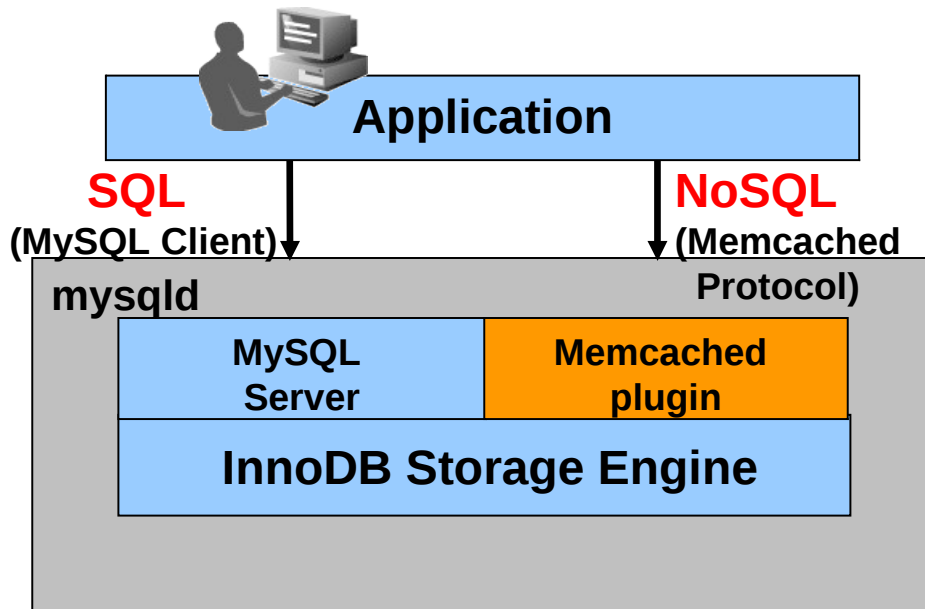
[labs.mysql.com](http://labs.mysql.com)



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# MySQL 5.6:

NotOnlySQL: Memcached API



- Fast, simple access to InnoDB
  - Accessed via Memcached API
  - Use existing Memcached clients
  - Bypasses SQL transformations
- NotOnlySQL access
  - Memcached for key-value operations
  - SQL for rich queries, JOINS, foreign keys, etc
- Implementation
  - Memcached daemon plug-in to mysqld
  - Memcached protocol mapped to the native InnoDB API
  - Shared process space for ultra-low latency
  - Additional implementations in future DMS



# InnoDB Full-Text Search



- Support all query types supported by MyISAM:
  - λ Natural language search
  - λ Query expansion
  - λ Boolean search
- Plus
  - λ Proximity search
  - λ Create full-text index with parallel tokenization and parallel sort



# InnoDB New Features



- Performance and Scalability
  - λ Increase the max size of redo log files
  - λ Reduce contention during file extension
  - λ Make deadlock detection non-recursive
  - λ Improve thread scheduling
  - λ Change rw-lock to mutex for trx\_sys\_t
  - λ Option to preload buffer pool
  - λ Allow UNDO logs to reside in their own tablespace
  - λ Reintroduce random readahead
  - λ Support smaller page sizes (4K & 8K)



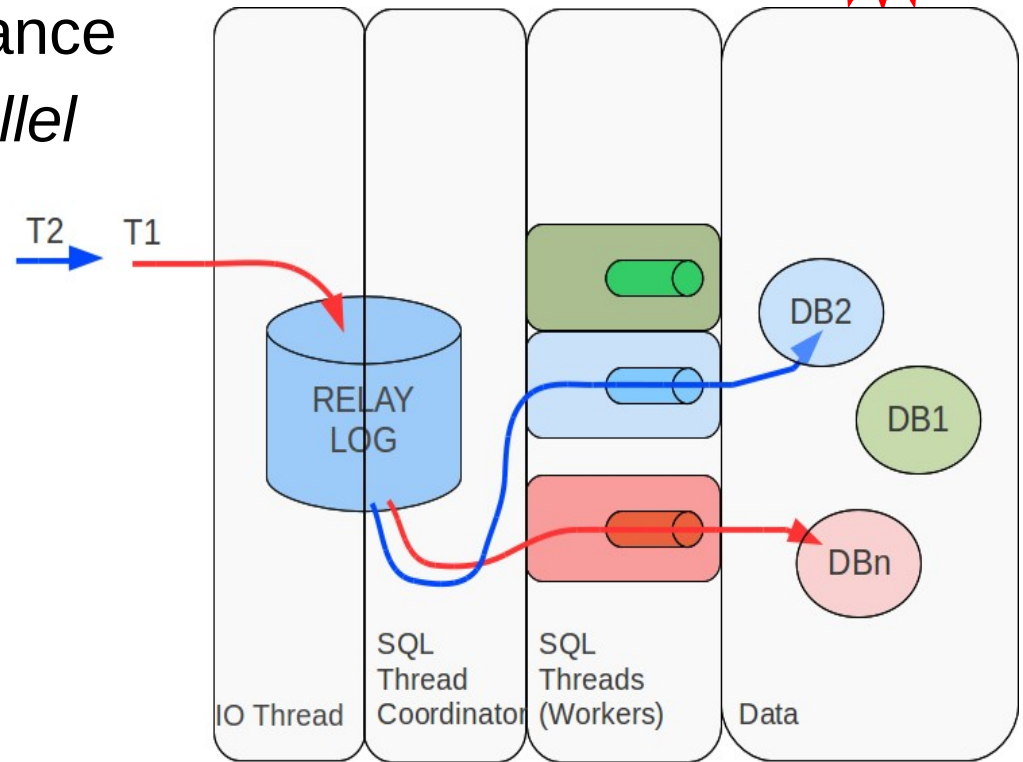
# Multi-Threaded Slave



Increased slave performance

*Workload applied in parallel*

Changes to each db  
applied and committed  
independently  
Automatic (serialized)  
recovery at restart



# Replication Performance Enhancements



Events first written to local cache, then to binary log

*Shorter lock time*

Reduced number of memory allocations

*For auto-inc columns when binary log is enabled*

Included in the multi-threaded slave labs snapshot



# Binary Log Group Commit



- Reduced number of fsync's
- Improved scalability by reducing lock time
- Integrated with InnoDB group commit
- Significant throughput increase



# Binary log C++ API



Mine the binary log by resorting to a programmatic C++ API to the binary log.

- Read binary log from master directly or from a file
- Add content to and create new binary log files

OSCON Session Friday 10:00am



# Binary log C++ API



## Some Use Cases

- Replicate MySQL into other DBMS, NoSQL stores
- Extend MySQL with online fulltext search engines
- Create your own binary log reader

<http://labs.mysql.com>

<https://launchpad.net/mysql-replication-listener>

OSCON Session Friday 10:00am



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A photograph of a server rack with numerous network cables plugged into ports. The cables are primarily yellow and white. The ports are arranged in a grid, and some have small indicator lights. The background is slightly blurred, focusing on the cables and ports.

# A Better MySQL: MySQL Cluster 7.2 Development Release

# MySQL Cluster 7.1

High Write Scalability, Real Time Performance, 99,999% Uptime



- Telecoms

- Subscriber Databases (HLR/HLR)
- Service Delivery Platforms
- VoIP, IPTV & VoD
- Mobile Content Delivery
- On-Line app stores and portals
- IP Management
- Payment Gateways

- Web

- User profile management
- Session stores
- eCommerce
- On-Line Gaming
- Application Servers



# MySQL Cluster 7.2



- **Queries 20x Faster**

- Adaptive Query Localization (aka Push Down JOINS, SPJ)
- Ships the query to the data, reducing overhead

- **Schema Flexibility**

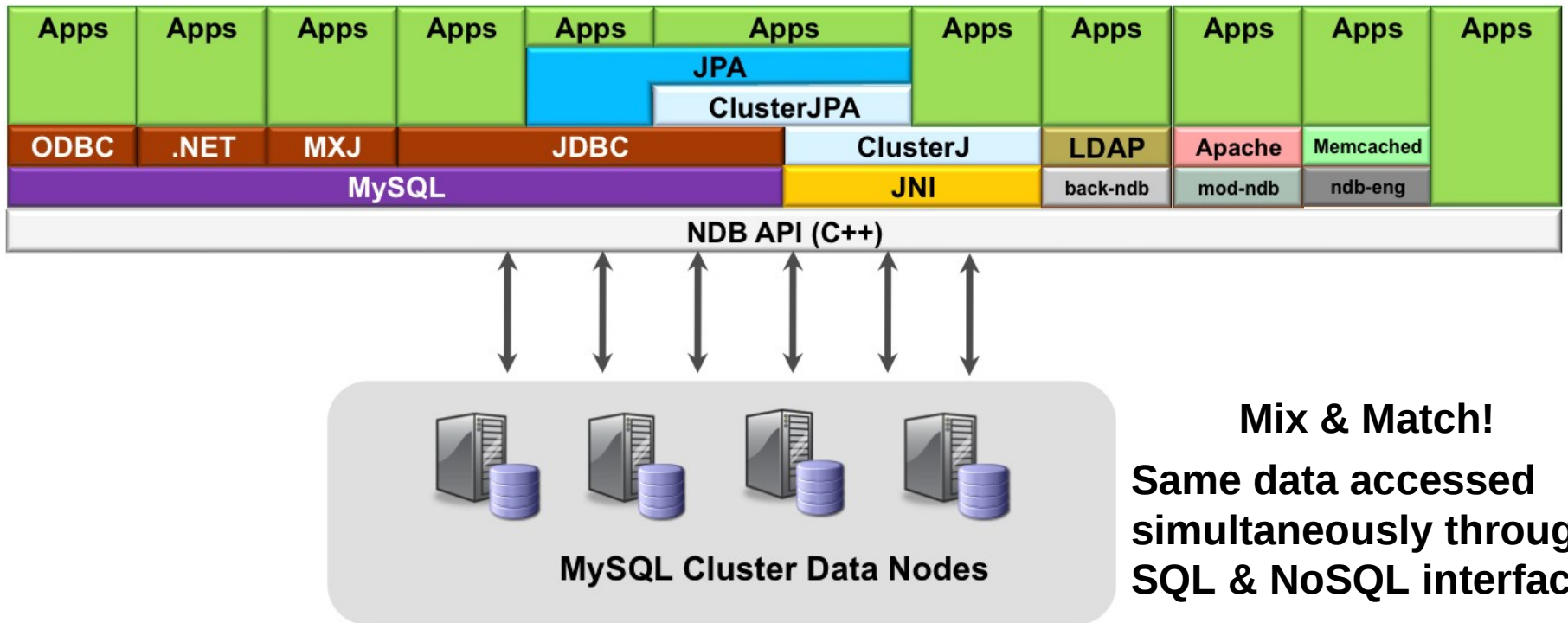
- 4x increase in column support, 128 to 512 columns
- Can be added on-line to existing tables, no service interruption

- **User Data Consolidation**

- Centralizes user privileges to data nodes, accessible from all MySQL Servers
- Radically simplifies provisioning and admin



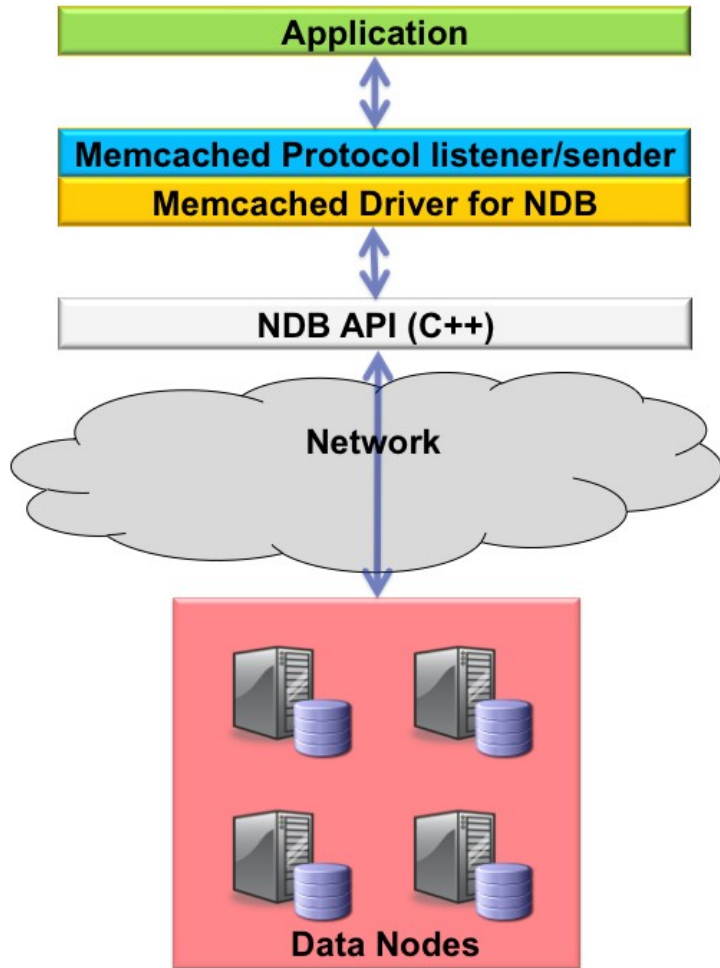
# MySQL Cluster: SQL & NoSQL Combined



- NoSQL -- 3 Ways to bypass SQL, and maximize performance:
  - NDB API. C++ for highest performance, lowest latency
  - Cluster/J for optimized access in Java
  - NEW! Memcached. Use all your existing clients/applications

# MySQL Cluster 7.2:

## NotOnlySQL: Memcached API



- Build update-intensive, highly available services with MySQL Cluster back-end
  - Accessed via memcached API
- Consolidate caching and database tiers
  - Use existing memcached clients & avoid application changes
  - Support for update-intensive workloads, eliminate cache invalidation
  - Scalable, persistent, HA data store
  - Simpler re-use of data across services
- Implementation
  - NDB plug-in to memcached server
  - Direct access to NDB API





## MySQL Cluster 7.2 Early Adopter Speaks!

*“Testing of **Adaptive Query Localization** has yielded over 20x **higher performance** on complex queries within our application, enabling DocuDesk to expand our use of MySQL Cluster into a broader range of highly dynamic web services.”*

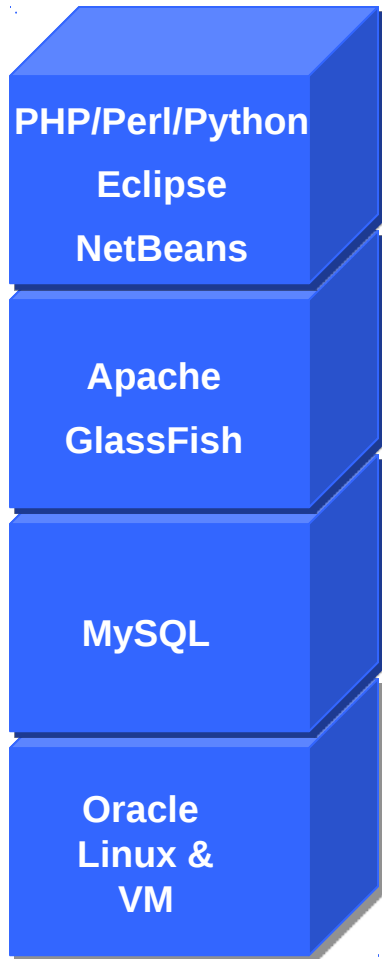
**Casey Brown**

Manager, Development & DBA Services, DocuDesk



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# New Applications with the LAMP Stack



- Highly Popular for Web and Cloud Based Applications
- Oracle Delivers the Industry's Most Complete LAMP Stack
- One Stop Shop Opportunity for Support Across the LAMP Stack
- Integration between LAMP Components





**Oracle VM Template for MySQL.**



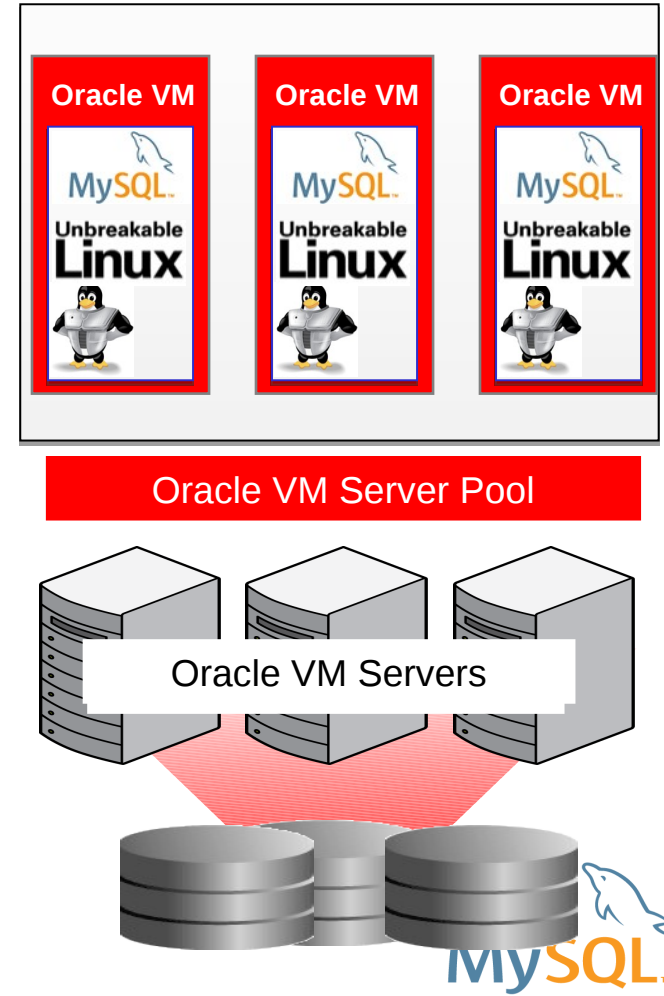
# Oracle VM Template for MySQL

Integrated & Tested OS, VM and Database Stack

Deploy virtualized, cloud-ready MySQL instances, certified for production use

- Rapid **DEPLOYMENT**
- Increased **RELIABILITY**
- Higher **AVAILABILITY**
- Lower **COST**

Oracle VM is Based on the Open Source Xen Hypervisor Technology



# MySQL on Windows, Priorities

## Faster. Easier. More Convenient.

- Windows Performance & Scalability optimizations
  - Additional Performance Enhancements
- Universal Windows Installer
  - Installs, Configures, Upgrades
- Native Windows Authentication
  - MySQL Enterprise Authentication
- Windows Eco-system Support
  - Visual Studio
  - Entity Framework
  - Windows Administration Tooling
  - Connector Enhancements

**Windows: #1  
Development  
Platform for  
MySQL**



# MySQL Usability

- The MySQL 15 Minutes Rule
  - Valid since the early days MySQL

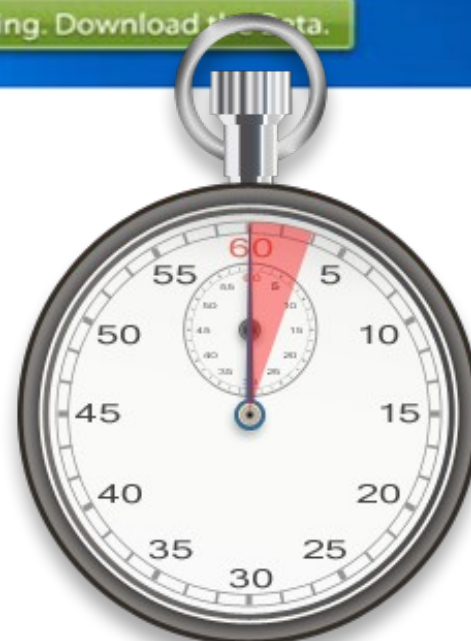


**“Download, install and start using MySQL in 15 minutes.”**



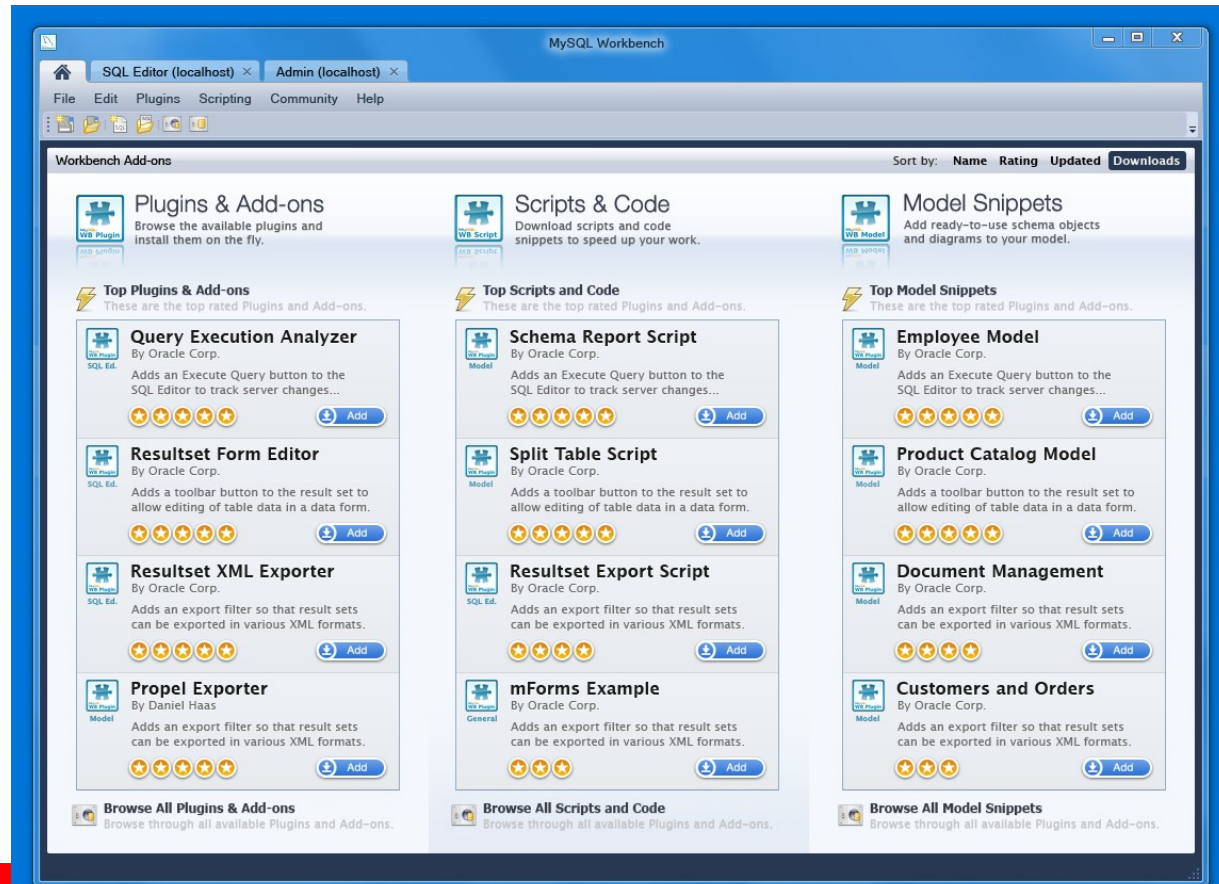
# MySQL Installer for Windows

- 15 Minute Rule down to **3 Minutes** for full MySQL stack



# MySQL Workbench - Plugins

- Community driven Plugins & Add-ons site
  - Code in Python, share with the community



# MySQL Workbench Utilities

MySQL Workbench:

<http://www.mysql.com/downloads/workbench>

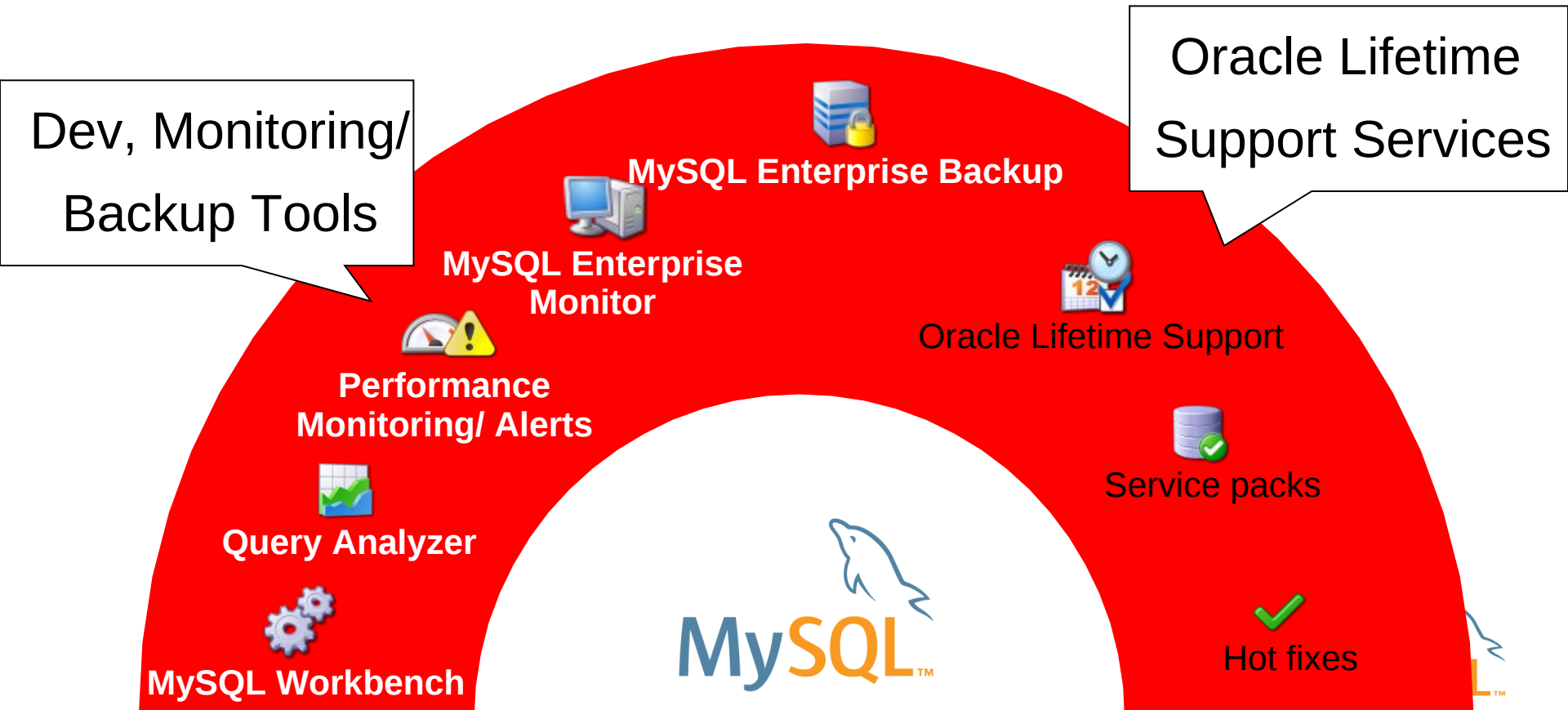
Latest development source code for Workbench Utilities:

<https://launchpad.net/mysql-utilities>



# MySQL Enterprise Edition

- MySQL Visual Development, Monitoring, Backup tools, and Oracle Lifetime Support services



# MySQL 5.6 and Cluster 7.2 Availability

- MySQL 5.6.2 and MySQL Cluster 7.2.0
  - <http://dev.mysql.com/downloads/mysql/>
- Labs “early and often” features
  - <http://labs.mysql.com/>
  - Feature specific builds, descriptively named



# MySQL Installer Availability

- MySQL Installer Beta
  - <http://dev.mysql.com/tech-resources/articles/mysql-installer-for-windows.html>



# Upcoming Events

- **Oracle OpenWorld 2011**
  - October 2 – 6, 2011
  - Dedicated “MySQL Track”
  - 40+ Technical Sessions
  - MySQL Community Reception



## MySQL High Availability

Get it as free ebook:

<http://oreilly.com/go/ebookrequest>

Valid this week, mention event

“MySQL Replication Update”



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# Hardware and Software

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# Engineered to Work Together

