Introduction to MariaDB

Mike Pavlak, Solution Consultant

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Agenda

• What is Maria
• Install
• Access
• GUI’s
• DB2 Storage Engine
• Q&A
What is MySQL?

• Most Popular and widely used Open Source Database
• Relational Database management System (RDBMS)
• Like DB2, but not, really
• Command line interface
• Many GUI utilities available to manage
How does it work?

- Essentially flat files in the IFS
- MySQL has two major parts:
  - UI Layer
  - Storage Engine
    - MyISAM
    - INNODB
    - IBMDB2
- Sound familiar?
HISTORY OF MYSQL/MARIA
In the beginning

- Founded in 1994 -1995 by
  - David Axmark
  - Allan Larsson
  - Michael “Monty” Widenius
  - Named after Monty’s daughter “My” (Pronounced mee)

- Monty now working on MariaDB so let’s shift focus...
Ownership

• MySQL
  – Remember MySQL is Open Source: Anyone can compile the source code and use the binaries as long as they follow the rules of the license.
  – Jan 2008: Sun purchased MySQL for $1B
  – Oracle purchased Sun about year later for $7.4B
  – FUD ensues...
  – Today, MySQL continues to live on, but Maria DB is waiting in the wings should MySQL fall away.

• Maria
  – Monty created a foundation so no one will ever “own” Maria
What about IBM i?  

**Zend DBI == MariaDB**

- A few years ago Oracle dropped support for MySQL on Power and discontinued compiling the binaries.
- Old binaries still available on Oracle archive site
- IBM began looking for a new suitor
- Zend stepped up and took over the binary distribution for MySQL for IBM i and the new product is called **Zend DBi**
- Same wonderful MySQL, just compiled for POWER IBM i
- Supported on i7.1 and higher
- Available for no charge at [www.zend.com/products/dbi](http://www.zend.com/products/dbi)
- What gets installed?
  - Maria 10.1 with MySQL 5.6 compatibility
Why Maria?

- Primarily the license
- But also to have a purely open source solution with no ties to commercial competitor
- Performance benefits
- More storage engines
- A ton of optimizer enhancements
- Extensions and new features
  - KILL feature for runaway queries
  - Faster join and subquery
  - SHOW EXPLAIN
  - Extended user statistics
Maria Performance

- [https://mariadb.org/update-on-performance-measurement-on-mariadb-10-1-and-mysql-5-7-4-labs-tplc/](https://mariadb.org/update-on-performance-measurement-on-mariadb-10-1-and-mysql-5-7-4-labs-tplc/)
Turbo LAMP whitepaper

- [https://www.ibm.com/developerworks/community/groups/community/turbolamp](https://www.ibm.com/developerworks/community/groups/community/turbolamp)

Exclusive parallel slave architecture which delivers nearly 10x better cluster replication performance than MySQL. MariaDB 10’s advanced replication algorithms will likely deliver an even bigger boost when coupled with the speed and throughput of Mellanox networking in the Turbo LAMP architecture.

UP TO 10 TIMES FASTER QUERIES

Foedus experienced a significant improvement in the Octobus performance when switching from MySQL 5.6 to MariaDB 10.0. “We realized that one of our longest running queries on MariaDB was almost 10 times faster than the same query executed on MySQL. And once we built the system on MariaDB with IBM POWER8 the execution time of the same query improved from “hours” to “seconds”. During this migration the MariaDB team provided us with all the support we needed and was a great back-up for us,” said Paolo Messina, CEO of Foedus Group.
Softizy Performance

- Cache is KING!
Maria Likes Power

https://mariadb.com/products/mariadb-ibm-power8

Performance boost your application and lower your TCO with MariaDB on IBM POWER8

MariaDB Corporation and IBM have joined forces to bring you a new platform on which to deploy MariaDB Enterprise - IBM’s Power System servers. IBM’s advanced server platform is based on a mature, highly scalable and high performance RISC architecture featuring multi-core, multi-terabyte memory servers combined with open software architectures such as MariaDB and Linux. Now you can scale-out your applications even more cost-effectively using these proven solutions.

IBM and MariaDB Corporation worked together to port MariaDB to POWER8, making the database compatible with both big-endian and little-endian instruction sets, as well as tuning and performance benchmarking. MariaDB Enterprise is an integral part of IBM’s TurboLAMP stack, a full stack of infrastructure software optimized for POWER8.

Now two leaders in enterprise computing - IBM and MariaDB - are working together to bring you unprecedented scalability and performance for the most demanding enterprise workloads.
Who is using Maria?

- Google

**Google quietly dumps Oracle MySQL for MariaDB**

Linux distributors have been moving from Oracle's MySQL to its popular fork, MariaDB - and now Google is also moving to MariaDB.

- Wikipedia

**Wikipedia dumps MySQL, hooks up with MariaDB**

Driven by preference for open source software 'without bifurcated code bases,' Wikipedia embraces MariaDB, a MySQL fork free of Oracle baggage

---

**MORE LIKE THIS**

<table>
<thead>
<tr>
<th>MySQL, MariaDB to merge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fedora, OpenSuse ditch MySQL, in a</td>
</tr>
</tbody>
</table>
Introduction to Maria
Installation
• Announcement screen

Zend Technologies Ltd. - Welcome

Please read the documentation and License Agreement.

You are about to install ZendDBi product.

This installation procedure will create

- MYSQL User Profile
- ZMARIADB ZendDBI Library
- mariadb and mariadbdata dir will be placed under /usr/local
- Auto start jobs in ZENDDBI10 subsystem
- Note: ZendDBi default port is 3306

F3=Exit  Enter=Accept

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Preamble

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freedom to share and change it. By contrast, the GNU General Public Lic
ense
is intended to guarantee your freedom to share and change free
software--to make sure the software is free for all its users. This
General Public License applies to most of the Free Software
Foundation’s software and to any other program whose authors commit to
using it. (Some other Free Software Foundation software is covered by
the GNU Lesser General Public License instead.) You can apply it to
your programs, too.

When we speak of free software, we are referring to freedom, not

F3=Exit Enter=Accept

More...
Status

ZendDBI 10 Installation

- ZendDBI is being installed and configured
  Please wait ...

Creating ZendDBI Subsystem ZendDBI.
Progress bar
All done
Announcement

Date: 5/15/16
Time: 23:10:31

Thank you for installing ZendDBI

ZendDBI is installed in the ZMARIADB library and
/usr/local/mariadb directory using TCP/IP port 3306

Note: Press Enter to start ZENDDBI10 subsystem. Otherwise press F3

In order to manage and configure ZendDBI services use STRZDBI command or
GO ZENDDBI/ZDBMENU

F3=Exit   Enter=Accept

Copyrig Zend Technologies LTD (2016)
See the option listed in GO LICPGM

```
<table>
<thead>
<tr>
<th>Licensed Program</th>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5770XE1</td>
<td>COMPATIBLE</td>
<td>IBM i Access for Windows</td>
</tr>
<tr>
<td>5770XW1</td>
<td>COMPATIBLE</td>
<td>IBM i Access Family</td>
</tr>
<tr>
<td>5770XW1</td>
<td>COMPATIBLE</td>
<td>IBM i Access Enablement Support</td>
</tr>
<tr>
<td>1ZENDDB1</td>
<td>INSTALLED</td>
<td>ZendDBI for IBM i 10.1.12</td>
</tr>
<tr>
<td>2ZSVRP1</td>
<td>INSTALLED</td>
<td>Zend Server for IBM i 5.6.0 (PHP 5.3)</td>
</tr>
<tr>
<td>6ZSVRP1</td>
<td>INSTALLED</td>
<td>Zend Server for IBM i 8.5.1 (PHP 5.6)</td>
</tr>
<tr>
<td>7ZSVRP1</td>
<td>INSTALLED</td>
<td>Zend Server for IBM i 9.0.0 (PHP 7.0)</td>
</tr>
</tbody>
</table>
```

Press Enter to continue.

F3=Exit  F11=Display release  F12=Cancel  F19=Display trademarks

Already at bottom of area.
## Subsystem and jobs

**Work with Active Jobs**

<table>
<thead>
<tr>
<th>Opt</th>
<th>Subsystem/Job</th>
<th>User</th>
<th>Type</th>
<th>CPU %</th>
<th>Function</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ZENDDB10</td>
<td></td>
<td></td>
<td>0.0</td>
<td>DE0W</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ZENDDB10</td>
<td></td>
<td></td>
<td>0.0</td>
<td>PGM-mysqld</td>
<td>SELW</td>
</tr>
</tbody>
</table>

**Parameters or command**

- F3 = Exit
- F5 = Refresh
- F7 = Find
- F10 = Restart statistics
- F11 = Display elapsed data
- F12 = Cancel
- F23 = More options
- F24 = More keys
Monitor

- Maria has no native GUI interface (sound familiar?)
- Command line accessible from QSHELL, QP2TERM, etc.
- This is the natural method for accessing.
- Will show you access, but not a big fan.
- Fully documented at Maria website
- Many books on the subject
Setup terminal in green screen

• CALL QP2TERM or QSH
• cd /usr/local/mariadb/bin
• Load the terminal: export TERM=xterm
• mysql -u root

```
$ export TERM=xterm
$ mysql -u root
Welcome to the MariaDB monitor. Commands end with ; or \
g.
Your MariaDB connection id is 2
Server version: 10.1.12-MariaDB-debug Source distribution

Copyright (c) 2000, 2016, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]>
```
MySQL to DB2 terminology

- Database
- Library
- Table
- Physical File / Table
- Index
- Logical File / Index
- Monitor
- STRSQL
Can issue commands like show

• Show databases
• Then switch to use a database
  • Selects the database you will use for processing
  • Database is like a library, where you store tables, etc.
  • Typically one database per application

> show databases;
+---------------------+
| Database             |
+---------------------+
| information_schema  |
| mysql               |
| performance_schema  |
| test                |
+---------------------+
(B [0;1m4 rows in set (0.00 sec)
(B [0m (B [0;1m
(B [0mMariaDB [(none)]>

> use mysql
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

(B [0;1mDatabase changed
(B [0mMariaDB [mysql]>
Show some columns from table

```sql
> select host, user, password from user;

+----------+-------+--------+
| host     | user  | password|
|----------+-------+--------+
| localhost| root  | root   |
| i71sup1.cvo.roguewave.com | root | root   |
| 127.0.0.1 | root  | root   |
| ::1      | root  | root   |
| localhost| root  | root   |
| i71sup1.cvo.roguewave.com | root | root   |

(0 rows in set (0.00 sec))
```
Toodles

```plaintext
> quit
   (B [0;1mBye
   (B [0m$

===>
```
**Maria Options**

1. Maria can install on clean LPAR and listen on port 3306
   1. Install the LP and go
2. Maria can install side by side with older version of MySQL
   1. Installer will ask you for another port
   2. Export data from MySQL, import to Maria
See options if MySQL already on 3306

Port 3306 is in use by an existing MySQL installation

Please choose another port on which the ZendDBi service will listen

Enter port number: 3307
See both operating

- MySQL 5.1 and Maria 10.1 side by side
Details on deleting MySQL

• Steps for a clean removal...
  • ENDSBS ZMYSQL OPTION(*IMMED)
  • DLTLIB ZMYSQL
  • CALL QP2TERM
  • rm -f /usr/local/mysql
  • rm -r -f /usr/local/mysql-5.1.50-i5os-power-64bit
  • rm -r -f /usr/local/mysqldata
  • rm -f /etc/my.cnf
  • rm -f /tmp/mysql.sock
GUI ANYONE?
Many GUI solutions, here’s a couple…

- Adminer
  - Single PHP script
  - Lightweight, powerful and easy to use

- phpMyAdmin
  - Widely used by community
  - Installed with Zend Server

Open source & lightweight

All code in single PHP script, drop it in and go!

<table>
<thead>
<tr>
<th>Language:</th>
<th>English</th>
</tr>
</thead>
</table>

**Adminer 3.3.4**

**MySQL » Server » Database: a264133_9f2rp027**

**Database: a264133_9f2rp027**

**Tables and views**

Search data in tables: [Search]

<table>
<thead>
<tr>
<th>Table</th>
<th>Engine</th>
<th>Collation</th>
<th>Data Length</th>
<th>Index Length</th>
<th>Data Free</th>
<th>Auto Increment</th>
<th>Rows</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>albums</td>
<td>InnoDB</td>
<td>utf8_general_ci</td>
<td>16,384</td>
<td>16,384</td>
<td>0</td>
<td>2</td>
<td>~1</td>
<td>Albums</td>
</tr>
<tr>
<td>interprets</td>
<td>InnoDB</td>
<td>utf8_general_ci</td>
<td>16,384</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>~1</td>
<td>Interprets</td>
</tr>
<tr>
<td>songs</td>
<td>InnoDB</td>
<td>utf8_general_ci</td>
<td>16,384</td>
<td>16,384</td>
<td>0</td>
<td>15</td>
<td>~14</td>
<td>Songs</td>
</tr>
</tbody>
</table>

3 in total

[Analyze] [Optimize] [Check] [Repair] [Truncate] [Drop]

Move to other database: a264133_9f2rp027 [Move] [Copy]
phpMyAdmin

- Open Source PHP Project
- Provides nearly every access to MySQL you might need
- Can be deployed from Zend site
  - [http://files.zend.com/help/Zend-Server-/content/installing_phpmyadmin.htm](http://files.zend.com/help/Zend-Server-/content/installing_phpmyadmin.htm)
- Documentation at [http://www.phpmyadmin.net/documentation/](http://www.phpmyadmin.net/documentation/)

---

**Installing and Configuring phpMyAdmin**

This topic explains how to install and configure phpMyAdmin on Zend Server.

**Note:**
phpMyAdmin is a free software tool written in PHP, intended to handle the administration of MySQL over the Web. This tool is not supported by Zend.

**Deploying phpMyAdmin**

This procedure describes how to download and deploy the phpMyAdmin application package on Zend Server.

**Note:**
Currently, deployment of phpMyAdmin on Zend Server can only be performed on Apache and nginx servers.

**To install phpMyAdmin:**
1. Click [here](http://files.zend.com/help/Zend-Server-/content/installing_phpmyadmin.htm) to download the phpMyAdmin application package.
2. In the UI, go to the Applications | Apps page.
3. In the Action bar, click the `Deploy Application` button.

The Deploy Application wizard displays.
phpMyAdmin - Password management

- Login with “root” profile
- Create your profile
- Test your profile
- Change root password IMMEDIATELY (if not sooner)
Tour the dashboard...then on to users
Users

- Click Add user
- Fill out details, click GO
Look at databases & tables

- Left hand navigation
- Right hand workspace
- FULL CRUD capabilities
- Think DFU for MySQL!
Introduction to Maria
Data Migration from MySQL
Export data using phpMyAdmin

- Navigate to the database and click export
Exported file looks like SQL

CREATE TABLE IF NOT EXISTS `wp_comments` (  
    `comment_ID` bigint(20) unsigned NOT NULL AUTO_INCREMENT,  
    `comment_post_ID` bigint(20) unsigned NOT NULL DEFAULT '0',  
    `comment_author` tinytext NOT NULL,  
    `comment_author_email` varchar(100) NOT NULL DEFAULT '',  
    `comment_author_url` varchar(200) NOT NULL DEFAULT '',  
    `comment_author_IP` varchar(100) NOT NULL DEFAULT '',  
    `comment_date` datetime NOT NULL DEFAULT '0000-00-00 00:00:00',  
    `comment_date_gmt` datetime NOT NULL DEFAULT '0000-00-00 00:00:00',  
    `comment_content` text NOT NULL,  
    `comment_karma` int(11) NOT NULL DEFAULT '0',  
    `comment_approved` varchar(20) NOT NULL DEFAULT '1',  
    `comment_agent` varchar(255) NOT NULL DEFAULT '',  
    `comment_type` varchar(20) NOT NULL DEFAULT '',  
    `comment_parent` bigint(20) unsigned NOT NULL DEFAULT '0',  
    `user_id` bigint(20) unsigned NOT NULL DEFAULT '0',  
    PRIMARY KEY (`comment_ID`),  
    KEY `comment_post_ID` (`comment_post_ID`),  
    KEY `comment_approved` (`comment_approved`,  
    `comment_date_gmt`),  
    KEY `comment_date_gmt` (`comment_date_gmt`),  
    KEY `comment_parent` (`comment_parent`),  
    KEY `comment_author_email` (`comment_author_email`(10))  
) ENGINE=MyISAM DEFAULT CHARSET=utf8 AUTO_INCREMENT=2 ;
--
-- Dumping data for table `wp_comments`
--

INSERT INTO `wp_comments` (`comment_ID`, `comment_post_ID`,  
`comment_author`, `comment_author_email`, `comment_author_url`,  
```
Now import into Maria
Was it OK?
IBM DB2 STORAGE ENGINE
MYSQL ONLY, FOR NOW?
Why use MySQL to store in DB2?

- Many PHP applications in the open source arena
- Can be easily installed
- Modifying to access DB2 can be cumbersome & then updates?
- Zend DBi includes IBM DB2 Storage Engine
Architecture

Connectors
- Native C API
- JDBC
- ODBC
- .NET
- PHP
- Python
- Perl
- Ruby
- VB

MySQL Server
- Connection Pool
  - Authentication
  - Thread Reuse
  - Connection Limits
  - Check Memory
  - Caches

SQL Interface
- DML, DDL
- Stored Procedures
- Views, Triggers, etc.

Parser
- Query Translation
- Object Privilege

Optimizer
- Access Paths
- Statistics

Caches & Buffers
- Global and Engine Specific
- Caches & Buffers

Pluggable Storage Engines
- Memory, Index & Storage Management
- MyISAM
- InnoDB
- Cluster
- Falcon
- Archive
- Federated
- Merge
- Memory
- Partner
- Community
- Custom

File System
- NTFS – NFS
- SAN – NAS

Files & Logs
- Redo, Undo, Data, Index, Binary
- Error, Query, and Slow
How to install

- From the MySQL Monitor in QSH or QP2TERM
- `install plugin ibmdb2i soname "ha_ibmdb2i.so";`
- Instruction is in Install Notes for ZendDBi and IBM Redbooks
Show engines...

```
$ show engines;

<table>
<thead>
<tr>
<th>Engine</th>
<th>Support</th>
<th>Comment</th>
<th>Transactions</th>
<th>XA</th>
<th>Savepoints</th>
</tr>
</thead>
<tbody>
<tr>
<td>InnoDB</td>
<td>YES</td>
<td>Supports transactions, row-level locking, and foreign keys</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>MRG_MYISAM</td>
<td>YES</td>
<td>Collection of identical MyISAM tables</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>BLACKHOLE</td>
<td>YES</td>
<td>/dev/null storage engine (anything you write to it disappears)</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>CSV</td>
<td>YES</td>
<td>CSV storage engine</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>MEMORY</td>
<td>YES</td>
<td>Hash based, stored in memory, useful for temporary tables</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>FEDERATED</td>
<td>NO</td>
<td>Federated MySQL storage engine</td>
<td>NULL</td>
<td>NULL</td>
<td>NULL</td>
</tr>
<tr>
<td>IBMDB2I</td>
<td>YES</td>
<td>IBM DB2 for i Storage Engine</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>ARCHIVE</td>
<td>YES</td>
<td>Archive storage engine</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>MyISAM</td>
<td>DEFAULT</td>
<td>Default engine as of MySQL 3.23 with great performance</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
</tbody>
</table>

9 rows in set (0.00 sec)

mysql>
```
IBM DB2 Storage Engine: phpMyAdmin

- Create Table, set number of fields
- Select storage engine
If you are using command line...

Use the parameter option for the storage engine...

ENGINE = IBMDB2I

```
CREATE TABLE IF NOT EXISTS `exampleDB2` (  
  `name` varchar(20) NOT NULL,  
  `Address` varchar(20) NOT NULL,  
  `City` varchar(20) NOT NULL,  
  `State` text NOT NULL,  
  `Zip` text NOT NULL  
  ) ENGINE=IBMDB2I DEFAULT CHARSET=latin1 COMMENT='Customer info';
```
Add records to table

```sql
SELECT * FROM `exampleDB2` LIMIT 0, 30
```

<table>
<thead>
<tr>
<th>NAME</th>
<th>ADDRESS</th>
<th>CITY</th>
<th>STATE</th>
<th>ZIP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheldon Cooper</td>
<td>Somewhere in CalTech</td>
<td>Pasadena</td>
<td>CA</td>
<td>91051</td>
</tr>
<tr>
<td>Leonard Hofstadter</td>
<td>Somewhere Else in Ca</td>
<td>Pasadena</td>
<td>CA</td>
<td>91051</td>
</tr>
<tr>
<td>Raj Koothrapali</td>
<td>Sheldons Office at C</td>
<td>Pasadena</td>
<td>CA</td>
<td>91051</td>
</tr>
<tr>
<td>Howard Walowitz</td>
<td>Engineering @CatTech</td>
<td>Pasadena</td>
<td>CA</td>
<td>91051</td>
</tr>
</tbody>
</table>
What happened on the i?

- Library “TEST” was created
- Table “EXAMPLEDB2” was created
- Records populated
Records, please?

- STRSQL
- Select * from test/exampleDB2

<table>
<thead>
<tr>
<th>NAME</th>
<th>ADDRESS</th>
<th>CITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheldon Cooper</td>
<td>Somewhere in CalTech</td>
<td>Pasadena</td>
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<tr>
<td>Leonard Hofstadter</td>
<td>Somewhere Else in Ca</td>
<td>Pasadena</td>
</tr>
<tr>
<td>Raj Koothrapali</td>
<td>Sheldons Office at C</td>
<td>Pasadena</td>
</tr>
<tr>
<td>Howard Walowitz</td>
<td>Engineering @CatTech</td>
<td>Pasadena</td>
</tr>
</tbody>
</table>

******* End of data *******
WRAP IT UP
Reminders

- ZendDBi == MySQL
- Command line or GUI
- ROOT profile
  - Should have a password
  - Rarely be used
- DB2 Storage Engine available with ZendDBi
- Data is actually stored in DB2 and not duplicated
- Base for thousands of open source applications
IBM Redbook and Redpiece

Discovering MySQL

Using the DB2 Storage Engine

Discovering MySQL on IBM i5/OS

Using IBM DB2 for i as a Storage Engine of MySQL
zendcon2016
Accelerate great PHP Oct 18-21, Las Vegas

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