



MariaDB 10.4 New Features

DOAG K&A 2019, Nürnberg (Germany)

Oli Sennhauser

Senior MariaDB and MySQL Consultant at FromDual GmbH

<https://www.fromdual.com/presentations>



About FromDual GmbH

www.fromdual.com



Enterprise Support



Training



Consulting



remote-DBA





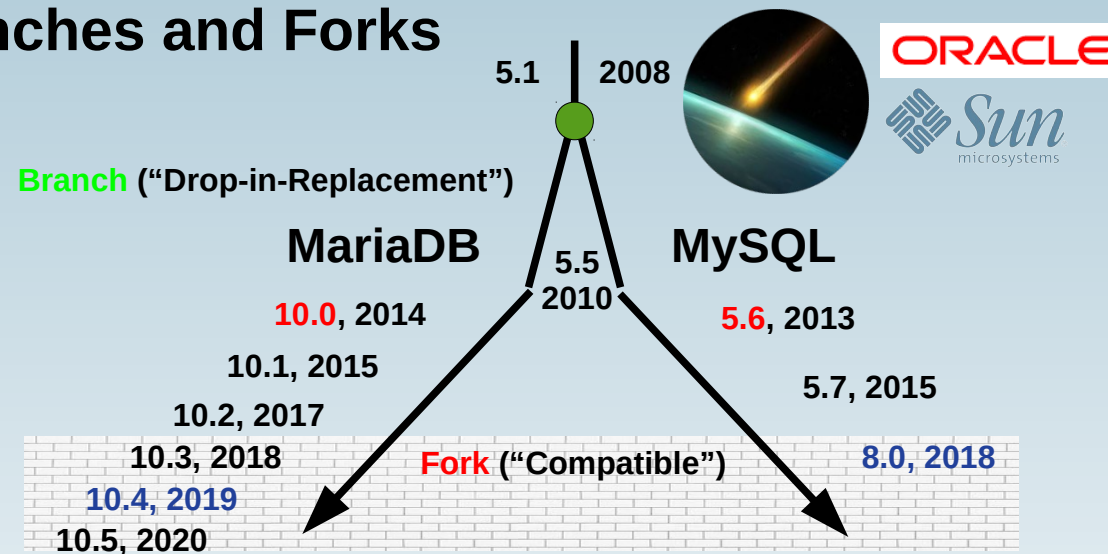
Contents

MariaDB 10.4 – New Features

- **Branches and Forks**
- **MariaDB and Linux Distributions**
- **Authentication**
- **InnoDB**
- **MariaDB Optimizer**
- **Application-Time Period Tables**
- **General Stuff**
- **Backup Stage**
- **Galera 4**
- **Outlook MariaDB 10.5**

Branches and Forks

- MariaDB and MySQL are Open Source (GPL v2)
 - This means everybody is allowed to DiY
 - → Branches and Forks



- Who uses a MariaDB/MySQL in here?
 - Chaos will happen! :-)
 - See Sybase ASE vs. MicroSoft SQL Server (1995(v6.0)-2005)
 - Examples: GTID, Protocol X, MariaDB CS, Virtual Columns, JSON, User Management, Group Replication, PL/SQL, etc.

MariaDB and Linux Distros

- Redhat/CentOS:
 - 6 → [MySQL 5.1](#)
 - 7 → [MariaDB 5.5](#)
 - 8 → [MariaDB 10.3](#), [MySQL 8.0](#)
- Ubuntu:
 - 16.04 → [MySQL 5.7](#)
 - 18.04 → [MySQL 5.7](#) ([MariaDB 10.1](#))
 - 20.04 → ? (Ubuntu 19.10: [MySQL 8.0](#) ([MariaDB 10.3](#)))
- Debian:
 - 8 → [MySQL 5.5](#)
 - 9 → [MariaDB 10.1](#)
 - 10 → [MariaDB 10.3](#)
- SuSE SLE / OpenSuSE:
 - 12 → [MariaDB 10.0](#)
 - 15 → [MariaDB 10.2](#)
 - Leap 42 → [MariaDB 10.0](#), Leap 15, → [MariaDB 10.2](#)

MariaDB IPO



DATA CENTRE SOFTWARE SECURITY DEVOPS BUSINESS PERSONAL TECH SCIENCE EMERGENT TECH BOOTNOTES LECTURES

Michael Howard: Embrace of open source is destroying 'artificial definitions' of legacy vendors

MariaDB boss says IPO is part of his 3-year plan

By [Rebecca Hill](#) 13 Nov 2018 at 09:04 26  SHARE ▼

Interview Michael Howard, Berkley grad and alumnus of Oracle and EMC, took the helm at open-source biz MariaDB almost three years ago. Reflecting on how things have changed, he reckons the biggest shift is in how both investors and enterprise have embrace open-source. Now, he has an IPO on his mind.

In an interview with *EI Reg*, Howard – who, as noted at the time of his [appointment](#), has worked for a number of companies who were slurped up by bigger businesses – said the end of 2018 will see the end of the first year of a three-year plan he devised for the firm.

IPO 2020 ???



Retrospect MariaDB 10.3

- GA May 2018
- Invisible Columns
- System-versioned Tables
- Instant ADD COLUMN
- Storage Engine independent Column Compression
- Semi-synchronous Replication Built-in (before Plug-in)
- PROXY Protocol Support (Galera/HAproxy)
- Optimizer Improvements (SQL Performance)
- Aggregate Stored Functions (DWH, MariaDB Column Store)
- Oracle Compatibility (`sql_mode = ORACLE`)
- Oracle PL/SQL Packages, Oracle Style Sequences
- and many, many more...

MariaDB 10.4 - Overview

- **GA June 2019 (10.4.6)**
 - → wait 6 – 12 months for production (mid 2020)!
 - Still very poor quality (especially Galera 4!)
 - Regression in 10.4.9 (5. 11. 2019)
 - Remember MySQL IPO plan 2005: 5.0 was “worst release ever”
- **Cloud... (IPO?)**
- **Standard compliant (IPO?)**
- **More feature complete**

Authentication

- **unix_socket authentication is default!**

- Access if O/S user = DB user
- New DB user: mysql

- **User Password Expiry:**

```
ALTER USER 'oli'@'localhost'  
PASSWORD EXPIRE INTERVAL 90 DAY;
```

- **Account Locking:**

```
ALTER USER 'oli'@'localhost' ACCOUNT LOCK;
```

- **Table mysql.user is retired!!!**

- → Can break Admin Applications...
- New: mysql.global_priv Table

- **More than 1 authentication plugin possible**

- → slowly migrate users to more secure authentication
- CREATE USER admin@localhost IDENTIFIED VIA unix_socket OR mysql_native_password USING 'secret';



InnoDB

- Instant DROP COLUMN operation
 - Changing of column order
 - More Instant operations (VARCHAR, collation and character set)
- Improvements in Index DDL
 - RENAME INDEX
- Merge InnoDB changes from “upstream”
- InnoDB row length count fixed (10.4.7)
 - Leads to errors:

```
[Warning] InnoDB: Cannot add field `thumbnails` in table `test`.`products` because after adding it, the row size is 8702 which is greater than maximum allowed size (8126) for a record on index leaf page.
```

InnoDB Instant DDL

```
ALTER TABLE test
  ADD COLUMN d BIGINT
  /*!100400 , ALGORITHM=INSTANT */;
Query OK, 0 rows affected (0.247 sec)
```

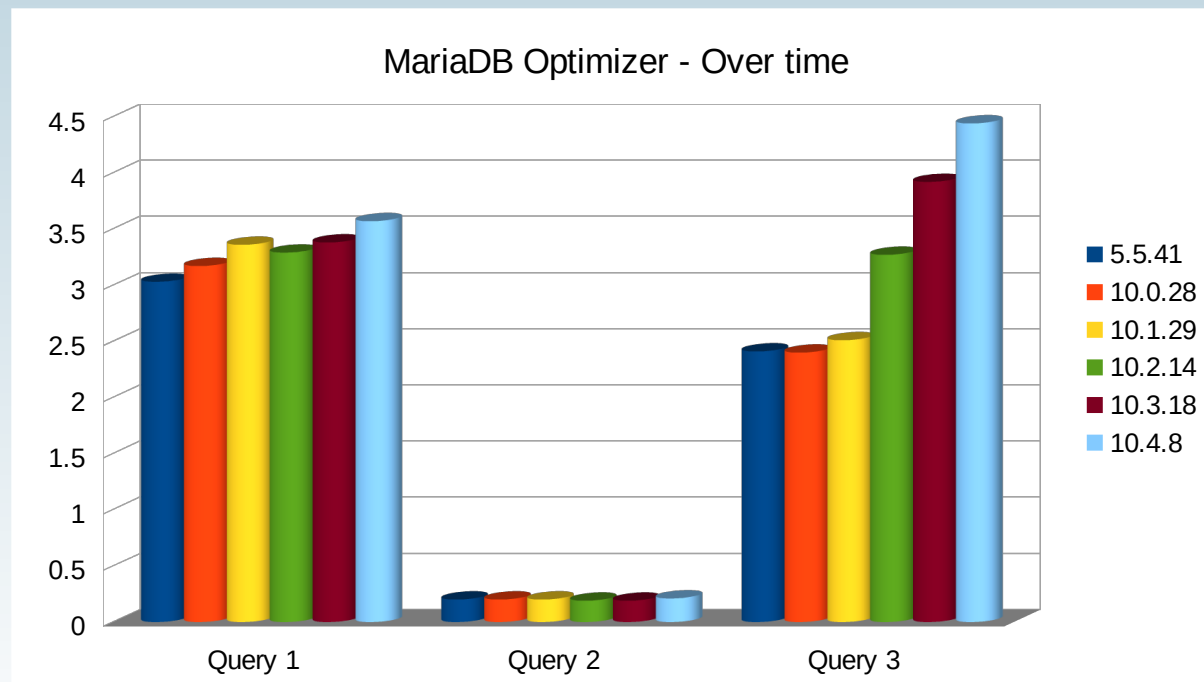
```
ALTER TABLE test MODIFY COLUMN
  c BIGINT(20) DEFAULT NULL AFTER d
  /*!100400 , ALGORITHM=INSTANT */;
Query OK, 0 rows affected (0.072 sec)
```

Optimizer

- **Optimizer Trace:**
 - `SET SESSION optimizer_trace='enabled=on';`
 - `I_S.optimizer_trace`
- **SE Independent Table Statistics**
 - Histogram collection by default
- **Improved Condition Pushdown Optimization**
 - `SELECT ... WHERE xxx AND ... IN (<subquery>)`
- **Automatic optimized use of Join Buffer**
 - Exists since 5.3.0 but was disabled :-)
- **Rowid Filtering Optimization**
 - `WHERE a.date BETWEEN '2018-01-01' AND '2018-01-31'
AND b.price between 200000 and 230000;`
- **But...**

Optimizer – Query Runtime

	5.5.41	10.0.28	10.1.29	10.2.14	10.3.18	10.4.8
Query 1	3.03	3.17	3.36	3.29	3.38	3.57
Query 2	0.20	0.20	0.20	0.19	0.19	0.21
Query 3	2.41	2.40	2.51	3.27	3.92	4.44



Optimizer Trace

```
SQL> SET SESSION optimizer_trace='enabled=on';
SQL> EXPLAIN SELECT * FROM test WHERE id <10;
SQL> SELECT trace
      FROM information_schema.optimizer_trace;
```

```

"steps": [
  {
    "condition_processing": {
      "condition": "WHERE",
      "original_condition": "test.`id` < 10",
      "steps": [
        {
          "transformation": "equality_propagation",
          "resulting_condition": "test.`id` < 10"
        },
        {
          "transformation": "constant_propagation",
          "resulting_condition": "test.`id` < 10"
        },
        {
          "transformation": "trivial_condition_removal",
          "resulting_condition": "test.`id` < 10"
        }
      ]
    }
  }
]

```

Application-Time Period Tables

- ISO/IEC 9075, SQL:2011 Part 2
- MariaDB 10.3: System Versioned Tables
- Journal/Tracking of an Item.

```
CREATE TABLE employee (  
  ID          INT UNSIGNED NOT NULL  
  , Start     DATE  
  , End       DATE  
  , Department VARCHAR(32)  
  , Position  VARCHAR(32)  
  , PRIMARY KEY (ID, Start, End)  
  , PERIOD FOR Period (Start, End)  
);
```

- **AUTO_INCREMENT ID is NO good plan!**

Lend Employee

```

UPDATE employee
  FOR PORTION OF Period
  FROM '2018-03-15' TO '2018-07-15'
  SET Department = 'Development'
      Position = 'DBA'
WHERE ID = 12345

```

```

;
Query OK, 1 row affected (0.000 sec)
Rows matched: 1  Changed: 1  Inserted: 2  Warnings: 0

```

```

SELECT * FROM employee ORDER BY Start;

```

ID	Start	End	Department	Position
12345	2017-01-01	2018-03-15	Engineering	Junior DBA
12345	2018-03-15	2018-07-15	Development	DBA
12345	2018-07-15	9999-12-31	Engineering	Junior DBA

Upgrade Employee

```

UPDATE employee
  FOR PORTION OF Period
  FROM '2018-07-15'
  TO '9999-12-31'
  SET Position = 'DBA'
WHERE ID = 12345
;

```

ID	Start	End	Department	Position
12345	2017-01-01	2018-03-15	Engineering	Junior DBA
12345	2018-03-15	2018-07-15	Development	DBA
12345	2018-07-15	9999-12-31	Engineering	DBA

1 year vacation (unpaid)

```
DELETE FROM employee
      FOR PORTION OF Period
      FROM '2018-09-30'    -- !?!
      TO   '2019-10-01'    -- !?!
WHERE ID = 12345
;
```

ID	Start	End	Department	Position
12345	2017-01-01	2018-03-15	Engineering	Junior DBA
12345	2018-03-15	2018-07-15	Development	DBA
12345	2018-07-15	2018-09-30	Engineering	DBA
12345	2019-10-01	9999-12-31	Engineering	DBA

Querying

What is valid now?

```
SELECT *  
  FROM employee  
 WHERE Start <= CURRENT_DATE()  
        AND End > CURRENT_DATE()  
;
```

What was valid during last year?

```
SELECT *  
  FROM employee  
 WHERE End >= '2018-01-01'  
        AND Start <= '2018-12-31'  
;
```

Syntax – Variables – Replication

- **Bitemporal Tables is also possible**
 - Combination of system versioned and application-time periods
- **SQL> FLUSH SSL;**
 - Dynamically exchange servers TLS certificates
- **SQL> INSTALL/UNINSTALL IF [NOT] EXISTS PLUGIN ...**
- **Variables: Some minor changes...**
- **Replication:**
 - GTID clean-up (`gtid_cleanup_batch_size`)
 - Binary Log Rotation speed up
 - **SQL> SHUTDOWN WAIT FOR ALL SLAVES;**



General

- **System Tables (`mysql.*`) Crash-safe Aria!**
- **Commands `mysql*` → `mariadb*`**
 - Expected but breaks with many applications! :-)
- **Performance improvements for Unicode collations**
- **User data type plugin (work in progress)**
 - Oracle `TYPE ... TABLE OF, ... AS OBJECT OF`
- **Much faster privilege checks (Cloud)**
 - Many users accounts or database grants
- **MS SQL Server compatibility: `sql_mode = MSSQL`**
 - “For the moment MSSQL mode only has limited functionality, but we plan to add more later according to demand.”
- **JSON: `JSON_MERGE_PATCH` and `JSON_MERGE_PRESERVE`**

BACKUP STAGE

- Differences between MariaDB Community and Enterprise Server :-(
• More efficient Backup Locks for Storage Snapshots:

```
SQL> BACKUP STAGE START;
```

```
SQL> BACKUP STAGE BLOCK_COMMIT;
```

```
SQL> system lvcreate --size 1G --snapshot \  
--name snapshot /dev/vg/snapshots
```

```
SQL> BACKUP STAGE END;
```

- Now officially supported (thanks to Cloud)!
- Better than FLUSH TABLES WITH READ LOCK;



Galera 4

- Galera ready by default since MariaDB 10.1
- New Galera Tables
 - `mysql.wsrep_{cluster,cluster_members,streaming_log}`
- Streaming Replication
 - Transactions of unlimited size
 - Replicates gradually in small fragments
 - Dynamically per session: `wsrep_trx_fragment_size = <n>`
 - Usefull size ~10k rows
 - Degrades transaction throughput!!!
 - Conflicts with LOAD DATA splitting (`wsrep_load_data_splitting`)
- Rolling Upgrade from Galera 3 to 4 is supported
- Completely not mature yet (10.4.10) also w/o Streaming Repl!



Outlook MariaDB 10.5

- **INSERT/REPLACE ... RETURNING**
- **S3 Storage Engine (Archive in the Cloud)**
- **Aria SE improvements (for S3 SE?)**
- **Thread Pool Statistics (Cloud?)**
- **InnoDB clean-up**
- **MySQL extended Binlog Metadata from Upstream**
- **INFORMATION_SCHEMA improvements**
- **Perl Scripts from `DBD::mysql` → `DBD::MariaDB`**
- **→ a bit too quite IMHO atm**

Q & A



Questions ?

Discussion?

We have time for some face-to-face talks...

- **FromDual provides neutral and independent:**
 - **Consulting**
 - **Training**
 - **Remote-DBA**
 - **Support for MariaDB, Galera Cluster and MySQL**