

Meet the 10.2

Sergei Golubchik
MariaDB Corporation

10.2

- **Facts**
 - **About a year in active development**
 - **Currently at 10.2.2-beta**
- **Plans**
 - **Gamma soon**
 - **GA by the end of the year**

10.2

- **Analytical queries**
- **Removing historical limitations**
- **Client and protocol**
- **Optimizations**
- **MySQL compatibility**

- **GSoC!**

Analytical queries

Common Table Expressions

Subquery in the FROM clause

```
SELECT * FROM t2,  
       (SELECT a FROM t1 WHERE b >= 'c') AS sq  
WHERE t2.c=sq.a;
```

Common Table Expressions

```
WITH sq AS (SELECT a FROM t1 WHERE b >= 'c')  
SELECT * FROM t2, sq WHERE t2.c=sq.a;
```

Again...

```
SELECT * FROM t2,  
       (SELECT a FROM t1 WHERE b >= 'c') AS sq  
WHERE t2.c=sq.a;
```

```
WITH sq AS (SELECT a FROM t1 WHERE b >= 'c')  
SELECT * FROM t2, sq WHERE t2.c=sq.a;
```

Recursive CTE

```
WITH RECURSIVE ancestors AS (  
  SELECT * FROM folks WHERE name = 'Sergei'  
  UNION ALL  
  SELECT folks.* FROM folks, ancestors  
     WHERE folks.id = ancestors.father  
     OR    folks.id = ancestors.mother  
)  
SELECT * FROM ancestors;
```


Recursive CTE: factorial

```
WITH RECURSIVE fact AS
  (SELECT 1 AS n, 1 AS `n!` UNION ALL
   SELECT n+1, `n!`*(n+1) FROM fact WHERE n < 20
 ) SELECT * FROM fact;
```

n	n!
1	1
2	2
3	6
4	24
5	120
...	
20	2432902008176640000

Recursive CTE: Fibonacci

```
WITH RECURSIVE fib (a, b) AS
  (SELECT 1, 1 UNION ALL
   SELECT b, a+b FROM fib WHERE b < 200000
 ) SELECT a FROM fib;
```

```
+-----+
| a      |
+-----+
|      1 |
|      1 |
|      2 |
|      3 |
|      5 |
|      8 |
|     13 |
|     ...
```

More information

**Common Table Expressions in MariaDB 10.2
by Sergei Petrunia and Galina Shalygina
yesterday, 11:20 at St. Gallen**

Analytical queries

Window functions

The schema

```
CREATE TABLE profile (  
  start DECIMAL(4, 1) NOT NULL,  
  duration DECIMAL(8, 3) NOT NULL,  
  url VARCHAR(255) NOT NULL,  
  size BIGINT UNSIGNED NOT NULL  
);  
INSERT profile VALUES (0, 515.222, '/', 109421); -- https://www.percona.com  
INSERT profile VALUES (0.492, 439.851, '/sites/default/files/css/css_ThLHjJfm8uowk-CB  
INSERT profile VALUES (0.492, 455.253, '/sites/default/files/css/css_e9ilo2m_GsLXCeIe  
INSERT profile VALUES (1.477, 704.539, '/sites/default/files/menuimage/mysql-menu_0.j  
INSERT profile VALUES (1.532, 751.988, '/sites/default/files/Last10.png', 85069);  
INSERT profile VALUES (2.119, 597.272, '/sites/all/modules/md_slider/images/light-tim  
INSERT profile VALUES (3.594, 166.540, '/sites/default/files/favicon_0.ico', 894);  
...
```

Stats

```
SELECT * FROM profile;
```

```
+-----+-----+-----+
| start | duration | url
+-----+-----+-----+
| 0.000 | 515.222  | /
...
| 3.594 | 166.540  | /sites/default/files/favicon_0.ico
+-----+-----+-----+
```

```
SELECT COUNT(*), SUM(duration) FROM profile;
```

```
+-----+-----+
| count(*) | sum(duration) |
+-----+-----+
|          56 | 27909.295      |
+-----+-----+
```

```
1 row in set (0.00 sec)
```

Running total

```
SELECT start, duration,  
       (SELECT SUM(p.duration) FROM profile p  
        WHERE p.start <= profile.start) rt, url  
FROM profile ORDER BY start;
```

start	duration	rt	url
0.000	515.222	515.222	/
0.489	269.333	784.555	/sites/default/files/css/css_lQaZfjVp
0.492	439.851	2226.234	/sites/default/files/css/css_ThLHjJfm
0.492	455.253	2226.234	/sites/default/files/css/css_e9i1o2m
...			
3.574	154.049	27742.755	https://track.hubspot.com/__ptq.gif?k
3.594	166.540	27909.295	/sites/default/files/favicon_0.ico

Running total

```
SELECT start, duration,  
       SUM(duration) OVER (ORDER BY start) rt, url  
FROM profile;
```


Ntile

```
SELECT duration,  
       NTILE(10) OVER (ORDER BY duration) nt, url  
FROM profile ORDER BY duration DESC;
```

duration	nt	url
1297.196	10	/sites/default/files/support-lifesaver.png
1221.500	10	/sites/default/files/bg-slide-plam.jpg
1166.282	10	/sites/default/files/pxdbc-white.png
1132.411	10	/sites/default/files/find-out-slider_1.png
1074.529	10	/sites/default/files/tokumx-white_3.png
999.368	9	/sites/all/themes/percona2015/images/optimize.png
943.001	9	/sites/all/themes/percona2015/images/manage.png
...		

Running average

```
SELECT start,  
       AVG(size/duration) OVER (ORDER BY start  
                               ROWS BETWEEN 3 PRECEDING AND 3 FOLLOWING)  
FROM profile ORDER BY start;
```

More information

Optimizing Queries Using Window Functions
by Vicentiu-Marian Ciorbaru
today, 16:25 at Winterthur

Removing limitations

Temporary tables

Before 10.2: self-join

```
CREATE TEMPORARY TABLE employees (  
  id INT PRIMARY KEY,  
  name VARCHAR(100),  
  reports_to INT);  
Query OK, 0 rows affected (0.00 sec)  
  
INSERT employees VALUES (1, 'Rasmus', NULL), (2, 'Sergei', 1);  
Query OK, 1 rows affected (0.00 sec)  
  
SELECT e.name, m.name AS manager FROM employees e, employees m  
  WHERE e.reports_to=m.id;  
ERROR 1137 (HY000): Can't reopen table: 'employees'
```

Temporary tables in 10.2

```
CREATE TEMPORARY TABLE employees (  
  id INT PRIMARY KEY,  
  name VARCHAR(100),  
  reports_to INT);  
INSERT employees VALUES (1, 'Rasmus', NULL), (2, 'Sergei', 1);  
  
SELECT e.name, m.name AS manager FROM employees e, employees m  
  WHERE e.reports_to=m.id;
```

```
+-----+-----+  
| name  | manager |  
+-----+-----+  
| Sergei | Rasmus  |  
+-----+-----+
```

Removing limitations

CHECK constraint

CHECK constraint, 1998-2016

```
CREATE TABLE t1 (a INT, b INT CHECK (b > 10), CHECK (a > b));  
Query OK, 0 rows affected (0.00 sec)  
  
INSERT t1 VALUES (5, 6);  
Query OK, 1 row affected (0.00 sec)
```

Wait, what?

CHECK constraint in 10.2

```
CREATE TABLE t1 (a INT, b INT CHECK (b > 10), CHECK (a > b));
```

```
INSERT t1 VALUES (5, 6);
```

```
ERROR 4025 (23000): CONSTRAINT `b` failed for `test`.`t1`
```

```
INSERT t1 VALUES (5, 16);
```

```
ERROR 4025 (23000): CONSTRAINT `CONSTRAINT_1` failed for `test`.`t1`
```

Removing limitations

DEFAULT clause

DEFAULT clause in 10.2

- Expressions
- DEFAULT for BLOBs

```
CREATE TABLE defs (  
  uid CHAR(32) DEFAULT UUID(),  
  c1 INT, c2 INT DEFAULT (c1 + 1),  
  data BLOB DEFAULT 'foo'  
);
```

Removing more limitations: generated columns

- Up to 64K per expression (was 252 bytes)
- Can use constant expressions
- Can refer to other virtual columns
- Can use non-deterministic functions (UDFs, server variables, ...)

```
CREATE TABLE t1 (  
  a INT GENERATED ALWAYS AS (10),  
  b INT GENERATED ALWAYS AS (a+1),  
  c TIMESTAMP GENERATED ALWAYS AS (NOW() + INTERVAL 1 HOUR)  
);
```

Removing even more limitations

- longer DECIMAL

```
CREATE TABLE t1 (a DECIMAL(65, 38));
```

- Views and subqueries in the FROM clause

```
CREATE VIEW v1 AS  
  SELECT * FROM (SELECT a+1 FROM t1) x;
```

Other features

New user management commands

```
CREATE USER foo@bar REQUIRE SSL WITH MAX_QUERIES_PER_HOUR 10;
```

```
Query OK, 0 rows affected (0.00 sec)
```

```
ALTER USER foo@bar IDENTIFIED VIA pam WITH MAX_USER_CONNECTIONS 3;
```

```
Query OK, 0 rows affected (0.00 sec)
```

```
SHOW CREATE USER foo@bar;
```

```
+-----+  
| CREATE USER for foo@bar  
+-----+  
| CREATE USER 'foo'@'bar' IDENTIFIED VIA pam REQUIRE SSL  
WITH MAX_QUERIES_PER_HOUR 10 MAX_USER_CONNECTIONS 3  
+-----+
```

Even more

- NO PAD collations
- INFORMATION_SCHEMA.USER_VARIABLES
- mysqlbinlog continuous backup
- mysqld -version=xxx

```
[server]  
version=5.6.10-fake-as-a-three-dollar-bill
```


InnoDB 5.7

New client library

and protocol enhancements

Client library

- **MariaDB Connector/C**
- **for MySQL and MariaDB**
- **libmysqlclient API compatible**
- **LGPL**
- **OpenSSL/GnuTLS/schannel**

Protocol Enhancements

- **COM_MULTI - command bundling**
- **EXECUTE IMMEDIATE**
- **session trackers**

- **bulk operations**
- **bundling in the authentication packet**

Optimizer

**Condition pushdown into non-mergeable
derived tables and views**

Using views: MERGE is good

```
CREATE TABLE t1 (a INT UNIQUE, b INT);
CREATE TABLE t2 (a INT UNIQUE, b INT);
CREATE VIEW v1 AS SELECT a+b AS c FROM t1 WHERE a>2;
EXPLAIN EXTENDED SELECT * FROM v1, t2 WHERE a=c AND c<100;
```

id	select_type	table	type	key	rows	filtered	Extra
1	SIMPLE	t1	ALL	NULL	1000	99.80	Using where
1	SIMPLE	t2	ref	a	11	100.00	Using where

Note (Code 1003): select t1.a + t1.b AS c,t2.a,t2.b from t1 join t2 where t2.a = t1.a + t1.b and t1.a + t1.b < 100 and t1.a > 2

Using views: no MERGE is not good

```
CREATE VIEW v2 AS SELECT a+b AS c FROM t1 WHERE a > 2 GROUP BY c;
EXPLAIN EXTENDED SELECT * FROM v2, t2 WHERE a=c AND c<100;
```

id	select_type	table	type	Extra
1	PRIMARY	t2	ALL	Using where
1	PRIMARY	<derived2>	ref	Using where
2	DERIVED	t1	ALL	Using where; Using temporary

3 rows in set, 1 warning (0.00 sec)

Note (Code 1003): select v2.c,t2.a,t2.b from v2 join t2 where t2.a = v2.c and v2.c < 100

Condition pushdown into non-mergeable views

```
SET optimizer_switch='condition_pushdown_for_derived=on';
EXPLAIN FORMAT=JSON SELECT * FROM v2, t2 WHERE a=c AND c<100;
...
  "materialized": {
    "query_block": {
      "temporary_table": {
        ...
        "filtered": 99.8,
        "attached_condition": "t1.a>2 and t1.a+t1.b<100"
      }
    }
  }
...

```


Performance

Performance improvements

- ▣▣▣▣→ **Fast connect**
- ▣▣▣▣→ **CRC32 on P8**
- ▣▣▣▣→ **partitioned auto-scaling table cache**
- ▣▣▣▣→ **thread pool with prioritization**
- ▣▣▣▣→ **non-blocking ANALYZE TABLE**

GSoC

GSoC

- **NO PAD collations (Daniil Medvedev)**
- **Condition pushdown into non-mergeable views (Galina Shalygina)**
- **CREATE AGGREGATE FUNCTION (Varun Gupta)**
- **Long UNIQUE constraint (Shubham Barai, Sachin Setia)**
- **Invisible columns (Sachin Setia)**

You too can contribute!

- **Code: <https://github.com/mariadb/server>**
- **KnowledgeBase: <https://mariadb.com/kb/>**
- **Bugs: <https://jira.mariadb.org/>**
- **IRC: #maria on Freenode**
- **Mailing list: maria-discuss@lists.launchpad.net**
- **Feedback plugin: enable-feedback in my.cnf**
- **And don't forget to rate this talk**

Questions?