New Features in
MySQL 5.0, 5.1, and Beyond

Jim Winstead

`jimw@mysql.com`

Southern California Linux Expo

February 2006

MySQL AB

The World's Most Popular Open Source Database

5.0: GA on 19 October 2005

- Expanded SQL standard support:
  - Stored procedures and functions
  - Triggers
  - Views
  - INFORMATION_SCHEMA
  - True VARCHAR
  - True DECIMAL (precision math)
  - SQL Mode
- XA (Distributed transactions)
- Federated and archive storage engines

Stored procedures and functions

```
mysql> DELIMITER //

mysql> CREATE PROCEDURE simpleproc (OUT param1 INT)
    -> BEGIN
    ->   SELECT COUNT(*) INTO param1 FROM t;
    -> END//
Query OK, 0 rows affected (0.00 sec)

mysql> CALL simpleproc(@a)//
Query OK, 0 rows affected (0.00 sec)

mysql> SELECT @a//
+------+
| @a   |
+------+
| 3    |
+------+
1 row in set (0.00 sec)
```

Triggers

```
mysql> delimiter //
mysql> CREATE TRIGGER upd_check
    -> BEFORE UPDATE ON account
    -> FOR EACH ROW
    -> BEGIN
    ->     IF NEW.amount < 0 THEN
    ->         SET NEW.amount = 0;
    ->     ELSEIF NEW.amount > 100 THEN
    ->         SET NEW.amount = 100;
    ->     END IF;
    -> END;//
```

Views

```
mysql> CREATE TABLE t (qty INT, price INT);
mysql> INSERT INTO t VALUES(3, 50);
mysql> CREATE VIEW v AS
    -> SELECT qty, price, qty*price AS value
    ->   FROM t;
mysql> SELECT * FROM v;
+------+-------+-------+
| qty  | price | value |
+------+-------+-------+
|    3 |    50 |   150 |
+------+-------+-------+
```

INFORMATION_SCHEMA

```
mysql> SELECT table_name, table_type, engine
    -> FROM information_schema.tables
    -> WHERE table_schema = 'db5'
    -> ORDER BY table_name DESC;
+------------+------------+--------+
| table_name | table_type | engine |
+------------+------------+--------+
| v          | VIEW       | NULL   |
| t2         | BASE TABLE | MyISAM |
| t          | BASE TABLE | MyISAM |
| pk         | BASE TABLE | InnoDB |
| fk         | BASE TABLE | InnoDB |
+------------+------------+--------+
5 rows in set (0.01 sec)
```

True VARCHAR and True DECIMAL

- VARCHAR
  - Preserves trailing spaces
  - Length can be up to 65,535 characters (but only 65,532 effectively)
- DECIMAL
  - Calculations done using new fixed-point precision math library, with a precision of up to 65 digits

SQL mode

```
mysql> SET sql_mode = 'traditional';
Query OK, 0 rows affected (0.00 sec)

mysql> INSERT INTO t1
    ->    SET date_field = '2006-2-29';
ERROR 1292 (22007): Incorrect date value:
'2006-2-29' for column 'date_field' at row 1
```

New storage engines

- FEDERATED

  - Allows seamless access to a table on another MySQL server

  - Transaction support added in 5.1

  - Will be extended for heterogeneous federation in a later release

- ARCHIVE

  - No indexes (except auto_increment in 5.1)

  - Does zlib compression of data

  - Great for data warehousing

  - Fast BLOB skipping in 5.1

- BLACKHOLE

  - Useful in some replication setups

  - Supports transactions in 5.1

5.1: GA in Q2 2006

- Partitioning

- Row-based replication

- Cluster disk data

- Cluster replication

- Task scheduler

- Logs as tables

- Fast ALTER TABLE

- Plugin API

- XML (XPath)

Partitioning

- Allows for splitting data across different tables (which could be located on different disks)

- Supported by all storage engines (some natively, like Cluster)

- Partition pruning done by optimizer

- No parallelism (yet)

- Can partition by:
  - Range
  - Hash
  - Key
  - List

- Subpartitioning supported

Partition example
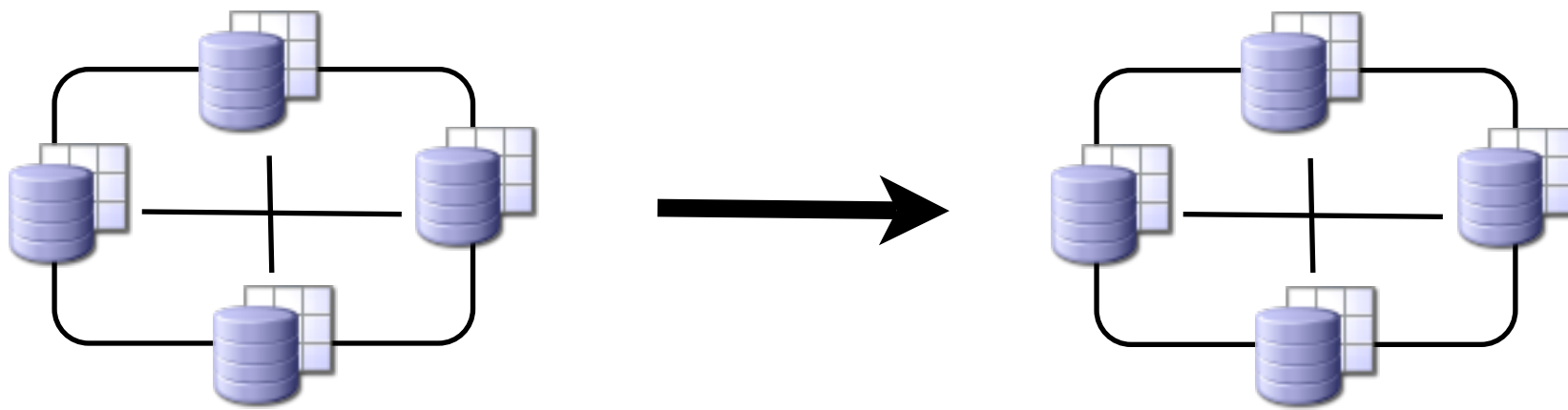
```
mysql> CREATE TABLE list_by_area (
    ->    store_number   INT            NOT NULL,
    ->   location       INT            NOT NULL,
    ->    rollup_date    DATE           NOT NULL,
    ->    store_recipts DECIMAL(10,2) NOT NULL)
    -> PARTITION BY LIST(location) (
    ->   PARTITION p1 VALUES IN (1,2),
    ->   PARTITION p2 VALUES IN (3),
    ->   PARTITION p3 VALUES IN (4,5)
    -> );
```

The World's Most Popular Open Source Database

Row-based replication

- Start server with **`--binlog-format=row`**

- Instead of logging statements, the binary log will instead contain images of the rows that are added, changed, or deleted

- DDL statements (like **`ALTER TABLE`**) are still logged as statements

New cluster features

- Disk-based data
  - Indexes must still fit in memory
- Variable-sized records (`VARCHAR` only takes up as much space/memory as necessary)
- Cluster replication

Task scheduler

```
mysql> delimiter //
mysql> CREATE EVENT optimize_tables
    -> ON SCHEDULE EVERY 1 WEEK
    -> STARTS '2006-03-05 1:00:00' /*Sunday*/
    -> ON COMPLETION PRESERVE
    -> DO
    -> BEGIN
    ->   OPTIMIZE TABLE test.table1;
    ->   OPTIMIZE TABLE test.table2;
    -> END//
```

Plugin API

- New framework for extending server functionality

- First plugins are for FULLTEXT indexing

  - Work sponsored by CNET

- Future areas for plugins:

  - Storage engines

  - Authentication and authorization

  - ?

XML (XPath)

```
mysql> SELECT
    ->     ExtractValue('<a>ccc<b>ddd</b></a>', '/a') AS v1,
    ->     ExtractValue('<a>ccc<b>ddd</b></a>', '/a/b') AS v2;
+------+------+
| v1   | v2   |
+------+------+
| ccc  | ddd  |
+------+------+
1 rows in set (0.01 sec)


mysql> SELECT
    ->     UpdateXML('<a><b>ccc</b><d></d></a>', '/a',
    ->               '<e>fff</e>') AS v1,
    ->     UpdateXML('<a><b>ccc</b><d></d></a>', '/b',
    ->               '<e>fff</e>') AS v2 \G

*************************** 1. row ***************************
v1: <e>fff</e>
v2: <a><b>ccc</b><d></d></a>
1 rows in set (0.01 sec)
```

...and Beyond

- 5.2 will (probably) include ROLES and pluggable authentication/authorization support

  – I'm (one of the people) writing it

- And a lot more that I can't talk about.

Questions?

Contact:

Jim Winstead

`jimw@mysql.com`