# Learning MySQL 5.7 Jervin Real July 2017



## **Agenda**

- 1. Background
- 2. New Features
- 3. Upgrading to 5.7

# Background and Current State



#### **Background and Current State**

#### In Comparison, MySQL 5.7 is:

- Percona Server 5.7
- MariaDB 10.1 (hybrid with 5.6)

#### Dates

- First GA in October 2015, 5.7.9
- Matured enough to adopt, stream of bug fixes
- 5.5 is now in extended support, 5.6 will be in extended support after Feb 2018
- This means likely 8.0 could go GA early 2018
- Do not be behind by more than one major version if possible



#### Some of them in <30 minutes ...

- JSON
- GIS
- Replication
  - Parallel Replication
  - Multi Source Replication
  - Semisync Improvements
  - Group Replication
- InnoDB Enhancements
- Online EXPLAIN
- Performance Schema and sys Schema
- Complete List of Changes: <a href="http://www.thecompletelistoffeatures.com">http://www.thecompletelistoffeatures.com</a>

#### **JSON**

- Native JSON Data Type
- utf8mb4 character set
- JSON Comparator
- Short-hand JSON\_EXTRACT operator
  - (field->"json\_path")
- Document validation on INSERT
- Indexes via scalar generated columns
- Functions to CREATE, SEARCH, MODIFY and return JSON values

#### **GIS**

- InnoDB supports indexing of spatial datatypes https://www.percona.com/blog/2016/02/03/new-gis-features-in-mysql-5-7/
- Consistent naming scheme for GIS functions
- GIS has been refactored internally; now based on Boost::Geometry
- Geohash functions
- GeoJSON functions
- Functions: ST\_Distance\_Sphere, ST\_MakeEnvelope, ST\_IsValid, ST\_Validate, ST\_Simplify, ST\_Buffer and ST\_IsSimple

#### Replication (1)

• Online changes to Replication Filters

```
CHANGE REPLICATION FILTER
REPLICATE_WILD_DO_TABLE = ('db1.old%');
```

• Parallel replication - Group Commit

```
STOP SLAVE;
SET GLOBAL slave_parallel_workers=32;
SET GLOBAL slave_parallel_type='LOGICAL_CLOCK';
START SLAVE;
```

- Multi-source replication
  - o FOR CHANNEL 'channel'
  - Replication filters not configurable per channel
  - Support multi-threaded slave
  - Monitoring support in Performance\_Schema



## Replication (2)

- Improved Semisync Replication
  - Semi-sync can now wait for N slaves acknowledgement

```
rpl_semi_sync_master_wait_for_slave_count = N
```

- Online GTID Deployment (already available on Percona Server 5.6)
- Group Replication

#### InnoDB (1)

• Online Buffer Pool Resize

```
SET GLOBAL innodb_buffer_pool_size=402653184;
SHOW GLOBAL STATUS LIKE 'innodb_buffer_pool_resize%';
```

- ALTER TABLE RENAME INDEX; meta-data change
- General Tablespace Support

```
CREATE TABLESPACE test
ADD DATAFILE '/tmp/tmp_general_tablespace.ibd';
ALTER TABLE test.title TABLESPACE=test;
CREATE TABLE test.testtblspc (a int) TABLESPACE=test;
```

#### InnoDB (2)

- Separate tablespace for temporary tables.
  - No redo log, special UNDO log for ROLLBACK TO SAVEPOINT.
  - No fsync()s, reduces IO overhead
- Virtual Columns
  - Metadata only, not stored by default
  - Can be indexed to support tricky queries

#### **EXPLAIN for CONNECTION**

#### Performance\_Schema and sys Schema (1)

- Overhead has been reduced in client connect/disconnect phases
- Memory footprint has been reduced, auto-size/auto-scale but never deallocated
- Number of new instrumentations added, including watching itself i.e. memory usage, lost metrics
  - MDL lock
  - Memory per user, by event, etc
  - Estimation for ALTER statement progress
- SYS schema is now bundled by default

#### Performance\_Schema and sys Schema (2)

- 100 new views, 21 new stored functions and 26 new stored procedures
- Table IO statistics are now batched for improved performance
  - For workloads that are read heavy
- Better replication monitoring specially for multi-source and multithreaded



#### Installation

- *test* database no longer created
- Anonymous users no longer created
- Random password generated during install
- Auto generation of SSL keys (CA, cert, key) by default

#### New Configuration Defaults (Replication)

```
binlog_format=ROW # OLD: STATEMENT

binlog_gtid_simple_recovery=1 # OLD: 0

binlog_error_action=ABORT_SERVER # OLD: IGNORE_ERROR

slave_net_timeout=60 # OLD: 3600

sync_binlog=1 # OLD: 0
```

## New Configuration Defaults (InnoDB)

```
innodb buffer pool dump at shutdown=1
                                          # OLD: 0
innodb buffer pool load at startup=1
                                          # OLD: 0
innodb file format=Barracuda
                                          # OLD: Antelope
innodb default row format=DYNAMIC
                                          # OLD: COMPACT
                                          # OLD: 1
innodb page cleaners=4
innodb purge threads=4
                                          # OLD: 1
innodb strict mode=1
                                          # OLD: 0
innodb checksum algorithm=crc32
                                          # OLD: innodb
```

#### New Configuration Defaults (Optimizer)

```
internal_tmp_disk_storage_engine=INNODB # OLD: MyISAM (hardcoded)
eq_range_index_dive_limit=200 # OLD: 10

sql_mode=ONLY_FULL_GROUP_BY, STRICT_TRANS_TABLES,
    NO_ZERO_IN_DATE, NO_ZERO_DATE,
    ERROR_FOR_DIVISION_BY_ZERO, NO_AUTO_CREATE_USER,
    NO_ENGINE_SUBSTITUTION # OLD: NO_ENGINE_SUBSTITUTION
```

#### Deprecations and Imcompatibilities

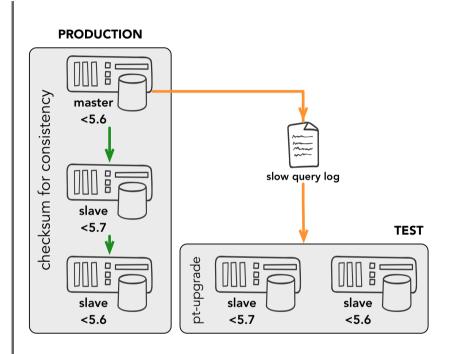
- Old pre-4.1 password formats and functions has been removed
- YEAR(2) to YEAR(4)
- INSERT DELAYED is no longer supported

## Upgrade Procedure (Oracle)

- 5.6 to 5.7 is the only upgrade path officially supported
- Backup your data
- Read all release notes and assess
- In-Place Upgrade:
  - Clean shutdown (innodb\_fast\_shutdown=0)
  - Run mysql\_upgrade (beware of Barracuda)
- Logical Upgrade:
  - mysqldump data
  - Import data again
  - Run mysql\_upgrade to fix mysql schema

#### Upgrade Procedure - Tests

- Read consistency checks with pttable-checksum
- Write consistency checks with ptupgrade using slow logs
- Perform real world workload on separate environment
- Chained replication for rollback contingency
- Test mysql\_upgrade too, parallelization helps!



# Questions!



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https://www.percona.com/live/e17/percona-live-call-for-papers

