MySQL 5.6 and Percona Server 5.6

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About Percona

- Everything MySQL and MySQL Variants
- Started in 2006
- Vendor Neutral
- Distributed Company
  - More than 20 different countries, 10 different states
  - “Headquarters” in Durham, NC
- Always looking for smart people
Percona and MySQL Ecosystem

• MySQL Performance Blog
  • http://www.mysqlperformanceblog.com
• Spreading MySQL World
  • Conferences, Users Groups, Training
• Open Source Software
  • Percona Server
  • Percona Toolkit
  • Percona XtraDB Cluster
  • Percona Toolkit
Open for Business

• Helping businesses (big and small) to reach full potential with MySQL
  • Consulting
  • Support
  • RemoteDBA
  • Training
About Presentation

• Brief Overview
• Birds eye view of features in 5.6 and Percona Server 5.6
• Documentation + Production use
  • MySQL 5.6 is not very broadly used yet (around 8%)
• Focus on Why and When the feature is important for you
MySQL 5.6

• Looks to be great release!
• Have been GA since 5th of February 2013
• A bit over 2 years since MySQL 5.5 GA
  • Work on some 5.6 features started 4+ years ago
• A lot of focus on conventional MySQL usage
When to Upgrade to MySQL 5.6

- What specific benefits are you looking from upgrade?
- Use it for any new development
- Reasonably safe to upgrade
  - Especially if not relaying on bleeding edge features
Percona and MySQL 5.6

- Percona is ready to help you to be successful with MySQL 5.6
- MySQL 5.6 is fully supported by our Support, Consulting, RemoteDBA teams
- Percona Software support for 5.6 is current or on a way
- Learn more
Percona Server 5.6

- Percona Server 5.6 Available as GA
  - Since October 2013
- Includes All MySQL 5.6 features plus Percona Improvements
Percona Server 5.6 Value

- Performance and Scalability
- Operational Features
- Transparency
- Access to features which are close source in MySQL
PS 5.6 Performance

• MySQL 5.6 focuses a lot of Performance issues
  • Many Previous Percona Server ideas have been implemented in MySQL
• Our Development team found more great opportunities for optimizations
  • Performance, Stable Performance
  • Mutexes; Flushing Code; Balancing
Scalability with Many Threads

Test: sysbench: IO bound
32 tables, 12M rows each/BS=25GB

Transactions per second, tps

Number of threads

Server:
- MySQL Server 5.6.13
- Percona Server 5.6.13 bp-split-prejoins

www.percona.com
Many Concurrent Transactions

Test: sysbench/8 tables, 1M rows each

<table>
<thead>
<tr>
<th>Server</th>
<th>Percona Server</th>
<th>MySQL Server</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version</td>
<td>5.5.30-rel30.2</td>
<td>5.6.10</td>
</tr>
<tr>
<td>jemalloc</td>
<td></td>
<td>jemalloc</td>
</tr>
</tbody>
</table>

Transactions per second, tps

Number of threads
Better Backup

- Features to support better backup with Percona Xtrabackup
  - Page Change Tracking
    - Supporting real incremental backup
  - Log Archiving
    - Recover from full backup using innodb transactional logs
Make it Open

- Thread Pool for handling very large number of connections
  - “MySQL Enterprise Scalability”
- PAM Plugin
  - “MySQL Enterprise Security”
Percona XtraDB Cluster 5.6

- PXC 5.6 is Release Candidate now
- Great potential of joining MySQL 5.6 replication improvements
  - With Galera Replication technology
Feature Categories

• Scalability
• Optimizer and Execution
• Replication
• Transparency
• Database Operations
• New Functionality
• Security
Scalability

• Innodb Storage engine in Focus
• Scalable Read Only Transactions
• Non Recursive Deadlock Detection
• Improved Innodb Thread Concurrency
• Multiple Background Purge Threads
• Improved Purge Lag Control
• Improved Adaptive Flushing
• Support for Large (over 4GB) redo logs
Scalability

- Split of “Kernel Mutex”
- Data Dictionary Cache
- Page Cleaner / Separate Flush Thread
- Group Commit for Binary Log
- Reduced InnoDB Memory Fragmentation
- Reduced Locking for Partitioned Tables
- Reduced Contention for LOCK_open
- Multiple table_open_cache instances
MySQL 5.6 performance

- Multiple CPU cores at focus
- Results from Oracle
MySQL 5.6 Performance

- Number of connections at Focus
- Results from Oracle
Binary log Group Commit

- Gains with `sync_binlog=1`
- Results by Oracle
Optimizer and Execution

• Index Condition Pushdown (ICP)
• Batched Key Access Joins (BKA)
• Multi Range Read (MRR)
• Faster ORDER BY nidxcol LIMIT N
• Persistent Statistics for Innodb
• Improvements to Innodb Compression
Optimizer and Execution

- Fast Page Checksums (CRC32)
- 4K and 8K Page sizes for InnoDB
- Subquery Optimizations
- More efficient Optimizer
  - Especially handling many tables in JOIN
BKA+MRR May rock your world

- Reporting Query Benchmark
- Results from Oracle

DBT3 Q 13: “Customer Distribution Query”
Replication

- Optimized ROW Based Replication
- Multi-Threaded Slave
- Global Transactions Identifiers
- Crash Safe Slave and Binlog
- Replication Event Checksums
- Time Delayed Replication
- Server UUID
- Improved Logging for ROW based Repl.
- Replication Utilities for Failover and Adm.
Multi Threaded Slave

- Peak gains with Multiple Schema
- Results by Oracle
Transparency

- Many new INFORMATION_SCHEMA tables
  - INNODB_METRICS
  - Table Meta Data Information Tables
  - Buffer Pool Contents Information Tables
- Improved EXPLAIN
  - Handling INSERT/UPDATE/DELETE
  - JSON output with additional information
- Optimizer Tracing
- Deadlock Logging
- GET DIAGNOSTICS
Innodb Metrics Example

mysql [localhost] (msandbox) (information_schema) > select * from innodb_metrics where status!="disabled" and count!=max_count limit 1 \G

*************************** 1. row ***************************
  NAME: buffer_pool_pages_free
  SUBSYSTEM: buffer
  COUNT: 2359
  MAX_COUNT: 7957
  MIN_COUNT: 2359
  AVG_COUNT: NULL
  COUNT_RESET: 2359
  MAX_COUNT_RESET: 7957
  MIN_COUNT_RESET: 2359
  AVG_COUNT_RESET: NULL
  TIME_ENABLED: 2013-03-06 09:43:43
  TIME_DISABLED: NULL
  TIME_ELAPSED: 471
  TIME_RESET: NULL
  STATUS: enabled
  TYPE: value
  COMMENT: Buffer pages currently free (innodb_buffer_pool_pages_free)

1 row in set (0.01 sec)
JSON EXPLAIN Example

mysql [localhost] {msandbox} (sbtest) > explain format=json delete from sbtest where k>2  
1. row

EXPLAIN: {
  "query_block": {
    "select_id": 1,
    "table": {
      "delete": true,
      "table_name": "sbtest",
      "access_type": "range",
      "possible_keys": [
        "PRIMARY",
        "k"
      ],
      "key": "k",
      "used_key_parts": [
        "k"
      ],
      "key_length": "4",
      "rows": 1,
      "filtered": 100,
      "attached_condition": "(`sbtest`.`sbtest`.`k` > 2)"
    }
  }
}
1 row in set (0.00 sec)
Transparency

• Improved PERFORMANCE_SCHEMA
  • Reduced Overhead
  • Simplified Configuration
  • Table Access Instrumentation
  • Statement Instrumentation
  • Stages Instrumentation
  • Aggregation by User, Host etc
  • Network IO Instrumentation
  • Host Cache contents
  • Improved File I/O Instrumentation
PERFORMANCE_SCHEMA Example

mysql [localhost] {msandbox} (performance_schema) > select *
from users;

<table>
<thead>
<tr>
<th>USER</th>
<th>CURRENT_CONNECTIONS</th>
<th>TOTAL_CONNECTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NULL</td>
<td>18</td>
<td>21</td>
</tr>
<tr>
<td>msandbox</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

2 rows in set (0.00 sec)
.. Not replacement for User Statistics

```
mysql> select * from information_schema.user_statistics limit 1

*************************** 1. row ***************************
    USER: root
      TOTAL_CONNECTIONS: 2
     CONCURRENT_CONNECTIONS: 0
     CONNECTED_TIME: 4
       BUSY_TIME: 0
       CPU_TIME: 0
  BYTES_RECEIVED: 67
  BYTES_SENT: 0
BINLOGBYTES_WRITTEN: 0
    ROWS_FETCHED: 2
    ROWS_UPDATED: 0
  TABLE_ROWS_READ: 0
   SELECT_COMMANDS: 2
   UPDATE_COMMANDS: 0
    OTHER_COMMANDS: 0
    COMMIT_TRANSACTIONS: 0
  ROLLBACK_TRANSACTIONS: 0
   DENIED_CONNECTIONS: 0
   LOST_CONNECTIONS: 0
 ACCESS_DENIED: 0
   EMPTY_QUERIES: 0
    TOTAL_SSL_CONNECTIONS: 0
1 row in set (0.00 sec)
```
Operational Improvements

- Separate Tablespaces for UNDO Logs
- Fast Restart – InnoDB BP preloading
- Online DDL
- Import/Export for Partitioned Tables
- Remote Binlog Backup
- InnoDB Transportable Tablespaces
- New configuration variables defaults
- User defined DATA DIRECTORY for InnoDB tables
New Functionality for Developers

- MemcacheD API for Innodb
- Explicit Partition Selection in Queries
- Full Text Search indexes for Innodb
- Microsecond TIME precision
- Precise spatial operations for GIS
Security

- Passwords hashes in Query Logs
- SHA256 hashing with salt for Authentication
- Support obfuscated password storage for command line tools
- Policy Based password validation
- Plugin based Authentication support in Replication
Where to Learn More?

- MySQL 5.6 Manual is great
- Blogs
  - [http://blogs.innodb.com](http://blogs.innodb.com)
  - [http://www.planetmysql.org](http://www.planetmysql.org)
  - [http://www.mysqlperformanceblog.com](http://www.mysqlperformanceblog.com)
Local MySQL Meetup

- MySQL Meetup at Durham, NC
  - Hosted by Percona
  - http://www.meetup.com/triangle_mysql
- Come to our first meeting next Monday!
Introducing Percona Cloud Tools
Thank You!

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