Percona Toolkit Recipes

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Outline

About us

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Presentation Overview

- What is Percona Toolkit & Why should you be here?
- Classes of problems solved by Percona Toolkit
- Targeted recipes for specific problems
- Further resources & Recommended reading
- Q&A

What is Percona Toolkit?

Percona Toolkit is a collection of advanced command-line tools to perform a variety of MySQL and system tasks that are too tedious and/or complex to perform manually.

Why should you be here?

Don't re-invent the wheel

- Replication
- Performance
- Upgrading
- Troubleshooting
- Schema Changes

Replication

Problem 1: Master and Slave MAY have different data

- Statements unsafe for replication (CURRENT_USER(), etc)
- Incorrect failover procedures
- Developers writing directly to the slave
- Rolling upgrades
- Storage Engines
- Temporary Tables
- Replication Filters

Solution 1: pt-table-checksum

Recipe demo: how to verify a three node setup

Problem 2: Master and Slave DO have different data

Same reasons as Problem 1, but validated via Solution 1

Solution 2: pt-table-sync

Recipe demo: resyncing

Problem 3: SQL Injection + Long Restore Times

Solution 3: pt-slave-delay

Problem 4: Slow Queries

Amdahl's Law

Solution 4: pt-query-digest

Recipe: Analyzing a query log looking for candidates for performance optimization

Problem 5: Rapid Development & Constantly Changing Workload

Solution 5: pt-query-digest

```
# Profile
# Rank Query ID           Response time  Calls  R/Call Apdx V/M   Item
# ==== ================== ============== ====== ====== ==== ===== ========
#    1 0xEC05647D4CB27595 166.7007 76.1% 150000 0.0011 1.00  0.00 SELECT s
#    2 0xC69B6ED2C47380A4  30.4519 13.9%  50000 0.0006 1.00  0.00 SHOW VARIABLES
#    3 0xA2750AF24EA2AEE6  16.4794  7.5%  50000 0.0003 1.00  0.00 SHOW COLLATION
#    4 0x3AEAAD0E15D725B5   1.7959  0.8% 100000 0.0000 1.00  0.00 SET
#    5 0x3607184B9D9C3A96   1.5672  0.7%  50000 0.0000 1.00  0.00 SELECT
#    6 0xE4CF7146873CCC28   1.0553  0.5%  50000 0.0000 1.00  0.00 SET
#    7 0x38B3D80280BBFA2A   1.0019  0.5%  50000 0.0000 1.00  0.00 SET
#    8 0xAA353644DE4C4CB4   0.0585  0.0%  44477 0.0000 1.00  0.00 ADMIN QUIT
```

Figure: Sample query ranking from a pt-query-digest report

Solution 5: pt-query-digest

```
# Query 2: 135.87 QPS, 0.08x concurrency, ID 0xC69B6ED2C47380A4 at byte 125086566
# Scores: Apdex = 1.00 [1.0], V/M = 0.00
# Query_time sparkline: |   ^_     |
# Time range: 2012-04-06 22:24:12 to 22:30:20
# Attribute    pct   total     min     max     avg     95%  stddev  median
# ============ === ======= ======= ======= ======= ======= ======= =======
# Count          9   50000
# Exec time     13     30s   565us     4ms   609us   626us    75us   568us
# Lock time     45      4s    62us   405us    71us    84us    10us    66us
# Rows sent      0 830.08k      17      17      17      17       0      17
# Rows examine   0 830.08k      17      17      17      17       0      17
# Query size    74  43.34M     909     909     909     909       0     909
# String:
# Hosts        localhost
# Users        msandbox
# Query_time distribution
#   1us
#  10us
# 100us  ################################################################
#   1ms  #
#  10ms
# 100ms
#    1s
#  10s+
/* mysql-connector-java-5.1.18 ( Revision: tonci.grgin@oracle.com-20110930151701-j:
S WHERE Variable_name ='language' OR Variable_name = 'net_write_timeout' OR Variabl
R Variable_name = 'wait_timeout' OR Variable_name = 'character_set_client' OR Varia
tion' OR Variable_name = 'character_set' OR Variable_name = 'character_set_server'
' OR Variable_name = 'transaction_isolation' OR Variable_name = 'character_set_resu
e' OR Variable_name = 'time_zone' OR Variable_name = 'system_time_zone' OR Variable
 OR Variable_name = 'max_allowed_packet' OR Variable_name = 'net_buffer_length' OR
riable_name = 'query_cache_type' OR Variable_name = 'query_cache_size' OR Variable_
```

Figure: Sample query detail from a pt-query-digest report

Upgrading

Problem 6: Upgrading MySQL can break my app

Solution 6: pt-upgrade

2 ways to upgrade MySQL:

- Reckless
- Safe
- http://bit.ly/upgrading-mysql

Troubleshooting

Problem 7: Root Cause Analysis

Solution 7: pt-stalk & pt-sift

Problem 8: Intermittent non-repeatable problems

Solution 8: pt-stalk, pt-sift

Why?
"Everything freezes at random times"

pt-stalk : triggered captures

Triggers based on

- show global status
- show full processlist
- user defined function

pt-stalk : trigger examples

pt-stalk –function processlist –variable Command –match Sleep –threshold 155 –cycles 0

pt-stalk : trigger examples

pt-stalk –threshold 40 –cycles 6

pt-stalk : trigger examples

pt-stalk –function check_loadavg.sh –threshold 12

pt-stalk : function trigger example

```
function trg_plugin()
{
uptime |sed 's/.*load average: //g;s/:*//g'
}
```

pt-stalk : making sense of a capture

Now . . . Where do we start?
pt-sift!

pt-sift

```
--diskstats--
  #ts device    rd_s rd_avkb rd_mb_s rd_mrg rd_cnc   rd_rt    wr_s wr_avkb wr_mb_s wr_mrg wr_cnc   wr_rt busy in_prg    io_s  qtime stime
 {29} sdd1       0.0     0.0     0.0     0%    0.0     0.0    39.6     4.1     0.2     0%    0.1     3.3  13%      0    39.6    0.0   3.2
 sdd1  0% 25% . . 15% 0% . . . . . . . . . . . . . . . . . . . . . . . . . . . .
--vmstat--
  r b swpd      free   buff    cache si so bi  bo   in    cs us sy  id wa st
100 1 5216 177085184 346908 6741672  0  0 28 162    0     0  0  0 100  0  0
  0 0 5216 177490208 346956 6750640  0  0  0 642 1143 10521  1  2  96  1  0
wa 0% . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
--innodb--
    txns: 96xACTIVE (3s)
    18 queries inside InnoDB, 0 queries in queue
    Main thread: sleeping, pending reads 0, writes 0, flush 0
    Log: lsn = 737633786, chkp = 737388727, chkp age = 245059
    Threads are waiting at:
    216 trx/trx0trx.c line 1711
      3 trx/trx0trx.c line 807
      1 trx/trx0trx.c line 432
    Threads are waiting on:
--processlist--
    State
    556  update
     84  Sending data
     29  freeing items
      2
      1  NULL
    Command
    671  Query
      2  Sleep
--stack traces--
    No stack trace file exists
--oprofile--
    No opreport file exists
```

mutex_enter(&kernel_mutex);

Figure: Sample pt-sift summary

Problem 9: Blocking ALTER Statements

Solution 9: pt-online-alter-table

Resources

http://bit.ly/pt-recipes