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## **Troubleshooting MySQL Performance**

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# What will we discuss

- Workflow

- Missed details

- <http://www.sql-error.js-client.com/devconf2012>
    - [http://www.microbecal.com/ftp\\_load/Troubleshooting\\_MySQL\\_Performance\\_addons\\_en.pdf](http://www.microbecal.com/ftp_load/Troubleshooting_MySQL_Performance_addons_en.pdf)
    - <http://www.slideshare.net/SvetaSmirnova/troubleshooting-my-sqlperformanceaddonsen>

# What are we going to troubleshoot?

- What does mean slowly?
- It depends
- Think about your application

# How to find if MySQL is a weak link?

- Pseudo-code
  - Measure current time at moment1
  - Call MySQL function
  - Measure current time at moment2
  - Difference between moment2 and moment1 is how much time MySQL spent working on your request.
- Usually built-in into software you use
- Only rough imagination needed

# What to check

- Query
- Options
- Hardware

# Sandbox

- Test!
- But testing in production is dangerous!
- Copy data
  - CREATE TABLE test\_copy LIKE test;
  - INSERT INTO test\_copy SELECT \* FROM test;
  - Any backup-restore technique which can copy-restore single table
- OR
  - CREATE DATABASE test\_copy;
  - Copy all involved objects (tables, views and so on) into new database
  - Use your favorite backup-restore technique

# MySQL Sandbox

- Designed by Giuseppe Maxia to create MySQL Sandbox of distribution you like with single command
- Available at <http://mysqlsandbox.net/>
- Collection of Perl scripts
- On UNIX, Linux, Mac OS X
  - perl Makefile.PL
  - make
  - [make test] - optionally
  - sudo make install
- Use Cygwin on Windows
- Need mysql-\*.tar.gz or mysql-\*.zip package

# How to find out if query runs slow?

- At development stage
- On production only
  - EXPLAIN
  - Slow query log



# What to do next?

- EXPLAIN
- EXPLAIN EXTENDED
- EXPLAIN PARTITIONS
- SHOW STATUS LIKE 'Handler\_%'

# Suddenly slow query

- Worked fast initially
- Diagnostic utilities showed good result
- After some time, usually long, started to work slow
  - Variance: works fast on development server and slow on production
- Stable slowdown: it never works fast anymore
- How to find:
  - Slow Query Log
  - SHOW PROCESSLIST
- How to fix:
  - Same methods like for simple slow query
  - Data and index file maintaining

# SHOW PROCESSLIST

- Your first friend when debugging
- Shows all queries, executing at the moment
- Accessible in any version
- You can find same data in the INFORMATION\_SCHEMA.PROCESSLIST table, introduced in version 5.1
- Only tool for MyISAM
- MDL locks are also visible in
  - performance\_schema.event\_waits

## Parallel execution: InnoDB

- SHOW ENGINE INNODB STATUS
- INNODB\_\* tables  
in the  
INFORMATION SCHEMA
  - INNODB\_TRX
  - INNODB\_LOCKS
  - INNODB\_LOCK\_WAITS

# General Query Log

```
mysql> select * from mysql.general_log where
thread_id = 1312 order by event_time \G
*****
1. row *****
event_time: 2009-10-01 15:54:11
user_host: root[root] @ localhost []
thread_id: 1312
server_id: 51
command_type: Query
argument: begin
*****
2. row *****
event_time: 2009-10-01 15:54:13
user_host: root[root] @ localhost []
thread_id: 1312
server_id: 51
command_type: Query
argument: insert into t1 values(2, '1994-12-30',
'1994-12-03')
```

# MySQL Server Variables or Options: Scope

## § Global

- Control parameters, necessary for all server processes
  - Location of server files: datadir etc.
  - Shared buffers
  - More

## § Session

- Control connection-specific parameters

# MySQL Server Variables or Options: When allocated

§ Those which control behavior of whole server

- Once at server startup

- Can start with low values, then grow to specified

§ Connection options

- For every connection when connection opens

§ Operation-specific

- For every operation when needed

# MySQL Server Variables or Options: How to control

§ SHOW [GLOBAL] STATUS

§ GLOBAL

- Since server start

§ SESSION

- For operations in current session
- Can be reset
  - FLUSH STATUS



# MySQL Server Variables or Options: When affecting option is not known

- § Record currently used variables
  - SHOW [GLOBAL] VARIABLES
- § Start mysqld with option `--no-defaults`
  - This option must be first one!
- § Check if problem is solved
- § Change variable values one-by-one until you find one which leads to the problem



# System resources

- Memory
- CPU
- Disk
- Network

# Memory: diagnostic

- Free

```
[sveta@delly meb-trunk]$ free
      total        used        free      shared    buffers     cached
Mem:   7937924    7665236    272688         0     708056    5079376
-/+ buffers/cache: 1877804    6060120
Swap:  8546572         6200    8540372
```

- Top

```
Tasks: 246 total,  2 running, 244 sleeping,   0 stopped,   0 zombie
Cpu(s):  3.2%us,  1.2%sy,  0.0%ni, 95.1%id,  0.4%wa,  0.0%hi,  0.0%si,  0.0%st
Mem:   7937924k total, 7662172k used,  275752k free,  708148k buffers
Swap:  8546572k total,   6200k used,  8540372k free,  5075036k cached
```

```

  PID USER      PR  NI  VIRT  RES  SHR  S  %CPU  %MEM    TIME+  COMMAND
  1914 mysql    20   0   670m  95m 1296  S   0.7   1.2    2:42.14  mysqld
```

- vmstat

# Disk: diagnostic

- df

```
[sveta@delly mysql-5.1]$ df
Filesystem            1K-blocks      Used Available Use% Mounted on
/dev/sda3             126388036  90639344  29328520  76% /
tmpfs                 3968960      672    3968288   1% /dev/shm
/dev/sda2             341869564 114894920 226974644  34% /mnt/windows
/dev/mmcblk0p1       31154688    309376   30845312   1% /media/MYDATA
```

- iostat

```
[sveta@delly mysql-5.1]$ iostat -x
Linux 2.6.32-131.0.15.el6.x86_64 (delly)          05/03/2012          _x86_64_ (4 CPU)
avg-cpu:  %user   %nice %system %iowait  %steal   %idle
           5.29    0.00   1.47    2.45    0.00   90.79

Device:            rrqm/s  wrqm/s   r/s    w/s  rsec/s  wsec/s avgrq-sz avgqu-sz  await  svctm  %util
Scd0                2.91    0.00   0.09  0.00  11.99   0.00  129.97  0.00    46.46  24.55  0.23
sda                 1.43   56.87   2.10  2.39 201.15 473.77  150.25  0.49   109.38  4.83  2.17
mmcblk0             0.03    0.00   0.00  0.00   0.03   0.00   31.08  0.00    3.14   2.69  0.00
```

# CPU: diagnostic

- top

```
- Tasks: 246 total, 2 running, 244 sleeping, 0 stopped, 0 zombie
- Cpu(s): 3.2%us, 1.2%sy, 0.0%ni, 95.1%id, 0.4%wa, 0.0%hi, 0.0%si, 0.0%st
- Mem: 7937924k total, 7662172k used, 275752k free, 708148k buffers
- Swap: 8546572k total, 6200k used, 8540372k free, 5075036k cached
```

```
- PID USER PR NI VIRT RES SHR S %CPU %MEM TIME+ COMMAND
- 1914 mysql 20 0 670m 95m 1296 S 0.7 1.2 2:42.14 mysqld
```

- iostat

- ps

```
- [sveta@delly src]$ ps -eo pid,user,comm,pcpu,pmem,vsz | grep mysqld
- 1817 root mysqld_safe 0.0 0.0 108192
- 1914 mysql mysqld 0.0 1.1 686328
- 14231 sveta mysqld 0.0 0.5 735744
```

# Network

- Important:
  - Stability
  - Bandwidth
  - Speed
    - RTT
- --log-warnings=2
- Send huge file (1G or larger)
- tcpdump

# Replication slowdowns

- Slow network
  - Any general diagnostic tool
  - Connect with mysql command line client
    - REPLICATION SLAVE
- Binary log slowdowns master
  - InnoDB locks
- Slave is slower than master
  - Multi threaded slave
  - Tune buffers
  - SHOW SLAVE STATUS
    - Seconds\_behind\_master


# References

- <http://dev.mysql.com/doc/refman/5.5/en/index.html>
- <http://shop.oreilly.com/product/0636920021964.do>
- <http://shop.oreilly.com/product/0636920022343.do>
- <http://planet.mysql.com/>
- <http://www.mysqlperformanceblog.com/>
- <http://dimitrik.free.fr/blog/index.html>



# Summary

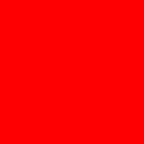
- Tune queries
  - Check if query is always slow
  - Ensure query is not affected by concurrency issue
- Check if your options are sane
- Check your hardware and operating system
- Repeat until you are happy
- Don't overtune!



**THANK YOU!**



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