



PERCONA
Performance Consulting Experts

Diagnosing Intermittent MySQL Problems

About Me

You can contact me at baron@percona.com



Percona

- MySQL Consulting, Support, Training, & Engineering
- Percona Server – enhanced version of MySQL
- Percona XtraBackup – hot InnoDB backups
- Percona Toolkit – tools for DBAs and sysadmins

Percona Events

- Webinars
 - Once a month. Free! See percona.com/webinars
 - Watch recordings of past webinars if you missed them
- Conferences
 - See percona.com/live
 - Percona Live London October 24-25
 - Percona Live Washington D.C. January 12th
 - Percona Live MySQL Conference & Expo
 - Santa Clara, April 10-12

Today's Agenda

- Diagnosing intermittent MySQL problems
 - What kind of problems are we talking about?
 - Why are they hard to solve?
 - What approaches can solve them successfully?
 - What tools can help you do it more quickly?
 - How can you set up and use these tools?
 - How do you interpret the results?
 - Case Studies

Intermittent Problems

- Happen at random times
- Hard to observe in action
- No obvious reason

What Kinds Of Problems?

- In general, we see three kinds
 - Randomly slow query
 - Sudden error message
 - Server-wide “stalls”
- Real customer examples:
 - “My server seems to freeze for ten seconds to a minute at random times. Suddenly, everything clears up again. It seems to happen for no reason.”
 - “I get sporadic 'too many connections' errors. Increasing max_connections doesn't help. This is not related to my peak load.”

How Hard Can It Be?

- It's hard to troubleshoot when you can't see it.
 - “Our graphs show this happens for 1 to 3 minutes once or twice a week.”
- It's hard to get support when it's not reproducible.
 - “Our support staff thinks that we are imagining it.”
 - “We filed a bug, but it was closed because we can't create a test case.”
- It can go on forever.
 - “We've been working on this for nearly 5 months.”

Why Does This Happen?

- More CPUs
- More memory
- More popularity
- Cloud computing

How Not To Do It

- DON'T try to use “tuning scripts”
- DON'T try to change server settings
- DON'T try rebooting everything
- DON'T do \$random_stab_in_the_dark
- DON'T try upgrading or replacing components

The Fruits of Trial-And-Error

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- “I saw someone else on the Internet with a problem like this. They said that switching from Debian to Red Hat fixed it. Can you try that?”
- “It still happens? Oh wow. What version of Java are you using? Can you [upgrade|downgrade] that?”

The Fruits of Trial-And-Error

... Time passes...

- “Sorry, I really don't know. Well, this is a free forum, so at least this didn't cost you anything.”

Measure, Measure, Measure

- You cannot fix what you cannot measure.

How Do I Measure?

- You have to measure in three ways:
- Completely.
 - Schwartz's Law: whatever you don't measure is the data you need.
- Correctly timed.
 - If you measure in 5 minute increments and it happens for 10 seconds, you'll never see it.
- Correctly scoped.
 - If you're looking at the whole server instead of measuring the specific piece that's having trouble, you'll mix data.

What Should I Measure?

- Everything.
 - Yes, it's a lot of data. See Schwartz's Law.

I Never See It Happen

- You need automatic tools watching for it.
- We've developed good tools for this.

Using Percona Toolkit

- Percona Toolkit = Maatkit + Aspersa
- The primary tools for this are:
 - pt-stalk: wait for something to happen, then execute...
 - pt-collect: gather tons of diagnostic data for a short time
 - pt-sift: look for needles in the pt-collect haystack

Finding a Trigger

- Find a reliable way to detect the problem
- Getting this right is the foundation!
- Use this as a trigger for pt-stalk.

Example

```
$ mysqladmin ext -i1 | awk '/Queries/{q=$4-qp;qp=$4}/Threads_connected/{tc=$4}/Threads_running/{printf "%5d %5d %5d\n", q, tc, $4}'
```

798	136	7
767	134	9
828	134	7
683	134	7
784	135	7
614	134	7
108	134	24
187	134	31
179	134	28
1179	134	7
1151	134	7
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Configuring pt-stalk

- Set THRESHOLD=15
- Set VARIABLE=Threads_running
- Then start a screen session, and run pt-stalk as root
- You may need to install and enable:
 - GDB for backtraces (wait analysis)
 - Oprofile for server profiling

Looking At The Data

```
Terminal - baron@ginger:~/collected
2011_07_21_11_08_20-opentables1      2011_07_21_11_40_41-diskstats
2011_07_21_11_08_20-opentables2     2011_07_21_11_40_41-hostname
2011_07_21_11_08_20-output          2011_07_21_11_40_41-innodbstatus1
2011_07_21_11_08_20-pmap            2011_07_21_11_40_41-innodbstatus2
2011_07_21_11_08_20-processlist1    2011_07_21_11_40_41-interrupts
2011_07_21_11_08_20-processlist2    2011_07_21_11_40_41-iostat
2011_07_21_11_08_20-procstat        2011_07_21_11_40_41-iostat-overall
2011_07_21_11_08_20-procvmstat      2011_07_21_11_40_41-log_error
2011_07_21_11_08_20-ps              2011_07_21_11_40_41-lsof
2011_07_21_11_08_20-slabinfo        2011_07_21_11_40_41-meminfo
2011_07_21_11_08_20-stacktrace      2011_07_21_11_40_41-mpstat
2011_07_21_11_08_20-sysctl          2011_07_21_11_40_41-mpstat-overall
2011_07_21_11_08_20-top              2011_07_21_11_40_41-mutex-status1
2011_07_21_11_08_20-trigger         2011_07_21_11_40_41-mutex-status2
2011_07_21_11_08_20-variables       2011_07_21_11_40_41-mysqldadmin
2011_07_21_11_08_20-vmstat          2011_07_21_11_40_41-netstat_s
2011_07_21_11_08_20-vmstat-overall  2011_07_21_11_40_41-opentables1
2011_07_21_11_10_31-df              2011_07_21_11_40_41-opentables2
2011_07_21_11_10_31-diskstats       2011_07_21_11_40_41-output
2011_07_21_11_10_31-hostname        2011_07_21_11_40_41-pmap
2011_07_21_11_10_31-innodbstatus1   2011_07_21_11_40_41-processlist1
2011_07_21_11_10_31-innodbstatus2   2011_07_21_11_40_41-processlist2
2011_07_21_11_10_31-interrupts      2011_07_21_11_40_41-procstat
2011_07_21_11_10_31-iostat         2011_07_21_11_40_41-procvmstat
```

Using pt-sift

```
Terminal - baron@ginger:~/collected
[baron@ginger collected]$
[baron@ginger collected]$
[baron@ginger collected]$
[baron@ginger collected]$
[baron@ginger collected]$
[baron@ginger collected]$
[baron@ginger collected]$
[baron@ginger collected]$
[baron@ginger collected]$
[baron@ginger collected]$
[baron@ginger collected]$
[baron@ginger collected]$ pt-sift .

2011_07_21_10_14_58 2011_07_21_10_16_49 2011_07_21_10_19_16
2011_07_21_10_22_02 2011_07_21_10_31_55 2011_07_21_10_40_36
2011_07_21_10_44_47 2011_07_21_10_54_48 2011_07_21_10_57_36
2011_07_21_11_00_11 2011_07_21_11_01_54 2011_07_21_11_04_05
2011_07_21_11_06_13 2011_07_21_11_08_20 2011_07_21_11_10_31
2011_07_21_11_12_40 2011_07_21_11_14_51 2011_07_21_11_16_59
2011_07_21_11_19_09 2011_07_21_11_21_16 2011_07_21_11_23_27
2011_07_21_11_25_35 2011_07_21_11_27_44 2011_07_21_11_29_35
2011_07_21_11_32_03 2011_07_21_11_34_12 2011_07_21_11_36_23
2011_07_21_11_38_30 2011_07_21_11_40_41

Select a timestamp from the list [2011_07_21_11_40_41]
```

Case Study

```
Terminal - baron@ginger:~/collected
--vmstat--
 r b swpd  free   buff   cache si so bi   bo   in   cs us sy id wa st
42 0 15840 760604 142084 16869724 0 0 36  381   0   0 7  1 92 0 0
 1 0 15840 742016 142284 16911564 0 0 73 13053 31329 56995 11 3 86 0 0
wa 0% . . . . .
--innodb--
 txns: 10xACTIVE (1s) 310xnot (0s)
 0 queries inside InnoDB, 0 queries in queue
Main thread: flushing buffer pool pages, pending reads 1, writes 6, flush 0
Log: lsn = 1777474532609, chkp = 1776282083670, chkp age = 1192448939
Threads are waiting at:
Threads are waiting on:
--processlist--
State
494
 19 Sending data
  5 Has sent all binlog to slave; waiting for binlog to be updated
  3 Reading from net
  2 freeing items
Command
496 Sleep
 25 Query
  6 Connect
  5 Binlog Dump
```

Thanks!

- Contact me at baron@percona.com
- We can help with all your MySQL needs!
- Visit <http://www.percona.com/mysql-support/>
- Contact sales at <http://www.percona.com/>