The Proper Care and Feeding of a MySQL Server for Busy Linux Admins

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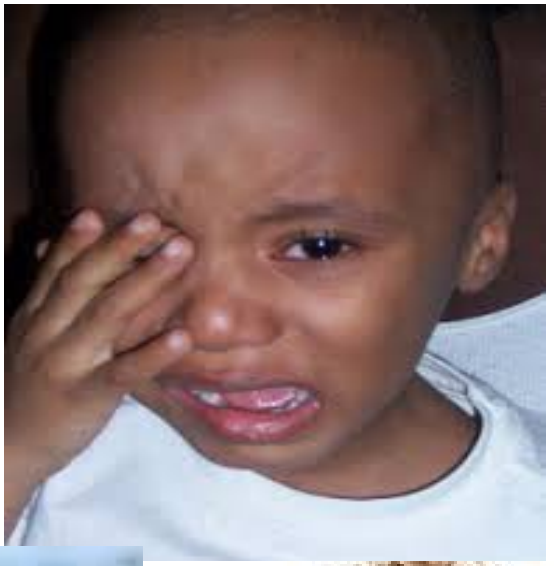
So take anything on future products with a grain of

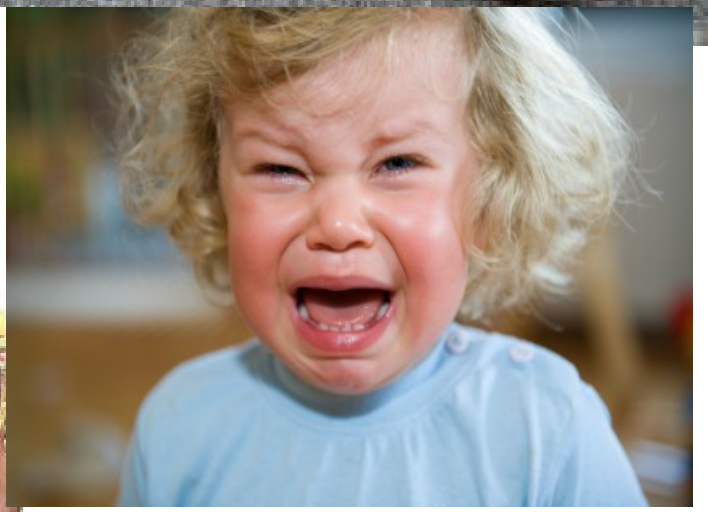
Happy Birthday to MySQL

Databases are

- Selfish
  - Want entire system to self
- Messy
  - Suck up memory, disk space, bandwidth, sanity
- Growing all the time
  - Needs updates
- Suck up a good part of your life

Databases are *nasty* toddlers!!





The previous opinions are

- The views of most admins (and developers) who *also* have DBA duties added to all their other regular tasks to help fill all their lavish spare time*

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* This is the opinion of their bosses between rounds of golf, frozen adult beverages, and private jet 'business trip' to tropical locations.

Happy MySQL Databases

- Hardware
- Software
- Backups & Replication
- Tools to make life easier
- Configuration suggestions
- Q&A

Hardware Happiness

- Databases *LOVE* memory
  - Spend money on good memory
  - Lots of it
  - More important than cores

Why memory?

- Reading from memory is 100,000 faster than reading from disk
  - 100K miles if four times plus around the world
  - At one situp a second, it would take 27.78 hours to do 100K

Disks or Disk Like Things

- Move data to separate controller/disk from logs
- Do not log on slow devices
- RAID to your favorite level – RAID 10 Minimum
- DO NOT USE Consumer Grade Disks
  - Use disks that are designed for 7/24/365 operation not a price point
- CACHES – disk and controller
  - Write through or write back caches
    - Both lie
    - Make sure they don't auto tune during production hours
- FusionIO cards
    - Atomic rites = No Double buffering , therefor *SPEED!!*

Network

- Never expose your instances to outside world
- SCRUB *rigorously* all user data
- Keep separate net for replication and/or backup
- MySQL authentications uses host, user & Password
  - Boss@Home May not equal Boss@Work
  - Overly enthusiastic, first match in table gets in!!!
  - Set switch to not do lookup in case DNS overloaded

Slave Servers

- Slaves need to have bigger/badder hardware than master
  - Do more work
  - Use MySQL Utilities to clone masters, set up slaves
  - Dedicated network to avoid network contention

Software

- Run the latest greatest version of MySQL you can
  - Performance
  - Bug fixes
  - Features
- Keep MySQL by itself
  - *Databases do not play well with other services*
  - Contention for resources
  - Swapping
  - Maybe a caching layer but *watch* memory use!!

Backups & Replication

- Thou shalt make backups!!!
  - Make sure you backup your data so frequently it verges on being painful and then look for ways to increase *that!*
  - Know how to restore entire instances, entire databases, or a table. Save views, functions, etc. And others on staff need to be able to do this too (cross train)
  - Keep off site backups off site and test randomly
    - Make sure multiple people can get to off site backups
- Nobody ever got fired for doing too many backups – Paranoia should be your friend!!!!

Replication

- MySQL replications is easy to set up and misunderstand
  - Two types of replications
    - Async – slave grabs copy of changes from master and applies them to own set of data, master unaware of what slave is doing
    - Semi-sync – master waits for acknowledgment from at least one slave before proceeding
  - Three forms – Statement, Row, and Mixed
- Single threaded before 5.6, multi threaded for different databases in 5,6, multi infra databases threaded for 5.7

Replication Filters

- Do not need to replicate everything
  - Check churn of data, maybe 1x day backup
- Filter tables
- Can change filters on the fly with 5.7
  - “Something going on in manufacturing, can we get ALL of their data copied someplace?'

Global Transaction IDs

- Each transaction has unique GTID starting 5.6
  - Easy for slaves to get caught up to master
  - No longer have to look at file offsets on master and slave to get start position
    - Saves time and $ and ***sanity***
- Storing replication data in InnoDB tables plus adding check sums make crash safe
- Row based can exploit only sending key and changed items, not entire row of data

Multimaster and Multisource

- Multimaster
  - Not recommended but many do it
  - System A auto_increment odd numbers and System B auto_increment even numbers
    - Needs to be watched
- Multi source – MySQL 5.7
  - Multiple masters send data to one slave for master backup
    - Make sure sharded data does not overlap

Oracle Database Shops!

IF you also have a big Oracle DB shop:

- You can backup to the big Oracle STB backup devices
  - Great if you are in an Oracle shop
- MySQL can use oracle Database Firewall & Audit Vault
- Enterprise Customers
  - Audit Vault

Replication for backup

- Replication uses three threads
  - Master to slave
  - Slave to log
  - Log to data
- Shut down log to data thread, run backup, then restart log to data
  - Data from master still stored but not written during backup but applied when backup is done

Tools to make life easier

- There are lots of tools to make life easier for DBA chores
  - Monitoring
    - Yes, you *need* to monitor
  - Administration
    - Yes, you can type everything by hand on the command line but don't you have better things to do!?
    - Documentation of instances
    - Backup

Monitoring

- Active
  - Watches instances and send alerts
    - MySQL Enterprise Monitor (supported customers)
    - Nagios, cacti, etc.
      - Percona has plugins
    - Your favorite that is not mentioned
    - Helps to be able to comb historical data
- Semi-active
  - MySQL Workbench
    - Dashboard & SYS Schema
    - PhpMyAdmin
    - Your favorite tool that is not mentioned

You can't the **full size** of a problem at first glance!!

MySQL Workbench

- Query tool
  - Visual Explain to aid in optimization
- Admin tool
  - Users, backup, imports, change settings
  - No more fat finger 'UPDATE user set 'SELECT_PRIV='Y',....
- Dashboard and System Monitoring
  - Sys Schema
- Entity Relationship Mapper
- Migration tool
- And more!

MySQL Utilities

- Written in Python, easy to extend
- Setup replication and automatic fail over
- Copy user settings
- Copy data
- Look for bad processed and kill 'em
- Move binary logs
- Grep for a columng
- And much more

And more

- Percona tool kit
- Toad for MySQL from Dell
- Your favorite tool that is not mentioned

Config *Suggestions*

- Turn off DNS lookups – zone transfer dies
  - Use skip-name-resolve
- Save/Load statistics
  - Use innodb_stats_persistent
  - See 1**4.13.16.1 Configuring Persistent Optimizer Statistics Parameters** in the MySQL Manual
  - innodb_buffer_pool_dump=ON
  - innodb_buffer_pool_dump_at_shutdown=ON & innodb_buffer_pool_load_at_startup=ON

Config continued

- Tune log level (5.7)
  - log_error_verbosity – errors, errors & warnings, E&W + notes
  - Send to SYSLOG
- Turn off query cache (5.7 Default)
  - Single threaded, use memcached/redis
  - Free up memory
- InnoDB buffer pool size
  - 75-80% of RAM

Big Hint #1

- BE *DAMN* STINGY with permissions & grants
  - Easier to say no than to constantly be restoring
  - --safe-updates or –i-am-a-dummy
    - No more 'opps, I forgot the where clause'

Big Hint #2

- Sys_schema – please use
  - Views, functions, and procedures on top of the Performance_schema and Information_schema
    - Who is hogging resources
    - Indexes not being used
    - Problematic queries
    - Other routine PITAs

Big Hint #3

- 5.7 Security
  - Secure install becomes the default
    - Forced root password
    - No anonymous account, no test DB
  - Password rotation
  - Configure rules
    - Length, characters
  - mysql_config_editor (5.6.6)
    - Store encrypted auth credentials (no clear text)
    - Use mysql --login-path=finance

Q&A

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