Which Database is Better for Zabbix? PostgreSQL vs MySQL

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About Myself

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Division: OSS technical Group
Providing support and consulting services for 30 or more kind of OSS
Zabbix experience

• We started Zabbix support service from 2011
• Last year, we joined Zabbix partnership program.

• Our company systems is monitored by Zabbix.
• We design the monitoring system of our customer’s.
  o Over 100 devices
  o Including virtualization system (vCenter /ESXi)
Agenda

• Introduction
• Simple test
  large number of items
• Partitioning test
  large number of items with Partitioning
Which database engine are you using for Zabbix?

View Poll Results: Which database engine are you using for Zabbix Server?

- MySQL: 75 votes, 69.44%
- Oracle: 8 votes, 7.41%
- PostgreSQL: 25 votes, 23.15%
- Other: 0 votes, 0%

 Voters: 108. You may not vote on this poll
PostgreSQL is Slow?

- The Performance of PG was improved from 9.2!
  - Compared with PG9.1
    - Read Query 4x Faster
    - Write Query 5x Faster

Reference:
PostgreSQL 9.2 release news
http://www.postgresql.org/about/news/1415/

Robert Haas@PGcon2012
Performance Improvement in PostgreSQL 9.2
http://www.pgcon.org/2012/schedule/events/416.en.l
MySQL vs PostgreSQL

• Zabbix benchmark with MySQL and PostgreSQL

• Environment
  
  o Amazon EC2 M1 medium instance
  o 3.75 Gib RAM
  o 2ECU (1 core)
  o 410 GB instance storage
  o OS: Amazon Linux AMI 2013.03 (64bit)
  o 3 servers ( 1 for Zabbix server and DB ,2 for Zabbix Agent)
Software

- Zabbix 2.1.1 (alpha release)

- Use latest release version for the components
  - MySQL 5.6.12
  - PostgreSQL 9.2.4
  - Apache httpd 2.4.6
  - PHP 5.4.17
Test Target

- Simulate 600 hosts (2 agent servers)
- 26400 items
  (44 items/1 host, 5 sec interval, keep history 1 day)
- 10200 triggers (17 triggers / 1 host)
- Starting with empty history
- Monitoring for:
  4 hours (short run)
  36 hours (long run)
- Zabbix:
  modified CacheSize=64M in zabbix_server.conf
Simple Test

• Test 1
  o Default DB setting

• Test 2
  o Same buffer size and Transaction log size

• Each Test is
  o Monitoring 4 hours
  o comparing CPU utilization and Zabbix performance
Test 1: default DB Config

- MySQL
  - character-set-server=utf8
  - skip-character-set-client-handshake
  - innodb_file_per_table

- PostgreSQL
  - ALL default
    PostgreSQL uses files per table
Test 1: CPU utilization

MySQL

PostgreSQL

PG: Heavy io wait

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Test 1: Zabbix Performance

MySQL

- `zabbix[wcache,values]`: Values processed by Zabbix server per second
- `zabbix[queue]`: Zabbix queue

PostgreSQL

PG cannot keep up with processing
Test 2: Tuning

- Same Buffer and Transaction log size
- MySQL
  - `Innodb_buffer_pool_size = 512MB`
  - `Innodb_log_file_size = 256MB`
    - `innodb_log_files_in_group=2 (default)`
    - `log size 512MB`
- PostgreSQL
  - `shared_buffers = 512MB`
  - `checkpoint_segments = 32`
    - `16MB/each segment` → `log size 512MB`
Test 2: CPU utilization

MySQL

PostgreSQL

Almost same load (PG is slightly stable and low io)
Test 2: Zabbix Performance

MySQL

PostgreSQL

zabbix[wcache,values] : Values processed by Zabbix server per second

zabbix[queue] : Zabbix queue
Compare DB Size

• Test 2 Case
• Exclude Transaction log

• MySQL : 3.3 GB
• PostgreSQL : 3.2 GB

• Almost Same Size
Study of Simple Test

- MySQL default setting is better than PostgreSQL.

- By Increasing Buffer and Transaction log size, MySQL and PostgreSQL are almost same performance.

- The size of DB is same in this Simple Test.
Characteristic of Zabbix DB

Large write and small read

Zabbix server: Disk read/write (6h)

- Disk read ops: last 103.88 ops, avg 103.88 ops
- Disk write ops: last 44.4 ops, avg 65.57 ops
Tuning Point

• Checkpoints tuning is very important in write case.
  o Incorrect Checkpoints increase write load
  o The opportunity of checkpoints are
    • full of Buffers
    • full of Transaction log
  o To Improve Checkpoint, it’s important of Buffer and Transaction log tuning
Zabbix DB Tuning

• Zabbix DB continue write operation by same rate.

• Estimate the growth rate of DB size

   In this test case 3.2GB/4h ÷ 70MB/5min

• Set a plenty of buffer and transaction log size from a growth rate of DB size.

   In this test case

   512MB buffers and 512MB transaction log size
Partitioning Test

- Same DB Tuning
  - Buffer and Total Transaction log size 512MB
- Test 3
  - Non-Partitioning and housekeeper is enabled.
  - Monitoring 36 hours
- Test 4
  - Partitioning daily and housekeeper is disabled.
  - Monitoring 36 hours
- Comparing CPU utilization and Zabbix performance
Test 3: CPU utilization

MySQL

PostgreSQL

Housekeeper’s Large io wait
Test 3: Zabbix Performance

MySQL

PostgreSQL

zabbix[wcache, values]: Values processed by Zabbix server per second

zabbix[queue]: Zabbix queue

PostgreSQL is more stable in heavy IO situation.
Test 4 Partitioning

• Disable Housekeeper
• Daily partitioning at history* tables.
• *PostgreSQL* supports partitioning
  o via table inheritance
  o define a trigger or rule.
    for redirecting data inserted into the parent table
to the appropriate child partition.
  o The performance is also depend on the trigger or rule.
  o In this test case, we define the trigger
    • Using pl/pgsql
    • Using C language (heap_insert method)
  
https://github.com/matheusoliveira/pg_partitioning_tests
Developed by Matheus de Oliveira
Test 4: CPU utilization

MySQL

PG(pl/pgsql)

PG(pl/pgsql) need more 3x CPU(user) power

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Test 4: Zabbix Performance

MySQL

PG(pl/pgsql)

zabbix[wcache,values]: Values processed by Zabbix server per second

zabbix[queue]: Zabbix queue

In spite of using more CPU, PG is still stable.
Test 4: CPU utilization

MySQL

PG(C lang)

The cpu usage of PG(C lang) is better than PG(pl/pgsql),
But it is worse than MySQL.

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Test 4: Zabbix Performance

MySQL

PG(C lang)

- zabbix[wcache,values]: Values processed by Zabbix server per second
- zabbix[queue]: Zabbix queue

Almost same performance
Conclusion

• In our test
  o PostgreSQL and MySQL is almost same performance as Zabbix DB.
  o Tuning Checkpoint (buffer and transaction log) is important.
  o MySQL’s partition is easy and better cpu usage than PostgreSQL. (PostgreSQL’s partition supports foreign key)
  o PostgreSQL is more stable in heavy io situation.