Scaling Zabbix with MySQL InnoDB Cluster

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Introduction
All organizations require their most critical systems to be highly available.
99.9999...% Availability: Monitoring is the key
Does Zabbix needs to be highly available?
Application HA vs Database HA
Zabbix supports MySQL, the #1 database for the web, used by 10 of the top 10 websites.
High Availability with MySQL InnoDB Cluster
Yesterday: Asynchronous replication

Read scale-out

write clients

read clients

More reads? More slaves!

write clients

read clients
Yesterday: Asynchronous Replication Challenges

**Redundancy** as a major building block for high availability: If master crashes, **promote** slave to master

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Today: MySQL InnoDB Cluster
MySQL Router

- Native support for MySQL InnoDB clusters
  - Understands Group Replication topology
  - Utilizes metadata schema stored on each member
    - Bootstraps itself and sets up client routing for the GR cluster
    - Allows for intelligent client routing into the GR cluster
    - Supports multi-master and single primary modes
MySQL Shell
A single unified client for all administrative and operations tasks

• Advanced command-line client and code editor for the MySQL Server
  – Supports **development & administration** for the MySQL Server
  – Can be used to perform data queries/update & administration operations

• Interactive multi-language: **JavaScript**, **Python**, and **SQL**
  – Naturally scriptable (with development & administrative **APIs**)
  – Both interactive and batch operations

• Exposes full **Admin API** to manage InnoDB Cluster:
  - create, configure, modify, validate, monitor... and script!!
The core component: MySQL Group Replication

• What is MySQL Group Replication?
  “Update everywhere replication plugin for MySQL with built-in automatic distributed recovery, conflict handling, group membership and distributed agreement.”

• What does the MySQL Group Replication plugin do for the user?
  – Removes the need for handling server fail-over.
  – Provides fault tolerance.
  – Enables update everywhere setups.
  – Automatic distributed coordination (protects against split-brain and message loss).
  – Less admin overhead, means more fun time!
MySQL Group Replication: Architecture
MySQL Group Replication: Some Theory Behind It...

• Implementation based in Replicated Database State Machines
  – Group Communication Primitives resemble properties of Databases.

• Deferred update replication: propagate atomically, check conflicts, eventually apply
  – Distributed state machine requires agreed delivery – implies total order;
  – Deterministic certification requires total order delivery.

2 Working modes: SINGLE Primary and MULTI Primary
MySQL Group Replication: Single Primary Mode

Configuration mode that makes a single member act as a writable master (PRIMARY) and the rest of the members act as hot-standbys (SECONDARY).

- **Failover**: the group itself coordinates automatically to figure out which is the member that will act as the PRIMARY, through a leader election mechanism.
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MySQL Group Replication: Automatic distributed recovery!

- Server that (re)joins the group will automatically synchronize with the others.
- If a server leaves the group, the others will automatically be informed.
MySQL Group Replication: Multi Primary Automatic Conflict Detection!

• Any two transactions on different servers can write to the same tuple.
• Conflicts will be detected and dealt with.
  – First committer wins rule (based on db-versions in writesets)
MySQL Group Replication: Major Building Blocks
MySQL Group Replication

Full Transaction life cycle
MySQL Group Replication: Performance Comparison

![Single-master Maximum Throughput: Sysbench OLTP RW](image)

Source: https://mysqlhighavailability.com/performance-evaluation-mysql-5-7-group-replication/

Durability is the D in ACID: https://dev.mysql.com/doc/refman/8.0/en/mysql-acid.html
Zabbix HA Deployment with MySQL InnoDB Cluster
InnoDB Cluster Requirements (by design)

• Requires InnoDB storage engine.
• Primary key/unique non-null key is required on every table.
• Requires global transaction identifiers turned on.
• No concurrent DDL
• No Transaction Isolation Mode “SERIALIZABLE”
• Restrictions on usage of Cascaded Foreign Keys
InnoDB Cluster Deployment: Hardware and Infrastructure Notes

• 3, 5, 7 or 9 machines per group
  – Isolate machine resources as much as possible
  – Limit virtualization layers
  – Machines configured for dedicated database server role
    • Recommended configuration
      – 32-64 vCPUs with fast CPU clock (2.5GHz+)
      – SSDs (for data and replication logs)
  – High quality network connection between each machine
    • Low latency, high throughput, reliable
    • Limit routers and hubs as much as possible
    • Isolated and dedicated network when possible
Architecture and Deployment overview

- InnoDB Cluster with 3 nodes
- MySQL Router on each app server
- Install Zabbix (if needed)
- Set/Clone the database instances
  *(add primary keys where needed)*
- Create an InnoDB Cluster
- Add a MySQL Router
- [if needed] Create Zabbix database
- Point the application to the router
  - Configure the database connection

what more? ...monitor? ...administer?
COME TO THE WORKSHOP!!
Conclusion
InnoDB Cluster makes your Zabbix deployment highly available with a powerful, self-healing, easy to deploy high-availability solution, natively provided by MySQL.

Zabbix monitors your critical systems: take care of with MySQL InnoDB Cluster!