MySQL HA vs. HA

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Support

MySQL

Beratung

remote-DBA

GALERA CLUSTER

Schulung

MariaDB

OSB Open Source Alliance

/CH/open

DOAG

SOUg

Percona Server

Oracle Silver Partner
Various MySQL High Availability (HA) Solutions

- MySQL Replication / MySQL Scale-Out
- High-Availability with Replication
- Master-Master Replication
- Active/passive fail-over with SAN
- Active/passive fail-over with DRBD
- Galera (synchronous) Replication
MySQL Scale-Out vs Scale-Up

Scale-Up
- Costs
- MySQL Design
- Physical bottlenecks

Scale-Out
- „Relaxation of Constraints“
High-Availability with Replication

- Fail-over?
Replication fail-over

Application

VIP  \( r_w \)

Slave \( M \)

Master

Slave \( 1 \)

Slave \( 2 \)

Slave \( 3 \)

Load balancer

Slave  {Reporting, Backup}

read only

deprecated
Advantages / Disadvantages

- + Simple „standard“ Set-up
- + Works very well if r >> w
- + Fail-over site is already warm/hot!
- - Delay Master/Slave (asynchronous)
- - Slave lagging (Slave is sometimes bottleneck)
- - Data in-consistencies between Master and Slave?
- - If master fails → which Slave becomes new master?

Switch → a lot of work, delicate!

There are tools to help (MMM v1/v2, MHA, Tungsten, MySQL utilities, ...
Master-Master Replikation
Master-Master Replication
Advantages / Disadvantages

+ Only slightly more complex than Master/Slave
+ Works very well if $r >> w$
+ Fail-over site is already warm/hot!
- Delay $\text{Master}_1/\text{Master}_2$ (asynchronous)
- $\text{Master}_2$ lagging (Slave is sometimes bottleneck)
- Data in-consistencies between $\text{Master}_1$ and $\text{Master}_2$?
- Careful when writing on both Masters!
  - Data in-consistency possible because of asynchronous MM replication
- You will NOT get more I/O throughput!
- A little more complicated to (re-)set-up
Active/passive fail-over with SAN

VIP

SAN

M'

M

Load balancing (LB)

Slave₁

Slave₂

Slave₃

App

App

App
Active/passive fail-over with SAN

- SPOF!
Advantages / Disadvantages

- + Synchronous “replication”
- + I/O throughput depends on SAN (I/O system)
- + No data IN-consistencies possible
- + Only one possible data source
- + Slaves are automatically and properly fail-overed
- - SAN and Filesystems are SpoFs!
- - Expensive if SAN are not available yet
- - SAN's are not easy to handle!
- - Other site is cold after fail-over!
- - Half of the hardware is idling
- - Far more complex to set-up
- - Need Unix know-how/root rights
Active/passive fail-over with DRBD

“Poor man's SAN”
Active/passive fail-over with DRBD

- App
- App
- App

- VIP

- M
- M

- DRBD

- Slave₁
- Slave₂
- Slave₃

Load balancing (LB)
Advantages / Disadvantages

- + Synchronous replication
- + No data IN-consistencies possible
- + Only one possible data source
- + Slaves are automatically and properly fail-overed
- - Filesystem is SpoF!
- - I/O throughput possibly lower?
- - DRBD can break! → monitor it...
- - Other site is cold after fail-over!
- - Half of the hardware is idling
- - Far more complex to set-up
- - Need Unix know-how/root rights
Galera (synchronous) Replication

Load balancing (LB)

Node 1
wsrep

Node 2
wsrep

Node 3
wsrep

Galera replication
Galera (synchronous) Replication
Advantages / Disadvantages

+ Synchronous replication: No lost transaction
+ Based on InnoDB SE (other SE theoretically possible)
+ Active-active real multi-master topology: Read and write to any cluster node
+ Automatic membership control
+ True parallel replication, on row level: No slave lag
+ Read scalability (Read Scale-Out!) and write improvements (+ SSD)
+ Rolling Restart (Upgrade of Hardware, O/S, DB release, etc.)
- No original MySQL binaries → Codership MySQL binaries
- Be aware of Hot Spots on rows: Higher probability of deadlocks
  - → application must be cluster aware!
- Slowest node is pace maker
Q & A

Wir haben Zeit für ein persönliches Gespräch...

- FromDual bietet neutral und unabhängig:
  - Beratung
  - Remote-DBA
  - Support für MySQL, Galera, Percona Server und MariaDB
  - Schulung

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