MySQL Multi-Site/Multi-Master Done Right
MySQL Clustering for HA and DR
The Dream: Multiple, active DBMS servers with identical data over distance – Too good to be true?
Synchronous multi-master clusters claim to deliver on the dream.
Synchronous multi-master introduces new problems

- Slow writes due to synchronous messaging
- Cross-site replication is unstable
- Operations like SELECT FOR UPDATE not supported
- Large transactions lock system or cause failures

<table>
<thead>
<tr>
<th>Ordering</th>
</tr>
</thead>
<tbody>
<tr>
<td>[1] id=1, data=6</td>
</tr>
<tr>
<td>[2] id=1, data=5</td>
</tr>
<tr>
<td>[3] id=7, data=25</td>
</tr>
</tbody>
</table>

Table foo
id=1, data=6

Table foo
id=7, data=25

Table foo
id=1, data=5
REJECTED!
Synchronous multi-master over WAN makes things worse
Can master/slave clusters offer the same benefits?

High Performance?  
High Availability?

Transparent read/write to any server?  
Updates propagated immediately?
Good MSMM Starts with Proper HA and High Performance Clusters
Tungsten Clustering: HA, DR and Performance Scaling

Benefits

- 24x7 data access
- Off-the-shelf MySQL
- SQL load balancing
- Simple management

Diagram:

- Application Stack
  - Tungsten Connector
  - Slave
  - Master
  - Slave

- Reads
- Writes

logo: continuum
Tungsten clusters add HA and scaling without taking features away
Failover and Maintenance
Tungsten clusters automatically monitor all cluster nodes for failure

- Tungsten Manager monitors database health
- Query flow and replication traffic are managed
Cluster rules fail over master if DBMS no longer accepts network connections

- Tungsten Manager detects a database outage
- Query flow stops, and a new master is chosen
Failed nodes can be re-provisioned from a backup with a single management command

- The replicator on the promoted node is then brought online as a Master
- Query flow is re-enabled so as to get the application online as quickly as possible
- Lastly, any remaining slave replicators will be re-pointed to the newly promoted master
For Multi-Site, Multi-Master
We spread that functionality across multiple datacenters
Tungsten Multi-Site/Multi-Master topologies operate independent, active clusters on 2 or more remote sites
Tungsten Disaster Recovery creates composite clusters that span sites and are ready for immediate failover.
Tungsten clusters support Zero-downtime Maintenance operations from parameter changes to app upgrade

- **Task**: Upgrade MySQL to the latest version
- **Problem**: Requires a mysqld restart, hence can cause application downtime
- **Constraint**: Avoid application-visible restart
- **Solution**: Upgrade nodes in succession
Rolling maintenance proceeds node-by-node starting with slaves and proceeding to master

- Slave upgrade
  - Shun slave
  - Upgrade MySQL
  - Return node to cluster
  - Discard and re-provision on failure

- Slave upgrade
  - Repeat for remaining slave(s)

- Switch
  - Switch master to promote an upgraded slave

- Master upgrade
  - Upgrade old master
  - Maintenance is now done!
MSMM Benefit Summary

• 24x7 data access
• SQL load balancing
• Off-the-shelf MySQL support (MySQL Community/Enterprise, Percona Server and MariaDB)
• Simple management
• Multiple datacenters
• Full HA support, including across datacenters
• Intelligent proxying and query redirection
• Full-speed performance with very low latency
• Zero-downtime maintenance
Upcoming Training and Webinars

• **Tungsten Training Program**
  – Training -- Tuesday, 13th June 2017, 09:00 PST, 17:00 BST, 30 minutes -- Basics: Introduction to Tungsten Replication
  – Training -- Tuesday, 27th June 2017, 09:00 PST, 17:00 BST, 30 minutes -- Basics: Introduction to Tungsten Clustering

• **Continuent Webinar Program**
  – Webinar -- Wednesday, 21st June 2017, 09:00 PST, 17:00 BST, 30 minutes -- Amazon RDS vs. AWS with Continuent Tungsten Clustering
Getting Started!

• Tungsten Replicator builds are available on GitHub:
  http://github.com/continuent/tungsten-replicator

• Replicator documentation is available on the Continuent website:
  http://docs.continuent.com/tungsten-replicator-5.1

• Tungsten Hadoop tools are available on GitHub:
  https://github.com/continuent/continuent-tools-hadoop

Contact Continuent for Annual Support Subscriptions!
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