Bringing Master/Slave into the 21st Century using Tungsten Database Clustering

Linas Virbalas
Continuent, Inc.
What is Master/Slave Replication?

/ Master/slave replication copies updates automatically from one database to another
/ Application commits on the master; updates propagate asynchronously to slaves
/ Every real database supports it at some level
Why is Master/Slave Good for Clustering?

- Master/slave replication is fast
- Accepts a wide range of SQL
- Works over WANs
- Supports a wide range of topologies
- Minimizes changes to applications
- No split brain problems
- Technical issues like serialization are tractable
Flexible Master/Slave Topologies

Master-Slave Pair for basic availability

Chaining to off-load master or go across slow link

Circular Replication for cross-site operation

Fan-Out for read scaling

Fan-In for data warehouse loading
Why Is Master/Slave Bad for Clustering?

Routing SQL transparently to right copy

Application Server

Database Routing

Master
Up-to-date Slave
Lagging Slave
Provisioning Slave

Making copies efficiently
Managing a cluster of copies
What Is Tungsten?

Tungsten enables clusters using database scale-out (master/slave)

- Avoid data loss with packaged, easy-to-use backup and replication
- Improve performance using data replicas
- Raise availability with simple, transparent failover procedures
- Solve data integration between open source databases and Oracle
Tungsten Makes Scale-Out Work

/ Tungsten Replicator
  • Database-neutral, platform independent master/slave replication

/ Tungsten Connector
  • Fast MySQL/PostgreSQL client to JDBC proxying

/ Tungsten SQL Router
  • JDBC wrapper for high-performance and transparent failover, load-balancing, and partitioning (no proxy required)

/ Tungsten Manager
  • Distributed commands to start, stop, back-up, reconfigure, failover database resources

/ Tungsten Monitor
  • Measure latency and detect whether resources are up/down

/ Tungsten FSM
  • Java library for fast, in-memory state machines
Tungsten Clustering In Action

Application Server
- SQL Router/Connector
- Manager

Replicator
Monitor
Manager

MySQL
Master DB
Master Host
Management Client

Replicator
Monitor
Manager

MySQL
Slave DB
Slave Host
Management Client
Tungsten Replicator Features

- Transactional event storage with no slave errors
- Easy promotion of slaves using global Xact IDs
- Heterogeneous replication to Oracle
- Event checksums and table consistency checks
- Hooks for filtering and transforming replicated data
- Cross-/down-version replication
- Time delay replication
- Integrated backup/restore
- No hardware dependencies
Tungsten SQL Router Features

- Automatic tracking of database status
- Planned as well unplanned failover
- No application changes to use failover
- No/minimal changes to use load balancing
- Direct integration into Java with zero performance overhead
- Transparent proxying for non-Java apps
- No hardware dependencies
Cluster Admin with Tungsten Manager

- Management Client
- Tungsten Manager
  - Resource Handlers
    - JMX-Enabled Services
    - OS-level Services
  - Group Communications
    - JMX-Enabled Services
    - OS-level Services
  - Policy Manager
    - JMX-Enabled Services
    - OS-level Services

Failover Rules
Tungsten Manager Features

- Auto-discovery of databases without knowing IP addresses in advance
- Single command for failover, switch operations
- Broadcast operations across multiple services
- No single point of failure
- Reduce open ports needed by firewalls for management
- Eliminate ssh/rsync setup
- No hardware dependencies
Prerequisites for Tungsten?

/ Java VM 1.5 or greater from [http://java.sun.com](http://java.sun.com)
  • Now included in most Linux builds

/ MySQL 5.0 or 5.1 from [http://www.mysql.com](http://www.mysql.com)
  • We recommend 5.1 because it has row replication

/ Tungsten Replicator from [http://www.continuent.com/community](http://www.continuent.com/community)
Where Can I Get Builds/Docs/Code?

/ All information is available from community web site:
  • http://www.continuent.com/community/tungsten-replicator

/ Access to downloads:
  • http://www.continuent.com/community/tungsten-replicator/downloads

/ Access to documentation:
  • http://www.continuent.com/community/tungsten-replicator/tungsten-replicatordocumentation

/ Code is hosted on SourceForge.net
  • https://sourceforge.net/projects/tungsten

/ Blog
  • http://scale-out-blog.blogspot.com/
Is This Open Source?

Yes - GPL V2

The fine print...

Replication from Oracle is a commercial add-on. We will also charge for extensions like data encryption, automated cluster management, and managed services on Amazon. It makes our investors happy and helps us all make house payments.
Summary

/ Tungsten is a rethinking of database clustering based on master/slave replication

/ Master/slave is an excellent basis for protecting data, increasing availability, and raising performance

/ Tungsten clustering is far better than simply using replication by itself

/ Try it today!
Thank you!

Questions?