Tungsten Cluster Master Class

Basics: Tungsten Clustering – Under the Hood

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The MySQL Availability Company

Topics

In this short course, we will

- Review the key benefits offered by Continuent Tungsten Clustering
- Examine the clustering architecture
  - The Manager
  - The Connector
  - The Replicator
- Compare Topologies

Benefits of Tungsten Clustering

Tungsten Key Benefits

Continuous MySQL Operations

- MySQL High Availability and Disaster Recovery solution, which provides redundancy within and across data centers
- Immediate failover for maximum availability and data protection of business-critical MySQL applications
- Reduce MySQL recovery time from hours or days to mere seconds
- Dashboard provides graphical view and management of all globally distributed MySQL clusters

Zero Downtime MySQL

- Site-level and cross-site failover ensures application availability
- Upgrade hardware, software and data without taking applications offline
- MySQL compatibility means seamless migration of your data and applications

Tungsten Key Benefits

Geo-Scale MySQL

- Load-balance MySQL read operations across multiple replicas, locally and globally
- Geo-distributed MySQL clusters bring data close to your application users for faster response times
- Easily add more MySQL clusters as needed for unlimited scaling, both locally or across the globe

Hybrid-Cloud and Multi-Cloud MySQL

- Deploy in the cloud, VM and bare metal environments
- Mix-and-match on-premises, private and public clouds (incl. Amazon AWS, Google Cloud and Microsoft Azure)
- Easy, seamless migration from cloud to cloud to avoid vendor lock-in in any specific cloud provider
- Withstand node, data center, zone or region failures or outages

Tungsten Key Benefits

Intelligent MySQL Proxy

- Provides intelligent traffic routing to a valid MySQL Primary, locally and globally
- Scale read queries via query inspection and other methods
- Application and active users do not disconnect during MySQL Primary failover events

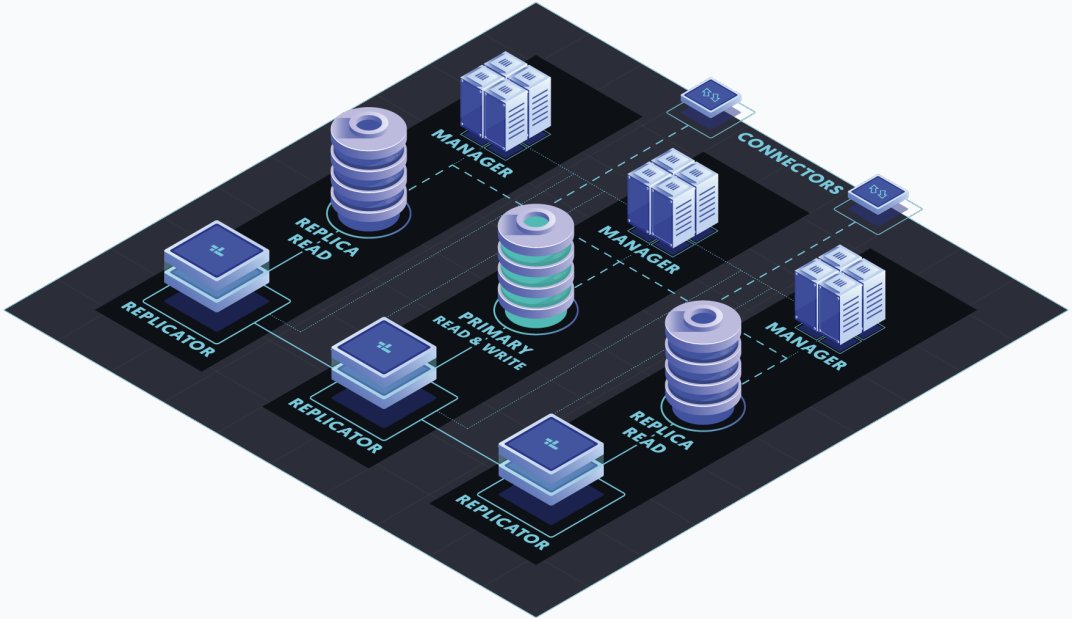
Full MySQL Support, No Application Changes

- Deploy and Configure MySQL clusters in minutes
- Not ‘MySQL-compatible” solution. Use any of your off-the-shelf MySQL, MariaDB and Percona Server versions
- Support for all modern MySQL (5.x through 8.x) and MariaDB (5.x and 10.x) versions and features
- SSL support for all in-flight traffic
- Native MySQL support means easy and complete migration of your data and applications

Architecture

Tungsten Clustering

- Core Components
  - Connector
  - Manager
  - Replicator



Tungsten Clustering

- Core Components
  - Connector
  - Manager
  - Replicator

- Intelligent Proxy
- Routing Modes
  - Bridge Mode (Default)
  - Proxy Mode
- Routing Methods
  - Port Based
  - Host Based
  - SQL Based
  - Direct Read
  - SmartScale
- Cluster-Aware
- Highly-configurable to suit multiple user requirements

https://www.continuent.com/blog/mastering-tungsten-clustering-experience-the-power-of-the-tungsten-connector-intelligent-mysql-proxy/
https://www.continuent.com/blog/how-can-i-tell-which-tungsten-connector-mode-i-am-using-bridge-proxy-direct-or-proxy-smartscale/
https://www.continuent.com/blog/configuring-the-tungsten-connector-for-pci-compliance/

Tungsten Clustering

- Core Components
  - Connector
  - Manager
  - Replicator

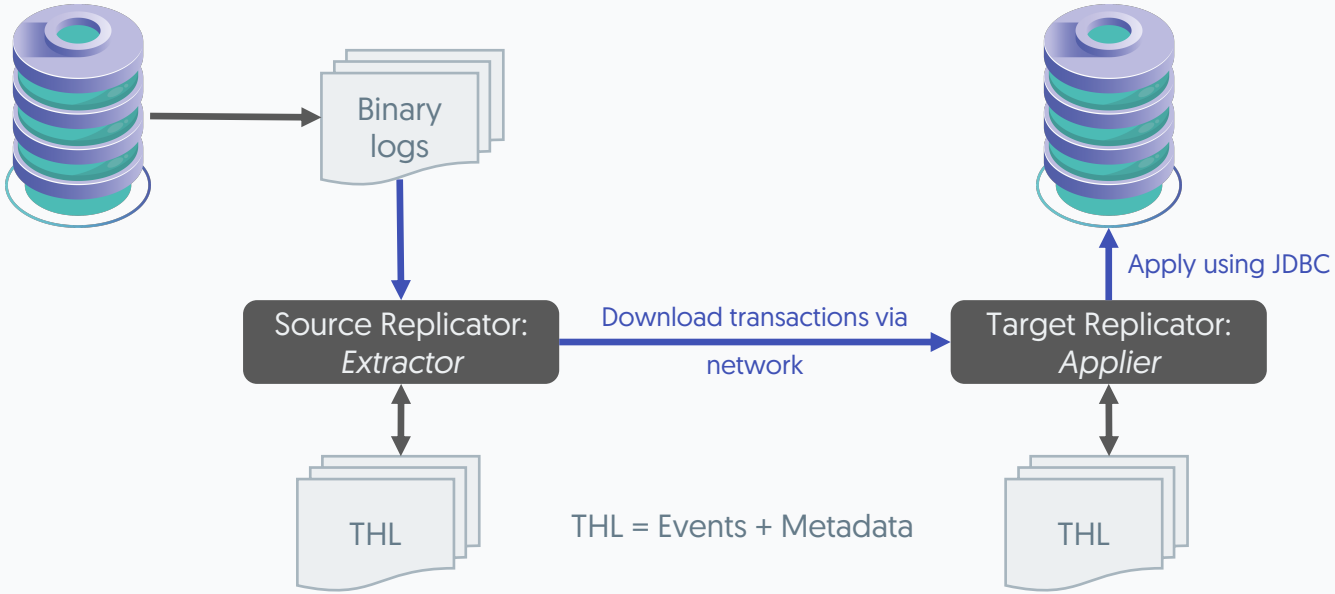
- The “brains” of the cluster
- Communicates with all components
- Rule based decision making
- Monitors
  - Database Instance State
  - Replicator State
- Provides status information to the Connectors
- Votes with other managers during Failover and Switchover for Primary selection

Tungsten Clustering

- Core Components
  - Connector
  - Manager
  - Replicator

- Asynchronous Replication
- Extracts entire events from MySQL binary log
- Converts to/from THL (Transaction History Log)
- Multiple stages for best performance
- Advanced filtering at any stage
- Extract once, use many means efficiency and lower overhead as a whole

Tungsten Replicator operation within a Tungsten Cluster

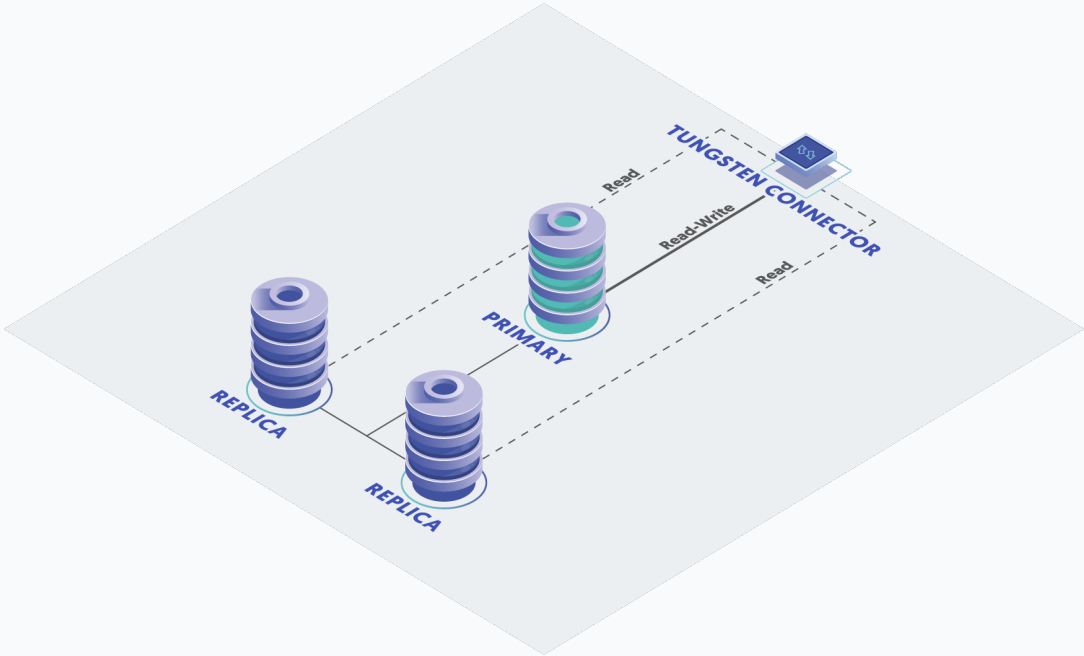


Tungsten Clustering Topologies

Tungsten Cluster

Standalone Cluster

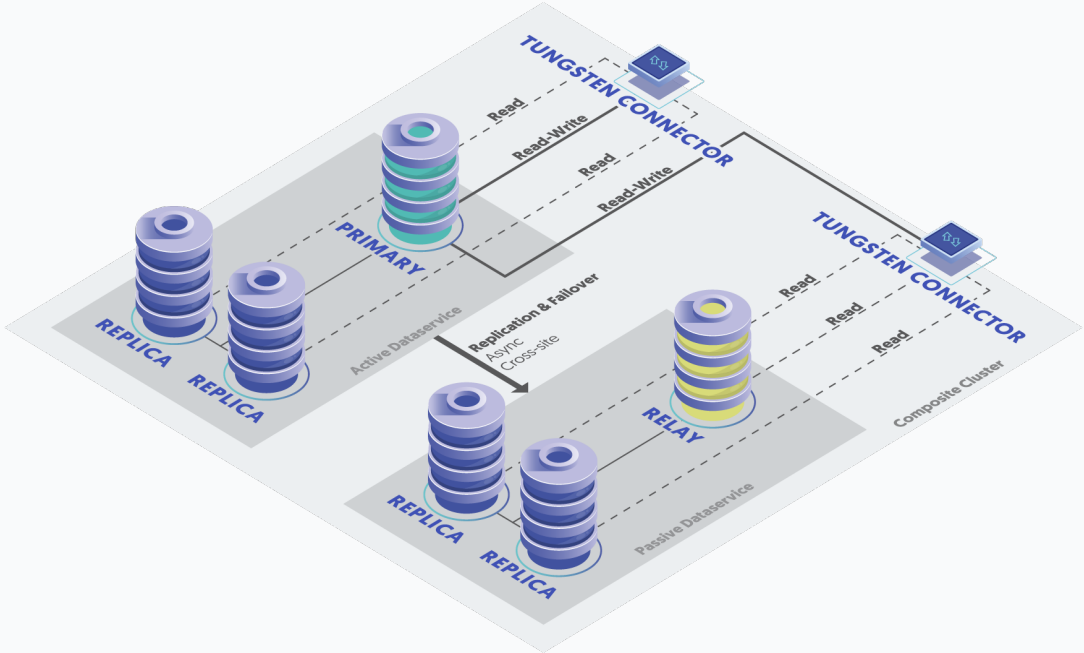
- Minimum 3 nodes
  - 1 Primary
  - 2 Replicas
- Odd number of nodes
- Single datacenter/region



Tungsten Cluster+

Composite Active/Passive Cluster

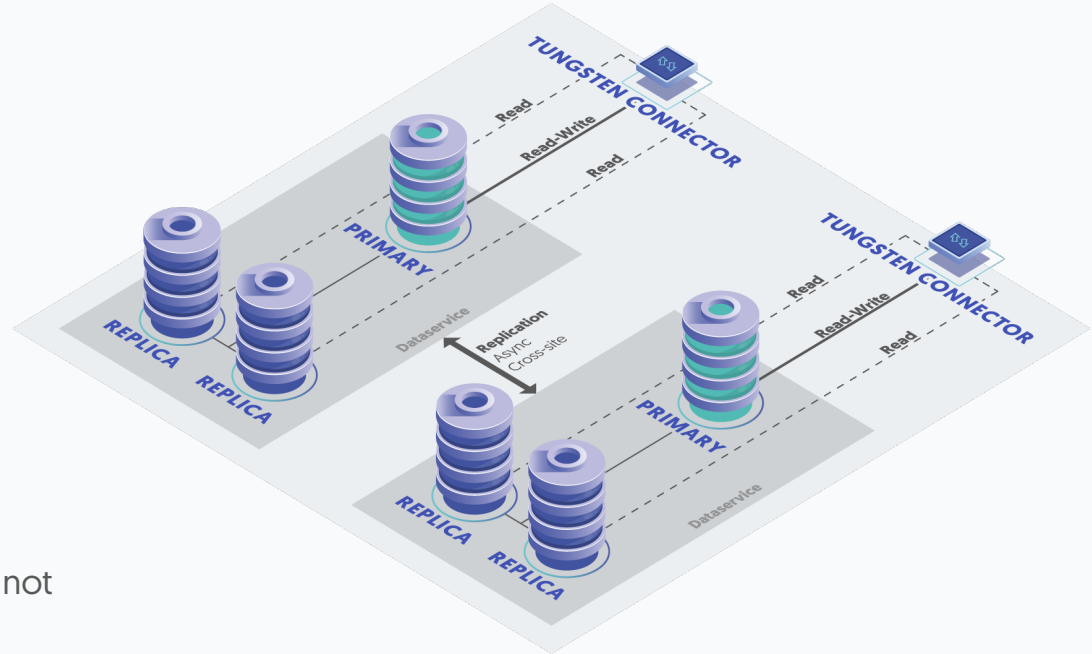
- Minimum 2 clusters
  - Min 3 nodes per cluster
- 1 Cluster for read/write
- All other clusters read-only
- Can be Cross-Region
- Simple to use and implement
- Single, write-able Primary
- Managed cross-site replication
- Often used for Disaster Recovery



Tungsten Cluster+

Multi-Site/Active-Active Cluster

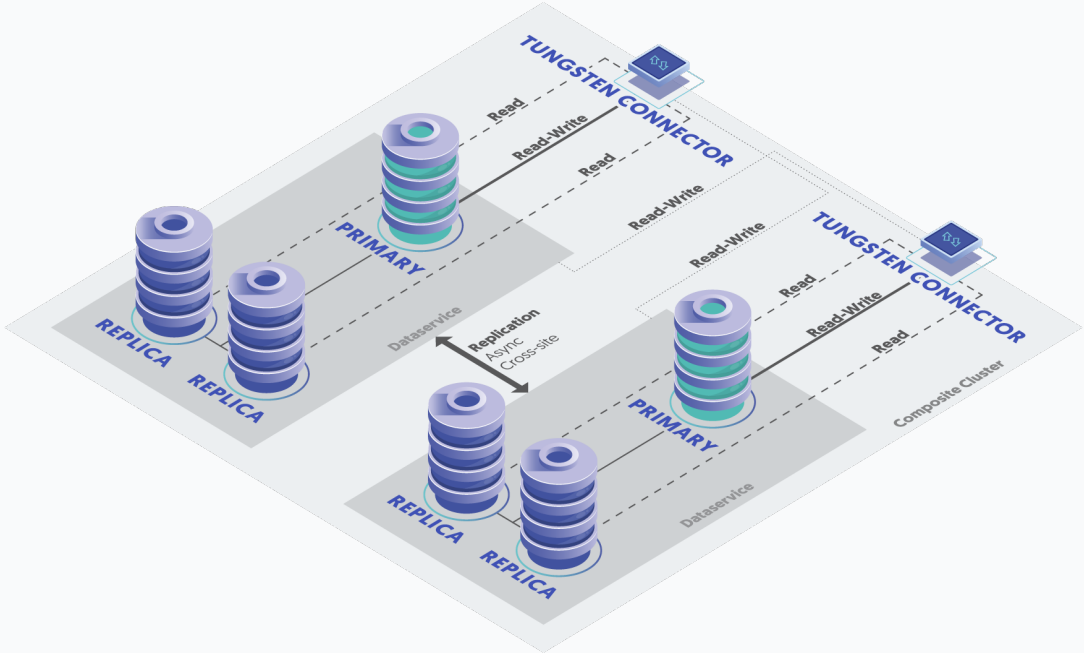
- Minimum 2 Clusters
  - Min 3 nodes per cluster
- All clusters are read/write
- Can be Cross-Region
- Each cluster is independent
- Un-managed cross-site replication
- Complex setup
- Dashboard will show each cluster but not cross-cluster replication
- All versions of Tungsten Clustering



Tungsten Cluster+

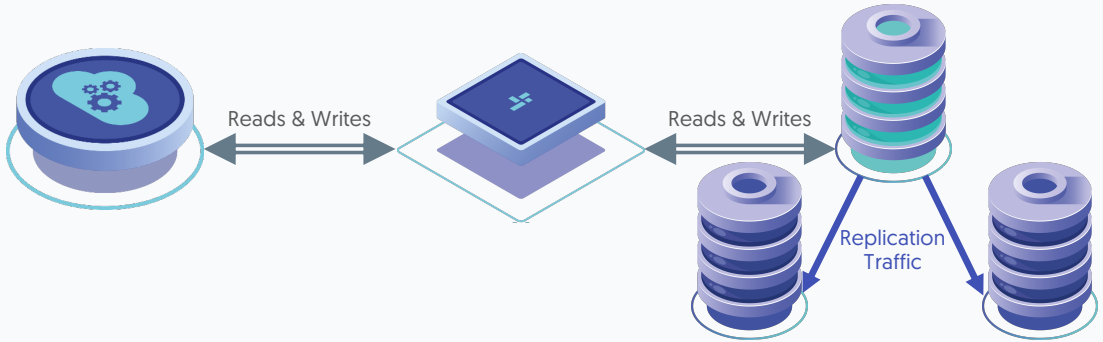
Composite Active/Active Cluster

- Minimum 2 Clusters
  - Min 3 nodes per cluster
- All clusters are read/write
- Cross-Region
- Vastly simplified setup and control
- Multiple write-able Primaries
- Managed cross-site replication – the managers are aware of and control the cross-site Replication services.
- Full Dashboard integration
- Version 6.0+ of Tungsten Clustering

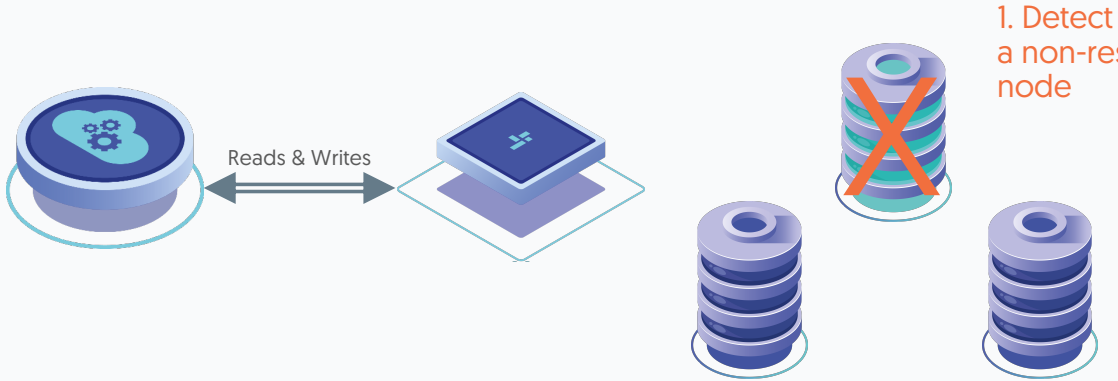


Automatic Failover

Automatic Failovers

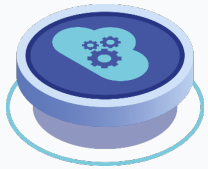


Automatic Failovers

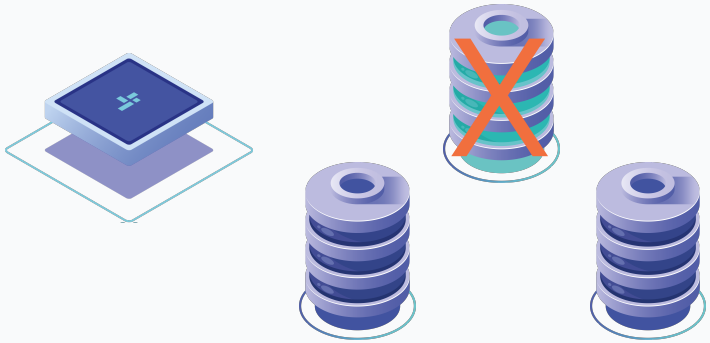


1. Detect and shun a non-responsive node

Automatic Failovers



2. Halt
in-coming
connections



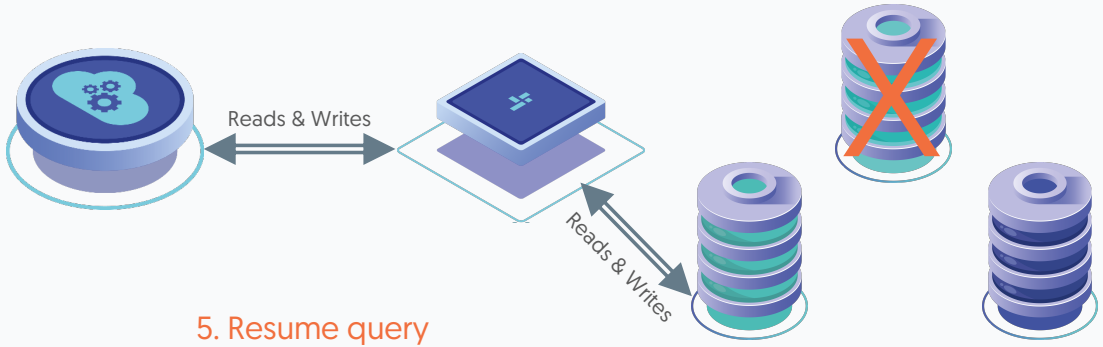
Automatic Failovers

3. Find and promote the most up-to-date replica

Automatic Failovers

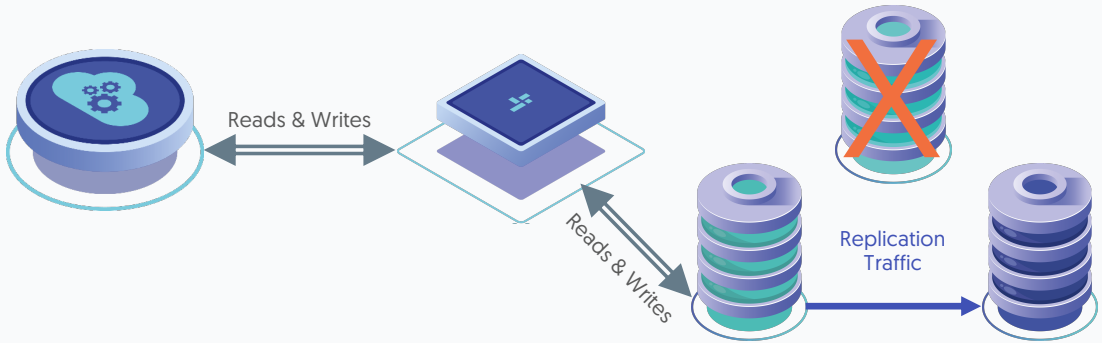
4. Bring replicator online as Primary

Automatic Failovers



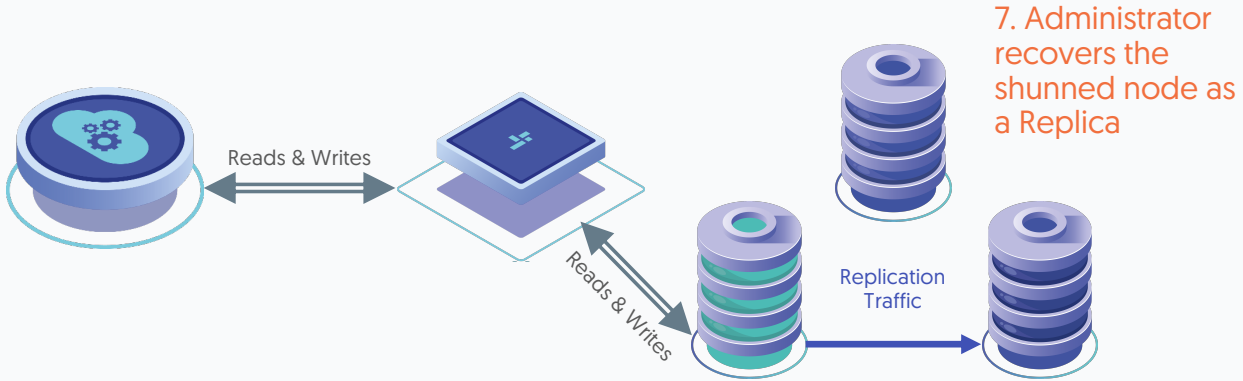
5. Resume query flow using new Primary

Automatic Failovers

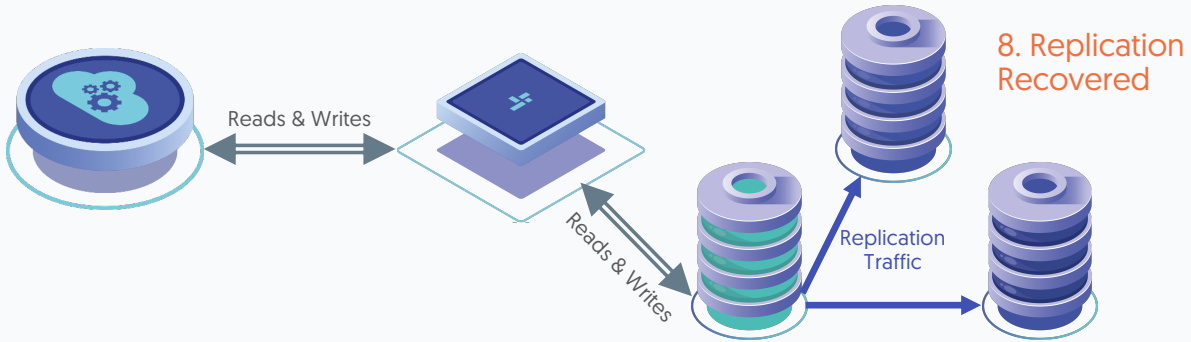


6. Reconfigure Replica to use the new Primary as source

Automatic Failovers



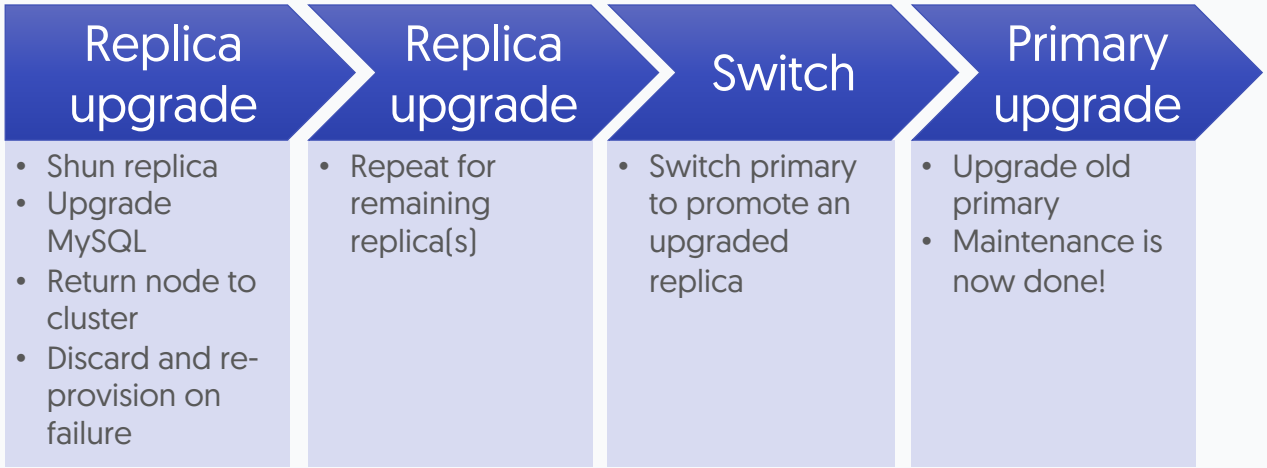
Automatic Failovers



Zero-Downtime Maintenance
(aka Rolling Maintenance)

Rolling Maintenance

Rolling maintenance proceeds node-by-node starting with replicas and proceeding to primary.



Summary

What we have learnt today

- Reviewed the key benefits offered by Continuent Tungsten Clustering
- Examined the clustering architecture
- Compared Topologies
- Reviewed automatic failover
- Explored the concepts of a rolling maintenance procedure

Next Steps

In the next session we will

- Take a deeper look at the Replicator.
- Review the Replicator States.
- Explore the Replicator Stages.

THANK YOU FOR LISTENING

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