# Advanced: Multi-Site/Multi-Master Clustering for Geo-Distributed Apps



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# Topics

In this short course we will:

- Review the Cluster Architecture

- Review required prerequisites

- Discuss Multi-Site/Multi-Master specific considerations and conflict resolution

- Walkthrough an Installation (Full end-to-end demo)
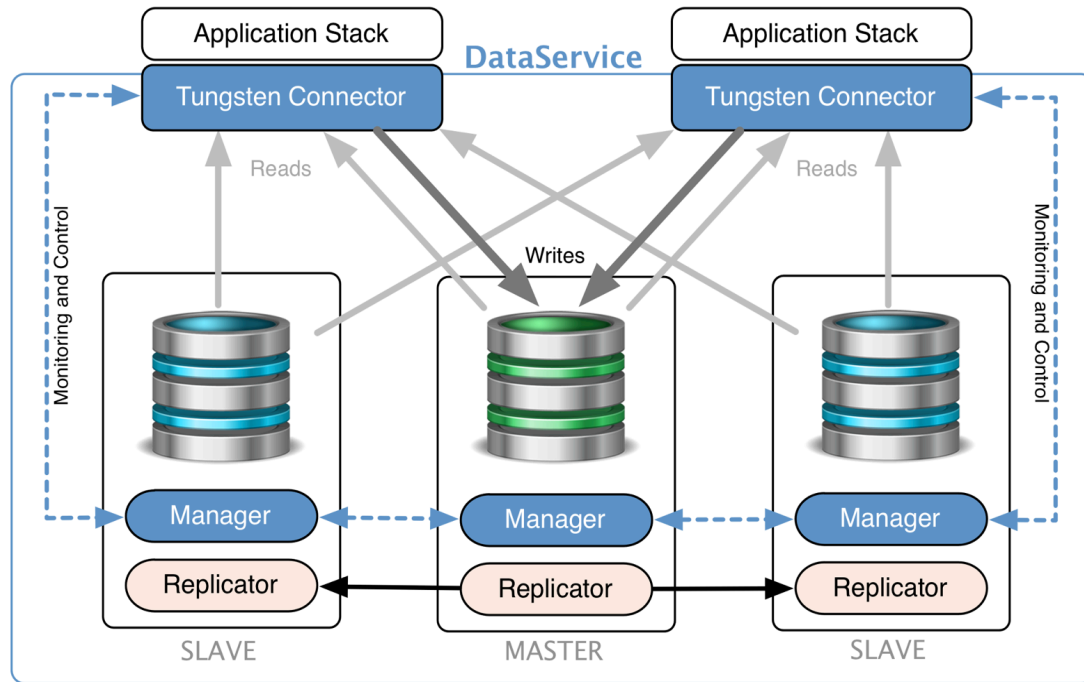
- Recap Key Resources and Tools


Course Prerequisite Learning

- Basics: Introduction to Clustering
- Basics: The Power of the Connector
- Basics: Simple Cluster Installation
- Visit the Continuent website or Tungsten University on YouTube to watch these recordings
  - Continuent website https://www.continuent.com/videos/
  - Tungsten University on YouTube https://www.youtube.com/channel/UCZ9iU-7nT1RLNnJvITFCsWA or http://tinyurl.com/TungstenUni
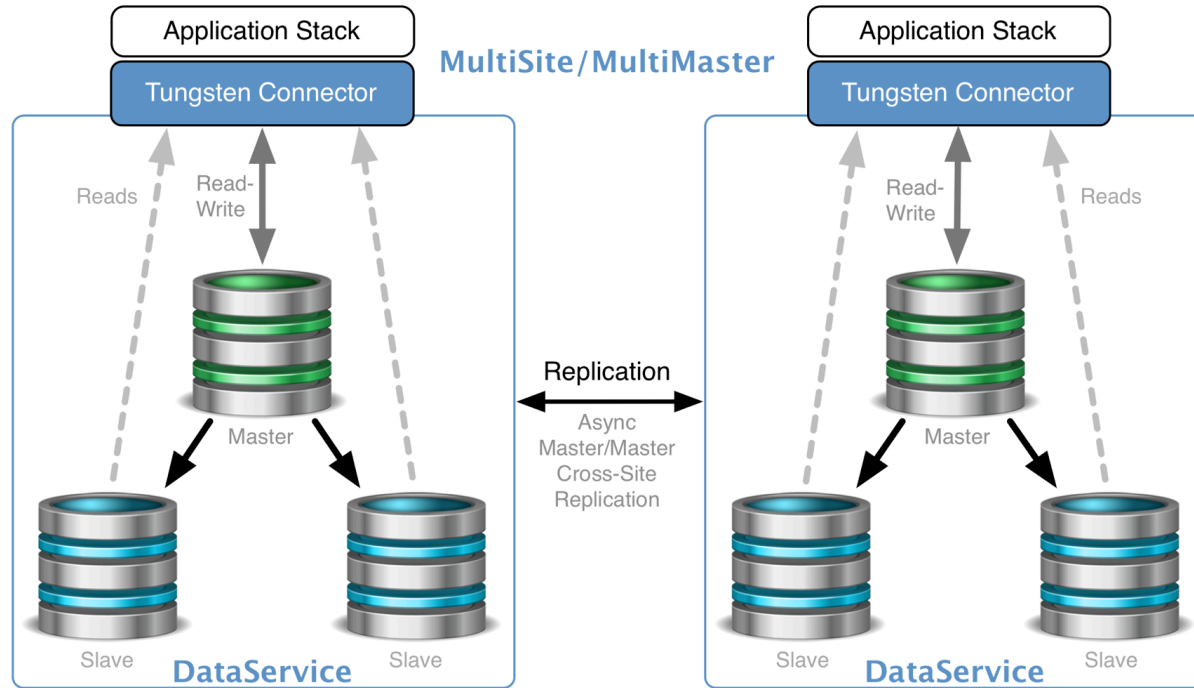
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# Tungsten Cluster Architecture

# Tungsten Cluster Architecture

# Tungsten Multi-Site/Multi-Master Cluster Architecture

# Cluster Decisions and Prerequisites

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# Pre Installation Environment Decisions

- Where will the connectors be installed?
  - Dev/Test/Staging – On DB Host is OK
  - Production – Dedicated hosts or directly on the Application Servers
- Which release of MySQL?
  - MySQL Community
  - Percona
  - MariaDB
  - Oracle MySQL Enterprise
- Which version?
  - 5.0 to 5.7, Maria 10.x
- What monitoring tools do you have?
- What backup tools do you have?

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# Prerequisites

- Review docs
  - http://docs.continuent.com/tungsten-clustering-5.2/prerequisite.html
- Host Prerequisites
  - OS user
  - /etc/hosts
  - sudoers and ssh
  - Ruby and required gems
  - Java
- Network Prerequisites
  - Review port requirements
- MySQL Prerequisites
  - my.cnf settings
  - tungsten user accounts
  - Offset auto_increment counters

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# Pre Installation Tungsten Decisions

- TAR file or RPM?
  - Requires both Clustering AND Replicator Software
- INI-based install or staging install?
- Which connector mode?
  - Bridge is default
  - Proxy mode
  - SmartScale
- SSL Enabled?

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# Conflict Resolution

- Short Answer: We don't do it!

- Every customer requirement is different

- Which node should be authoritative?

- Guidelines
  - Offset auto_increment for Primary Keys
  - Geo-Distribution
  - App Distribution
  - User Distribution

- However, watch this space for new features in future releases!

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# Installation Demo
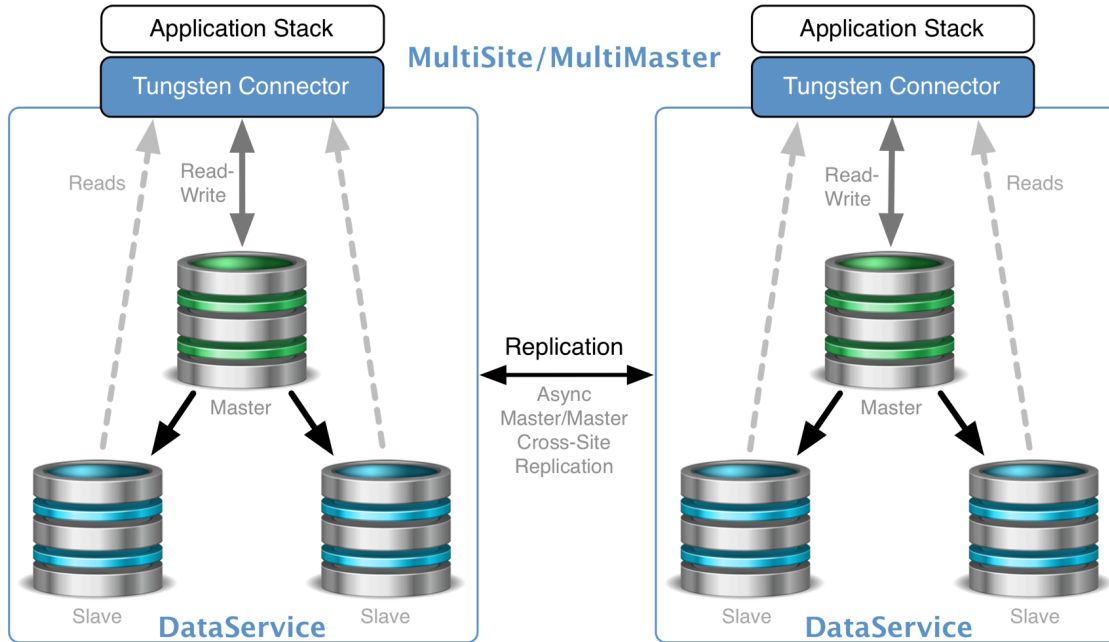


- Tungsten Clustering 5.2

- Tungsten Replicator 5.2

- Tar File

- ini Install

- Connectors in Port-Based Routing mode

- Amazon AWS EC2

- MySQL Community 5.7

- Java 1.8

- Ruby 2.0

# Command Line Tools
# &
# Resources

# Tools : cctrl

- "`cctrl`" can be run from any node within a cluster to control the local cluster and gather information

- Type "`help`" to get a full list of all commands available

- "ls" provides a summary overview of the entire cluster

```
[LOGICAL] /nyc > ls

COORDINATOR[db1:AUTOMATIC:ONLINE]

ROUTERS:
+---------------------------------------------------------------------------+
|connector@db1.tt-0509[25431](ONLINE, created=0, active=0)                  |
|connector@db2.tt-0509[24548](ONLINE, created=0, active=0)                  |
|connector@db3.tt-0509[24803](ONLINE, created=0, active=0)                  |
+---------------------------------------------------------------------------+

DATASOURCES:
+---------------------------------------------------------------------------+
|db1(master:ONLINE, progress=0, THL latency=0.776)                          |
|STATUS [OK] [2017/08/17 11:00:53 AM UTC]                                    |
+---------------------------------------------------------------------------+
|   MANAGER(state=ONLINE)                                                    |
|   REPLICATOR(role=master, state=ONLINE)                                    |
|   DATASERVER(state=ONLINE)                                                 |
|   CONNECTIONS(created=0, active=0)                                         |
+---------------------------------------------------------------------------+
. . .
```

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# Tools : trepctl

- "`trepctl status`" can be run from any node within a cluster to view the status of the local replicator

- "`trepctl status -r 3`" will show status output refreshed every 3 second until CTRL+C

- "`trepctl qs`" provides a quick summary overview of the local replicator

- "`trepctl perf`" provides deeper diagnostics of the different stages in the replicators

- Prefix all commands with value set during install, to view cross-site replicators
  - e.g. "`mm_trepctl status`"

```
$ trepctl qs
State: east Online for 21.069s, running for 45.654s
Latency: 0.837s from DB commit time on db1 into THL
         21.839s since last database commit
Sequence: 1 last applied, 0 transactions behind (0-1 stored) estimate 0.00s before synchronization
```

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# Tools : tpm connector

- Simple and quick way to connect to MySQL CLI

- Tungsten Commands to query database and cluster stats

  - Connector-based Tungsten commands are NOT available in Bridge Mode

  - This is a good way to tell if you are in Bridge mode – if no commands are available, then you are in Bridge mode

  - `tungsten help` will show all commands available

```
mysql> tungsten help;
+-------------------------------------------------------------------------------------------------------------------------+
| Message                                                                                                                 |
+-------------------------------------------------------------------------------------------------------------------------+
| tungsten connection status:            display information about the connection used for the last request ran          |
| tungsten connection count:             gives the count of current connections to each one of the cluster datasources   |
| tungsten cluster status:               prints detailed information about the cluster view this connector has           |
| tungsten show [full] processlist:      list all running queries handled by this connector instance                    |
| tungsten show variables [like '<string>']: list connector configuration options in use. The <string> may contain '%' wildcards |
| tungsten flush privileges:             reload user.map and refresh user credentials                                   |
| tungsten mem info:                     display memory information about current JVM                                    |
| tungsten gc:                           calls garbage collector                                                         |
| tungsten help:                         display this help message                                                       |
+-------------------------------------------------------------------------------------------------------------------------+
9 rows in set (0.00 sec)
```

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# Log Files

- The **/opt/continuent/service_logs/** directory contains both text files and symbolic links for cluster log files.

- The **/opt/replicator/service_logs/** directory contains both text files and symbolic links for the cross-site replicators.

- Links in the **service_logs** directory go to one of three (3) subdirectories:

  - /opt/continuent/tungsten/tungsten-connector/log/

  - /opt/continuent/tungsten/tungsten-manager/log/

  - /opt*/[continuent|replicator]*/tungsten/tungsten-replicator/log/

```
tungsten@db1:/opt/continuent/service_logs  $ ll
total 116
lrwxrwxrwx 1 tungsten tungsten        61  Jun 22 09:52    connector.log   -> /opt/continuent/tungsten/tungsten-connector/log/connector.log
lrwxrwxrwx 1 tungsten tungsten        62  Jun 22 09:52    mysqldump.log   -> /opt/continuent/tungsten/tungsten-replicator/log/mysqldump.log
lrwxrwxrwx 1 tungsten tungsten        55  Jun 22 09:52    tmsvc.log        -> /opt/continuent/tungsten/tungsten-manager/log/tmsvc.log
lrwxrwxrwx 1 tungsten tungsten        60  Jun 22 09:52    trepsvc.log      -> /opt/continuent/tungsten/tungsten-replicator/log/trepsvc.log
lrwxrwxrwx 1 tungsten tungsten        63  Jun 22 09:52    xtrabackup.log -> /opt/continuent/tungsten/tungsten-replicator/log/xtrabackup.log
```

# Tools : tpm diag

- Provides support engineers with an entire overview of the cluster state, by:
  - Gathering point-in-time status of all components in a cluster
  - Gathering log files of all components in a cluster, including database logs to provide historical information
  - Bundles everything into one easy zip file that can be attached to a support case
  - Will only include cluster diag, in MSMM environment, you will also need to execute "`<prefix>_tpm diag`" to gather cross-site replicator diagnostics

- ALWAYS create a diag package when you contact support for assistance

- tungsten_send_diag
  - Executes "`tpm diag`" to generate the diagnostic package
  - Automatically uploads the package to support
  - https://docs.continuent.com/tungsten-clustering-5.2/cmdline-tools-tungsten_send_diag.html

```
tungsten@db1:/opt/continuent/service_logs  $ tungsten_send_diag -d -c 1234
```

# Next Steps

- If you are interested in knowing more about the clustering software and would like to try it out for yourself, please contact our sales team who will be able to take you through the details and setup a POC – sales@continuent.com

- Read the documentation at http://docs.continuent.com/tungsten-clustering-5.2/index.html

- Subscribe to our Tungsten University YouTube channel! http://tinyurl.com/TungstenUni

- Visit the events calendar on our website for upcoming Webinars and Training Sessions https://www.continuent.com/events/

- Tues 19th September : Intermediate: Performing Cluster Maintenance with Zero-Downtime https://attendee.gotowebinar.com/register/3147236970857834243

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