

Tungsten Operator Master Class

Intermediate: Deploying a Cluster with Tungsten Operator

Presented by Chris Parker

VP of Customer Success, EMEA & APAC

Topics

In this short course, we will:

- Re-cap what Tungsten Operator is
- Explore prerequisites for a deployment
- Installing the Operator
- Installing a Tungsten Cluster
- Introduce the kubectl plugin

What is Tungsten Operator

What It Is

A Kubernetes-native automation system that manages MySQL clusters with Continuent Tungsten technology.

For Non-Technical Users

Acts like a "robot database admin" — keeps data synchronized, ensures copies in multiple places, and provides instant failover by utilizing Tungsten Clustering.

For Technical Users

A Go-based Kubernetes Operator using controller-runtime to manage MySQL clusters with replication, failover, backups, and workflows.

Why It Matters

Simplifies complex database operations, increases reliability, and reduces manual effort.

Deployment Scenarios

Development & Testing

- **Kind/Minikube:** Local Kubernetes testing
- **Single Node:** Development environments
- **MinIO Integration:** Local object storage for backup testing

Production Environments

- **Multi-Zone Clusters:** Geographic distribution for disaster recovery
- **External Load Balancers:** Production-grade traffic management
- **Enterprise Storage:** High-performance SSD storage classes
- **Monitoring Stack:** Full observability with alerting

Cloud Platforms

- **Amazon EKS:** Native AWS integration with S3 backups
- **Google GKE:** GCS storage and regional persistent disks
- **Azure AKS:** Azure Blob storage integration
- **On-Premises:** VMware, OpenStack, bare metal Kubernetes

Prerequisites

- Docker Registry
- Pre-Configured Kubernetes Cluster
 - Minimum version v1.25
 - Minimum 3 nodes
 - Minimum Memory requirements
 - 1Gb for Tungsten Manager
 - 2Gb for Tungsten Replicator
 - 1Gb for Tungsten Connector
 - MySQL
 - cert-manager v1.16+

Prerequisites

- Staging Host
 - Connectivity to Kubernetes Cluster & Docker Registry
 - Docker
 - Kubectl
 - Configured staging directory e.g. /opt/continuent/software
 - OS User e.g. tungsten
 - OPTIONAL: kind
 - OPTIONAL: aws/gcp cli tools

Installing Tungsten Operator

Download and unpack images:

- Tungsten Operator packages
- Docker images



Installing Tungsten Operator

1. Load files into Docker Registry

```
shell> export ARCH=amd64
shell> export RELEASE=8.0.0-27
shell> export REGION=us-east-1
shell> export REGISTRY=111222333444.dkr.ecr.us-east-1.amazonaws.com
shell> cd /opt/continuent/software/tungsten-operator-${RELEASE}
shell> docker load -i images/tungsten-operator-${RELEASE}-${ARCH}.tar
shell> cd /opt/continuent/software/tungsten-docker-images-${RELEASE}
shell> docker load -i tungsten-connector-${RELEASE}-${ARCH}.tar
shell> docker load -i tungsten-manager-${RELEASE}-${ARCH}.tar
shell> docker load -i tungsten-replicator-${RELEASE}-${ARCH}.tar
```

2. Retrieve authentication token

```
shell> aws ecr get-login-password --region ${REGION} |
    docker login --username AWS --password-stdin ${REGISTRY}
```

3. Tag the images

```
shell> docker tag tungsten-operator:${RELEASE} ${REGISTRY}/tungsten-operator:${RELEASE}
shell> docker tag tungsten-connector:${RELEASE} ${REGISTRY}/tungsten-connector:${RELEASE}
shell> docker tag tungsten-manager:${RELEASE} ${REGISTRY}/tungsten-manager:${RELEASE}
shell> docker tag tungsten-replicator:${RELEASE} ${REGISTRY}/tungsten-replicator:${RELEASE}
```

4. Push images to Docker Registry

```
shell> docker push ${REGISTRY}/tungsten-operator:${RELEASE}
shell> docker push ${REGISTRY}/tungsten-connector:${RELEASE}
shell> docker push ${REGISTRY}/tungsten-manager:${RELEASE}
shell> docker push ${REGISTRY}/tungsten-replicator:${RELEASE}
```

Installing Tungsten Operator

1. Execute install.sh
2. Answer prompts
3. Operator Installed!

```
shell> cd /opt/continuent/software/tungsten-operator-8.0.0-27
shell> ./install.sh

Please input the container registry URL where Tungsten operator image is stored (without a
tag) [tungsten-operator]:
<Enter your registry URL here>

Please enter Tungsten operator version tag [8.0.0-27]:

Current Kubernetes context is set to: your-kubernetes-context
Press enter to continue or any other key to abort
Ensuring Cert-Manager is installed...
Installing Tungsten Operator Helm chart...
NAME: tungsten-operator
LAST DEPLOYED: Tue Oct 28 12:49:14 2025
NAMESPACE: tungsten-operator
STATUS: deployed
REVISION: 1
TEST SUITE: None
Waiting for operator to become ready...
deployment.apps/tungsten-operator condition met
Operator is ready!

Installation completed!

To create an example cluster, run:
kubectl apply -f examples/mysql-passwords.yaml && kubectl apply -f
examples/tungsten_v1alpha1_tungstenmysqlcluster.yaml
```

Install Tungsten Cluster

Configure YAML Files

- YAML File templates available for all topologies
 - **NOTE:** Active/Passive and Active/Active clusters in same region
- Customize to suit
- Full documentation showing all examples

Install Tungsten Cluster

Configure Passwords

- Allow cluster to generate passwords, or
- Use yaml file
 - mysql-passwords.yaml in examples directory
- Setup passwords before cluster creation

```
apiVersion: v1
kind: Secret
metadata:
  name: tungsten-passwords-sample-secret
type: Opaque
stringData:
  mysqlRootPassword: rootsecret
  applicationPassword: appsecret
  replicatorPassword: replicatorsecret
  restApiAdminPassword: apisecret
```

Install Tungsten Cluster

Configure Custom Cluster Properties

- Equivalent to setting custom properties in tungsten.ini
- Name/value key pairs within the YAML file
- Include section
customTungstenIniProperties
- configuration = ini [defaults] stanza
- dataServices = ini [serviceName] stanza
- See Tungsten Cluster docs for all ini properties

```
...
spec:
  configuration:
    customPasswordSecret: custom-tungsten-passwords-sample
    customTungstenIniProperties:
      - name: connector-bridge-mode
        value: "true"
      - name: repl-buffer-size
        value: "10"
  dataServices:
    - name: composite
      topology: composite-active-passive
      sources:
        - east
        - west
    - name: east
      topology: clustered
      size: 3
      customTungstenIniProperties:
        - name: connector-disconnect-timeout
          value: "10"
        - name: property=manager.prometheus.exporter.enabled
          value: "true"
...
```

Install Tungsten Cluster

Using kubectl

- Customize YAML files if required
- Use kubectl to apply the configuration

```
shell> kubectl apply -f examples/mysql-passwords.yaml  
shell> kubectl apply -f examples/tungsten_v1alpha1_mysqlcluster.yaml
```

kubectl Plugin

- Simplifies management of Tungsten Clusters
- Installed automatically as part of the install.sh actions
- Easy to use actions:
 - backup – Manage backups
 - `kubectl tungsten backup create <backupName> [flags]`
 - cluster – Manage clusters
 - `kubectl tungsten cluster cctrl <cluster>` – opens shell session to specified cluster
 - `kubectl tungsten cluster switch` – Initiate a switch of the primary node

Summary

What we have learnt in this session:

- Reviewed what Tungsten Operator is
- Explored the prerequisites for a deployment
- Install the Operator
- Install a Tungsten Cluster
- Introduced the kubectl plugin

Thank you for listening

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