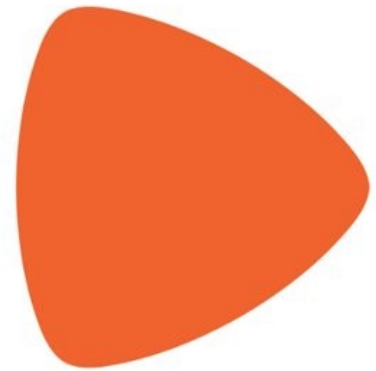
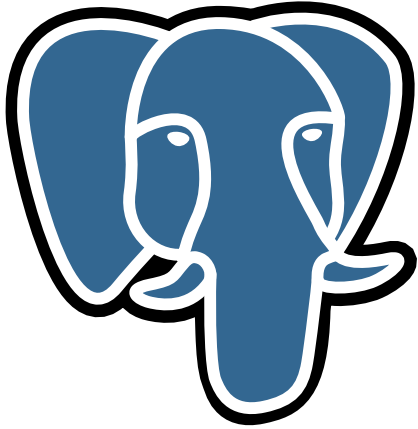
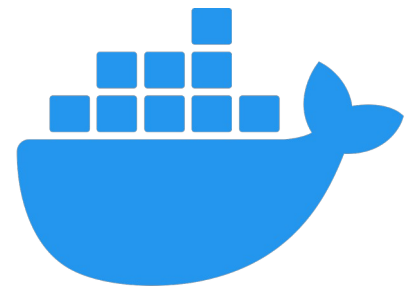


Redpill
Linpro

HA PostgreSQL in kubernetes: zalando/postgres-operator



zalando



docker®

Plan

- Install to GKE
 - Configuration
 - Installation
- Howto operations:
 - Backup
 - Restore
 - Minor upgrades
 - Major upgrades

Ex1: Terminal presentation mode

- We have a k8s cluster ready
- `kubectl get nodes`

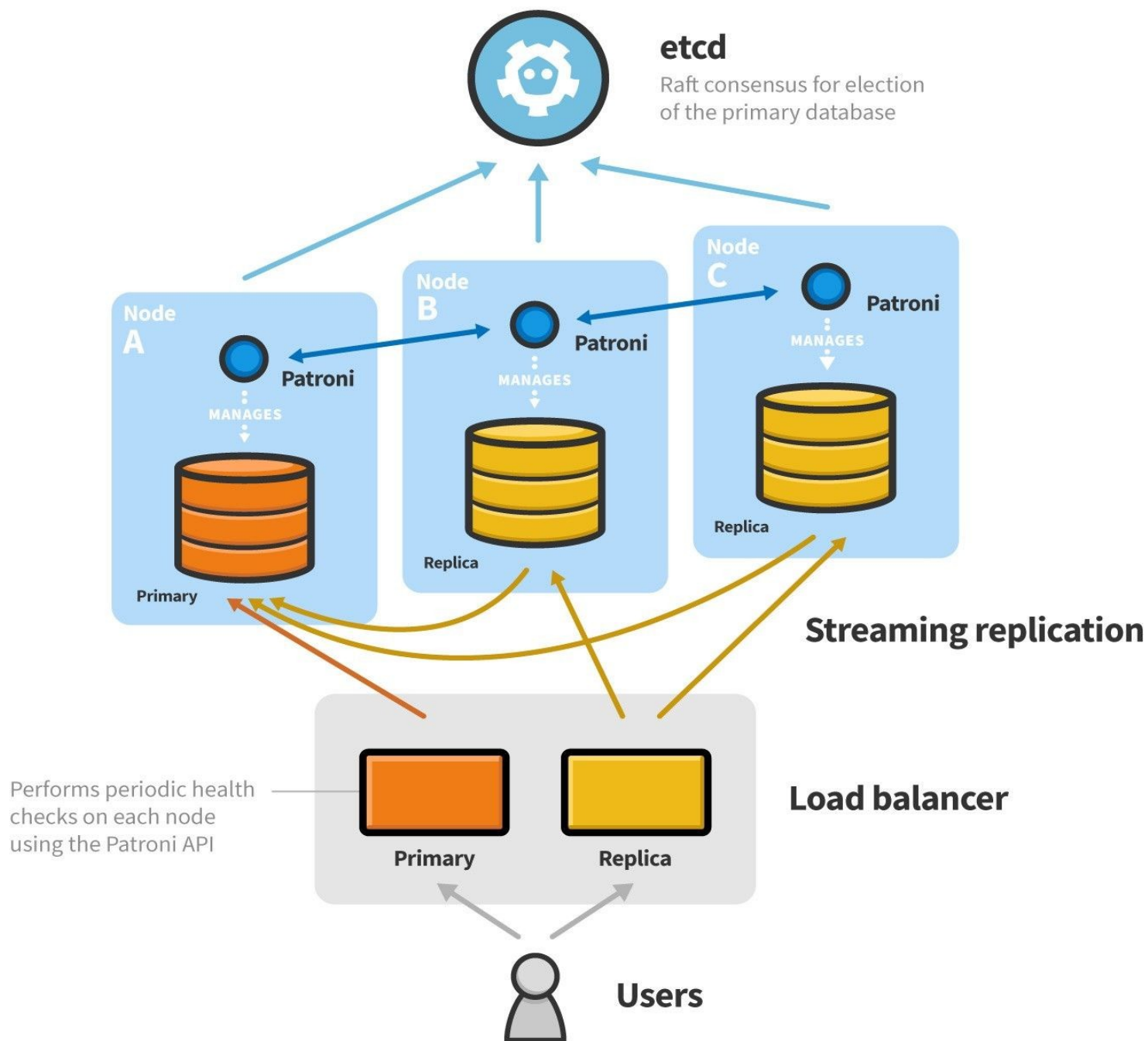
Component: zalando/spilo

- Docker image
- Wraps:
 - PostgreSQL 9,10,11
 - 12 is WIP
 - Patroni
 - HA controller for PG
 - WAL-E, WAL-G
 - Basebackup and WAL archiving to buckets

Component: zalando/patroni

- HA Template for PG
 - Patroni owns PG master
- DCS for configuration
 - k8s etcd
- Manage stateful set
 - 1 x master, N x standby
- Auto failover
 - Master elections w/ RAFT
- tcp:5432 through LB

Patroni architecture



Component: Citusdata WAL-G

- `pg_basebackup $DATADIR`
 - store in bucket
- `archive_command`
- Restore `$DATADIR`
- `restore_command`

Ex2: ServiceAccount

- RBAC

Ex3: pod config

- postgres-pod-config

Ex4: The operator

- postgres-operator
 - kubectl get pods

Ex5: operator config

- postgresql-operator-default-configuration.yaml
 - kubectl get pods

Ex6: A cluster with prometheus

- rldemo-cluster.yaml
 - kubectl create -f
 - kubectl exec -it <pod> su postgres
 - patronictl list
 - check bucket
- Some config auto:
 - shared_buffers

Ex7: Add standbys

- numberOfInstances
- kubectl edit postgresql

Ex8: Resize storage

- Operator resize not available in GKE
- `kubectrl edit pvc (all)`
- `kubectrl delete pod (all)`
 - standbys first

Ex9: Clone or restore the cluster

- 1 pod first, then resize
 - Race: Reset cluster ID, and take lead
- rldemo-restore.yaml
 - kubectl logs
- Easy restore **test**
 - Automate and report

Ex10: Major upgrade

- Spilo contains 9,10,11
- Clone with upgraded version in manifest

Minor upgrade

- Needs spilo support
- Update postgresql-operator-default-configuration
- Restart postgres-operator
 - `kubectl delete -f postgres-operator-<id>`
 - Will start rolling update of all clusters seen by operator...

Ex11: Drop clusters

- `kubectl delete postgresql`

Ex12: Logging the operator

- `kubectrl logs <operator>`

Cloning from old school cluster

- Establish k8s cluster
 - Recommend one node
 - But standbys possible
- Patroni in pause mode
- pg_basebackup -R
- Change DB system identifier in k8s cluster config endpoint
 - Put there on cluster creation by operator

Memory

- Spilo is "smart"
- Your workload may still OOM the pods

References

- <https://github.com/zalando/spilo>
- <https://github.com/zalando/postgres-operator>
- <https://github.com/wal-g/wal-g>
- <https://www.redpill-linpro.com/techblog/2019/09/28/postgres-in-kubernetes.html>
- <https://gitlab.redpill-linpro.com/is-postgres/pg-op-gke-quickstart>