Couchbase
spindox
DIGITAL SOUL
redhat.
Bringing the Database inside the Microservices World on Red Hat Openshift with Couchbase Data Platform
Daniele Paolucci - Lead Devops Engineer (Spindox)
Arduino Cascella - Solutions Engineer (Couchbase)
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AGENDA

01 The Path From Monolith to Microservice Architecture

02 Microservices, Containers and Operations

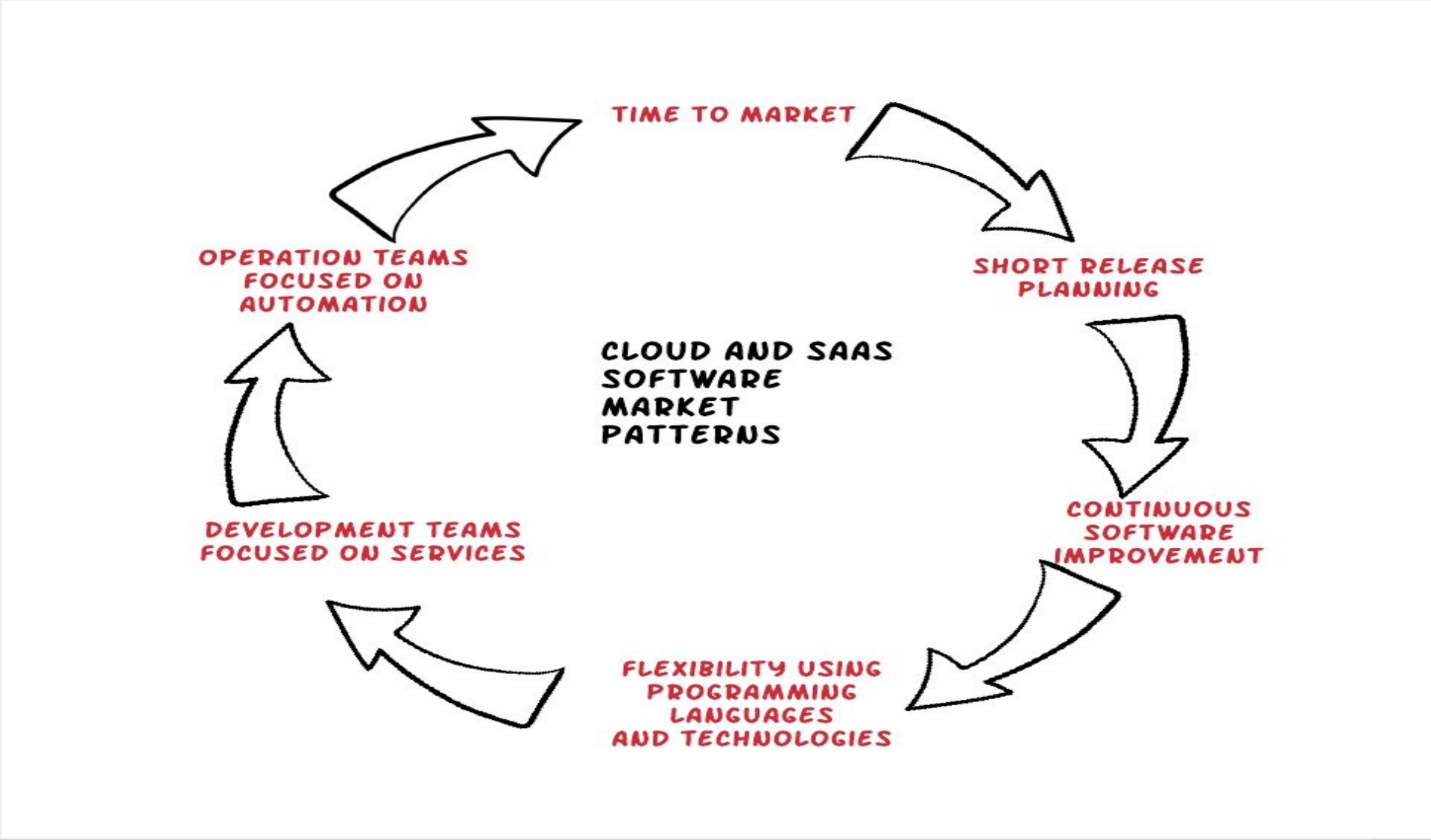
03 Couchbase: The Data Platform For Containers

04 Couchbase Operator Demo

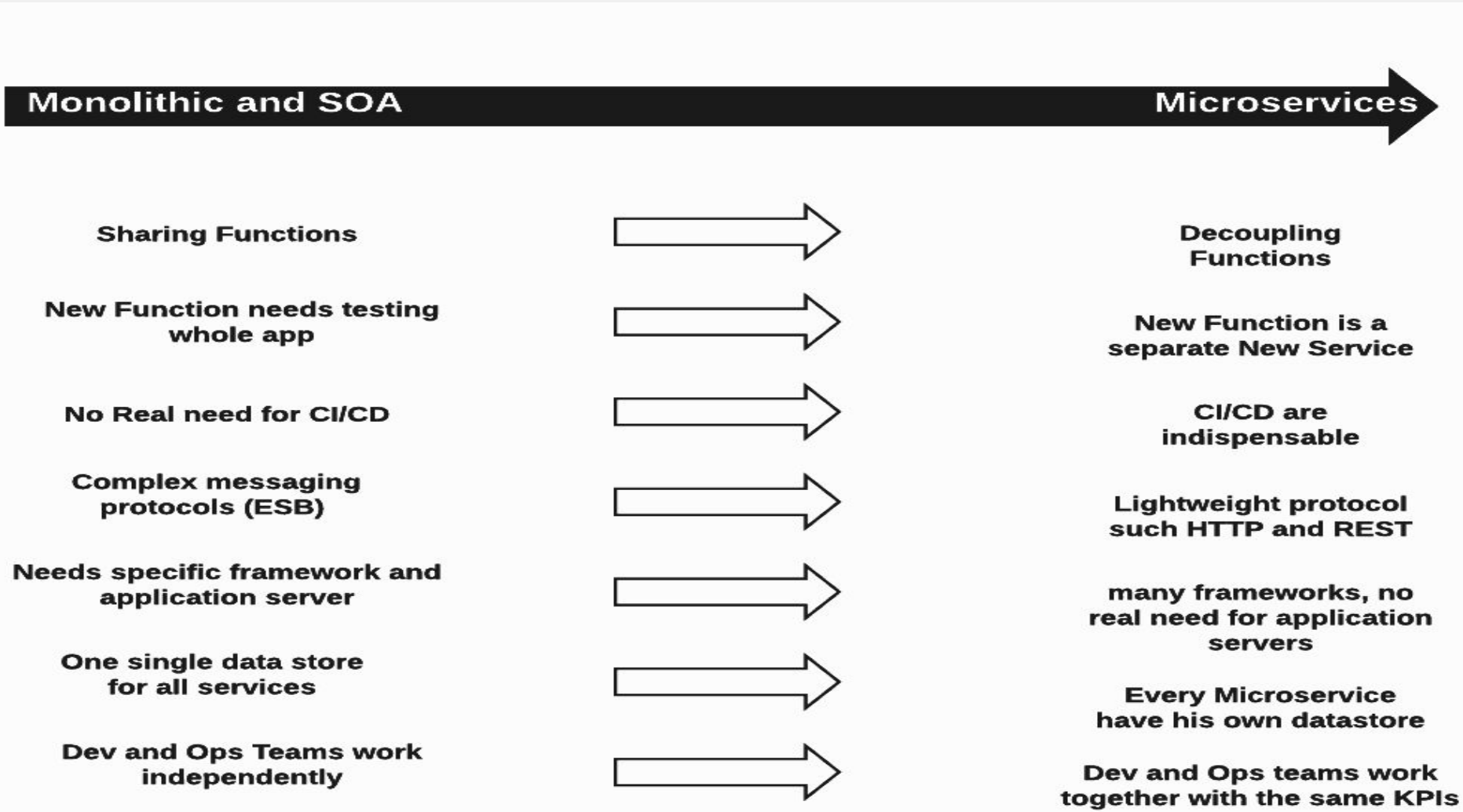
05 Example of Stateful Application

1) The Path From Monolithic to Microservices Architecture

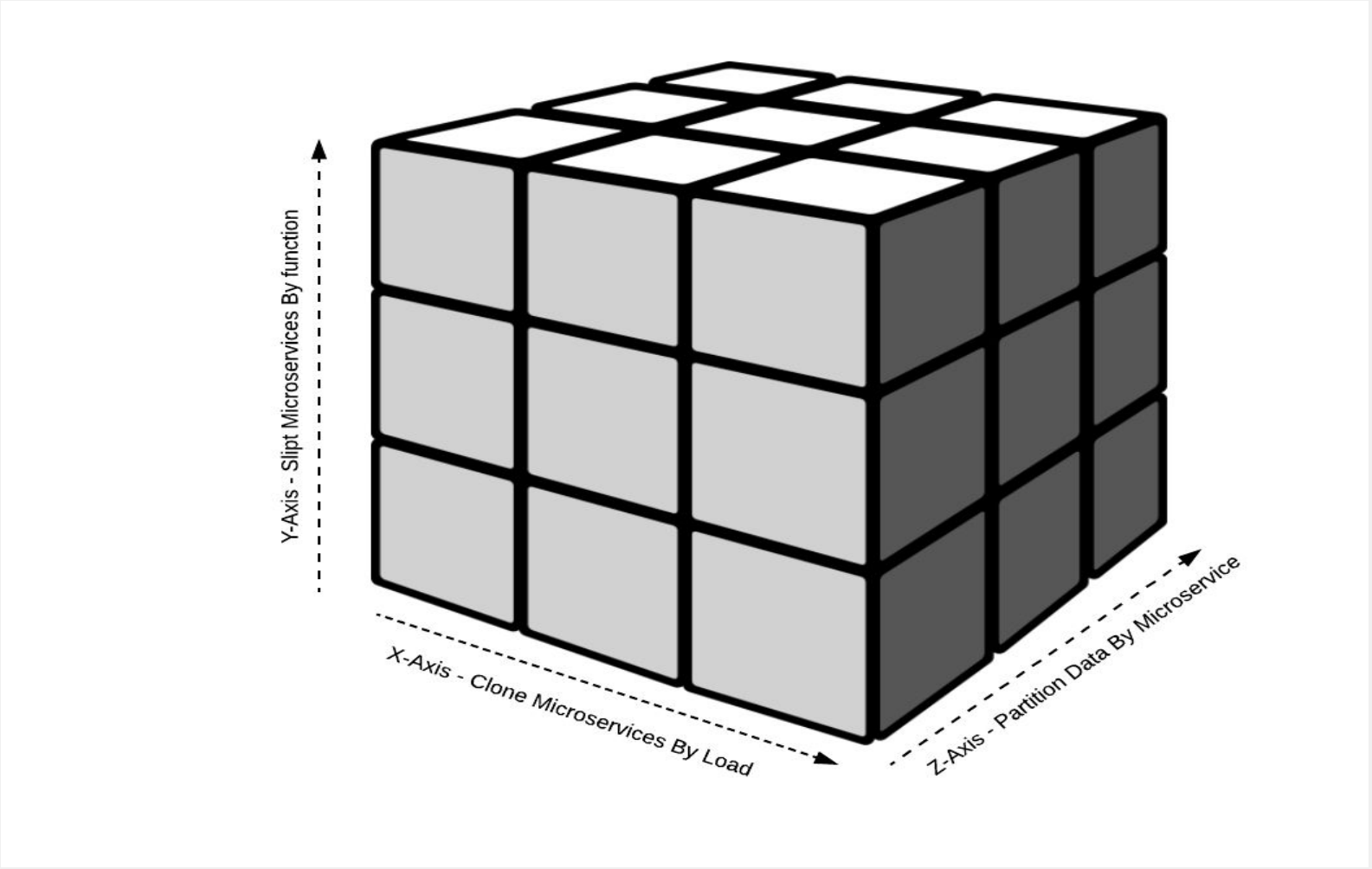
Why Business requires Microservices



Pattern changes Between Monolithic and Microservices



Microservices Scalability: The Scale Cube



2) Microservices, Containers and Operations

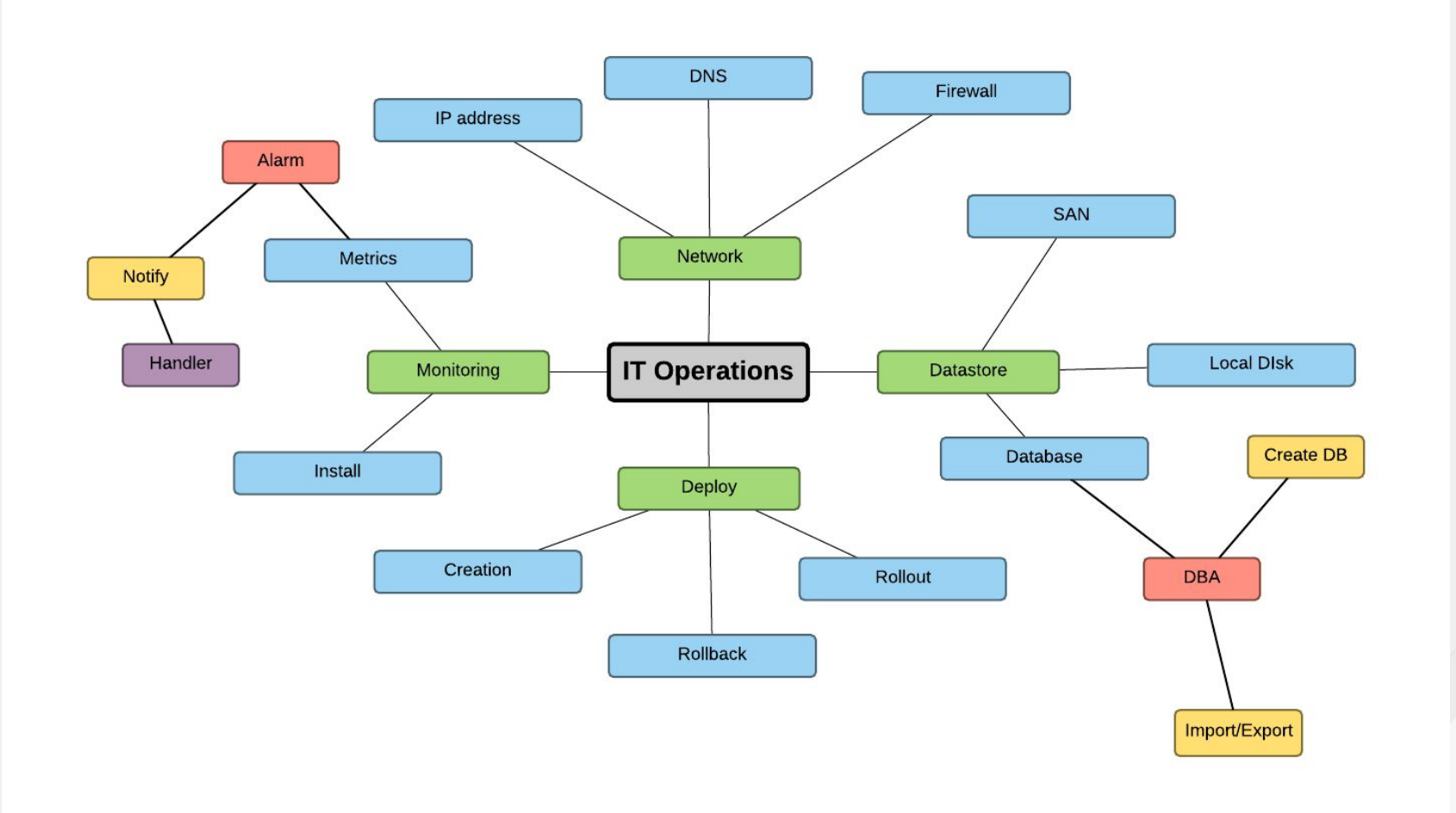
Containers - An Evolution in Application Deployment

Containers enable:

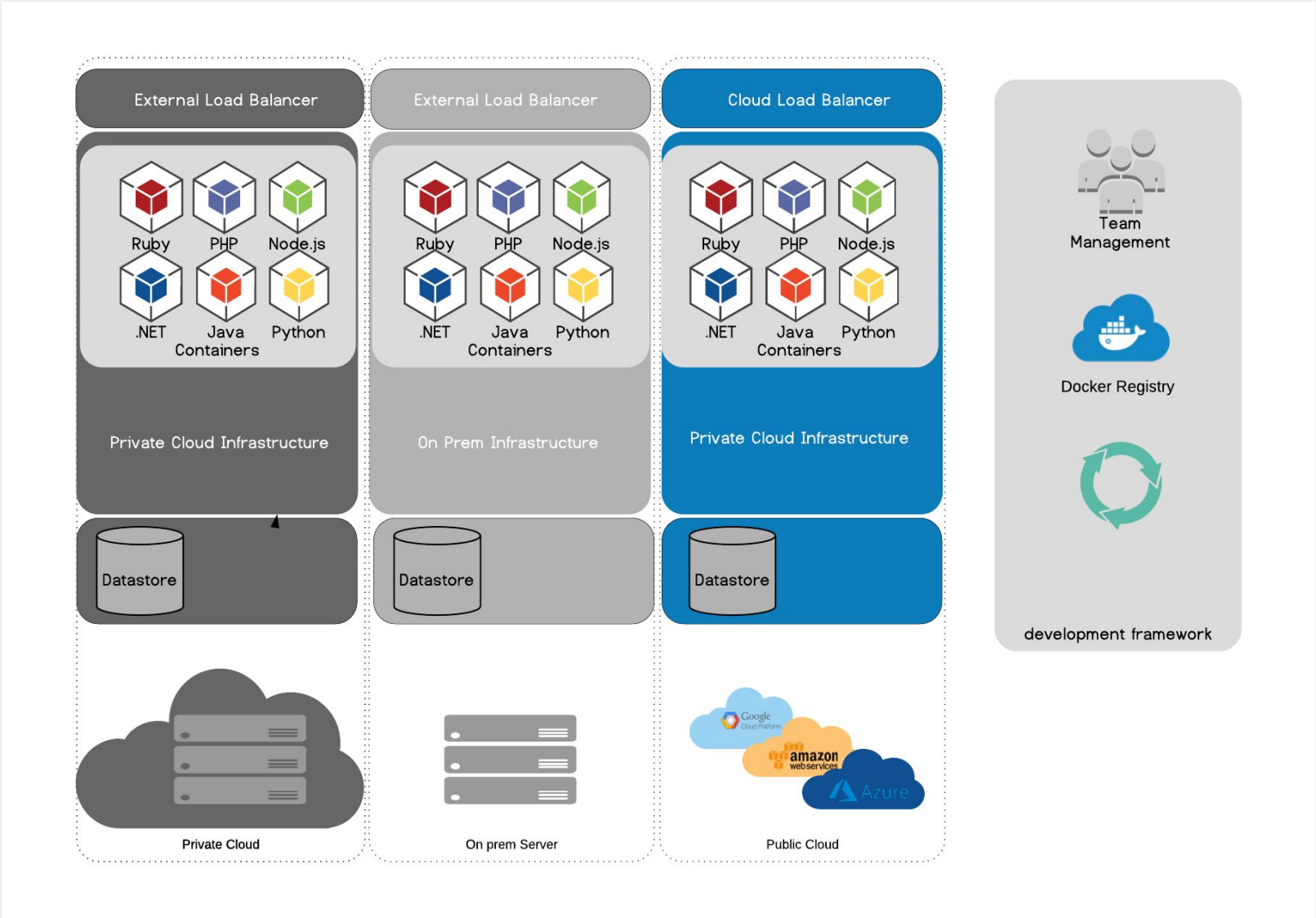
- **Efficiency and automation** for microservices, but also support traditional applications
- **Faster and more consistent deployments** from Development to Production
- **Application portability** across 4 infrastructure footprints: Physical, Virtual, Private & Public Cloud

Microservices and Operations: new challenges

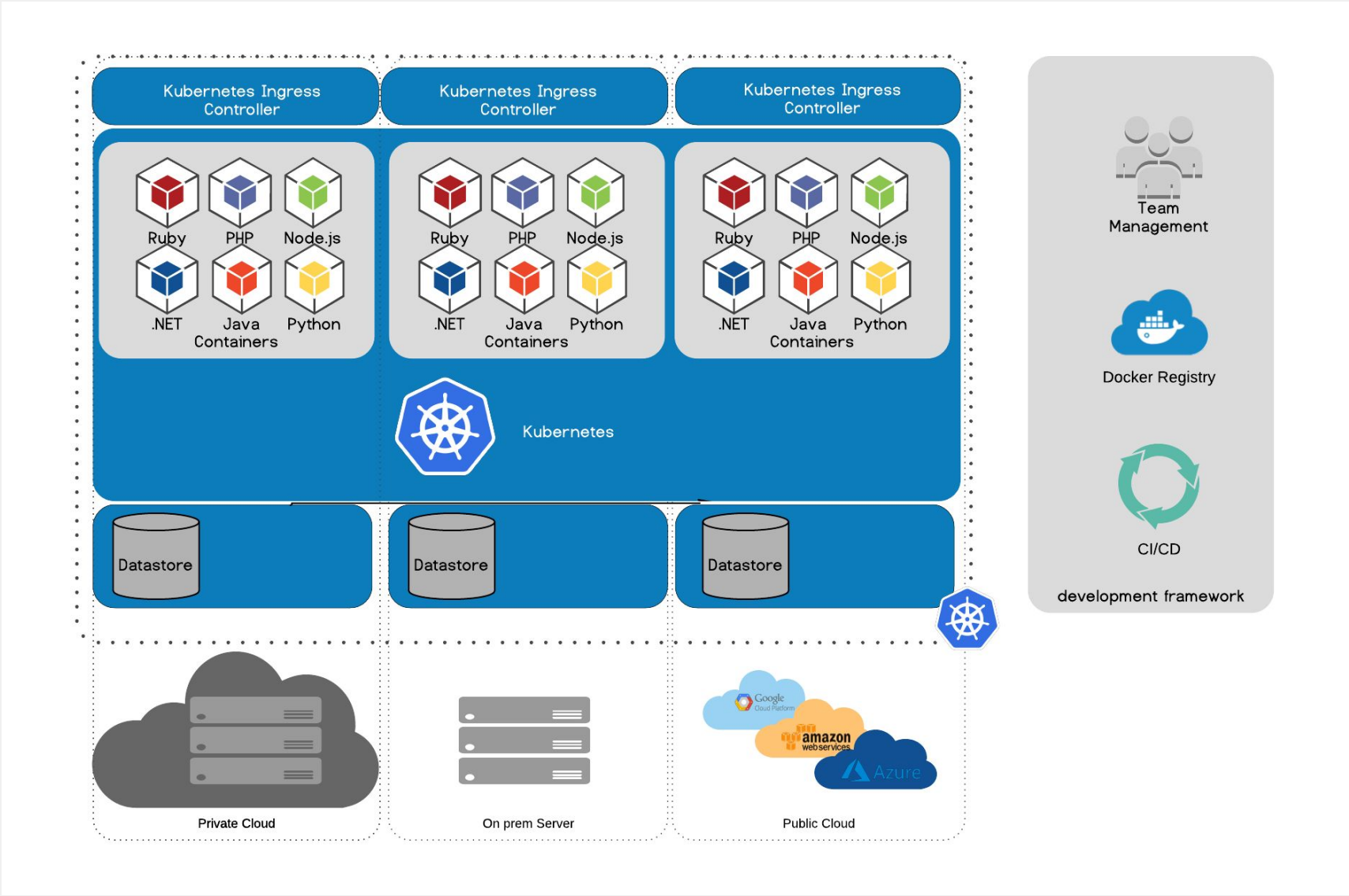
- Microservices Need complex Infrastructure Setup
- Setup may change depending on the Infrastructure type
- Create or update Microservices may need a lot of effort in IT Operations



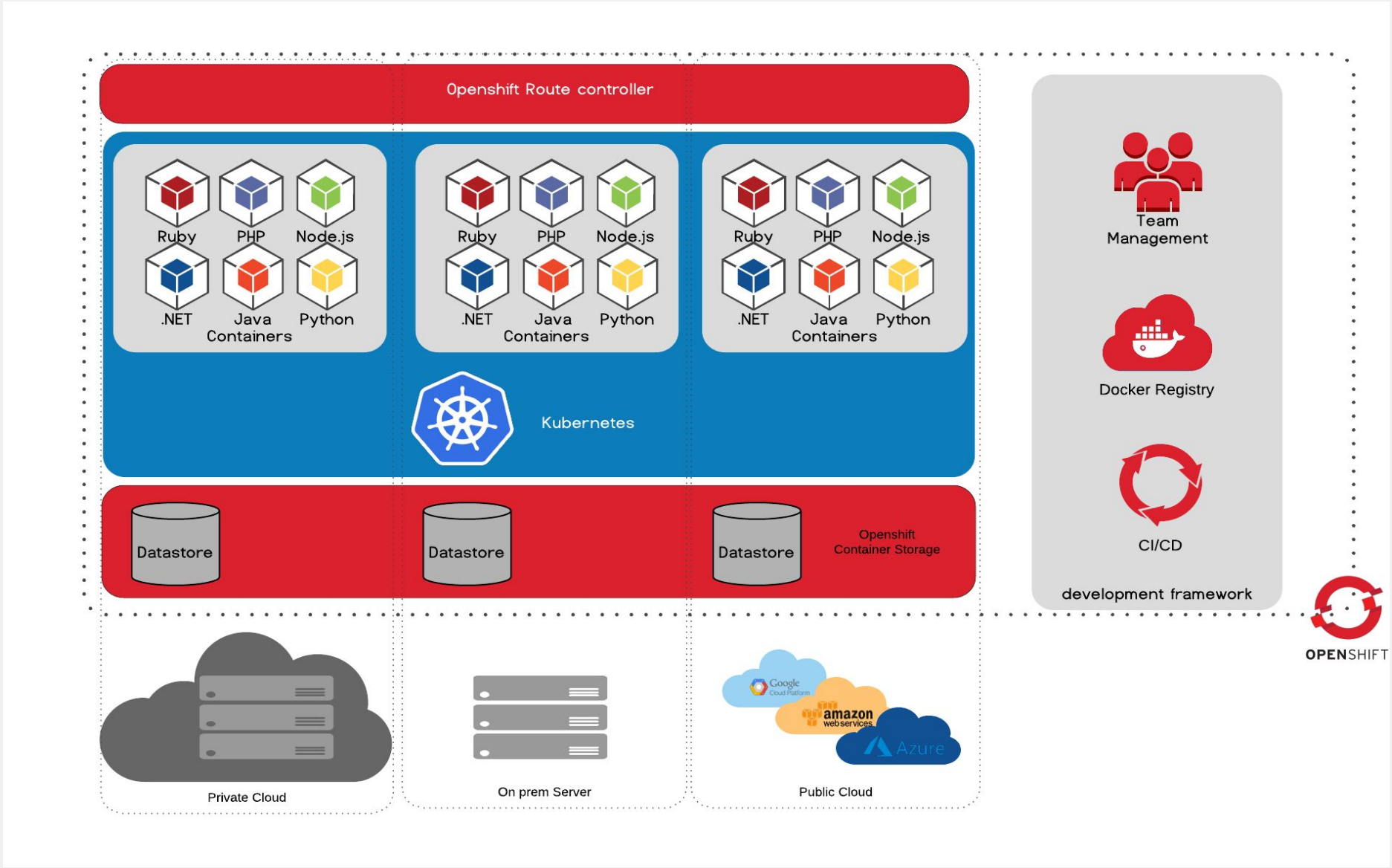
Different Platforms, different operations



Kubernetes abstracts operations on microservices



Complete software lifecycle management with OpenShift PaaS



3) Couchbase: The Data Platform For Containers

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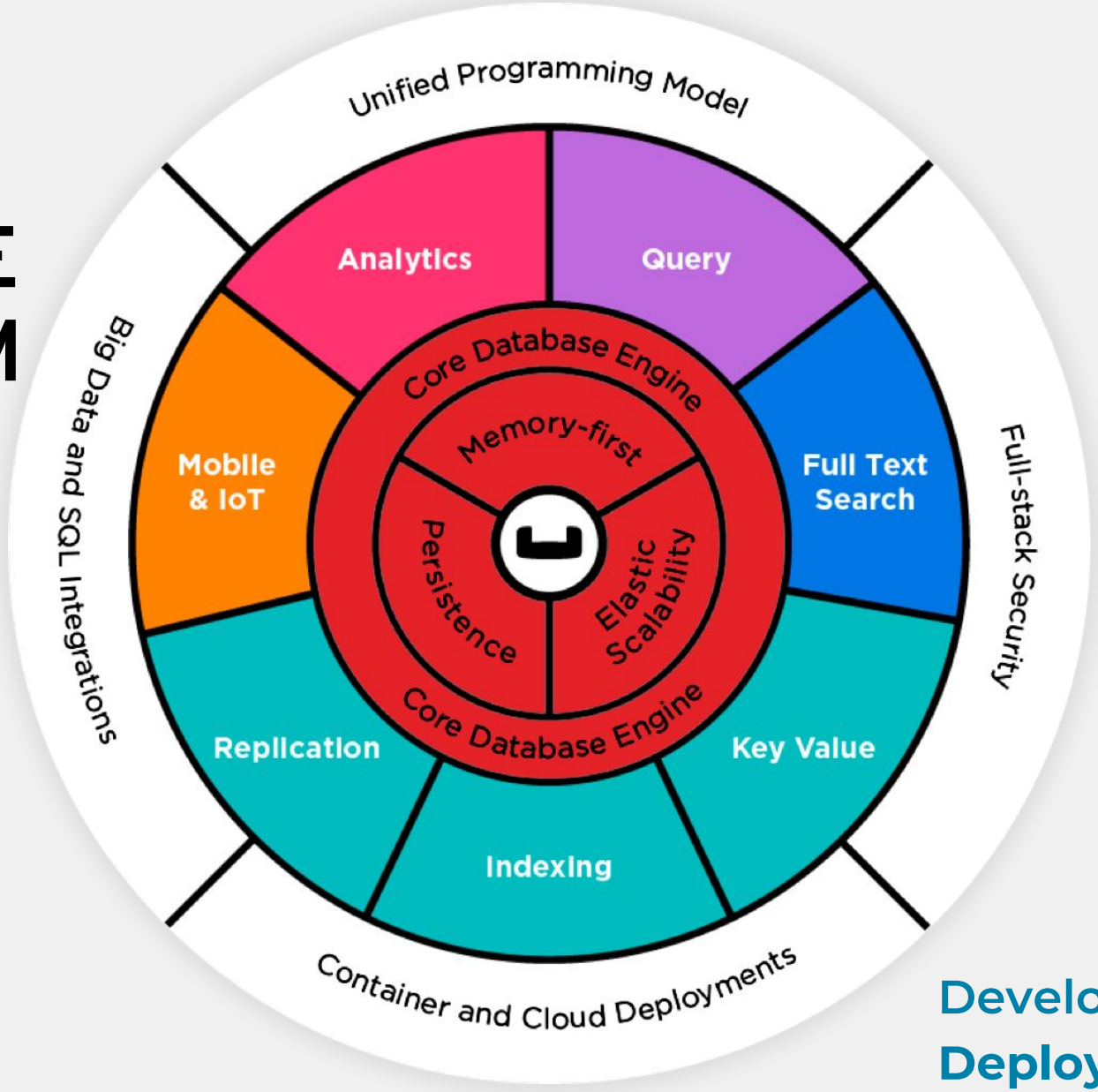
Why Not Databases in Containers?

3 major obstacles for DB containerisation:

1. How to shard data among containers?
2. How to avoid data corruption if multiple writes in different pods?
3. How to ensure high availability, backup policies, restore?

Only state is not enough!

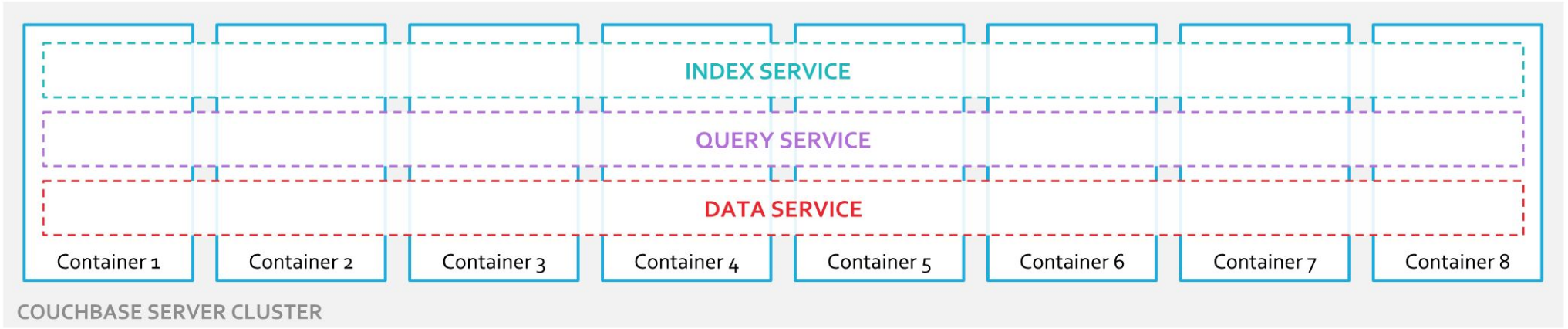
THE COUCHBASE DATA PLATFORM

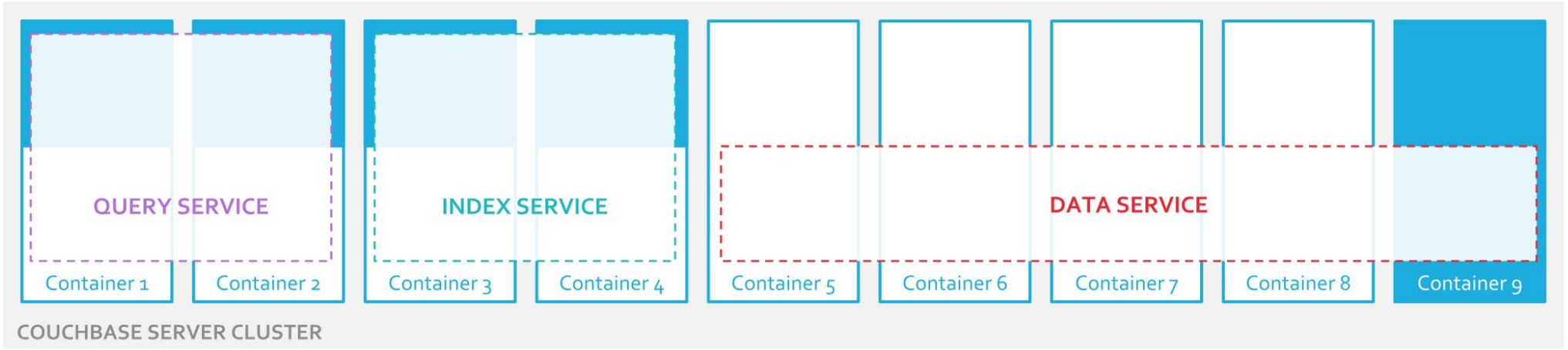


Develop with agility.
Deploy at any scale.

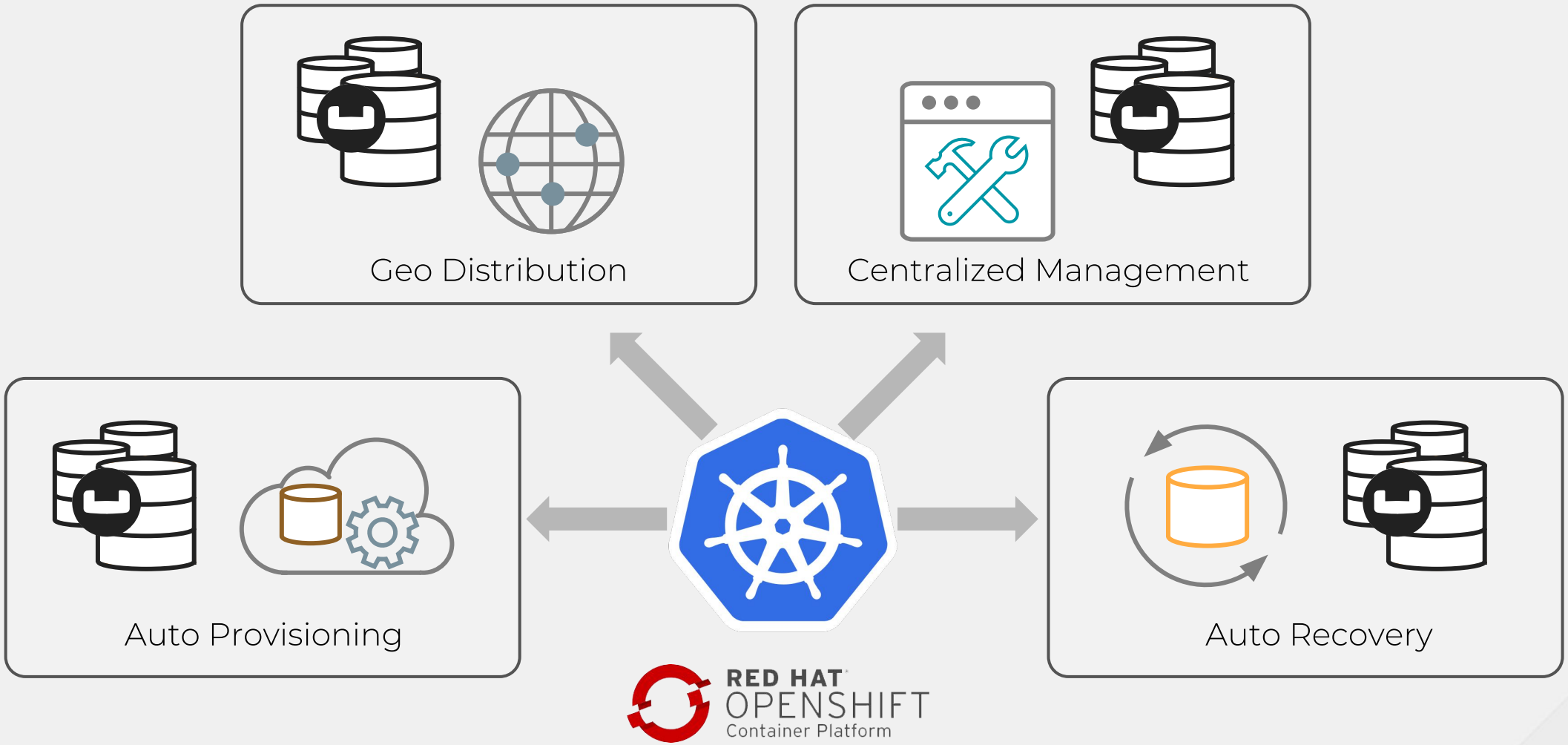
Couchbase designed for containerized applications

Microservice Architecture == Multi-Dimensional Scaling

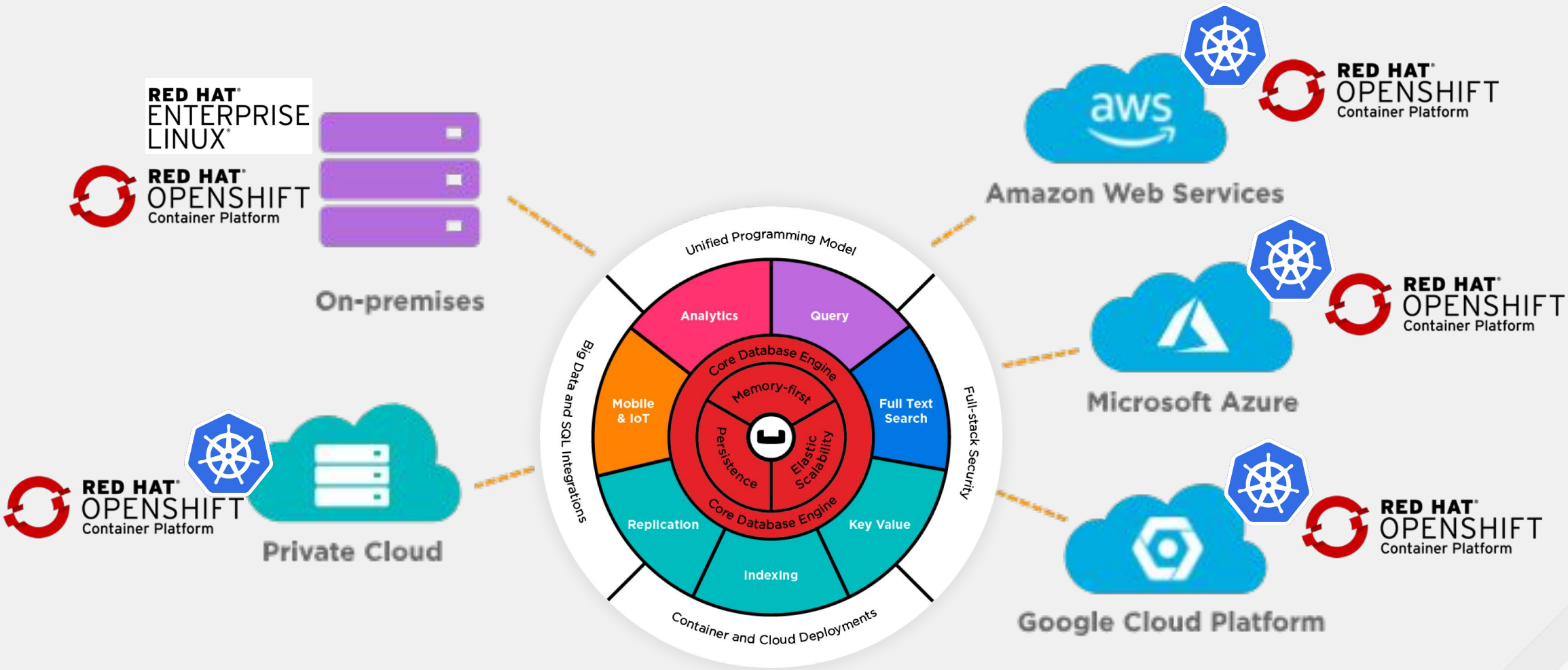




Couchbase Designed for Containerized Applications



Couchbase and Red Hat enable hybrid/multi-cloud



Customers across every industry embracing digital

1 billion+ user profiles
7 DCs
740 nodes
300K reads,
20K writes/sec sustained

GANNETT

50M unique
monthly visitors
2.5B monthly page views
Replaced MongoDB

LinkedIn

2821 nodes,
100+ clusters
16M entries every 5 min
2.5 million ops/sec. on a single cluster

PayPal

1 billion+ documents
10TB+ data
Sub-2ooms
response time

E-Commerce

Walmart
cars.com
FANATICS
Office DEPOT OfficeMax
STAPLES
TESCO
QVC
BEST BUY

Travel

MARRIOTT
amadeus
Sabre
ORBITZ
tripadvisor
skyscanner

Gaming

EA
betfair
zynga
BLIZZARD ENTERTAINMENT
Pokémon GO
Playtika
SGN

Communications

COMCAST
verizon
KDDI
at&t
Viber
Telefónica

Financial Services

ADP
FICO
CONCUR
PayPal
WELLS FARGO
VISA

Digital Health

WebMD
everyday HEALTH
BD
Cochlear
MONSENSO

Digital Media

sky
THOMSON REUTERS
FANDANGO
GANNETT
McGraw Hill
Disney
nielsen

Industrial IoT

suez
Numerex
CHAMBERLAIN
GE

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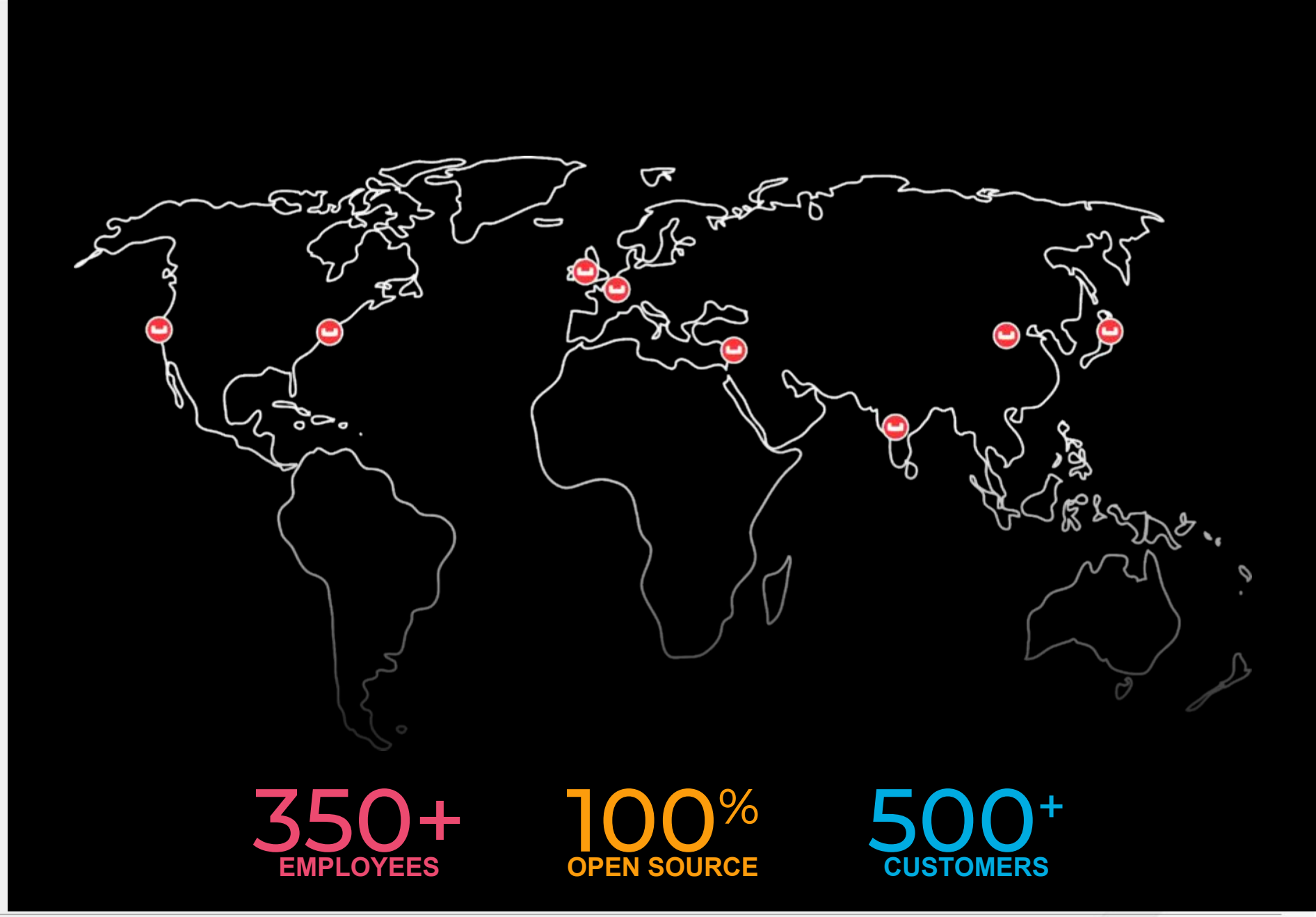
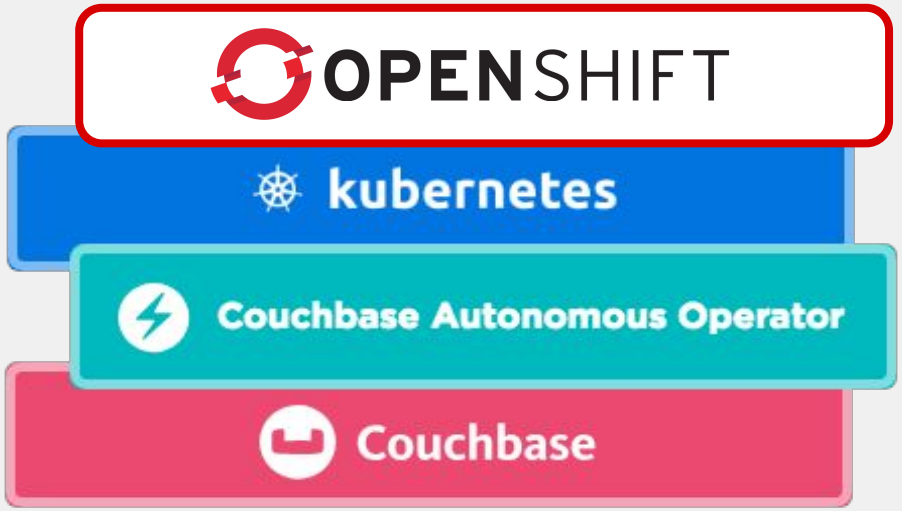
Couchbase, by the Numbers



COUCHBASE AUTONOMOUS OPERATOR

Introducing Couchbase Autonomous Operator



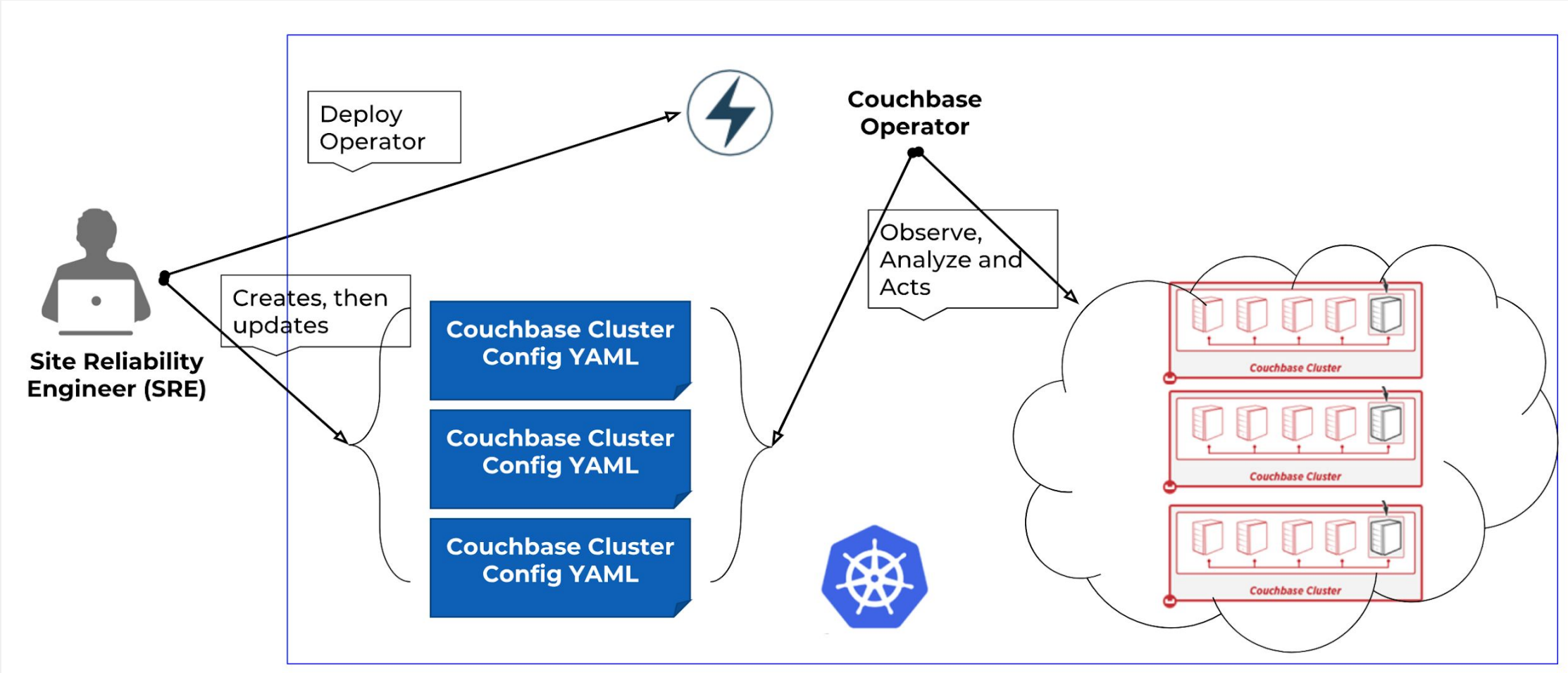
Couchbase Autonomous Operator is an **application-specific controller** that extends the Kubernetes API to create, **configure and manage instances of complex stateful applications** on behalf of a Kubernetes user.

It builds upon the basic Kubernetes resource and controller concepts, but also includes domain or application-specific knowledge to automate common tasks better managed by computers.

Multi-Dimensional Scaling

```
14      indexStorageSetting: memory_optimized
15      autoFailoverTimeout: 30
16    buckets:
17      - name: couchbase-sample
18        type: couchbase
19        memoryQuota: 128
20        replicas: 3
21        ioPriority: high
22        evictionPolicy: fullEviction
23        conflictResolution: seqno
24        enableFlush: true
25        enableIndexReplica: false
26    servers:
27      - size: 2
28        name: data_and_index
29        services:
30          - data
31          - index
32        dataPath: /opt/couchbase/var/lib/couchbase/data
33        indexPath: /opt/couchbase/var/lib/couchbase/data
34      - size: 1
35        name: query_and_search
36        services:
37          - query
38          - search
39        dataPath: /opt/couchbase/var/lib/couchbase/data
40        indexPath: /opt/couchbase/var/lib/couchbase/data
```

Architecture



Key Benefits

1. **Best way to Run and Manage Couchbase in Your Data Center – Up to 95% Reduction in Operational Overhead**
2. **Automated Best Practices - Zero-Downtime Ops**
3. **Elastic scaling - Push a button Dynamic Scaling**

4) Demo: The Couchbase Operator in Action

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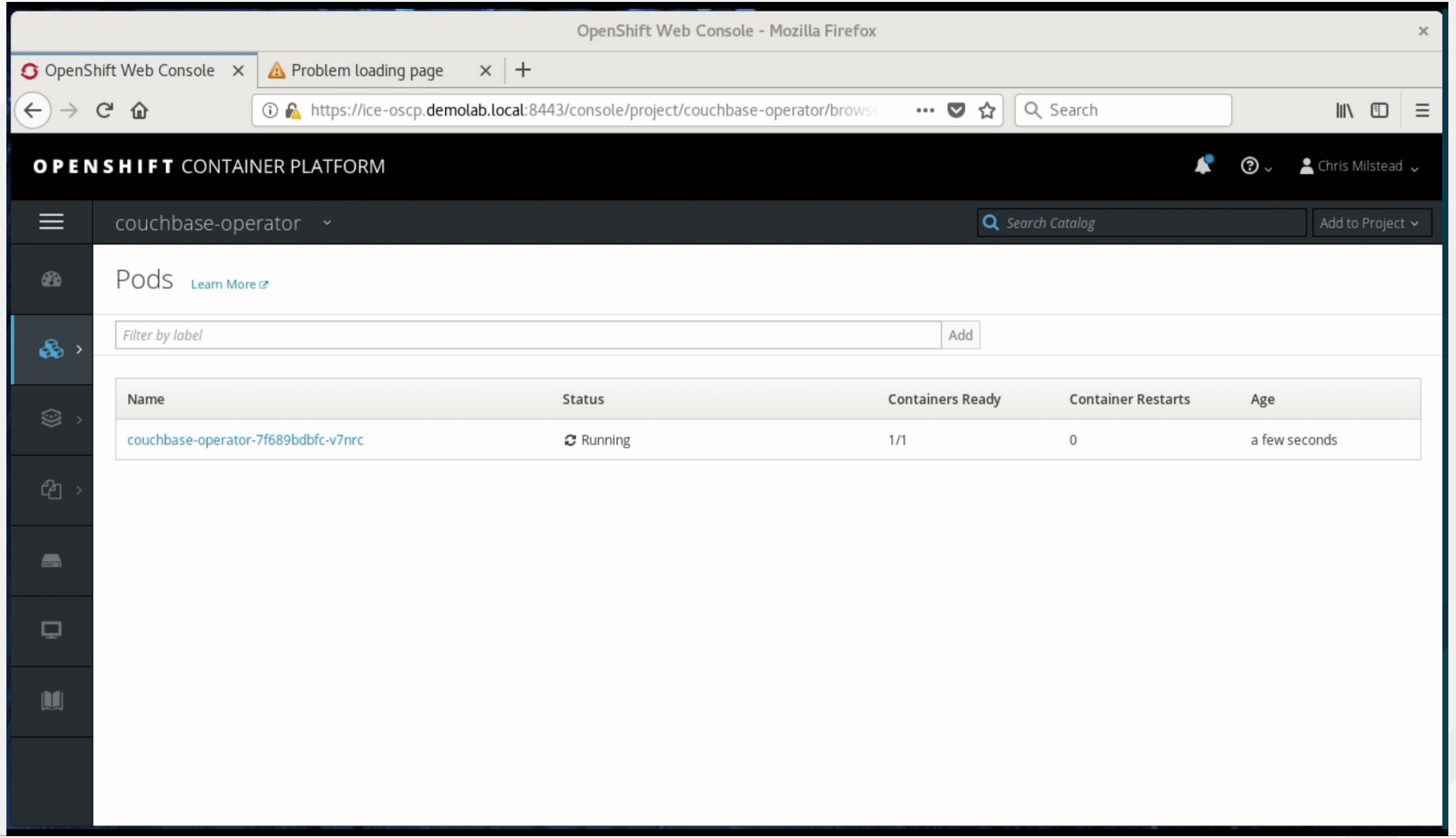

OpenShift Web Console - Mozilla Firefox
OpenShift Web Console
Problem loading page
https://ice-oscp.demolab.local:8443/console/project/couchbase-operator/brows
Search
OPENSHIFT CONTAINER PLATFORM
Chris Milstead
couchbase-operator
Search Catalog
Add to Project
Pods
Learn More
Filter by label
Add
Name
Status
Containers Ready
Container Restarts
Age
couchbase-operator-7f689bdbfc-v7nrc
Running
1/1
0
a few seconds

cluster-role-user.yaml | couchbase-cluster.yaml

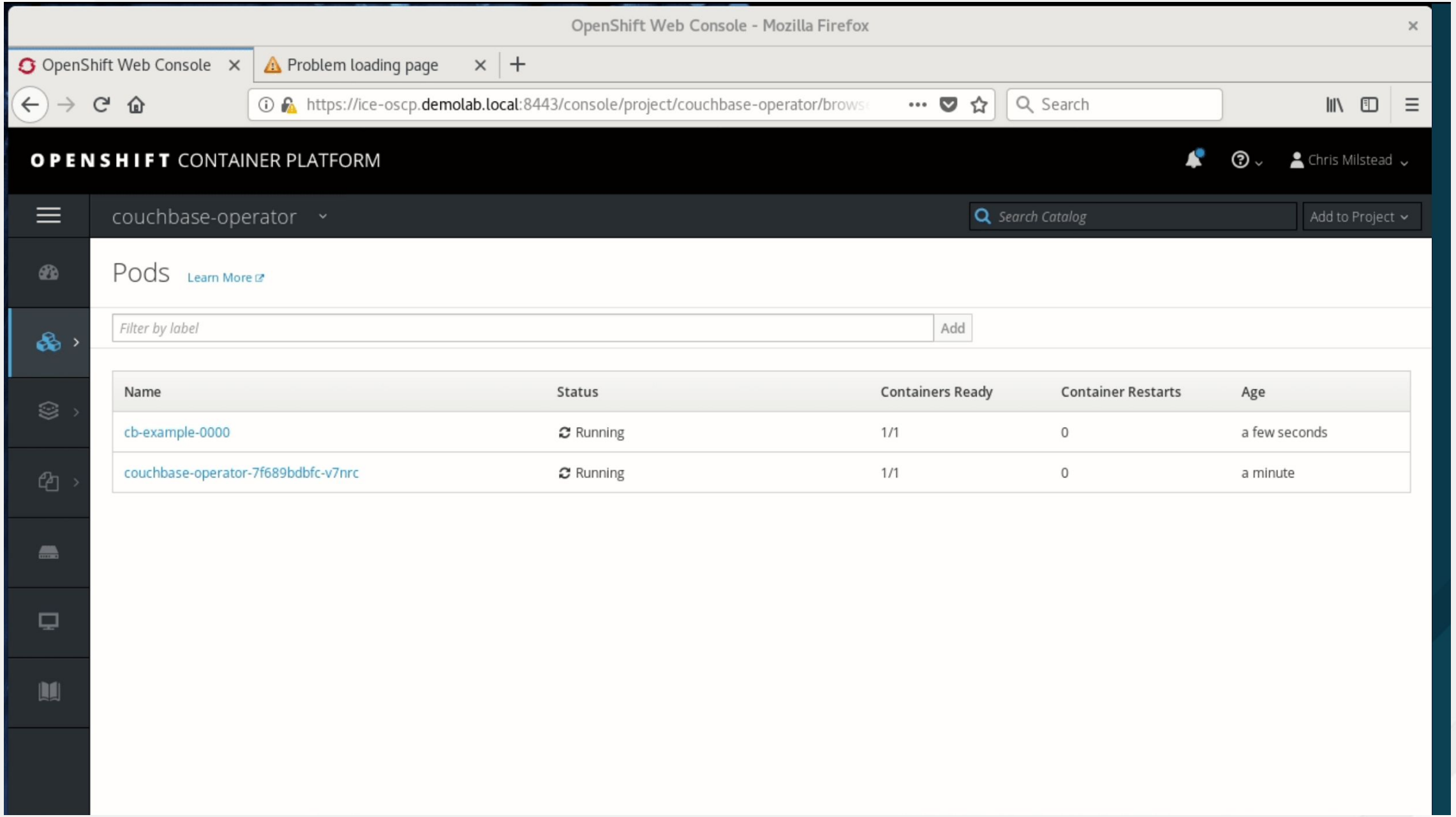
```yaml
apiVersion: couchbase.database.couchbase.com/v1beta1
kind: CouchbaseCluster
metadata:
  name: cb-example
spec:
  baseImage: couchbase/server
  version: enterprise-5.0.1
  authSecret: cb-example-auth
  exposeAdminConsole: true
  cluster:
    dataServiceMemoryQuota: 256
    indexServiceMemoryQuota: 256
    searchServiceMemoryQuota: 256
    indexStorageSetting: memory_optimized
    autoFailoverTimeout: 30
  buckets:
    - name: default
      type: couchbase
      memoryQuota: 128
      replicas: 1
      ioPriority: high
      evictionPolicy: fullEviction
      conflictResolution: seqno
      enableFlush: true
      enableIndexReplica: false
  servers:
    - size: 3
      name: all_services
      services:
        - data
        - index
        - query
        - search
      dataPath: /opt/couchbase/var/lib/couchbase/data
      indexPath: /opt/couchbase/var/lib/couchbase/data
```

Naming

Image to use

Size

How many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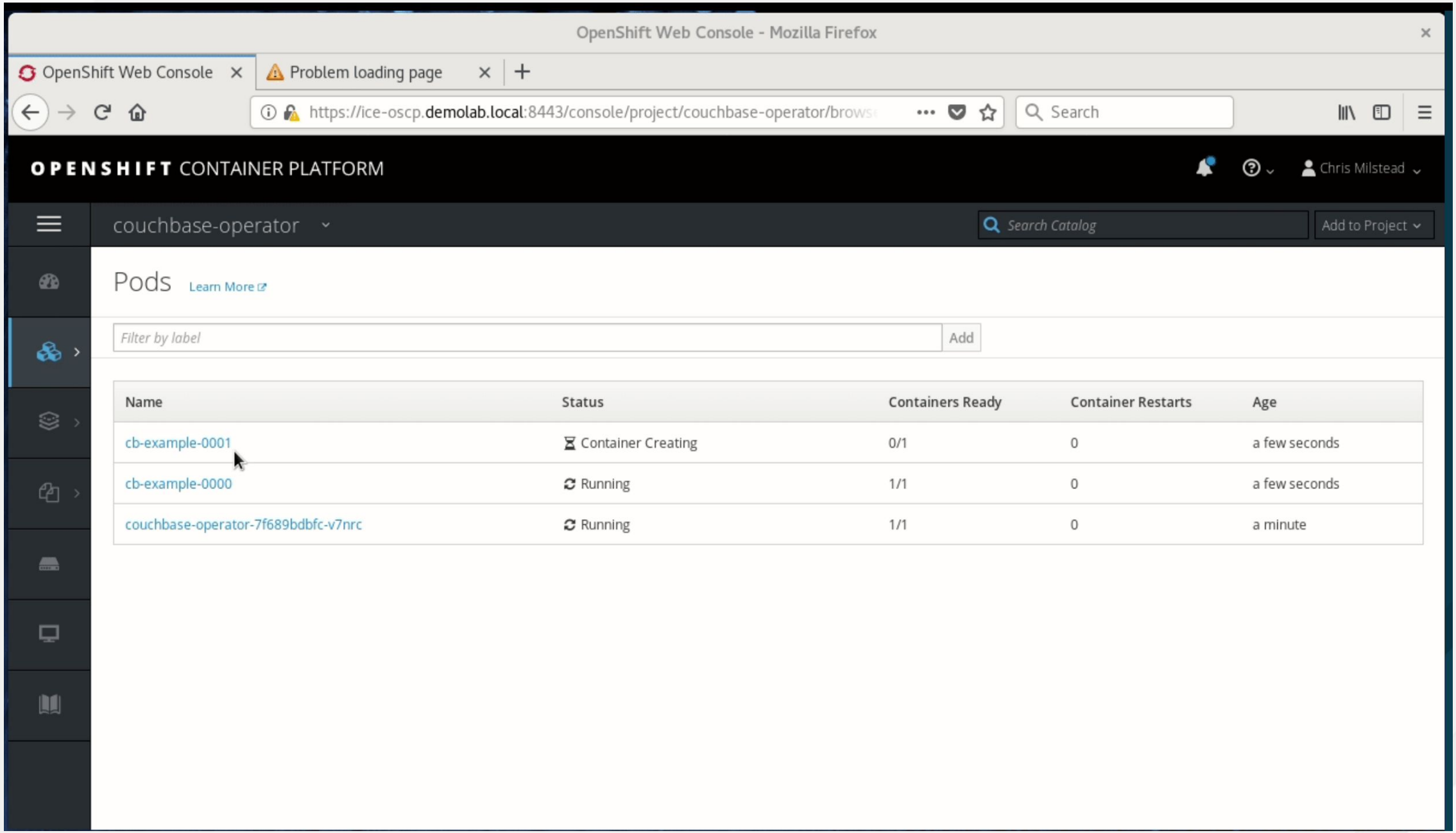
Pods
Learn More
Filter by label
Add
Name
Status
Containers Ready
Container Restarts
Age
cb-example-0000
Running
1/1
0
a few seconds
couchbase-operator-7f689bdbfc-v7nrc
Running
1/1
0
a minute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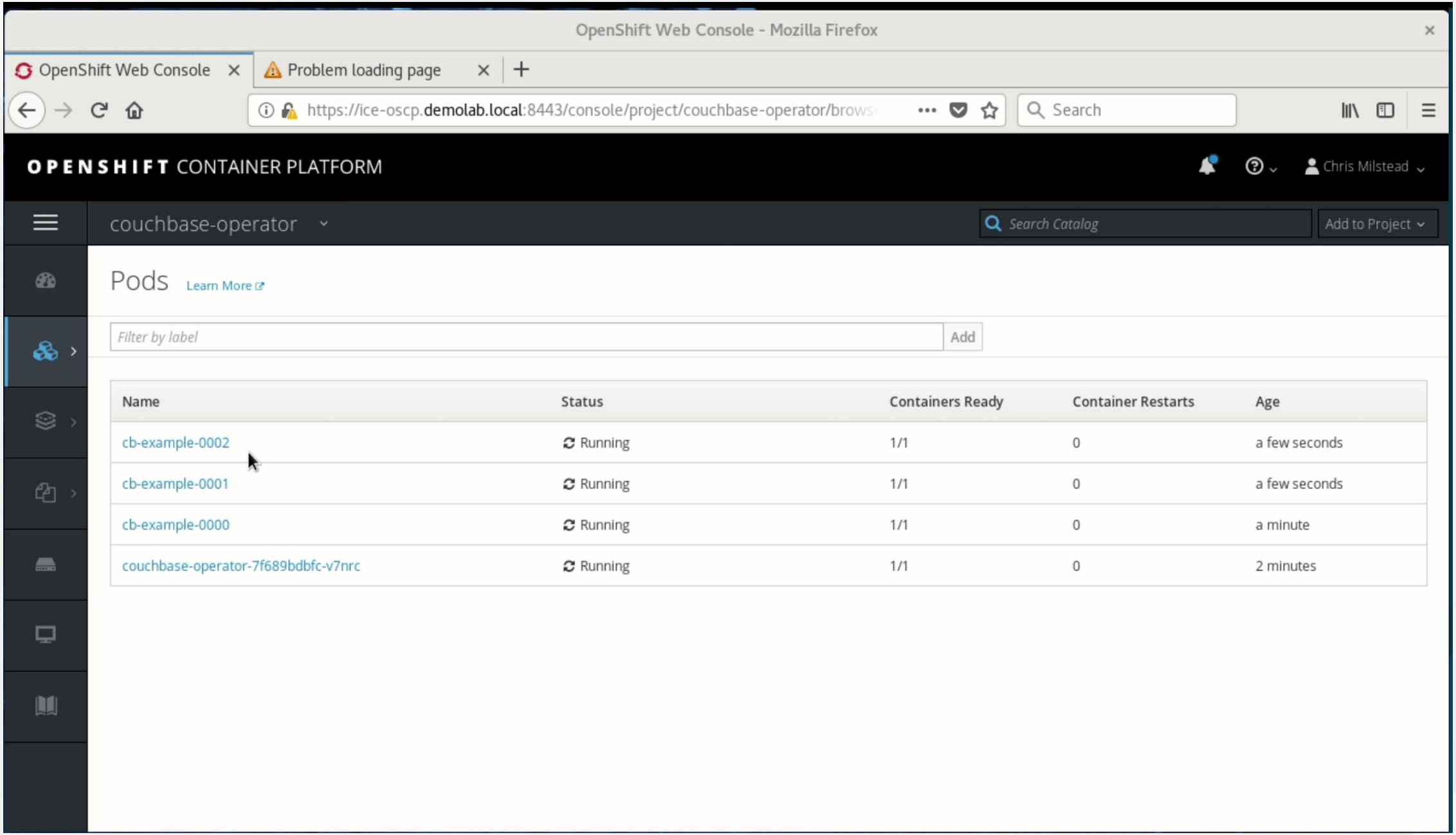
Chris Milstead
couchbase-operator
Search Catalog
Add to Project
Pods
Learn More
Filter by label
Add
Name
Status
Containers Ready
Container Restarts
Age
cb-example-0001
Container Creating
0/1
0
a few seconds
cb-example-0000
Running
1/1
0
a few seconds
couchbase-operator-7f689bdbfc-v7nrc
Running
1/1
0
a minute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https://ice-oscp.demolab.local:8443/console/project/couchbase-operator/brows
Search
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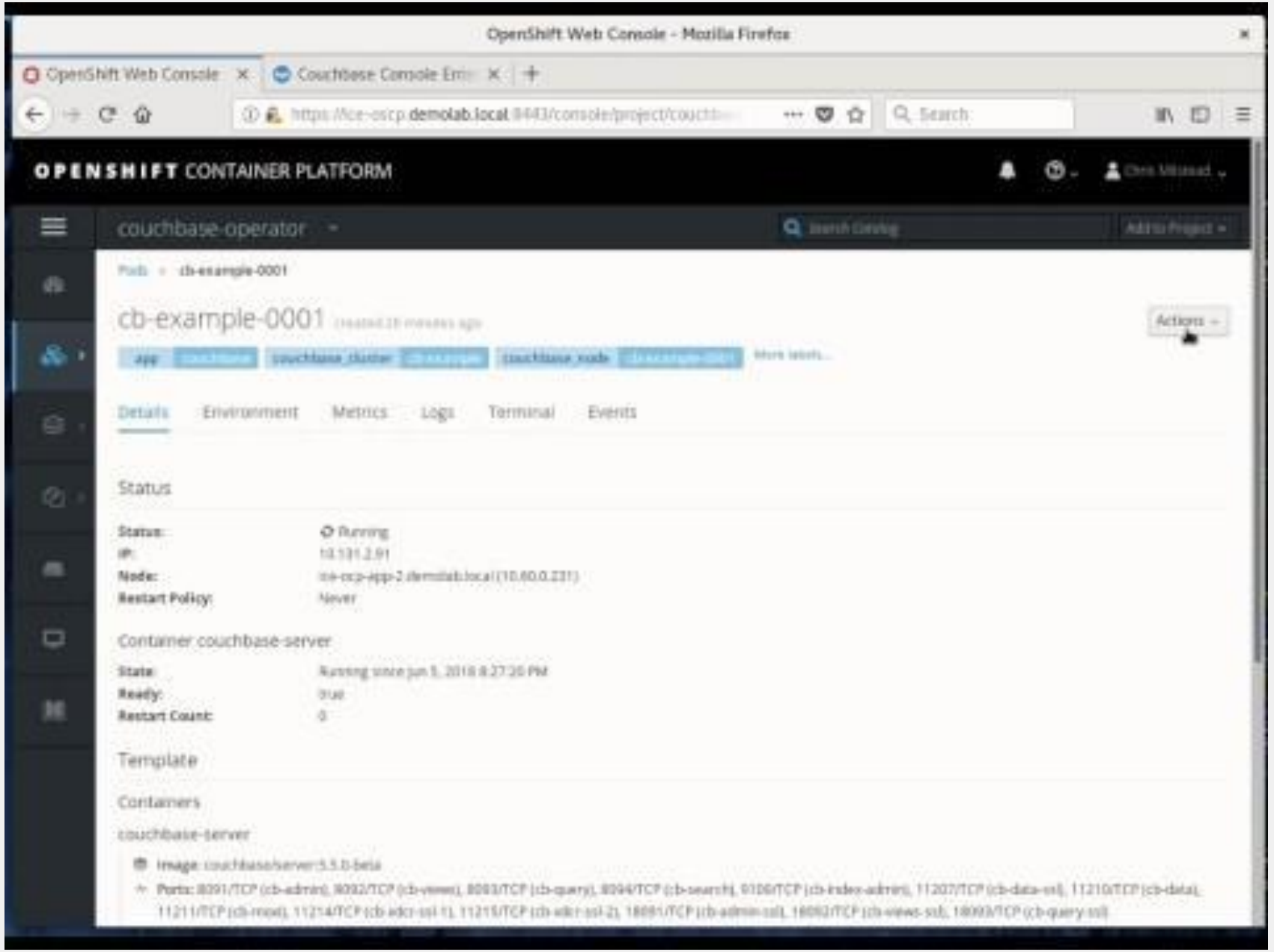
Chris Milstead
couchbase-operator
Search Catalog
Add to Project
Pods
Learn More
Filter by label
Add
Name
Status
Containers Ready
Container Restarts
Age
cb-example-0002
Running
1/1
0
a few seconds
cb-example-0001
Running
1/1
0
a few seconds
cb-example-0000
Running
1/1
0
a minute
couchbase-operator-7f689bdbfc-v7nrc
Running
1/1
0
2 minutes


OpenShift Web Console - Mozilla Firefox
OpenShift Web Console
OPENSHIFT CONTAINER PLATFORM
couchbase-operator
cb-example-0001
Actions
Details
Environment
Metrics
Logs
Terminal
Events
Status
Status:
Running
Node:
Restart Policy:
Never
Container couchbase-server
State:
Ready:
Restart Count:
Template
Containers
couchbase-server

5) Use Case: Running a stateful MPI Application

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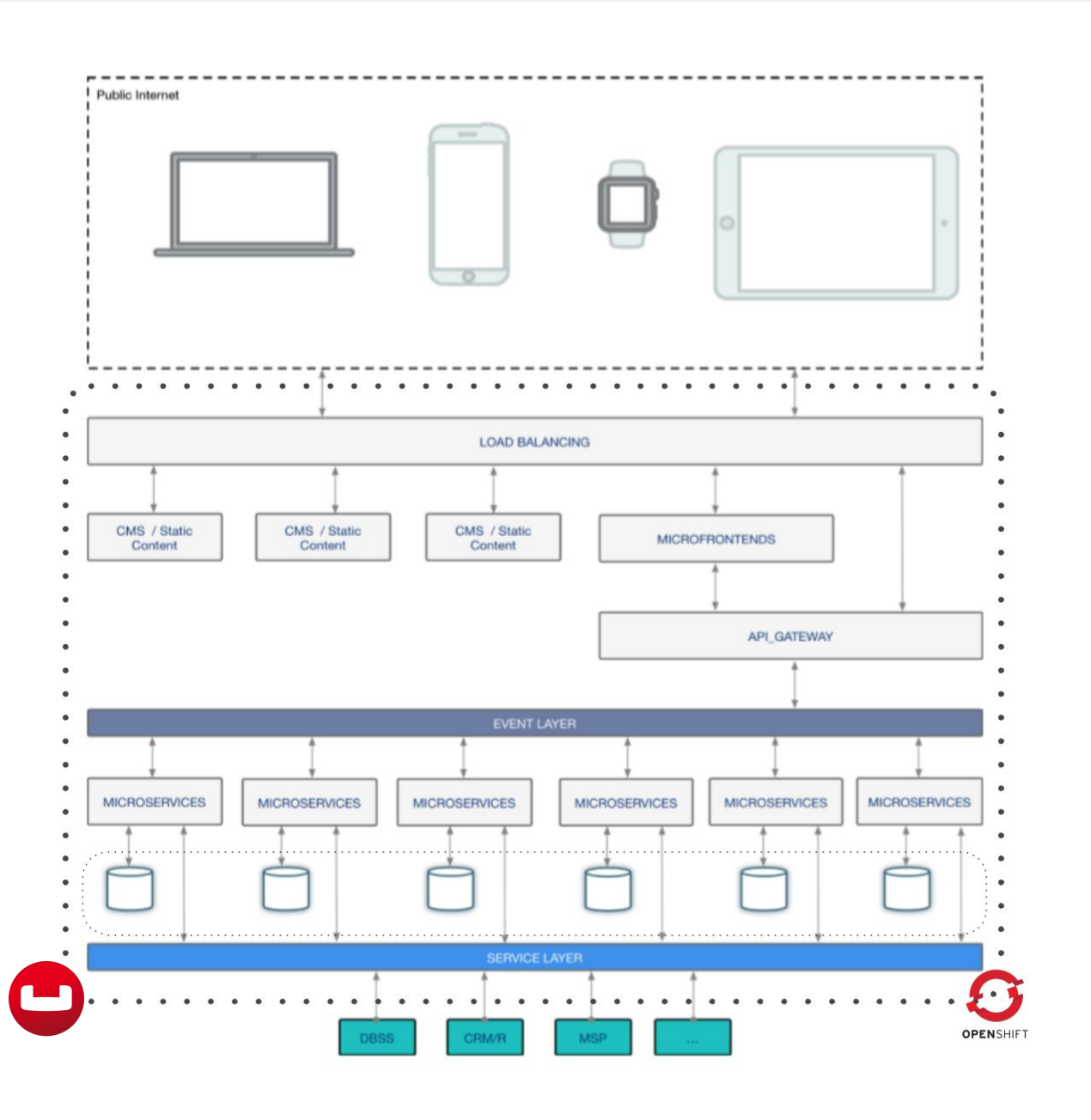
Use case

Microservices Architecture for the implementation of a pan-European Customer Portal to provide to Customers an easy way to see their own contractual information and to interact with back-end services as requested.



More info on Couchbase Autonomous Operator

1. https://www.linux.com/blog/event/kubecon/2018/4/extending-kubernetes-api-complex-stateful-applications-using-operator -
   blog post on **Couchbase** and our use of the **Kubernetes StatefulSet API**.

2. https://blog.couchbase.com/introducing-couchbase-operator/ -
   blog post on the **Couchbase Operator + OpenShift** beta announcement.

3. Red Hat Technical Implementation Guide (TIG) for Couchbase on OpenShift 3.9

4. https://blog.couchbase.com/couchbase-on-openshift-in-action/
   blog post **“Couchbase on OpenShift in Action”**

5. https://blog.couchbase.com/aks-couchbase-kubernetes-operator/
   blog post on creating and installing a Couchbase cluster with the **Couchbase Operator in AKS** (Azure Container Service)

GRAZIE PER L'ATTENZIONE

Daniele Paolucci - Lead Devops Engineer (Spindox)
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