RED HAT FORUMS

Migrating from OCP3 to OCP4

Why - What's there to help you - How it works?

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2019 October

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Nordic SA team
2019 October

Red Hat OpenShift

Trusted enterprise Kubernetes

- Trusted Host, Content, Platform
- Full Stack Automated Install
- Over the Air Updates & Day 2 Mgt

A cloud-like experience, everywhere

- Hybrid, Multi-Cluster Management
- Operator Framework
- Operator Hub & Certified ISVs

Empowering developers to innovate

- OpenShift Service Mesh (Istio)
- OpenShift Serverless (Knative)
- CodeReady Workspaces (Che)

ticketmaster®

“”

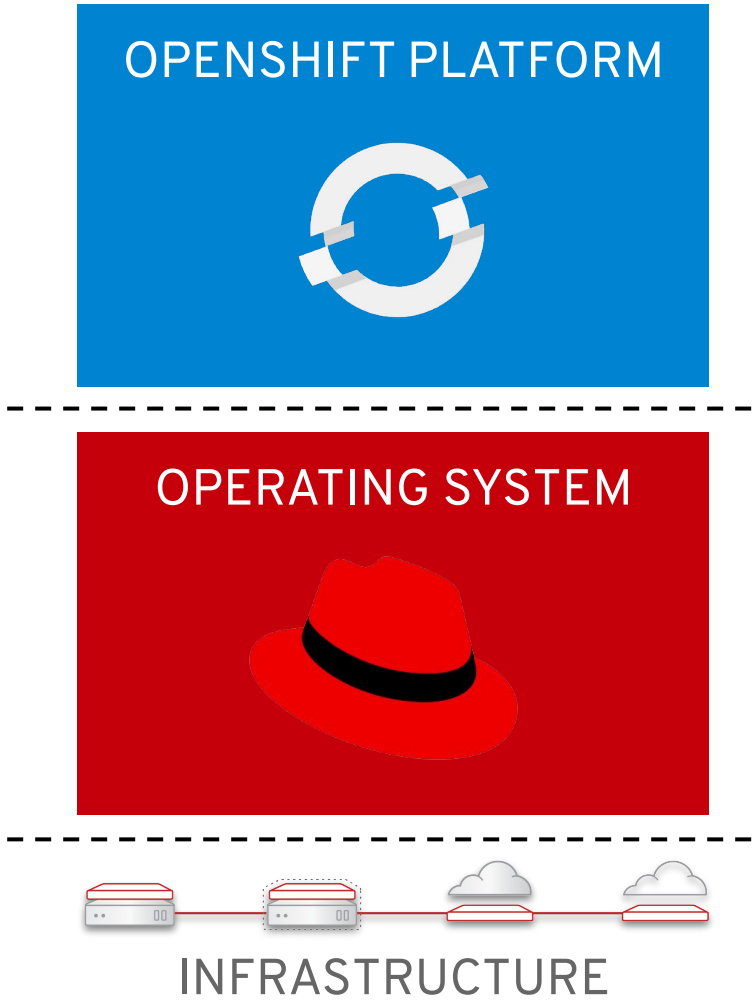
Using the Prometheus Operator,
our dev teams are able to provision their own end-to-end monitoring.
We could not hope to manage the 344 Prometheus instances without the domain knowledge the Operator encapsulates.

Michael Goodness
Lead Systems Engineer
Ticketmaster

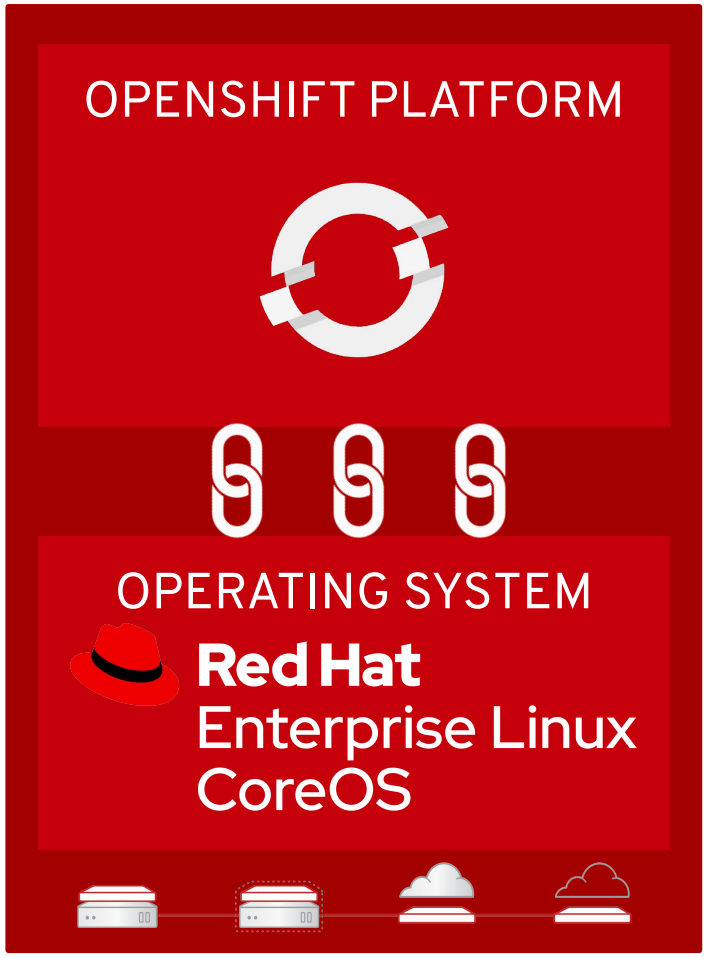
Red Hat

Full-stack automated install

OPENSHIFT 3 & 4



OPENSHIFT 4 (only)



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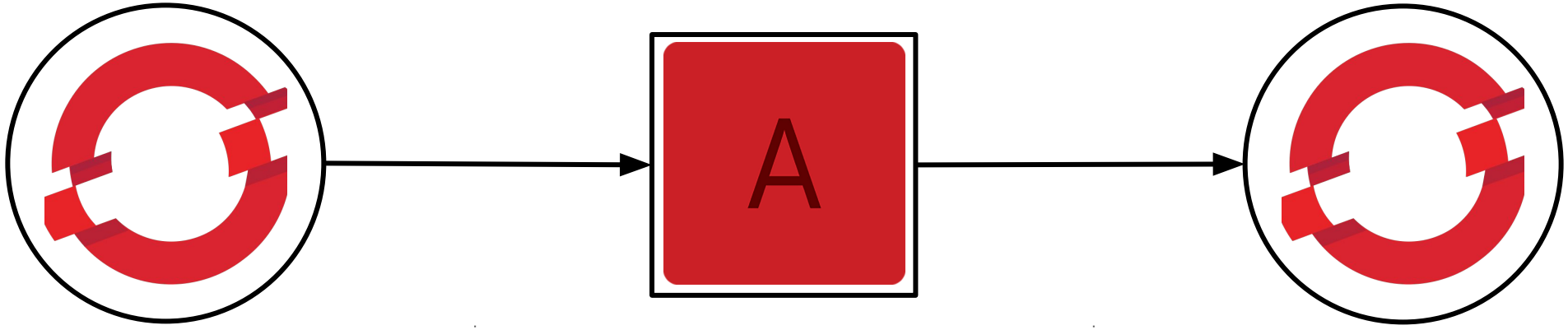
Migration Between Clusters



Old Cluster

API-Server Configuration

Cluster Configuration

Custom Resource

Cluster Services

SDN - Infra

Application

Stateful / Stateless?

State stored within cluster or external?

Distributed or Single instance?

http(s)/SNI or NodePort / External IP?

New Cluster

API-Server Configuration

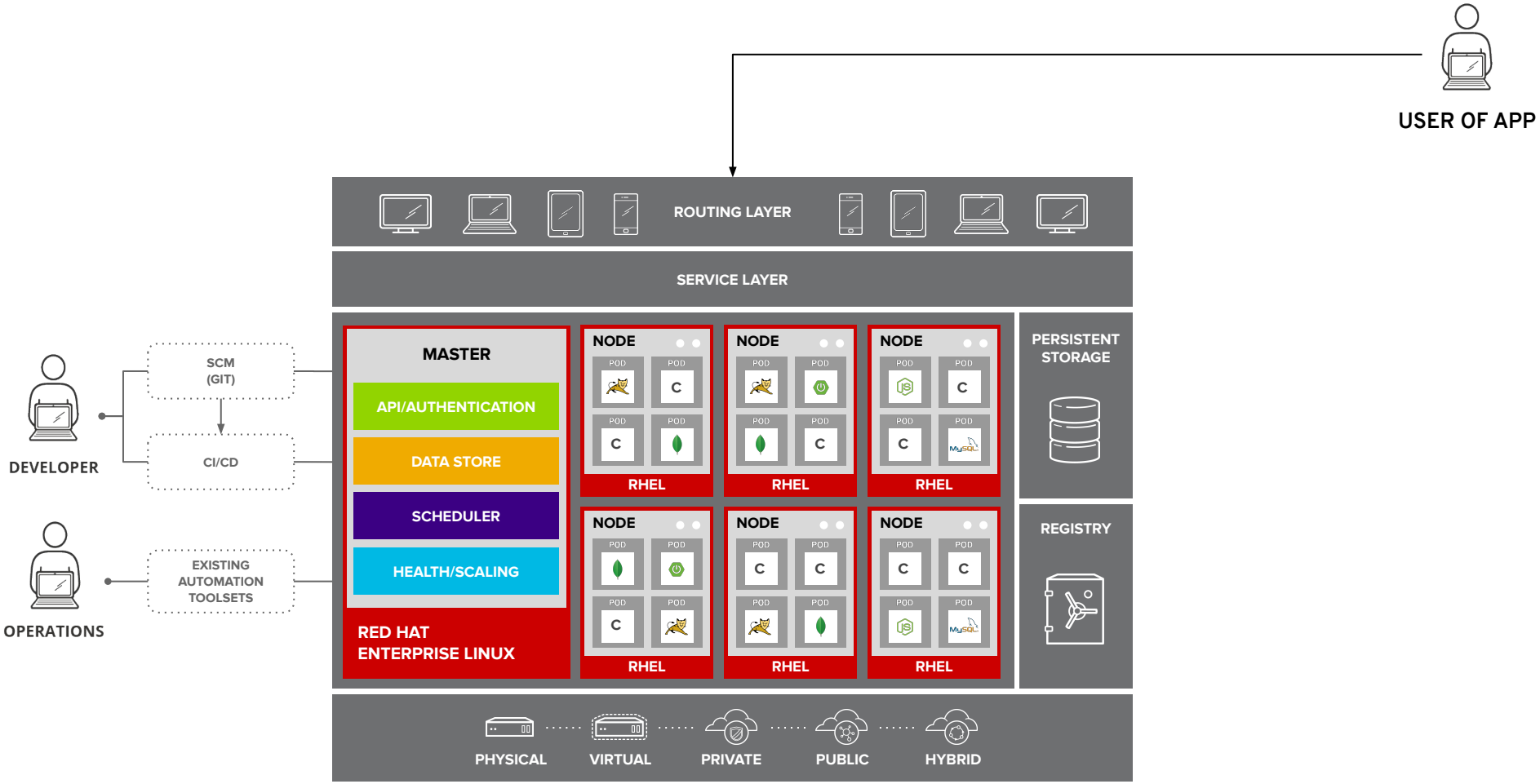
Cluster Configuration

Custom Resource

Cluster Services

SDN - Infra

EXAMPLE OCP ARCHITECTURE



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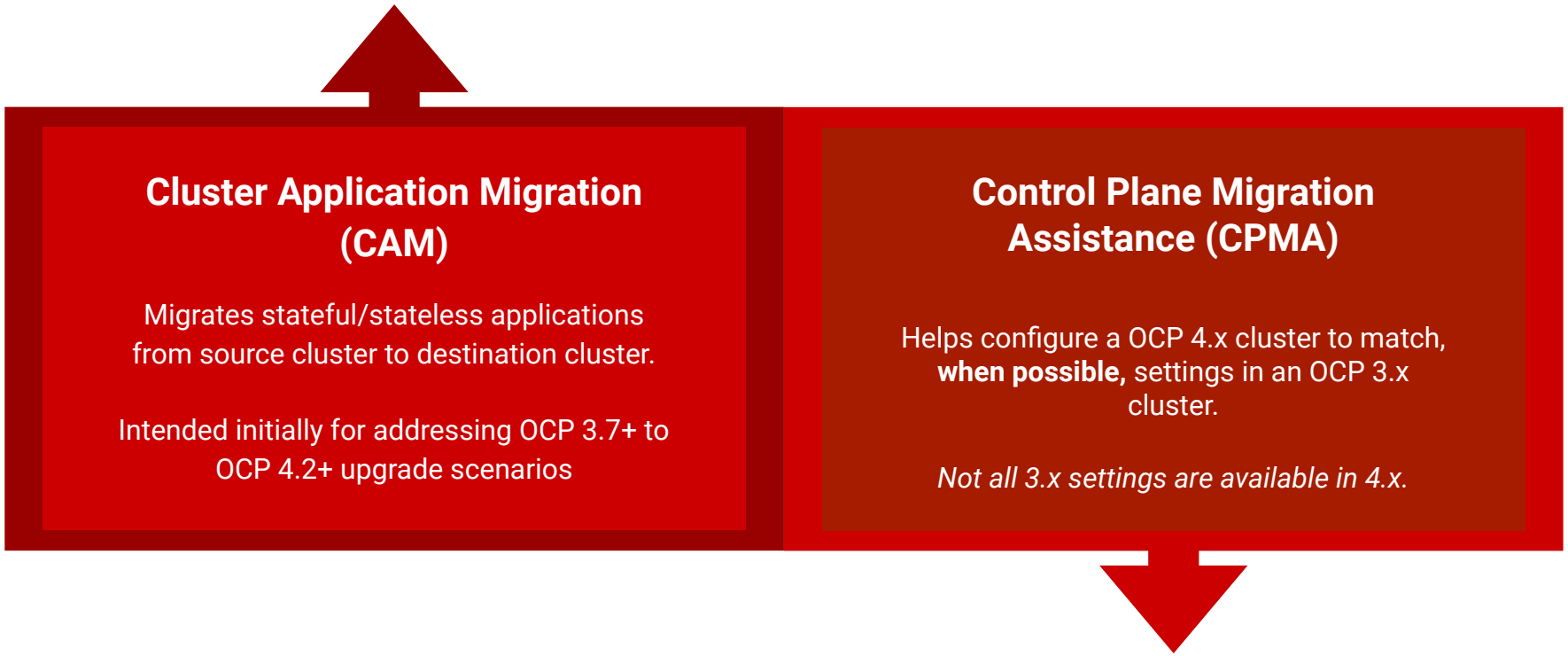
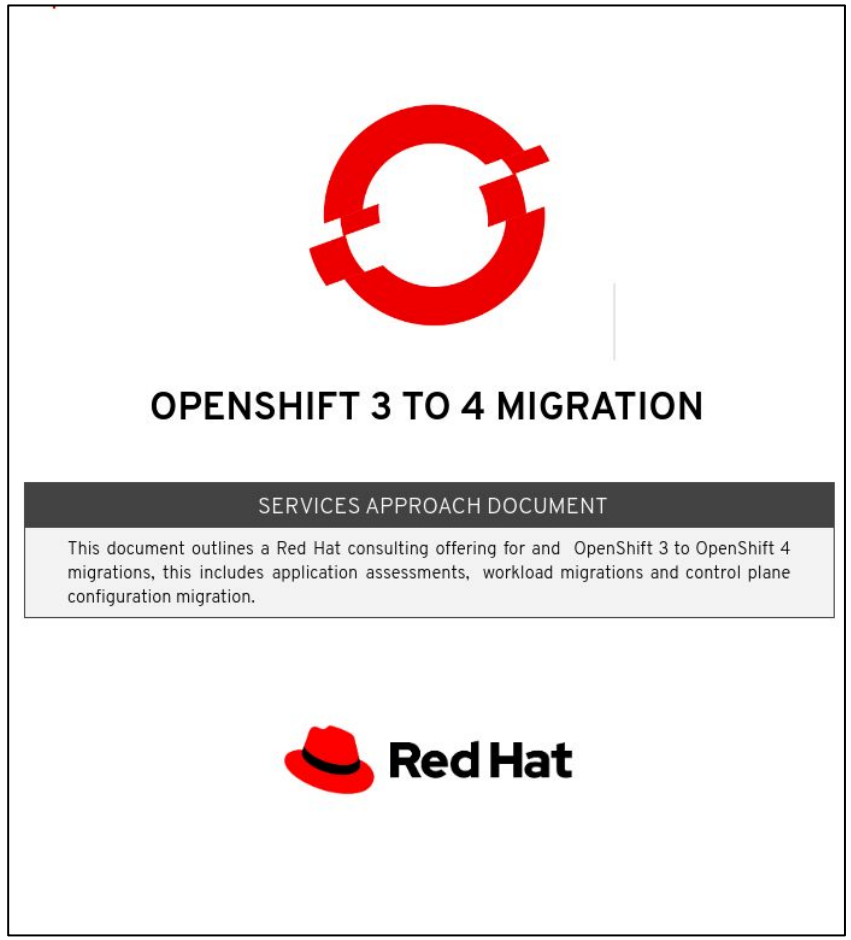
Application Workloads



Control Plane Config for 4.x



Architecture and Design, deployment of migration tool

API Server Configuration Migration

Application Assessment and Migration

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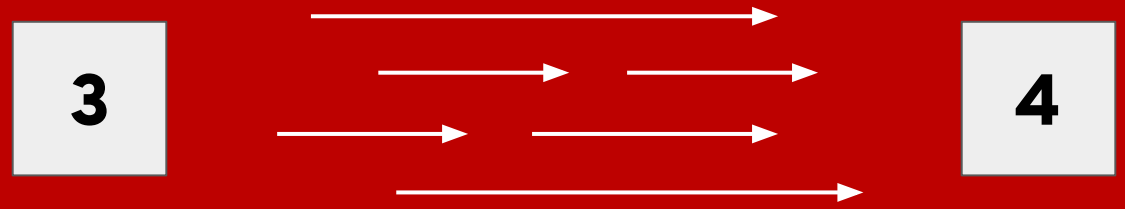
Migrating to OpenShift 4

Tooling and advice for moving from OpenShift 3.x to 4.x



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Cluster Migration Objectives

1. Provide a way for you to deploy a **replication of your applications** from one OpenShift cluster to a different OpenShift cluster

2. Enable you to determine what **cluster** specific **configuration** from OpenShift 3 will work on an OpenShift 4 cluster

3. Offer documentation as to how to handle common network, storage, and machine/node **re-use scenarios** between OpenShift 3 and OpenShift 4 clusters

Application Workloads

Cluster Application Migration (CAM)

Migrates stateful/stateless applications from source cluster to destination cluster.

Intended initially for addressing OCP 3.7+ to OCP 4.2+ upgrade scenarios

Control Plane Migration Assistance (CPMA)

Helps configure a OCP 4.x cluster to match, **when possible,** settings in an OCP 3.x cluster.

Not all 3.x settings are available in 4.x.

Control Plane Config for 4.x

Machine Config Operator (MCO)

Example with CRI-O:

- Simplified management across entire cluster
- Container Runtime Config (CRC) is specialized Machine Config (MC) for CRI-O
- Container Runtime Config for CRI-O exposes configuration knobs

Leverages

- Custom Resource Definitions
- Machine Config Pools
- Machine Config Pool Selector
- Machine Configs
- Container Runtime Config (specialized MC)

```
apiVersion: machineconfiguration.openshift.io/v1
kind: ContainerRuntimeConfig
metadata:
  name: set-log-and-pid
spec:
  machineConfigPoolSelector:
    matchLabels:
      debug-crio: config-log-and-pid
  containerRuntimeConfig:
    pidsLimit: 2048
    logLevel: debug
```

```
$ oc get ContainerRuntimeConfig

NAME              AGE
set-log-and-pid   22h
```

Machine Config Operator (MCO)

Cluster services are in pods. Service config get's managed easily and scalable way using config resources.

Example with CRI-O:

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apiVersion: machineconfiguration.openshift.io/v1
kind: ContainerRuntimeConfig
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$ oc get ContainerRuntimeConfig

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set-log-and-pid   22h
```

Network Configuration

Example #1: Operator-Assisted Ingress Ctrlr "Sharding"

In 4.1, the way you create a router to work with a shard is different (API call versus 'oc adm' command). A simple config (example to right) acted upon by the ingress operator automatically integrates sharding with the external (front-end) DNS/LB configured at install-time,.

```
apiVersion: operator.openshift.io/v1
kind: IngressController
metadata:
  namespace: openshift-ingress-operator
  name: internal-apps
spec:
  domain: internal-apps.dmace.devcluster.openshift.com
  routeSelector:
    matchLabels:
      environment: internal
```

Example #2: Create a Second Router

Ingress controller configuration is now a first-class object, meaning additional Ingress controllers can be created by making multiple Ingress objects. This is the preferred method for giving teams their own subdomains, replacing the 'oc adm' method (see right).

```
$ cat <<EOF | oc create -f -
apiVersion: operator.openshift.io/v1
kind: IngressController
metadata:
  namespace: openshift-ingress-operator
  name: finance-apps
spec:
  domain: finance-apps.openshift.example.com
EOF
```

Configuration changed

Example #1: Operator-Assisted Ingress Ctrlr “Sharding”

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apiVersion: operator.openshift.io/v1
kind: IngressController
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  name: internal-apps
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kind: IngressController
metadata:
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  name: finance-apps
spec:
  domain: finance-apps.openshift.example.com
EOF
```
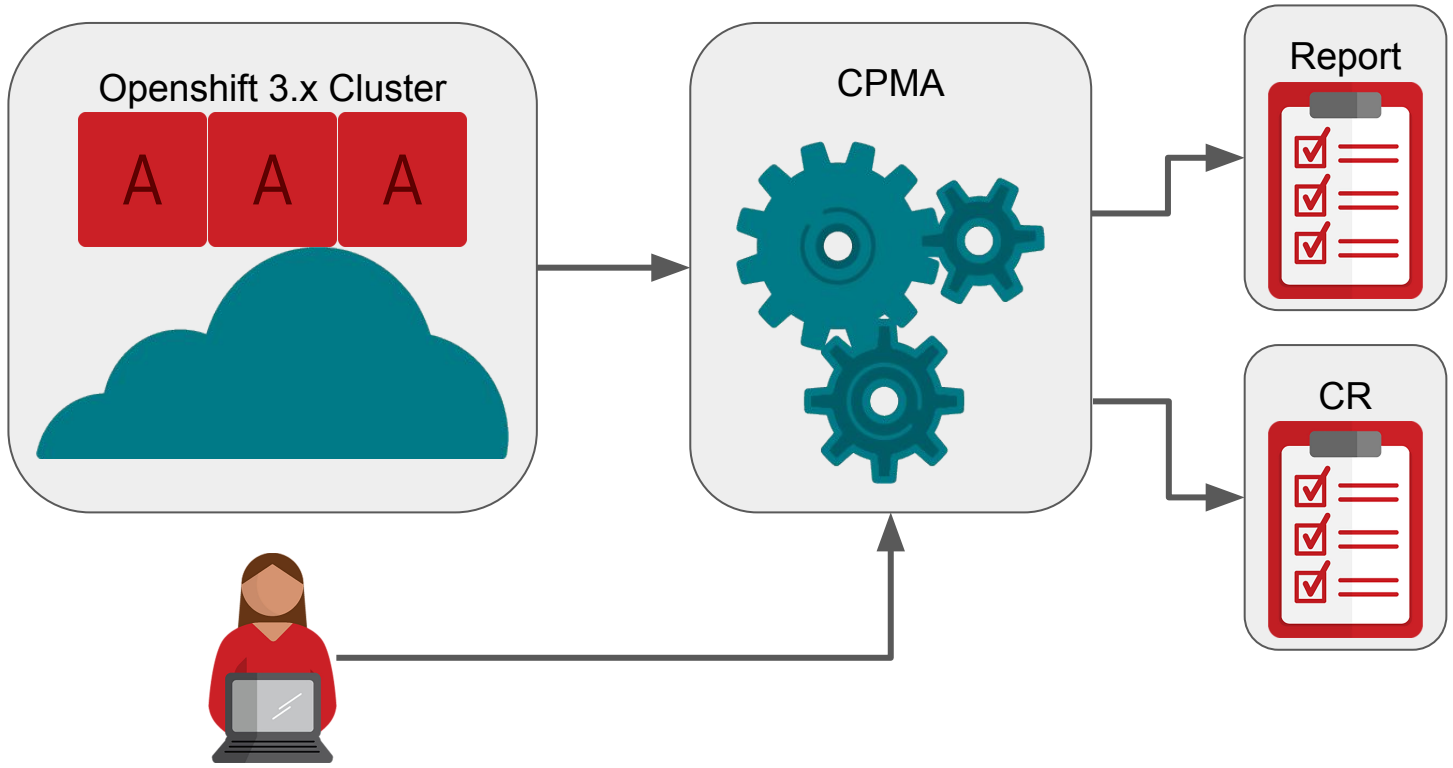
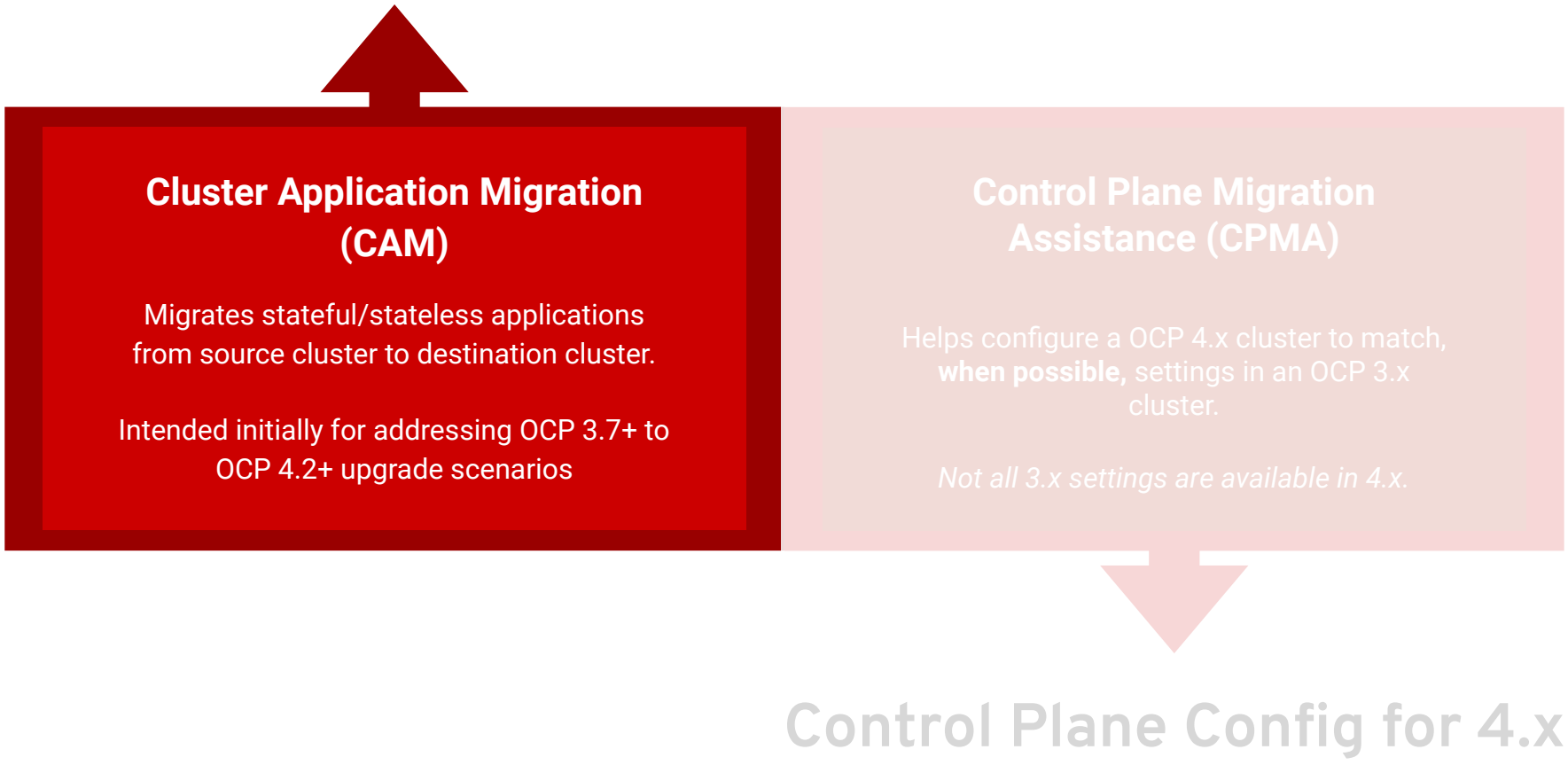

Control Plane Migration Assistance

Assists with:

- Report
  - What has been customized on 3.x control plane?
  - Can we help to translate to 4.x?
    - High confidence
    - Medium confidence
    - No confidence
      - not possible/supported in OCP 4.x
- Custom Resources (CR)
  - CRs to configure cluster for a component's behavior in OCP 4.x



Application Workloads

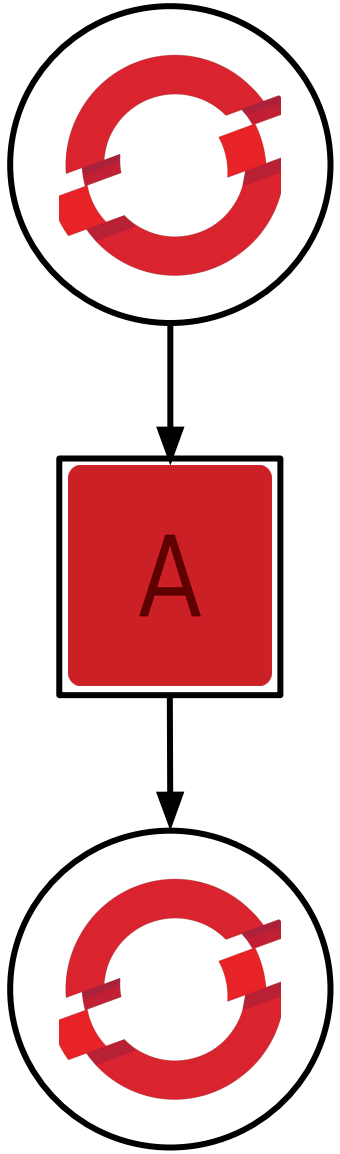


Limitations

- **Migration is at scope of a Namespace**.
  - *Future will allow selecting resources inside of a Namespace*

- **Cluster Scoped Resources <u>are not handled</u>**
  - Cluster Role Bindings, SCCs, etc are not handled with migration.
  - Expectation is that cluster admin handles cluster scoped resources ahead of running a Migration.

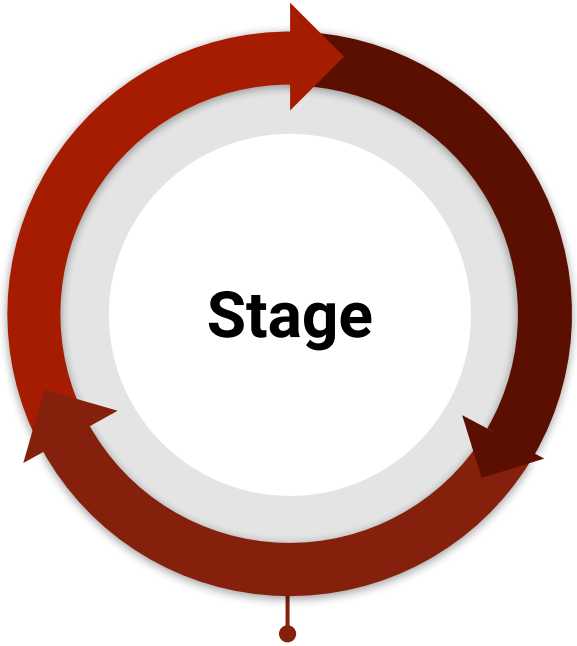
- **‘cluster-admin’ required for initial release targeting OCP 4.2**
  - Future plans to allow end user to migrate what they own post OCP 4.2+



Application Migration

Plan

1. Select Source Cluster
2. Select Namespaces
3. Choose Copy or Move for each PV
4. Specify Destination



Stages the data from Source to Destination.
May be run multiple times.
Applications are running
no Downtime during step

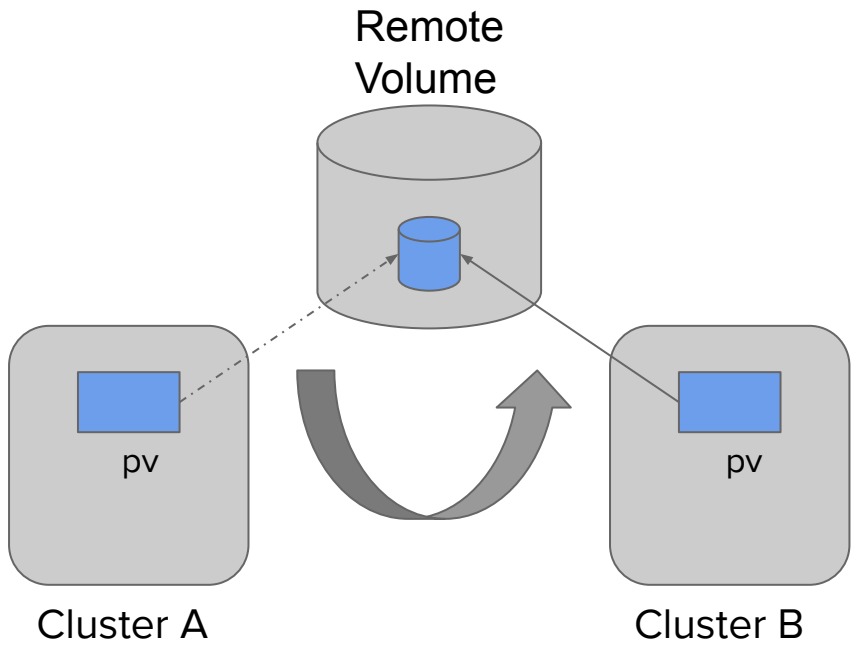
Migrate

Quiesce Application

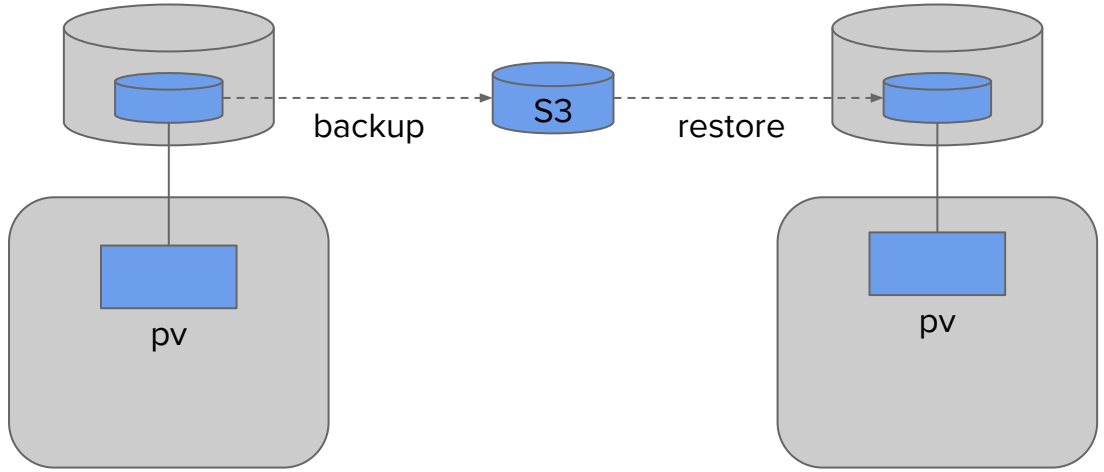
Migrate any delta bits not captured in stage.

Persistent Volume Handling

‘Move’ or ‘Swing the PV’



‘Copy’



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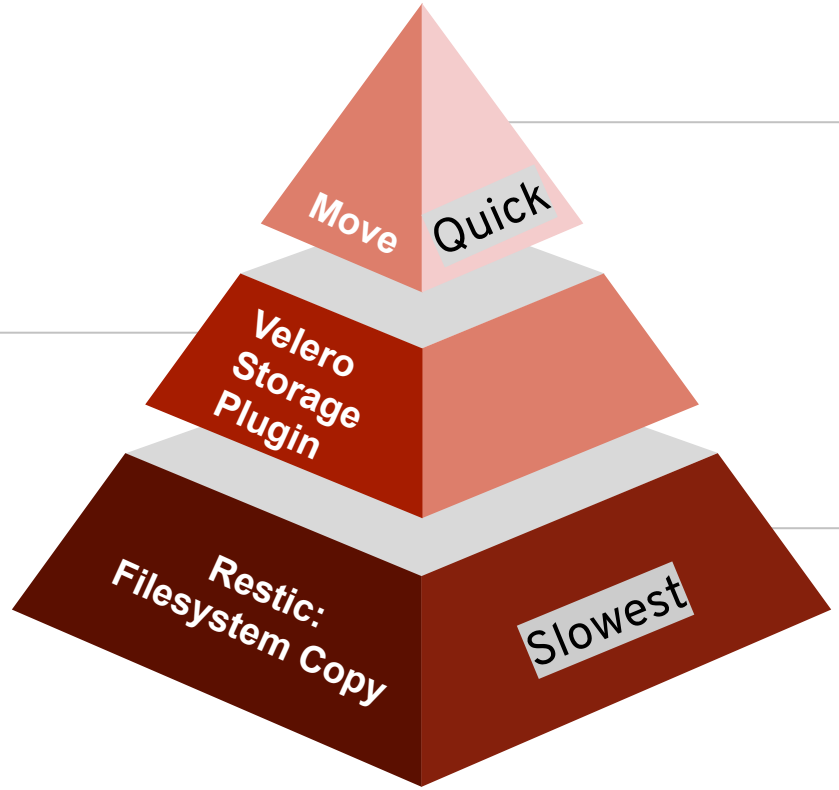
Persistent Volume Handling



1 **Move**
“Swing the PV”

2 **Copy: Storage Provider Plugin**
(AWS EBS, Google, Azure)

3 **Copy: Restic Filesystem level copy**

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THANK YOU

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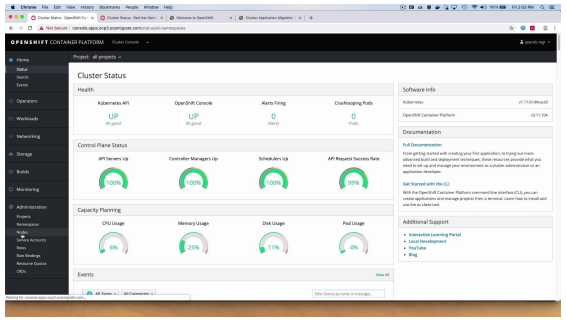
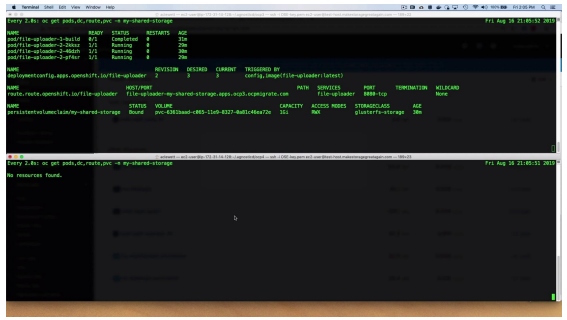
Demo

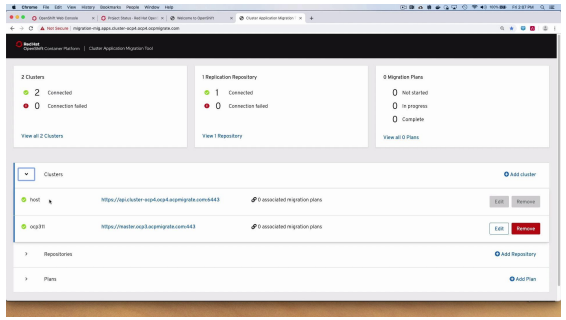
clusters



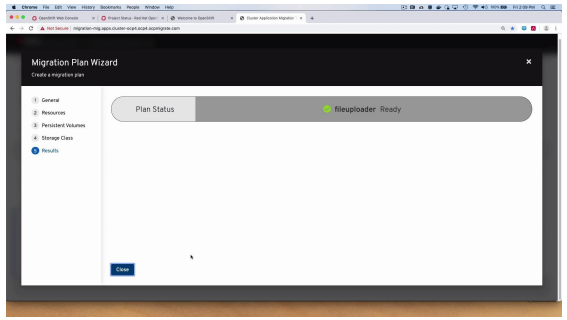
terminal before



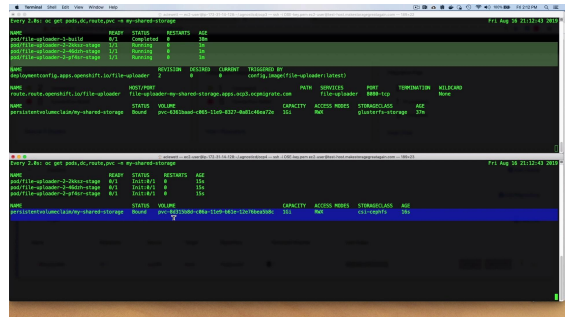
setup assistant



setup migration



terminal during



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