Kubernetes Armada (karmada)

Presenter Name: Rohan Shahi
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Coverage

- Introduction
- Architecture of Karmada
- Why karmada
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- Scheduling workloads using policy
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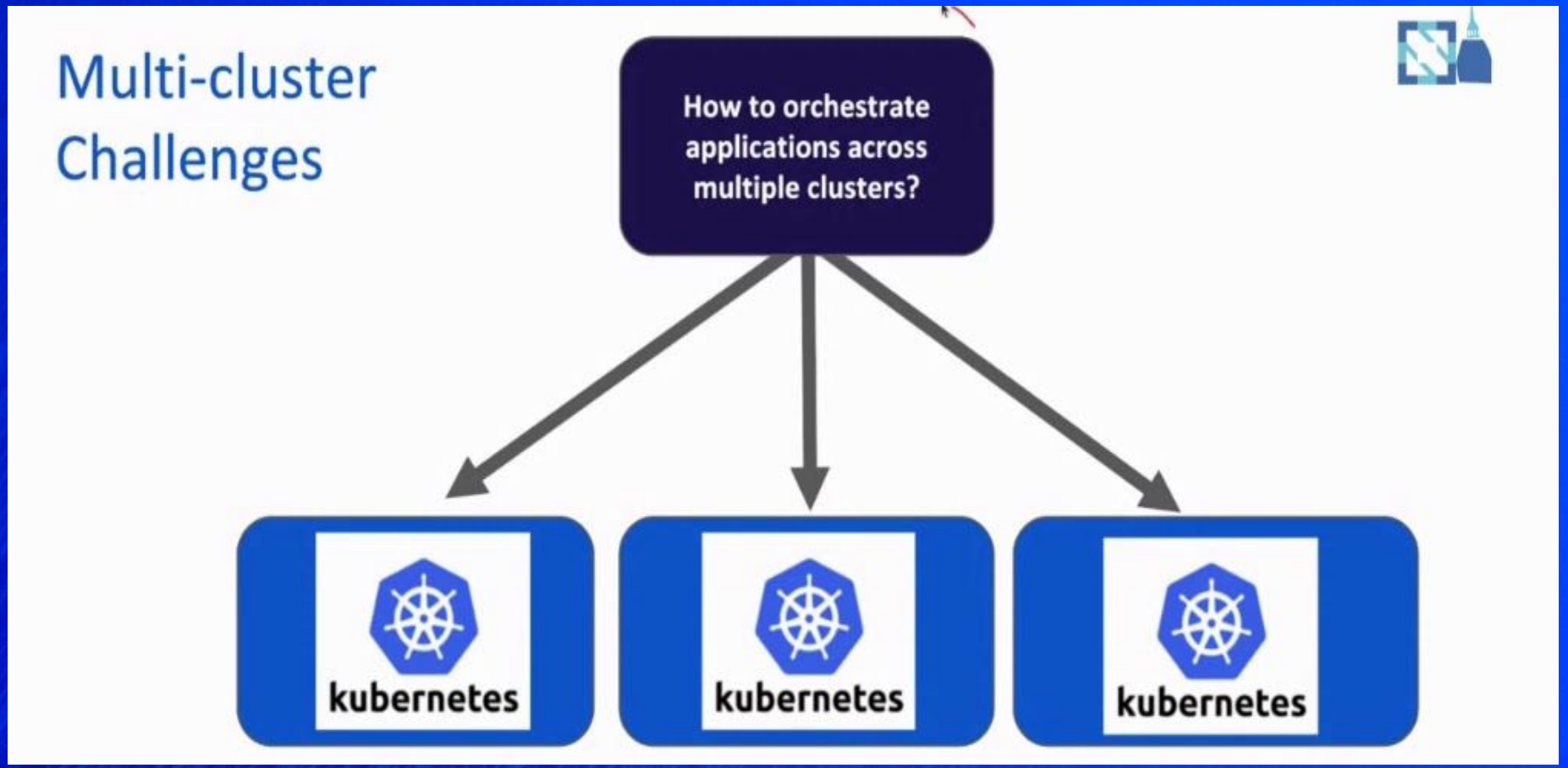
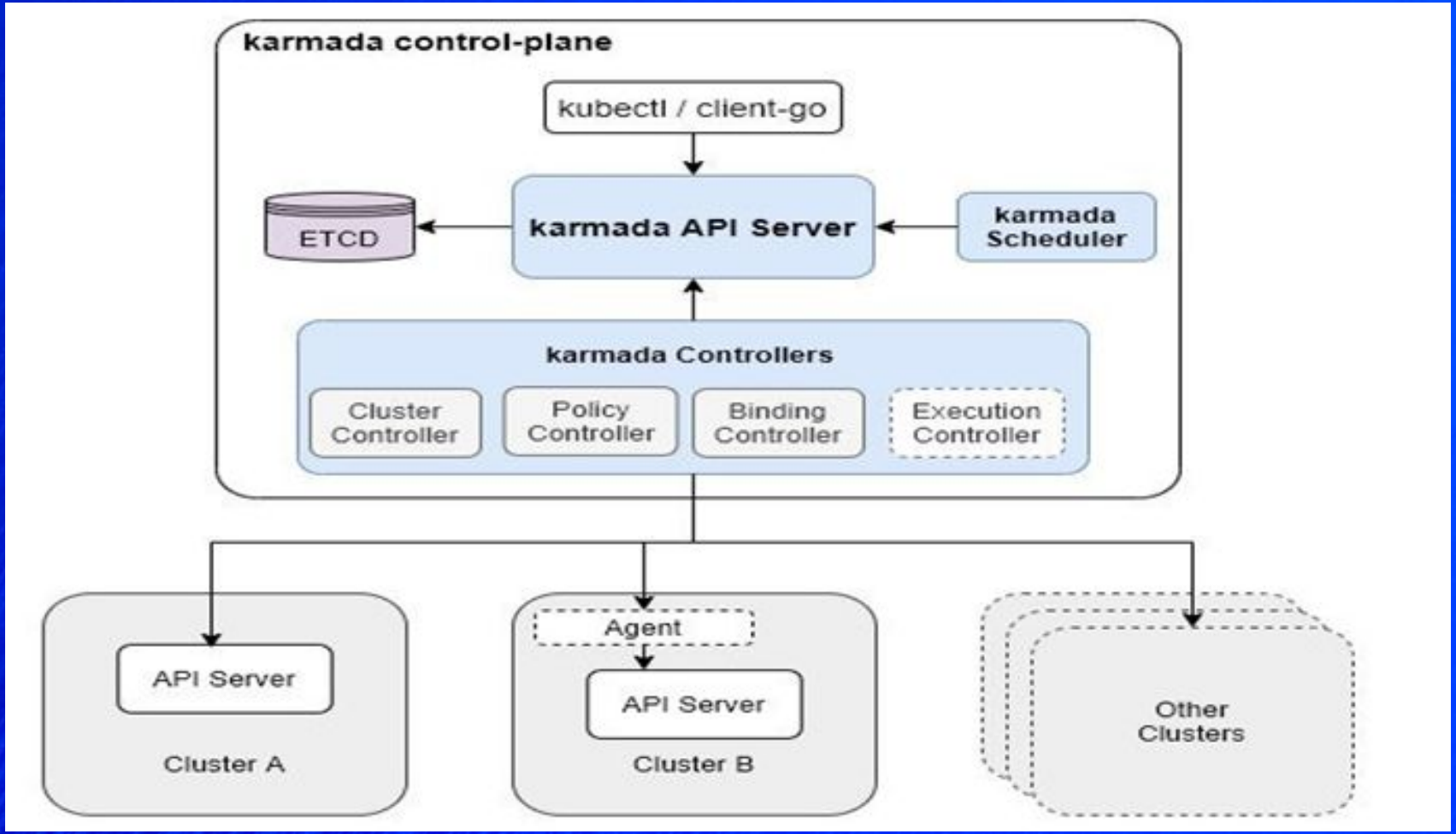
The Complexities of Multi-cluster Orchestration.



Introduction to Karmada

- A CNCF (Cloud Native Computing Foundation) sandbox project
- Simplified multi-cloud Kubernetes management
- Allows running applications across multiple Kubernetes clusters and clouds without modification.

Architecture of Karmada



Why Karmada?

- Federated Application Management
- Cross-Cluster Resource Sharing
- Centralized Control Plane
- Scheduling based on policy
- Policy-Based Governance

Karmada Control-plane

- Karmada API Server
- Karmada Scheduler
- Karmada Controller Manager : Cluster controller, Policy controller, Binding controller, Execution controller

```
rohan@berrybytes-desktop:~$ cd ~/.kube/
rohan@berrybytes-desktop:~/.kube$ ls
cache  config  karmada.config  members.config
rohan@berrybytes-desktop:~/.kube$ kubectl config get-contexts
CURRENT   NAME                 CLUSTER              AUTHINFO             NAMESPACE
*         karmada-apiserver    karmada-apiserver    karmada-apiserver
          karmada-host         kind-karmada-host    kind-karmada-host
rohan@berrybytes-desktop:~/.kube$ kubectl get pp
NAME                 AGE
nginx-propagation    23m
rohan@berrybytes-desktop:~/.kube$ export KUBECONFIG=~/.kube/members.config
rohan@berrybytes-desktop:~/.kube$ kubectl config get-contexts
CURRENT   NAME      CLUSTER         AUTHINFO        NAMESPACE
*         member1   kind-member1    kind-member1
          member2   kind-member2    kind-member2
          member3   kind-member3    kind-member3
rohan@berrybytes-desktop:~/.kube$
```

```
rohan@berrybytes-desktop:~$ kubectl get all -n karmada-system
NAME                                                READY   STATUS    RESTARTS   AGE
pod/etcd-0                                          1/1     Running   0          7m26s
pod/karmada-aggregated-apiserver-6b7b7b5657-krl2j   1/1     Running   0          6m10s
pod/karmada-aggregated-apiserver-6b7b7b5657-ktnnb   1/1     Running   0          6m10s
pod/karmada-apiserver-77974ccbff-f8vdc              1/1     Running   0          6m29s
pod/karmada-controller-manager-75fb96496f-585db     1/1     Running   0          5m58s
pod/karmada-controller-manager-75fb96496f-gtrqv     1/1     Running   0          5m58s
pod/karmada-descheduler-7c59d4b4f6-jt7v9            1/1     Running   0          5m57s
pod/karmada-descheduler-7c59d4b4f6-sd7qf            1/1     Running   0          5m57s
pod/karmada-kube-controller-manager-795c547674-pwrb8   1/1     Running   0          6m11s
pod/karmada-scheduler-64dfd6bbc4-9w9jb              1/1     Running   0          5m57s
pod/karmada-scheduler-64dfd6bbc4-hqhfg              1/1     Running   0          5m57s
pod/karmada-search-847c44696f-dszh5                 1/1     Running   0          6m7s
pod/karmada-search-847c44696f-nrxtx                 1/1     Running   0          6m7s
pod/karmada-webhook-5857555459-cwvd9                1/1     Running   0          2s
pod/karmada-webhook-5857555459-q7jfz                1/1     Running   0          4s

NAME                                    TYPE        CLUSTER-IP      EXTERNAL-IP   PORT(S)             AGE
service/etcd                            ClusterIP   None            <none>        2379/TCP,2380/TCP   7m26s
service/etcd-client                     ClusterIP   10.96.208.63    <none>        2379/TCP            7m26s
service/karmada-aggregated-apiserver    ClusterIP   10.96.126.209   <none>        443/TCP             6m10s
service/karmada-apiserver               ClusterIP   10.96.28.61     <none>        5443/TCP            6m29s
service/karmada-search                  ClusterIP   10.96.202.238   <none>        443/TCP             6m7s
service/karmada-webhook                 ClusterIP   10.96.66.169    <none>        443/TCP             5m57s

NAME                                           READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/karmada-aggregated-apiserver   2/2     2            2           6m10s
deployment.apps/karmada-apiserver              1/1     1            1           6m29s
deployment.apps/karmada-controller-manager     2/2     2            2           5m58s
deployment.apps/karmada-descheduler            2/2     2            2           5m57s
deployment.apps/karmada-kube-controller-manager   1/1     1            1           6m11s
deployment.apps/karmada-scheduler              2/2     2            2           5m57s
deployment.apps/karmada-search                 2/2     2            2           6m7s
deployment.apps/karmada-webhook                2/2     2            2           5m57s

NAME                                                 DESIRED   CURRENT   READY   AGE
replicaset.apps/karmada-aggregated-apiserver-6b7b7b5657   2         2         2       6m10s
replicaset.apps/karmada-apiserver-77974ccbff         1         1         1       6m29s
replicaset.apps/karmada-controller-manager-75fb96496f   2         2         2       5m58s
replicaset.apps/karmada-descheduler-7c59d4b4f6       2         2         2       5m57s
replicaset.apps/karmada-kube-controller-manager-795c547674   1         1         1       6m11s
replicaset.apps/karmada-scheduler-64dfd6bbc4         2         2         2       5m57s
replicaset.apps/karmada-search-847c44696f            2         2         2       6m7s
replicaset.apps/karmada-webhook-5857555459           2         2         2       4s
replicaset.apps/karmada-webhook-7587c9f44f           0         0         0       5m57s

NAME                       READY   AGE
statefulset.apps/etcd      1/1     7m26s
rohan@berrybytes-desktop:~$ kubectl config get-contexts
CURRENT   NAME                CLUSTER             AUTHINFO            NAMESPACE
          karmada-apiserver   karmada-apiserver   karmada-apiserver
*         karmada-host        kind-karmada-host   kind-karmada-host
rohan@berrybytes-desktop:~$
```

How we scheduled workload using policy?

- Propagation Policy
- Cluster propagation Policy
- Override Policy

Prerequisites

- Kind
- Golang 1.20
- kubectl
- karmadactl

Thank You!