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SIG Multicluster Intro & Deep Dive

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SIG Multicluster Intro & Deep Dive

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Welcome!

We'll cover:

- What this SIG is about
- Current activity
  - Kubefed Deprecation
  - ClusterSet / Namespace Sameness
  - About API for storing cluster properties such as Cluster ID / ClusterSet membership
  - Multicluster Services API / Multicluster DNS
  - StatefulSetSlices for migrating stateful sets between clusters
- Deep dive and Demo
  - About API and MCS API in action using AWS CloudMap MCS Controller for K8s
- How to contribute

What this SIG is about

- What should be the Kubernetes-native way to ….
  - Expose workloads from multiple clusters to each other
  - Share cluster metadata and its place relative to others
  - Generally break down the walls between clusters
- Touches many different functional areas, but we are still working to identify the best, most durable primitives
- We want AND need your input!
  - Real user stories and use cases are extremely valuable
  - Tell us what you're working on!

Our approach

- Avoid premature standardization
- Focus on APIs
- Avoid solving any optional problems
- Keep multicluster consistent with single cluster
- Work backwards from specific problems into something bigger, maybe

Current activity

Kubefed - on archival decision

- Kubefed will be archived
- Great learnings came from this project but is no longer under active development
- Archival is not deletion
- Thank you to everyone who contributed!

ClusterSet

- ClusterSet represents a pattern of use from the field:
  - A group of clusters governed by a single authority
  - High degree of trust within the set
  - Namespace Sameness applies to clusters in the set
    - Permissions and characteristics are consistent across clusters for a given namespace
    - Namespaces don't have to exist in every cluster, but behave the same across those in which they do
- A cluster's ClusterSet membership is stored in the about.k8s.io/ClusterProperty `clusterset.k8s.io`
  - See next slide …

About API: cluster metadata

- KEP-2149
- Now available at sigs.k8s.io/about-api
- Cluster scoped ClusterProperty CRD - name: value
- Uniquely identify clusters and identify their membership in a ClusterSet, for the lifetime of membership
- Provides a reference for multi-cluster tooling to build on within a cluster set (e.g. valid DNS label)
- Now a well-known place to store these or any other cluster properties that might otherwise be ad-hoc annotations on semantically adjacent objects

```
apiVersion: about.k8s.io/v1
kind: ClusterProperty
metadata:
  name: cluster.clusterset.k8s.io
spec:
   value: cluster-1
```

```
apiVersion: about.k8s.io/v1
kind: ClusterProperty
metadata:
  name: clusterset.k8s.io
spec:
   value: mycoolclusterset
```

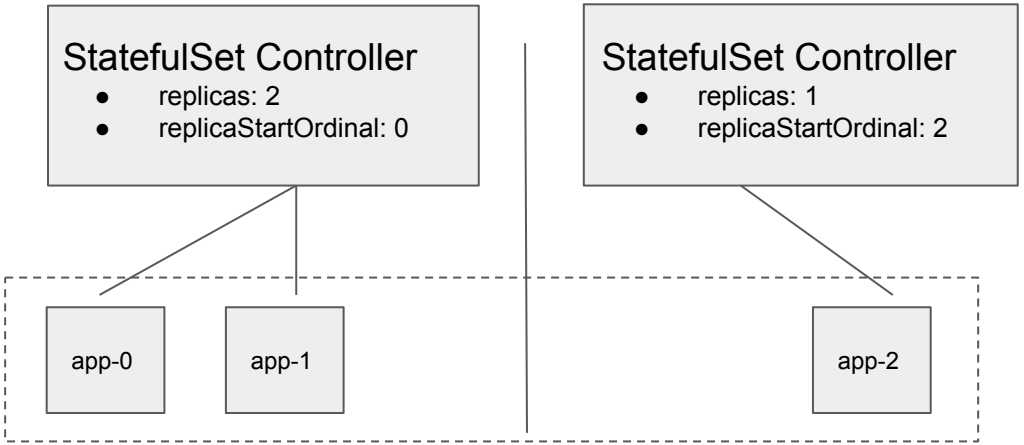
```
apiVersion: about.k8s.io/v1
kind: ClusterProperty
metadata:
  name: fingerprint.mycoolimplementation.com
spec:
  value:  '{"major": "1","minor":
"18","gitVersion": "v1.18.2","gitCommit":
"52c56ce7a8272c798dbc29846288d7cd9fbae032","git
TreeState": "clean","buildDate":
"2020-04-30T20:19:45Z","goVersion":
"go1.13.9","compiler": "gc","platform":
"linux/amd64"}'
```

MC Services API

- KEP-1645 and sigs.k8s.io/mcs-api
- Services are a multi-cluster building block
- Allows a single service to span and/or be consumed by multiple clusters
- Focused only on the API and common behavior, leaving room for various implementations
  - Submariner, GKE, Istio, AWS
- Consumers only ever rely on local data
- ClusterIP and headless services just work as expected across clusters.

```yaml
apiVersion: v1
kind: Service
metadata:
  name: foo
  namespace: bar
spec:
  ports:
  - port: 80
  selector:
    app: foo
---
apiVersion: multicluster.x-k8s.io/v1alpha1
kind: ServiceExport
metadata:
  name: foo
  namespace: bar
```

StatefulSetSlices



- KEP-3335, proposing a mechanism to support the “split brain” of individual StatefulSet controllers during migration of a StatefulSet across clusters
- Very cool POC leveraging both StatefulSetSlices and MCS
  - see @pwschuurman and @mattschallert showcasing this in their KubeconNA talk

Additional Topics

- More sophistication on MC networking
  - Network policy - applying policy uniformly across clusters
  - Multi-network - stitching together clusters on different networks
- Multicluster controllers / MC leader election
  - what SIG-MC should recommend or implement as a reference
- Work API
  - Spreading groups of resources to different cluster

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About API and MCS API in action with AWS CloudMap MCS Controller for K8s

Major shoutout to @runakash and @astaticvoid

Get involved

We need your input

Share your use cases, problems, and ideas

- Home page: https://github.com/kubernetes/community/tree/master/sig-multicluster
- Slack channel: https://kubernetes.slack.com/messages/sig-multicluster
- List: https://groups.google.com/forum/#!forum/kubernetes-sig-multicluster
- Meetings are biweekly Tuesdays, 12:30 eastern, 9:30 pacific, 16:30 UTC

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