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# One Inventory to Rule Them All: Standardizing Multicluster Management

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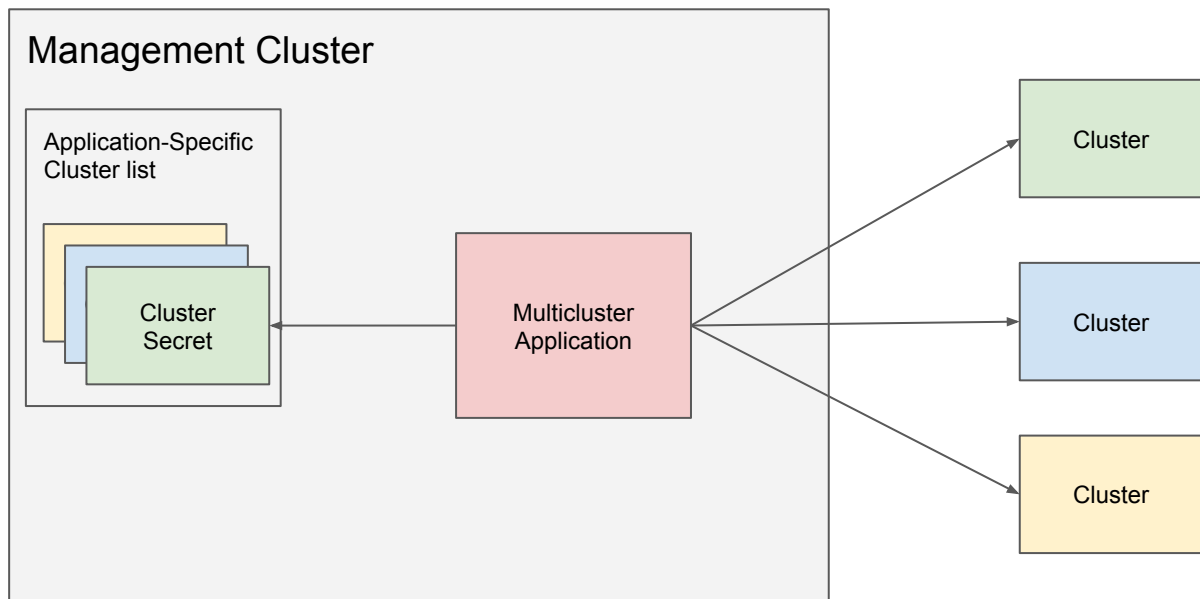


- **Multicluster Overview**
- Cluster Inventory
- In Practice
- Future work

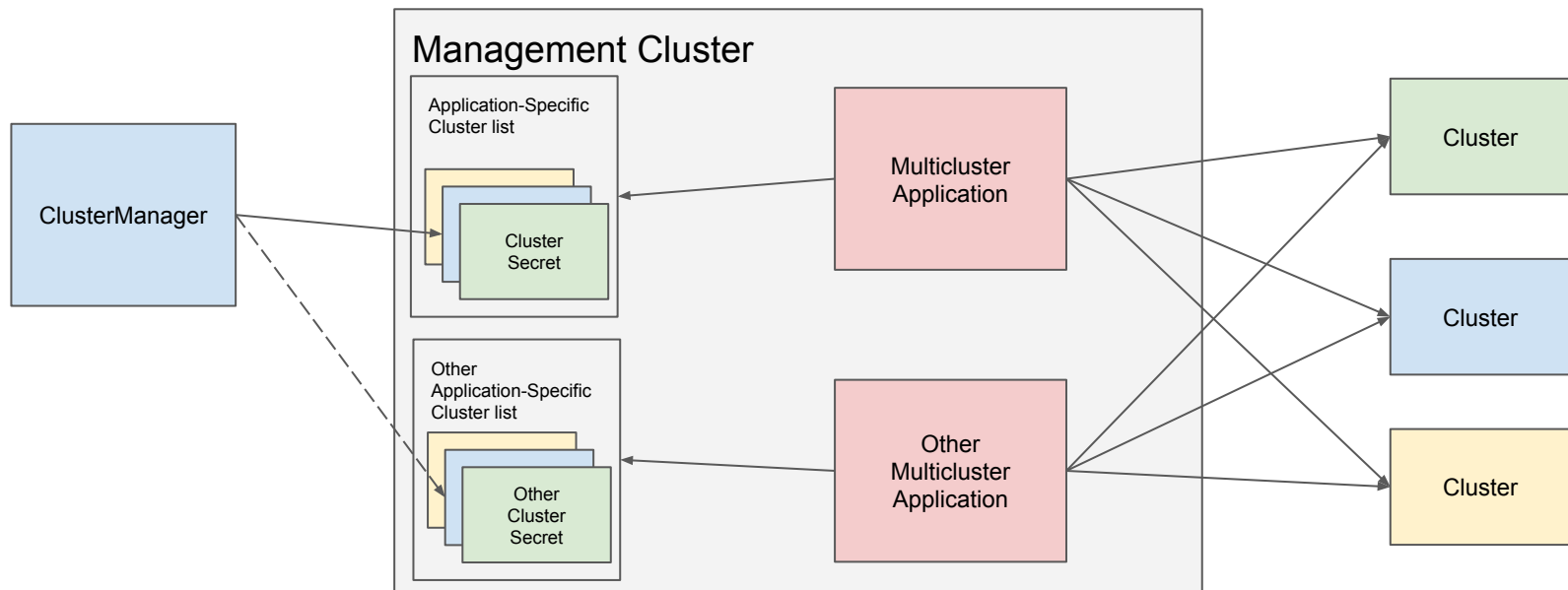
If you're here, either you:

- Have multiple Kubernetes clusters and using them “together”
- Are writing tools to help run application(s) on multiple Kubernetes clusters
- Are easily distracted by the Lord Of The Rings

It all started with one application...

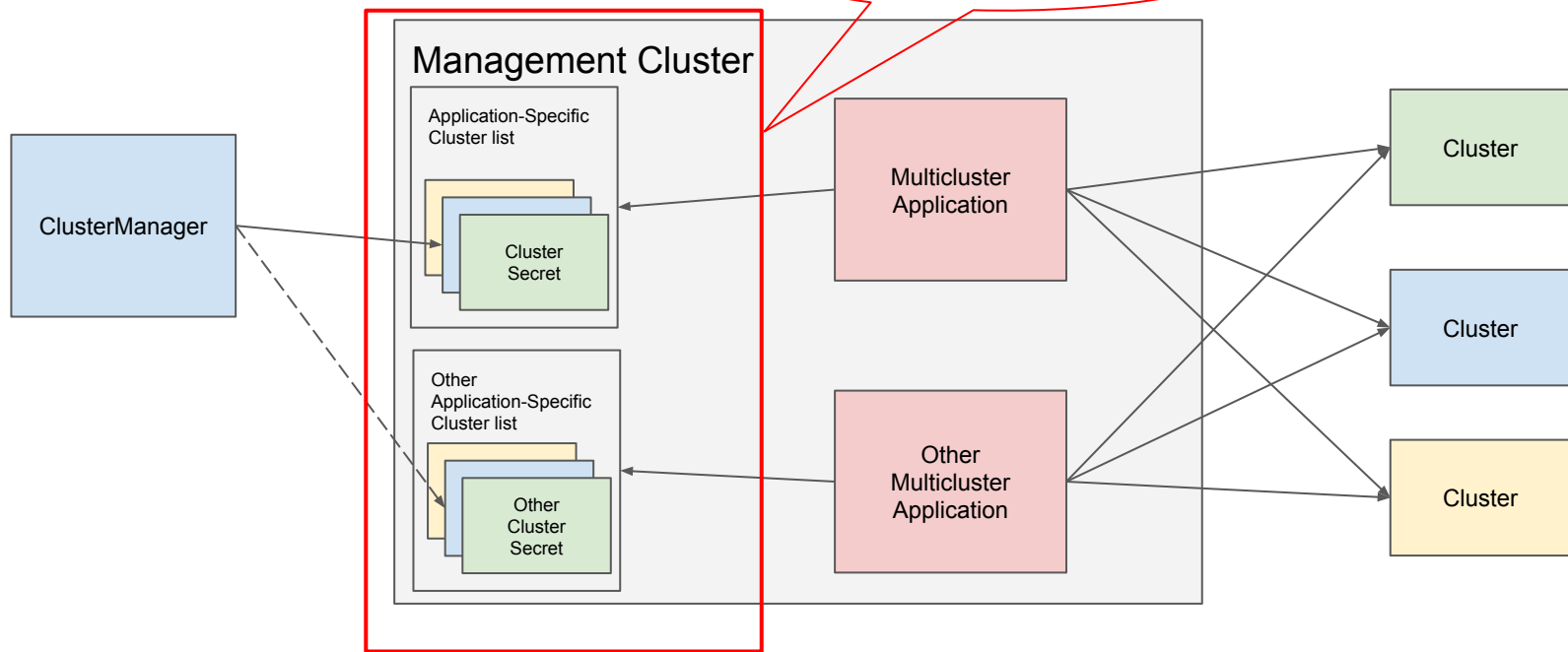


... then we added a few more.



We "just" needed a list of clusters.

Everyone inventing  
the same thing





Everyone is doing their own multicluster

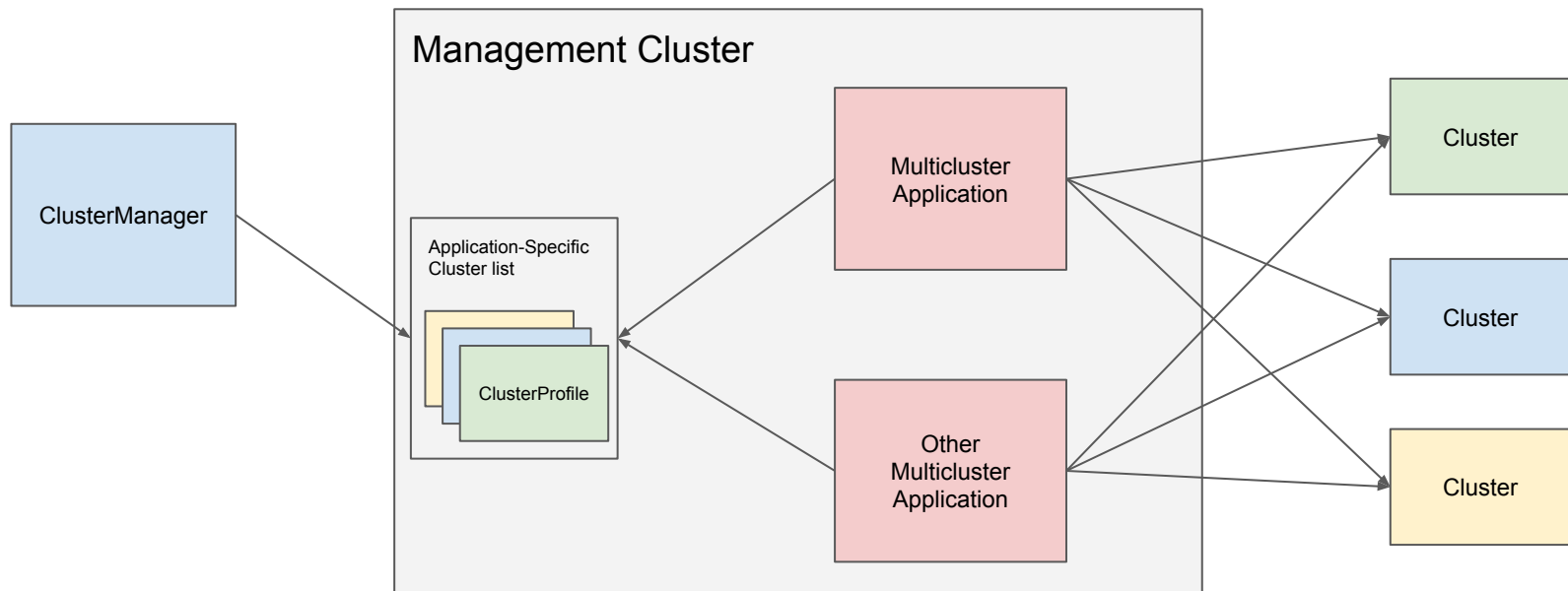
- Open source projects that focus on multi-cluster (Cluster Manager)
  - [KubeFleet](#)
  - [Open Cluster Management \(OCM\)](#)
  - [Clusternet](#)
  - Karmada
  - Kubestellar
  - KubeAdmiral
- Open source projects that has multi-cluster mode
  - [Kueue](#)
  - [ArgoCD](#)
  - [KubeVela](#)
  - [Istio](#)
- Cloud providers that try to help
  - [GKE Fleet](#)
  - [Azure Kubernetes Fleet Manager](#)

- Multicluster Overview
- **Cluster Inventory**
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- Future work

- Every multi-cluster solution has an object to represent a cluster inventory
  - Open Cluster Management (OCM): ManagedCluster
  - Clusternet: ManagedCluster
  - Fleet Manager: MemberCluster
  - KubeVela: Virtual-cluster
  - Kueue: MultiKueueCluster
  - ArgoCD/Istio: Secret
- A community backed API that defines cluster inventory
  - Establish a standardized inventory cluster API to represent clusters.
    - Multi-cluster workload orchestration
  - Lay the groundwork for multi-cluster tooling by providing a foundational component.
    - ArgoCD, Kueue, KubeVela

# Introducing ClusterProfile

## Standardizing with ClusterProfile



hopefully not <https://xkcd.com/927/>

# Introducing ClusterProfile

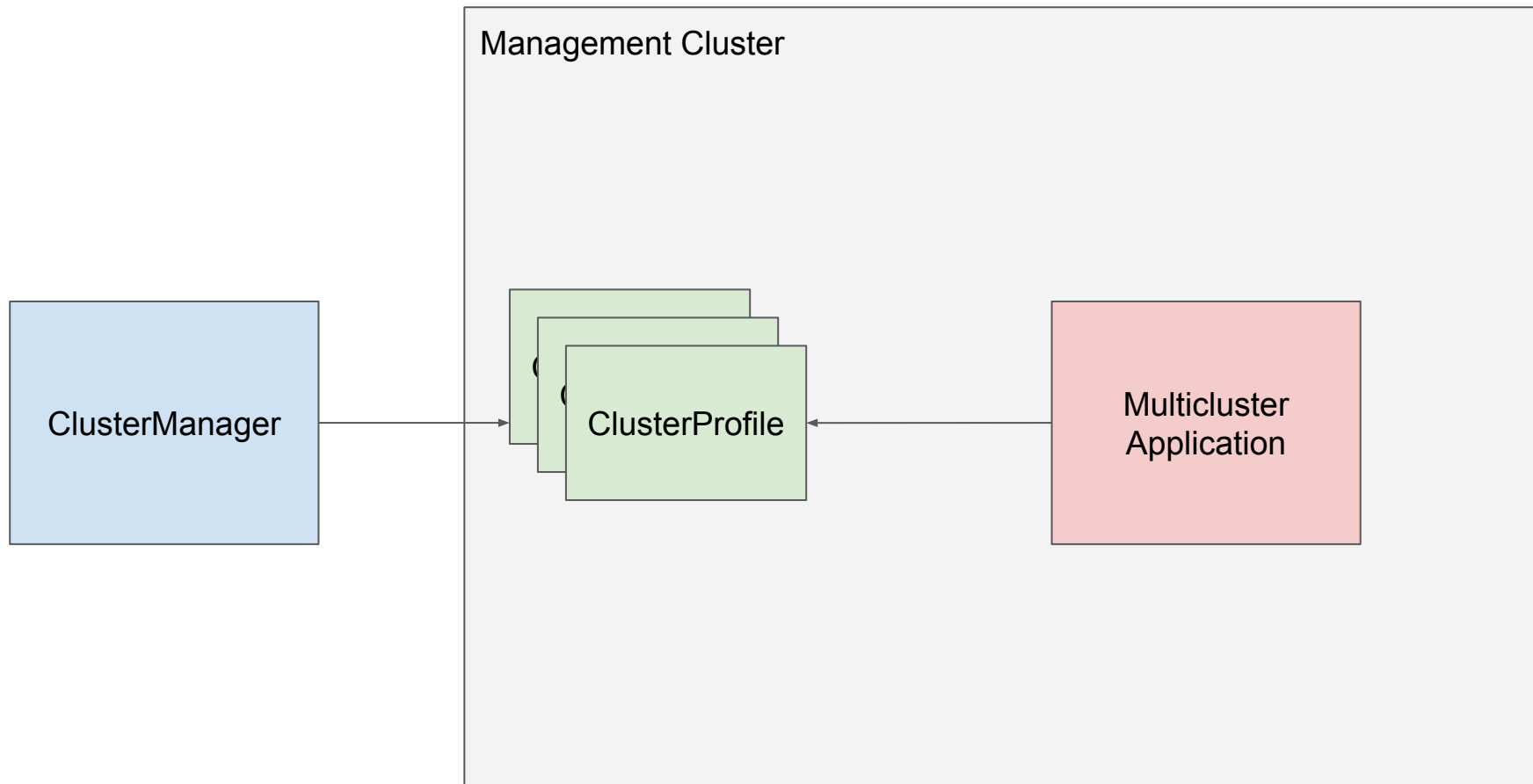


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# Introducing ClusterProfile



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Sig-Multicluster introduced ClusterProfile API

<[KEP](#), [Doc](#), [Repo](#)>

Set of rules:

- Namespaced
- An inventory may map to a clusterset
- Each ClusterProfile contains Properties

Non-Goals

- Provide a standard reference implementation.
- Define specific implementation details beyond general API behavior.
- Offering functionalities related to multi-cluster orchestration.

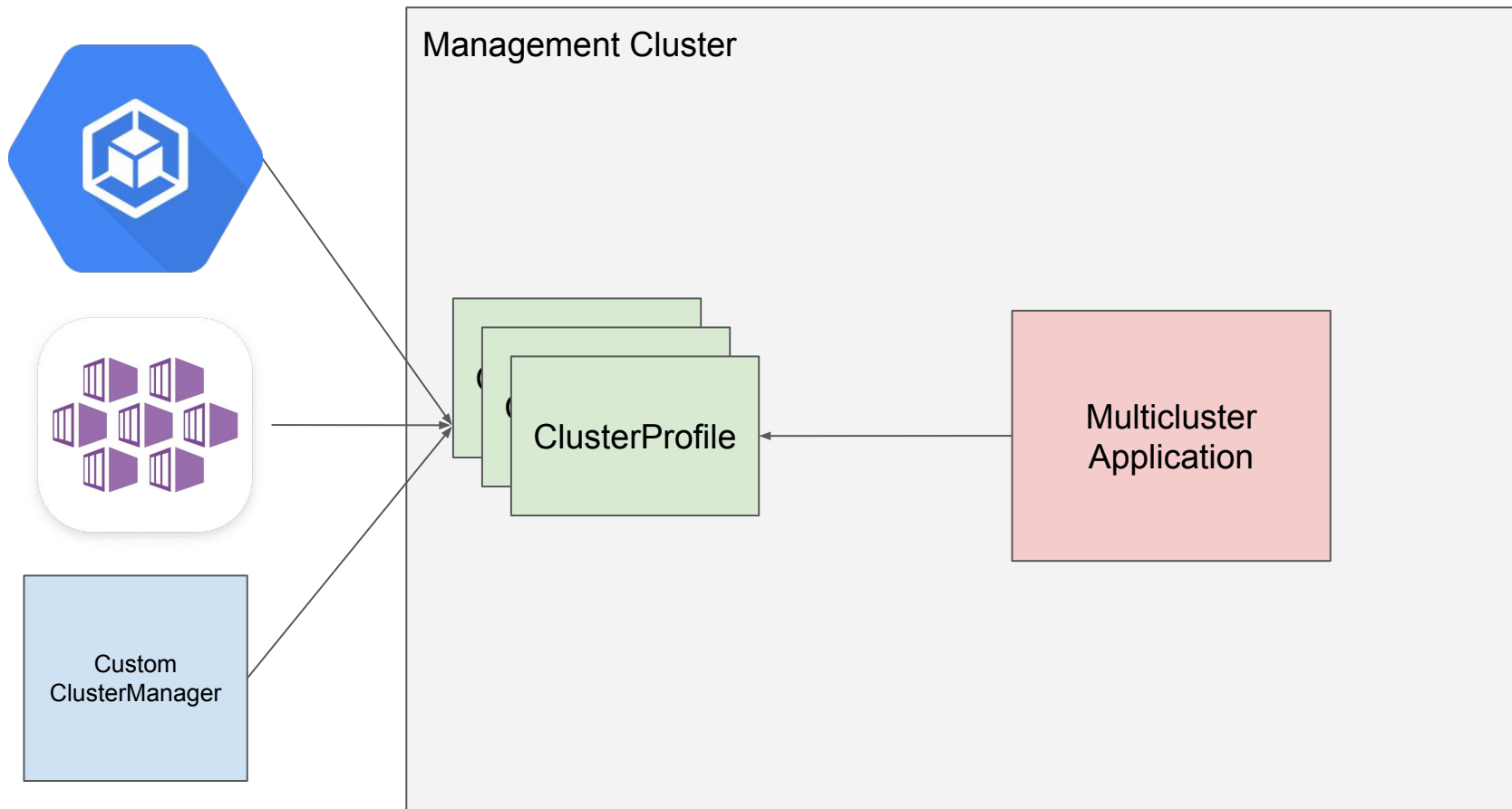
```
apiVersion: multicluster.x-k8s.io/v1alpha1
kind: ClusterProfile
metadata:
  name: slc-cluster
  namespace: fleet-system
  labels:
    x-k8s.io/cluster-manager:some-cluster-manager
spec:
  displayName: My SLC cluster
  clusterManager:
    name: some-cluster-manager
status:
  version:
    kubernetes: 1.31.0
  properties:
    - name: clusterset.k8s.io
      value: prod-fleet
    - name: location
      value: us-west3
```

- Multicluster Overview
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Fan-in: All Cluster Managers can write a single resource

- Generate ClusterProfile objects based on wherever the list of clusters resides.
- Can easily translate Cloud's Fleet (Azure, GKE...) into ClusterProfile
- Easy to also DIY directly from the cluster provisioner





Fan-in demo

Show GKE and KubeFleet generating ClusterProfile object.

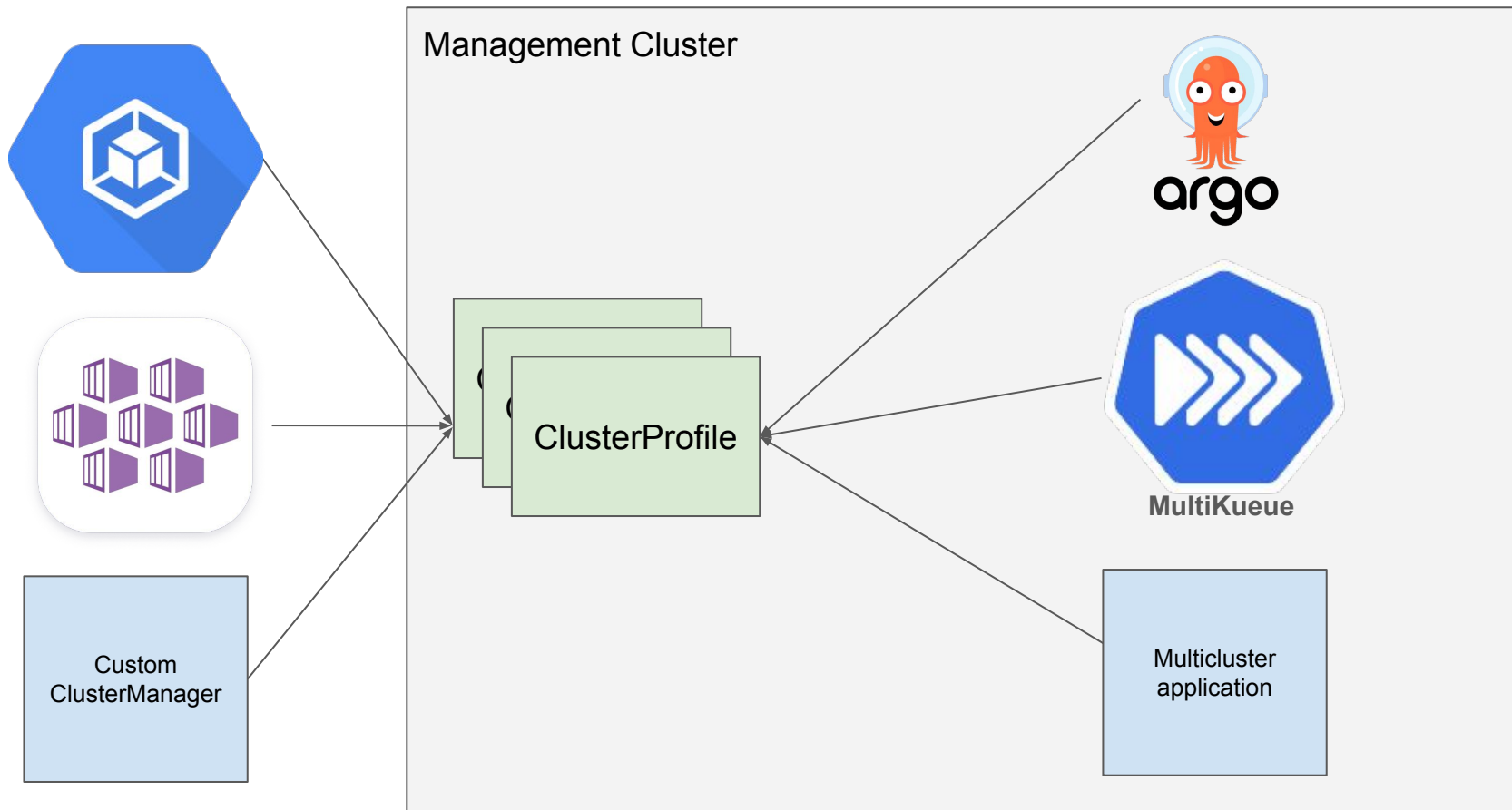
[KubeFleet PR for support](#) is merged



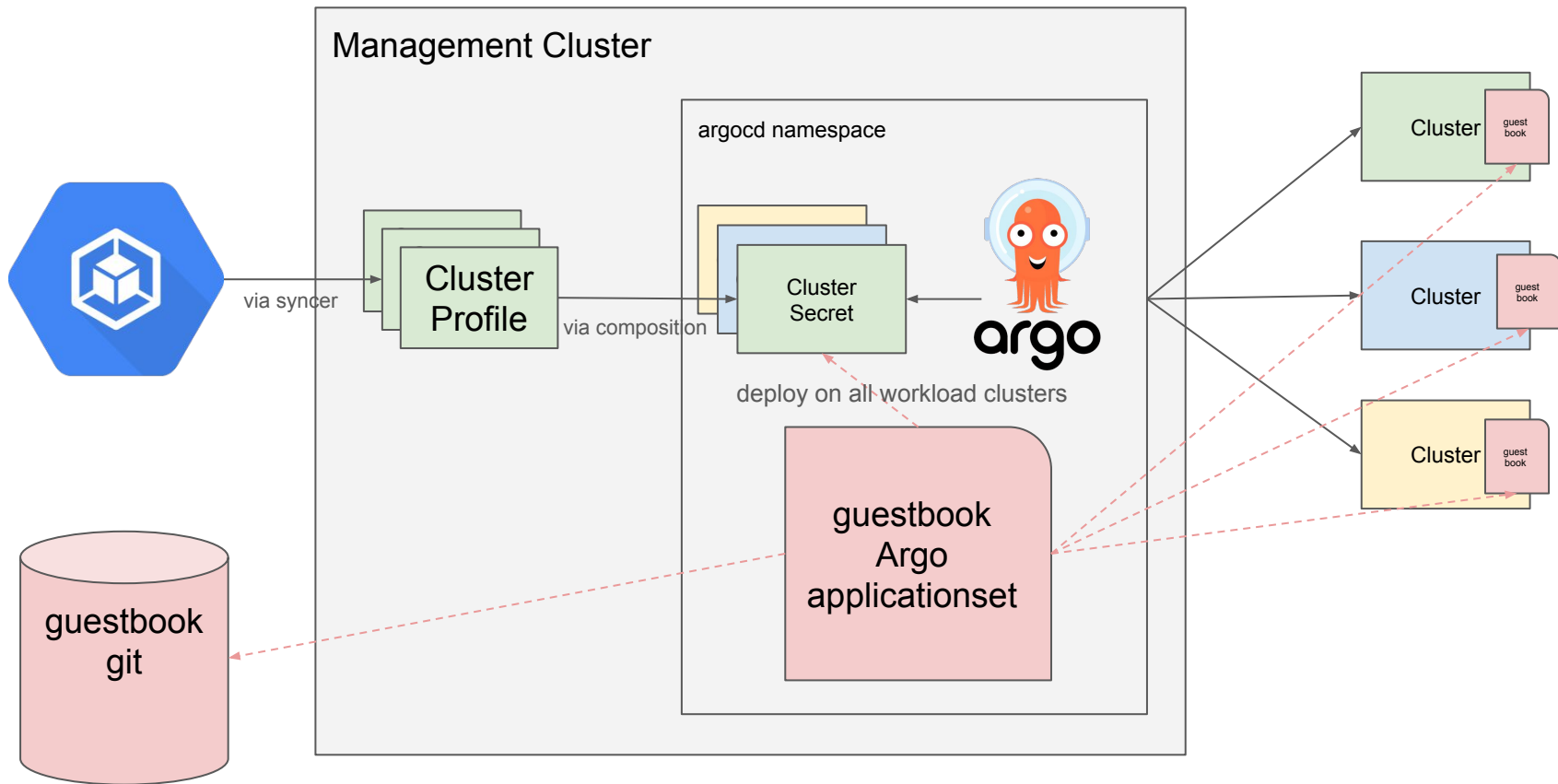
Fan-out: All Multicluster Applications can read from the **same source**

- All applications read from the same list.
- We're working with the different applications or will find ways to bridge to the existing lists
  - via plugins in their cluster listing
  - via translation to their original cluster listing
  - via direct support in the tool to replace a custom cluster listing

# Fan-out



# Fan-out Demo



# Fan-out Demo



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Backup recording <https://youtu.be/n7XtQyz93Gw>

- Multicluster Overview
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- **Future Work**

- Multicluster Application setup
  - Authentication
    - [Pull model](#)
    - [OpenID Connect](#)
    - Secrets
  - Authorization
    - How to setup RBAC on the managed clusters
- Standardize property fields in ClusterProfile:
  - Leverage [About API](#)
  - Health signals
  - Characteristics (location, type)
  - Available Resources
    - GPU SKU



- Fan-in support:
  - Cluster manager integrations
  - Cloud provider integrations
- Fan-out support:
  - Integrate applications that works with multi-cluster with Cluster Inventory.
  - If you are one, please reach out to sig-multicloud, we can help!

# Thank you



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just-a-happy-chicken-tumblr



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**Feedback**

<https://sched.co/1i7o5>

