OCM Multicluster App & Config Management

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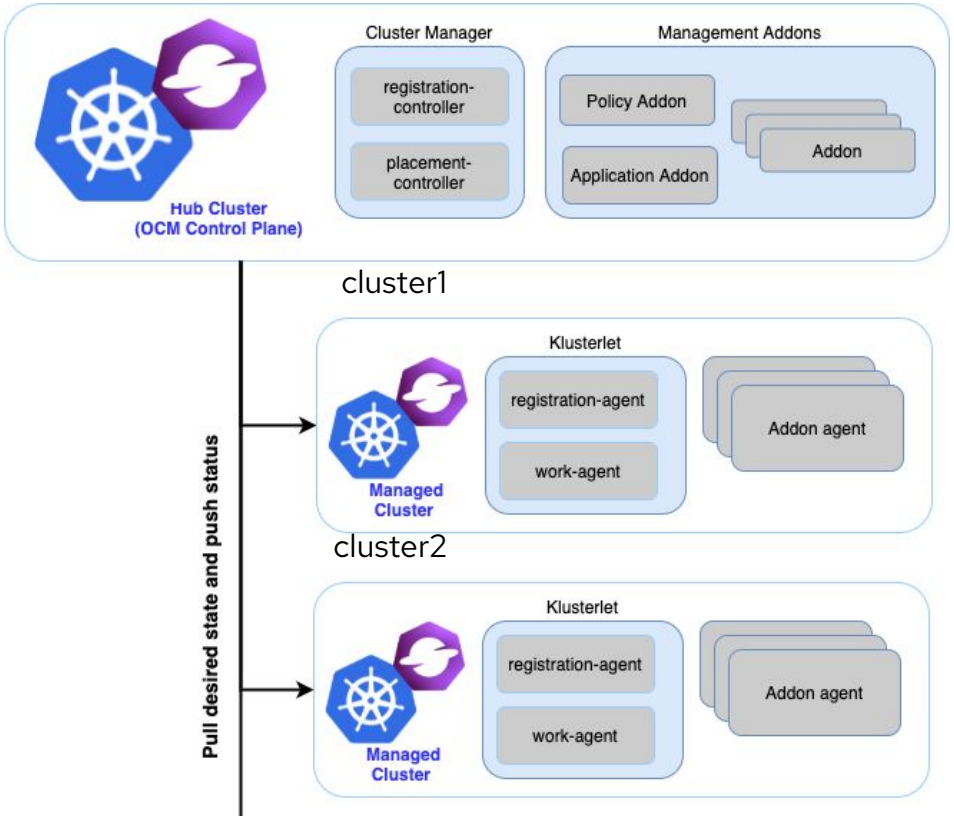
A Summary of Open Cluster Management

Simplify fleet management across the open hybrid cloud at scale.
open-cluster-management.io

- An open-source CNCF Sandbox project
- Simplifies the management of Kubernetes clusters
- Hub and spoke architecture
- Allows targeted distribution of Kubernetes manifests from the Hub
- Integration point for making Kubernetes capabilities multicluster aware

OCM Architecture



Management: What's going on upstream

Community focused on simplification of fleet management

- Provides a Governance & Compliance framework for delivering and auditing fleet readiness
- Provides dynamic placement and visibility to applications running across the fleet
- Introduces Cluster Manager & Klusterlet operators on operatorhub.io to provide a connected management agent within the cluster
- Integrates other projects like ArgoCD, Open Policy Agent, Thanos along with additional capabilities

OCM Application Addon

The OCM App add-on

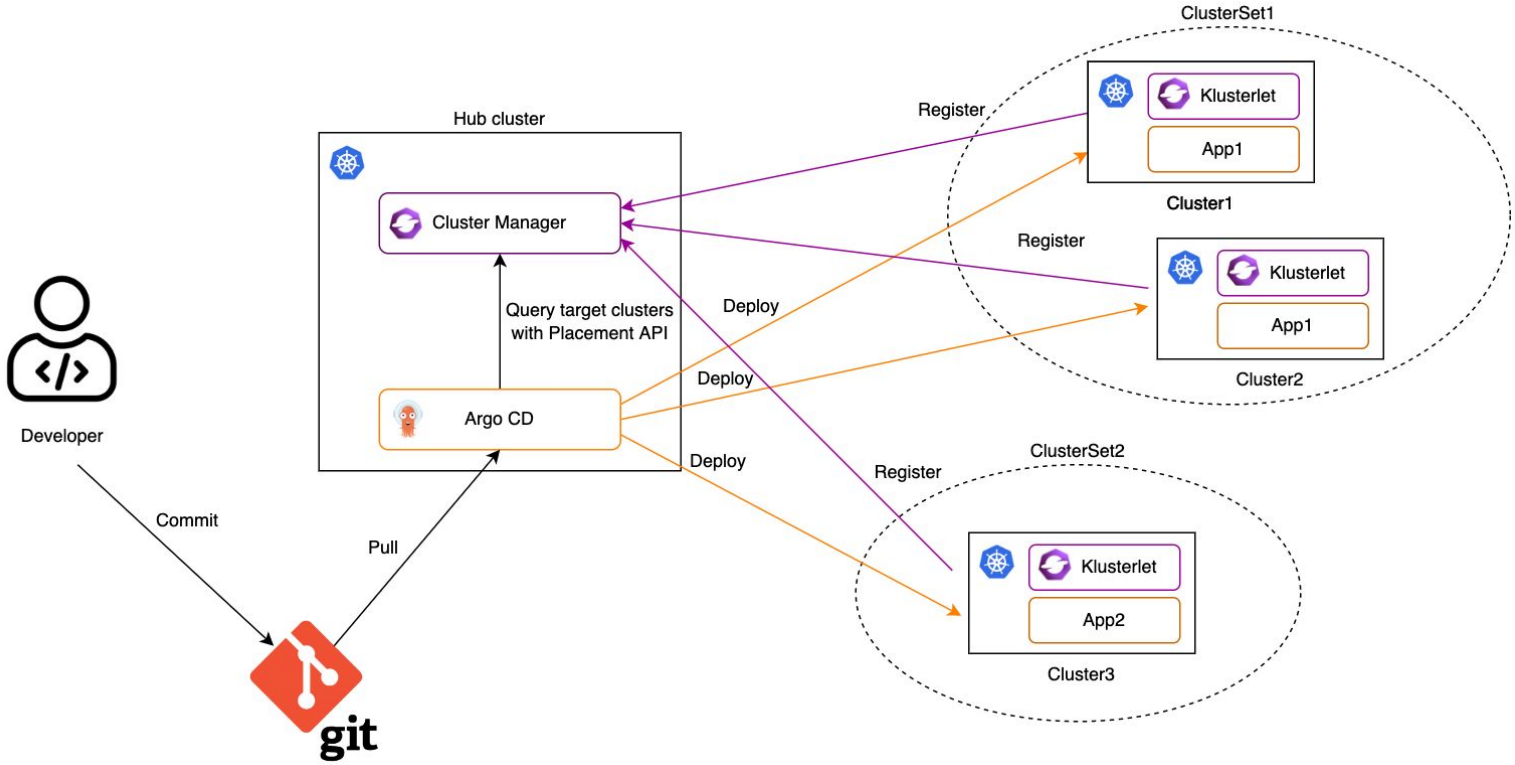
- Stand-alone and multi-cluster deployment
- GitOps(Git, Helm) subscription
- Object storage subscription
- Integration with ArgoCD

OCM Application API Concepts

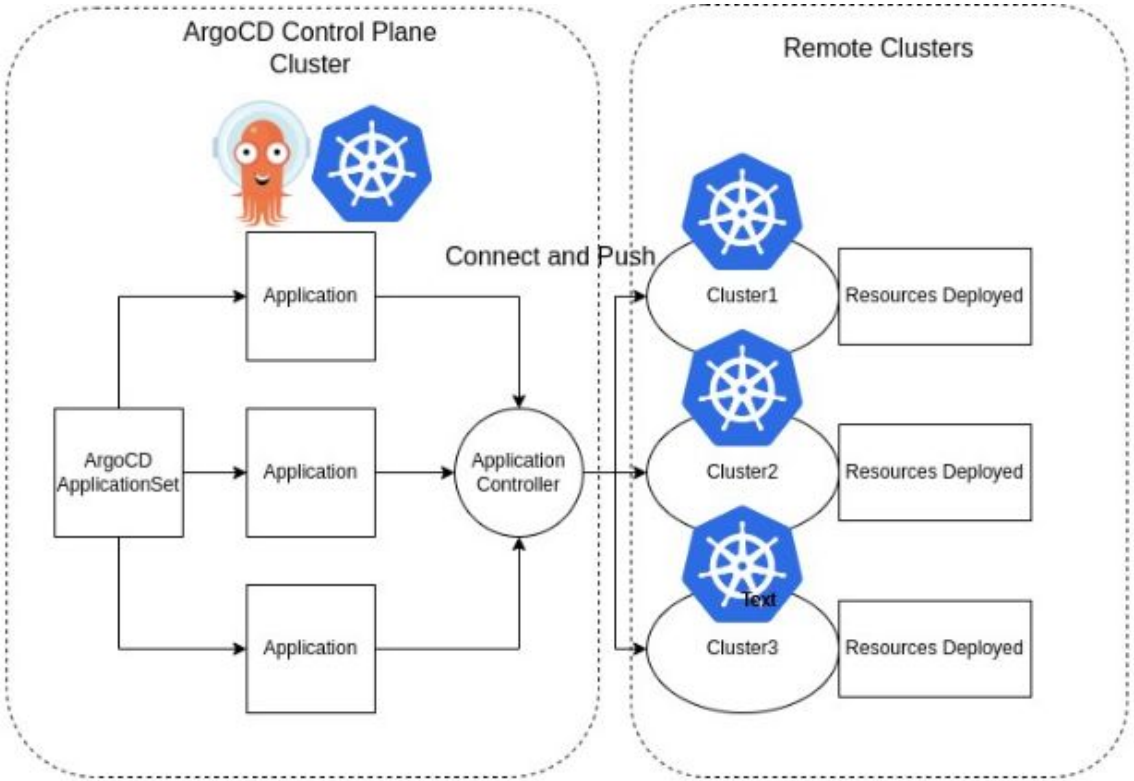
- **Placement**: dynamically select a set of managed clusters i.e. multi-cluster scheduling.
- **ApplicationSet**: supports deployments to large numbers of clusters, deployments of large monorepos, and enabling secure Application self-service.

- More details can be found on the open-cluster-management.io website.

Integration with Argo CD



Pushing resources



Demo

- Deploy application “guestbook-ui” to kind clusters (cluster1 and cluster2) with Argo CD and OCM

Future: pull model

argo

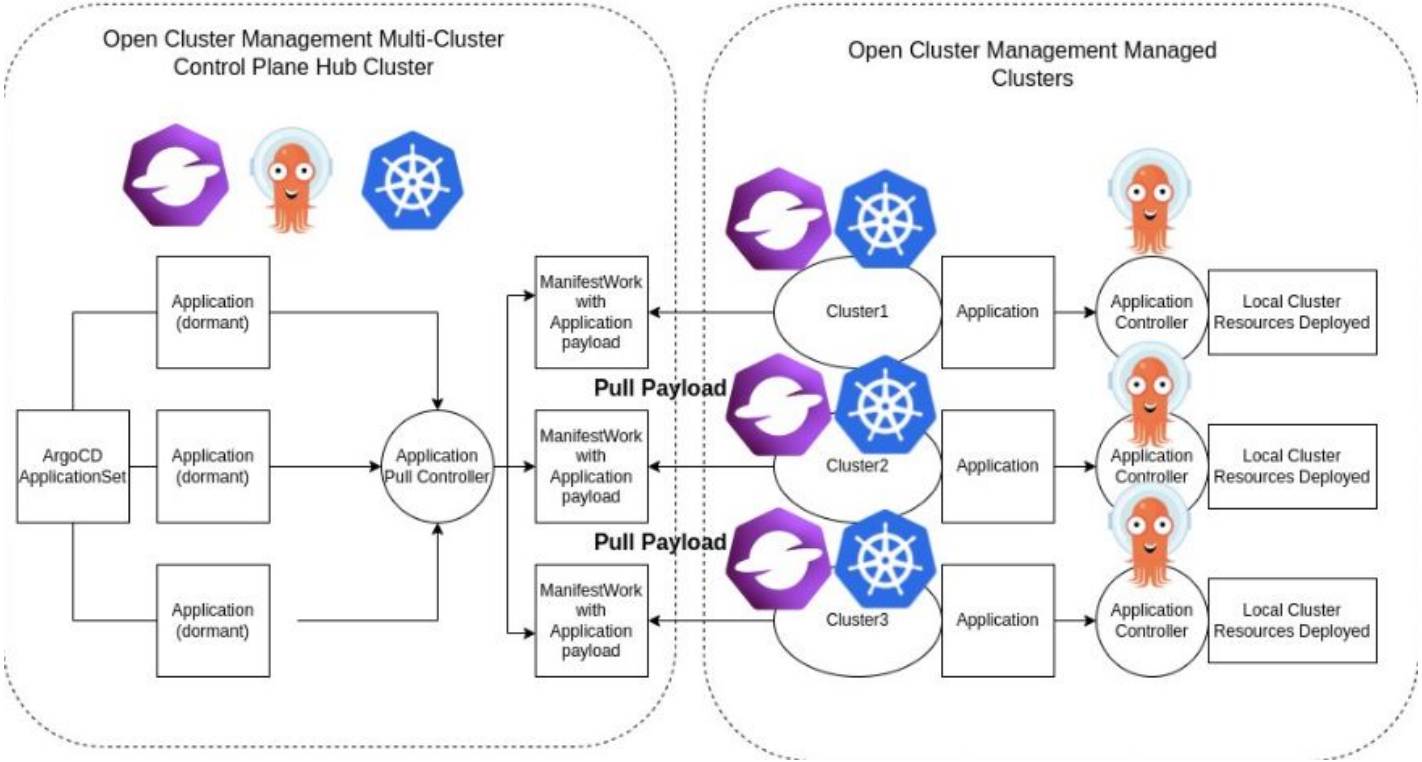
The pull model offers some advantages over the existing push model:

- **Scalability**: well documented that hub-spoke pattern offers better scalability.
- **Security**: cluster credentials doesn't have to be stored in a centralized environment.
- Reduce the impact of a single point of centralized failure.

This ArgoCD pull model controller on the Hub cluster will create ManifestWork objects wrapping Application objects as payload. The OCM agent on the Managed cluster will see the ManifestWork on the Hub cluster and pull the Application down.

Argo CD pull integration: https://github.com/mikeshng/argocd-pull-integration

Integration with Argo CD



OCM Policy Addon

Multicluster Governance Challenges

- Consistent configuration management in a multicluster or multicloud environment
- Meeting organization security standards
- Complying with external regulatory compliance requirements for security, resiliency, and software engineering practices
- Accounting for the fluidity of Cloud environments
- Find an open and extensible solution
- Integrating with existing tooling or procedures

The OCM Policy Addon

- Declarative policies
- Configuration management in a multicluster or multicloud environment
- Informs or enforces Kubernetes manifests on desired Kubernetes clusters
- Supports dynamic policies with templating
- Secure secrets distribution from the Hub to managed clusters
- Can wrap other policy engines
- An extensive collection of policies
    - github.com/stolostron/policy-collection
- Extensible framework for custom policy controllers

OCM Policy API Concepts

- **Policy Templates** are the policies that perform a desired check or action
  - For example, **ConfigurationPolicy** objects
- A **Policy** is a grouping mechanism for Policy Templates
- Embedded Policy Templates are distributed to applicable managed clusters
- A **PlacementBinding** binds a Placement to a Policy or PolicySet
- A **PolicySet** is a grouping mechanism of Policy objects

- More details can be found on the open-cluster-management.io website.

Policy Templating

- Allows dynamic ConfigurationPolicy definitions
- Uses Go text template syntax (similar to Helm)
- The template functions can be executed on:
    - The Hub with “{{hub … hub}}”
    - The managed cluster with “{{ … }}”
- Example template functions
    - {{ fromConfigMap "namespace" "name" "field" }}
    - {{hub fromSecret "" "name" "field" hub}}
    - http://{{ (lookup "v1" "Service" "default" "metrics").spec.clusterIP }}:8080

Demo

- Creating the “apps” Namespace with a pod security admission on clusters in the “detroit” data center

Simplify Writing Policies

- The Policy Generator is a Kustomize generator plugin
- It simplifies writing policies, especially in a GitOps environment
- A Red Hat blog on the Policy Generator: https://cloud.redhat.com/blog/generating-governance-policies-using-kustomize-and-gitops

OCM Policy Roadmap

- Improve Hub policy templates
- Policy order of execution
- Selective Policy Enforcement
- Improvements in the Ansible integration
- Making it easier to integrate with Kyverno
- Document how to install on a single cluster without the rest of OCM

Get Involved

- GitHub: https://github.com/open-cluster-management-io/OCM
- Website: https://open-cluster-management.io/
- Docs: https://open-cluster-management.io/concepts/
- Slack: https://kubernetes.slack.com/channels/open-cluster-mgmt
- YouTube: https://www.youtube.com/c/OpenClusterManagement
- Mailing Group: https://groups.google.com/g/open-cluster-management
- Community Meetings: https://calendar.google.com/calendar/u/0/embed?src=openclustermanagement@gmail.com

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