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Gloo Mesh Management with GitOps

Agenda

- What is GitOps
- ArgoCD Overview
- ArgoCD Demo

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The What and Why of GitOps?

What is GitOps?

GitOps has evolved from automation practices such as DevOps and Infrastructure as Code (IaC).

GitOps is:

1. **Declarative** - The system under management must have its desired state expressed declaratively.
2. **Versioned & immutable** - The desired state is stored in a source that is immutable, versioned and retrains history.
3. **Pulled automatically** - Controllers automatically pull the declarations on desired state from the source.
4. **Continuously reconcile** - Controllers continuously observe the actual system state and apply the desired state.

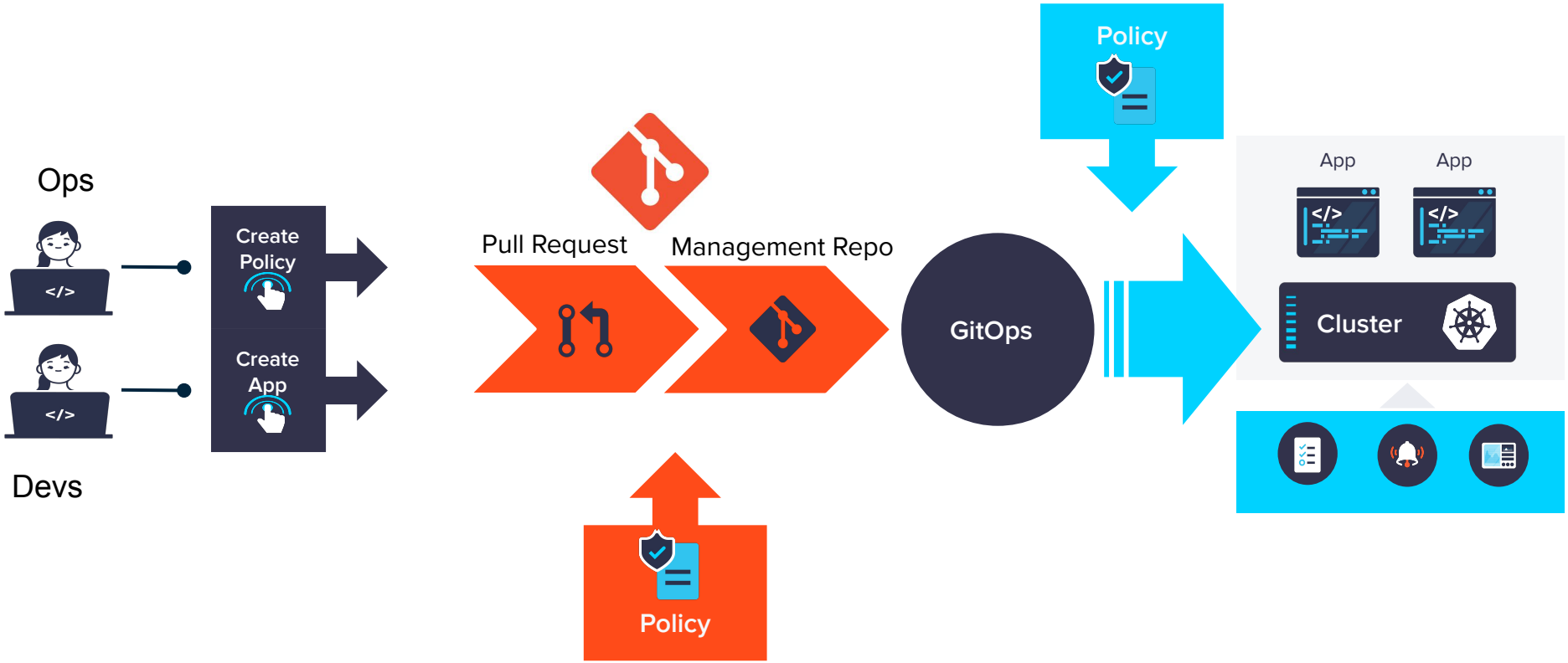
What and Why cont….

Why GitOps?

Organisations that implement GitOps experience many benefits.

- Increased Developer & Operational Productivity
- Enhanced Developer Experience
- Improved Stability
- Higher Reliability
- Consistency and Standardization
- Stronger Security Guarantees

GitOps Benefits



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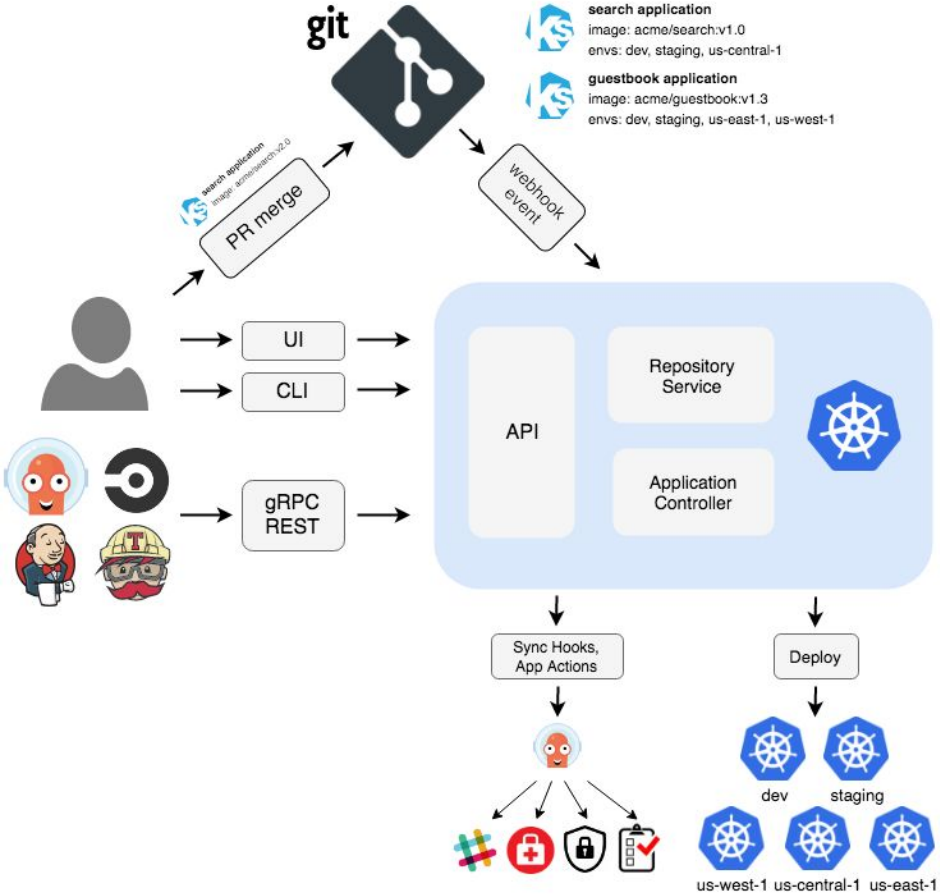
Overview of ArgoCD

ArgoCD Architecture



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ArgoCD Resources - Projects

```
apiVersion: argoproj.io/v1alpha1
kind: AppProject
metadata:
  name: my-project
  namespace: argocd
spec:
  description: Example Project
  sourceRepos:
  - '*'
  destinations:
  - namespace: guestbook
    server: https://kubernetes.default.svc
  roles:
  - name: read-only
    description: Read-only privileges to my-project
    policies:
    - p, proj:my-project:read-only, applications, get, my-project/*,
allow
    groups:
    - my-oidc-group
```

- Project - A grouping of Applications that share a logical responsibility.
  - Projects can control:
    - which Argo users can create/edit/delete Applications
    - which Repositories an Application can utilize
    - which Clusters (and namespaces within a cluster) Applications can target
    - which Kubernetes resources Applications can apply

ArgoCD Resources - Repositories

```
apiVersion: v1
kind: Secret
metadata:
  name: private-repo
  namespace: argocd
  labels:
    argocd.argoproj.io/secret-type: repository
stringData:
  type: git
  url: https://github.com/argoproj/private-repo
  password: my-password
  username: my-username
```

- Repository - A Secret that holds access credentials for a git (or Helm) repository where the manifests for an Application can be accessed.

ArgoCD Resources - Applications

```
apiVersion: argoproj.io/v1alpha1
kind: Application
metadata:
  name: guestbook
  namespace: argocd
spec:
  project: default
  source:
    repoURL: https://github.com/argoproj/argocd-example-apps.git
    targetRevision: HEAD
    path: guestbook
  destination:
    server: https://kubernetes.default.svc
    namespace: guestbook
```

- Application - Defines the set of manifests that will be deployed and managed together as an atomic object.
  - The Application is not considered “in-sync” unless all instances of these manifests in the cluster (the *live state*) match the state in their repository (the *target state*).
  - An Application can deploy more Applications, allowing for a tree-like “app of apps” structure.

ArgoCD Resources - Clusters

```
apiVersion: v1
kind: Secret
metadata:
  name: mycluster-secret
  labels:
    argocd.argoproj.io/secret-type: cluster
type: Opaque
stringData:
  name: mycluster.com
  server: https://mycluster.com
  config: |
    {
      "bearerToken": "<authentication token>",
      "tlsClientConfig": {
        "insecure": false,
        "caData": "<base64 encoded certificate>"
      }
    }
```

- Cluster - A Secret that references a Kubernetes cluster that can be targeted by an Application
  - Argo requires a ServiceAccount with specific privileges on the cluster in order to manage Applications. It can create this automatically on cluster addition or you can give it credentials for a pre-created SA.

ArgoCD Deployment Considerations

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One Management ArgoCD to Many Clusters

Benefits and tradeoffs include:

- A centralized ArgoCD instance cuts down on repeated deployments of Argo and allows for visibility of deployed Applications across all clusters.
- More strict RBAC and governance configurations
- Strict usage of Argo project configurations and whitelisting of resources to be allowed to sync to what namespaces on what clusters
- HA concerns with ArgoCD availability
  - Using HPA and multiple replicas across many nodes on management cluster

ArgoCD Instance Installed on Each Cluster

Benefits and tradeoffs include:

- ArgoCD used as an agent on each cluster to be responsible for the resources on its local cluster
- Each ArgoCD instance shares a common configuration
  - One helm chart configuration deployed over multiple clusters
- Less complicated configuration of RBAC and project restrictions
  - Overall less complicated configuration of ArgoCD itself
  - Less management of each individual ArgoCD instance
- Possibly many ArgoCD instances to be aware of

Demo
ArgoCD & Gloo Mesh

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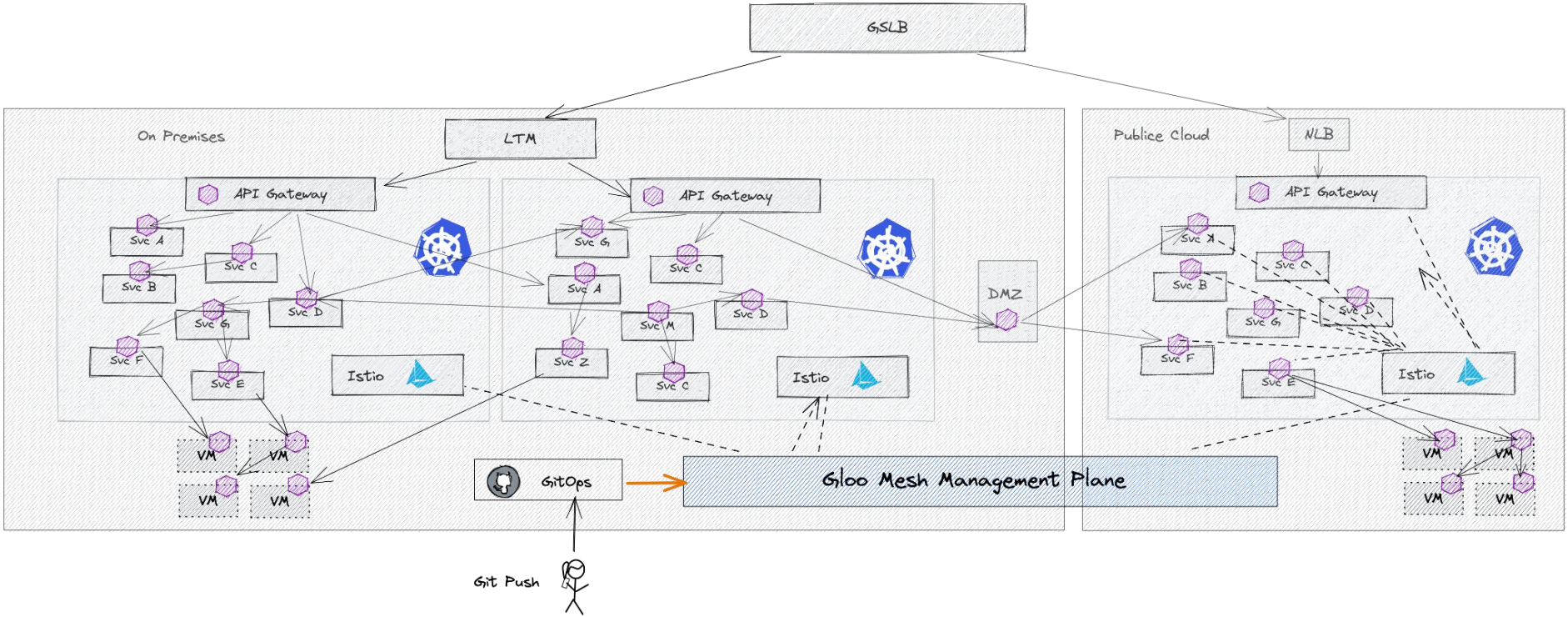
Drive everything through GitOps!



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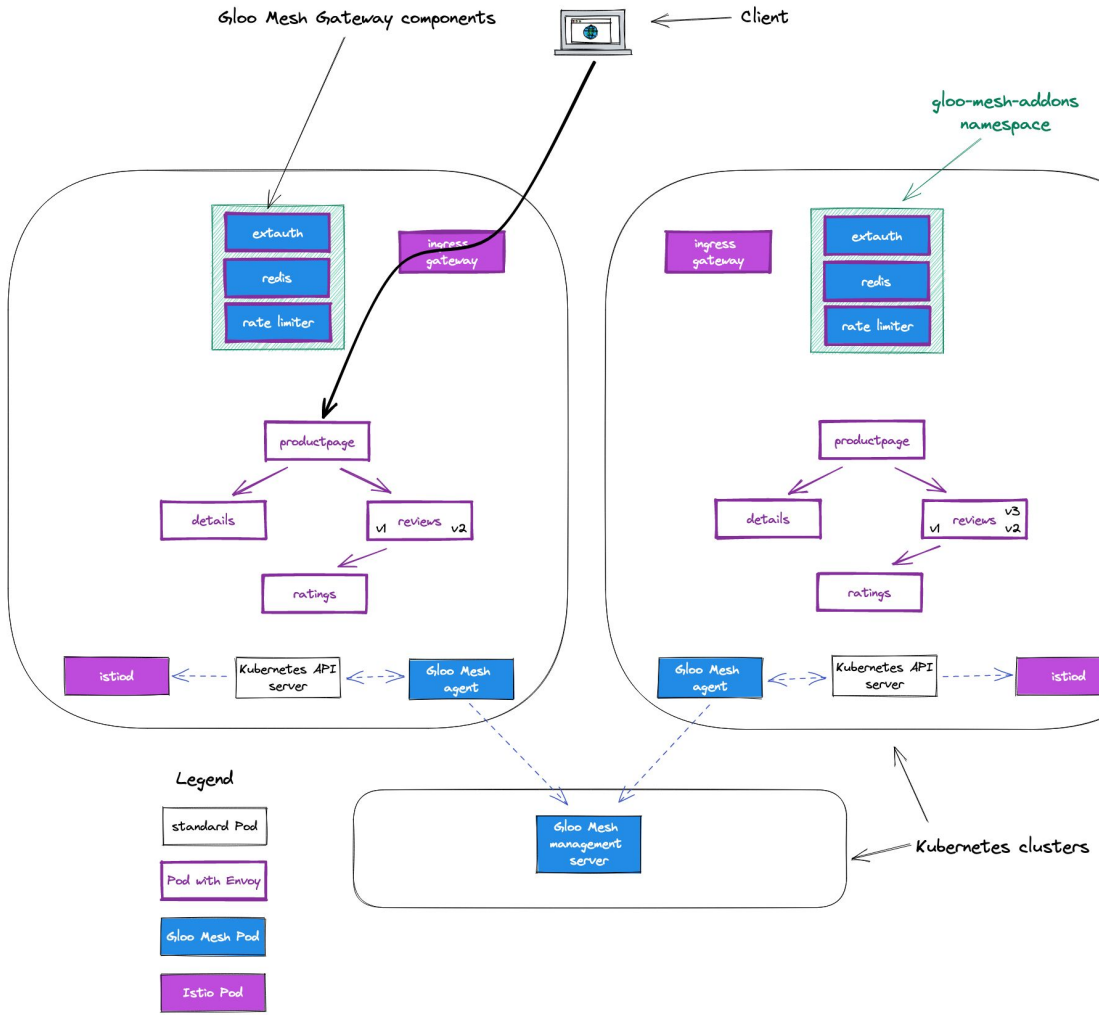
Demo

1. GitOps Gloo Mesh Configuration

    a. Enable Zero trust
        i. Enable Istio TLS
        ii. Enable Zero Trust with shared root trust

    b. Enable Traffic Policies
        i. Shift 75% of “reviews” traffic to cluster2


Gloo Mesh Gateway components
Client
gloo-mesh-addons namespace
extauth
redis
rate limiter
ingress gateway
productpage
details
v1
reviews
v2
ratings
istiod
Kubernetes API server
Gloo Mesh agent
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Gloo Mesh Pod
Istio Pod
Gloo Mesh management server
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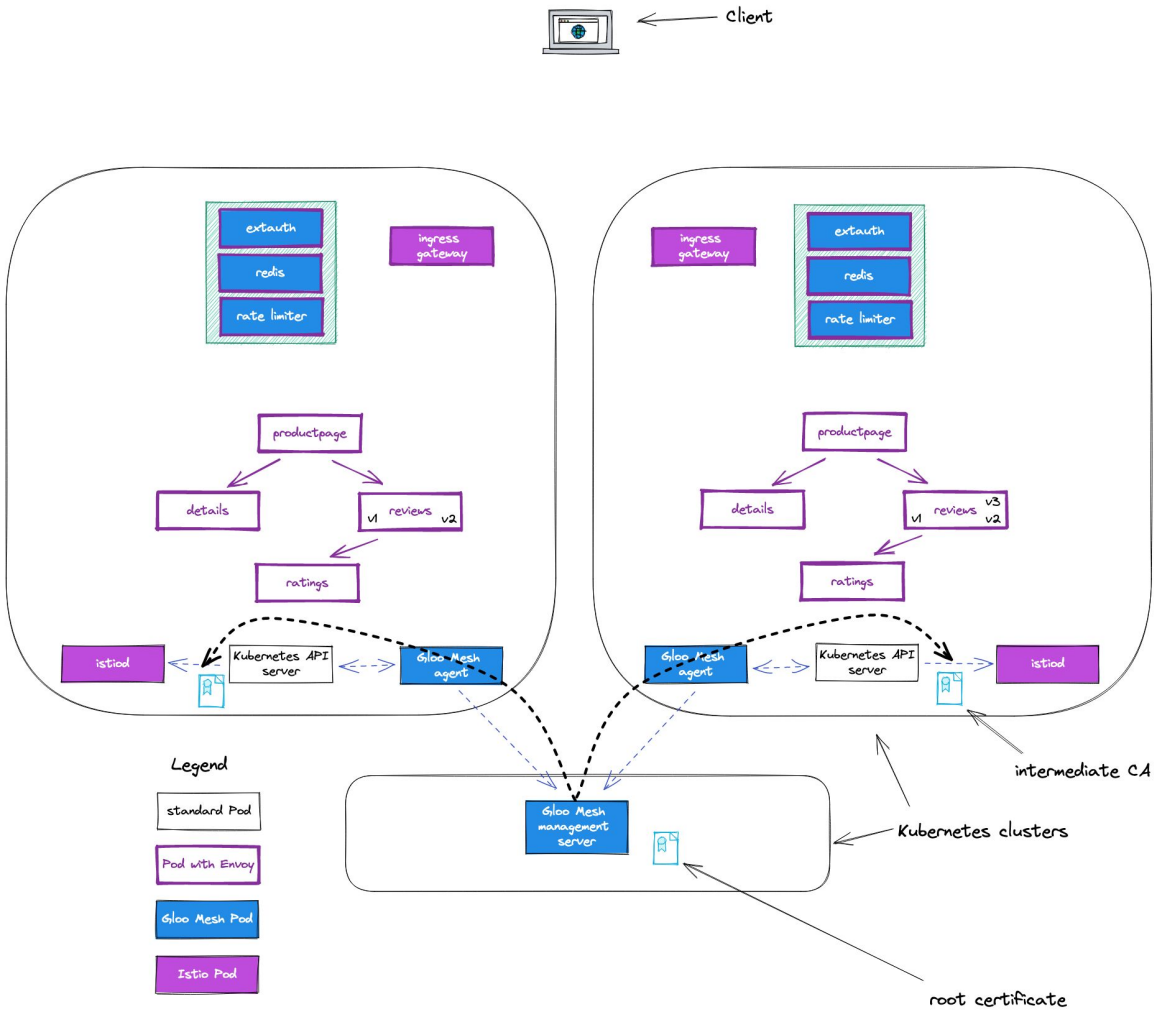
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root certificate

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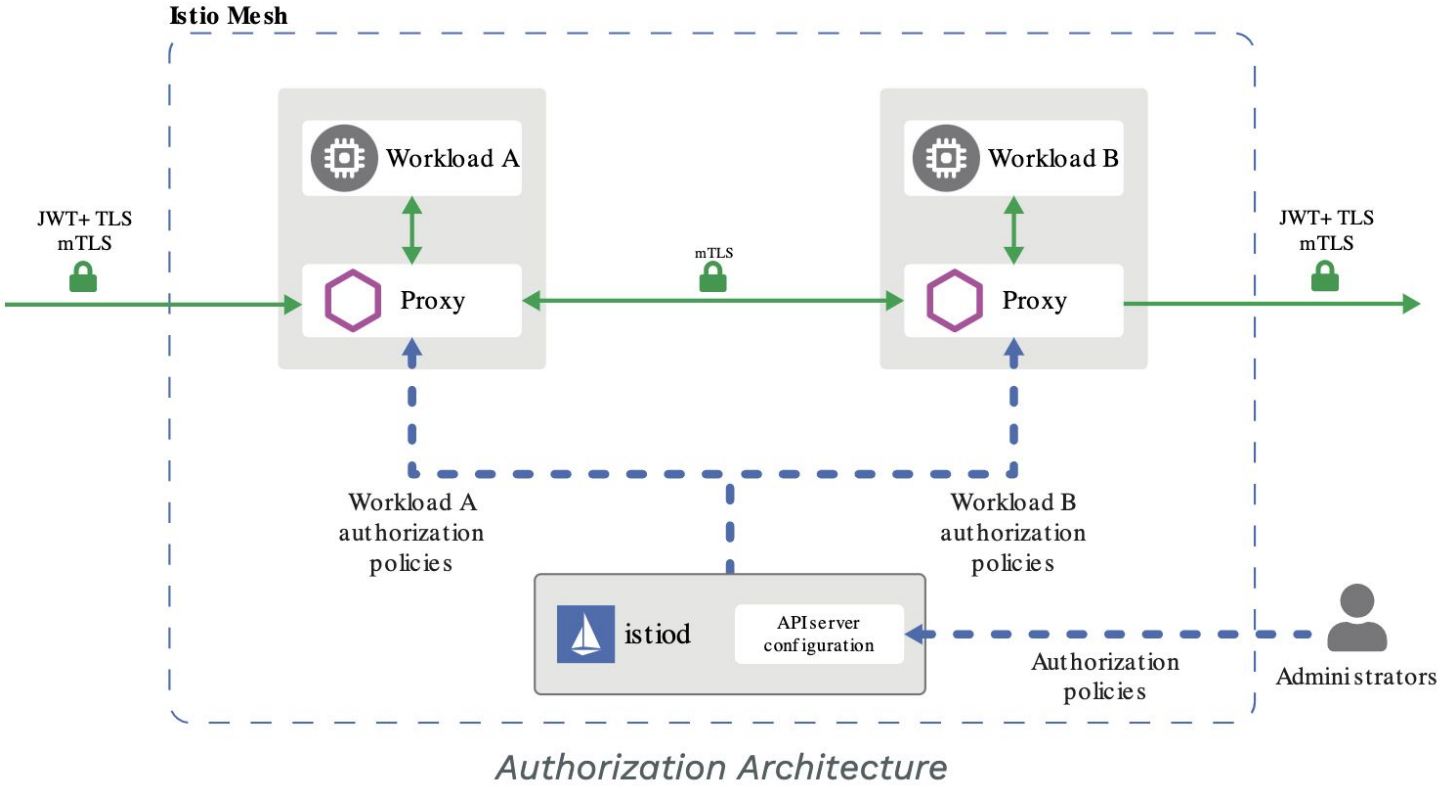
Istio Authorization



Authorization Architecture

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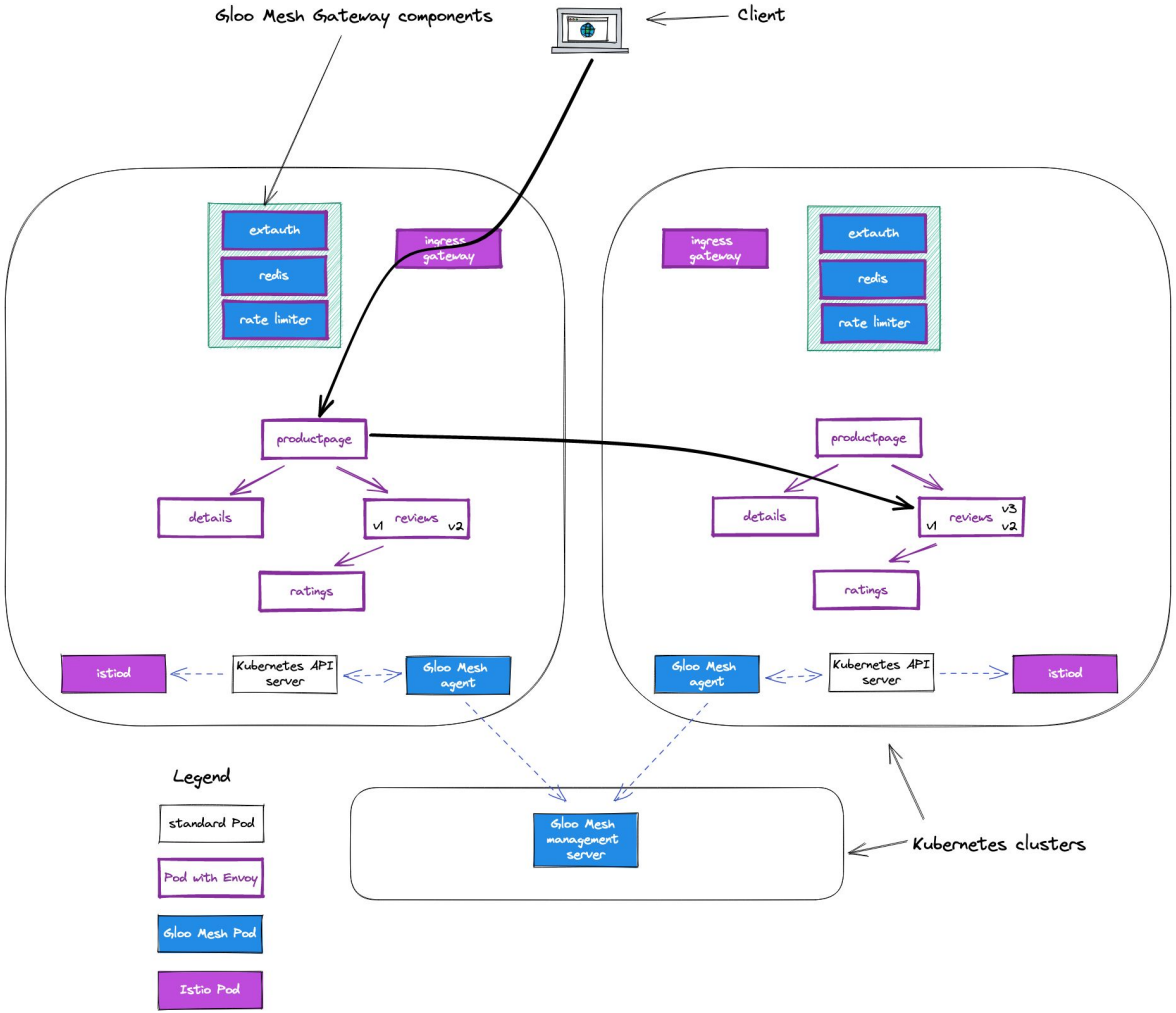
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Thank You