Deep Dive SPIFFE/SPIRE

Scott Emmons and
Emiliano Berenbaum

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AGENDA

- Since last KubeCon
- Experimental Istio CA Module
- Deploying SPIRE on Kubernetes
- Demo

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SPIFFE talks at KubeCon 2019

Introduction to SPIFFE	Tuesday, May 21 11:55
Zero Trust Service Mesh with Calico, SPIRE and Envoy	Wednesday, May 22 11:05
Deep Dive: SPIFFE	Wednesday, May 22 14:50
Securing Multi-Cloud Cross-Cluster Communication with SPIFFE and SPIRE	Thursday, May 23 14:00
Uber x Security: Why and How we Built Our Workload Identity Platform	Thursday, May 23 16:45

Since Last KubeCon

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K8 work

SAT Attestor

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K8 work

SAT Attestor

PSAT Attestor

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K8 work

SAT Attestor

PSAT Attestor

K8s Bundle Notifier

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Experimental Istio CA Module

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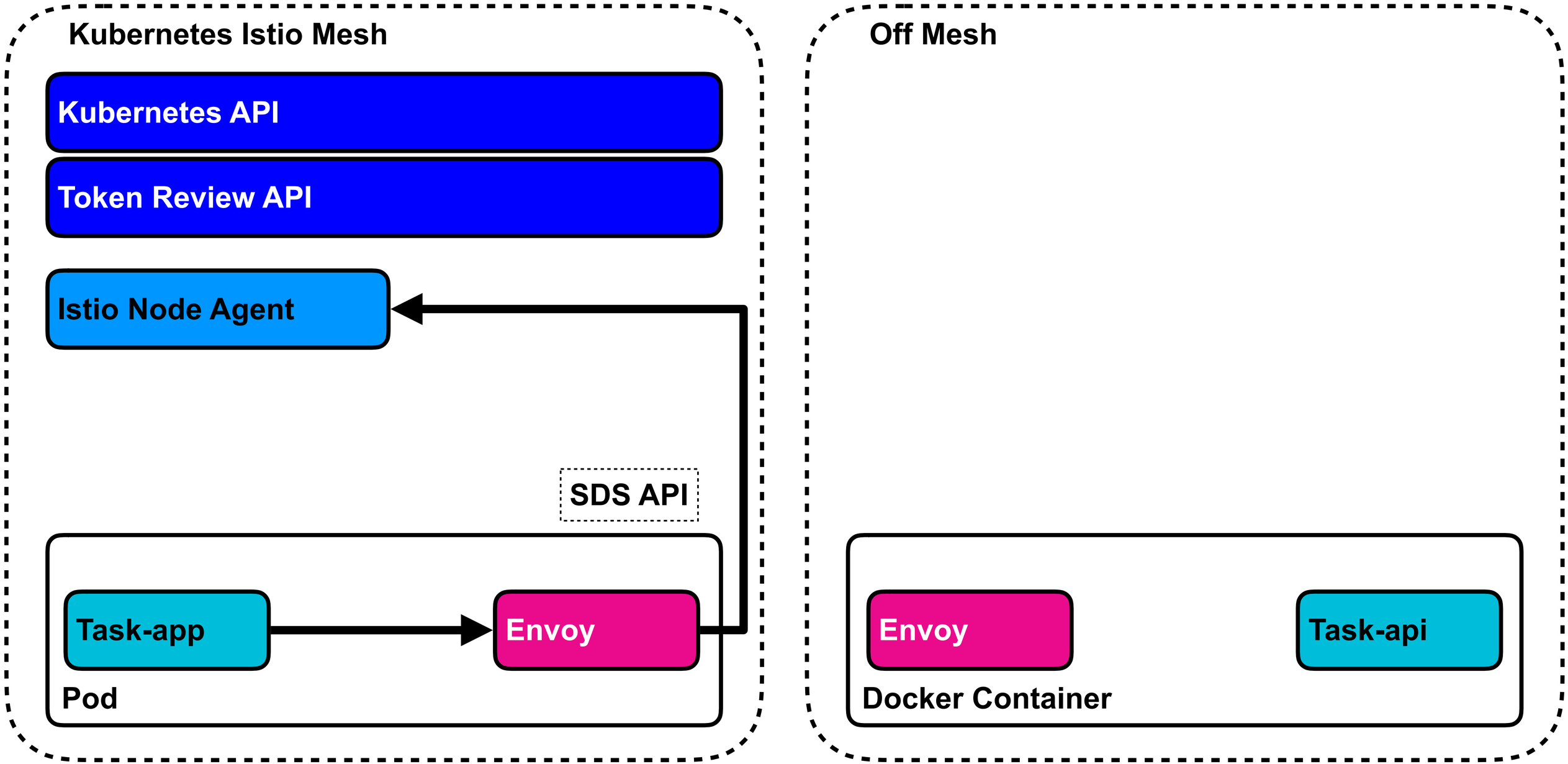
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Task-app
Envoy
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Docker Container

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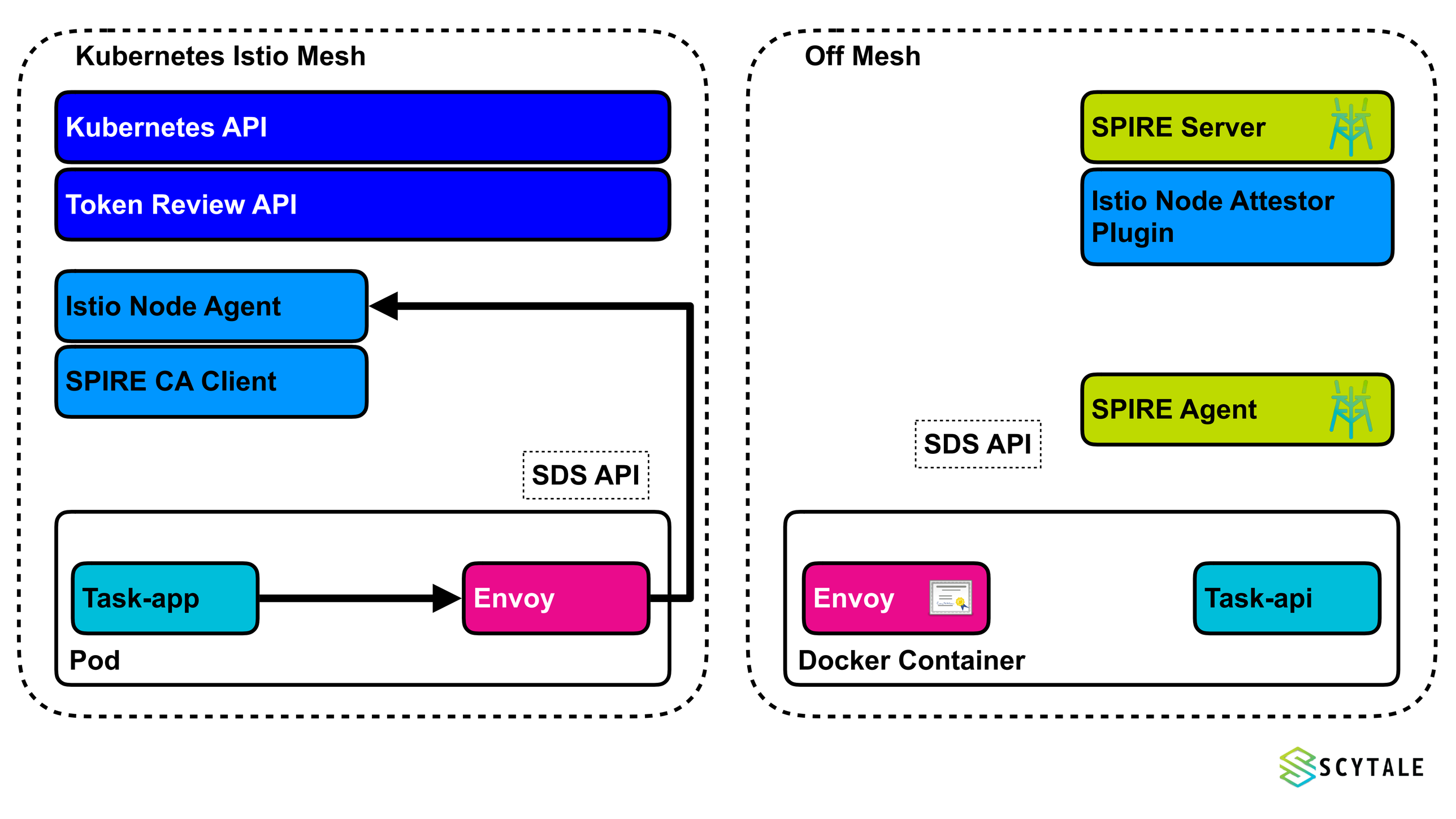
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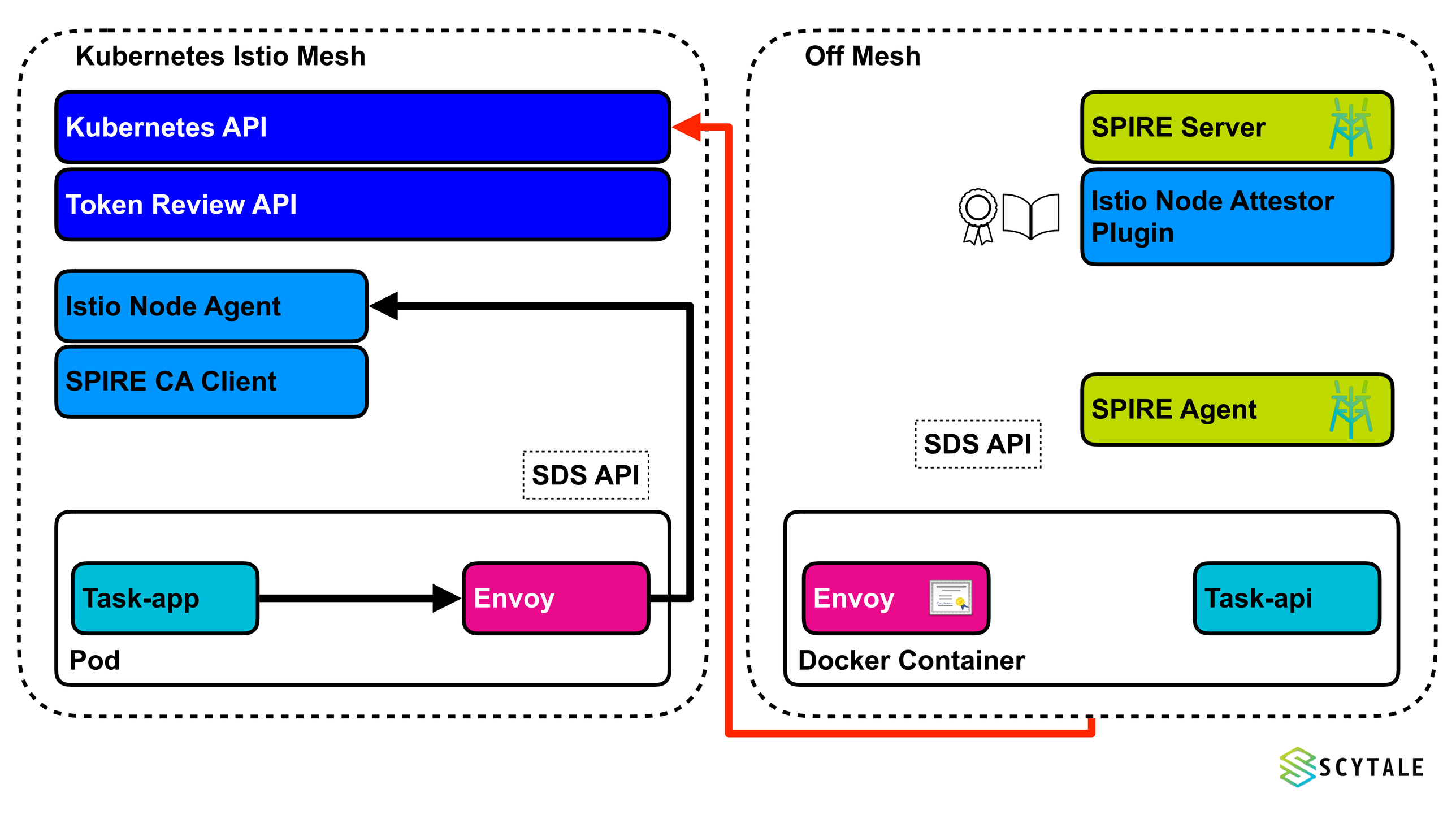
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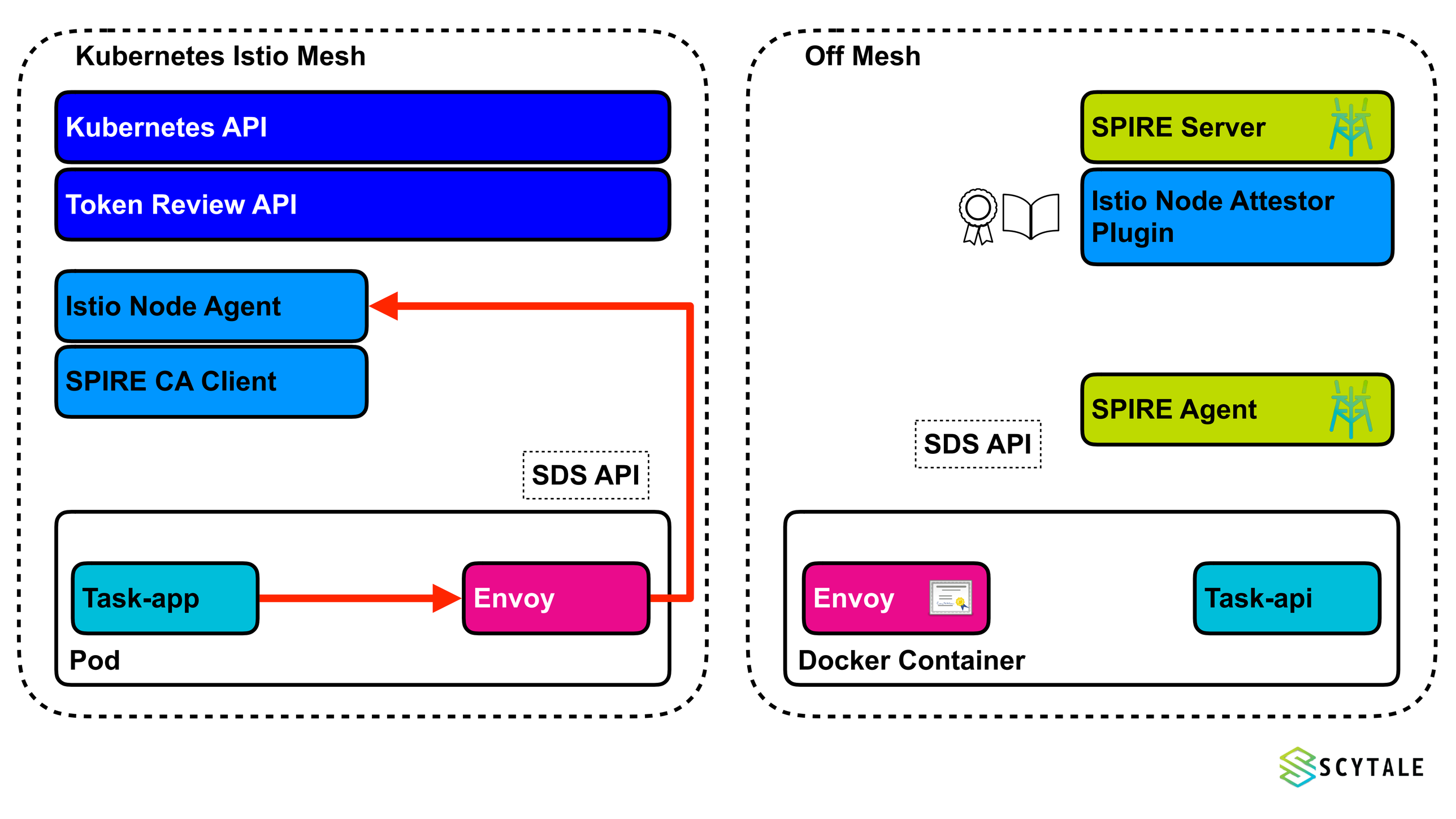
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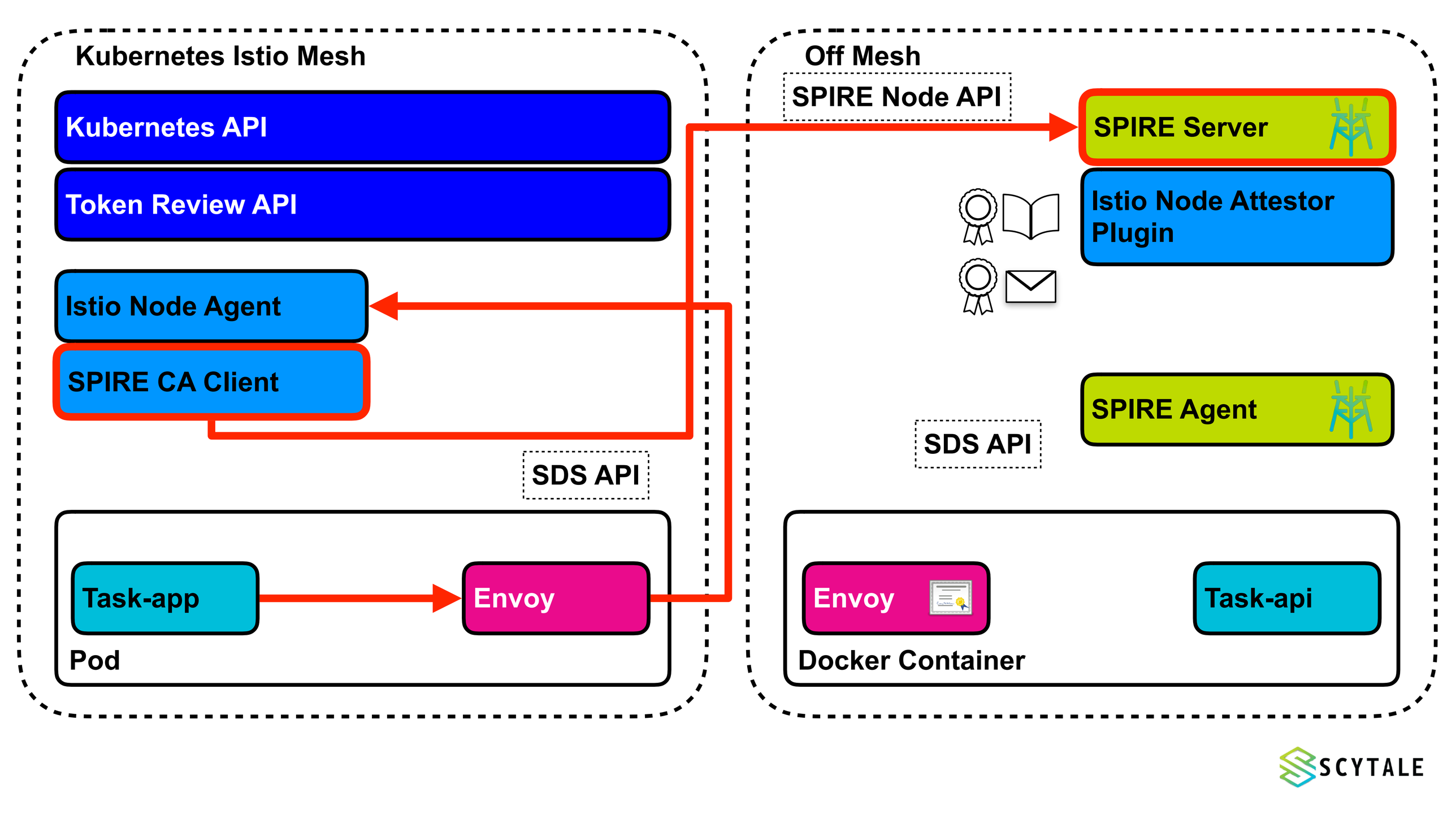
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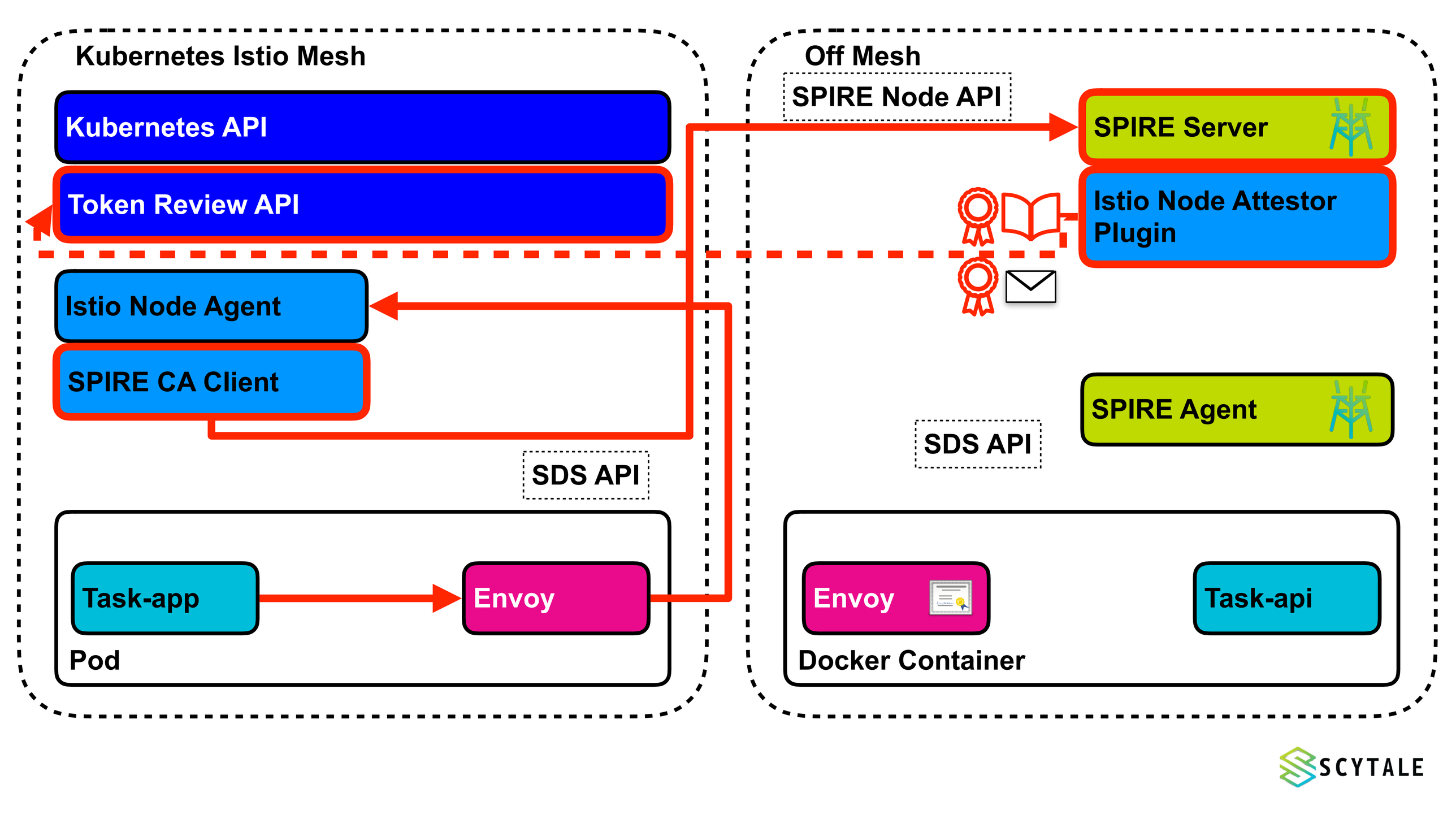
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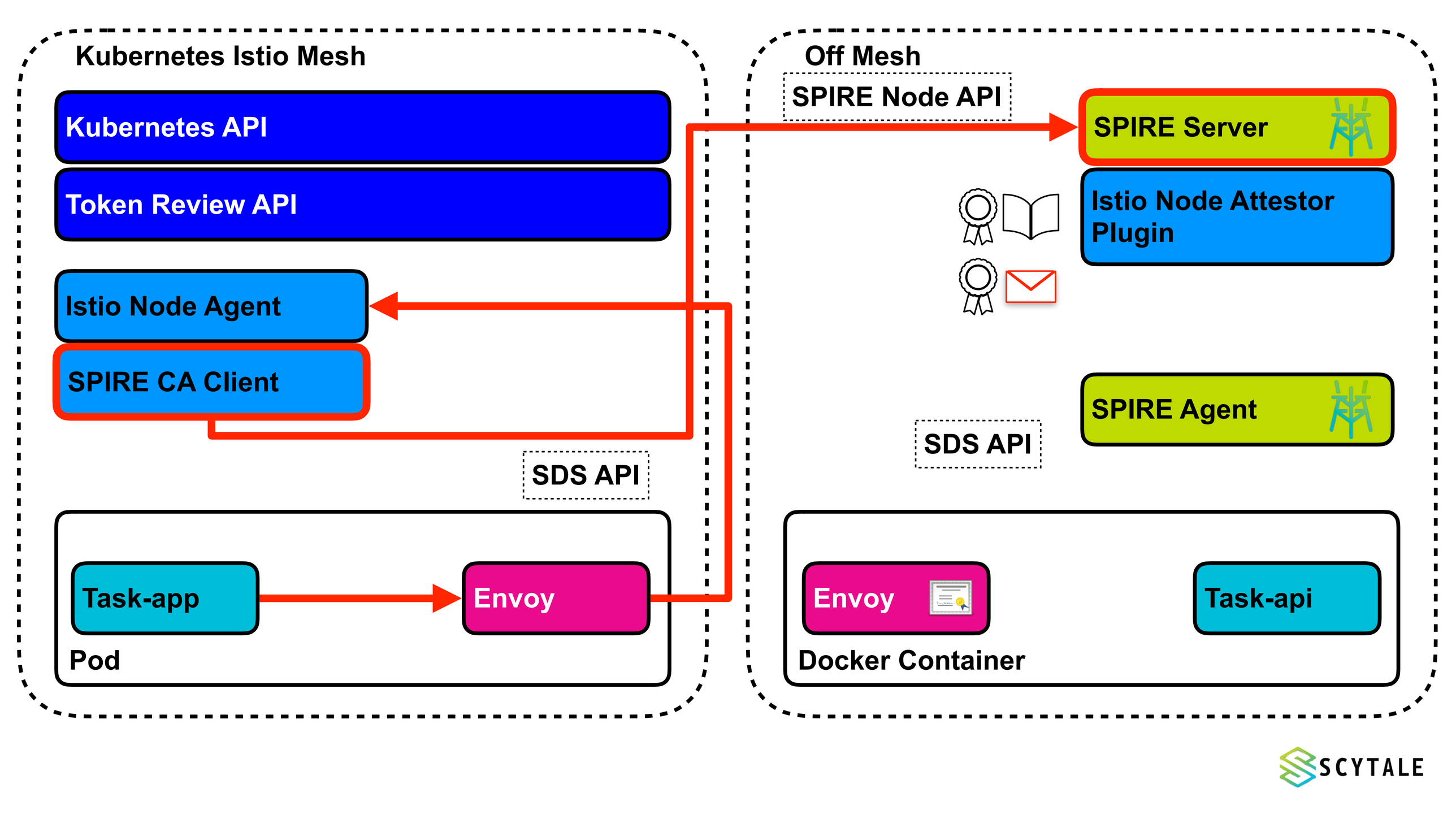
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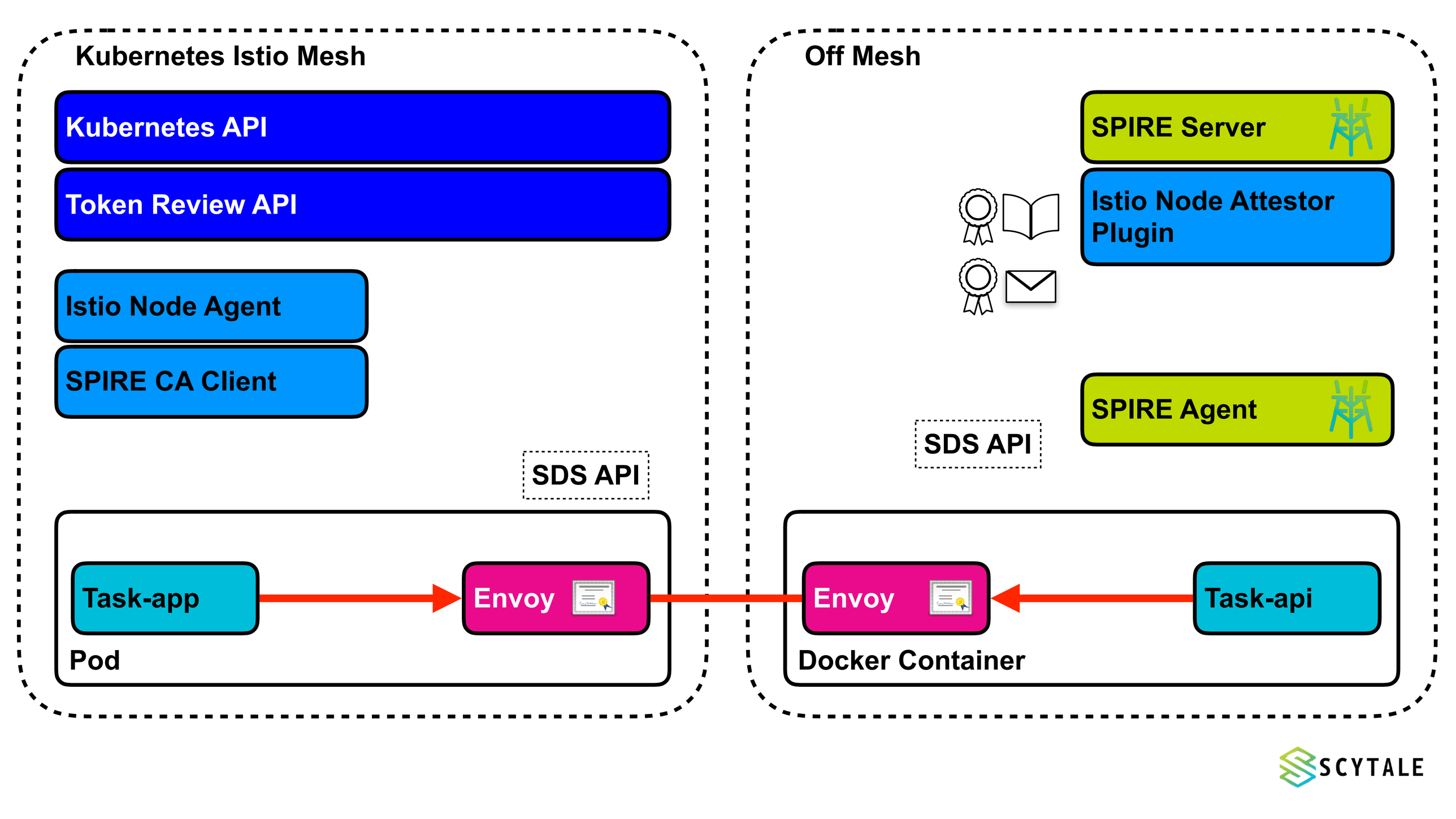
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Deploying SPIRE on Kubernetes

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SPIRE Server

- Typically deployed as a StatefulSet
- Use a persistent volume for **data_dir** (VolumeClaimTemplate)
- Requires a shared database (Postgres or MySQL)
- Scaling out SPIRE servers is fairly easy
  - Load balancer or round-robin DNS
- The certificate store is eventually consistent, not synchronous
- Servers need to be deployed in a controlled, rolling manner

SPIRE Agent

- Deployed as a DaemonSet
- May require local storage for **data_dir** (hostPath)
  - Depends on attestor
- Expose agent workload API socket directory for workloads
  - Not just the socket file

SPIRE Agent

```
Agent:
      volumeMounts:
        - name: spire-agent-socket
          mountPath: /run/spire/sockets
          readOnly: false
…
   volumes:
    - name: spire-agent-socket
      hostPath:
        path: /run/spire/sockets
        type: DirectoryOrCreate
```

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SPIRE Agent

```
Workload:
      volumeMounts:
        - name: spire-agent-socket
          mountPath: /run/spire/sockets
          readOnly: true
…
   volumes:
    - name: spire-agent-socket
      hostPath:
        path: /run/spire/sockets
        type: Directory
```

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Node Attestation

- Kubernetes Attestors
  - SAT - Service Account Token
  - PSAT - Projected Service Account Token
- Cloud Provider Attestors
  - AWS IID, AZURE MSI, and GCP IID Attestors
  - Requires local **data_dir** - agent can only attest once per instance

Kubernetes Attestors - SAT, PSAT

- Verification Methods
  - Token Certificate / Public Key
  - Token Review API
- SAT and PSAT attestors support either

SPIRE Server - k8s bundle notifier

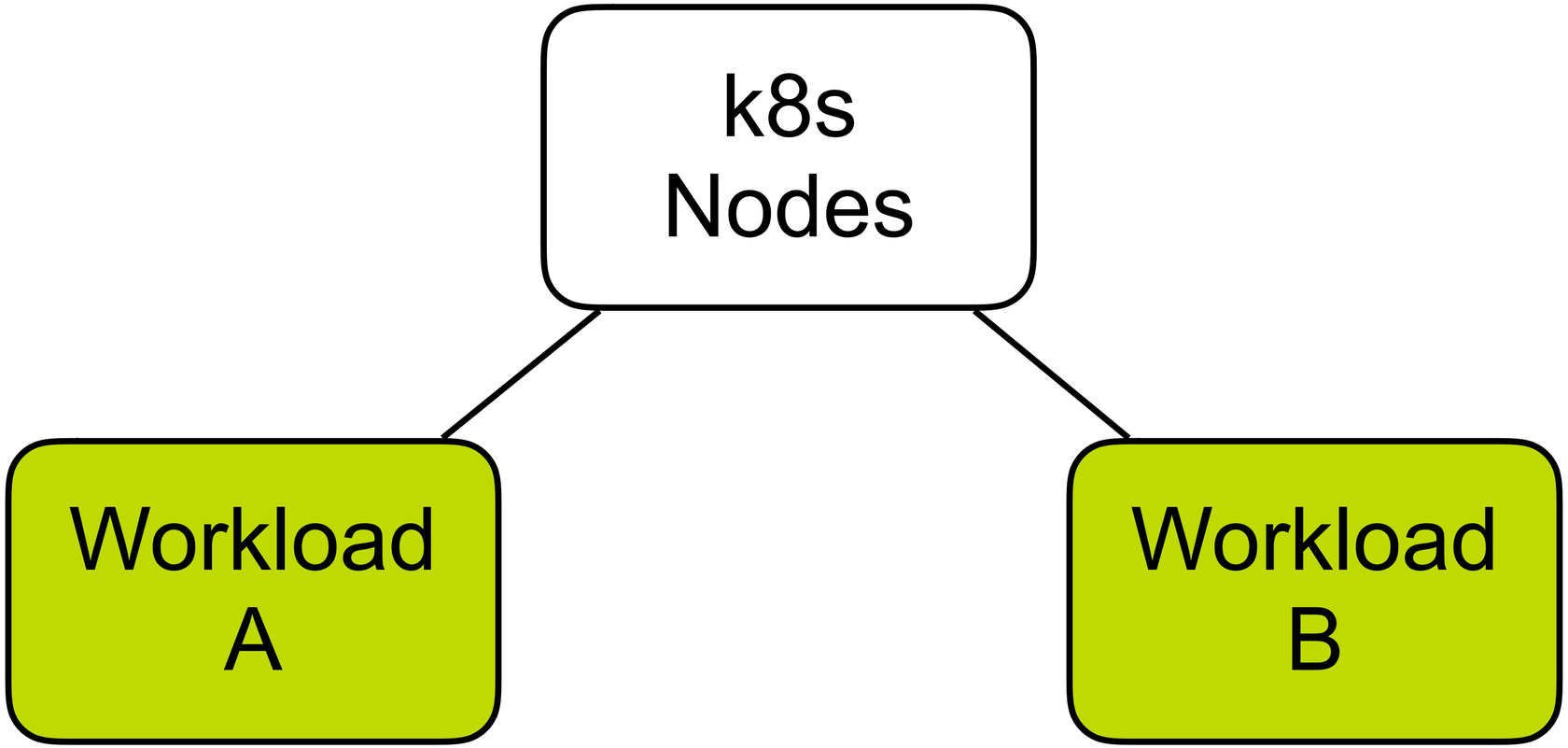
- New bundle notifier plugin can replace both bootstrap certificate and upstream CA
- Certificate bundle is stored in a ConfigMap
- Certificates are created and rotated by the SPIRE server via k8s API
- The ConfigMap is mounted ReadOnly in SPIRE agents
- SPIRE server **data_dir** needs to be persistent

Registration Entries

- Put some thought into how workload nodes will be grouped
- Create hierarchies and groupings that are natural
- Avoid creating manual entries that use specific node UUIDs for example:

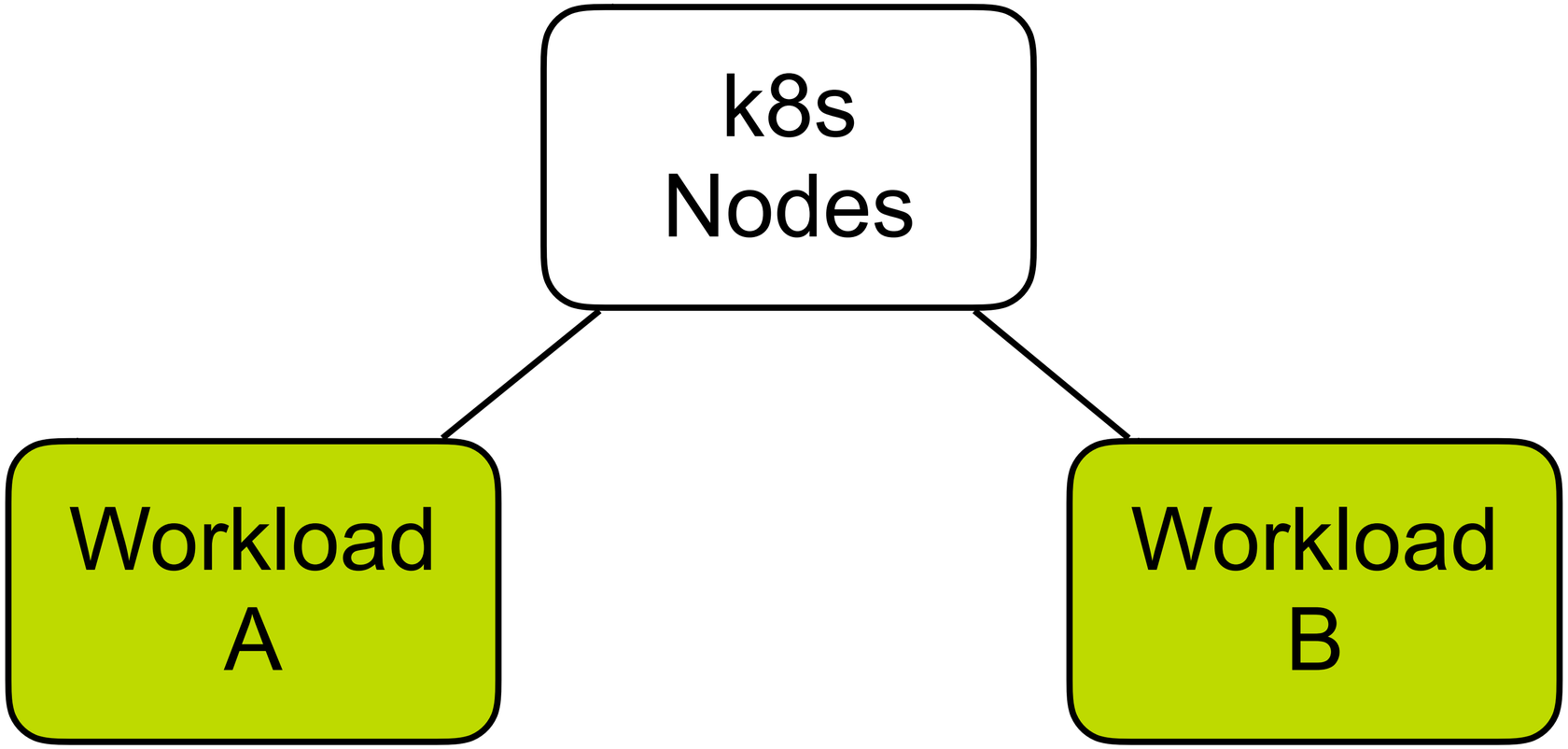
spiffe://mycluster/spire/agent/k8-sat/mycluster/2527c4f7-e154-a169-318a2f61478

Registration Entries



Registration Entries

spiffe://mycluster.io/nodes



spiffe://mycluster.io/workload/a

spiffe://mycluster.io/workload/b

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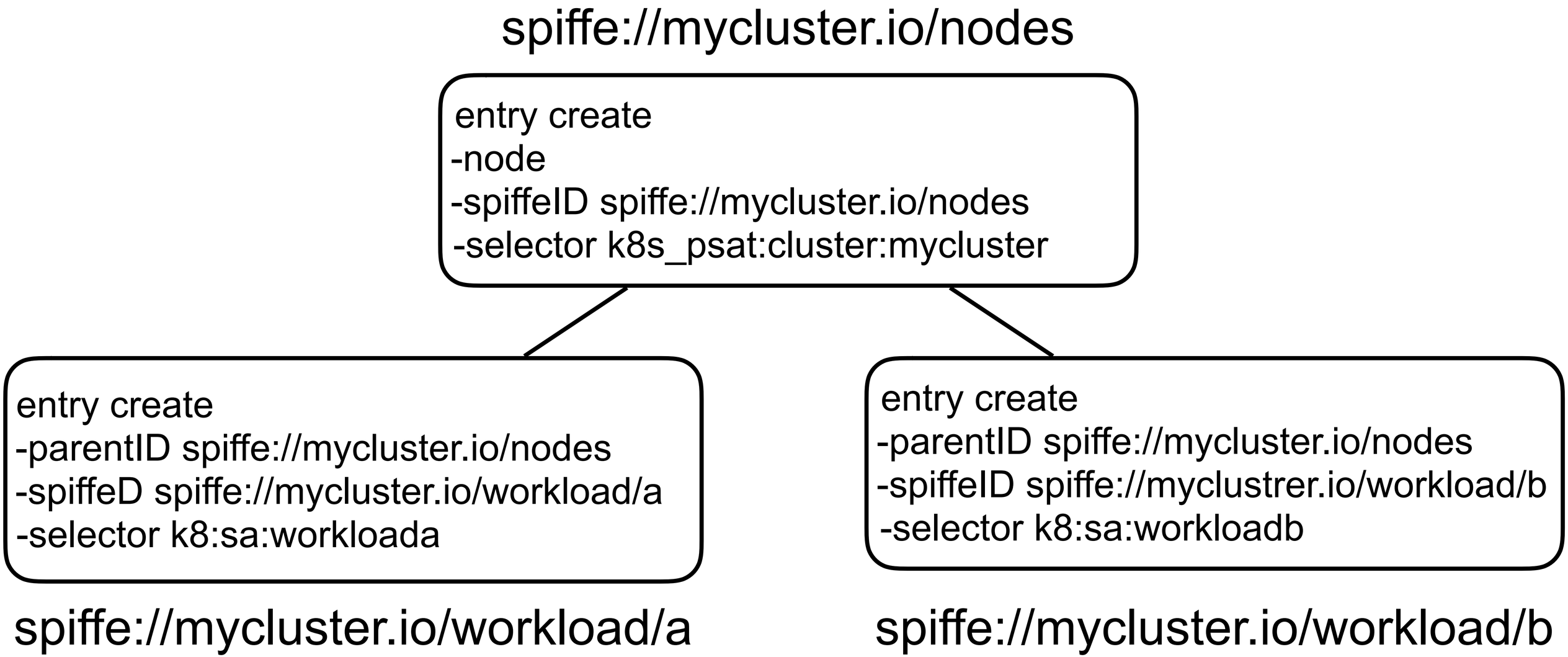
Registration Entries



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Demo time!

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Try it out

spiffe/spiffe

spiffe/spire

slack.spiffe.io

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Questions?

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