KUBESPHERE | CLOUD NATIVE COMPUTING FOUNDATION

带你了解 KubeSphere

万宏明

KubeSphere 研发工程师

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分享大纲

- KubeSphere 项目简介
- KubeSphere 的开源生态
- KubeSphere 的核心功能及架构
- KubeSphere 社区贡献方式

Part 1

KubeSphere 项目简介

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1.1 什么是KubeSphere

面向云原生应用的容器混合云

KubeSphere 是在 Kubernetes 之上构建的以应用为中心的多租户容器平台，提供全栈的 IT 自动化运维的能力，简化企业的 DevOps 工作流。KubeSphere 提供了运维友好的向导式操作界面，帮助企业快速构建一个强大和功能丰富的容器云平台。

KubeSphere 愿景是打造一个以 Kubernetes 为内核的云原生分布式操作系统。

完全开源

通过 CNCF 一致性认证的 Kubernetes 平台，100% 开源，由社区驱动与开发

简易安装

支持部署在任何基础设施环境，提供在线与离线安装，支持一键升级与扩容集群

功能丰富

在一个平台统一纳管 DevOps、云原生可观测性、服务网格、应用生命周期、多租户、多集群、存储与网络

模块化 & 可插拔

平台中的所有功能都是可插拔与松耦合，您可以根据业务场景可选安装所需功能组件

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1.2 主要功能

应用商店

提供基于 Helm 的应用商店与应用
命周期管理

基于 Istio 的微服务

提供细粒度的流量管理、流量监控
的流量拓扑

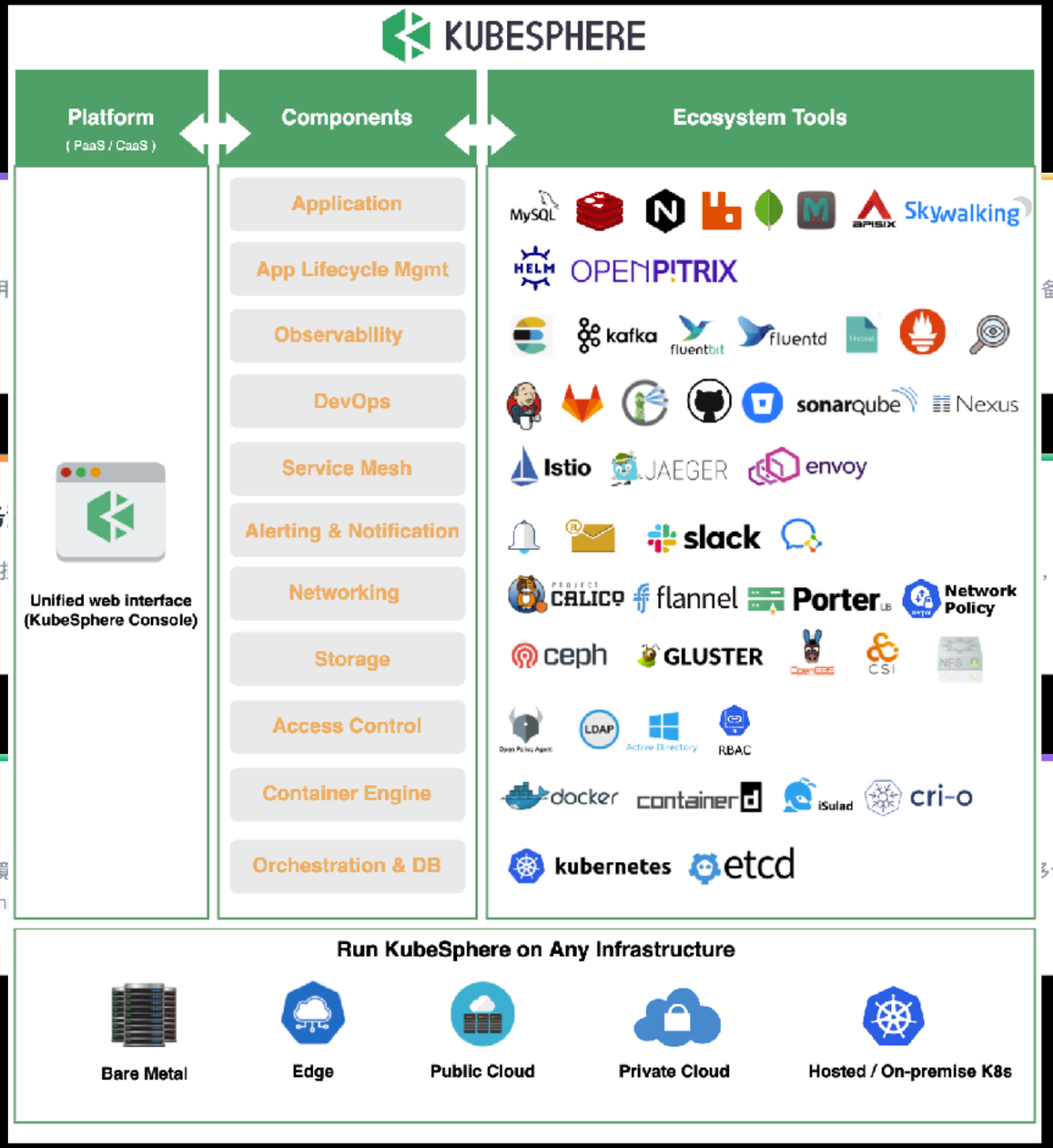
网络管理

提供面向物理机 Kubernetes 环境
可视化管理，支持 Calico 与 Flan

备的最佳实践，支持

，支持多种告警策略

多个 CSI 插件对接使



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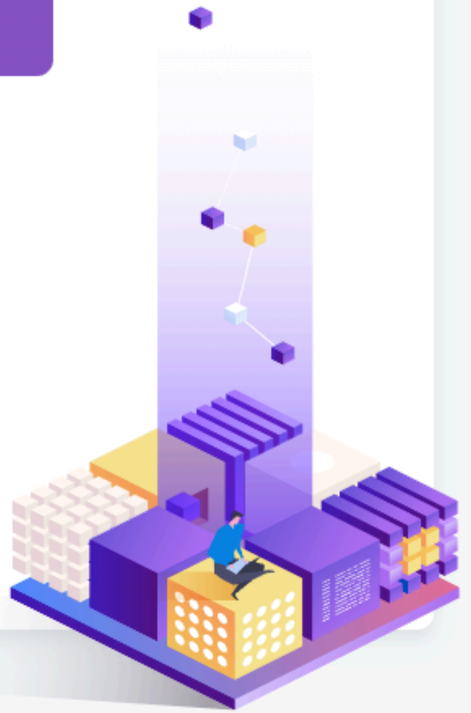
1.3 核心价值

👨‍💼基础设施团队

实现从云端到数据中心自动化部署、扩容与升级集群

- 提高资源利用率，减少内部基础设施的成本支出
- 提供安全增强，支持多种存储与网络方案
- 为企业交付一个通过 CNCF 认证和可信赖的 Kubernetes 发行版
- 支持 Kubernetes 的多云与多集群管理，提供多云与多可用区的高可用



Part 2

KubeSphere 的开源生态

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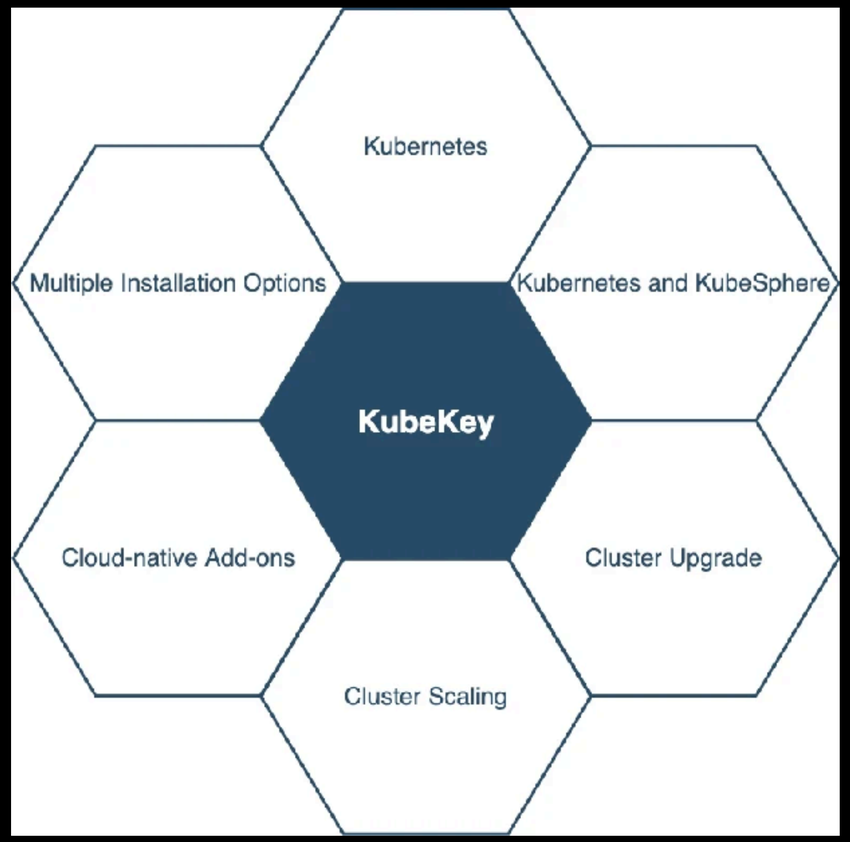
2.1 KubeKey

KubeKey 是由 KubeSphere 衍生的 K8s 集群安装工具。它提供了一个即插即用的架构，可以无缝集成第三方组件。



核心功能：

- 安装 Kubernetes
- 安装 KubeSphere
- Kubernetes 集群伸缩
- Kubernetes 集群升级
- 安装 Kubernetes 相关的插件（Chart 或 YAML）

理念： Cluster as an Object

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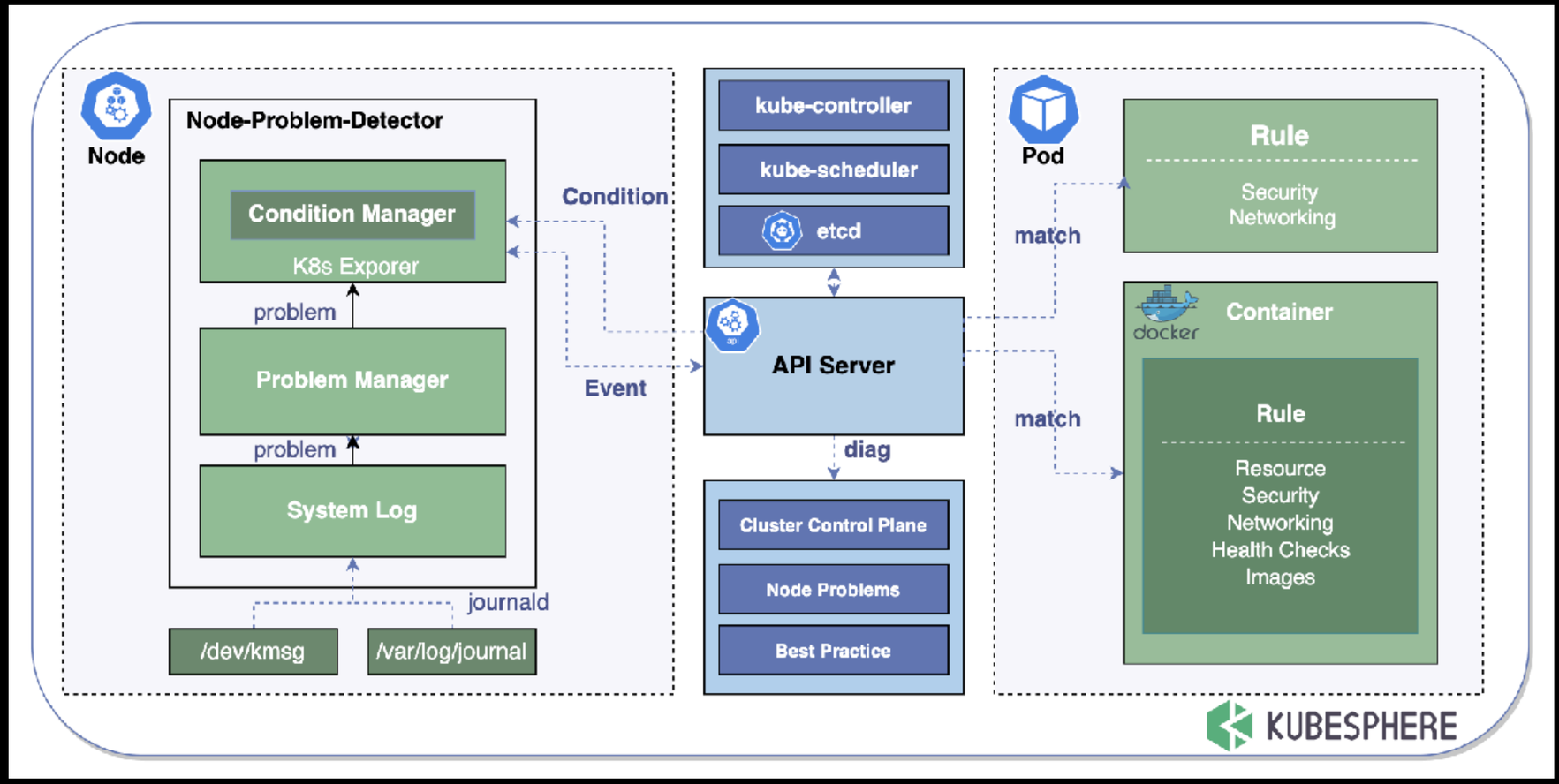
2.3 KubeEye

KubeEye

KubeEye 是一个 K8s 集群巡检工具

核心功能：

- 检测 K8s 控制平面的异常
- 检测节点异常
- 检测资源 YAML 规范



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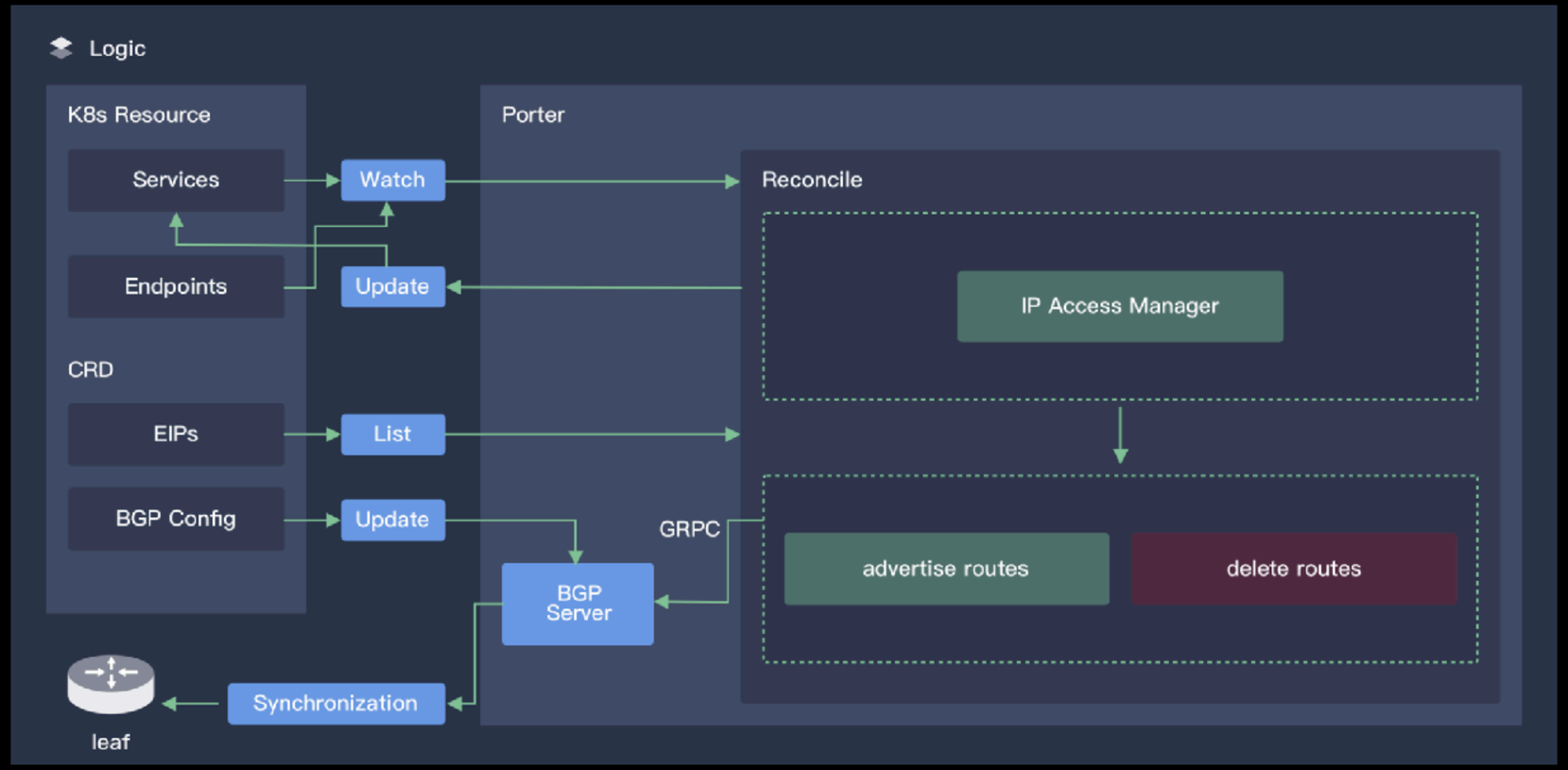
2.3 PorterLB



PorterLB

是一个裸金属环境负载均衡器实现

核心功能：

1. 基于 BGP 路由动态配置
2. 基于路由器 ECMP 的负载均衡
3. VIP 管理

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2.4 产品家族

Porter LB

硬负载均衡

开源分布式硬负载均衡

OPENPITRIX

跨平台云原生应用管理

支持跨云应用分发管理

支持 KubeEdge、EdgeWize 分发应用

KubeSphere Virtualization

虚拟机&HCI

超轻量虚拟机管理平台，单节点起步

虚拟化业务支撑、边缘设备对接等

KubeEye

集群健康&安全巡检

细粒度插件化集群自动巡检

KUBESPHERE®

KubeOcean

轻量化集群管理

支持基于 kind 快速和管理轻量化容器节点集群

KubeKey

云原生环境交付引擎

插件化可插拔交付框架

OPENFUNCTION

FaaS 开放框架

基于 Knative 的以事件驱动的、跨基础设施的 FaaS 产品

Part 3

KubeSphere 的核心功能及架构

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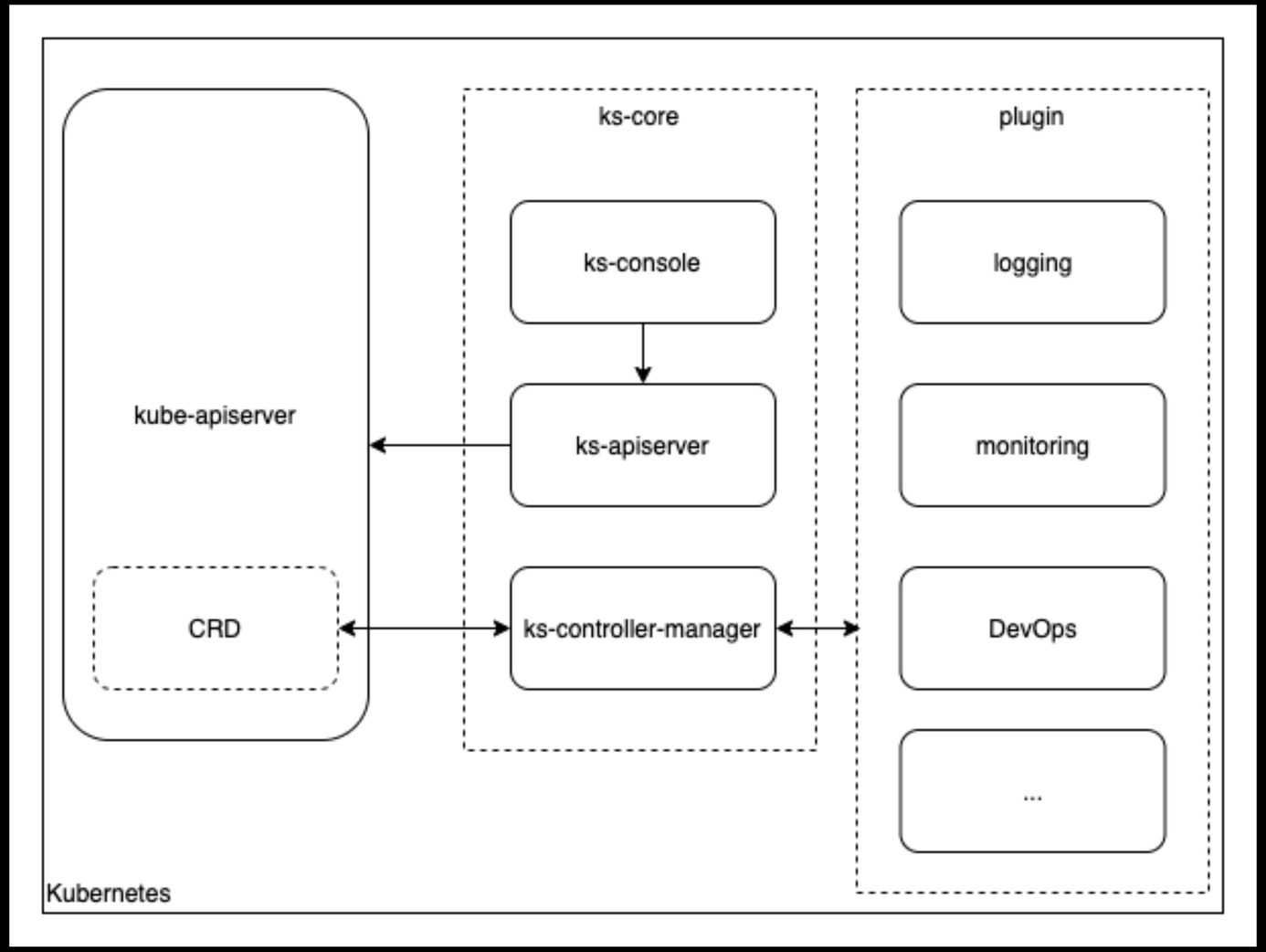
核心架构



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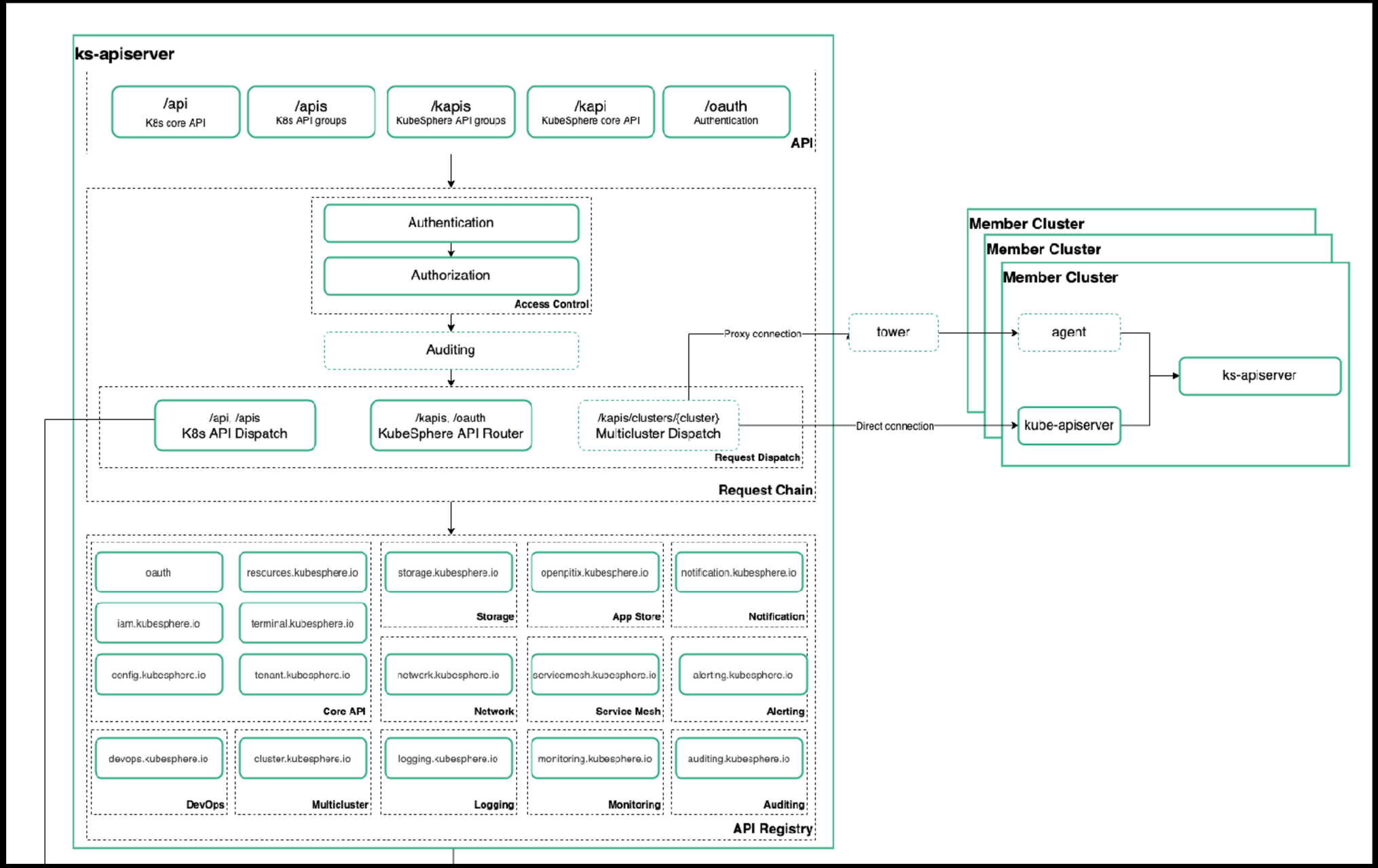
核心架构

- 认证、鉴权、审计
- 请求代理与分发
- API 聚合
- 资源（声明式）模型
- CRD
- controller runtime



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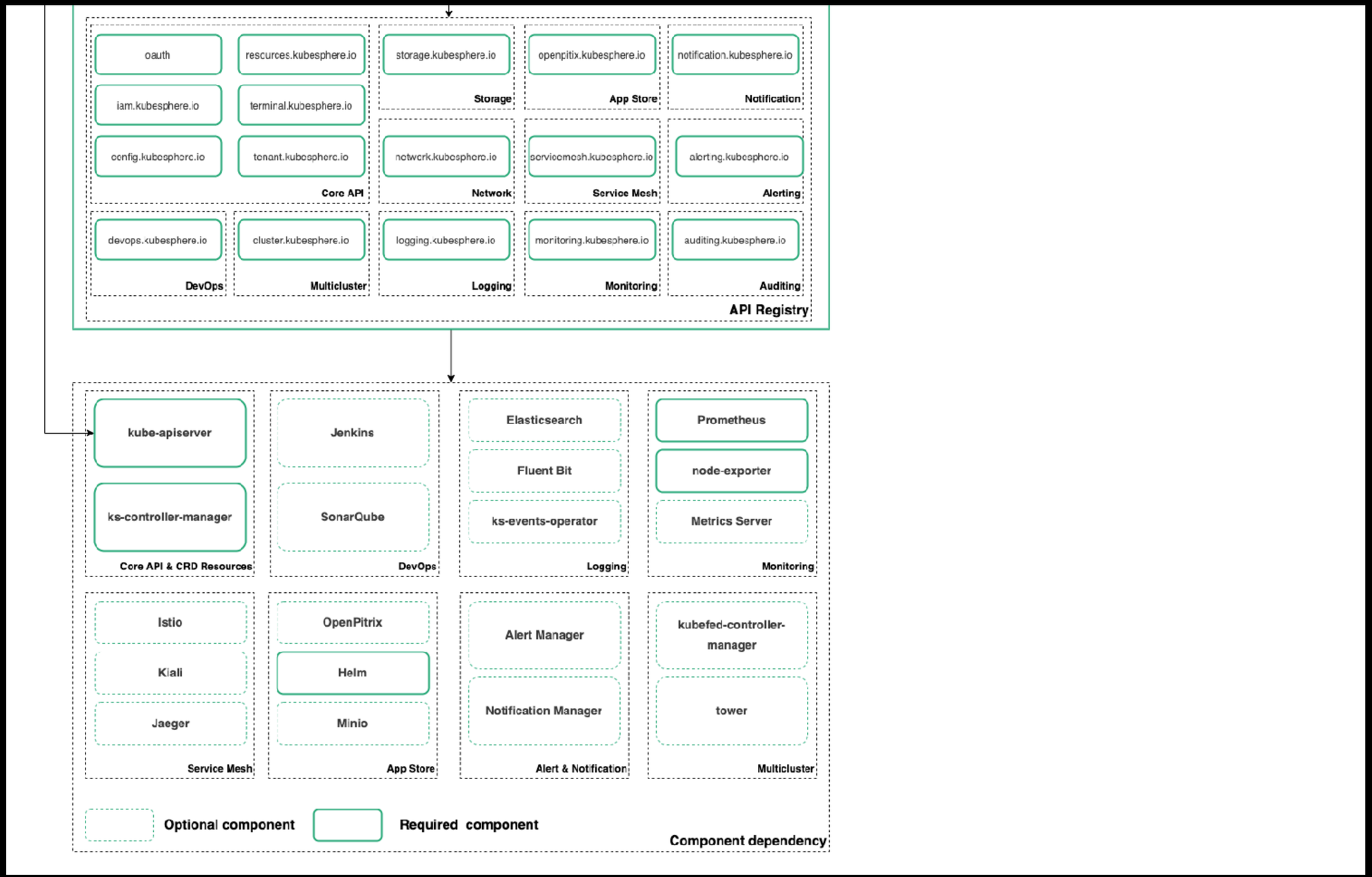

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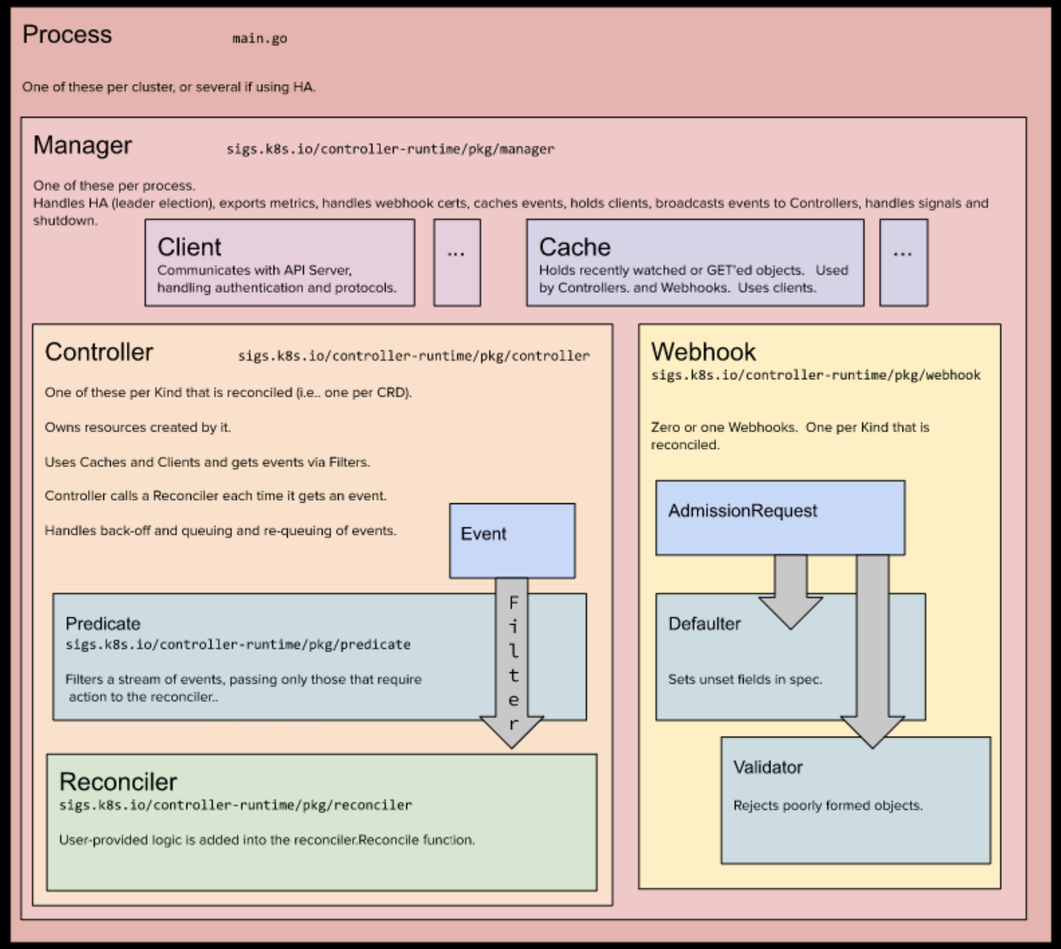
核心架构

CRD + Controller




```go
func main() {

    mgr, err := manager.New(config.GetConfigOrDie(), manager.Options{})
    if err != nil {
        log.Error(err, "could not create manager")
        os.Exit(1)
    }

    err = builder.
        ControllerManagedBy(mgr).  // Create the ControllerManagedBy
        For(&appsv1.ReplicaSet{}). // ReplicaSet is the Application API
        Owns(&corev1.Pod{}).       // ReplicaSet owns Pods created by it
        Complete(&ReplicaSetReconciler{})
    if err != nil {
        log.Error(err, "could not create controller")
        os.Exit(1)
    }

    if err := mgr.Start(signals.SetupSignalHandler()); err != nil {
        log.Error(err, "could not start manager")
        os.Exit(1)
    }
}

// ReplicaSetReconciler is a simple ControllerManagedBy example implementation.
type ReplicaSetReconciler struct {
    client.Client
}

// Implement the business logic:
// This function will be called when there is a change to a ReplicaSet or a Pod with an OwnerReference
// to a ReplicaSet.
// * Read the ReplicaSet
// * Read the Pods
// * Set a Label on the ReplicaSet with the Pod count
func (a *ReplicaSetReconciler) Reconcile(ctx context.Context, req reconcile.Request) (reconcile.Result, error) {

    rs := &appsv1.ReplicaSet{}
    err := a.Get(ctx, req.NamespacedName, rs)
    if err != nil {
        return reconcile.Result{}, err
    }

    pods := &corev1.PodList{}
    err = a.List(ctx, pods, client.InNamespace(req.Namespace), client.MatchingLabels(rs.Spec.Template.Labels))
    if err != nil {
        return reconcile.Result{}, err
    }

    rs.Labels["pod-count"] = fmt.Sprintf("%v", len(pods.Items))
    err = a.Update(ctx, rs)
    if err != nil {
        return reconcile.Result{}, err
    }

    return reconcile.Result{}, nil
}
```

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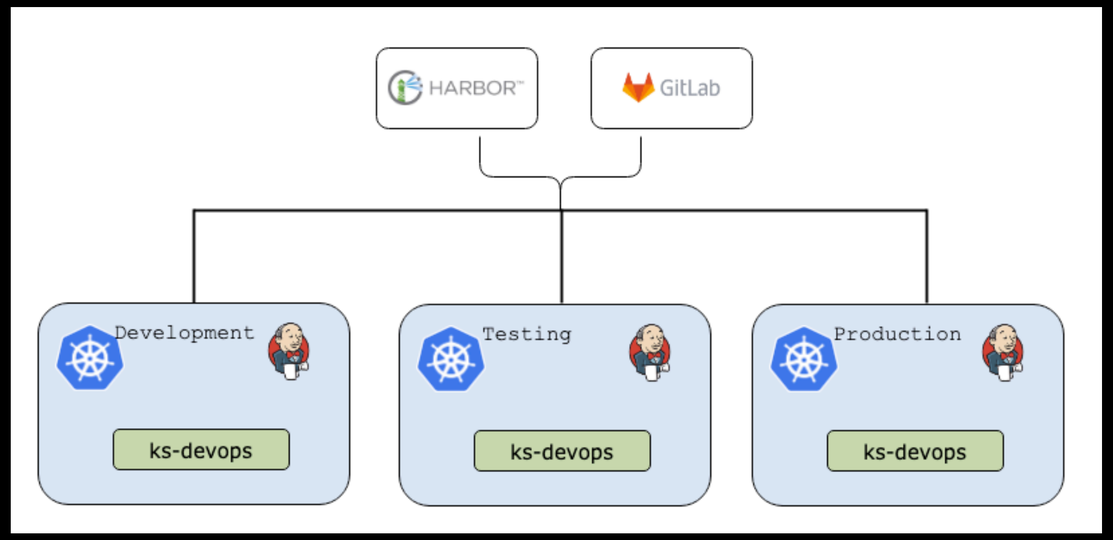
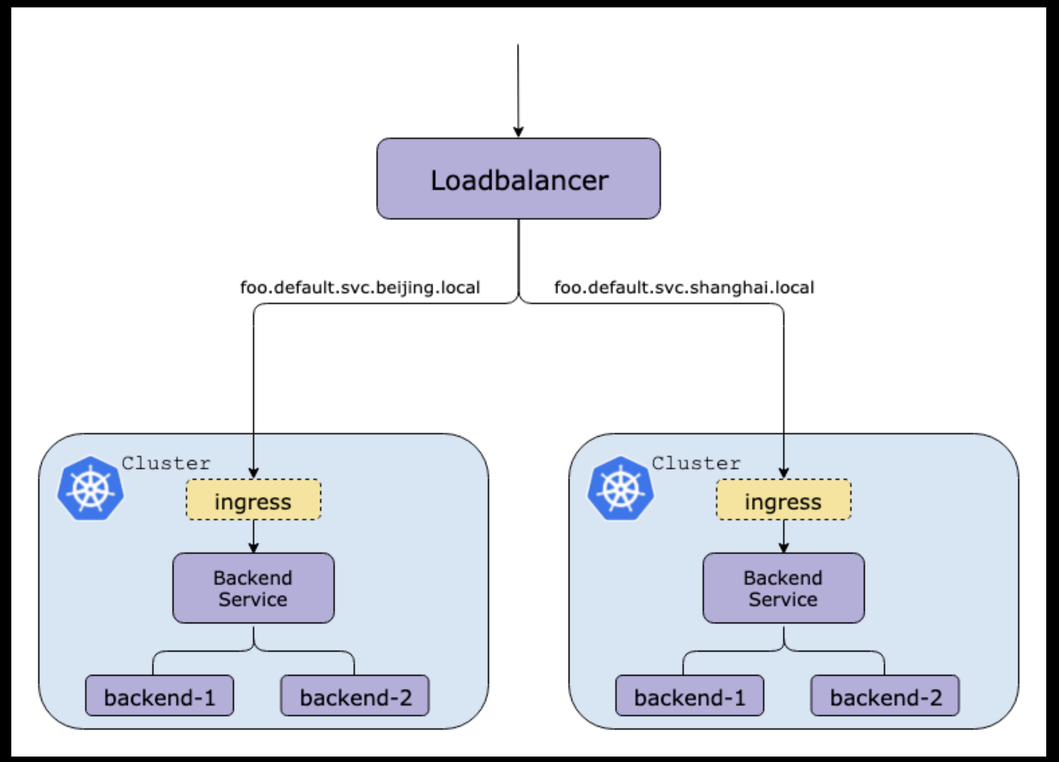
3.1 多集群管理

环境隔离



高可用



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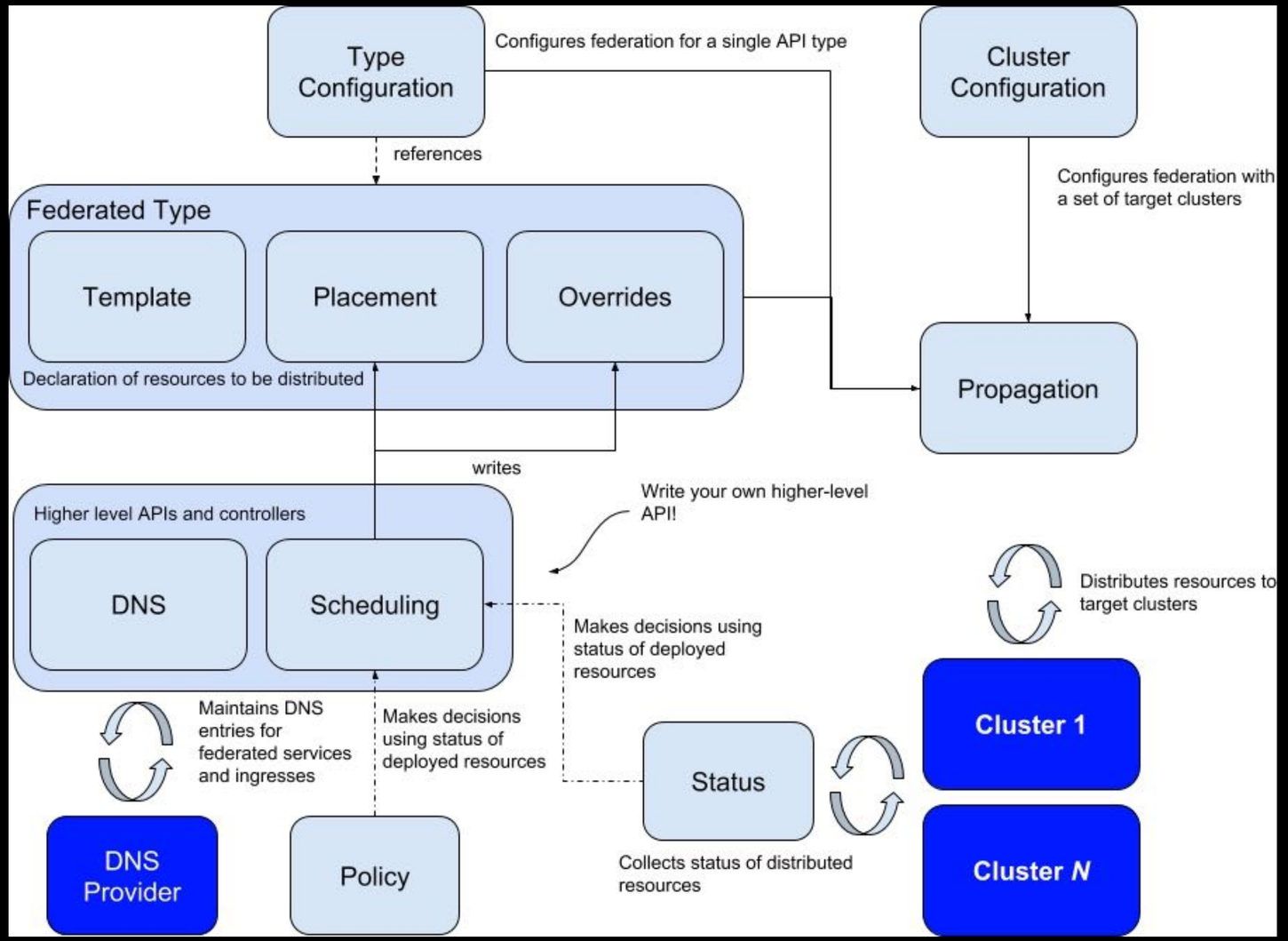
3.1 多集群管理

KubeSphere 多集群管理采用了
K8s 社区集群联邦方案（KubeFed v2）

```yaml
apiVersion: types.kubefed.io/v1beta1
    kind: FederatedDeployment
    metadata:
      labels:
        app: nginx
    name: nginx
    namespace: jeff
    spec:
      overrides:
      - clusterName: gondor
        clusterOverrides:
        - path: /spec/replicas
          value: 4
      placement:
        clusters:
        - name: gondor
        - name: rohan
        - name: shire
      template:
        metadata:
          labels:
            app: nginx
        namespace: jeff
        spec:
          replicas: 1
          template:
            metadata:
              labels:
                app: nginx
            spec:
              containers:
              - image: nginx:latest
                name: nginx
```



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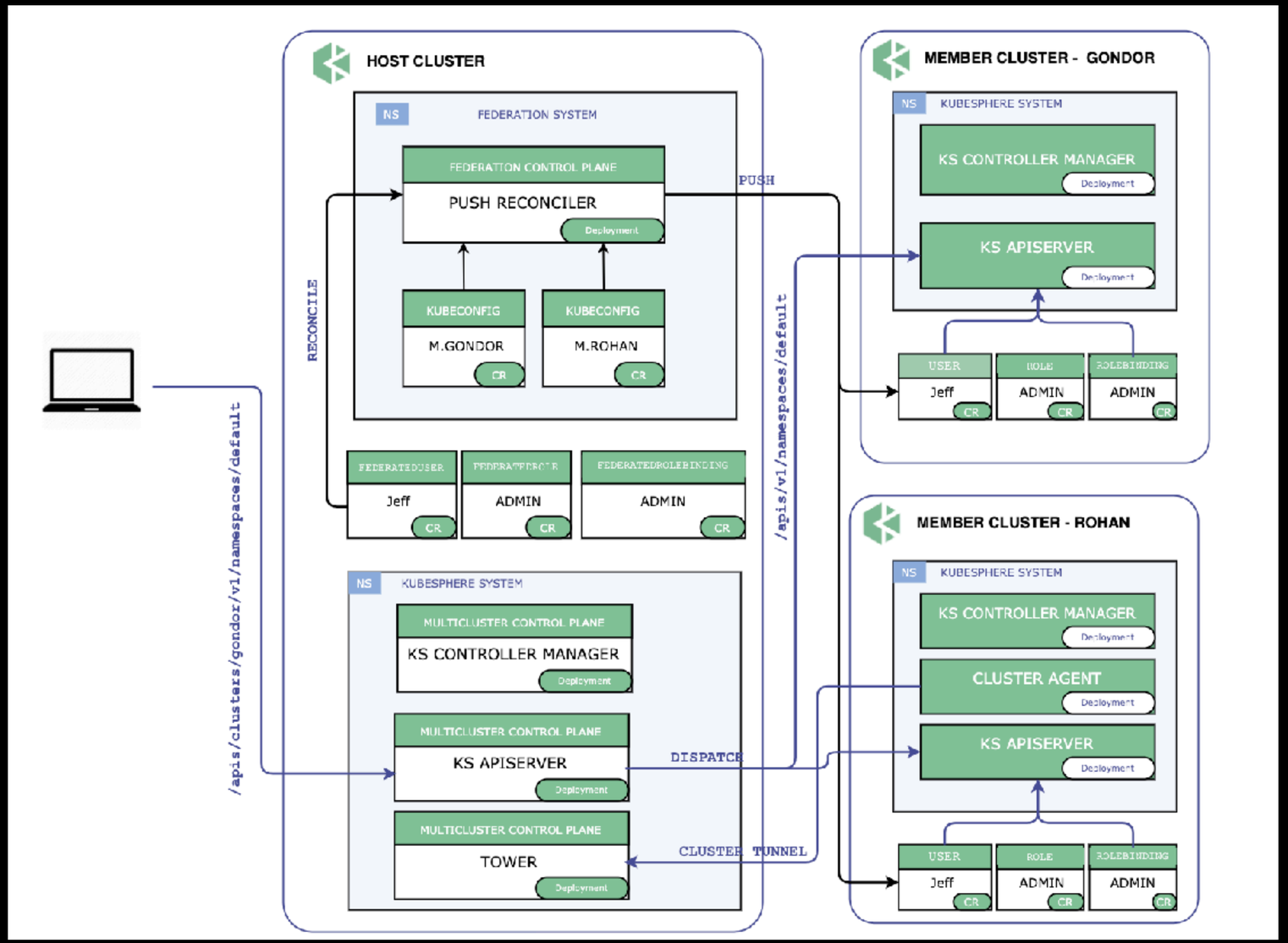
3.1 多集群管理



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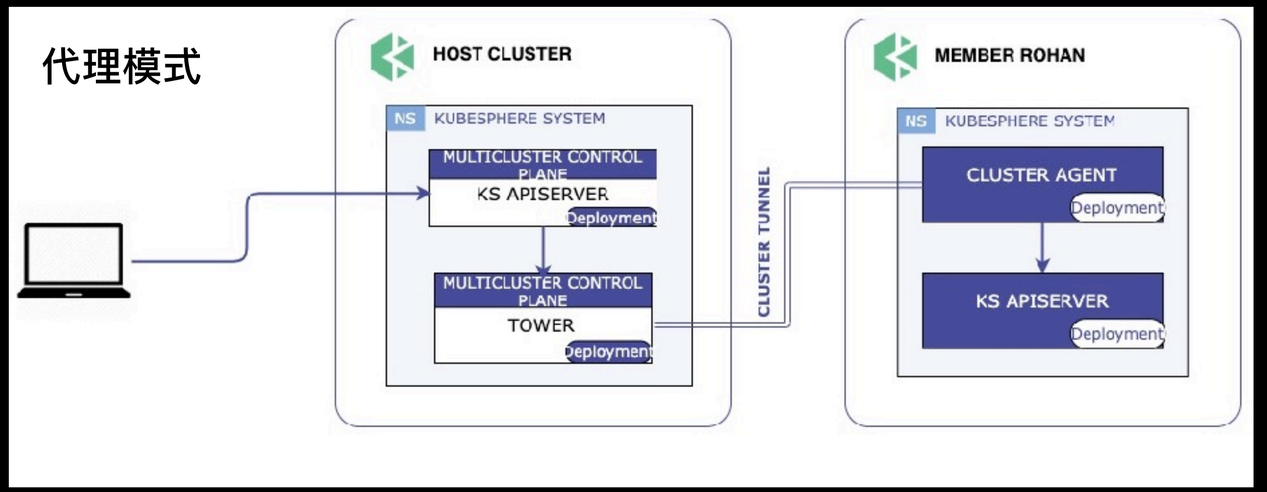
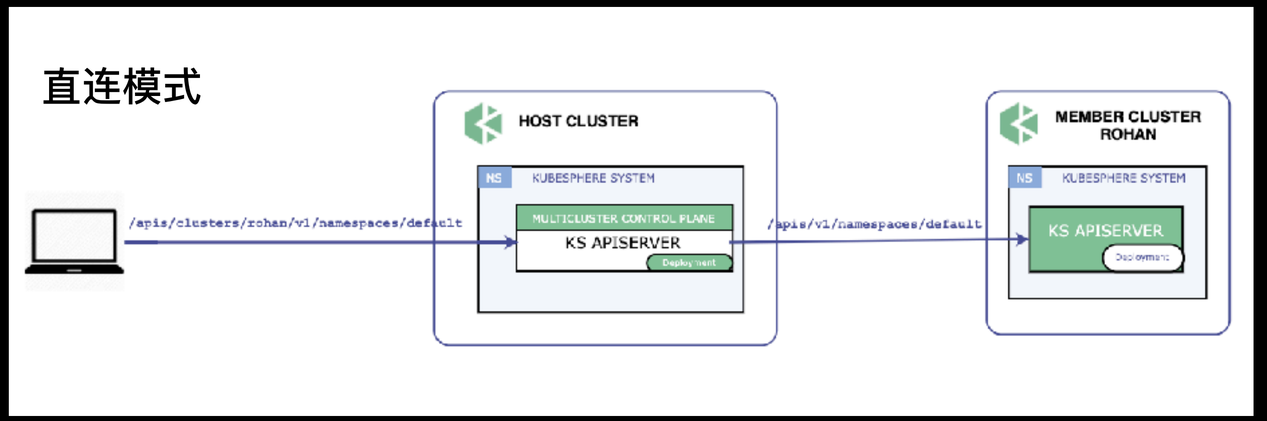
3.1 多集群管理





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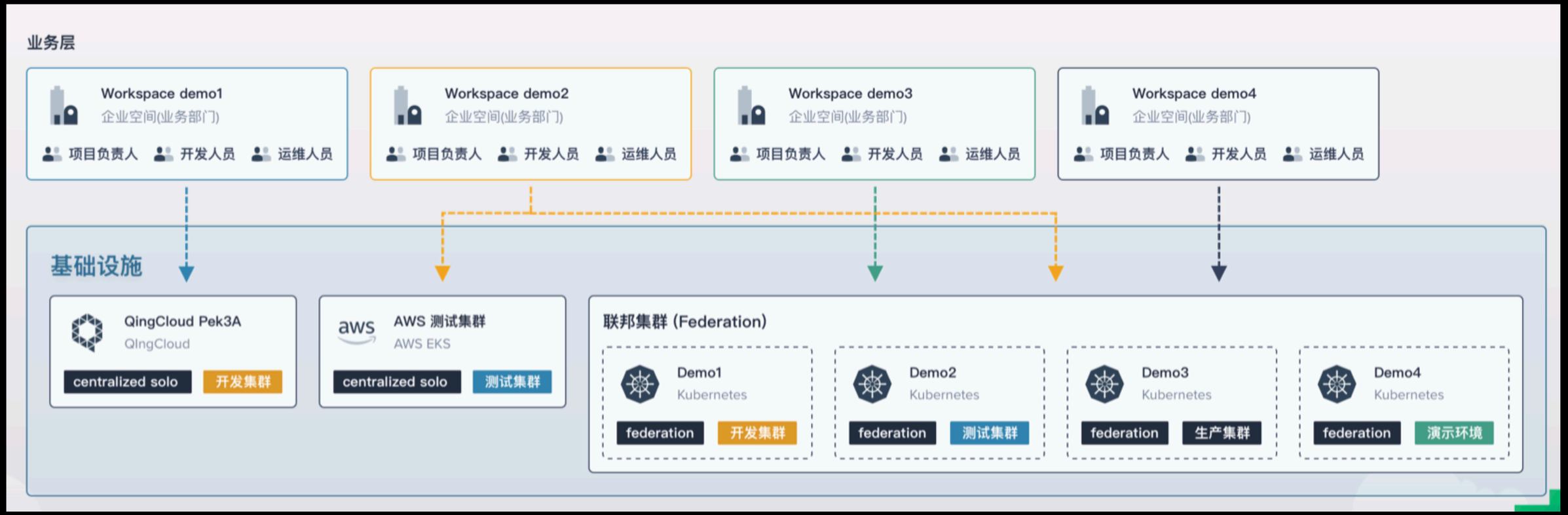
3.1 多集群管理



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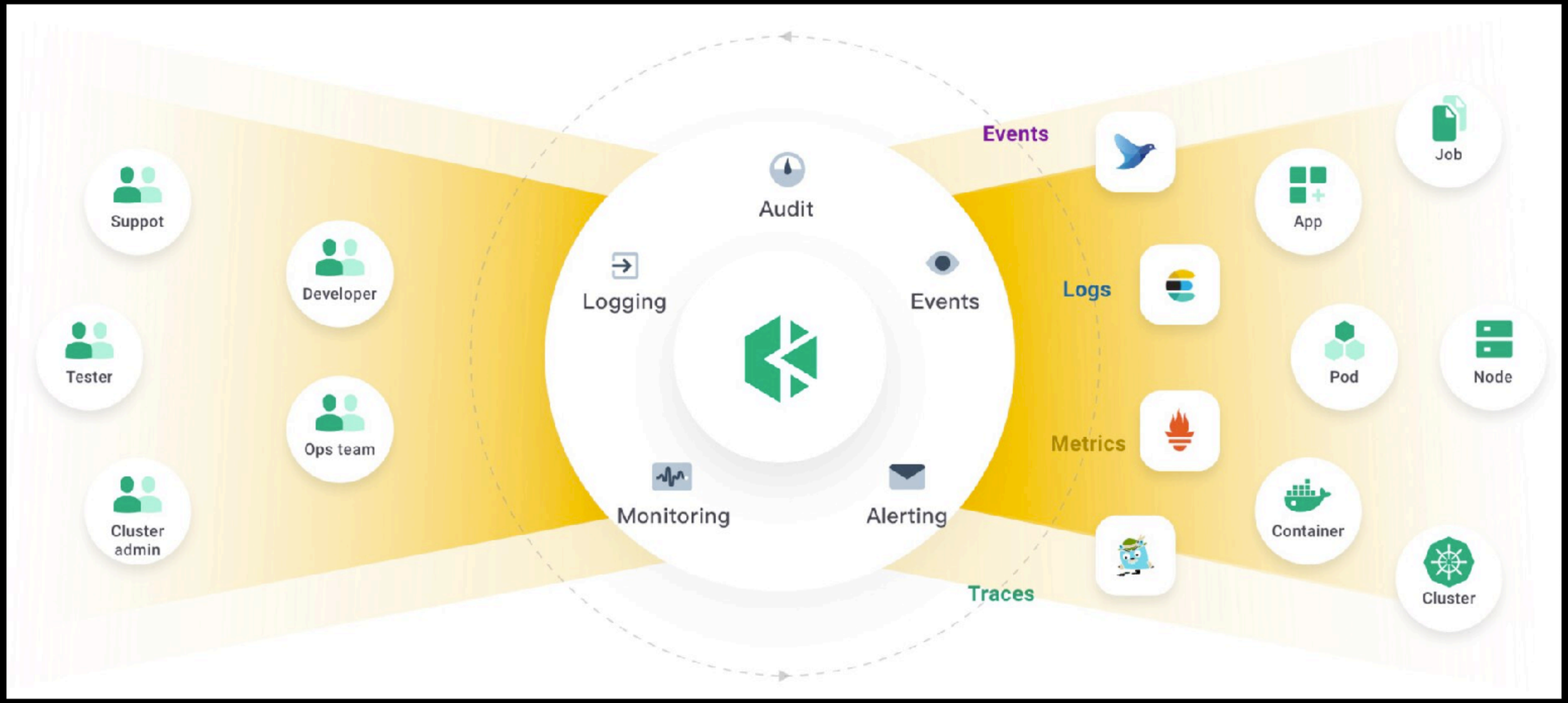
3.2 可观测性



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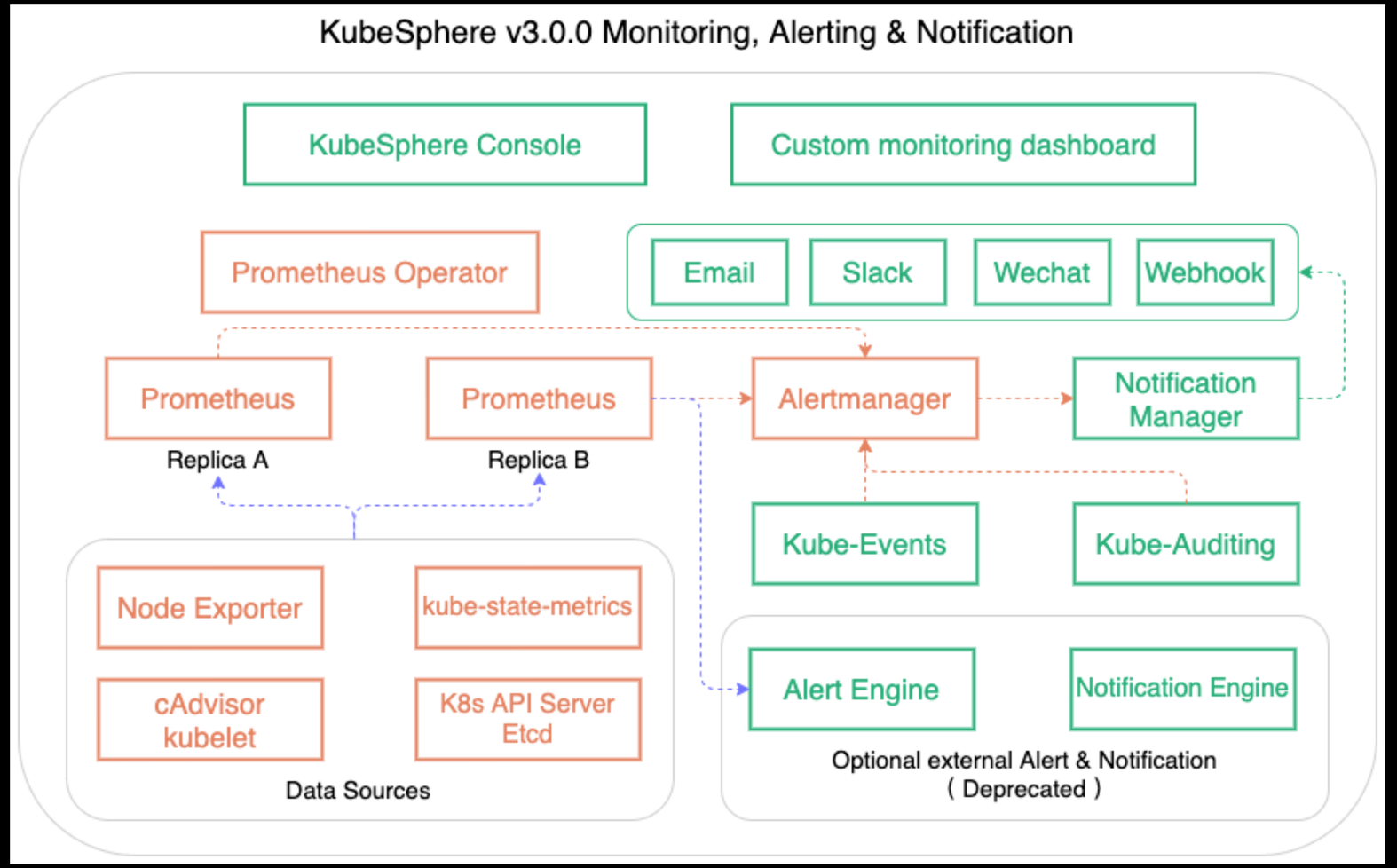
3.2 监控告警



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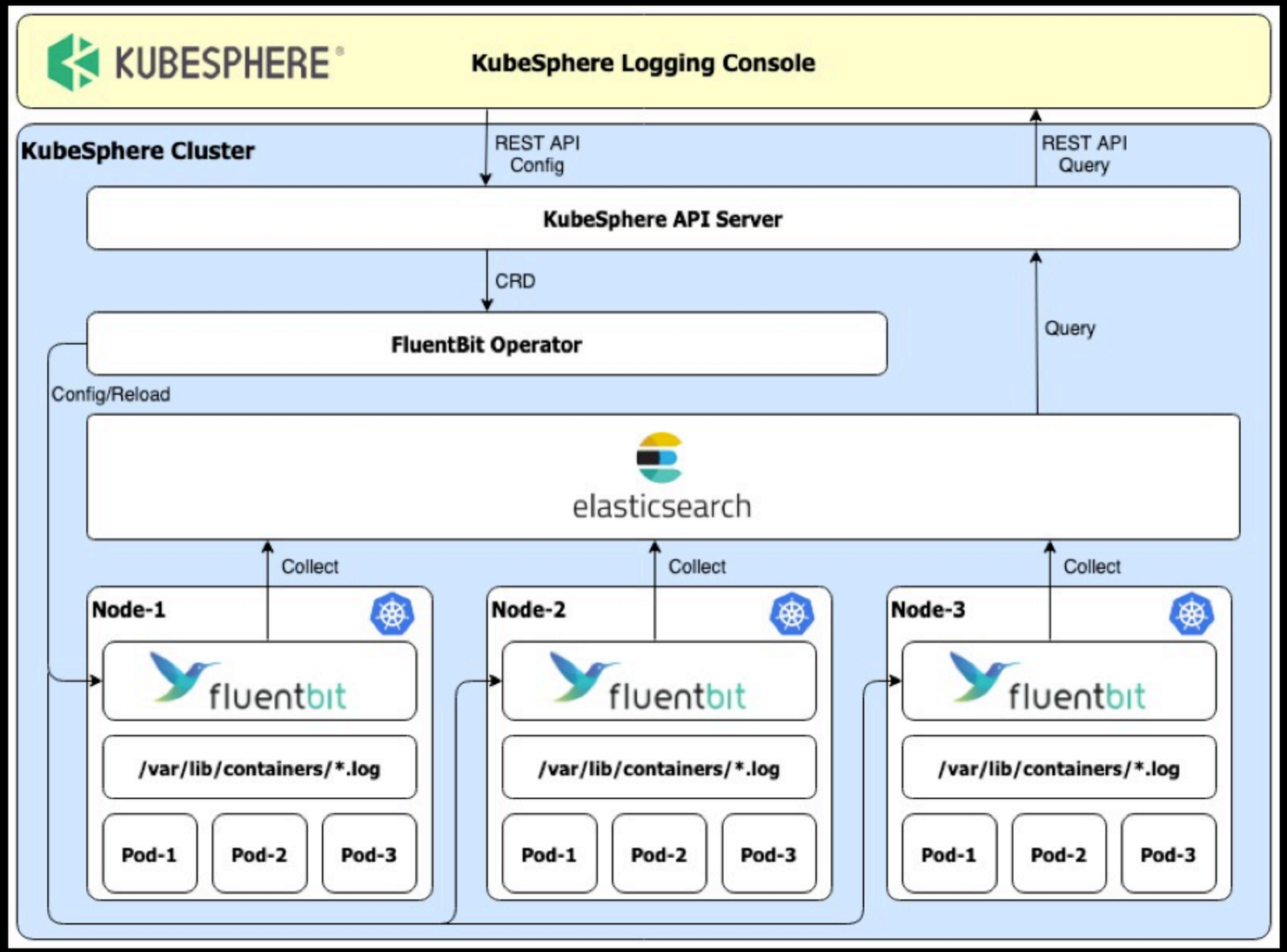
3.2 日志



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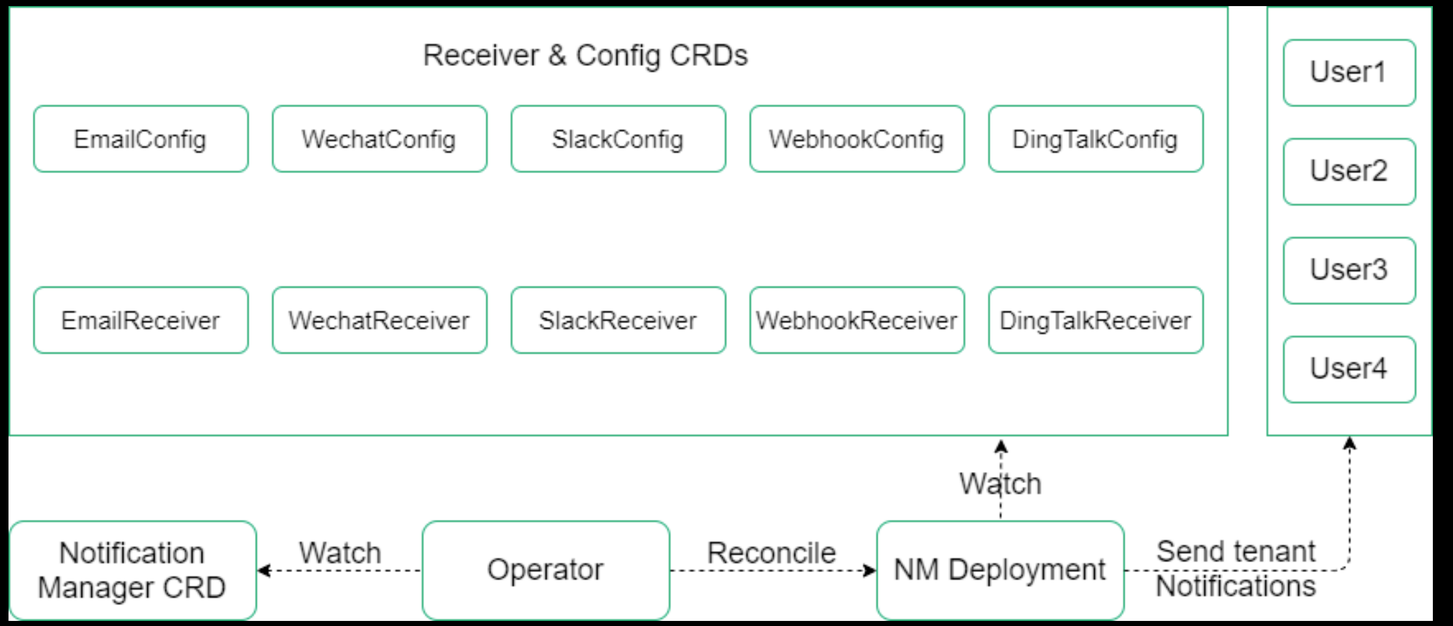
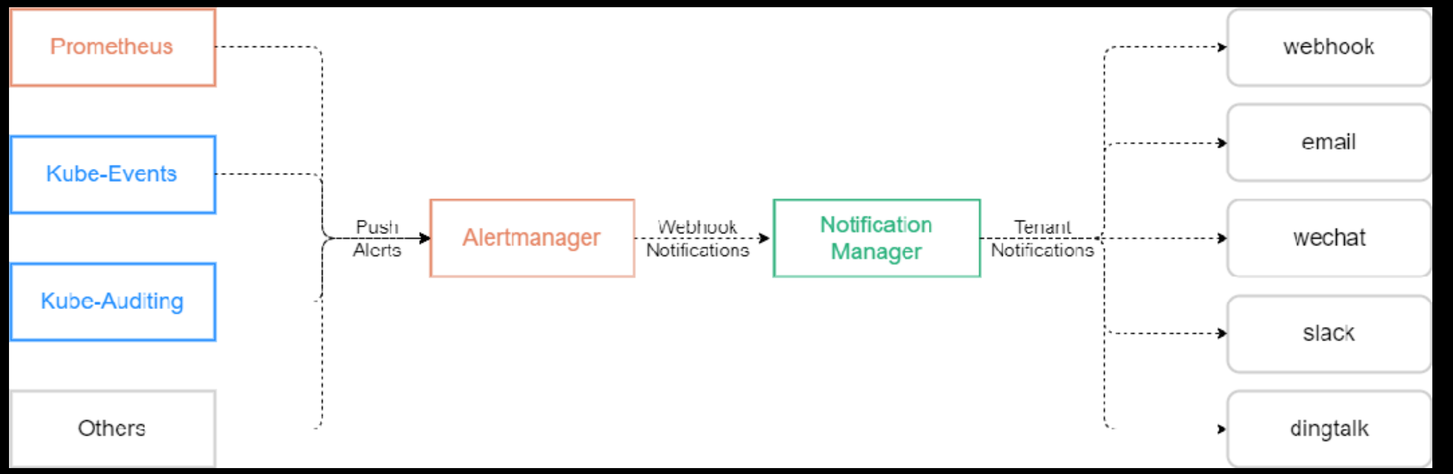
3.2 通知

```yaml
apiVersion: notification.kubesphere.io/v2beta1
kind: Receiver
metadata:
  labels:
    app: notification-manager
    type: global
  name: global-email-receiver
spec:
  email:
    enabled: true
    to:
    - receiver1@xyz.com
    - receiver2@xyz.com
```





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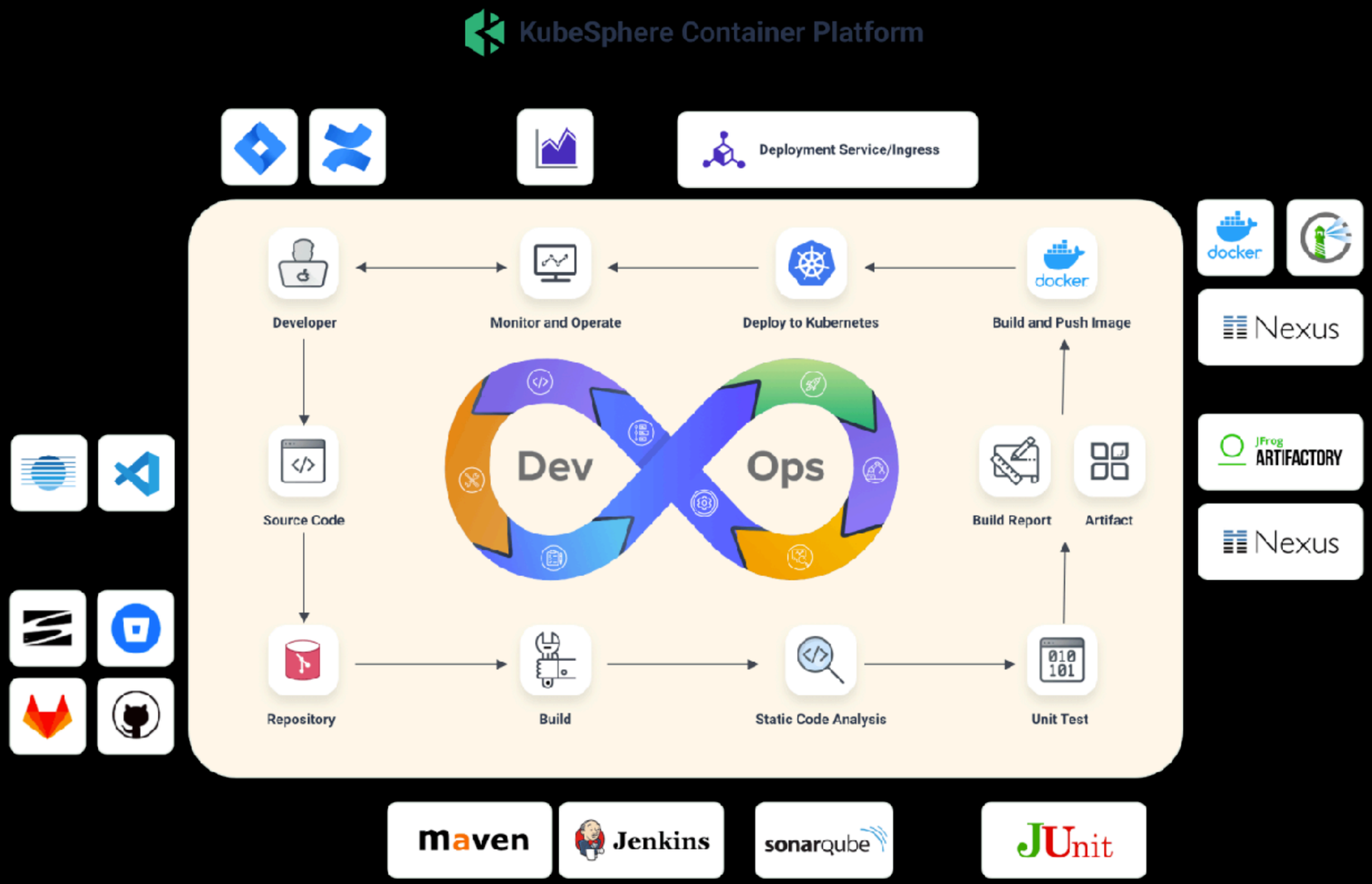
3.3 DevOps



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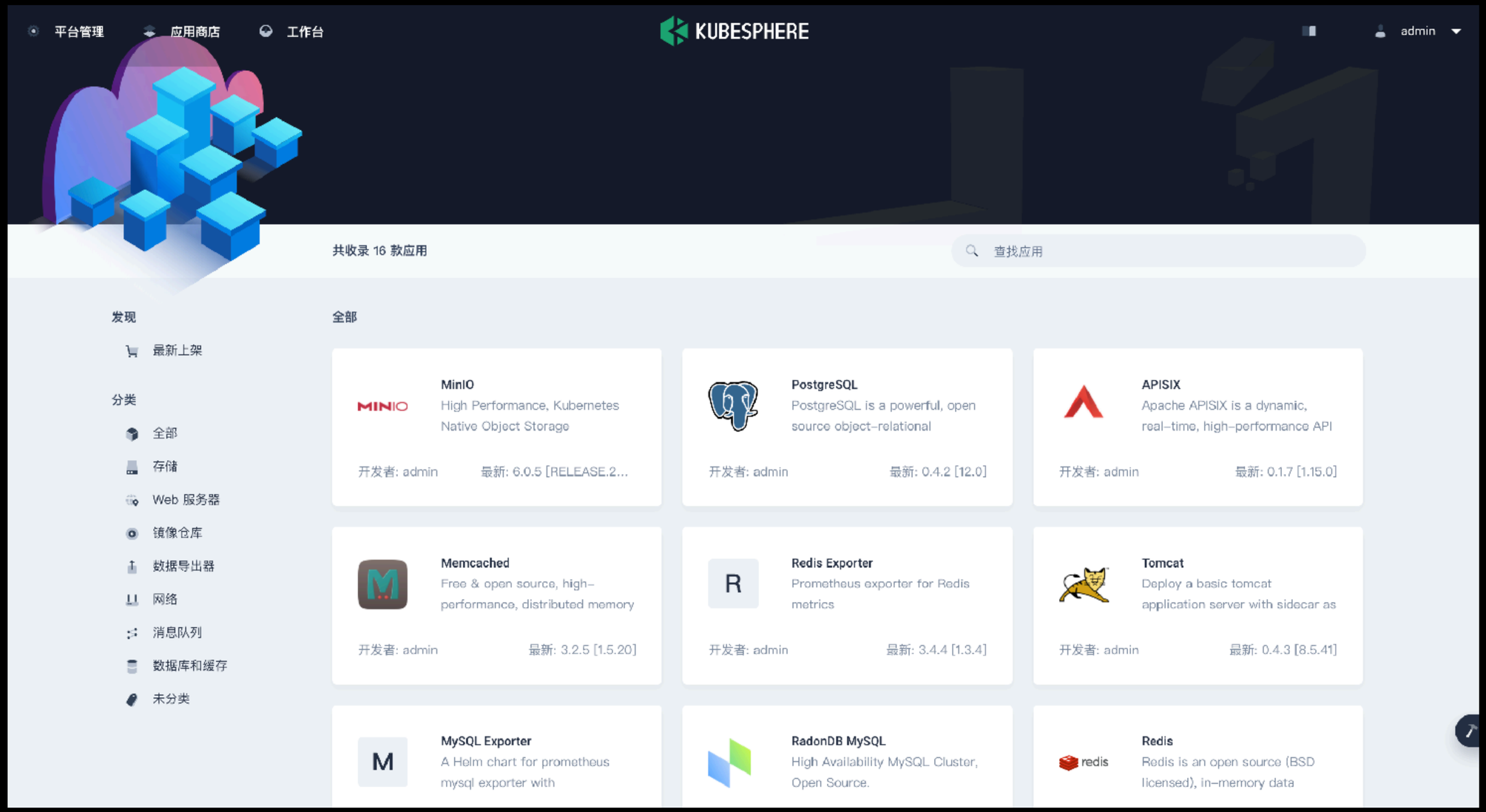
3.4 应用商店



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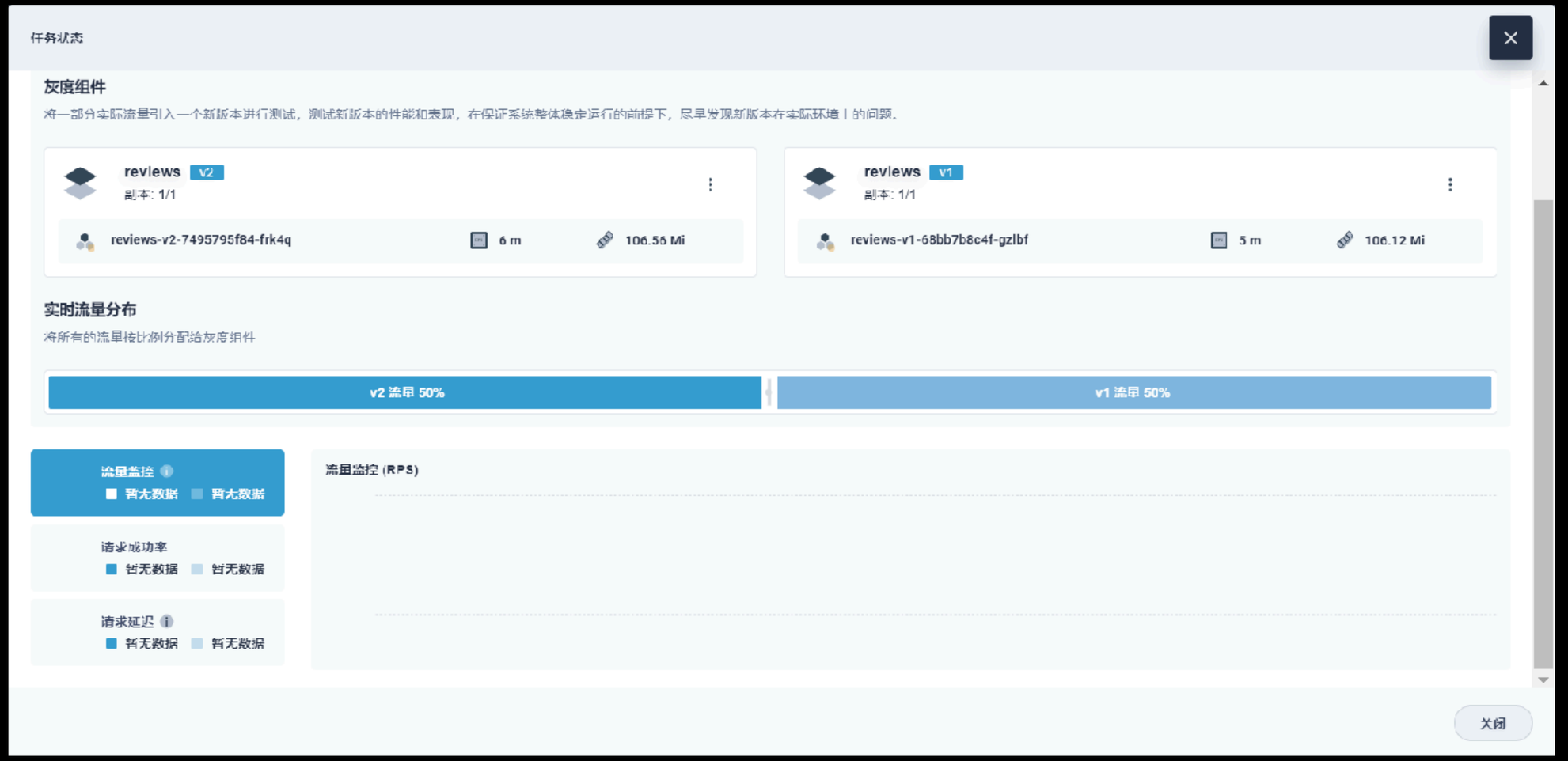
3.5 微服务



Part 4

KubeSphere 社区贡献方式

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- KubeSphere 社区 https://github.com/kubesphere/community
- 官网与文档 https://github.com/kubesphere/website
- KubeSphere 后端 https://github.com/kubesphere/kubesphere
- KubeKey https://github.com/kubesphere/kubekey
- KubeEye https://github.com/kubesphere/kubeeye
- PorterLB https://github.com/kubesphere/porterlb
- KubeDesign https://github.com/kubesphere/kube-design
- NotificationManager https://github.com/kubesphere/notification-manager

欢迎大家以各种形式参与社区，issue、doc、proposal

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Thank you!

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