基于VK实现多集群管理

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集群管理

集群接管
节点上下线
离线资源池管理
资源池管理
驱逐

持续集成

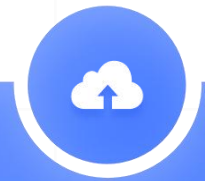
代码构建
镜像构建

服务发布

资源大小选择
资源池选择
调度策略选择
固定ip支持
回滚
灰度
配置管理

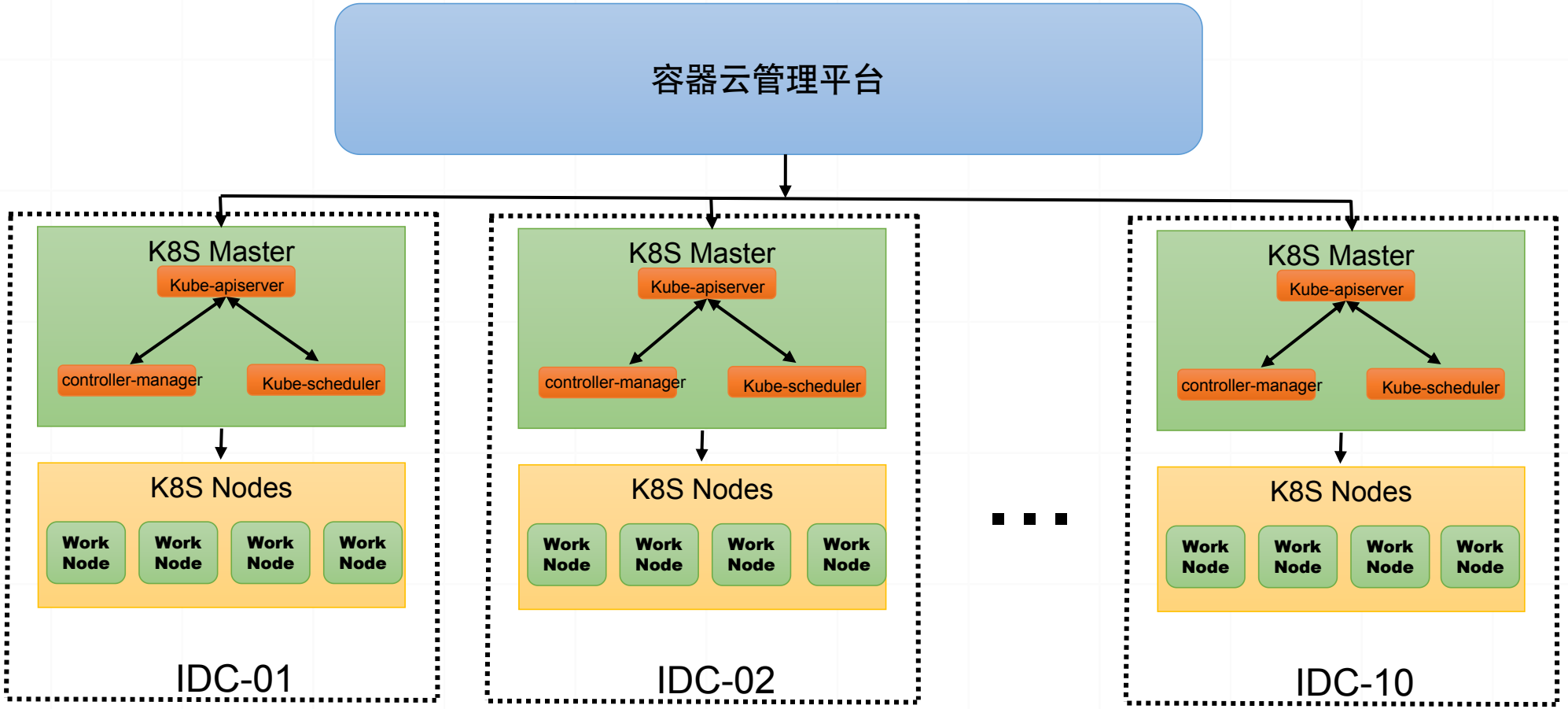
API提供

提供统一的部署接口
提供查询功能



报表查询

容器化接入率
集群资源使用详情
集群监控


容器云管理平台
K8S Master
Kube-apiserver
controller-manager
Kube-scheduler
K8S Nodes
Work Node
Work Node
Work Node
Work Node
IDC-01
K8S Master
Kube-apiserver
controller-manager
Kube-scheduler
K8S Nodes
Work Node
Work Node
Work Node
Work Node
IDC-02
K8S Master
Kube-apiserver
controller-manager
Kube-scheduler
K8S Nodes
Work Node
Work Node
Work Node
Work Node
IDC-10

单集群故障

单集群越来越大，降低单集群故障对业务的影响

集群平滑升级

通过新增集群实现集群的平滑升级

第三方集群接入

业务无需代码改动即可发布服务至第三方集群

边缘机房区域自治

防止前端机房计算节点与控制平面失联

公有云资源接入

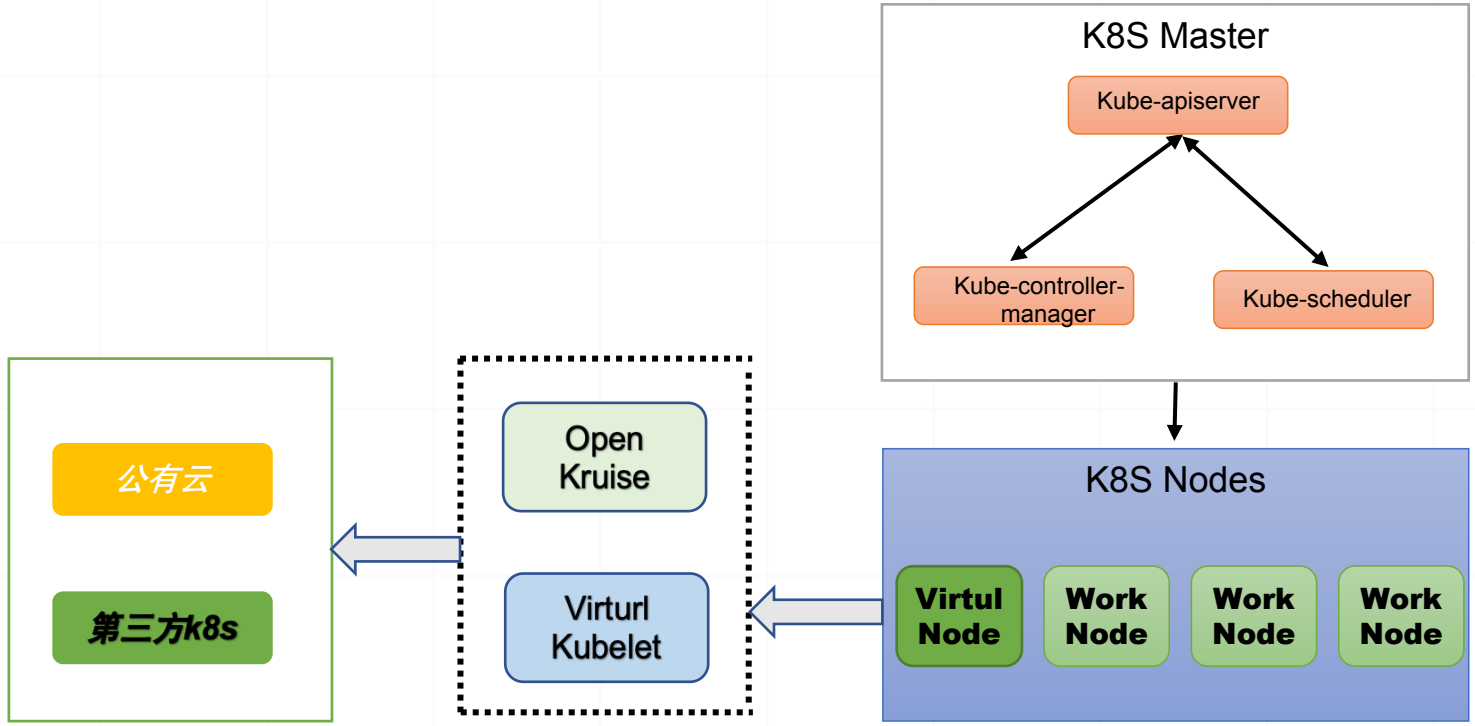
接入公有云弹性资源实现快速弹性功能

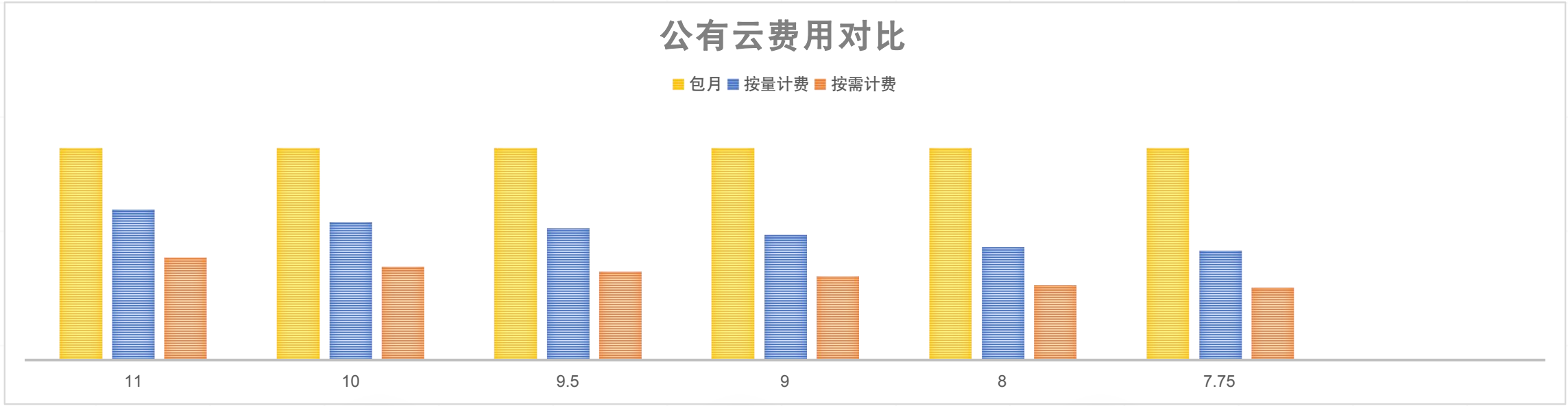
解决的问题：

依靠云资源可秒级弹性扩容
无需预留离线资源
支持优先部署到自建机房，资源不足时部署到弹性机房
快速接入第三方集群

成本优化：

云厂商即用即计费，优化计算资源成本，按需计费，不使用不计费
抢占式实例成本优化明显





01

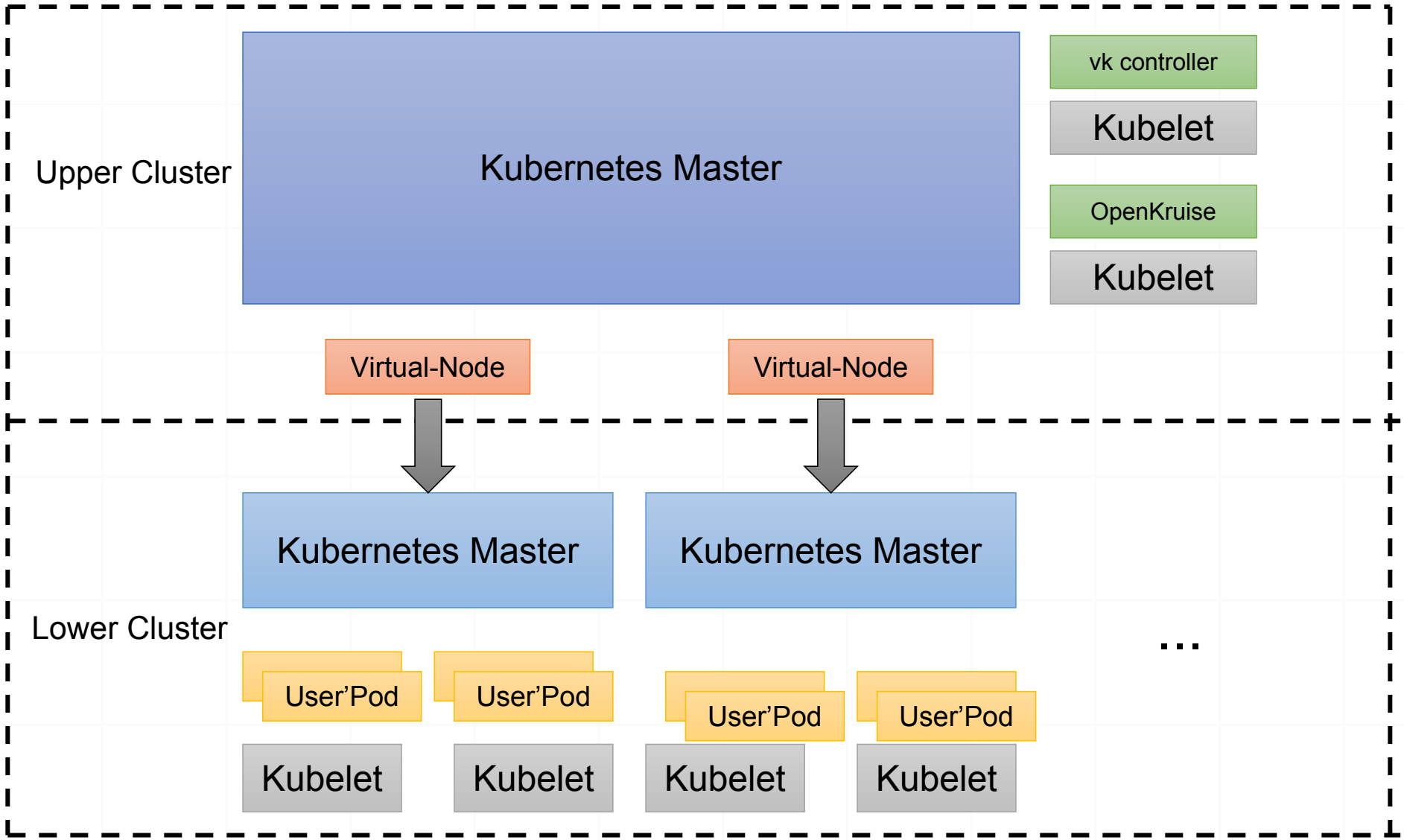
节点弹性伸缩在定时扩缩容节点满足目前的需求，扩容需要5分钟左右，在非定时伸缩情况下需要15分钟完成扩容

02

弹性伸缩可实现秒级扩容，与正常pod实例无差别

03

弹性伸缩比起节点弹性伸缩成本上表现更优，可节省更多的计算机缘成本


Upper Cluster
Kubernetes Master
vk controller
Kubelet
OpenKruise
Kubelet
Virtual-Node
Virtual-Node
Lower Cluster
Kubernetes Master
Kubernetes Master
...
User'Pod
User'Pod
User'Pod
User'Pod
Kubelet
Kubelet
Kubelet
Kubelet

Virturl Kubelet

- 虚拟 WorkerNode

  Liqo Provider

  Tensile Kube Provider

OpenKruise

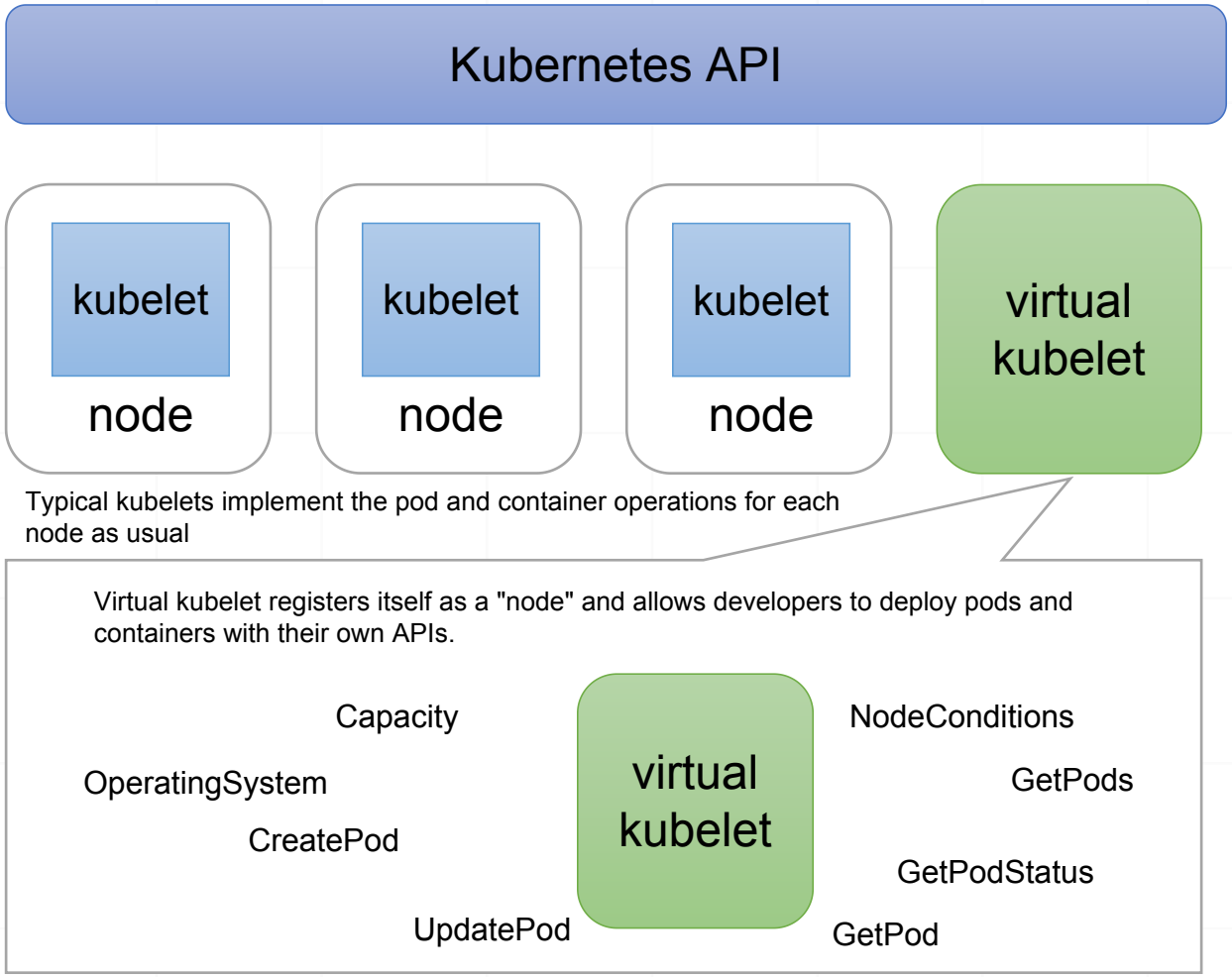
- WorkloadSpread

  能够将 Workload 的 Pod 按一定规则分布到不同类型的 Node 节点上，赋予单一 Workload 多区域部署和弹性部署的能力

- SidecarSet

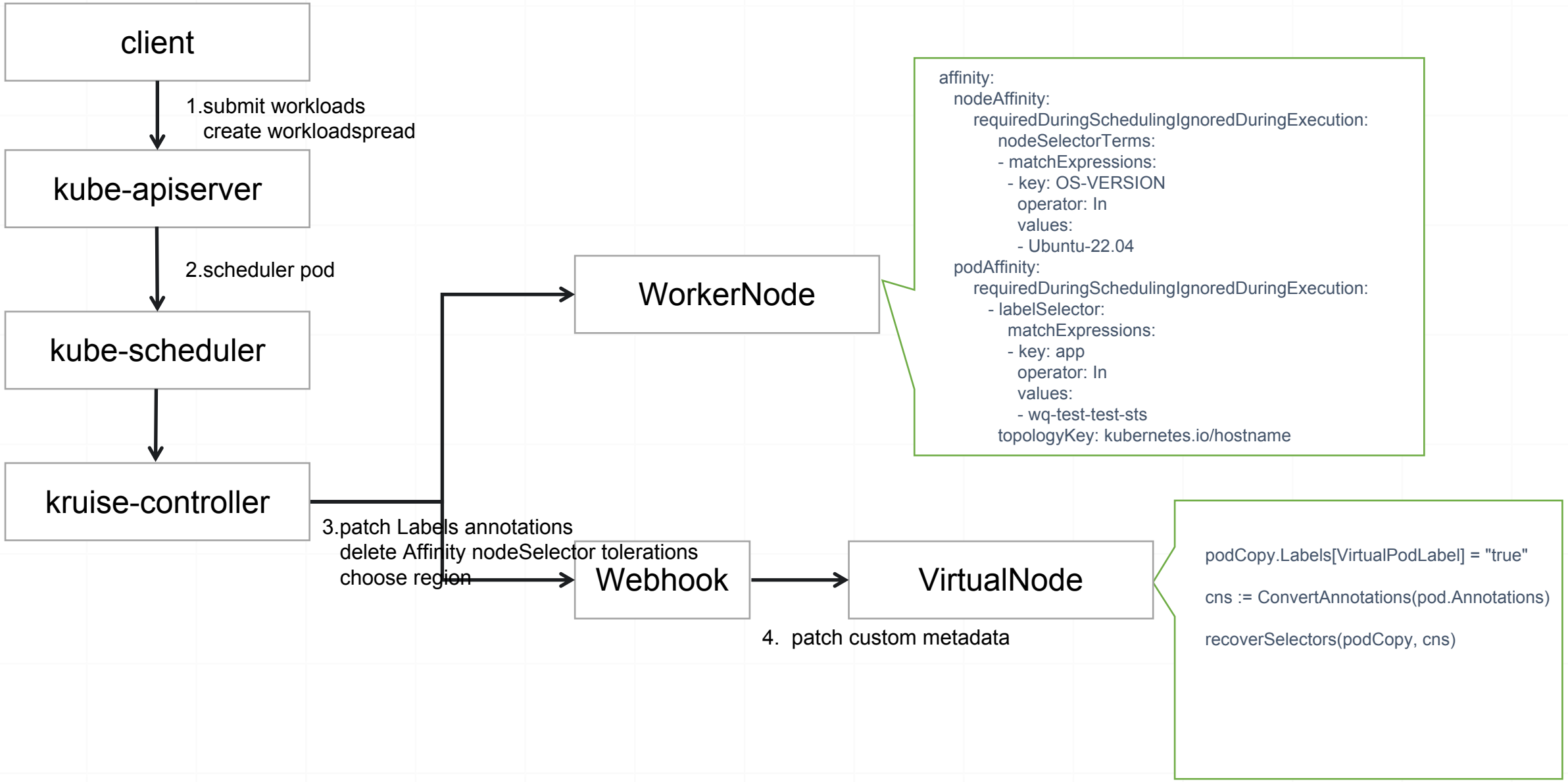
  自动注入 Container 至 Pod

- Webhook



功能：

- create, delete and update pods,cm,secrets
- container logs, exec, and metrics
- get pod, pods and pod status
- capacity
- node addresses, node capacity, node daemon endpoints
- operating system
- bring your own virtual network


client
1.submit workloads
create workloadspread
kube-apiserver
2.scheduler pod
kube-scheduler
kruise-controller
3.patch Labels annotations
delete Affinity nodeSelector tolerations
choose region
WorkerNode
Webhook
VirtualNode
4. patch custom metadata
affinity:
nodeAffinity:
requiredDuringSchedulingIgnoredDuringExecution:
nodeSelectorTerms:
- matchExpressions:
- key: OS-VERSION
operator: In
values:
- Ubuntu-22.04
podAffinity:
requiredDuringSchedulingIgnoredDuringExecution:
- labelSelector:
matchExpressions:
- key: app
operator: In
values:
- wq-test-test-sts
topologyKey: kubernetes.io/hostname
podCopy.Labels[VirtualPodLabel] = "true"
cns := ConvertAnnotations(pod.Annotations)
recoverSelectors(podCopy, cns)

WorkloadSpread

能够将 Workload 的 Pod 按一定规则分布到不同类型的 Node 节点上，赋予单一 Workload 多区域部署和弹性部署的能力

优先部署到自建机房，资源不足时部署到 VK

优先部署固定数量个 Pod 到自建机房，其余到 VK

```
apiVersion: apps.kruise.io/v1alpha1
kind: WorkloadSpread
metadata:
  name: workloadspread-demo
spec:
  scheduleStrategy:
    adaptive:
      rescheduleCriticalSeconds: 30
    type: Adaptive
  subsets:
  - name: common
    maxReplicas: 50%
    patch:
      metadata:
        annotations:
          subset: common
    requiredNodeSelectorTerm:
      matchExpressions:
      - key: node-role.kubernetes.io/WorkerNode
        operator: In
        values:
        - "true"
    tolerations:
    - effect: NoSchedule
      key: unscheduer
      operator: Equal
      value: "true"
  - name: local-virtual-kubelet
    patch:
      metadata:
        annotations:
          clusterSelector: '{"tolerations":[{"key":"node.kubernetes.io/not-
ready","operator":"Exists","effect":"NoExecute"},{"key":"node.kubernetes.io/unreachable","operator":"Exists","effect":"No
Execute"},{"key":"test","operator":"Exists","effect":"NoExecute"},{"key":"test1","operator":"Exists","effect":"NoExecute"},{"
key":"test2","operator":"Exists","effect":"NoExecute"},{"key":"test3","operator":"Exists","effect":"NoExecute"}]}'
          subset: local-virtual-kubelet
      spec:
        affinity:
          nodeAffinity: null
          podAntiAffinity: null
        nodeSelector: null
    requiredNodeSelectorTerm:
      matchExpressions:
      - key: node-role.kubernetes.io/local-virtual-kubelet
        operator: In
        values:
        - "true"
```

```
func recoverSelectors(pod *corev1.Pod, cns *ClustersNodeSelection) {
	if cns != nil {
		pod.Spec.NodeSelector = cns.NodeSelector
		pod.Spec.Tolerations = cns.Tolerations
		if pod.Spec.Affinity == nil {
			pod.Spec.Affinity = cns.Affinity
		} else {
			if cns.Affinity != nil && cns.Affinity.NodeAffinity != nil {
				if pod.Spec.Affinity.NodeAffinity != nil {
					pod.Spec.Affinity.NodeAffinity.RequiredDuringSchedulingIgnoredDuringExecution =
cns.Affinity.NodeAffinity.RequiredDuringSchedulingIgnoredDuringExecution
				} else {
					pod.Spec.Affinity.NodeAffinity = cns.Affinity.NodeAffinity
				}
			} else {
				pod.Spec.Affinity.NodeAffinity = nil
			}
			if cns.Affinity != nil {
				if cns.Affinity.PodAffinity != nil {
					pod.Spec.Affinity.PodAffinity = cns.Affinity.PodAffinity
				}
				if cns.Affinity.PodAntiAffinity != nil {
					pod.Spec.Affinity.PodAntiAffinity = cns.Affinity.PodAntiAffinity
				}
			}
		}
	} else {
		pod.Spec.NodeSelector = nil
		pod.Spec.Tolerations = nil
		if pod.Spec.Affinity != nil && pod.Spec.Affinity.NodeAffinity != nil {
			pod.Spec.Affinity.NodeAffinity.RequiredDuringSchedulingIgnoredDuringExecution = nil
		}
	}
	if pod.Spec.Affinity != nil {
		if pod.Spec.Affinity.NodeAffinity != nil {
			if pod.Spec.Affinity.NodeAffinity.RequiredDuringSchedulingIgnoredDuringExecution == nil &&
				pod.Spec.Affinity.NodeAffinity.PreferredDuringSchedulingIgnoredDuringExecution == nil {
				pod.Spec.Affinity.NodeAffinity = nil
			}
		}
		if pod.Spec.Affinity.NodeAffinity == nil && pod.Spec.Affinity.PodAffinity == nil &&
			pod.Spec.Affinity.PodAntiAffinity == nil {
			pod.Spec.Affinity = nil
		}
	}
}
```

SidecarSet

自动注入sidecar,可以将日志采集、监控上报等agent,通过sidecar的形式自动注入到pod

```yaml
# sidecarset.yaml
apiVersion: apps.kruise.io/v1alpha1
kind: SidecarSet
metadata:
  name: test-sidecarset
spec:
  selector:
    matchLabels:
      vk: true
  updateStrategy:
    type: RollingUpdate
    maxUnavailable: 1
  containers:
  - name: sidecar1
    image: centos:6.7
    command: ["sleep", "999d"] # do nothing at all
    volumeMounts:
    - name: log-volume
      mountPath: /var/log
  volumes: # this field will be merged into pod.spec.volumes
  - name: log-volume
    emptyDir: {}
```


01
Service
02
PVC
03
CRD

感谢观看

云原生社区
Cloud Native Community