

第四届
全国高校
云计算
应用创新大赛

全国高校云计算应用创新大赛 官方培训班在线课程

容器集群监控



胡正川

EasyStack研发工程师

目录

01

容器监控

02

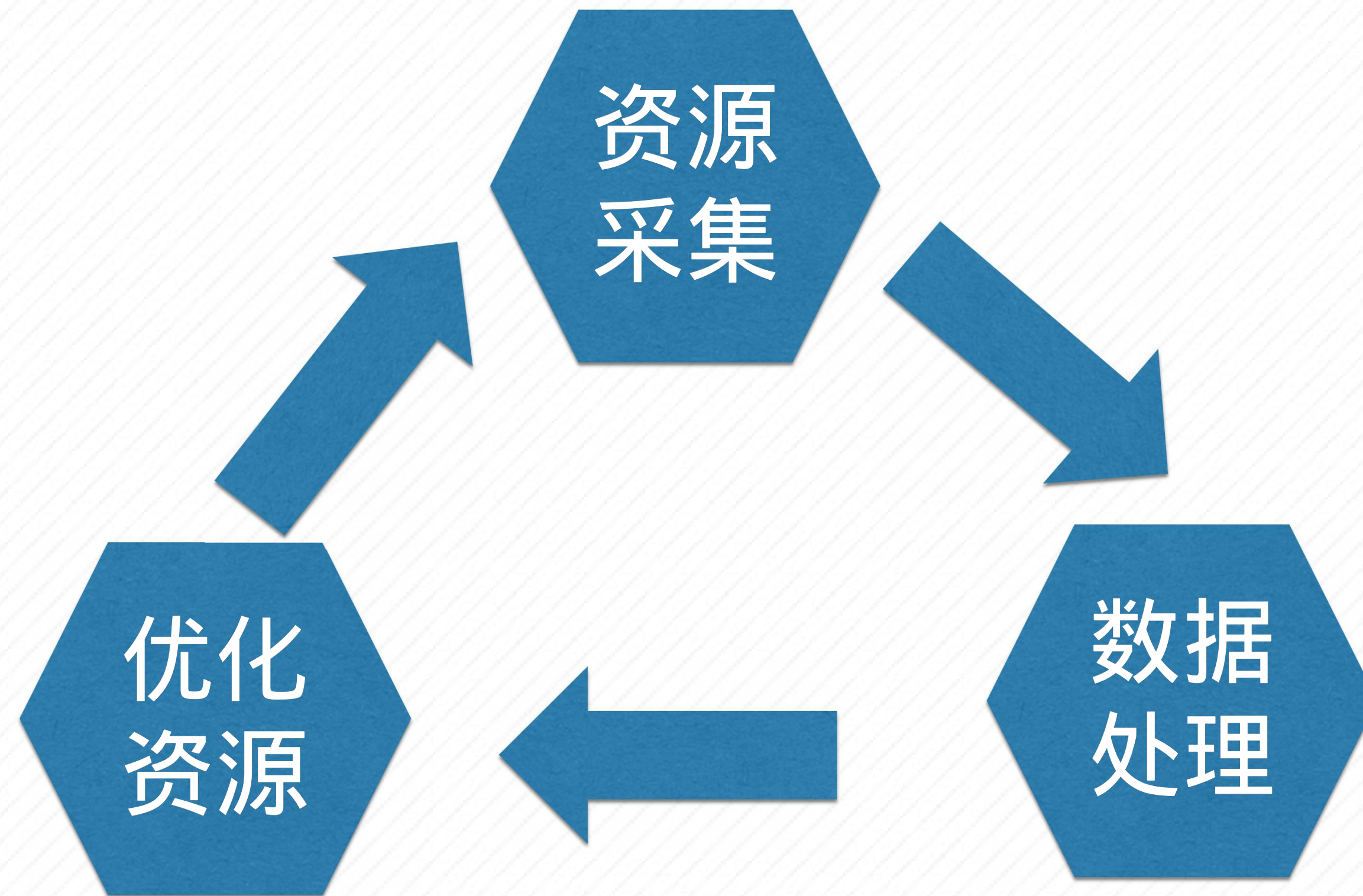
Kubernetes监控

03

Prometheus

04

Prometheus实践

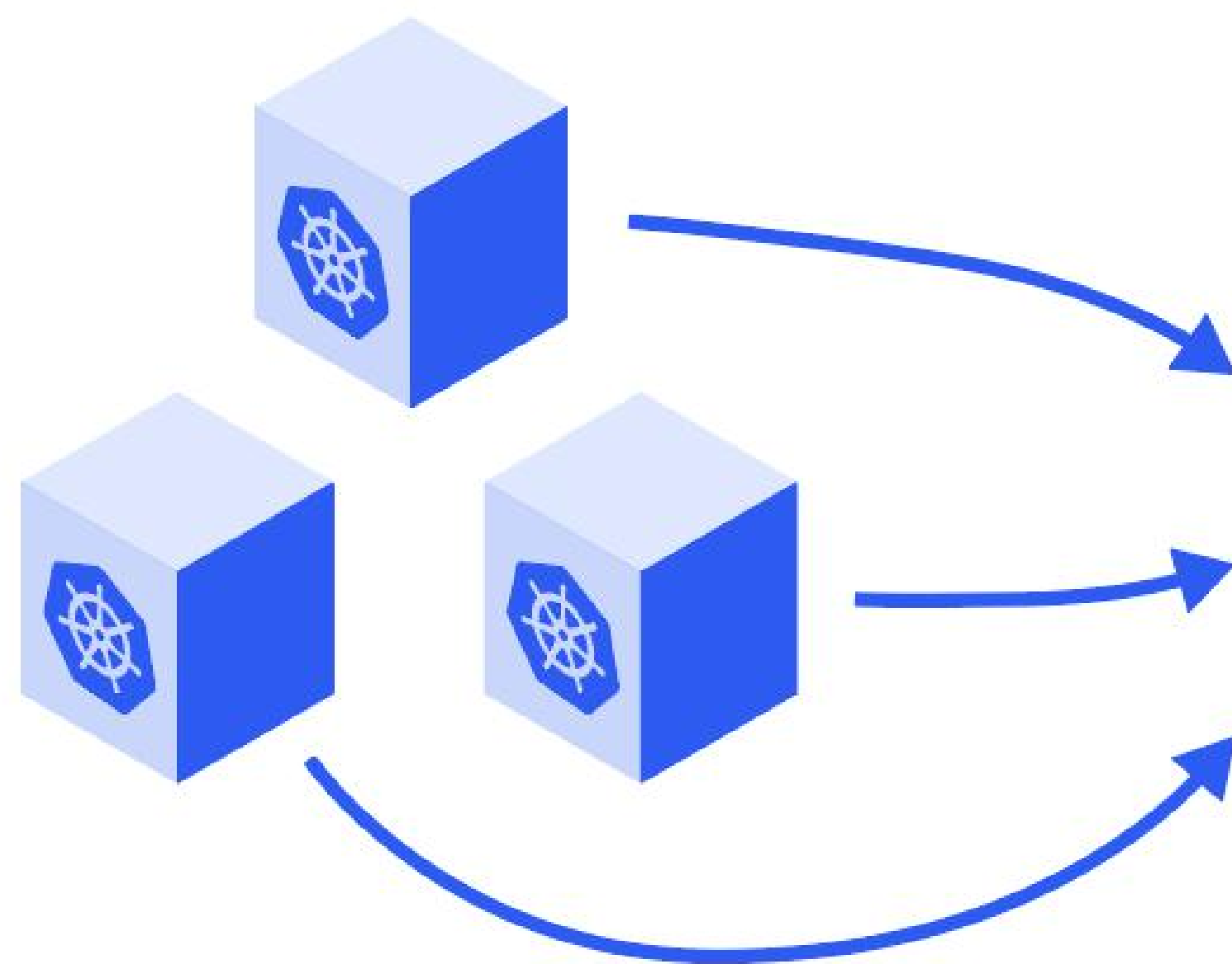


采集数据、分析存储数据、展示数据、告警以及自动化处理、监控工具自身的安全机制

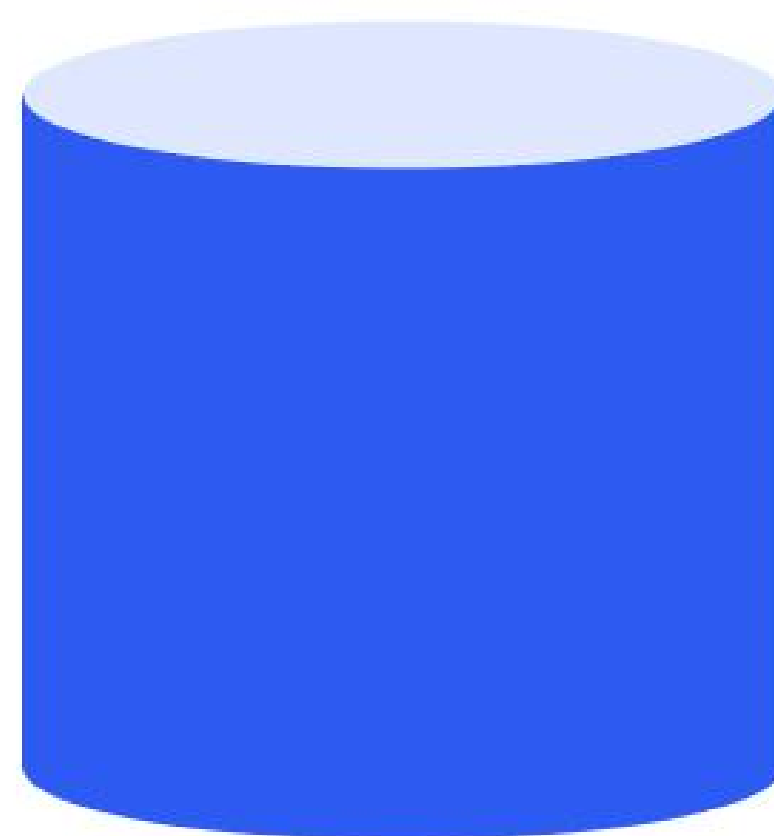
关心的监控指标

- 容器本身资源使用情况：cpu，内存，网络，磁盘
- 物理机的资源使用情况：cpu，内存，网络，磁盘
- 物理机上容器镜像情况，名字，大小

监控



1. Collecting Metrics

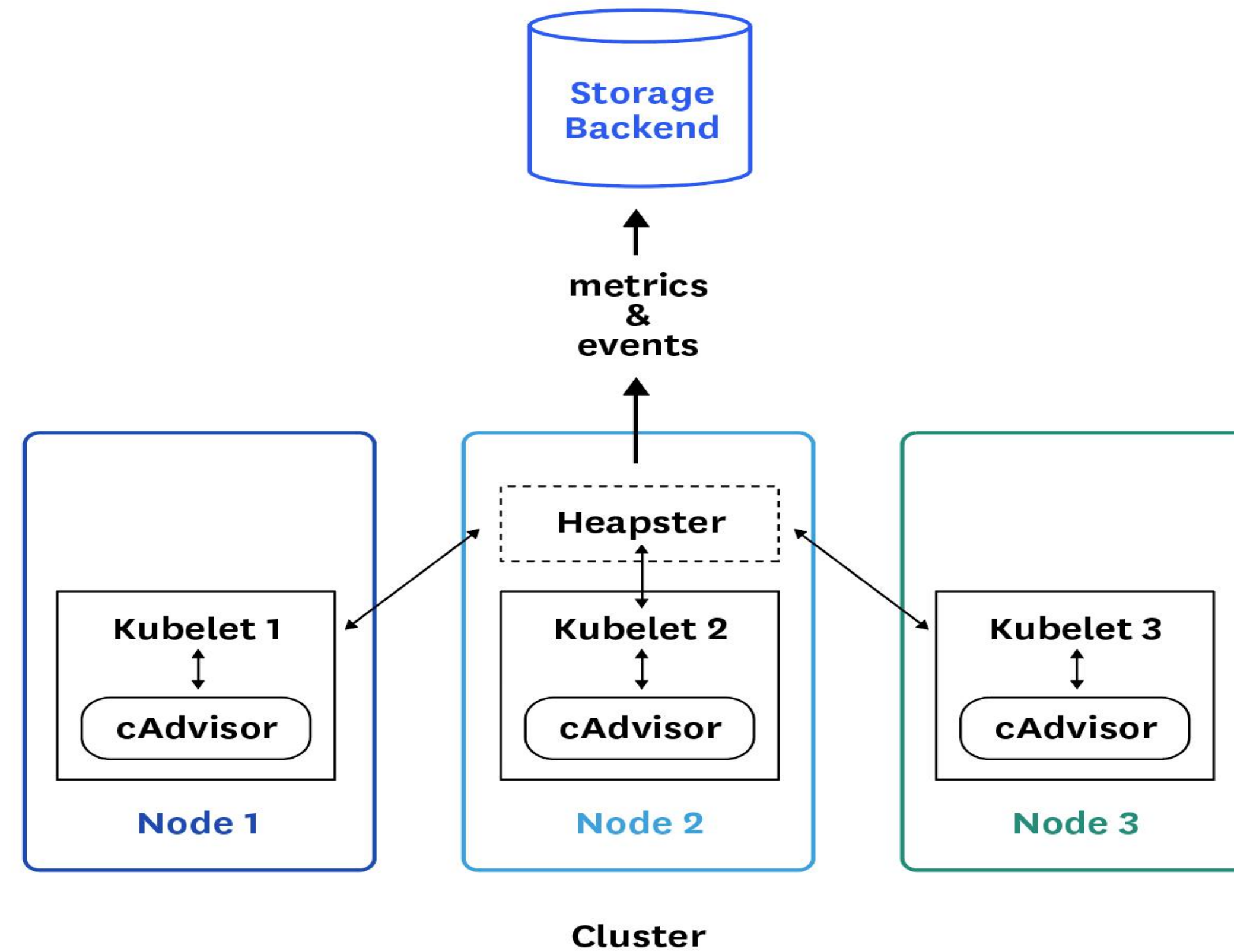


2. Storing Metrics



3. Graphing Metrics

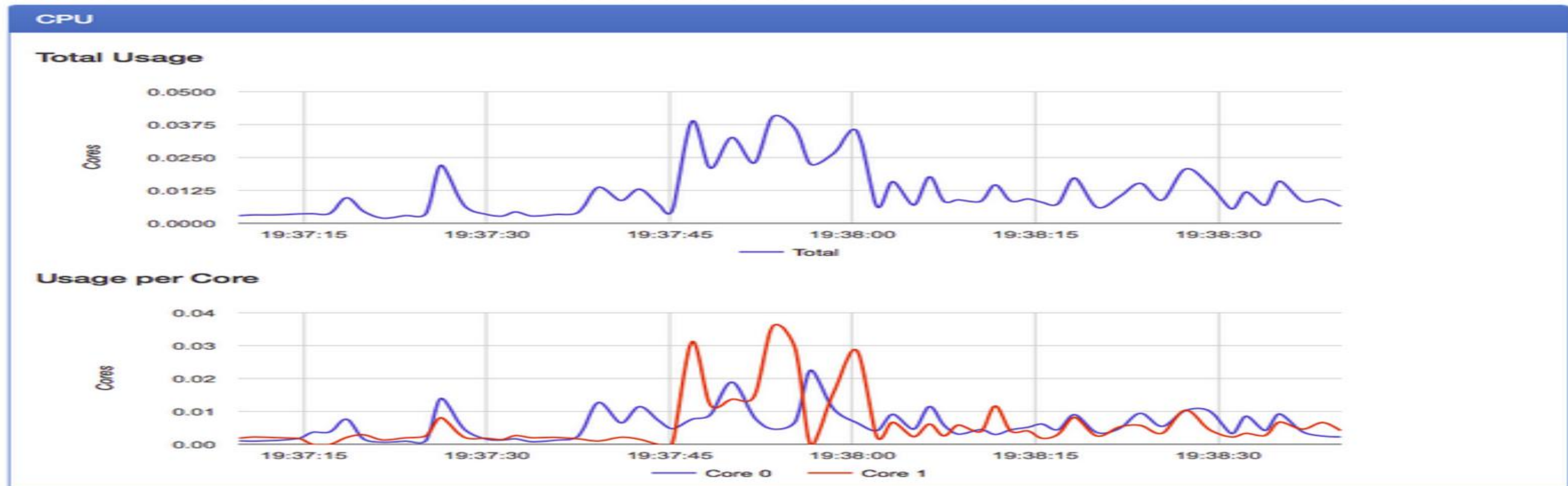
kubernetes原生监控



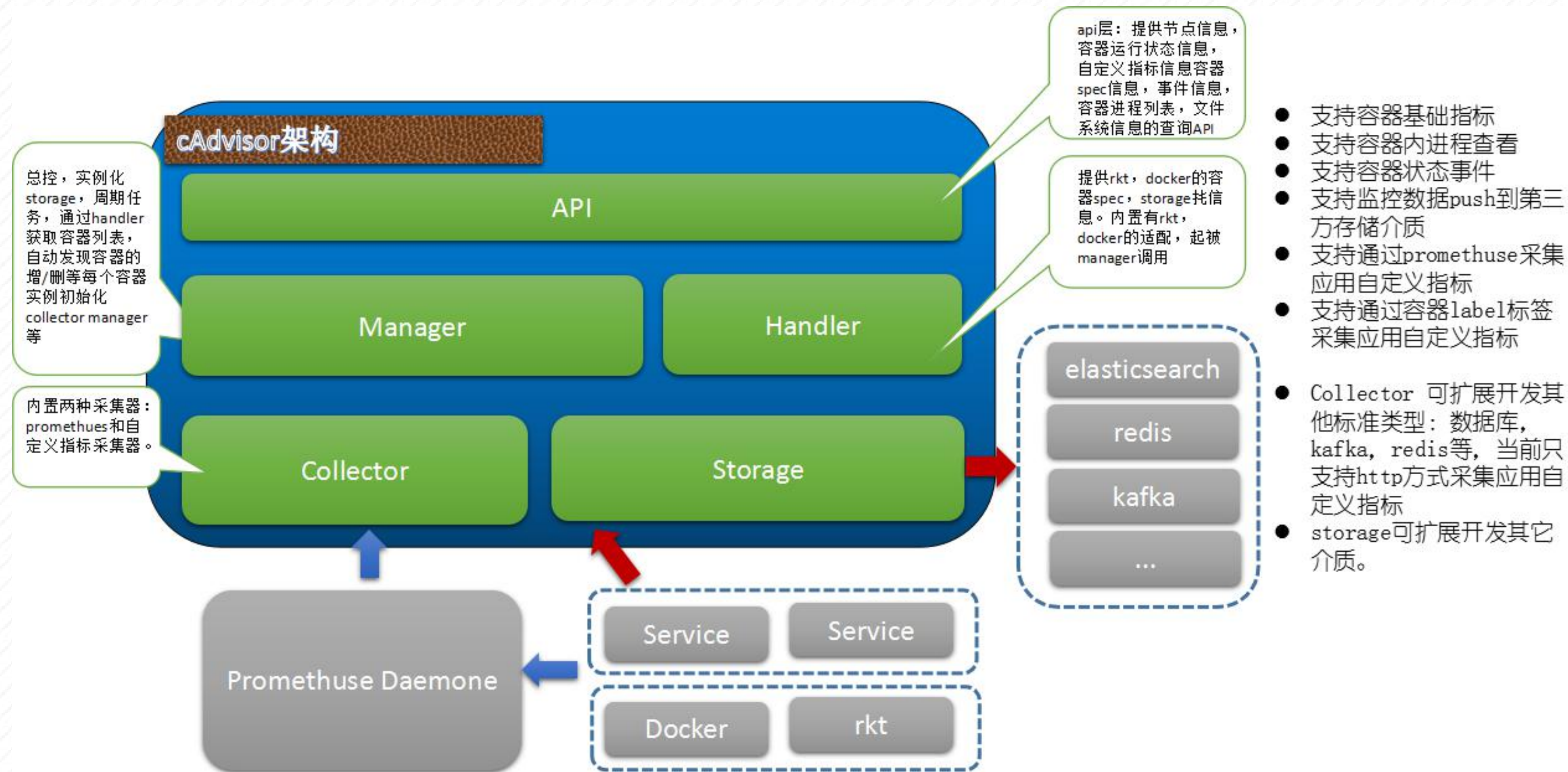
Agent- cAdvisor



cAdvisor是一个来自Google的容器监控工具，也是kubelet内置的容器资源收集工具。它会自动收集本机容器CPU、内存、网络 and 文件系统的资源占用情况，并对外提供cAdvisor原生的API & port 7201



Agent- cAdvisor



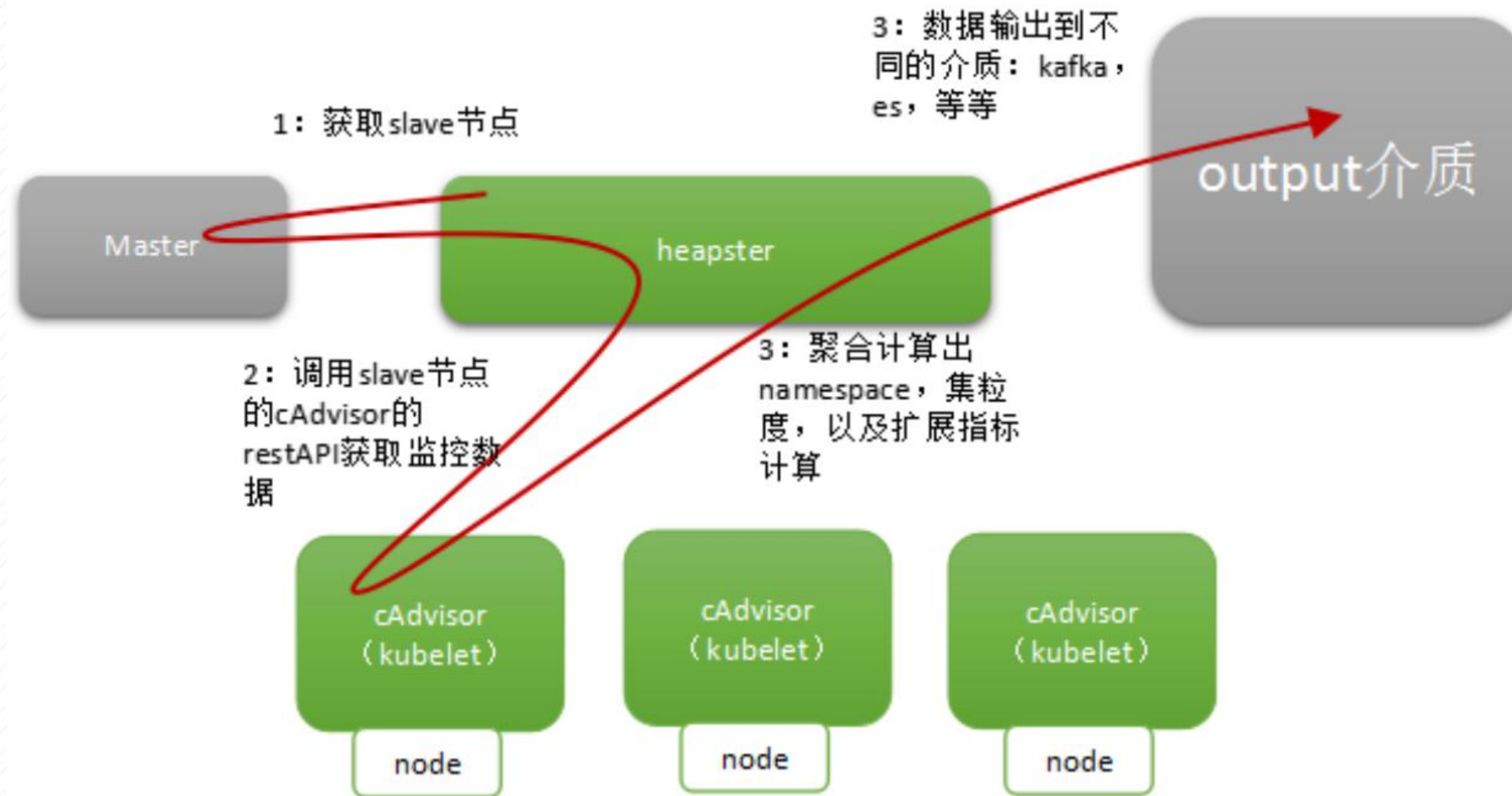
2017-2-26

heapster

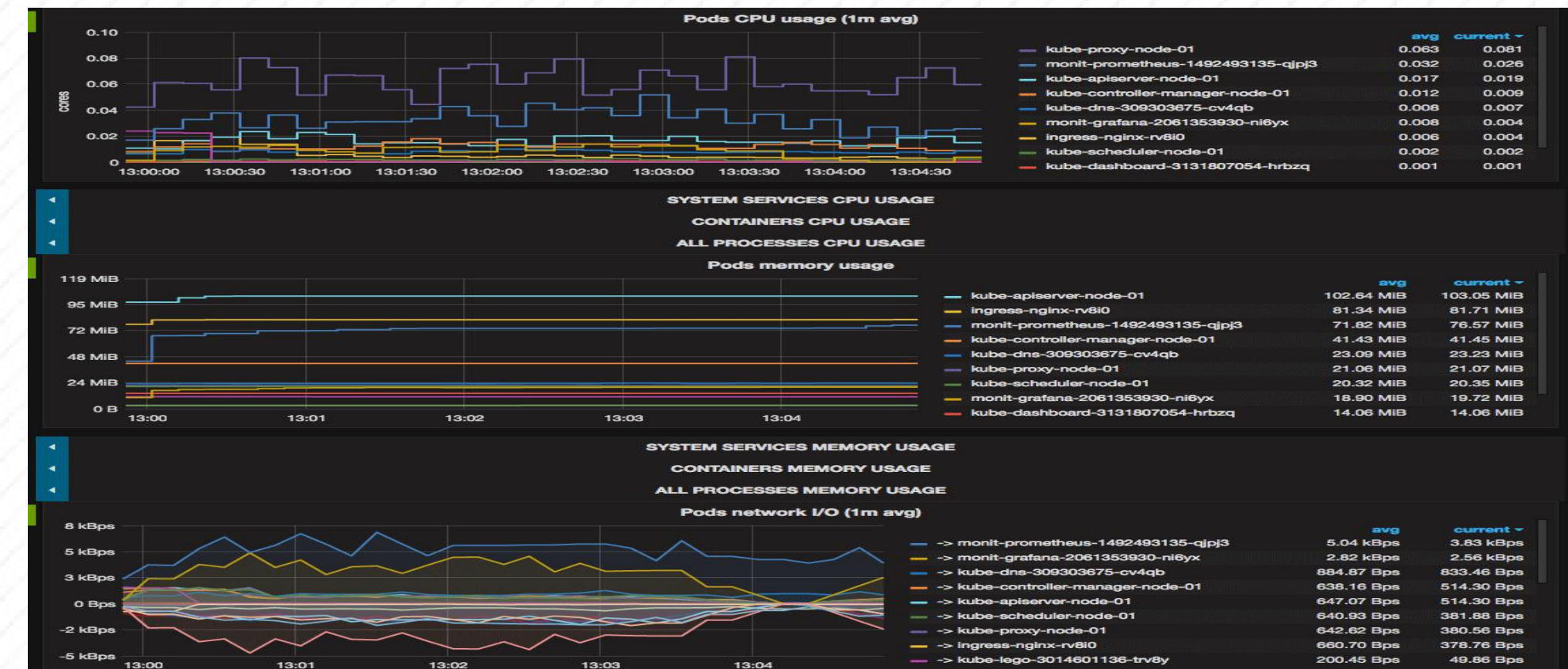
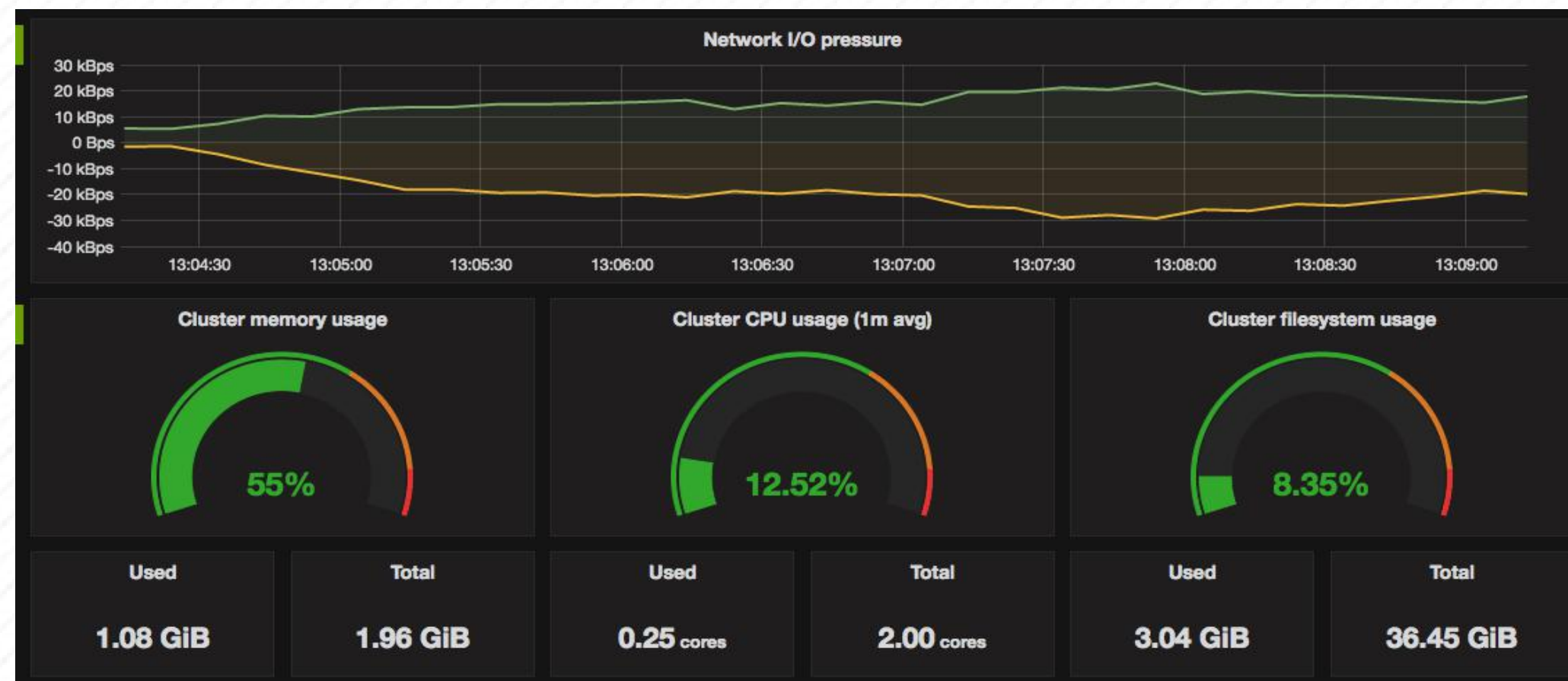
- Heapster collects and interprets various signals like compute resource usage* lifecycle events* etc* and exports cluster metrics via REST endpoints,
- Heapster supports multiple sources of data,
- Heapster supports the pluggable storage backends,

<https://github.com/kubernetes/heapster>

heapster



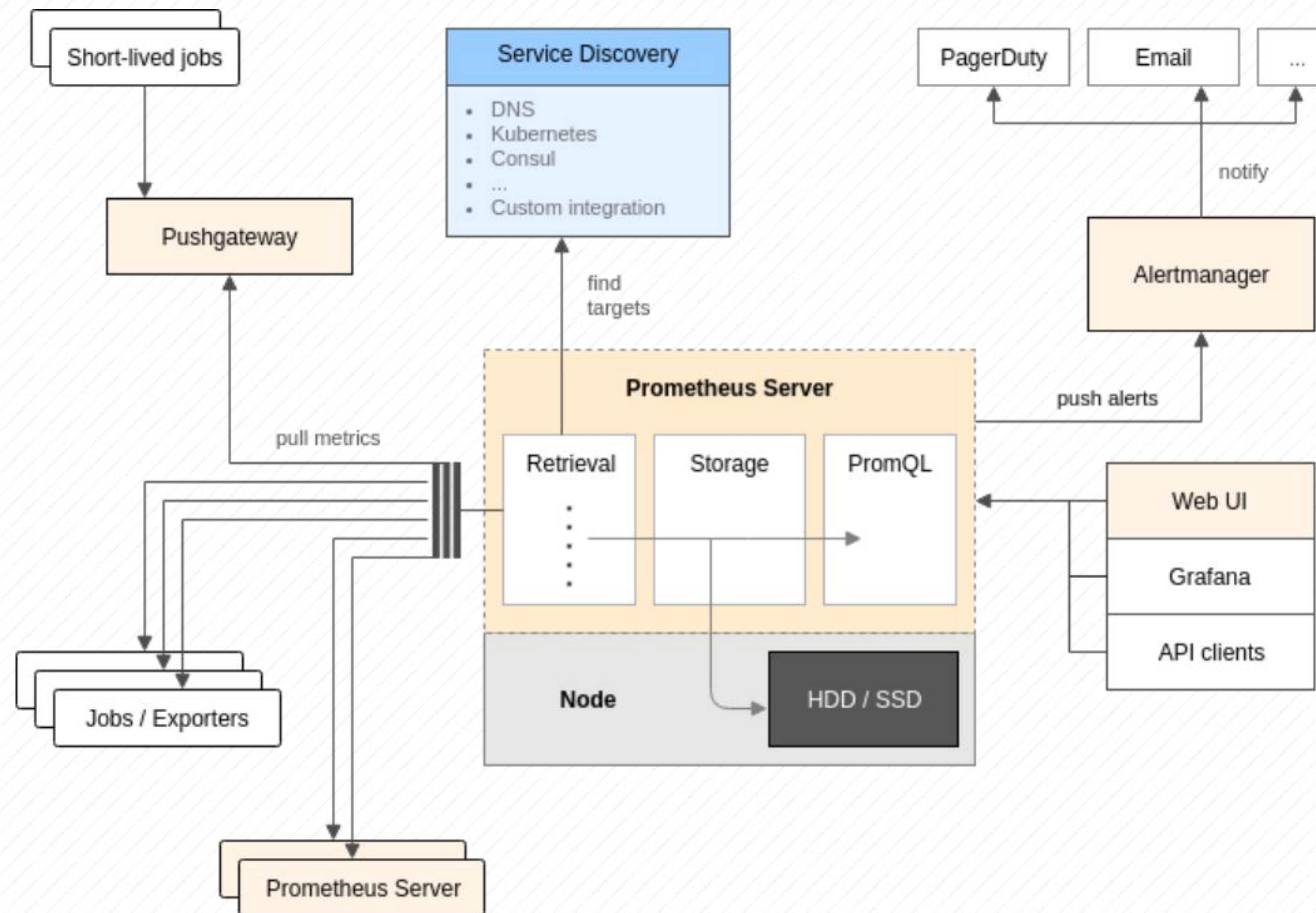
InfluxDB and Grafana



Prometheus

- A Next Generation Monitoring System
- Inspired by google Borgmon monitoring system
- An open- source systems monitoring and alerting toolkit
- Joined the Cloud Native Computing Foundation

Architecture



Prometheus concepts

- Date model

Metric names and labels

`<metric name; { <label name;: <label value;*,,,}`

- Metric types

Counter-Gauge-Histogram-Summary

- Jobs and instances

an endpoint you can scrape is called an instance* usually corresponding to a single process, A collection of instances with the same purpose* a process replicated for scalability or reliability for example* is called a job,

Kubernetes上部署heapster) InfluxDB) Grafana

- kubernetes上部署heapster) InfluxDB) Grafana

<https://github.com/kubernetes/heapster/blob/master/docs/influxdb.md>

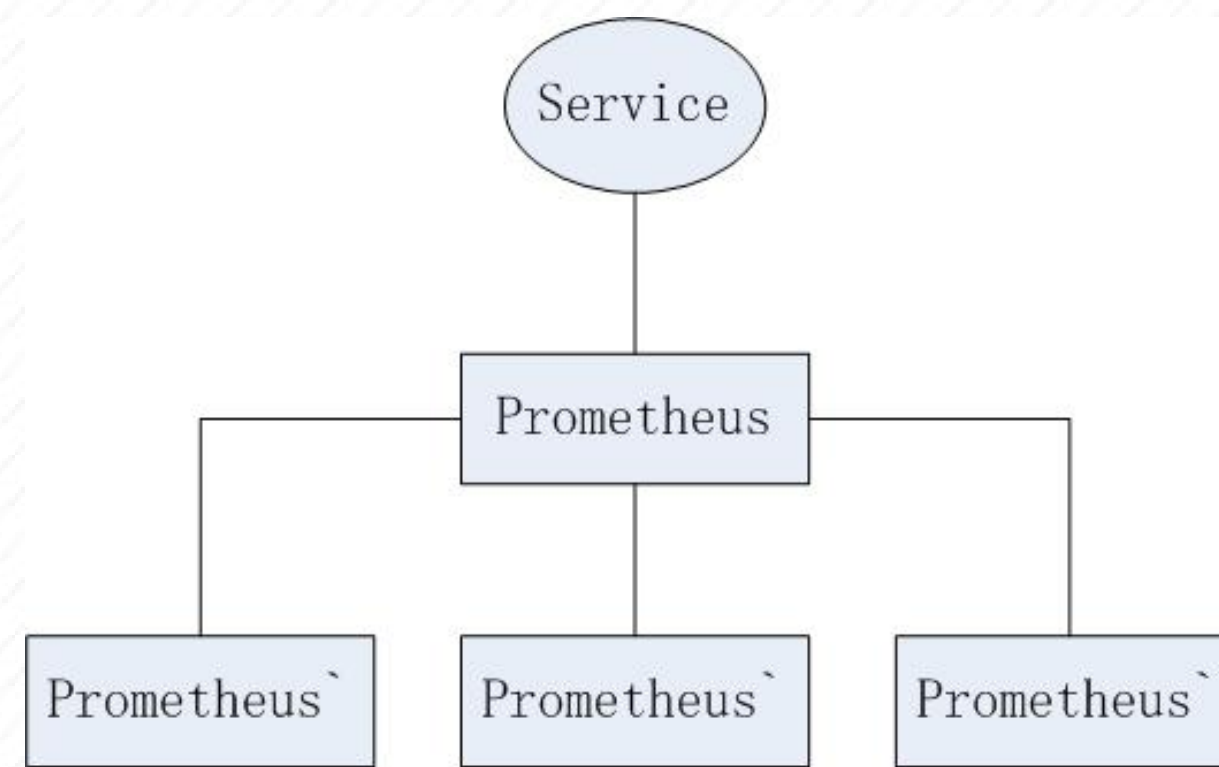
Kubernetes上部署Prometheus

- Kubernetes上部署

<https://github.com/prometheus/prometheus/blob/master/documentation/examples/prometheus-kubernetes.yml>

<https://github.com/kayrus/prometheus-kubernetes>

https://github.com/prometheus/node_exporter



查看Prometheus中endpoint的状态

PrometheusAlertsGraphStatus▼Help

Targets

kubernetes-apiservers

Endpoint	State	Labels
https://10.0.0.5:6443/metrics	UP	instance="10.0.0.5:6443"

kubernetes-nodes

Endpoint	State	Labels
https://10.0.0.5:10250/metrics	UP	beta_kubernetes_io_arch="amd64"
https://10.0.0.6:10250/metrics	UP	beta_kubernetes_io_arch="amd64" beta_kubernetes_io_os="linux" failure_domain_beta_kubernetes_io_region="RegionOne" instance="wb-wzulzz6-kube-minion-jdiyya3fa5do-node-iks3u6a7fllk" kubernetes_io_hostname="wb-wzulzz6-kube-minion-jdiyya3fa5do-node-iks3u6a7fllk" job="kubernetes-nodes"

kubernetes-service-endpoints

Endpoint	State	Labels
http://10.0.0.5:9100/metrics	UP	addonmanager_kubernetes_io_mode="Reconcile" host_ip="10.0.0.5" instance="10.0.0.5:9100" k8s_app="node-exporter" kubernetes_io_cluster_service="true" kubernetes_name="node-exporter" kubernetes_namespace="kube-system" node_name="wb-sn3nc2k-kube-master-ms3sromcwg-g-node-tg4sy3wpuans"
http://10.0.0.6:9100/metrics	UP	addonmanager_kubernetes_io_mode="Reconcile" host_ip="10.0.0.6" instance="10.0.0.6:9100" k8s_app="node-exporter" kubernetes_io_cluster_service="true" kubernetes_name="node-exporter" kubernetes_namespace="kube-system" node_name="wb-wzulzz6-kube-minion-jdiyya3fa5do-node-iks3u6a7fllk"

prometheus

Endpoint	State	Labels
http://localhost:9090/metrics	UP	instance="localhost:9090"

Before relabeling:

address="10.0.0.6:10250"

_meta_kubernetes_node_address_ExternalIP="172.20.0.156"

_meta_kubernetes_node_address_Hostname="wb-wzulzz6-kube-minion-jdiyya3fa5do-node-iks3u6a7fllk"

_meta_kubernetes_node_address_InternalIP="10.0.0.6"

_meta_kubernetes_node_annotation_node_alpha_kubernetes_io_ttl="0"

_meta_kubernetes_node_annotation_volumes_kubernetes_io_controller_managed_attach_detach="true"

_meta_kubernetes_node_label_beta_kubernetes_io_arch="amd64"

_meta_kubernetes_node_label_beta_kubernetes_io_os="linux"

_meta_kubernetes_node_label_failure_domain_beta_kubernetes_io_region="RegionOne"

_meta_kubernetes_node_label_kubernetes_io_hostname="wb-wzulzz6-kube-minion-jdiyya3fa5do-node-iks3u6a7fllk"

_meta_kubernetes_node_name="wb-wzulzz6-kube-minion-jdiyya3fa5do-node-iks3u6a7fllk"

_metrics_path_="/metrics"

scheme="https"

instance="wb-wzulzz6-kube-minion-jdiyya3fa5do-node-iks3u6a7fllk"

instance="wb-sn3nc2k-kube-master-ms3sromcwg-g-node-tg4sy3wpuans"

kubernetes_io_hostname="wb-sn3nc2k-kube-master-ms3sromcwg-g-node-tg4sy3wpuans"

http8- / 50,0. . . , / 3481. . . 4-targets

查看Prometheus中数据模型

Prometheus

Alerts

Graph

Status ▾

Help

node_disk_bytes_read

Load time: 98ms
Resolution: 14s
Total time series: 69

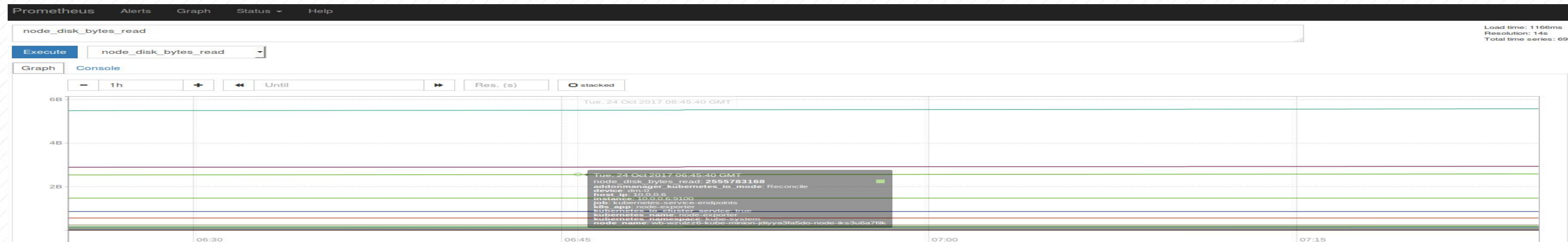
Execute

node_disk_bytes_read ▾

Graph

Console

Element	Value
node_disk_bytes_read{addonmanager_kubernetes_io_mode="Reconcile",device="dm-30",host_ip="10.0.0.6",instance="10.0.0.6:9100",job="kubernetes-service-endpoints",k8s_app="node-exporter",kubernetes_io_cluster_service="true",kubernetes_name="node-exporter",kubernetes_namespace="kube-system",node_name="wb-wzulzz6-kube-minion-jdiyya3fa5do-node-iks3u6a7filk"}	8094720
node_disk_bytes_read{addonmanager_kubernetes_io_mode="Reconcile",device="dm-23",host_ip="10.0.0.6",instance="10.0.0.6:9100",job="kubernetes-service-endpoints",k8s_app="node-exporter",kubernetes_io_cluster_service="true",kubernetes_name="node-exporter",kubernetes_namespace="kube-system",node_name="wb-wzulzz6-kube-minion-jdiyya3fa5do-node-iks3u6a7filk"}	153722880



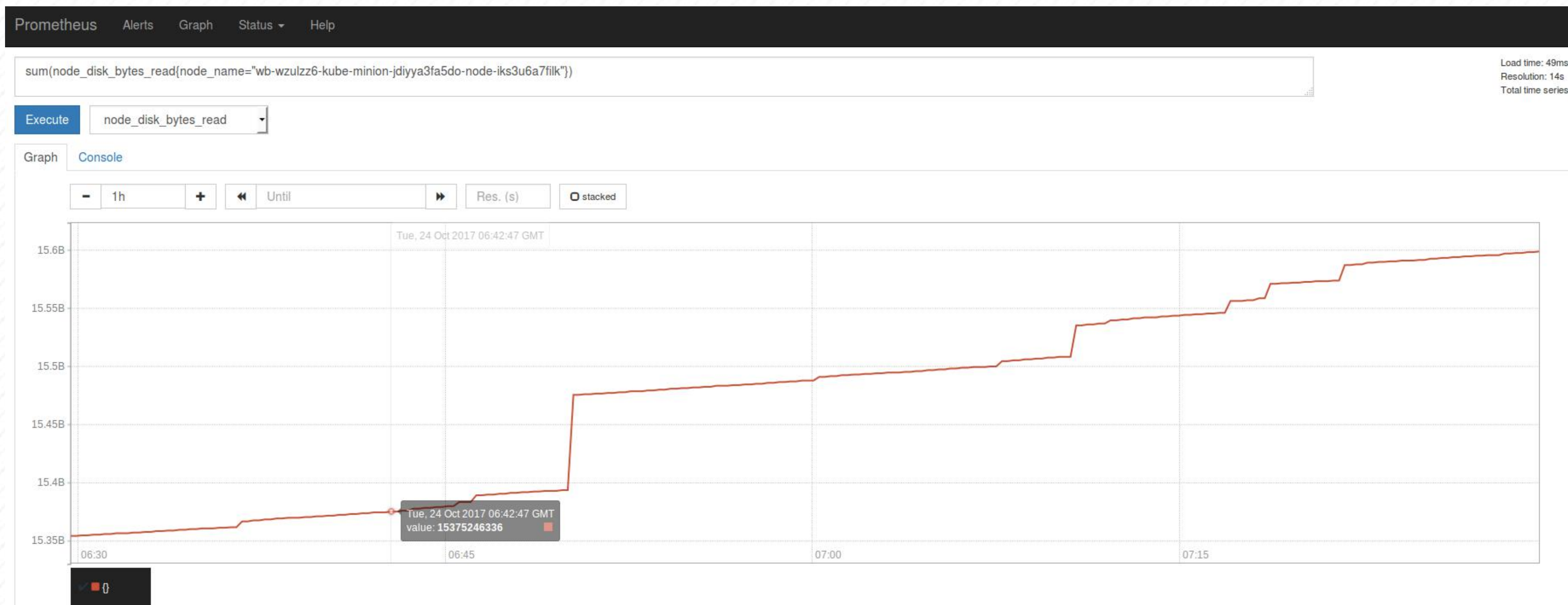
查看Prometheus中数据模型

<metric name;{<label name;: <label value;*,,,}

```
node_disk_bytes_read{addonmanager_kubernetes_io_mode: "Reconcile"*  
device: "dm-
```

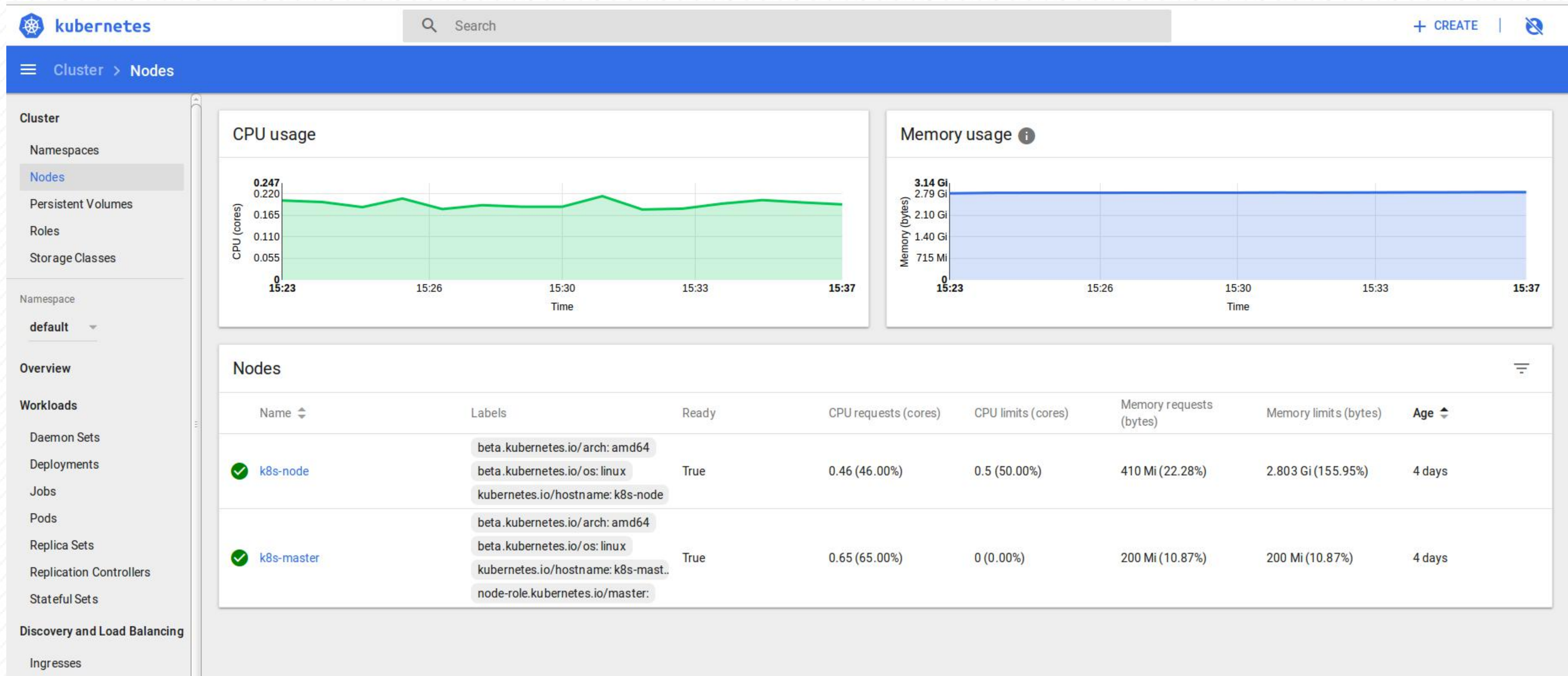
```
1. "*"host_ip: "/" . . . ,4"*instance: "/" . . . ,487/ . . "*"job: "kubernetes-  
service- endpoints"*k6s_app: "node-  
exporter"*kubernetes_io_cluster_service: "true"*kubernetes_name: "node  
- exporter"*kubernetes_namespace: "kube- system"*node_name: "wb-  
wzulzz4- kube- minion- jdiyya1fa3do- node- iks1u4a5filk"}
```

Prometheus中的数据模型



`sum(node_disk_bytes_read{node_name: "wb- wzulzz4- kube- minion-
jdiyya1fa3do- node- iks1u4a5filk"})`

如何在Kube_dashboard中增加监控指标



如何在Kube_dashboard中增加监控指标

- 在kube_dashboard中扩展使用goclient来获取Prometheus中的数据
- 扩展kube_dashboard的前端界面展示prometheus中的数据
- 重新制作dashboard的 i m a g e，更新到kubernetes集群中



THANK YOU
