

Kubernetes 完全教程

Kubernetes 的监控日志以及故障排查

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Agenda

1. Kubernetes 的监控与日志收集

- 监控
- 日志收集

2. Kubernetes 的故障排查

- 故障排查工具
- 集群相关故障
- 应用程序相关故障

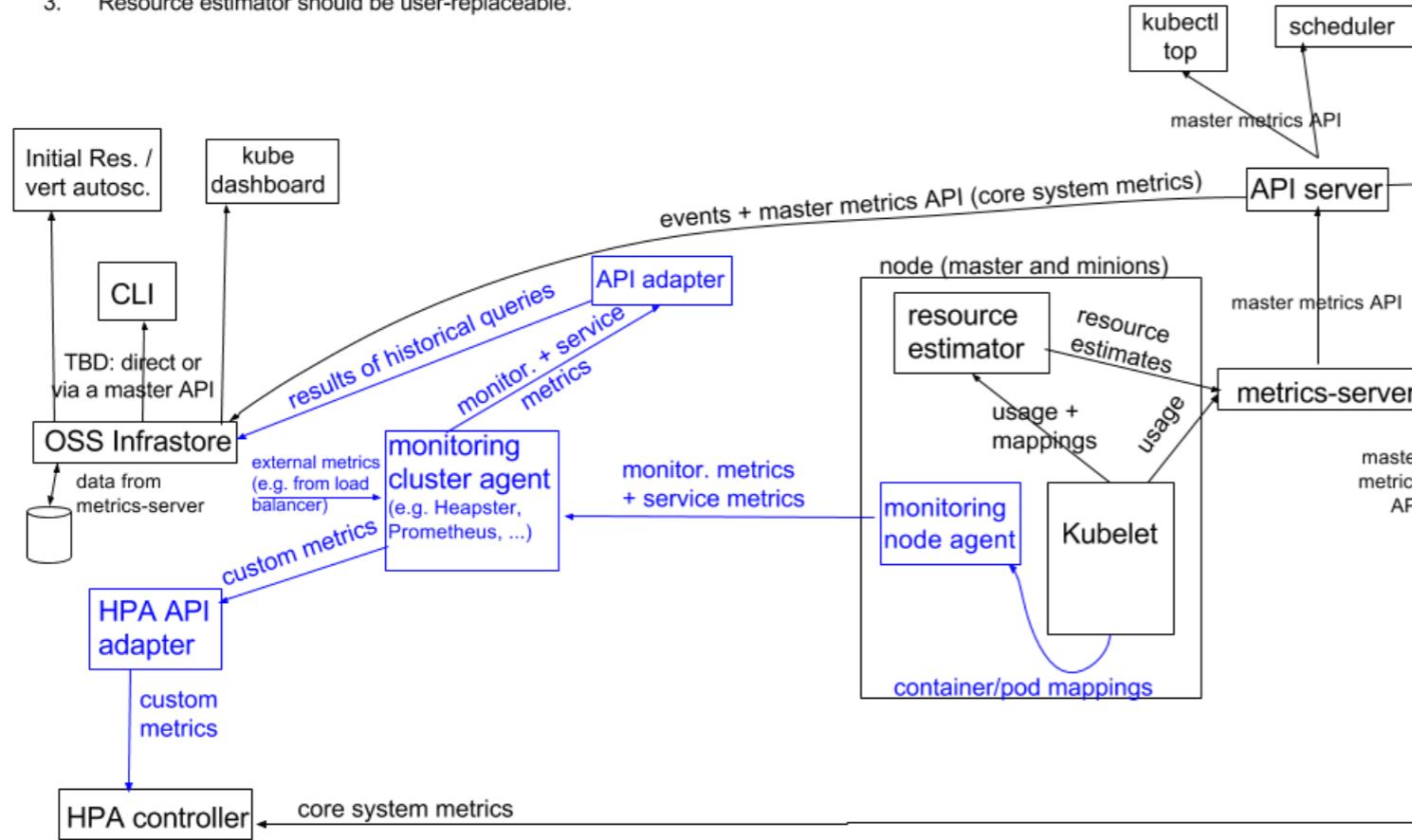
Kubernetes 监控概览

Monitoring architecture proposal: OSS

(arrows show direction of metrics flow)

Notes

1. Arrows show direction of metrics flow.
2. **Monitoring pipeline is in blue**. It is user-supplied and optional.
3. Resource estimator should be user-replaceable.

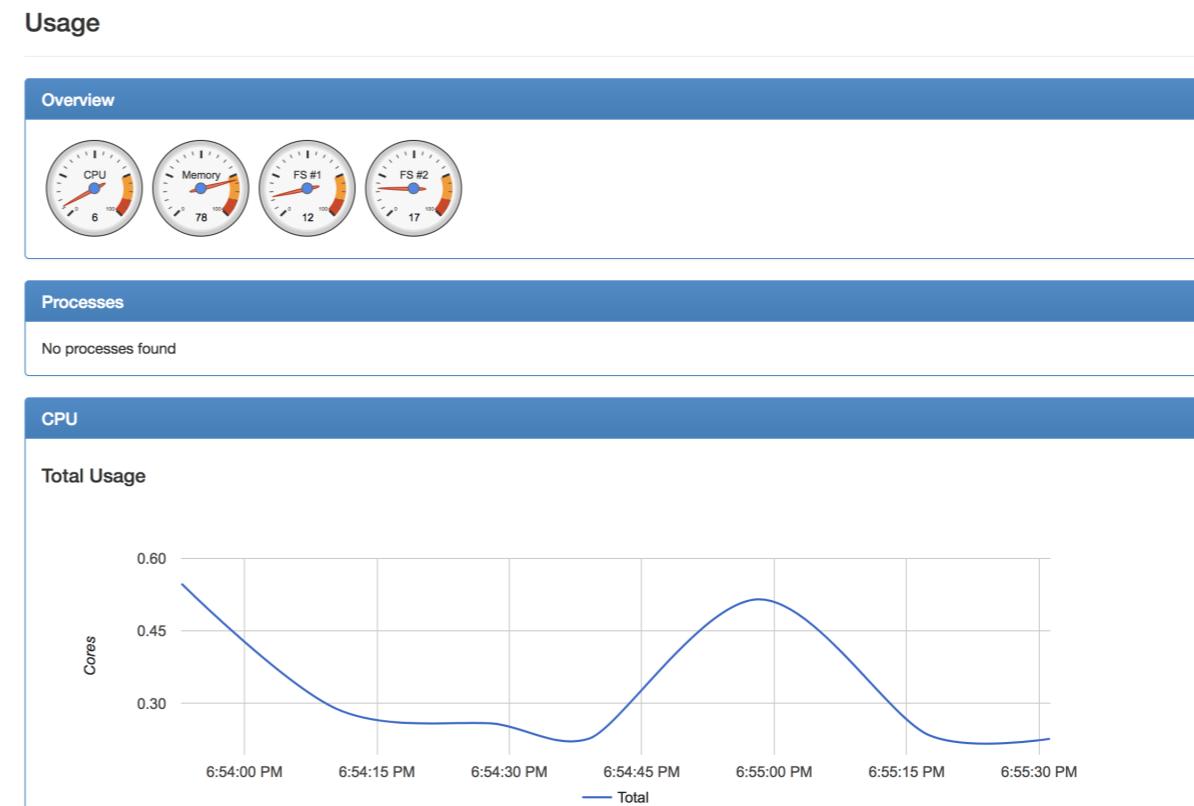


Kubernetes 监控涉及的组件

1. Cadvisor
2. Kubelet Stats/Metrics API
3. Heapster
4. 自定义监控数据和自动伸缩
5. Kube-state-metrics
6. Prometheus
7. Grafana

Cadvisor

- <https://github.com/google/cadvisor>
- <http://nodeip:4194/>
 - ContainerState
 - PodState
 - ImageFS

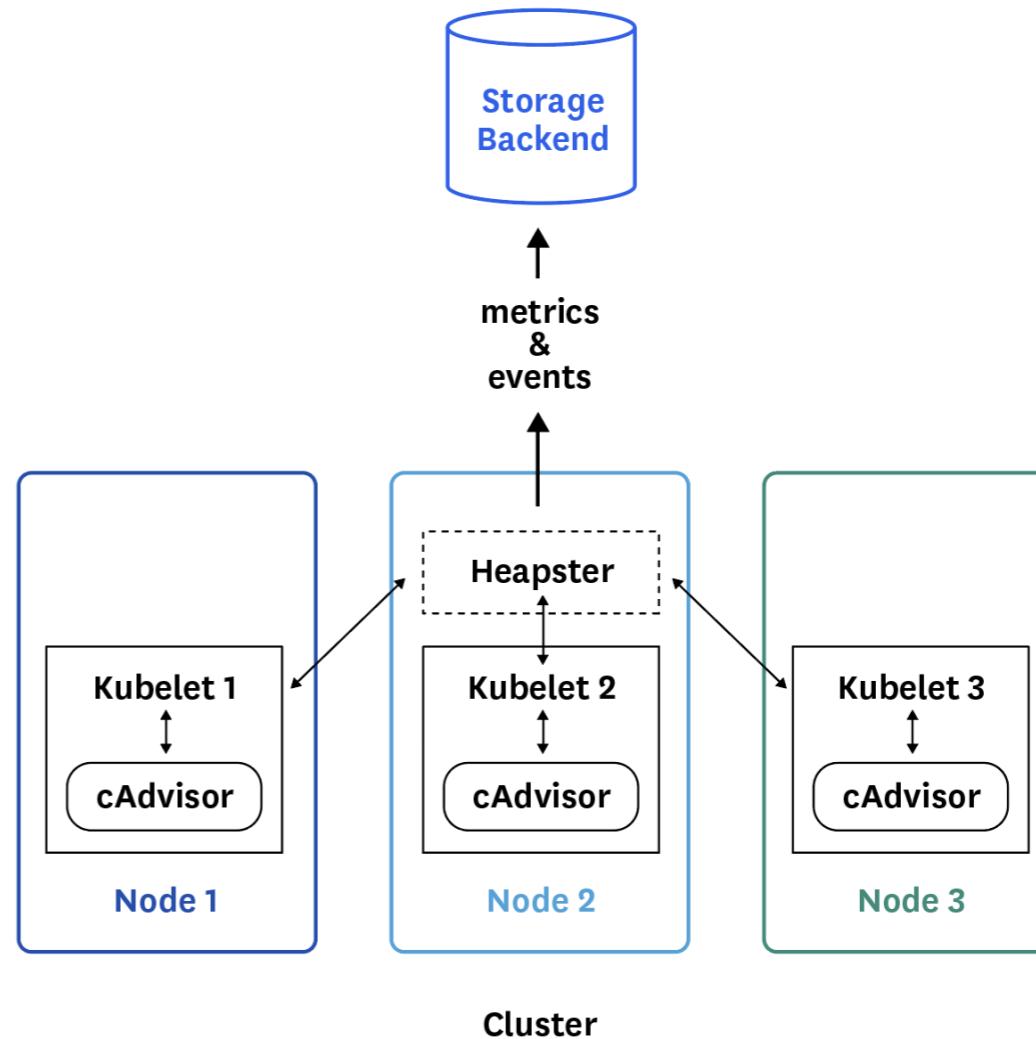


Kubelet State API

- <https://nodeip:10250/stats/>
 - /container/
 - /summary/
- <https://nodeip:10250/metrics/>
- 数据项
 - filesystem
 - network
 - cpu
 - memory

Heapster

- Backend(Sinks)
 - elasticsearch
 - influxdb
 - kafka
 - opentsdb
 - stackdriver
- Kube-state-metrics
生成新的 metrics



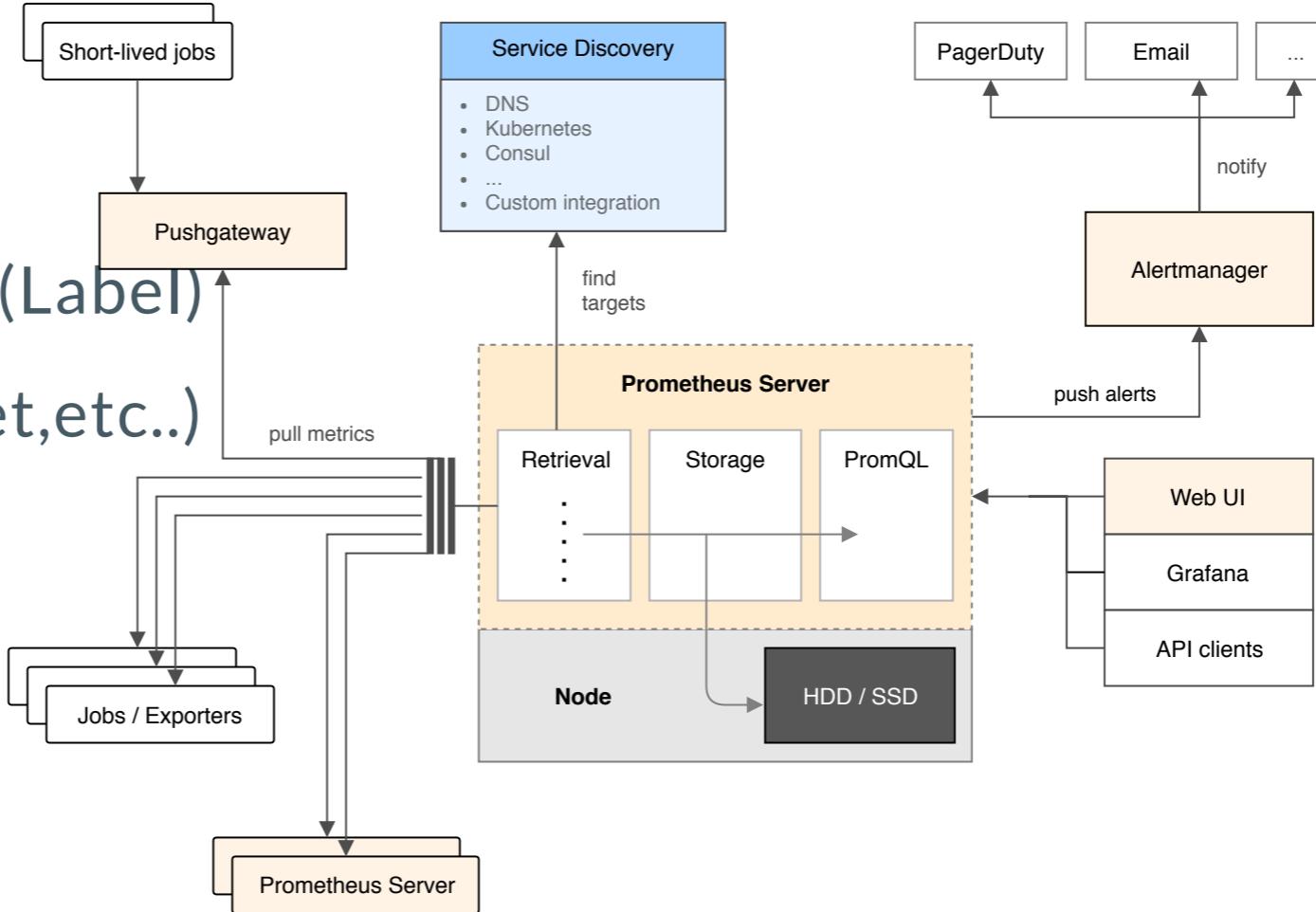
<https://www.datadoghq.com/blog/how-to-collect-and-graph-kubernetes-metrics/>

自定义监控数据和自动伸缩

- [Arbitrary/Custom Metrics in the Horizontal Pod Autoscaler](#)
- 基于自定义 API 机制
- 早期的 Custom Metrics 已经废弃

Prometheus

- Metrics Type
- Metrics Data Model(Label)
- Metrics SDK(Kubelet,etc..)
- Metrics Storage
- Metrics Query
- AlertManager
- Web UI



<https://github.com/prometheus/prometheus>

Kubernetes 日志概览

- Container Log
- Kubectl log
- 日志收集工具

Container Log

- Container stdout/stderr
- Docker Logger Driver (**syslog, journal, json-file**)
- Log Sidecar

```
name: logsidecar
image: busybox:1.27.1
args: [/bin/sh, -c, 'tail -n+1 -F /var/log/logdir/logfile']
```

Kubectl log

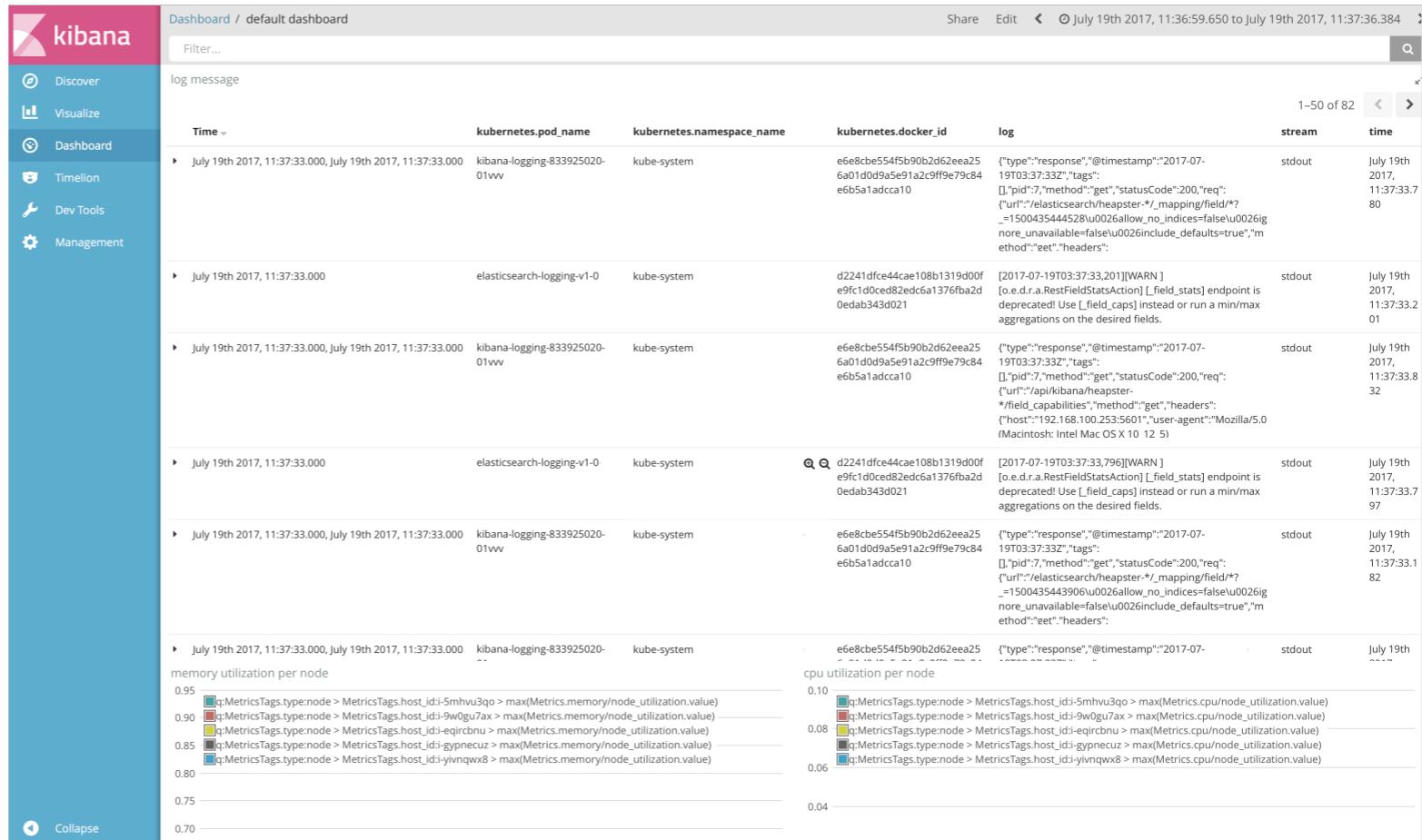
- Kubelet log api
 - <https://nodeip:10250/logs/pods/>
- Pod log: /var/log/containers/<pod_name><*pod_namespace*><container_name>-<container_id>.log

日志收集工具

- fluent/fluent-bit
 - <http://fluentbit.io/>
 - DaemonSet
 - Mount host /var/log
 - kubernetes filter (lables/annotations)
- filebeat
 - <https://github.com/elastic/beats>

监控日志汇总存储查询

- Elasticsearch
- HDFS
- Kafka
- Kibana
- Grafana



Kubernetes 故障排查

- 故障排查工具
- 集群相关故障
- 应用程序相关故障

故障排查工具

- kubectl describe
- kubectl logs
- kubectl exec
- Toolbox docker image
- 网络诊断工具

集群相关故障

- 网络与 ClusterIP (参看第三课 Kubernetes 的网络和存储)
- Kubernetes 系统日志
- 节点变为 NoReady

应用程序相关故障

- kubectl apply/create 报错
 - apiserver 和 etcd
 - 排查参数和yaml (api 版本)

```
Deployment in version "v1beta2" cannot be handled as a Deployment:  
no kind "Deployment" is registered for version "apps/v1beta2"
```

- 通过 kubectl api-versions 确认当前集群支持的版本
- 排查 Admission 设置
- 提交 Deployment 成功，但通过 kubectl 看不到 pod
 - 确认 controller-manager 状态

应用程序相关故障

- Pod 一直是 Init:XX 状态
 - 排查 init-container
- Pod 一直是 Pending 状态
 - 通过 kubectl describe 查看 event，确认具体原因
- Pod 一直是 ContainerCreating 状态
 - 确认镜像以及镜像仓库（墙）
- Pod 一直 CrashLoopBackOff
 - 确认镜像的 command 以及 arg 设置正确
 - 通过 kubectl log/kubectl log --previous 查看具体的日志错误

Kubernetes Debug Container

- [Propose a feature to troubleshoot running pods](#)
- <https://github.com/kubernetes/kubernetes/pull/46243>
- Kubernetes 1.9

```
kubectl debug -c debug-shell --image=debian target-pod -- bash
```

总结

对 Kubernetes 的监控与日志有一个整体的了解，以及熟悉解决 Kubernetes 故障的方式

演示

Kubernetes 的日志与监控

- cAdvisor
- <https://github.com/QingCloudAppcenter/kubernetes/tree/master/k8s/addons/monitor>

作业

1. 通过 Kubernetes 搭建一个监控与日志收集分析系统，可以参考：<https://github.com/QingCloudAppcenter/kubernetes/tree/master/k8s/addons/monitor>
2. 试图去看一下 Kubernetes 的源码，初步了解一下 Kubernetes 插件开发相关的知识

关于我

个人博客: <http://jolestar.com>

课程 Github: <https://github.com/jolestar/kubernetes-complete-course>

课程 QQ 群: 451252952



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