

# **Kubernetes 完全教程**

## **Kubernetes 的监控日志以及故障排查**

**王渊命 @jolestar**

# 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

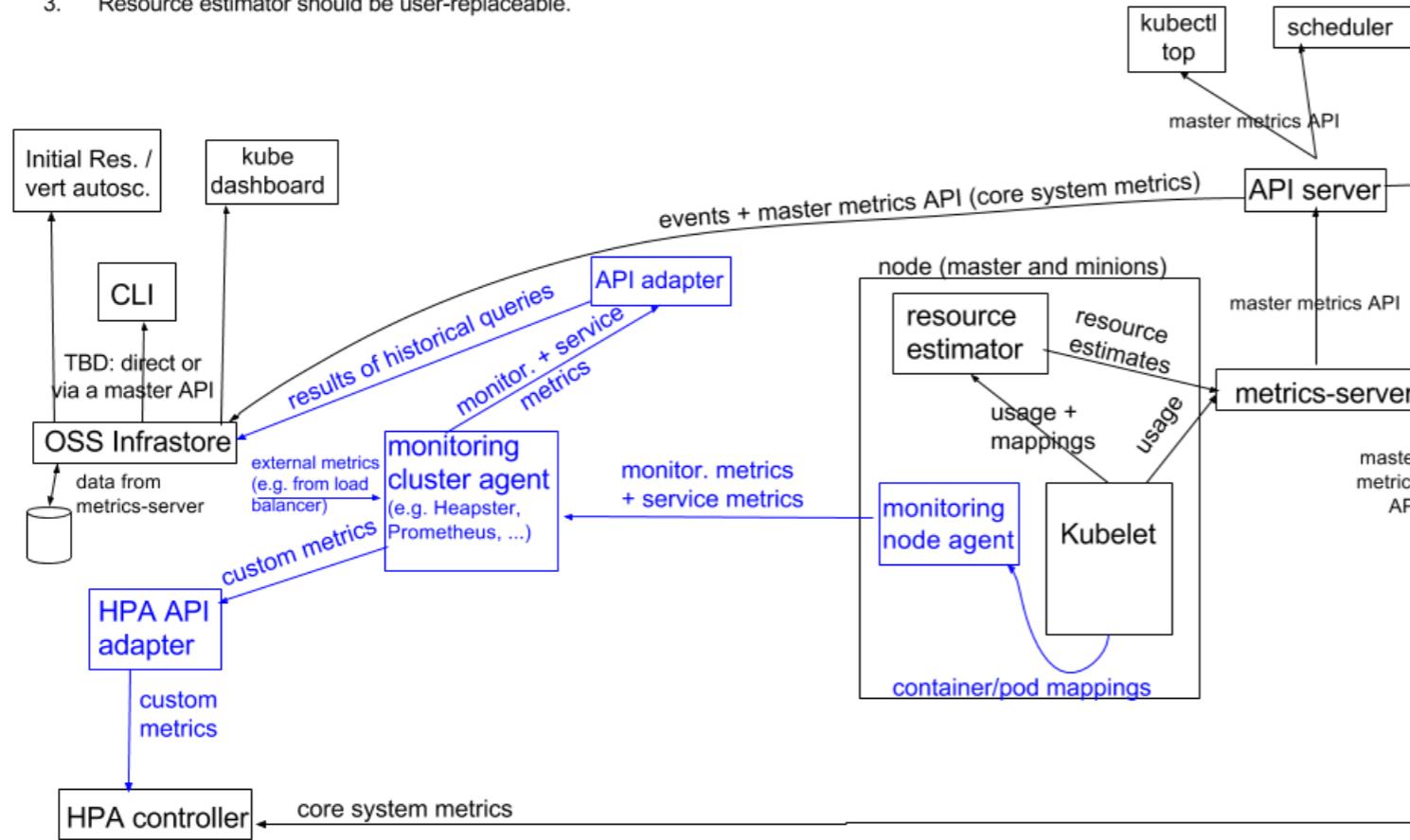
# Kubernetes 监控概览

## 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.

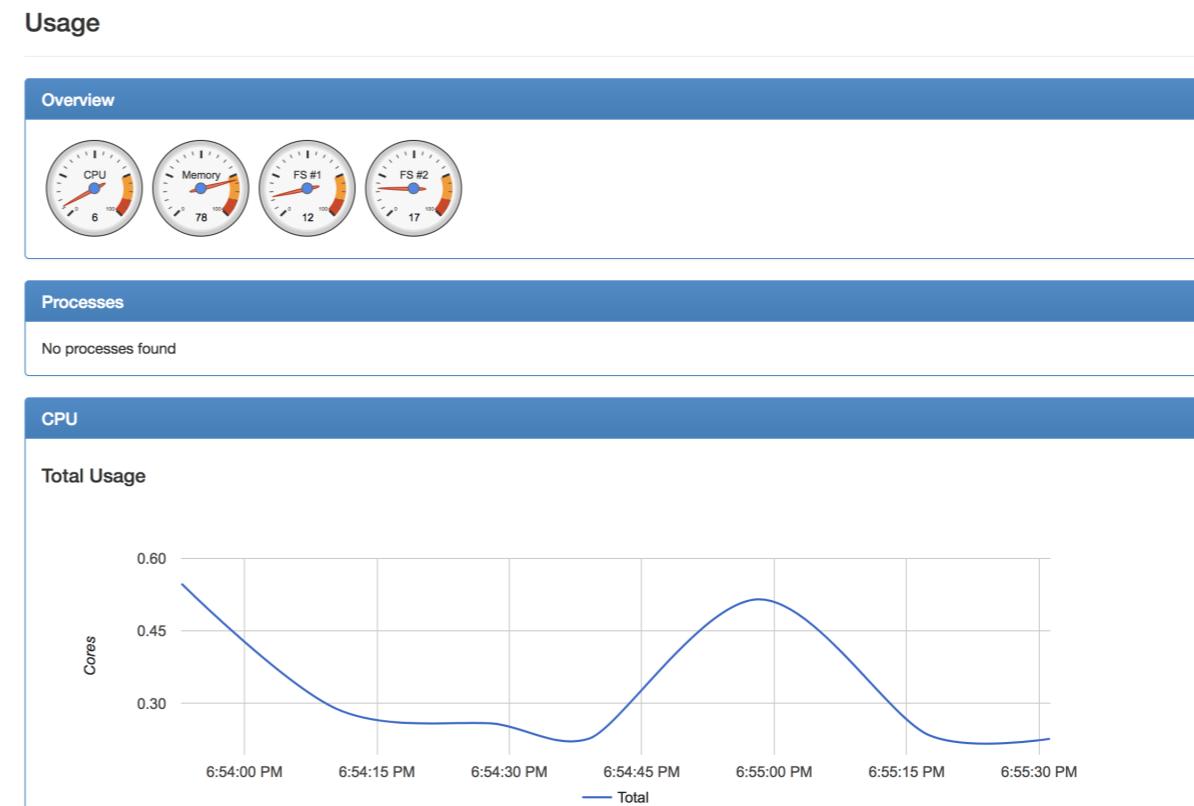


# Kubernetes 监控涉及的组件

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

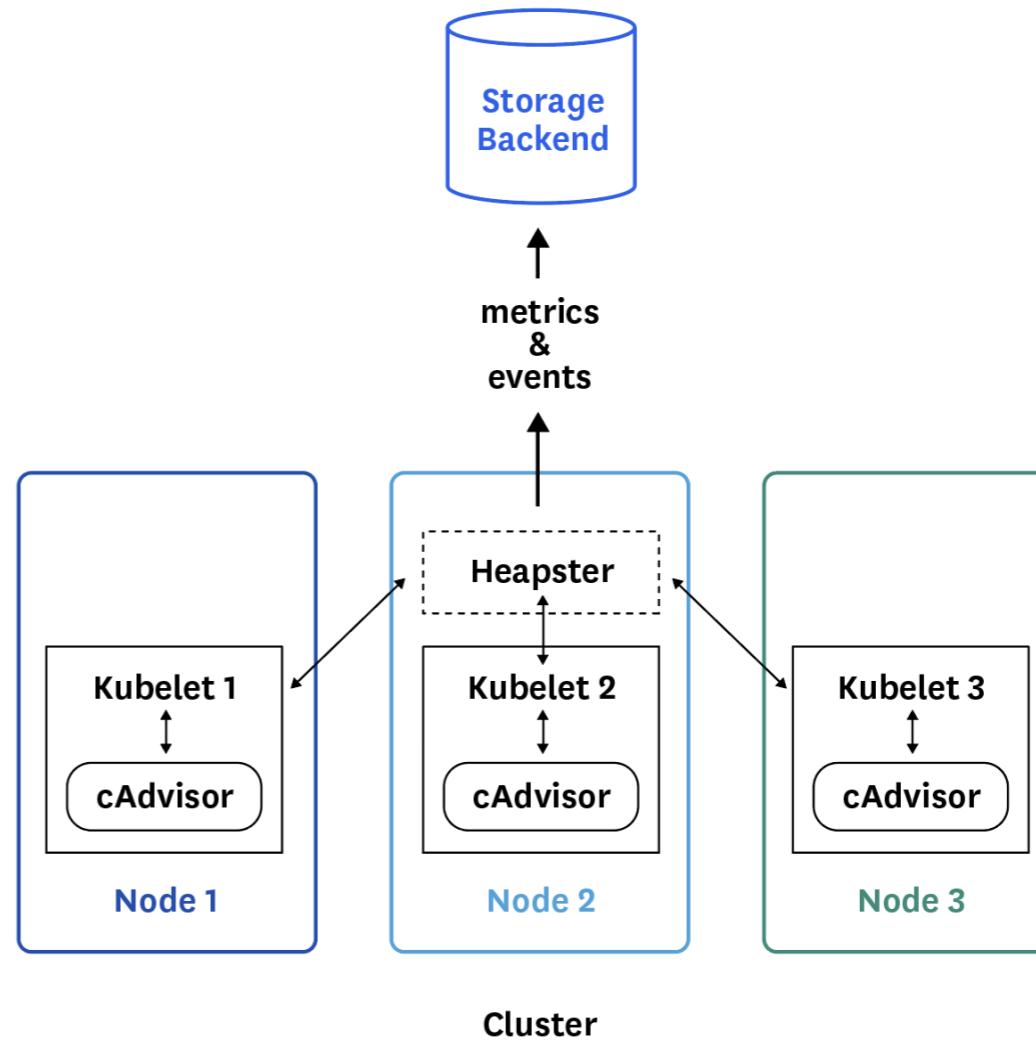


# Kubelet State API

- <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



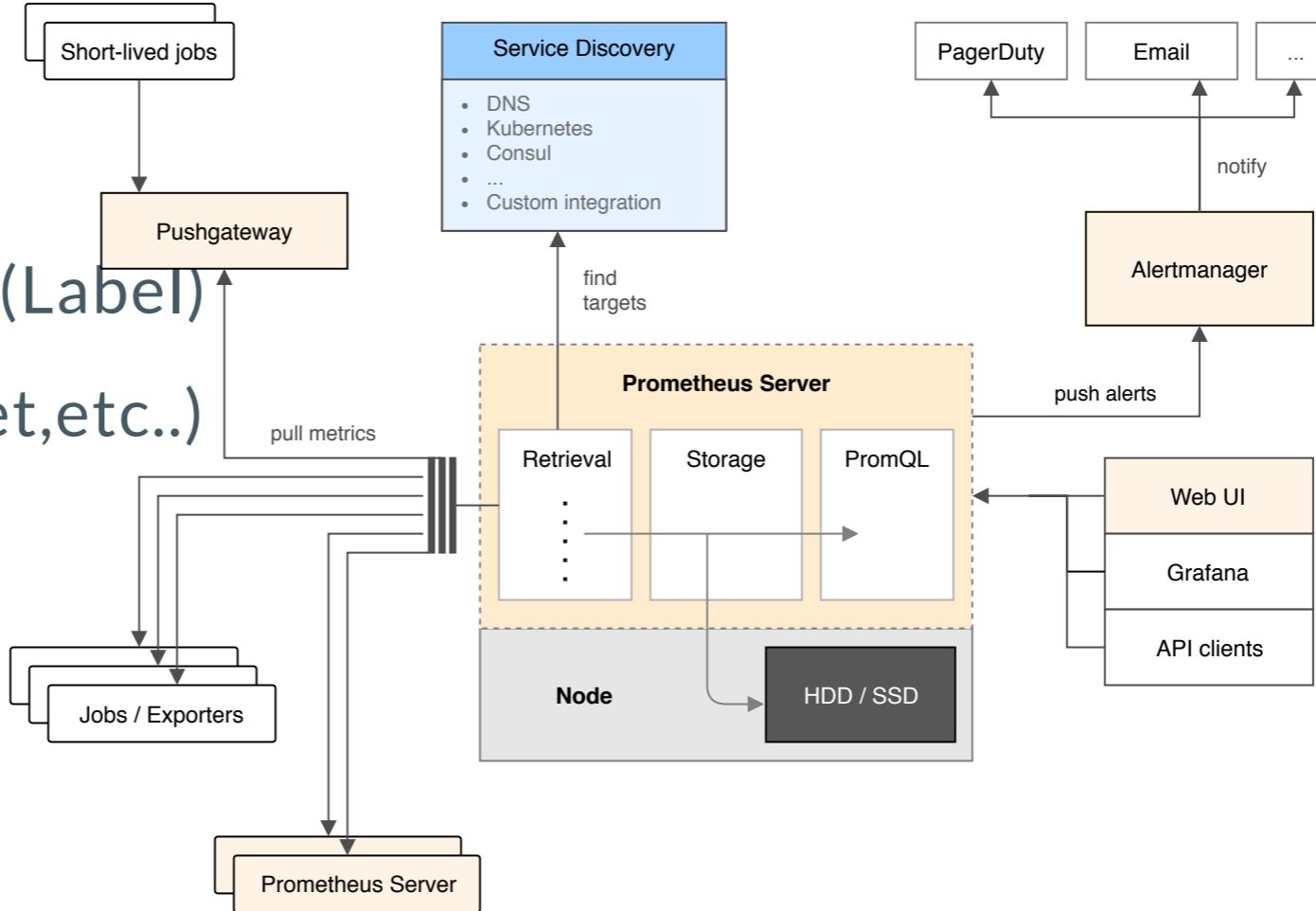
<https://www.datadoghq.com/blog/how-to-collect-and-graph-kubernetes-metrics/>

# 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

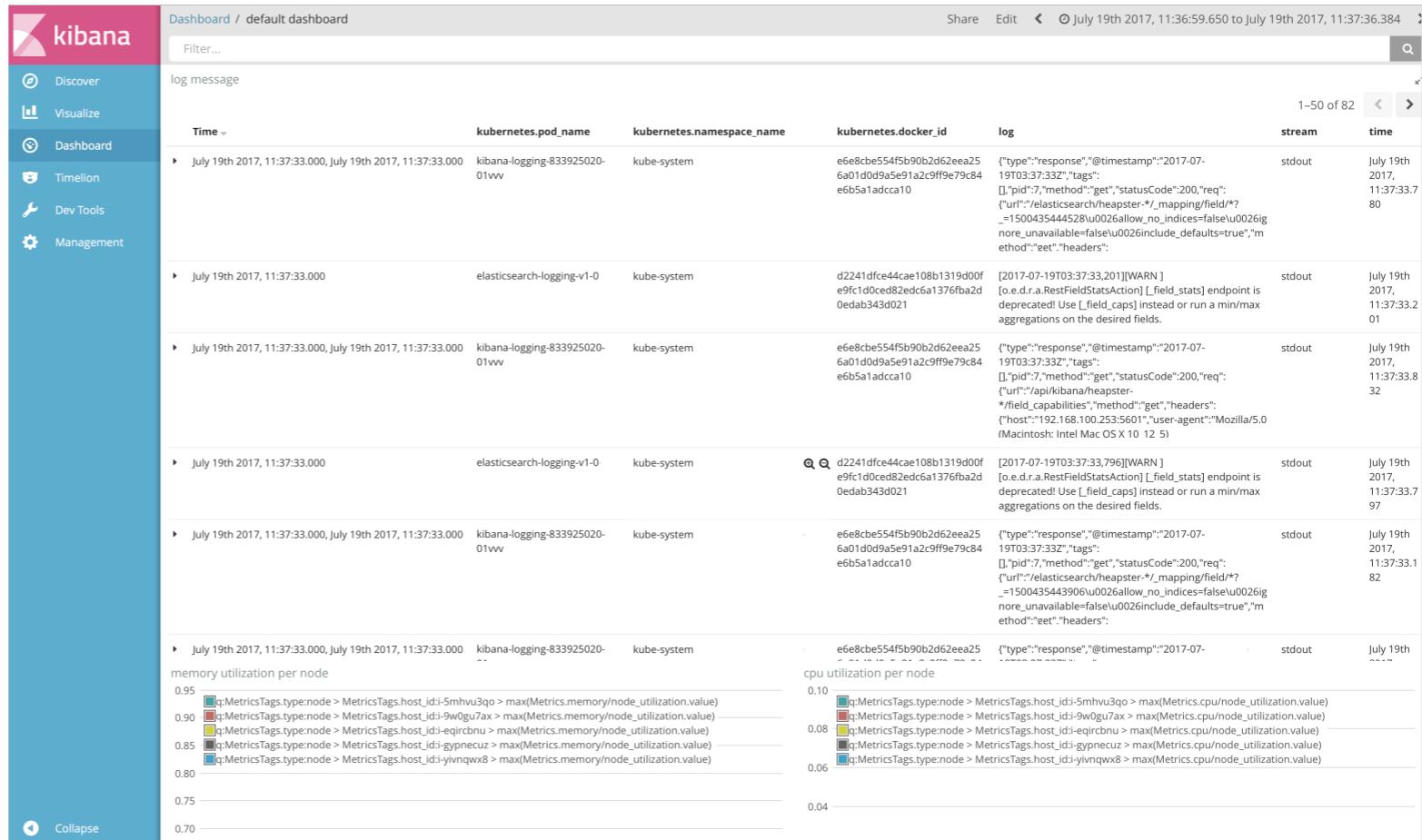
- Kubelet log api
  - <https://nodeip:10250/logs/pods/>
- Pod log: /var/log/containers/<pod\_name><*pod\_namespace*><container\_name>-<container\_id>.log

# 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

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个人博客: <http://jolestar.com>

课程 Github: [<https://github.com/jolestar/kubernetes-complete-course>]  
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课程 QQ 群: 451252952



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