Kubernetes监控与日志

时速云 – 赵宇

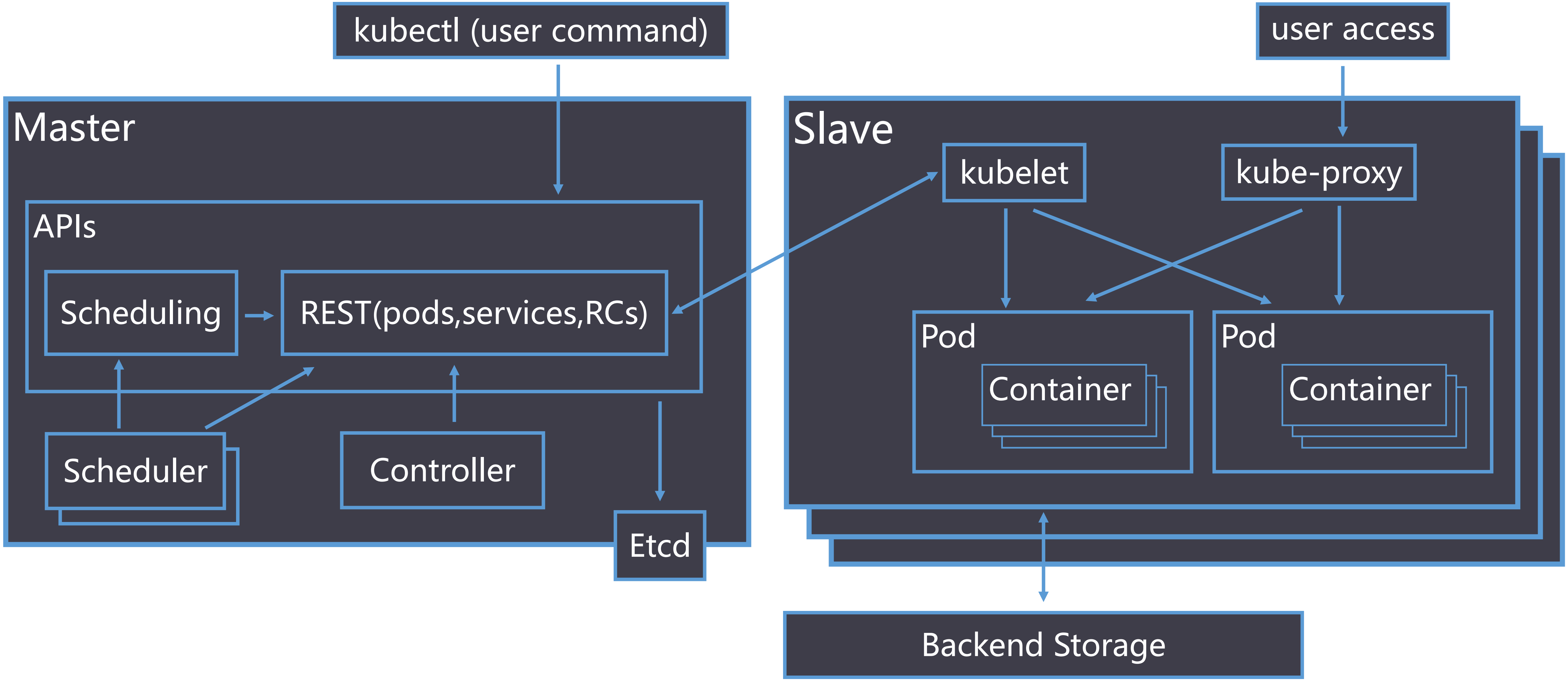
Agenda

- Kubernetes Summary
  - Features
  - Architecture
- Kubernetes Monitor
  - Resource Monitor
  - Service Monitor
- Kubernetes Logging
  - Fluentd
  - Elasticsearch
  - Flow
- 时速云平台实践

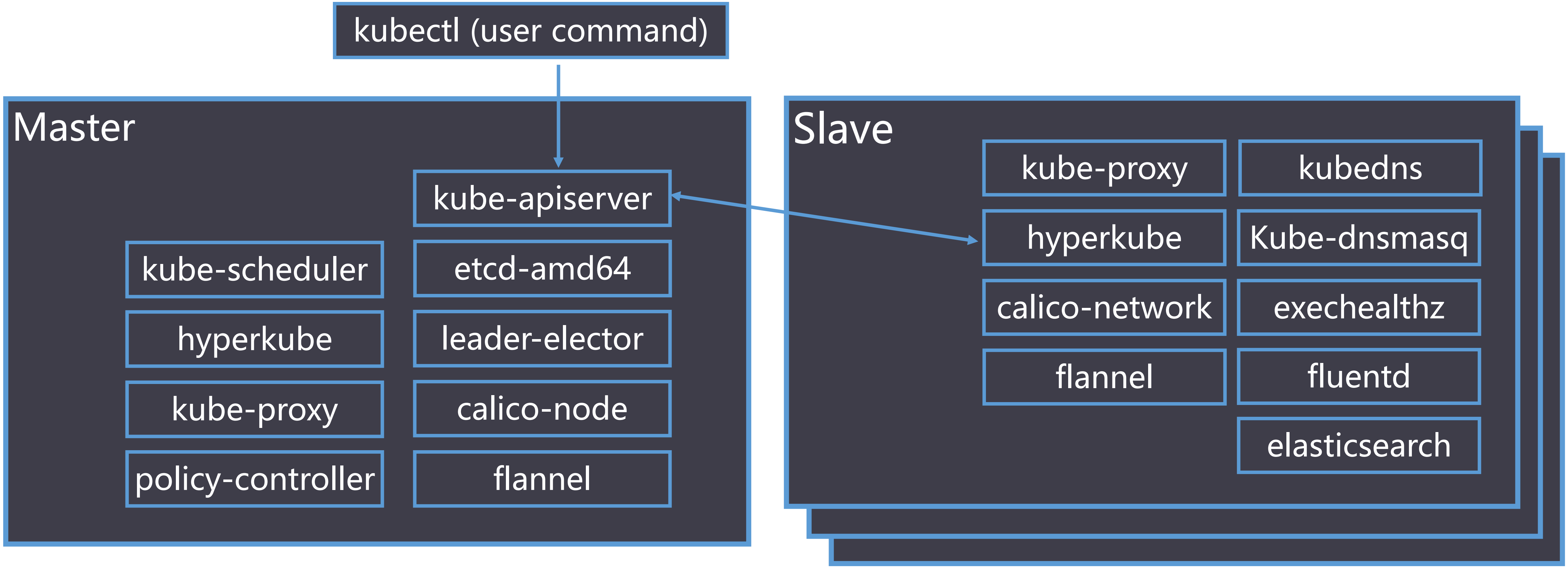
Features

- ✓ 资源管控
- ✓ 横向扩展
- ✓ 服务管理
- ✓ 数据持久化
- ✓ 自动化运维
- ✓ 服务发现和LB
- ✓ 安全&配置
- ✓ 工作任务

Architecture



Architecture

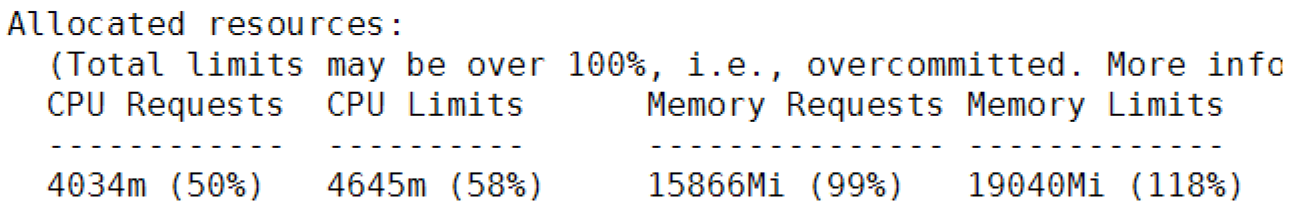


Agenda

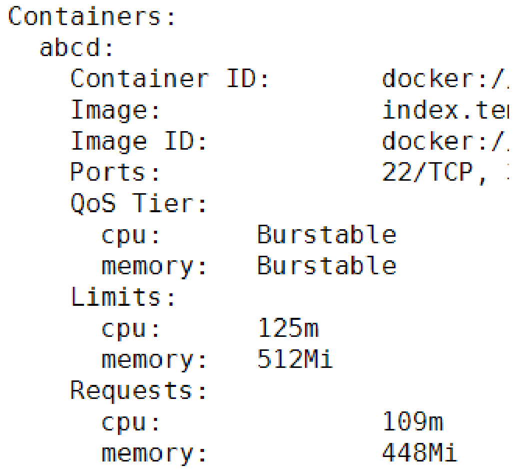
- Kubernetes Summary
  - Features
  - Architecture
- Kubernetes Monitor
  - Resource Monitor
  - Service Monitor
- Kubernetes Logging
  - Fluentd
  - Elasticsearch
  - Flow
- 时速云平台实践

Resource Monitor

- Resource
  - ✓ Cpu：1 core = 1000m
  - ✓ Memory：measured by bytes, 128MiB
- Container：利用容器自身限制
- Pod：限制系统内创建Pod的资源
- Namespace：用户级别的资源限制，项目更多，configmaps， pods ，svc…
- 查看资源：kubectl describe po/no --namespace=**



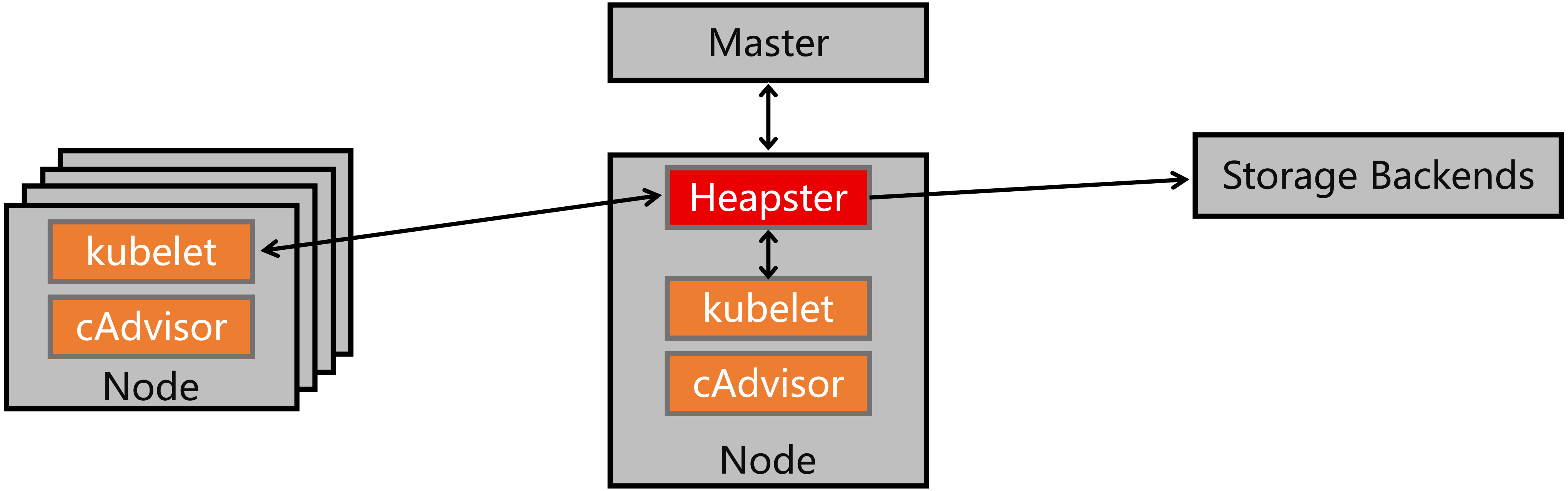
```
Allocated resources:
  (Total limits may be over 100%, i.e., overcommitted. More info
  CPU Requests   CPU Limits      Memory Requests Memory Limits
  ------------   ----------      --------------- -------------
  4034m (50%)    4645m (58%)     15866Mi (99%)   19040Mi (118%)
```



```
Containers:
  abcd:
    Container ID:       docker:/
    Image:              index.te
    Image ID:           docker:/
    Ports:              22/TCP,
    QoS Tier:
      cpu:      Burstable
      memory:   Burstable
    Limits:
      cpu:      125m
      memory:   512Mi
    Requests:
      cpu:              109m
      memory:           448Mi
```

Resource Monitor

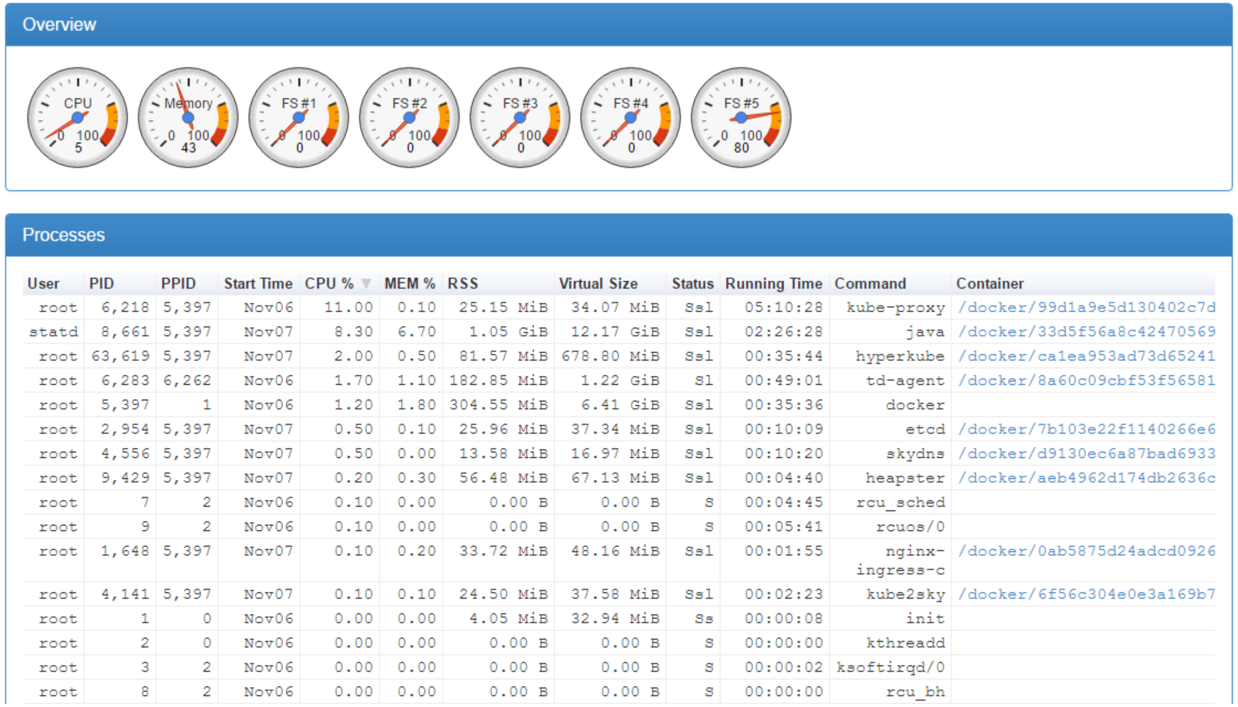
- 资源监控主要由kubelet，heapster和storage backends（如Influxdb）构成。Heapster可以在集群范围获取metrics和事件数据。它可以以pod的方式运行在集群中，也可以单独运行
- kubelet 从cAdvisor获取数据，heapster组织数据和推送数据到后端存储InfluxDB。cAdvisor不但可以统计节点上每个容器的资源情况，还提供整个节点的资源使用情况。



Resource Monitor

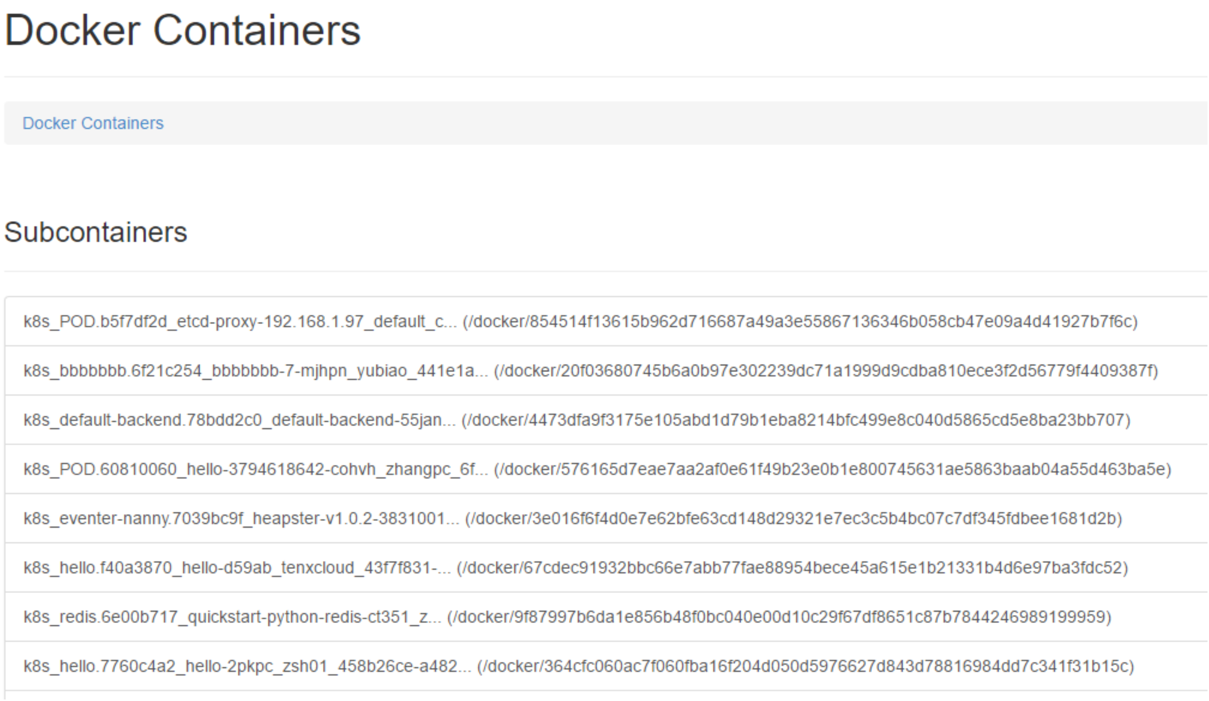
- cAdvisor（Container Advisor）是开源的专门用于监控、分析容器资源的代理程序
- cAdvisor自动发现所有容器并收集CPU、内存、磁盘和网络数据
- cAdvisor在每个节点提供简易的UI，通过端口4194访问
- 给容器打标签，并设置资源限制

cAdvisor



Processes

User	PID	PPID	Start Time	CPU % ▼	MEM %	RSS	Virtual Size	Status	Running Time	Command	Container
root	6,218	5,397	Nov06	11.00	0.10	25.15 MiB	34.07 MiB	Ssl	05:10:28	kube-proxy	/docker/99d1a9e5d130402c7d
statd	8,661	5,397	Nov07	8.30	6.70	1.05 GiB	12.17 GiB	Ssl	02:26:28	java	/docker/33d5f56a8c42470569
root	63,619	5,397	Nov07	2.00	0.50	81.57 MiB	678.80 MiB	Ssl	00:35:44	hyperkube	/docker/ca1ea953ad73d65241
root	6,283	6,262	Nov06	1.70	1.10	182.85 MiB	1.22 GiB	Sl	00:49:01	td-agent	/docker/8a60c09cbf53f56581
root	5,397	1	Nov06	1.20	1.80	304.55 MiB	6.41 GiB	Ssl	00:35:36	docker	
root	2,954	5,397	Nov07	0.50	0.10	25.96 MiB	37.34 MiB	Ssl	00:10:09	etcd	/docker/7b103e22f1140266e6
root	4,556	5,397	Nov07	0.50	0.00	13.58 MiB	16.97 MiB	Ssl	00:10:20	skydns	/docker/d9130ec6a87bad6933
root	9,429	5,397	Nov07	0.20	0.30	56.48 MiB	67.13 MiB	Ssl	00:04:40	heapster	/docker/aeb4962d174db2636c
root	7	2	Nov06	0.10	0.00	0.00 B	0.00 B	S	00:04:45	rcu_sched	
root	9	2	Nov06	0.10	0.00	0.00 B	0.00 B	S	00:05:41	rcuos/0	
root	1,648	5,397	Nov07	0.10	0.20	33.72 MiB	48.16 MiB	Ssl	00:01:55	nginx-ingress-c	/docker/0ab5875d24adcd0926
root	4,141	5,397	Nov07	0.10	0.10	24.50 MiB	37.58 MiB	Ssl	00:02:23	kube2sky	/docker/6f56c304e0e3a169b7
root	1	0	Nov06	0.00	0.00	4.05 MiB	32.94 MiB	Ss	00:00:08	init	
root	2	0	Nov06	0.00	0.00	0.00 B	0.00 B	S	00:00:00	kthreadd	
root	3	2	Nov06	0.00	0.00	0.00 B	0.00 B	S	00:00:02	ksoftirqd/0	
root	8	2	Nov06	0.00	0.00	0.00 B	0.00 B	S	00:00:00	rcu_bh	



Docker Containers

Docker Containers

Subcontainers

k8s_POD.b5f7df2d_etcd-proxy-192.168.1.97_default_c... (/docker/854514f13615b962d716687a49a3e55867136346b058cb47e09a4d41927b7f6c)

k8s_bbbbbbb.6f21c254_bbbbbbb-7-mjhpn_yubiao_441e1a... (/docker/20f03680745b6a0b97e302239dc71a1999d9cdba810ece3f2d56779f4409387f)

k8s_default-backend.78bdd2c0_default-backend-55jan... (/docker/4473dfa9f3175e105abd1d79b1eba8214bfc499e8c040d5865cd5e8ba23bb707)

k8s_POD.60810060_hello-3794618642-cohvh_zhangpc_6f... (/docker/576165d7eae7aa2af0e61f49b23e0b1e800745631ae5863baab04a55d463ba5e)

k8s_eventer-nanny.7039bc9f_heapster-v1.0.2-3831001... (/docker/3e016f6f4d0e7e62bfe63cd148d29321e7ec3c5b4bc07c7df345fdbee1681d2b)

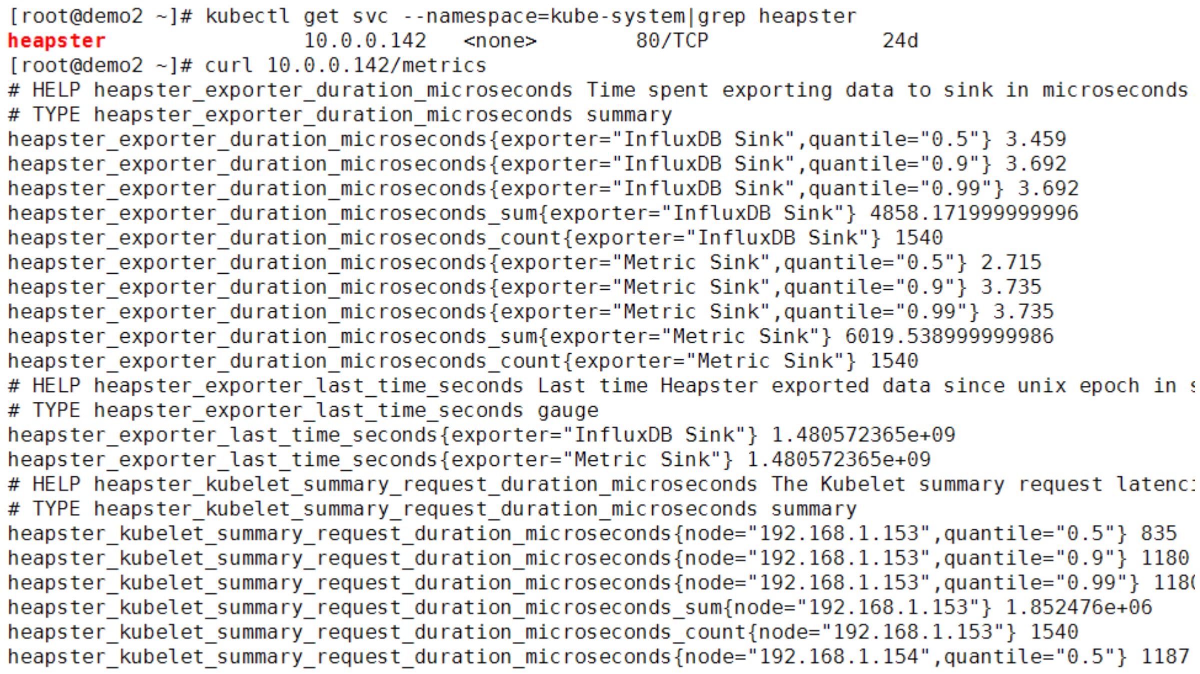
k8s_hello.f40a3870_hello-d59ab_tenxcloud_43f7f831-... (/docker/67cdec91932bbc66e7abb77fae88954bece45a615e1b21331b4d6e97ba3fdc52)

k8s_redis.6e00b717_quickstart-python-redis-ct351_z... (/docker/9f87997b6da1e856b48f0bc040e00d10c29f67df8651c87b7844246989199959)

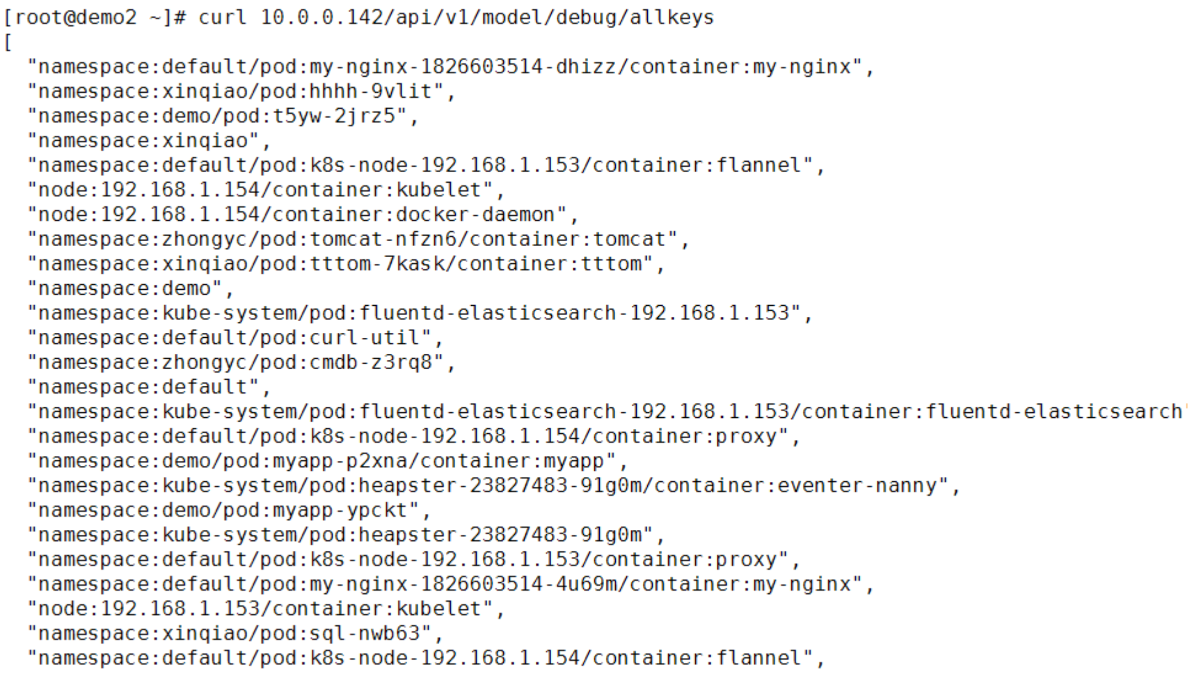
k8s_hello.7760c4a2_hello-2pkpc_zsh01_458b26ce-a482... (/docker/364cfc060ac7f060fba16f204d050d5976627d843d78816984dd7c341f31b15c)

Resource Monitor

- Inside Heapster



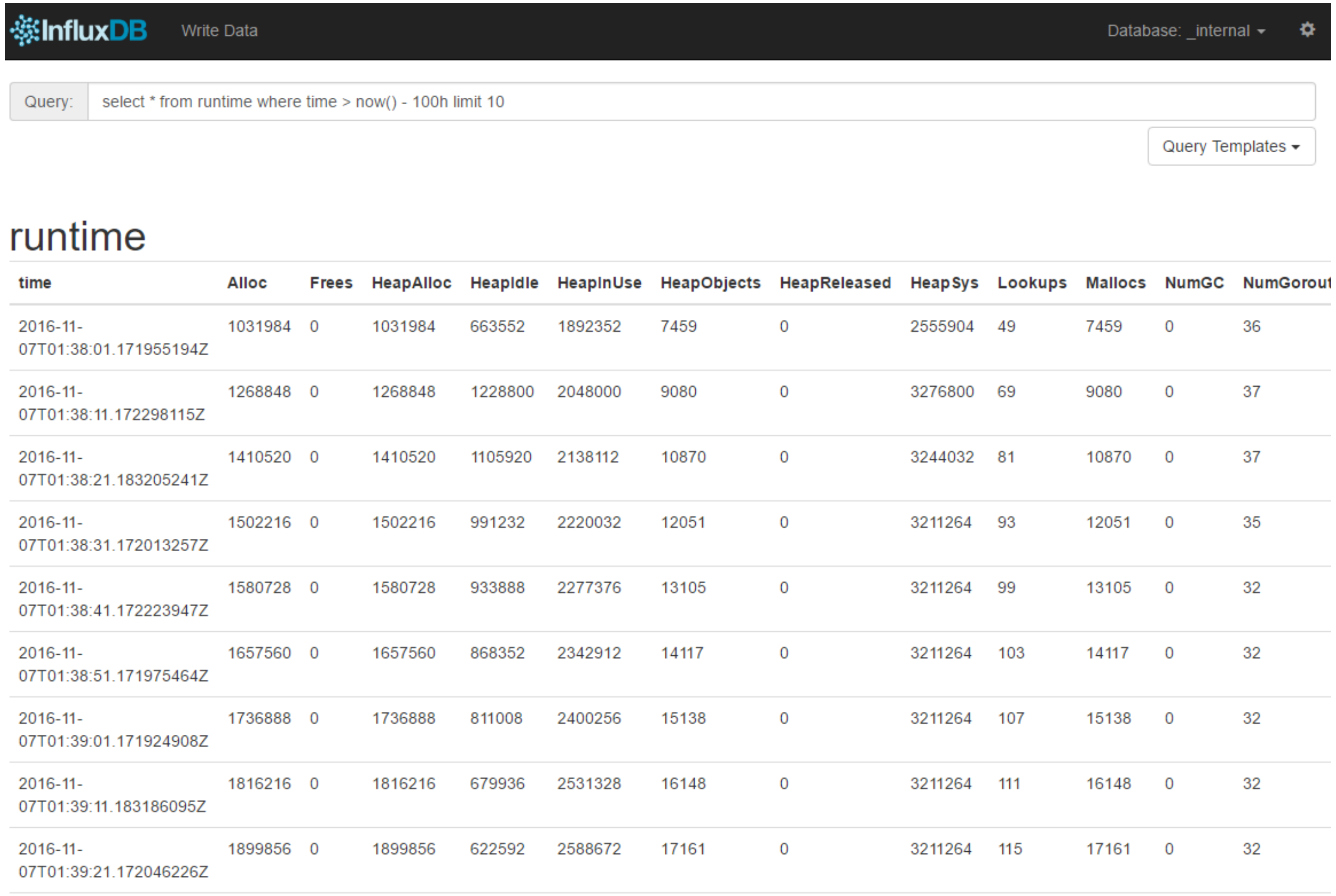
```
[root@demo2 ~]# kubectl get svc --namespace=kube-system|grep heapster
heapster                10.0.0.142   <none>        80/TCP              24d
[root@demo2 ~]# curl 10.0.0.142/metrics
# HELP heapster_exporter_duration_microseconds Time spent exporting data to sink in microseconds
# TYPE heapster_exporter_duration_microseconds summary
heapster_exporter_duration_microseconds{exporter="InfluxDB Sink",quantile="0.5"} 3.459
heapster_exporter_duration_microseconds{exporter="InfluxDB Sink",quantile="0.9"} 3.692
heapster_exporter_duration_microseconds{exporter="InfluxDB Sink",quantile="0.99"} 3.692
heapster_exporter_duration_microseconds_sum{exporter="InfluxDB Sink"} 4858.171999999996
heapster_exporter_duration_microseconds_count{exporter="InfluxDB Sink"} 1540
heapster_exporter_duration_microseconds{exporter="Metric Sink",quantile="0.5"} 2.715
heapster_exporter_duration_microseconds{exporter="Metric Sink",quantile="0.9"} 3.735
heapster_exporter_duration_microseconds{exporter="Metric Sink",quantile="0.99"} 3.735
heapster_exporter_duration_microseconds_sum{exporter="Metric Sink"} 6019.538999999986
heapster_exporter_duration_microseconds_count{exporter="Metric Sink"} 1540
# HELP heapster_exporter_last_time_seconds Last time Heapster exported data since unix epoch in
# TYPE heapster_exporter_last_time_seconds gauge
heapster_exporter_last_time_seconds{exporter="InfluxDB Sink"} 1.480572365e+09
heapster_exporter_last_time_seconds{exporter="Metric Sink"} 1.480572365e+09
# HELP heapster_kubelet_summary_request_duration_microseconds The Kubelet summary request latenc
# TYPE heapster_kubelet_summary_request_duration_microseconds summary
heapster_kubelet_summary_request_duration_microseconds{node="192.168.1.153",quantile="0.5"} 835
heapster_kubelet_summary_request_duration_microseconds{node="192.168.1.153",quantile="0.9"} 1180
heapster_kubelet_summary_request_duration_microseconds{node="192.168.1.153",quantile="0.99"} 118
heapster_kubelet_summary_request_duration_microseconds_sum{node="192.168.1.153"} 1.852476e+06
heapster_kubelet_summary_request_duration_microseconds_count{node="192.168.1.153"} 1540
heapster_kubelet_summary_request_duration_microseconds{node="192.168.1.154",quantile="0.5"} 1187
```



```
[root@demo2 ~]# curl 10.0.0.142/api/v1/model/debug/allkeys
[
  "namespace:default/pod:my-nginx-1826603514-dhizz/container:my-nginx",
  "namespace:xinqiao/pod:hhhh-9vlit",
  "namespace:demo/pod:t5yw-2jrz5",
  "namespace:xinqiao",
  "namespace:default/pod:k8s-node-192.168.1.153/container:flannel",
  "node:192.168.1.154/container:kubelet",
  "node:192.168.1.154/container:docker-daemon",
  "namespace:zhongyc/pod:tomcat-nfzn6/container:tomcat",
  "namespace:xinqiao/pod:tttom-7kask/container:tttom",
  "namespace:demo",
  "namespace:kube-system/pod:fluentd-elasticsearch-192.168.1.153",
  "namespace:default/pod:curl-util",
  "namespace:zhongyc/pod:cmdb-z3rq8",
  "namespace:default",
  "namespace:kube-system/pod:fluentd-elasticsearch-192.168.1.153/container:fluentd-elasticsearch"
  "namespace:default/pod:k8s-node-192.168.1.154/container:proxy",
  "namespace:demo/pod:myapp-p2xna/container:myapp",
  "namespace:kube-system/pod:heapster-23827483-91g0m/container:eventer-nanny",
  "namespace:demo/pod:myapp-ypckt",
  "namespace:kube-system/pod:heapster-23827483-91g0m",
  "namespace:default/pod:k8s-node-192.168.1.153/container:proxy",
  "namespace:default/pod:my-nginx-1826603514-4u69m/container:my-nginx",
  "node:192.168.1.153/container:kubelet",
  "namespace:xinqiao/pod:sql-nwb63",
  "namespace:default/pod:k8s-node-192.168.1.154/container:flannel",
```

Resource Monitor

- InfluxDB：开源的分布式时间序列数据库
  - ✓ 无结构，无限扩展的列
  - ✓ 单机、集群
  - ✓ 内置多样的统计函数
  - ✓ HTTP API
  - ✓ 类SQL的查询语句
  - ✓ 自带管理工具



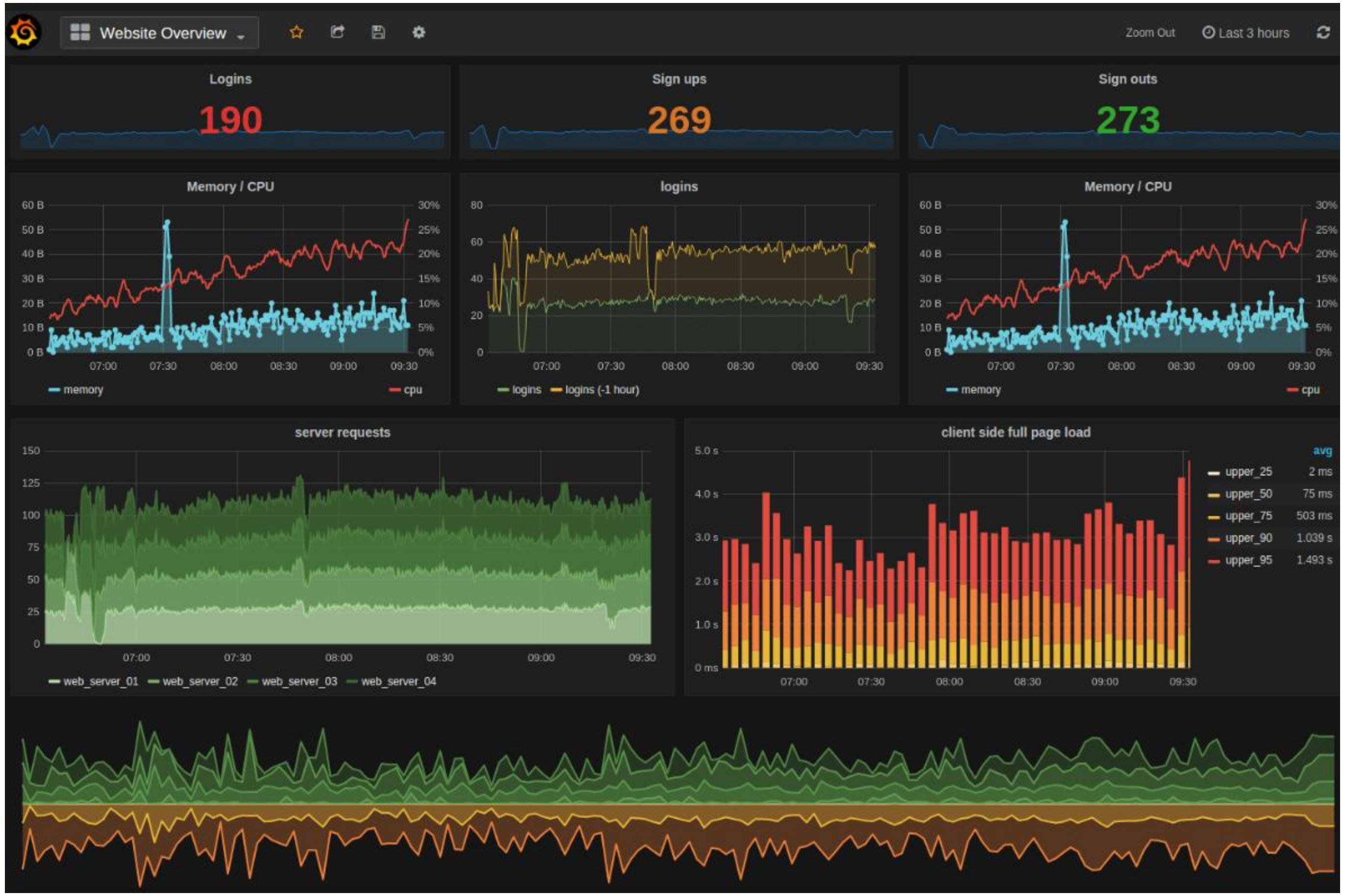
Query: select * from runtime where time > now() - 100h limit 10

runtime

time	Alloc	Frees	HeapAlloc	HeapIdle	HeapInUse	HeapObjects	HeapReleased	HeapSys	Lookups	Mallocs	NumGC	NumGorout
2016-11-07T01:38:01.171955194Z	1031984	0	1031984	663552	1892352	7459	0	2555904	49	7459	0	36
2016-11-07T01:38:11.172298115Z	1268848	0	1268848	1228800	2048000	9080	0	3276800	69	9080	0	37
2016-11-07T01:38:21.183205241Z	1410520	0	1410520	1105920	2138112	10870	0	3244032	81	10870	0	37
2016-11-07T01:38:31.172013257Z	1502216	0	1502216	991232	2220032	12051	0	3211264	93	12051	0	35
2016-11-07T01:38:41.172223947Z	1580728	0	1580728	933888	2277376	13105	0	3211264	99	13105	0	32
2016-11-07T01:38:51.171975464Z	1657560	0	1657560	868352	2342912	14117	0	3211264	103	14117	0	32
2016-11-07T01:39:01.171924908Z	1736888	0	1736888	811008	2400256	15138	0	3211264	107	15138	0	32
2016-11-07T01:39:11.183186095Z	1816216	0	1816216	679936	2531328	16148	0	3211264	111	16148	0	32
2016-11-07T01:39:21.172046226Z	1899856	0	1899856	622592	2588672	17161	0	3211264	115	17161	0	32

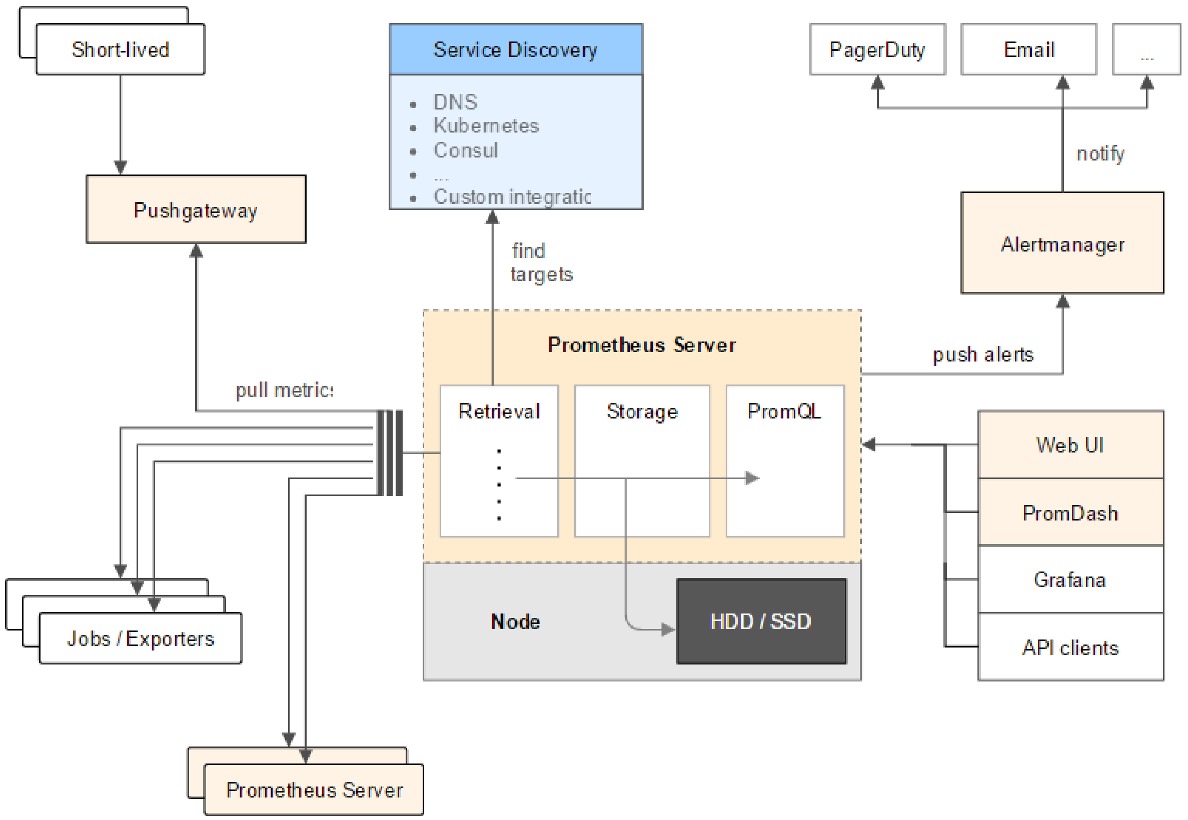
Resource Monitor

- Grafana：开源的可定制、易扩展的强大丰富的数据可视化工具
  - ✓ Html/js应用
  - ✓ 灵活丰富，多种风格
  - ✓ 定义数据源
  - ✓ 配置展示页面



Resource Monitor

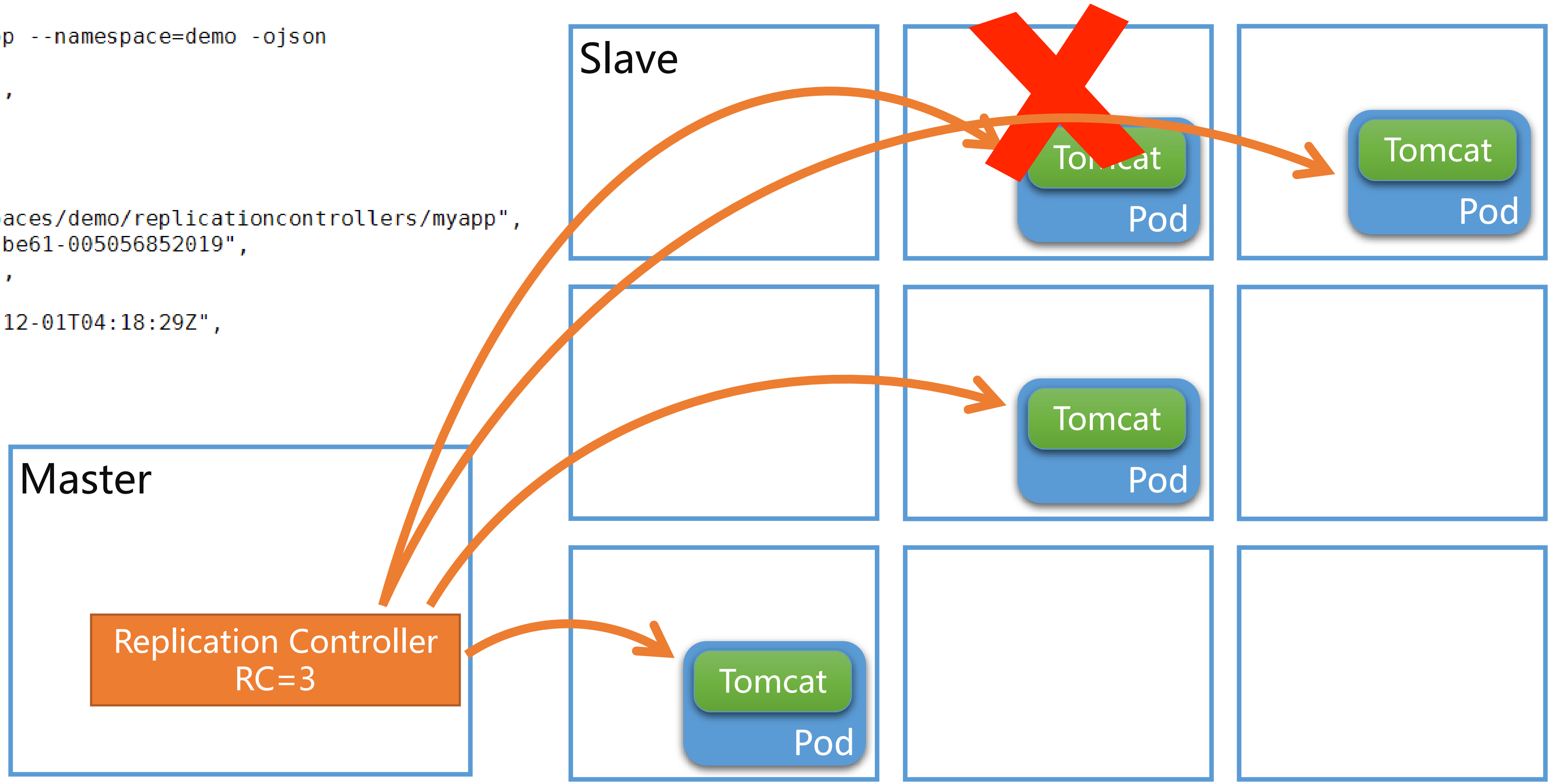
- Prometheus：开源的监控工具、易扩展的强大丰富的数据可视化工具
  - ✓ 支持k8s metrics数据格式
  - ✓ 支持k8s api进行服务发现
  - ✓ 多维度监控
  - ✓ 自定义告警



Service Monitor

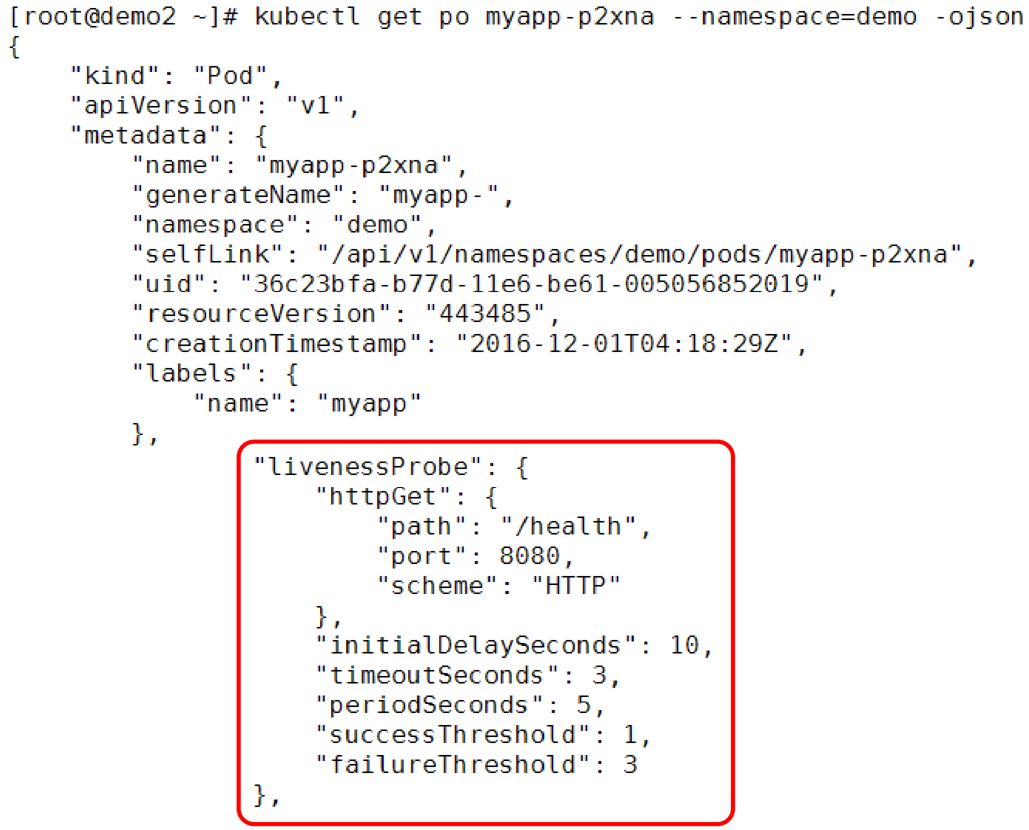
- Kubernetes提供对Pod、容器运行状况的监控，通过RC保持运行数量

```
[root@demo2 ~]# kubectl get rc myapp --namespace=demo -ojson
{
    "kind": "ReplicationController",
    "apiVersion": "v1",
    "metadata": {
        "name": "myapp",
        "namespace": "demo",
        "selfLink": "/api/v1/namespaces/demo/replicationcontrollers/myapp",
        "uid": "36c1678d-b77d-11e6-be61-005056852019",
        "resourceVersion": "443757",
        "generation": 2,
        "creationTimestamp": "2016-12-01T04:18:29Z",
        "labels": {
            "name": "myapp"
        }
    },
    "spec": {
        "replicas": 3,
        "selector": {
            "name": "myapp"
        },
```

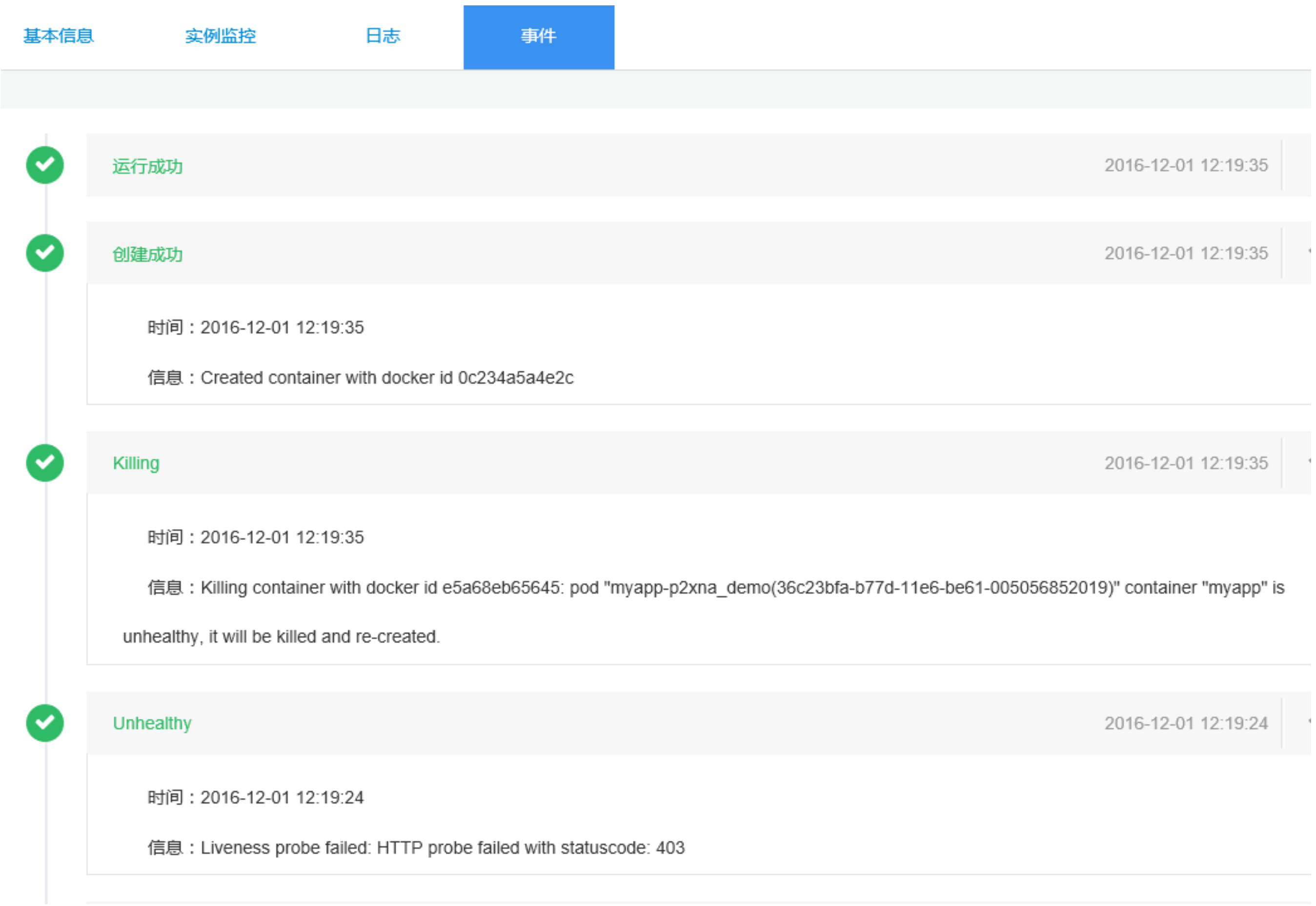


Service Monitor

- Container Probes提供HTTP、TCP的健康监控，保证应用的正常运行



```
[root@demo2 ~]# kubectl get po myapp-p2xna --namespace=demo -ojson
{
    "kind": "Pod",
    "apiVersion": "v1",
    "metadata": {
        "name": "myapp-p2xna",
        "generateName": "myapp-",
        "namespace": "demo",
        "selfLink": "/api/v1/namespaces/demo/pods/myapp-p2xna",
        "uid": "36c23bfa-b77d-11e6-be61-005056852019",
        "resourceVersion": "443485",
        "creationTimestamp": "2016-12-01T04:18:29Z",
        "labels": {
            "name": "myapp"
        },
                "livenessProbe": {
                    "httpGet": {
                        "path": "/health",
                        "port": 8080,
                        "scheme": "HTTP"
                    },
                    "initialDelaySeconds": 10,
                    "timeoutSeconds": 3,
                    "periodSeconds": 5,
                    "successThreshold": 1,
                    "failureThreshold": 3
                },
```



运行成功 2016-12-01 12:19:35

创建成功 2016-12-01 12:19:35

时间：2016-12-01 12:19:35

信息：Created container with docker id 0c234a5a4e2c

Killing 2016-12-01 12:19:35

时间：2016-12-01 12:19:35

信息：Killing container with docker id e5a68eb65645: pod "myapp-p2xna_demo(36c23bfa-b77d-11e6-be61-005056852019)" container "myapp" is unhealthy, it will be killed and re-created.

Unhealthy 2016-12-01 12:19:24

时间：2016-12-01 12:19:24

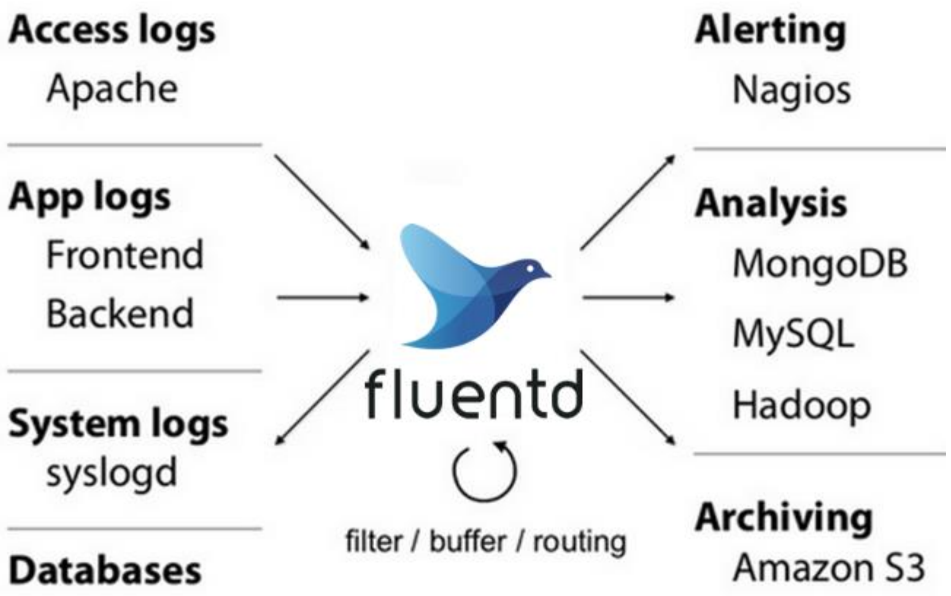
信息：Liveness probe failed: HTTP probe failed with statuscode: 403

Agenda

- Kubernetes Summary
  - Features
  - Architecture
- Kubernetes Monitor
  - Resource Monitor
  - Service Monitor
- Kubernetes Logging
  - Fluentd
  - Elasticsearch
  - Flow
- 时速云平台实践

Fluentd

- Fluentd: 开源的，日志收集工具.



✓ Unified Logging Layer
- Json 格式
- 可靠传输
- 易收集、易保存

✓ 统一接口，降低复杂度

✓ 插件丰富、可扩展

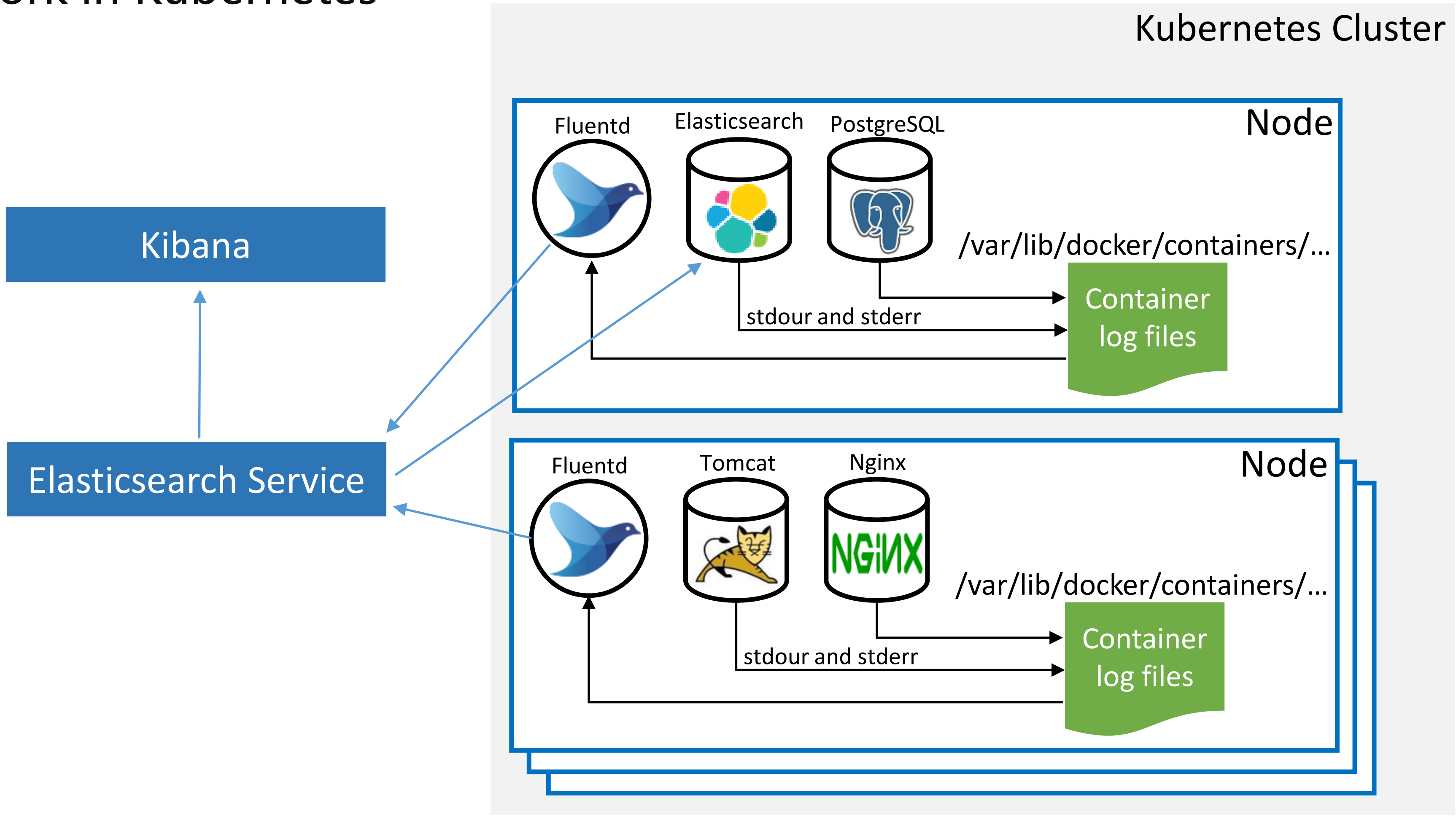
✓ 生产实践

Elasticsearch

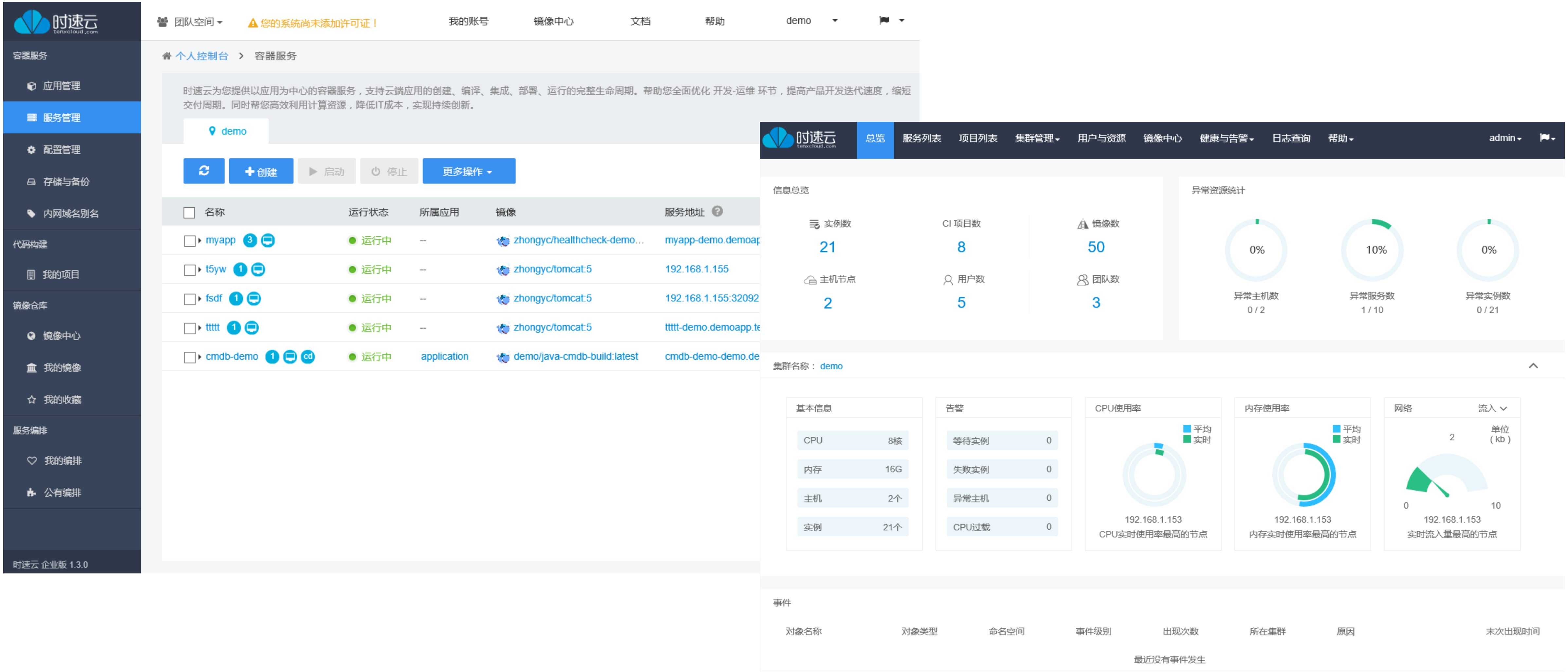
- Elasticsearch: 开源的、实时的分布式搜索和分析引擎
  - 分布式存储
  - 分布式搜索
  - 处理PB级别数据
  - Restful API
  - 集群编排/单机 + 持久化存储 on kubernetes

Flow

- How to work in Kubernetes



时速云平台实践



⚠ 您的系统尚未添加许可证！

个人控制台 > 容器服务

时速云为您提供以应用为中心的容器服务，支持云端应用的创建、编译、集成、部署、运行的完整生命周期。帮助您全面优化 开发-运维 环节，提高产品开发迭代速度，缩短交付周期。同时帮您高效利用计算资源，降低IT成本，实现持续创新。

demo

+ 创建 | ▶ 启动 | ⏻ 停止 | 更多操作

□	名称	运行状态	所属应用	镜像	服务地址
□	myapp 3	● 运行中	--	zhongyc/healthcheck-demo…	myapp-demo.demoap
□	t5yw 1	● 运行中	--	zhongyc/tomcat:5	192.168.1.155
□	fsdf 1	● 运行中	--	zhongyc/tomcat:5	192.168.1.155:32092
□	ttttt 1	● 运行中	--	zhongyc/tomcat:5	ttttt-demo.demoapp.te
□	cmdb-demo 1 cd	● 运行中	application	demo/java-cmdb-build:latest	cmdb-demo-demo.de

信息总览

实例数	CI 项目数	镜像数
21	8	50
主机节点	用户数	团队数
2	5	3

异常资源统计

异常主机数	异常服务数	异常实例数
0%	10%	0%
0 / 2	1 / 10	0 / 21

集群名称： demo

基本信息

CPU	8核
内存	16G
主机	2个
实例	21个

告警

等待实例	0
失败实例	0
异常主机	0
CPU过载	0

192.168.1.153
CPU实时使用率最高的节点

192.168.1.153
内存实时使用率最高的节点

192.168.1.153
实时流入量最高的节点

事件

对象名称	对象类型	命名空间	事件级别	出现次数	所在集群	原因	末次出现时间

最近没有事件发生

谢谢关注

联系我们：400-626-1876

地址：北京市海淀区中关村E世界C座8层881

邮箱：service@tenxcloud.com

网址：www.tenxcloud.com