

# Cloud Introduction

# What is Cloud

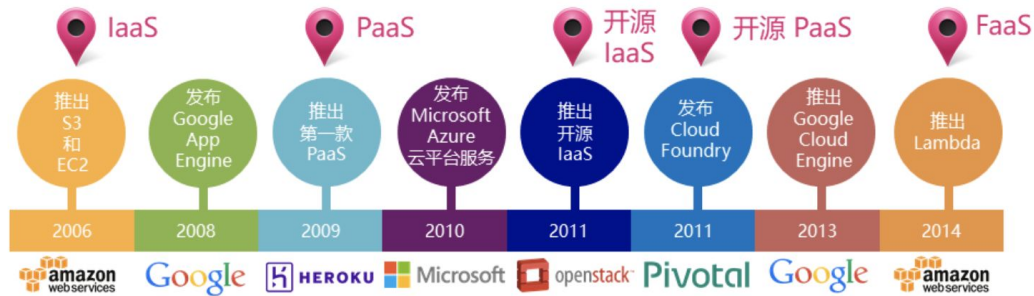
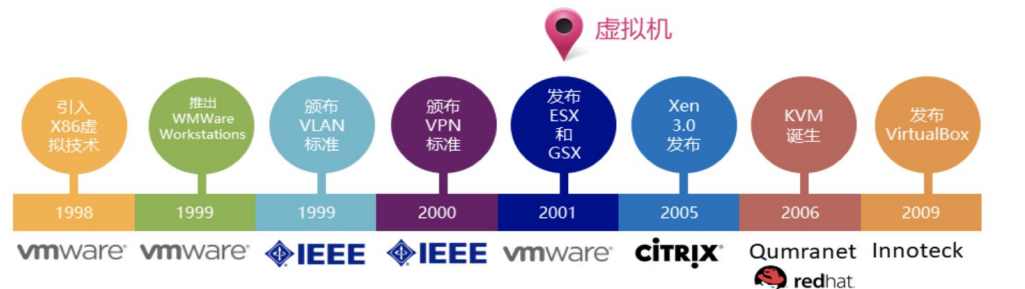
云计算 (Cloud Computing) 是分布式计算 (Distributed Computing)、并行计算 (Parallel Computing)、效用计算 (Utility Computing)、网络存储 (Network Storage Technologies)、虚拟化 (Virtualization)、负载均衡 (Load Balance)、热备份冗余 (High Available) 等传统计算机和网络技术发展融合的产物。

美国国家标准与技术研究院 ([NIST](#)) 定义: 云计算是一种按使用量付费的模式, 这种模式提供可用的、便捷的、按需的网络访问, 进入可配置的计算资源共享池 (资源包括网络, 服务器, 存储, 应用软件, 服务), 这些资源能够被快速提供, 只需投入很少的管理工作, 或与服 务供应商进行很少的交互。

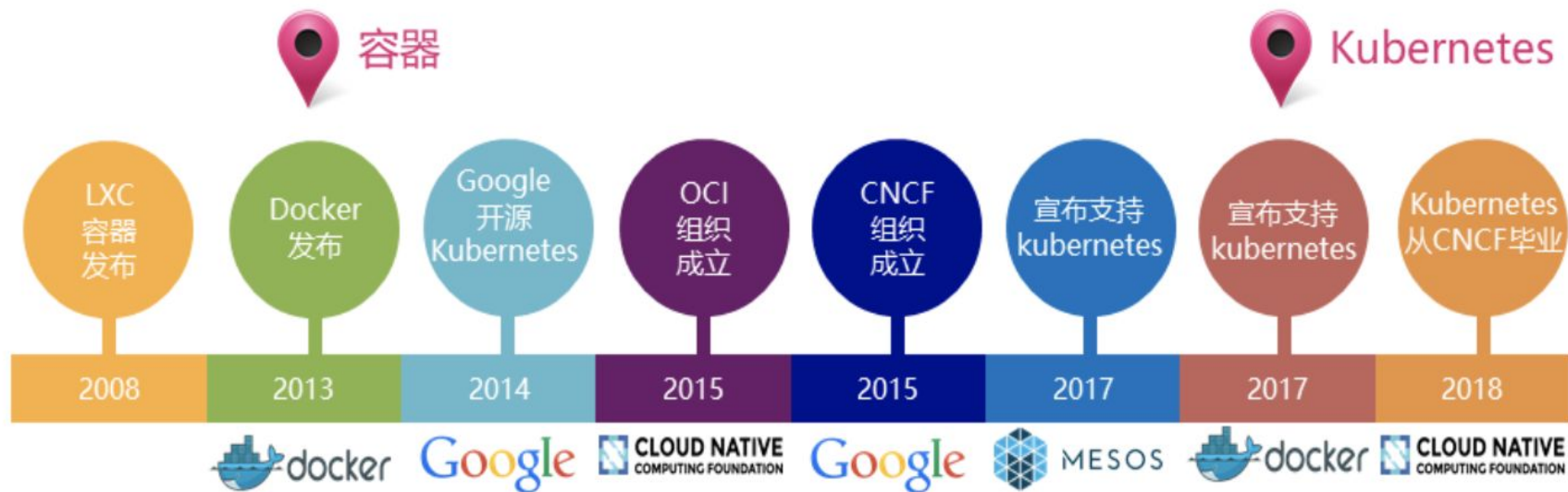
# Why we need cloud

- 更强的计算能力
- 支持更多的客户
- 降低运维的成本
- 大规模, 虚拟化, 高可靠性, 通用性
- 按需服务

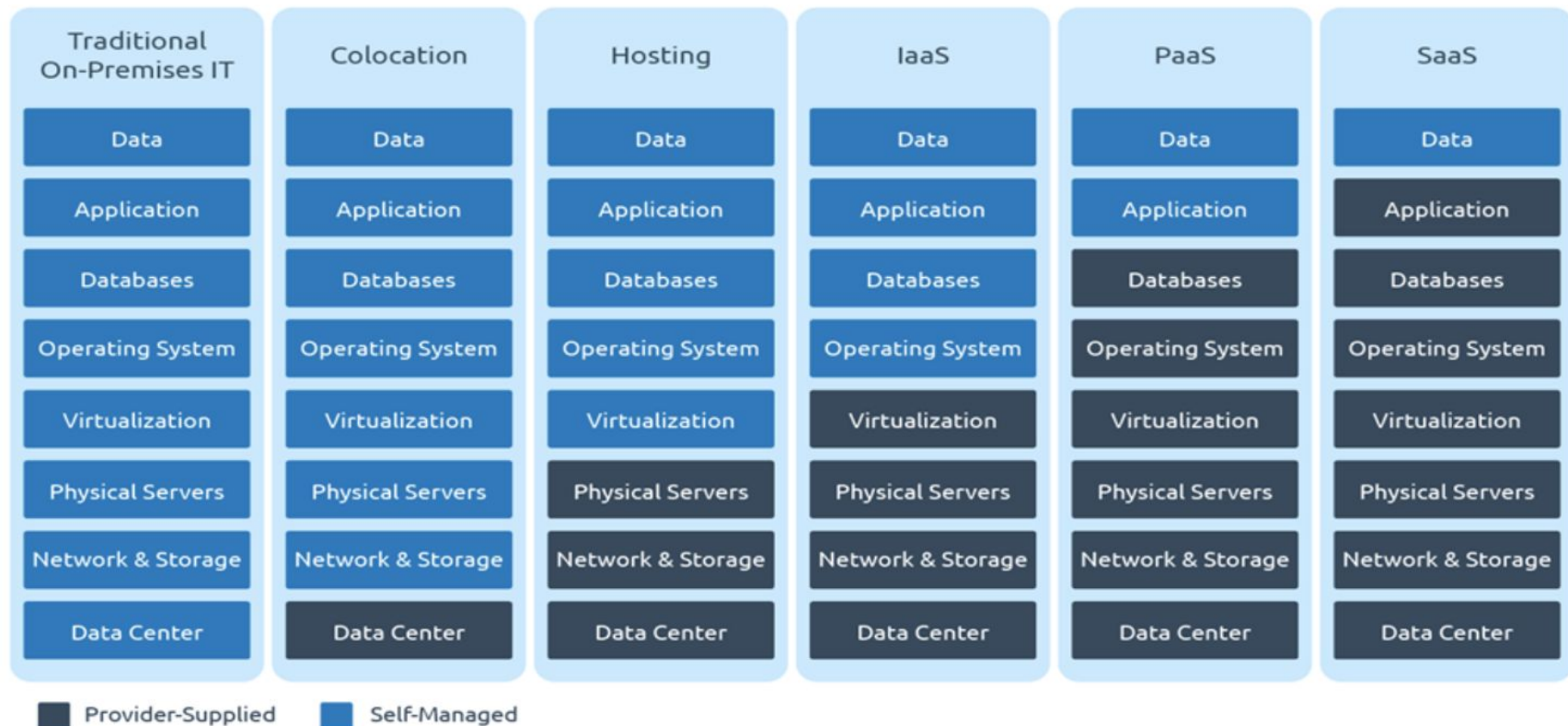
# Cloud History



# Cloud History

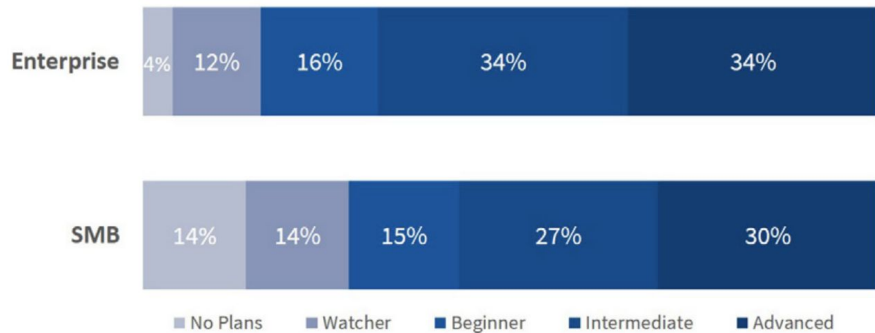


# Cloud History



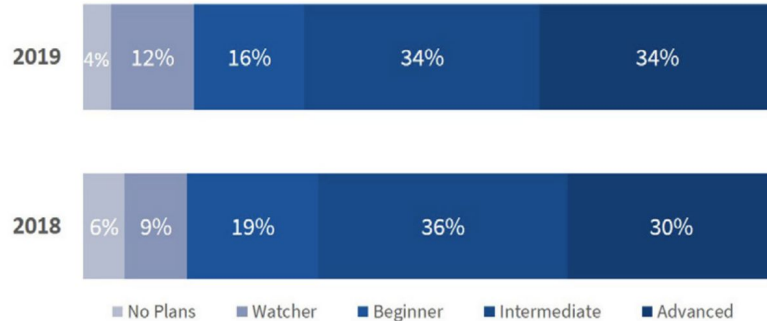
# Cloud Current Status

## Cloud Maturity by Company Size



Source: RightScale 2019 State of the Cloud Report from Flexera

## Cloud Maturity - Enterprise

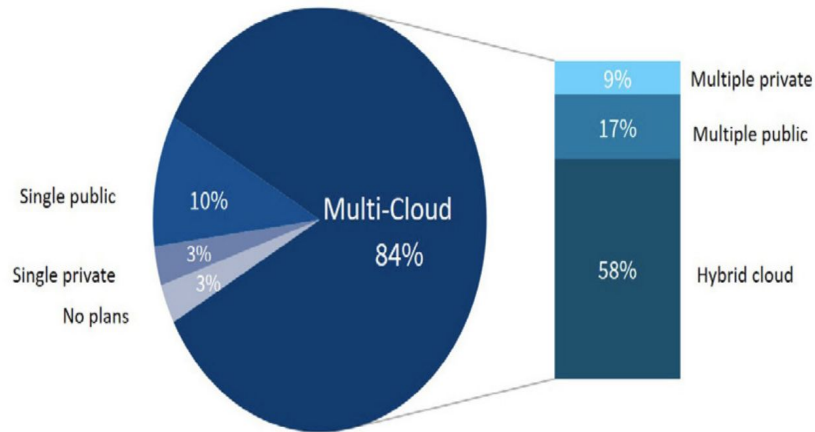


Source: RightScale 2019 State of the Cloud Report from Flexera

# Cloud Current Status

## Enterprise Cloud Strategy

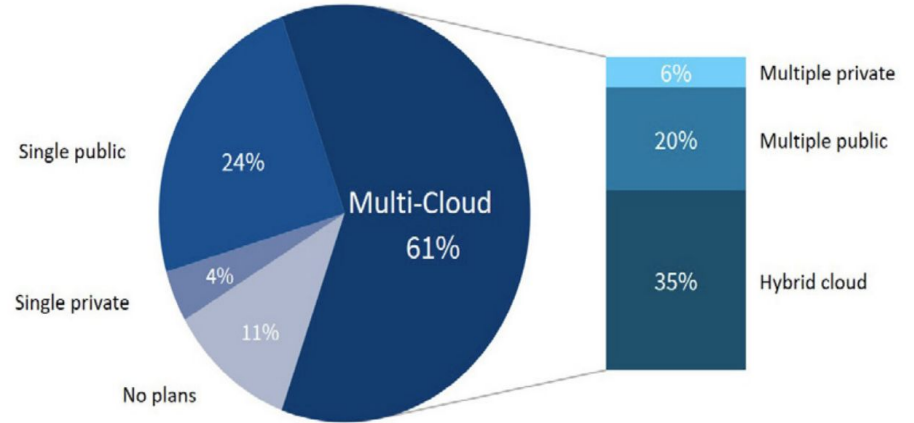
1000+ Employees



Source: RightScale 2019 State of the Cloud Report from Flexera

## SMB Cloud Strategy

<1000 Employees



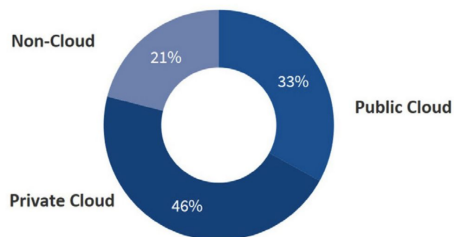
Source: RightScale 2019 State of the Cloud Report from Flexera



# Cloud Current Status

## Enterprise Workloads in Cloud

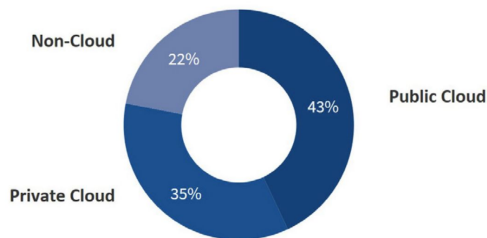
1000+ employees



Source: RightScale 2019 State of the Cloud Report from Flexera

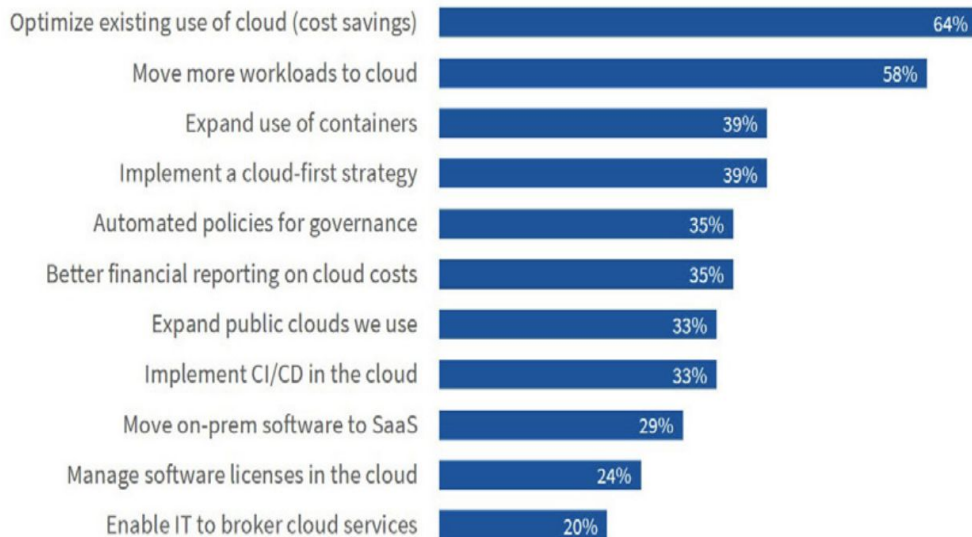
## SMB Workloads in Cloud

<1000 employees



Source: RightScale 2019 State of the Cloud Report from Flexera

## Top Cloud Initiatives in 2019

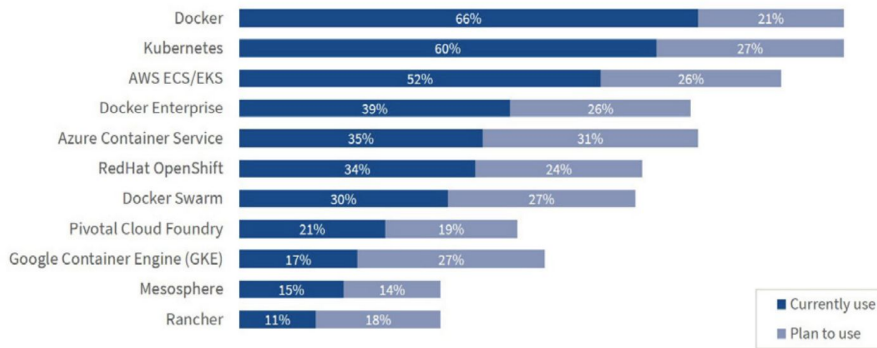


Source: RightScale 2019 State of the Cloud Report from Flexera

# Cloud Current Status

## Container Tools Used - Enterprise

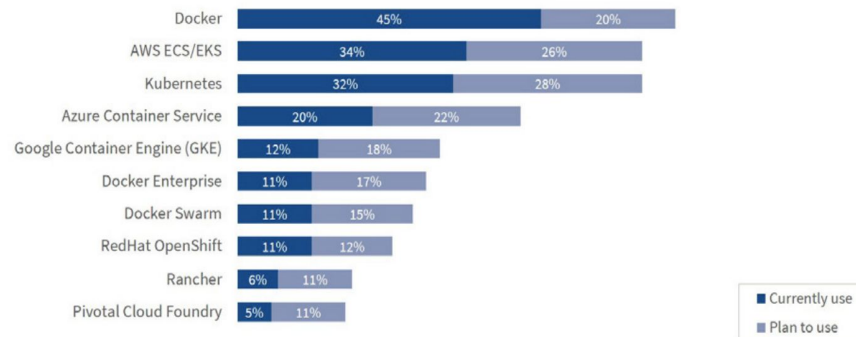
% of Respondents



Source: RightScale 2019 State of the Cloud Report from Flexera

## Container Tools Used - SMB

% of Respondents



Source: RightScale 2019 State of the Cloud Report from Flexera

# 虚拟化和容器的比较



CONTAINERS



VIRTUAL MACHINES

# k8s vs. Openstack

	OpenStack(vSphere/CloudStack/Eucalyptus...)	Kubernetes(Marathon/Swarm/Compose/openshit)
基本架构	IAAS (Infrastructure as a service)	PAAS (Platform as a service)
历史	Launched in 2010 co-founded by NASA, already dead few years ago in 2016, focus on reshaping containerized openstack on google images	Launched in 2014, co-founded by Google
稳定性	not so stability	stable
优势	计算, 存储, 网络资源的管理 - 计算: 有nova, glance, cinder等相关服务, 能很好的编排管理我们的物理机, 虚拟机, 甚至是容器 - 网络, 有Netruon实现虚拟网络, 能更好的管理我们的网络资源。 - 存储: 有cinder, swift等, - 并提供像VPN, 负载均衡, 数据库等等服务, 以及我们可能需要的其他基础服务。	- 高效的容器编排引擎 - 高效的资源利用 - 服务动态伸缩 - 容错和高可用 - 安全的管理: 通信采用http2, 用TLS加密。
劣势	- 大量的依赖组件, 包括mysql, rabbitmq, apache, nova, nova-api, nova-conduction, nova-scheduler, cinder-api, cinder-scheduler, netruon等 - 各个项目设计简单, 容易扩展和维护, 存在较少的性能问题, 不过所有项目整合起来会相对难运维。	- 依赖组件很少: kube-proxy, kubelet, kube-api, kube-scheduler, etcd, controller - 组件全部可容器化, 安装简单 - 各个项目设计简单, 中心化设计相对较少, 性能问题主要集中在etcd
特性	- 实现了基于软件的虚拟化SDN网络(Neturon) - 提供对象存储, 块存储, 块存储会用在vm之间的共享和自定义挂载	- 利用开源组件(flannel, calico, weave)实现overlay网络, 没有指定某种实现, 主要去实现一种网络接口, 也不会有专门的网络节点。 - 不去实现一种针对容器较好的存储, 而是去对接各个存储引擎。 像比较主流的Nfs, Glusterfs, ceph, 以及像各个公有云的云存储组件
资源隔离	- 隔离性相对较高: 完善的多资源的多租户隔离 - 对vm是针对内核层面的隔离	- 隔离程度相对较低, 不支持多租户 - 对资源池的管理基于resource, 和 namespace。不是基于内核层面
发展现状	- 容器化结合 - slowed contribution. git favorite/number of topics in summit(70% related to k8s)	- 54% of the Fortune 500 were hiring for Kubernetes skills in 2017 - Google generates more than 2 billion container deployments a week

# Openstack top 10 Contributors

## Reviews by Company

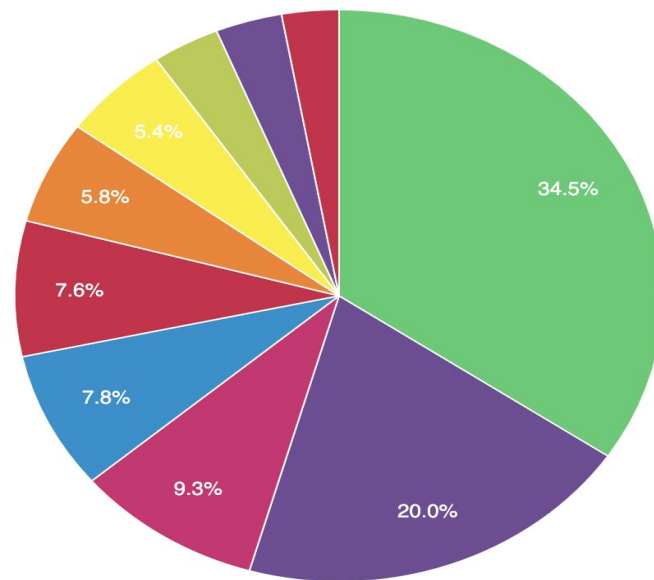
Show  entries

#	Company	Reviews
1	 Red Hat	305105
2	 Mirantis	142469
3	 Rackspace	118626
4	 IBM	116593
	 *independent	89128
5	 HP	82278
6	 Huawei	51323
7	 SUSE	50680
8	 NEC	43370
9	HPE	42997

Showing 1 to 10 of 364 entries

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# K8s top 10 contributors

## Commits by Company

Show 10 entries

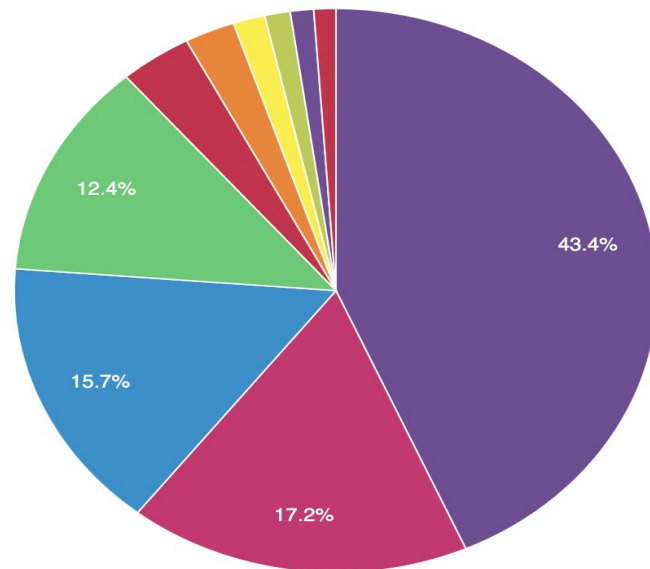
Search

#	Company	Commits
1	Google	19830
2	Red Hat	7855
	*independent	7157
3	Huawei	1657
4	ZTE Corporation	1155
5	Microsoft	732
6	FathomDB	587
7	VMware	535
8	CoreOS	505
9	Fujitsu	482

Showing 1 to 10 of 118 entries

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# Kubernetes (k8s)

At CoreOS we considered Kubernetes to be the **"kernel" of distributed systems**. We recognized that a well designed job scheduler, operating across multiple machines, capable of reconciling the state of managed workloads would naturally foster collaboration much in the same way that the Linux kernel did for the scheduling workloads on a single host. ---- From [Brian 'redbeard' Harrington](#) (working on openshift in Redhat)

k8s is an open source platform that automates [Linux container](#) operations. In other words, you can cluster together groups of hosts running Linux containers, and Kubernetes helps you easily and efficiently manage those clusters. These clusters can span hosts across [public](#), [private](#), or [hybrid clouds](#). For this reason, Kubernetes is an ideal platform for hosting [cloud-native applications](#) that require rapid scaling, like [real-time data streaming through Apache Kafka](#).

k8s相当于分布式系统的核心，可以跨机器的管理集群的负载。就像Kernel管理一台机器的负载一样。

# Why you need k8s

- Real production apps span multiple containers. 产品本身需要多种容器。
- Those containers must be deployed across multiple server hosts. 产品本身是分布式的, 需要横跨多台主机。
- [Security for containers](#) is multilayered and can be complicated. 容器本身需要多层次且复杂的安全策略。

Kubernetes orchestration allows you to build application services that span multiple containers, schedule those containers across a cluster, scale those containers, and manage the health of those containers over time. With Kubernetes you can take [real steps towards better IT security](#).

所谓的Cloud Native所需要实现的是:

- 分布式多层的系统架构。
- 服务化的能力供应。
- 自动化的运维能力。

京东的容器化实践之路: <https://mp.weixin.qq.com/s/Xa--qTTMwll1hkUjqDEJnw>

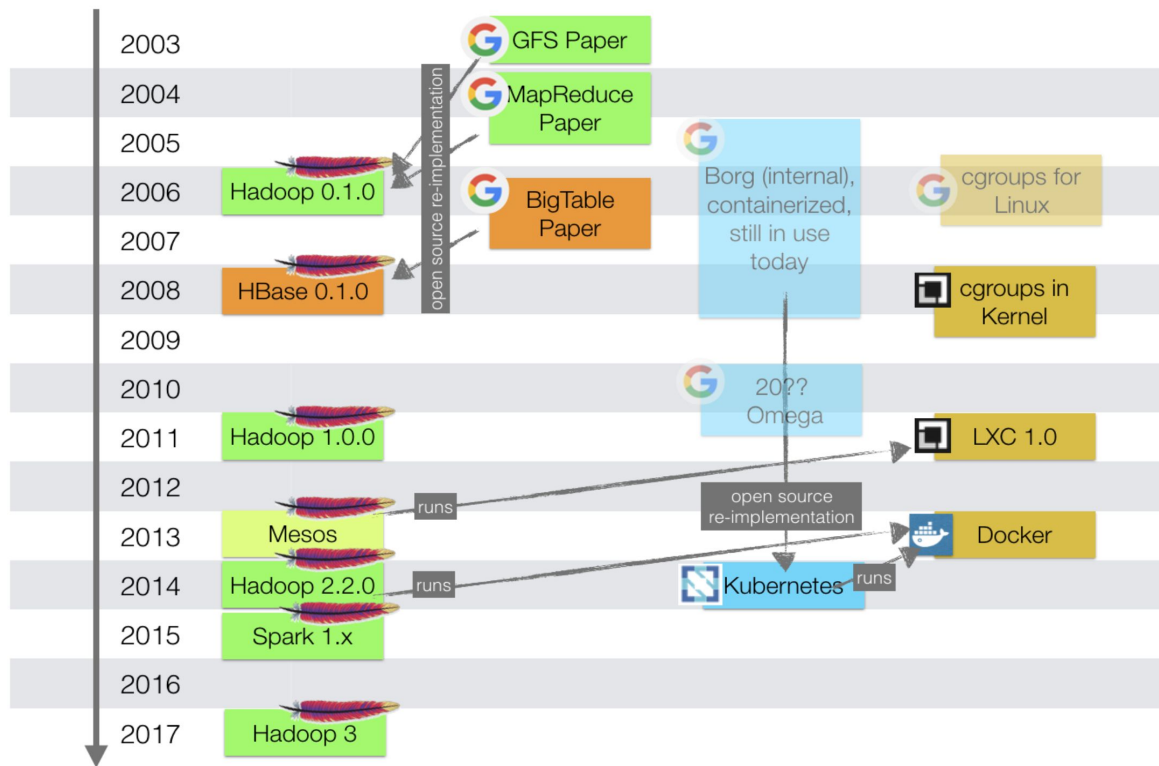


# Big Data Current Status

- 目前三大流行的免费的Hadoop集群管理: CDH/HDP/Apache

	Ambari + HDP	CM + CDH
厂商	Hortonworks	Cloudera
稳定性	可装选最新版本, 稳定性不如CDH	选用稳定版本(相对较老), 版本划分清晰, 稳定性好
资源消耗	ambari的server端Xmx是2G, metric的ams和hbase的env大概也就是2G	cloudera manager的server端Xmx是2G, agent是1G, 但是有host monitor和服务 monitor总共大概1G
滚动升级	支持	不支持
Kerberos安全认证	支持	支持
二次开发	支持, 依靠社区力量	不支持, cloudera做了定制开发和打patch
安装过程	简单	复杂
邮件报警	支持很好	支持不好
安装包	rpm	parcel
服务集成性	较好, 可以支持redis、kylin、es	较弱, 不支持集成其他组件
试图定制	支持创建自己的视图, 添加自定义服务	不支持

# BigData History



在2005年“Borg”就成为google的容器管理平台, Borg在当时就实现了用容器来做分布式的隔离, 比Docker的诞生整整早了10年. GFS 和 MapReduce 作为大数据在Borg上的解决方案。

可以简单的理解为:  
Apache Hadoop =  
YARN + HDFS + MapReduce

Hadoop@Google =  
Borg + GFS + MapReduce

# BigData on k8s



Bluedata目前是收费的。但18年在逐步推出开源版:

<https://github.com/bluek8s/kubedirector>

- blue8s : to build entire bigdata ecosystem with container
- Containerized ubuntu + hadoop
- Hadoop on k8s
- 基于portworx的分布式存储搭建
- spark on k8s: <https://github.com/apache-spark-on-k8s/spark>
- yarn on k8s: <https://github.com/Comcast/kube-yarn>
- flink on k8s: <https://ci.apache.org/projects/flink/flink-docs-stable/ops/deployment/kubernetes.html>
- Kafka on k8s: <https://github.com/Yolean/kubernetes-kafka>
- Hive on k8s: <https://mr3.postech.ac.kr/hivek8s/home/>

# k8s 集群的监控

- cAdvisor + InfluxDB + Grafana
- Heapster + InfluxDB + Grafana
- Prometheus + kube-state-metrics + Grafana

# 大数据集群的监控

- hadoop自带的
- cdh自带的

# 相关链接

- Cloud contributor status: <https://www.stackalytics.com/>
- 虚拟化技术的比较: <https://stackshare.io/stackups/apache-cloudstack-vs-eucalyptus-vs-openstack>
- k8s和openstack: <https://stackshare.io/stackups/kubernetes-vs-openstack>
- Hdfs vs. k8s: <https://www.g2.com/compare/hadoop-hdfs-vs-kubernetes>
- cdh免费版和付费版: <https://www.cnblogs.com/wangsongbai/p/9124853.html>
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