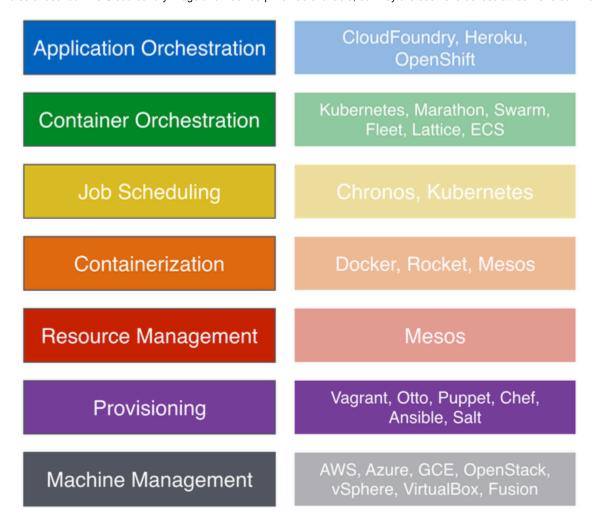# Orchestration solutions

Overview

Containers give flexible way of packaging application which simplifies delivery. In order to manage large number of running containers in production and between environments in deployment pipeline, companies use container orchestration. Different orchestrators have different set of features. By acting on container level and leveraging simplified packing and startup, orchestrators can help to manage large number of microservices and effectively and spread them over existing hardware resources with ability to control load and failures by adding or removing new instances of containers (replicas) on demand.

Below is random set of features provided by container orchestration:

- Provisioning hosts
- Instantiating a set of containers
- Linking containers together through agreed interfaces
- Automated deployment and replication of containers
- Online scale-in or scale-out of container clusters
- Load balancing over groups of containers
- Rolling upgrades of application containers
- Resilience, with automated rescheduling of failed containers
- Controlled exposure of network ports to systems outside of the cluster

According to categories below, in order to orchestrate containers we need to look into kubernetes, docker swarm, and mesos marathon. There is also endeavour like Cloudfoundry Diego and Hashicorp Nomad available, but they are seems to be less attractive to community.

Application Orchestration	CloudFoundry, Heroku, OpenShift
Container Orchestration	Kubernetes, Marathon, Swarm, Fleet, Lattice, ECS
Job Scheduling	Chronos, Kubernetes
Containerization	Docker, Rocket, Mesos
Resource Management	Mesos
Provisioning	Vagrant, Otto, Puppet, Chef, Ansible, Salt
Machine Management	AWS, Azure, GCE, OpenStack, vSphere, VirtualBox, Fusion

Comparison table

- Kubernetes
- CloudFoundry Diego
- Docker Swarm
- Mesosphere Marathon
- Hashicorp Nomad

	Kubernetes	CloudFoundry Diego	Docker Swarm	Mesosphere Marathon	Hashicorp Nomad
Developed by	• Google	• Pivotal	• Docker	• Mesosphere	• Hashicorp
Creation purpose	• Compete with Amazon • Sell as a service	• Sell as tool • Sell as a service	• Sell as tool • Sell as a service	• Sell as tool	• Sell as tool
Licensing	• Apache 2.0	• Apache 2.0	• Creative Commons Attribution-ShareAlike 4.0 International Public	• Apache 2.0	• Apache 2.0
Compatible pipeline tool	• Spinnaker • Wercker • shippable • jenkins • cloudmunch	• Cloudfoundry • Spinnaker • travis-ci • codeship	• GoCD	• Can't find info	• Can't find info
Big companies using it	• Google • HP • Goldman Sachs • Ebay https://www.packet.net/blog/open-source-season-on-the-kubernetes-highway/	• Cloudfoundry itself is widely adopted but can't find info about Diego release users	• Can't find public references on production deployments	• Hard to find references on production deployments	• Hard to find references on production deployments
Support	Customisations: • https://tectonic.com/ Third party vendors: • https://apprenda.com/kubernetes-support/ • http://www.jetstack.io/	Pivotal • https://pivotal.io/platform	Docker • https://www.docker.com/pricing#/pricing_datacenter	Mesosphere • https://mesosphere.com/pricing/	Hashicorp • https://www.hashicorp.com/nomad.html
Cluster monitoring	• https://github.com/kubernetes/dashboard • https://kubernetes.io/docs/user-guide/monitoring/ • https://grafana.net/dashboards?search=kubernetes • https://stefanprodan.com/2016/a-monitoring-solution-for-docker-hosts-containers-and-containerized-services/	• https://docs.pivotal.io/pivotalcf/1-9/opsguide/metrics.html	• https://grafana.net/dashboards?search=swarm • https://github.com/ManoMarks/docker-swarm-visualizer	• https://docs.mesosphere.com/1.8/administration/monitoring	• https://scada.hashicorp.com/ • can't find screenshots on web

Compatible resource provides	https://kubernetes.io/docs/getting-started-guides/#table-of-solutions	https://docs.cloudfoundry.org/deploying/index.html	Any resource manager which supports linux VM's https://docs.docker.com/engine/installation/	https://mesosphere.github.io/marathon/docs/setup.html	https://www.nomadproject.io/docs/install/
Code Contributors	• 1659 contributors • https://github.com/kubernetes/kubernetes/graphs/contributors	• 140 contributors • https://github.com/cloudfoundry/diego-release/graphs/contributors	• 168 contributors • https://github.com/docker/swarm/graphs/contributors	• 258 contributors • https://github.com/mesosphere/marathon	• 241 • https://github.com/hashicorp/nomad/graphs/contributors
Community	• 7969 questions tagged • http://stackoverflow.com/questions/tagged/kubernetes	• 81 results • http://stackoverflow.com/search?q=%5Bcloudfoundry%5D+diego	• 145 questions tagged • http://stackoverflow.com/questions/tagged/swarm	• 476 questions tagged • http://stackoverflow.com/questions/tagged/marathon	• 30 questions tagged • http://stackoverflow.com/questions/tagged/nomad

Summary

From the found info it looks like that kubernetes has wider community and adoption. It can be deployed to different public cloud providers as well as private cloud infrastructure running on hypervisor or bare metal.

Advantages of kubernetes over other orchestrators:

- Keeps desired state of a cluster, not just provide API to manage cluster and script desired state
- Supports not only docker (rkt, roll your own)
- Integrated with Spinnaker
- Code quality is higher according to users feedback

Latest Thoughtworks tech radar placed kubernetes into "Trial" category: https://www.thoughtworks.com/radar/platforms/kubernetes.

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