

kubernetes+helm+rancher stack in the DESY compute cloud

Technology Demonstration for PaNOSC WP6 weekly meeting

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Feb 29 2020



Software stack container orchestration

Infrastructure as a Service
Cloud Computing
Software Defined Networking



Software stack container orchestration

Container as a Service

Cloud Native CI/CD

Docker registry



GitLab



Infrastructure as a Service

Cloud Computing

Software Defined Networking



openstack®

Software stack container orchestration

Kubernetes as a Service

Container Orchestration

Container Networking

Kubernetes Package Manager



Container as a Service

Cloud Native CI/CD

Docker registry



Infrastructure as a Service

Cloud Computing

Software Defined Networking



Software stack container orchestration

Software as a Service

Container-based environments
App deployments as code



Kubernetes as a Service

Container Orchestration
Container Networking
Kubernetes Package Manager



Container as a Service

Cloud Native CI/CD
Docker registry



Infrastructure as a Service

Cloud Computing
Software Defined Networking
Infrastructure as code



Market Overview projects

FIGURE 2 Forrester Wave™: Continuous Integration Tools, Q3 '17

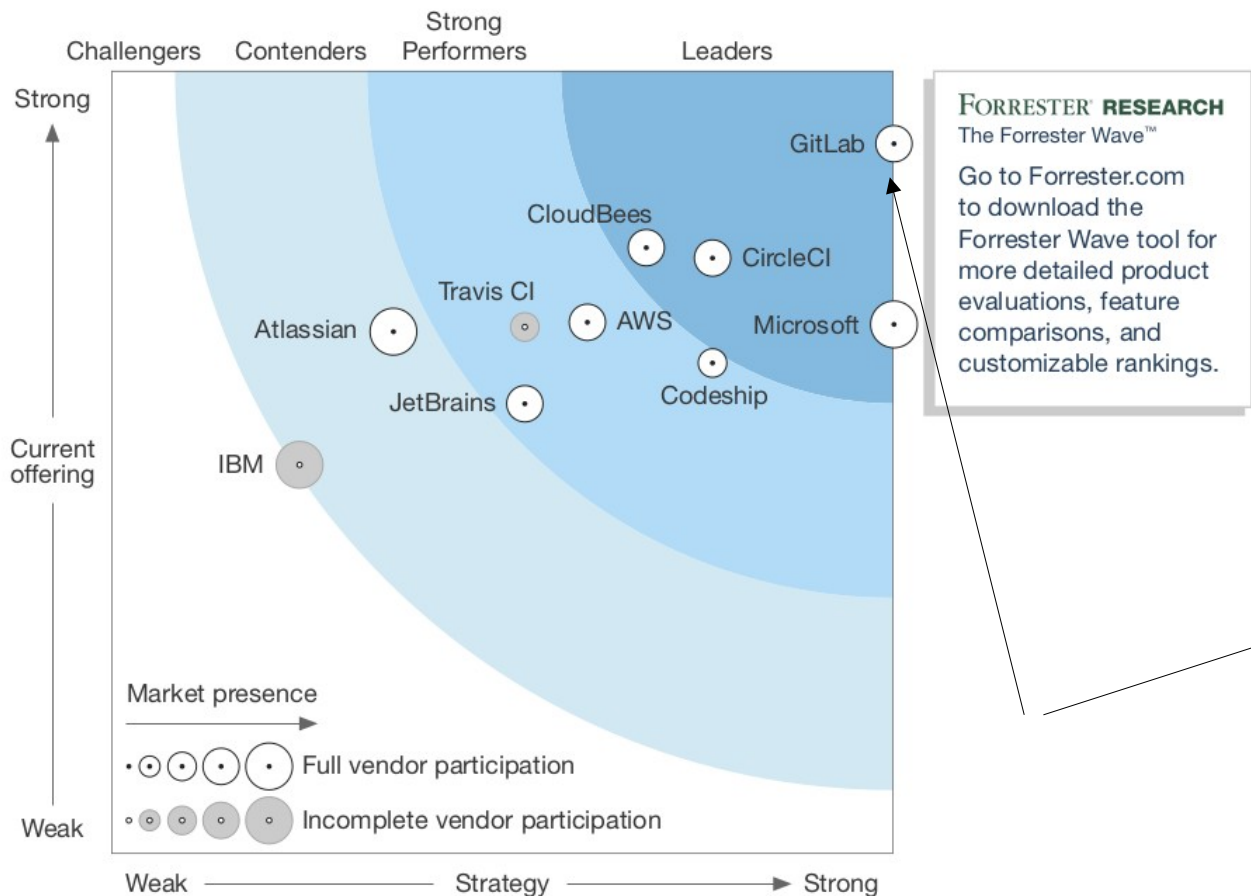
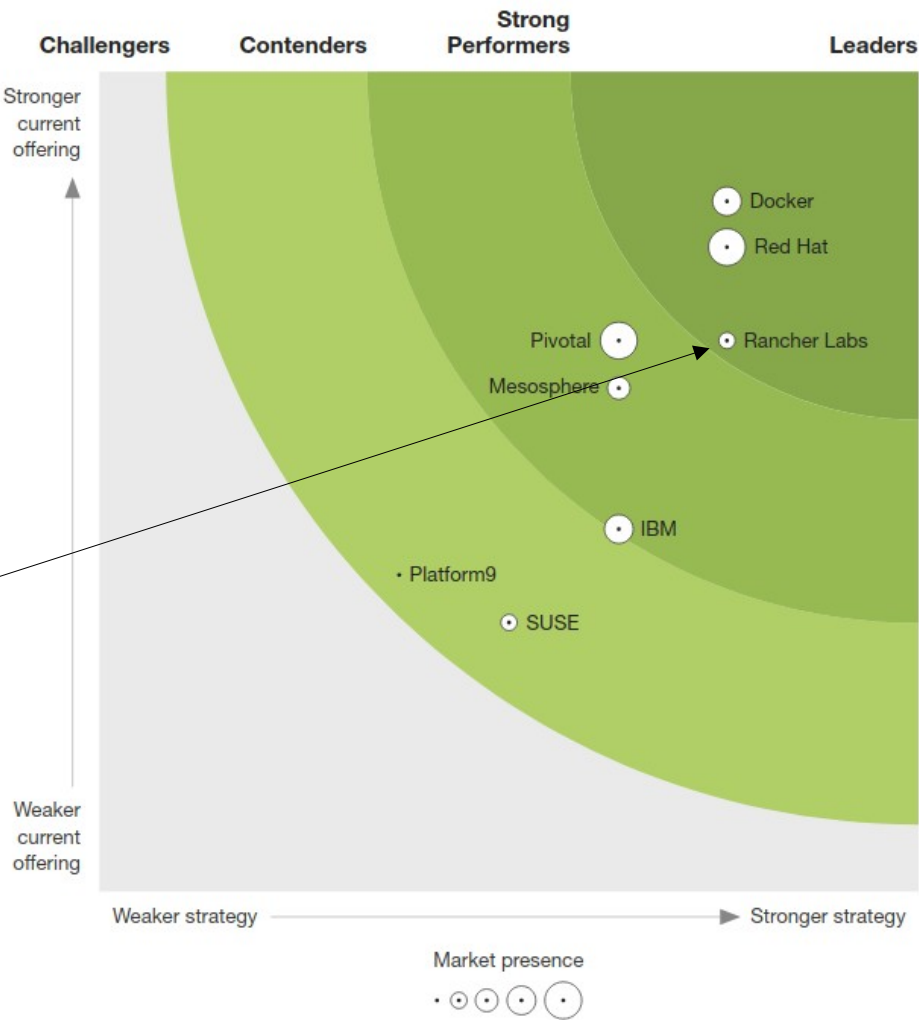


FIGURE 2 Forrester New Wave™: Enterprise Container Platform Software Suites, Q4 2018

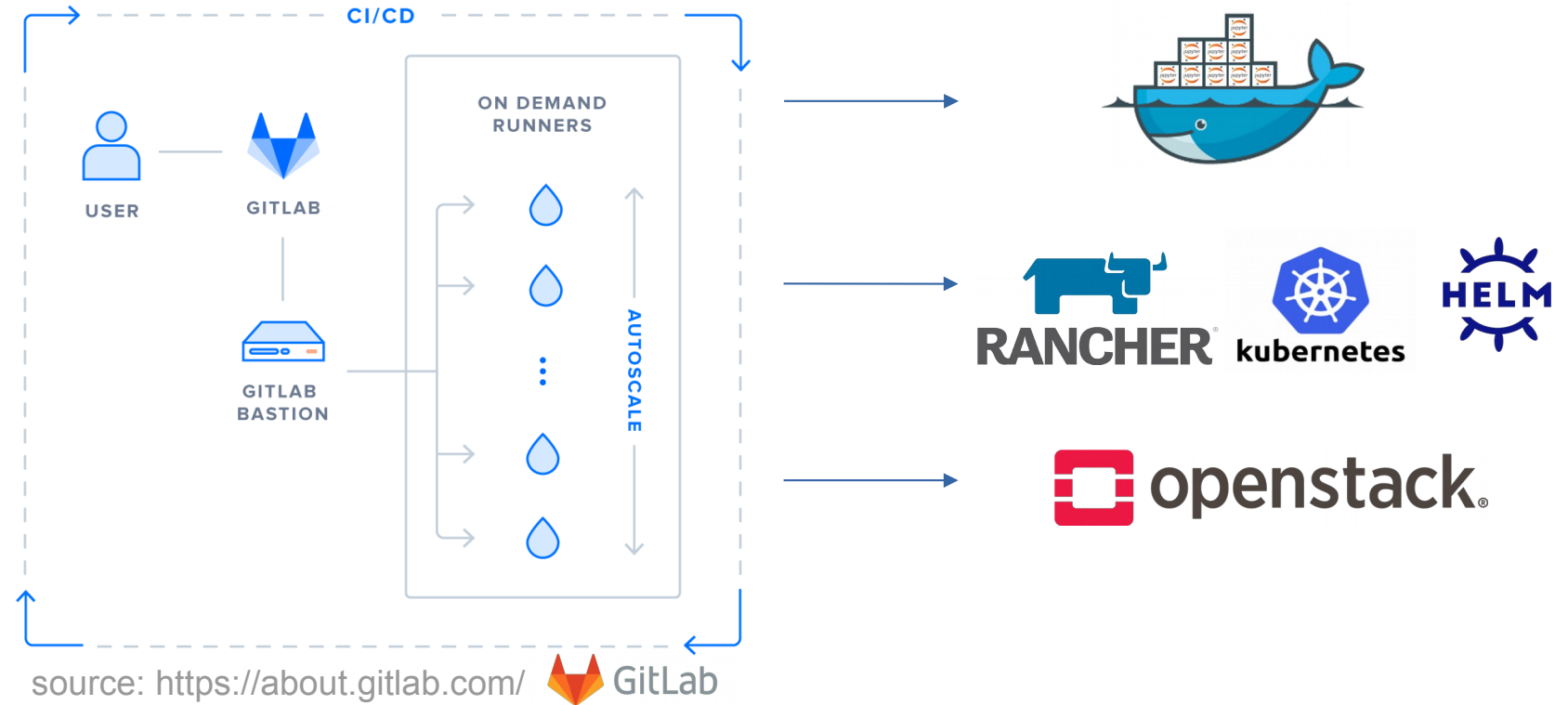
THE FORRESTER NEW WAVE™
Enterprise Container Platform Software Suites
Q4 2018



Sources and further reading:
The Forrester Wave™: Continuous Integration Tools, Q3 2017
The Forrester New Wave™: Enterprise Container Platform Software Suites, Q4 2018

GitLab CI/CD for Container and Cloud Applications

- **Push code, go live**
 - VM images
 - Cloud Applications
 - Container Application
- GitLab platform for
 - Web frontend
 - Version control
 - Auto-scaling CI/CD
 - Container registry
 - Secret management
 - per user, group, project
 - per CI/CD job



GitLab CI/CD for Container and Cloud Applications

gitops-demo > apps > My ASP .Net App1 > Pipelines > #88314435

passed Pipeline #88314435 triggered 1 month ago by Brad Downey

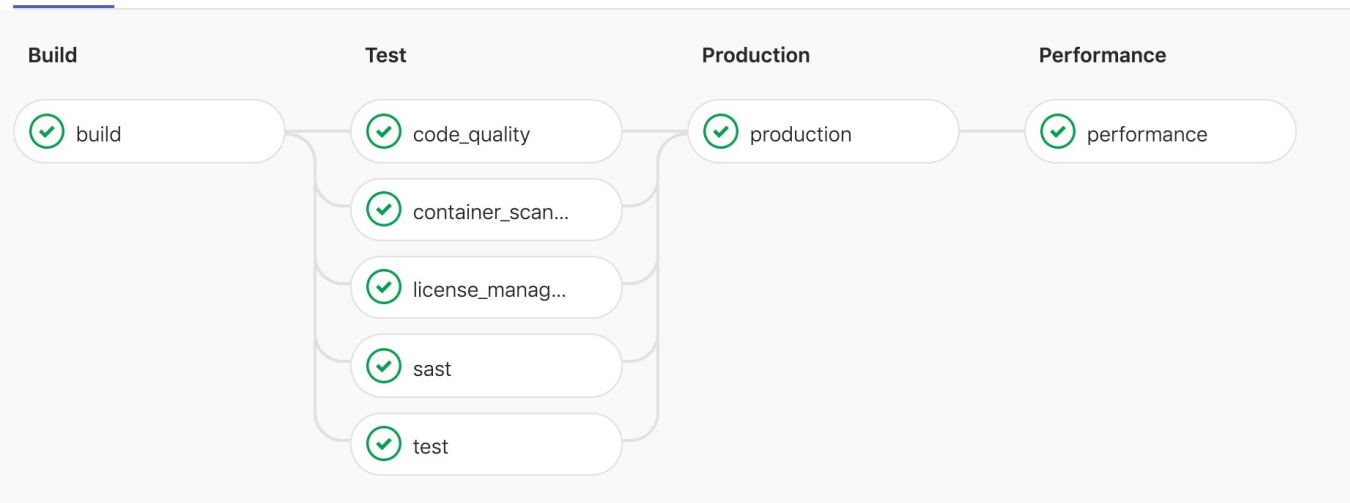
Remove staging

8 jobs for `master` in 14 minutes and 21 seconds (queued for 9 minutes and 59 seconds)

926f65b8

No related merge requests found.

Pipeline Jobs 8 Security Licenses 12



Git repositories as “single source of truth” for all infrastructure and application deployments

GitOps demo video and article by GitLab on “How To Deploy applications using GitLab CI, Helm and Kubernetes”:

<https://about.gitlab.com/blog/2019/11/18/gitops-prt-3/>

Rancher Server – Cluster and Node Drivers

Cluster Drivers Node Drivers

Refresh Kubernetes Metadata

Add Cluster Driver

Activate ▶ Deactivate || Delete 🗑️

Search

<input type="checkbox"/>	State ↕	Name ↕
<input type="checkbox"/>	Inactive	Alibaba ACK https://github.com/rancher/kontainer-engine-driver-aliyun/releases/download/v0.2.5/kontainer-engine-driver-aliyun-linux
<input type="checkbox"/>	Inactive	Amazon EKS
<input type="checkbox"/>	Inactive	Azure AKS
<input type="checkbox"/>	Inactive	Baidu CCE https://github.com/cnrmancer/kontainer-engine-driver-baidu/releases/download/v0.2.0/kontainer-engine-driver-baidu-linux
<input type="checkbox"/>	Inactive	Google GKE
<input type="checkbox"/>	Inactive	Huawei CCE https://github.com/rancher/kontainer-engine-driver-huawei/releases/download/v0.12/kontainer-engine-driver-huawei-linux
<input type="checkbox"/>	Active	Rancher RKE
<input type="checkbox"/>	Inactive	Tencent TKE https://github.com/rancher/kontainer-engine-driver-tencent/releases/download/v0.2.3/kontainer-engine-driver-tencent-linux

Cluster Drivers Node Drivers

Add Node Driver

Activate ▶ Deactivate || Delete 🗑️

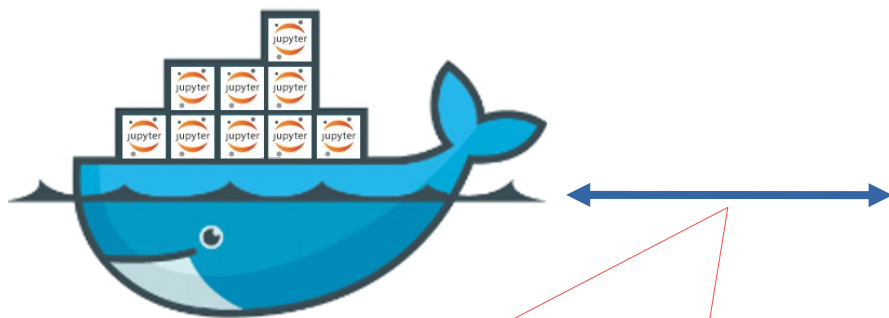
Search

<input type="checkbox"/>	State ↕	Name ↕
<input type="checkbox"/>	Inactive	Aliyun ECS http://machine-driver.oss-cn-shanghai.aliyuncs.com/aliyun/10.2/linux/amd64/docker-machine-driver-aliyunecs.tgz
<input type="checkbox"/>	Inactive	Amazon EC2 Built-In
<input type="checkbox"/>	Inactive	Azure Built-In
<input type="checkbox"/>	Inactive	Cloud.ca https://github.com/cloud-ca/docker-machine-driver-cloudca/files/2446837/docker-machine-driver-cloudca_v2.0.0_linux-amd64.zip
<input type="checkbox"/>	Inactive	DigitalOcean Built-In
<input type="checkbox"/>	Inactive	Exoscale Built-In
<input type="checkbox"/>	Inactive	Linode Built-In
<input type="checkbox"/>	Active	OpenStack Built-In
<input type="checkbox"/>	Inactive	Open Telekom Cloud https://github.com/rancher-plugins/docker-machine-driver-otc/releases/download/v2019.5.7/docker-machine-driver-otc
<input type="checkbox"/>	Inactive	Packet https://github.com/packethost/docker-machine-driver-packet/releases/download/v0.14/docker-machine-driver-packet_linux-amd64.zip
<input type="checkbox"/>	Inactive	Pinganyun ECS https://machine-driver.oss-cn-shanghai.aliyuncs.com/pinganyun/v0.3.0/linux/amd64/docker-machine-driver-pinganyunecs-linux.tgz
<input type="checkbox"/>	Inactive	RackSpace Built-In
<input type="checkbox"/>	Inactive	SoftLayer Built-In
<input type="checkbox"/>	Inactive	vSphere Built-In

Rancher Kubernetes Engine (RKE)

- Kubernetes distribution
- Runs entirely in Docker containers
- On any platform running Docker
- Node Drivers implemented with Docker Machine
- We use Openstack Nodes

Docker Machine Openstack Driver - use with caution



Docker Machine is now in maintenance mode



- Openstack driver used in:
 - Gitlab docker+machine runners
 - Rancher
- github.com/docker/machine/issues/4537


- Amazon Web Services
- Microsoft Azure
- DigitalOcean
- Exoscale
- Generic
- Google Compute Engine
- Linode (unofficial plugin, not supported by Docker)
- Microsoft Hyper-V
- OpenStack
- Rackspace
- IBM Softlayer
- Oracle VirtualBox
- VMware vCloud Air
- VMware Fusion
- VMware vSphere
- VMware Workstation (unofficial plugin, not supported by Docker)
- Grid 5000 (unofficial plugin, not supported by Docker)
- Scaleway (unofficial plugin, not supported by Docker)
- Hetzner Cloud (unofficial plugin, not supported by Docker)
















Source: <https://docs.docker.com/machine/drivers/>

Rancher Server – Node Templates

Node Templates

 Manage Cloud Credentials  Add Template

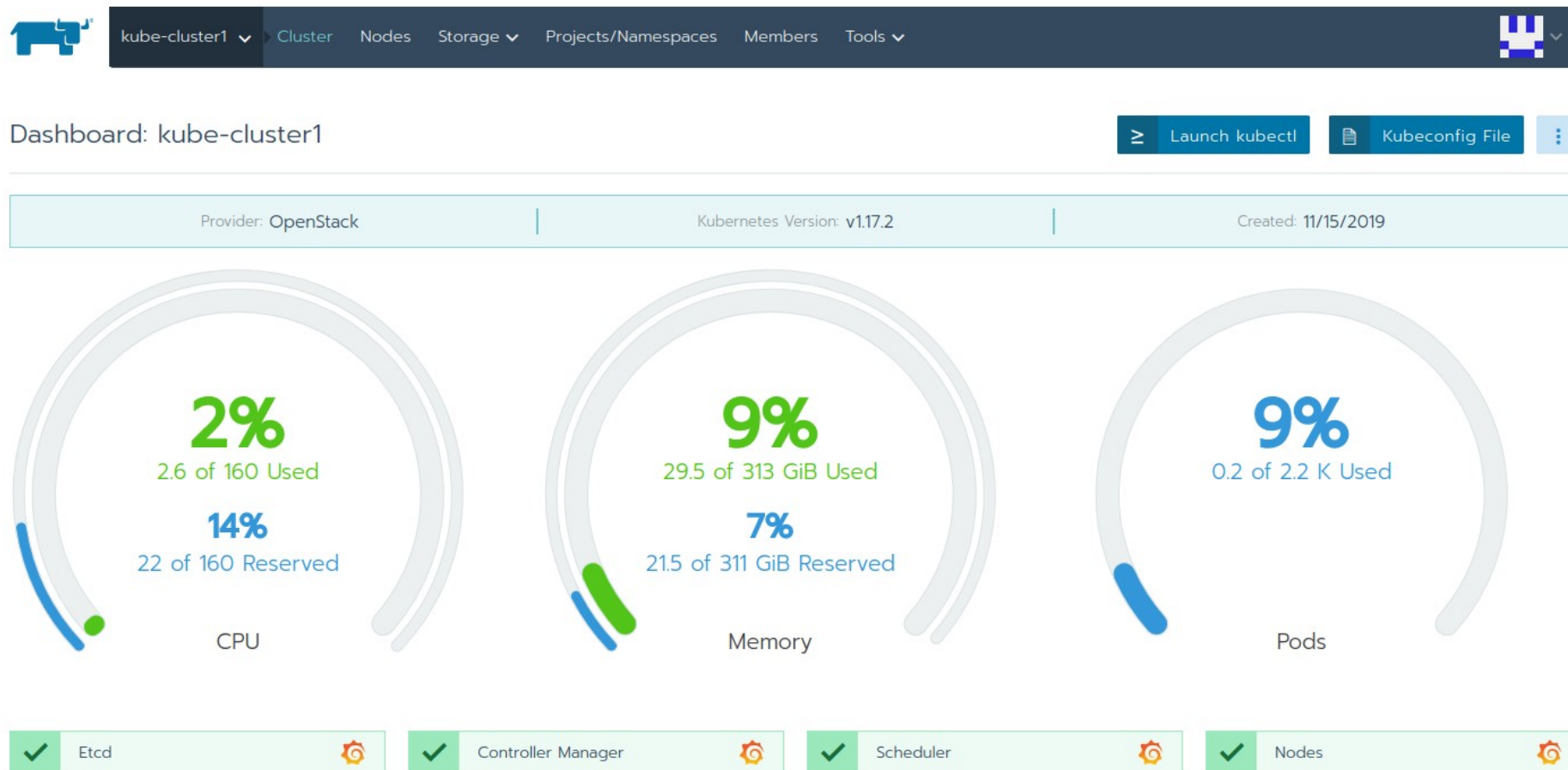
Delete  1 Item

<input type="checkbox"/>	State 	Name 	Owner 	Provider 	Location 	Size 	
Owner:							
<input checked="" type="checkbox"/>	Active	k8s-centos-master		OpenStack	RegionOne	N/A	
<input type="checkbox"/>	Active	k8s-centos-node		OpenStack	RegionOne	N/A	
<input type="checkbox"/>	Active	rancherOS-k8s-network		OpenStack	RegionOne	N/A	
<input type="checkbox"/>	Active	rancherOS-master		OpenStack	RegionOne	N/A	
<input type="checkbox"/>	Active	rancherOS-node		OpenStack	RegionOne	N/A	
<input type="checkbox"/>	Active	ubuntu-k8s-master		OpenStack	RegionOne	N/A	
<input type="checkbox"/>	Active	ubuntu-k8s-node		OpenStack	RegionOne	N/A	
Owner: Michael Schuh							
<input type="checkbox"/>	Active	k8s-master-ubuntu-18-1908	Michael Schuh	OpenStack	RegionOne	N/A	
<input type="checkbox"/>	Active	ubuntu-18-1908-docker	Michael Schuh	OpenStack	RegionOne	N/A	

Node Templates

- Shape k8s nodes
- Configure Docker
- Add Registries

Rancher Server – Cluster View



- Nodes
- Storage
- Namespaces
- Authorization
- Monitoring, logging, ...

This cluster runs


- **~200/2.200 containers**
 - JupyterHub
 - Spark
 - Python Dask
 - Mattermost
 - Mediawiki
 - Openwhisk
 - Openfaas
 - ... even more
- While most are idle
 - **30/313 GB RAM**
 - **22/160 CPU**

Rancher Server – Command Line Client

```
schuhm@work:~$ rancher clusters
CURRENT ID STATE NAME PROVIDER NODES CPU RAM PODS
* c-754m5 active gitlab-public-ci Rancher Kubernetes Engine 6 3.43/40 1.56/77.83 GB 32/550
c-dsrzl active kube-cluster1 Rancher Kubernetes Engine 23 22/160 21.47/311.33 GB 194/2200
c-kmghz active guest-k8s Rancher Kubernetes Engine 8 2.73/40 1.19/77.83 GB 35/550

schuhm@work:~$ rancher context switch
NUMBER CLUSTER NAME PROJECT ID PROJECT NAME PROJECT DESCRIPTION
1 gitlab-public-ci c-754m5:p-ldn7h Default Default project created for the cluster
2 gitlab-public-ci c-754m5:p-ssb7l System System project created for the cluster
3 kube-cluster1 c-dsrzl:p-56mxx Serverless
4 kube-cluster1 c-dsrzl:p-876bg Data-Analysis
5 kube-cluster1 c-dsrzl:p-8dp2v hifis
6 kube-cluster1 c-dsrzl:p-b8rts onda
7 kube-cluster1 c-dsrzl:p-grgrn continuous-integration
8 kube-cluster1 c-dsrzl:p-n5ktg Grid-dev
9 kube-cluster1 c-dsrzl:p-pxwf6 Default Default project created for the cluster
10 kube-cluster1 c-dsrzl:p-wjbpk System System project created for the cluster
11 guest-k8s c-kmghz:p-88982 guest-tim
12 guest-k8s c-kmghz:p-f5tfq Default Default project created for the cluster
13 guest-k8s c-kmghz:p-hlfrl marlin
14 guest-k8s c-kmghz:p-xtj98 System System project created for the cluster
Select a Project:4
INFO[0005] Setting new context to project Data-Analysis
INFO[0005] Saving config to /home/schuhm/.rancher/cli2.json
schuhm@work:~$
```

Rancher Server – include Helm Charts as Catalogs



kube-cluster1
Data-Analysis

Resources

Apps

Namespaces

Members

Catalogs

Delete

<input type="checkbox"/>	State	Scope	Name	Catalog URL
<input type="checkbox"/>	Active	Global	apache-openwhisk	https://openwhisk.apache.org/helm-charts/
<input type="checkbox"/>	Active	Global	bitnami	https://charts.bitnami.com/
<input type="checkbox"/>	Active	Global	cert-manager	https://charts.jetstack.io/
<input type="checkbox"/>	Active	Global	confluent	https://charts.confluent.com/
<input type="checkbox"/>	Active	Global	consul	https://github.com/hashicorp/consul-helm.git
<input type="checkbox"/>	Active	Global	couchdb	https://apache.github.io/couchdb-helm
<input type="checkbox"/>	Active	Project	dask-official	https://helm.dask.org/
<input type="checkbox"/>	Active	Global	desy-it	https://charts.desy.de/desy-it
<input type="checkbox"/>	Active	Global	gitlab	https://charts.gitlab.io
<input type="checkbox"/>	Active	Global	helm	https://kubernetes-charts.storage.googleapis.com/
<input type="checkbox"/>	Active	Global	helm-incubator	https://kubernetes-charts-incubator.storage.googleapis.com/
<input type="checkbox"/>	Active	Global	jupyterhub-helm	https://jupyterhub.github.io/helm-chart/

Add Catalog

Name

my-charts

Catalog URL

gitlab.desy.de/my-group/my-project

☐ Use private catalog

Branch

my-dev-branch

Scope

project

Create

Cancel



Add Catalog

Search

Branch

master

master

master

master

master


master

master

master


master

Rancher Server – Deploy Helm Charts as Applications



kube-cluster1
Data-Analysis





Resources Apps Namespaces Members Tools



Apps

Manage CatalogsLaunch

Search

	<div>dask</div> <div>Up to date (4.16)Active</div> <div>443/https, 30310/tcp, 30730/tcp</div> <div>3</div>		<div>jupyterhub</div> <div>Up to date (0.9.0-beta.4.n000.h72e54ee)Active</div> <div>443/https</div> <div>24</div>
	<div>project-monitoring</div> <div>Up to date (0.0.7)Active</div> <div>/index.html, /index.html</div> <div>2</div>		<div>spark-pure</div> <div>Up to date (1.2.6)Active</div> <div>443/https</div> <div>3</div>

Contact

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