# kubernetes+helm+rancher stack in the DESY compute cloud

**Technology Demonstration for PaNOSC WP6 weekly meeting**

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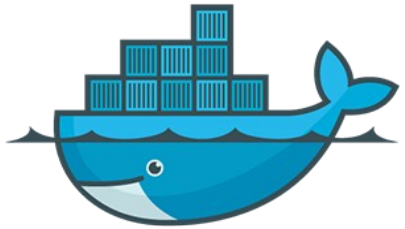
Feb 29 2020

# 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

**Infrastructure as a Service**
Cloud Computing
Software Defined Networking

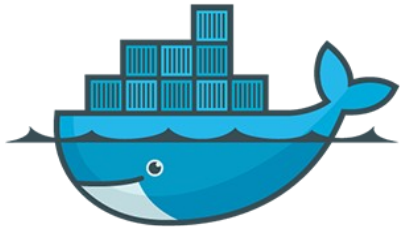
# Software stack container orchestration

**Kubernetes as a Service**
Container Orchestration
Container Networking
Kubernetes Package Manager


kubernetes


**Container as a Service**
Cloud Native CI/CD
Docker registry

GitLab



**Infrastructure as a Service**
Cloud Computing
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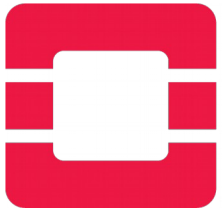


openstack®

# 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

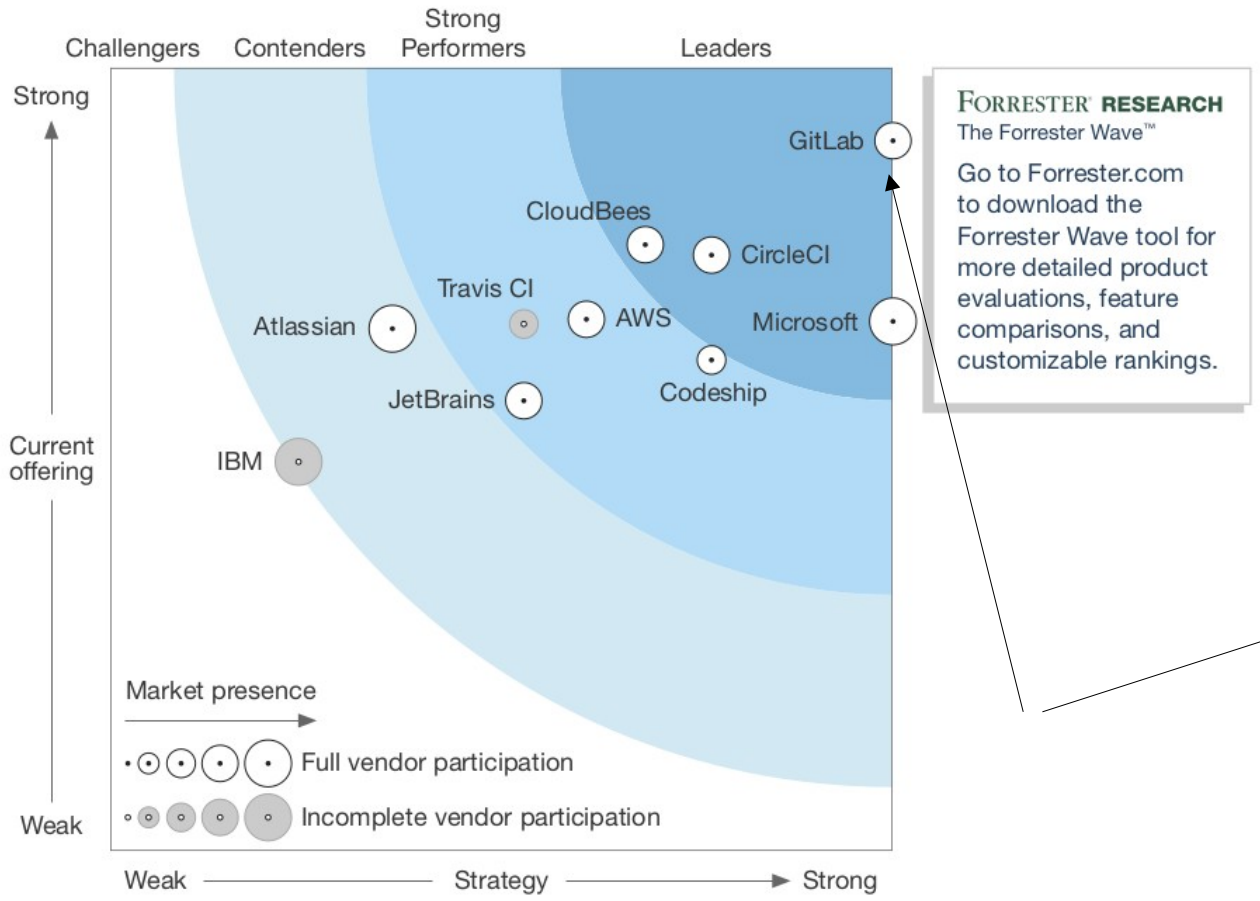
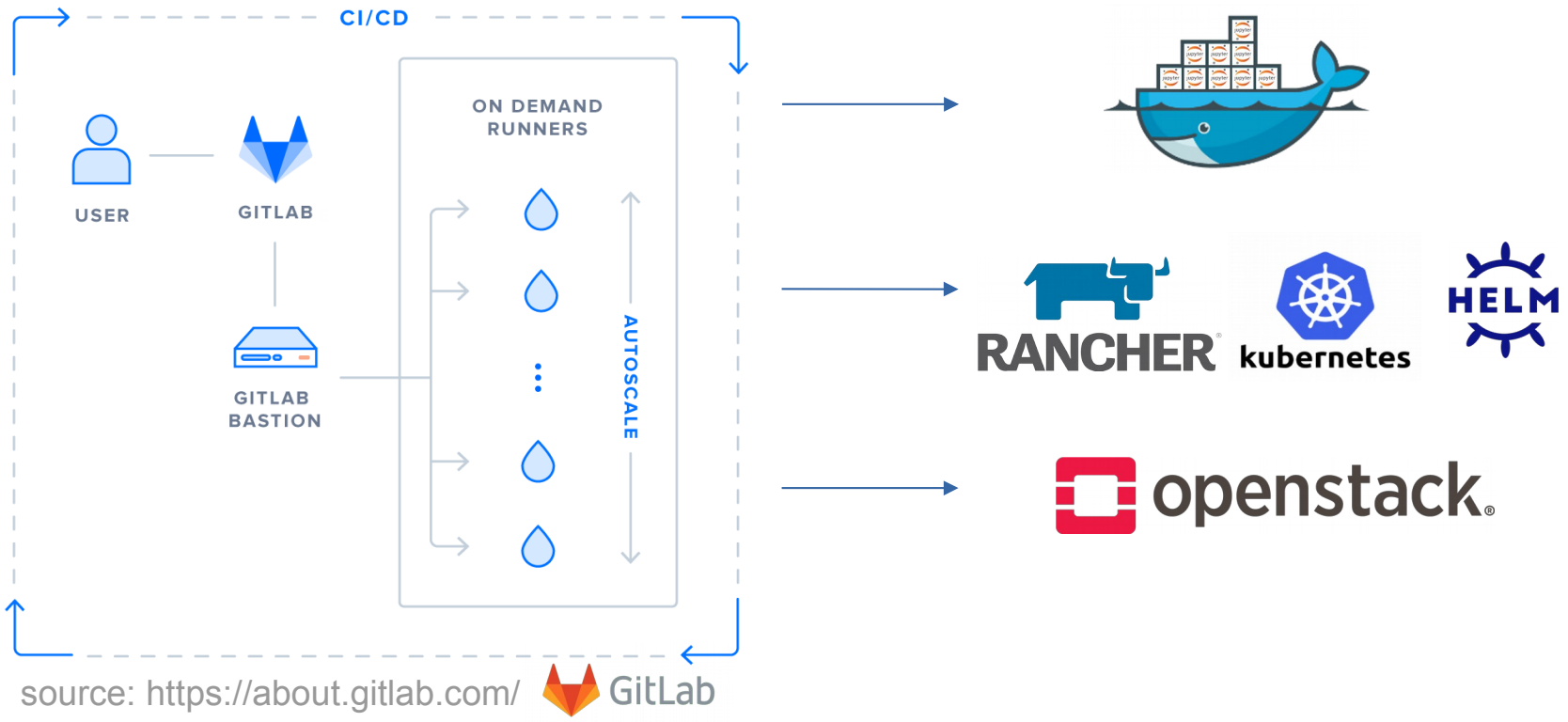



**FIGURE 2** Forrester New Wave™: Enterprise Container Platform Software Suites, Q4 2018

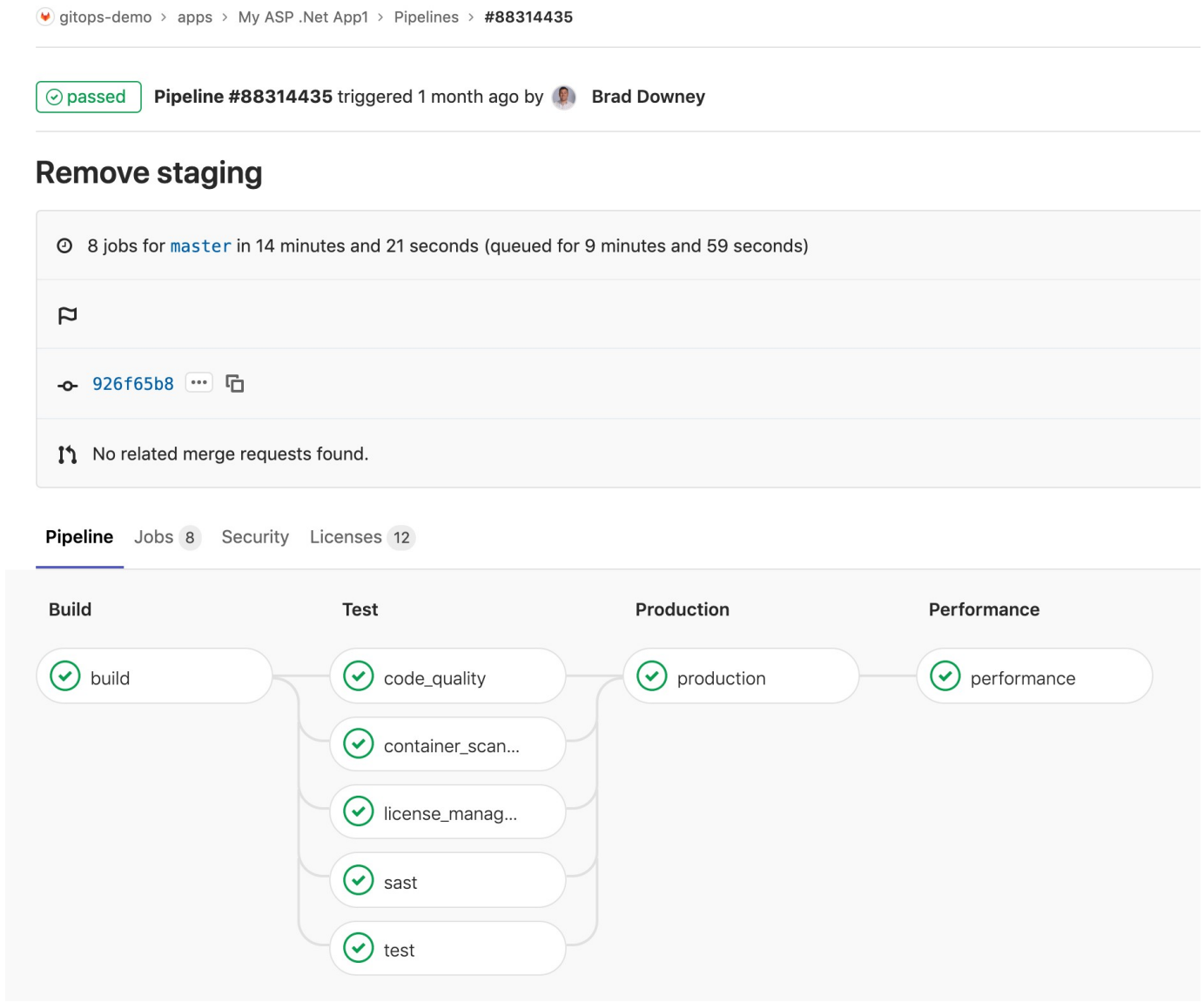

Sources and further reading:
The Forrester Wave™: Continuous Integration Tools, Q3 2017
The Forrester New Wave™: Enterprise Container Platform Software Suites, Q4 2018

# 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

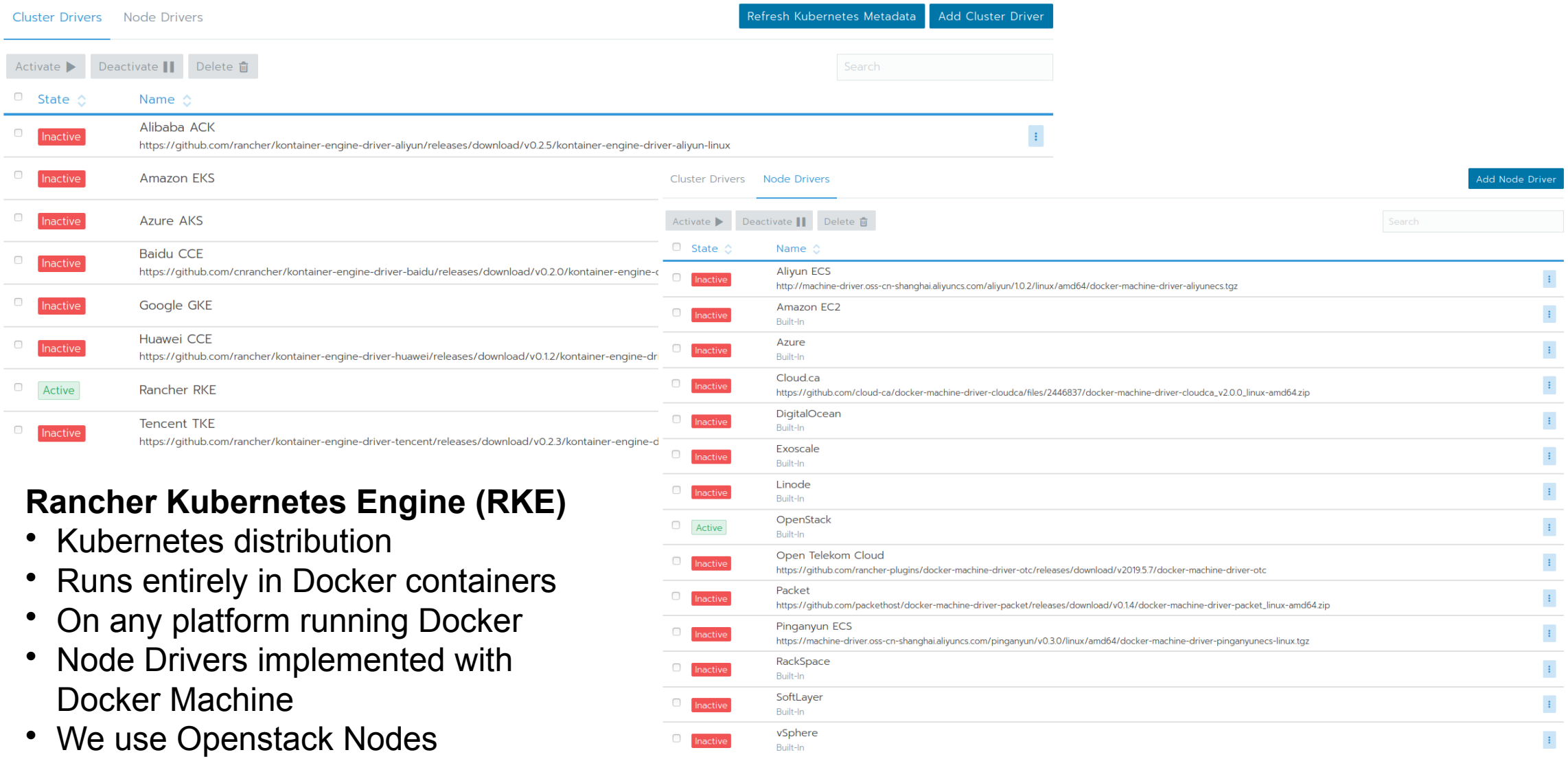



Git repositories as “single source of truth” for all infrastructure and application deployments

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/

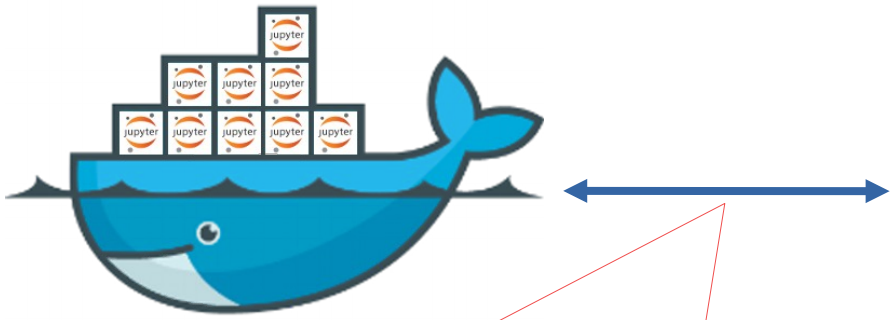
# Rancher Server – Cluster and Node Drivers




## 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



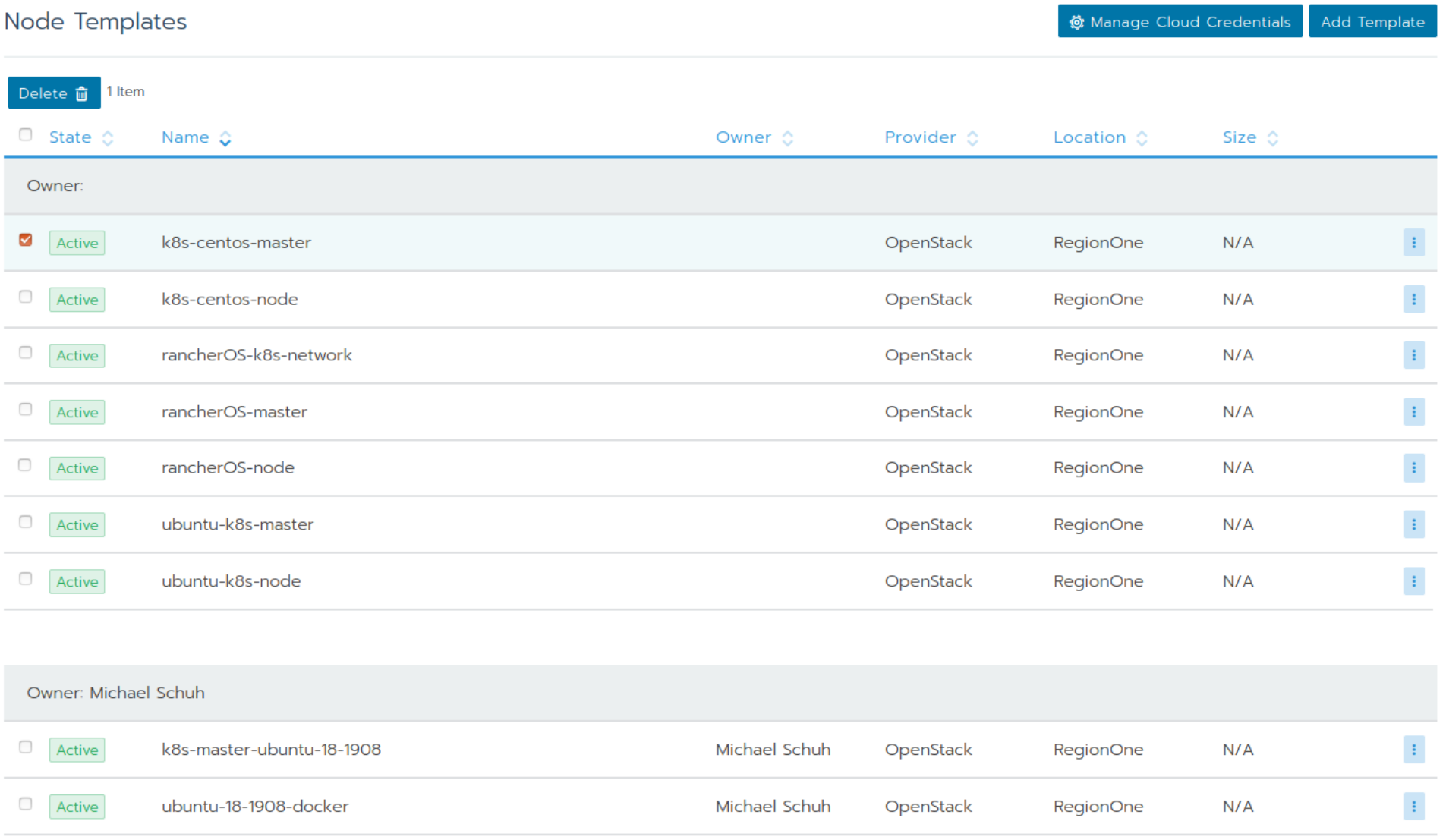
Docker Machine is now in maintenance mode

- 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/

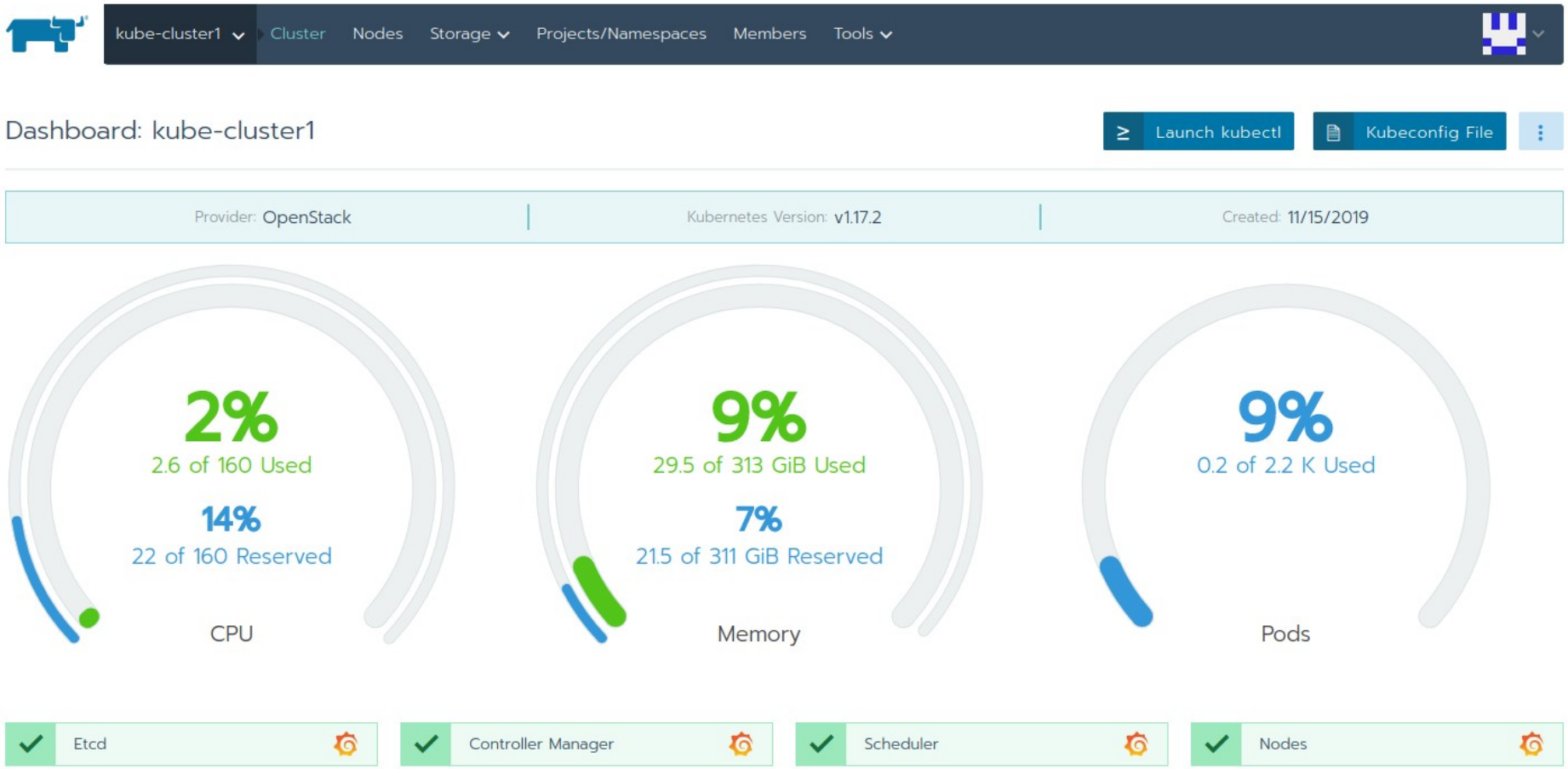
# Rancher Server – Node Templates




## Node Templates

- Shape k8s nodes
- Configure Docker
- Add Registries

# Rancher Server – Cluster View




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

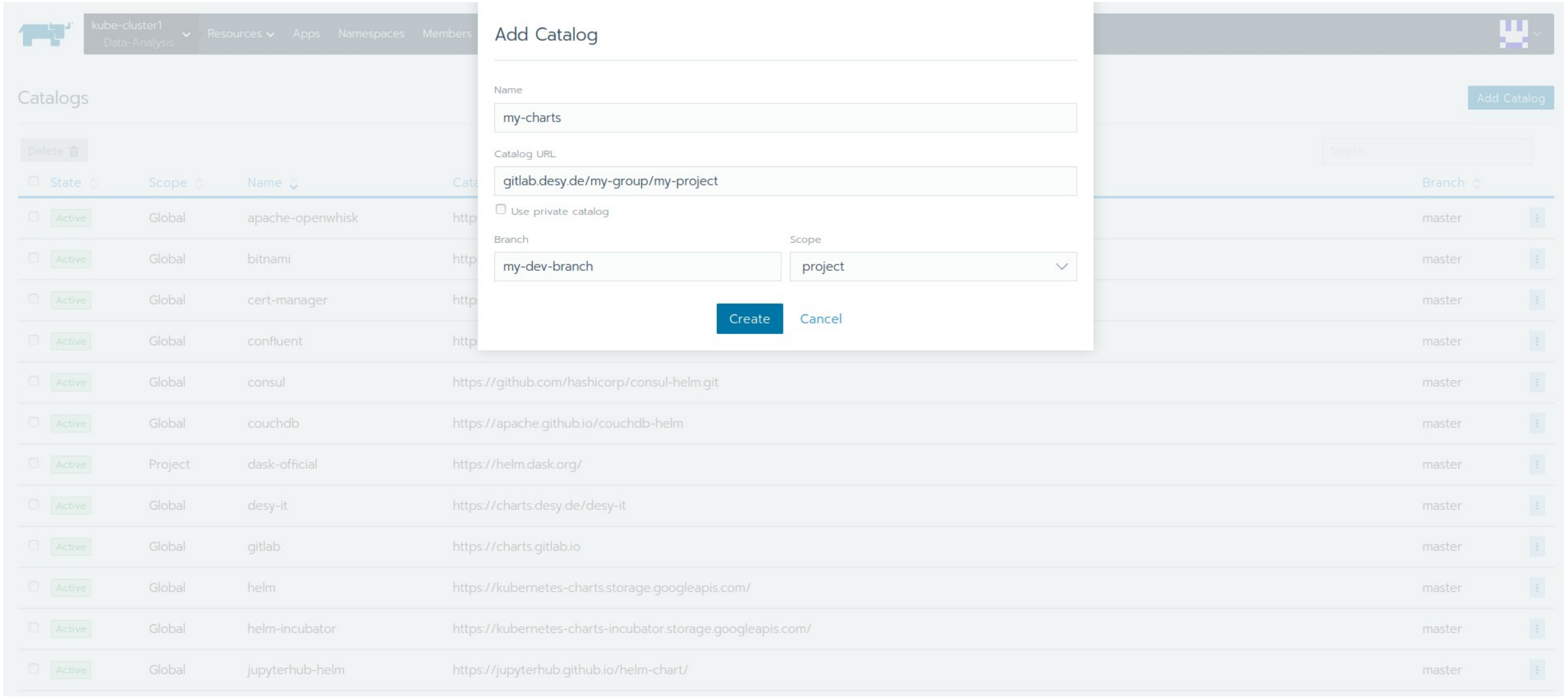
**This cluster runs**

- **~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**

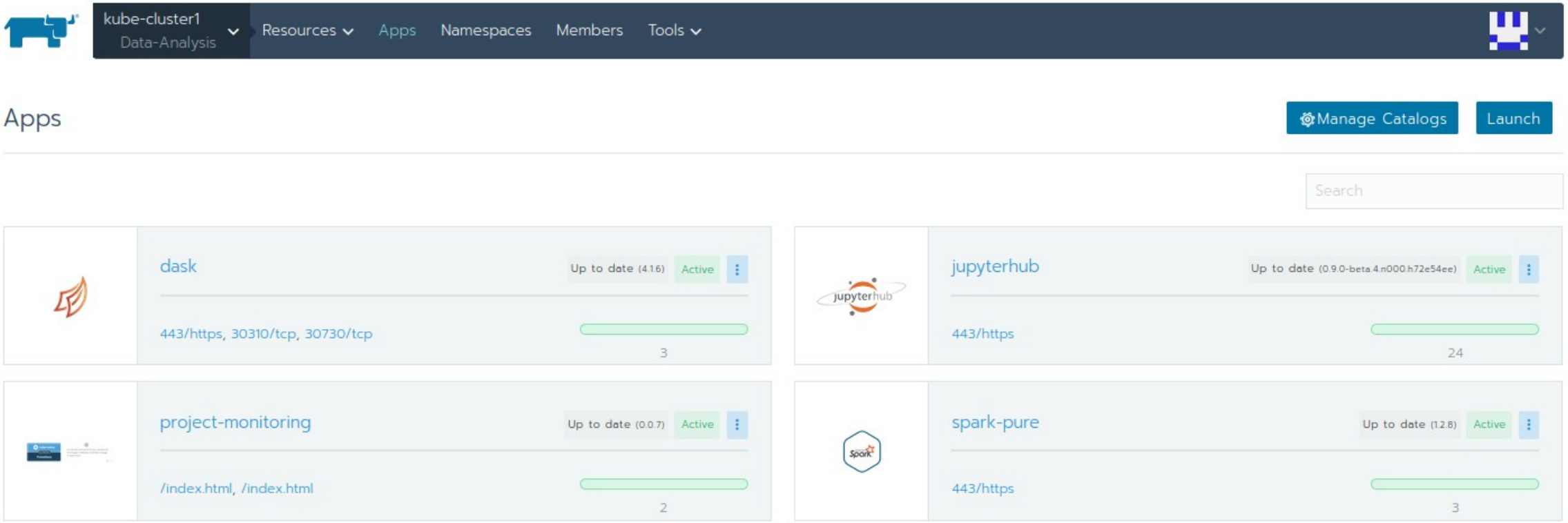
# Rancher Server – Command Line Client

```
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



# Rancher Server – Deploy Helm Charts as Applications



## Contact

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