



KUBERNETES ON OPENSTACK

Cluster creation, management and service deployment

20.02.2024 | TIM KREUZER

WHAT TO EXPECT

Why you're here and what you will learn

- Kubernetes in 3 minutes
- Create a kubernetes cluster on OpenStack
- Manage your cluster – Browser and CLI
- Deploy services – the easy way
- Deploy services – the right way

KUBERNETES

In (nearly) 3 minutes

- „Kubernetes, also known as K8s, is an open source system for managing containerized applications across multiple hosts. It provides basic mechanisms for deployment, maintenance, and scaling of applications.”

github.com/kubernetes/kubernetes

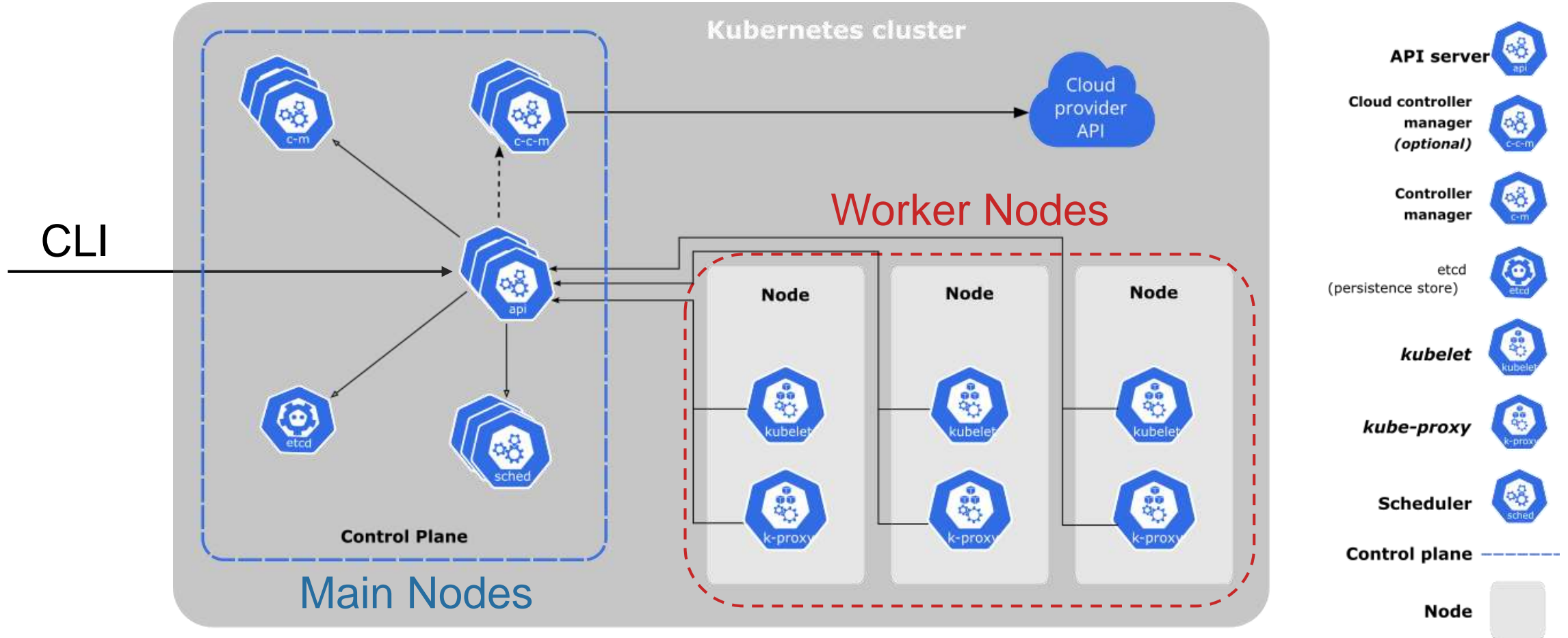
- Features:

- Load Balancing
- Storage orchestration
- Automated rollouts and rollbacks
- Automated bin packing
- Self-healing
- Secret and configuration management

kubernetes.io/docs/concepts/overview/

KUBERNETES

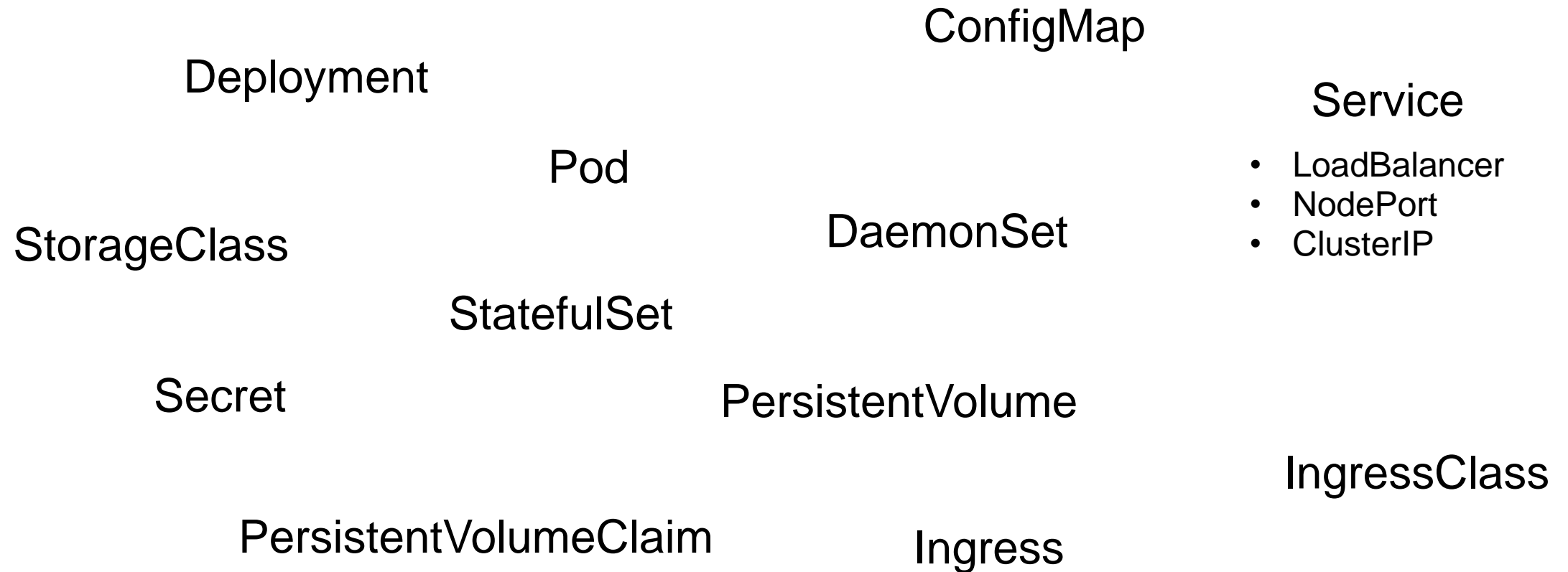
Architecture



kubernetes.io/docs/concepts/overview/components/

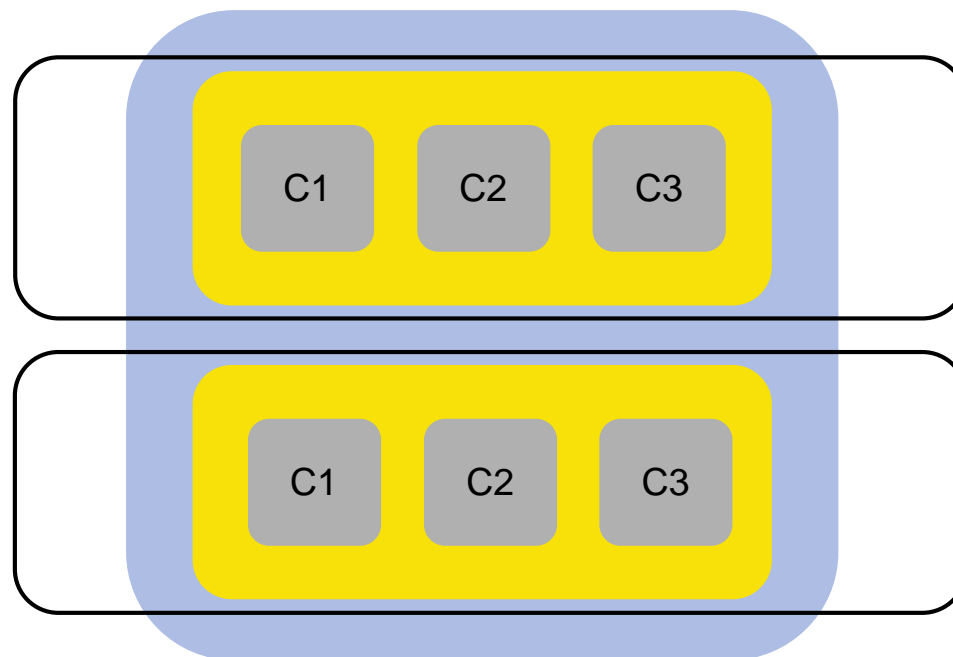
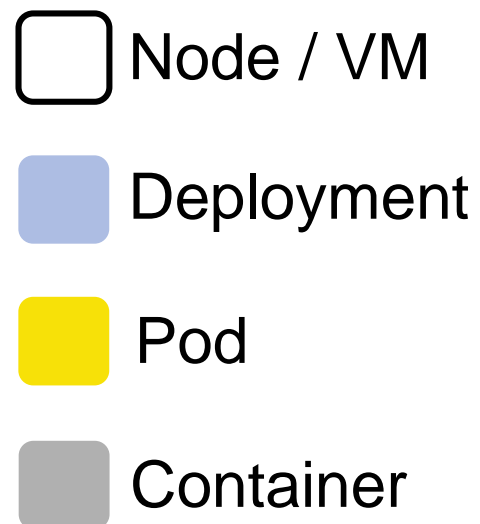
KUBERNETES

Resources



KUBERNETES





Resources - Deployment

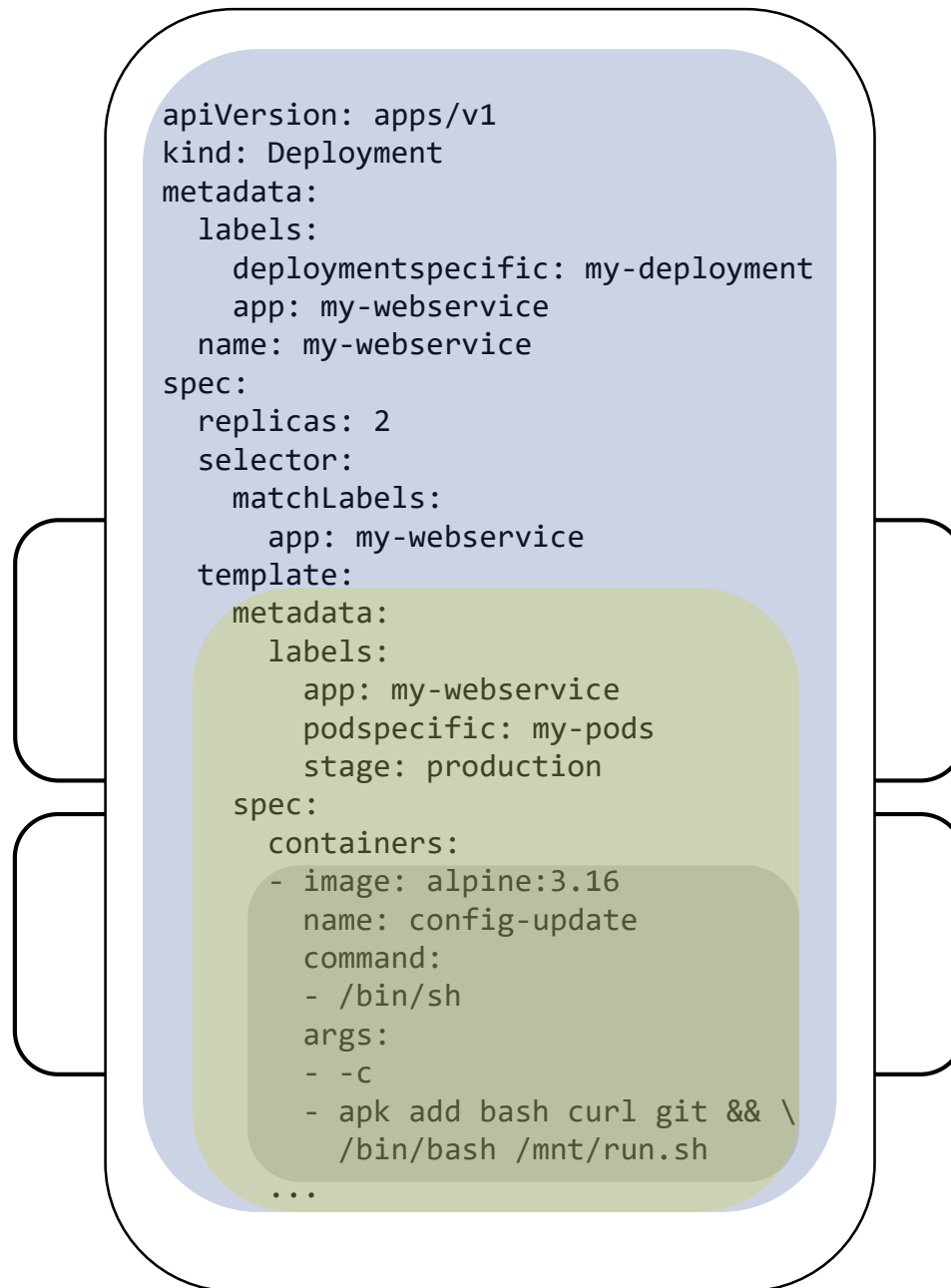


C1: update config
C2: webservice
C3: serve static files

KUBERNETES

Resources - Deployment

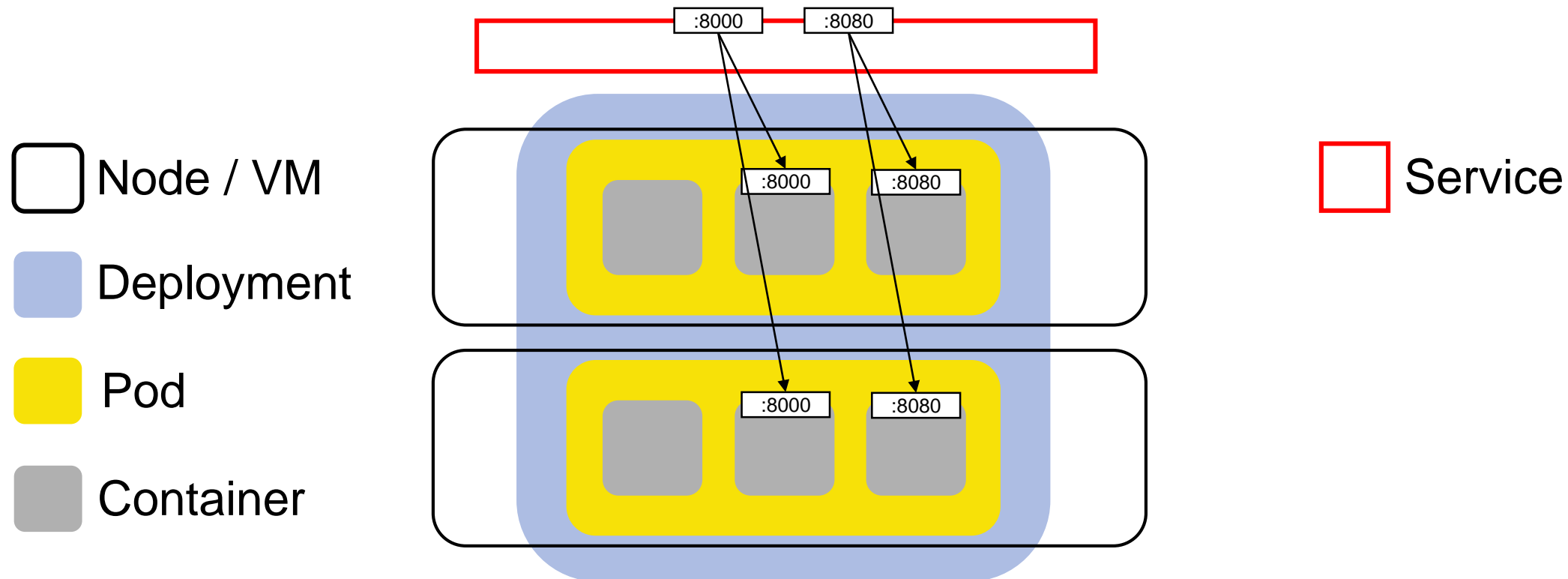
-  Node / VM
-  Deployment
-  Pod
-  Container



- C1: update config
- C2: webservice
- C3: serve static files





KUBERNETES

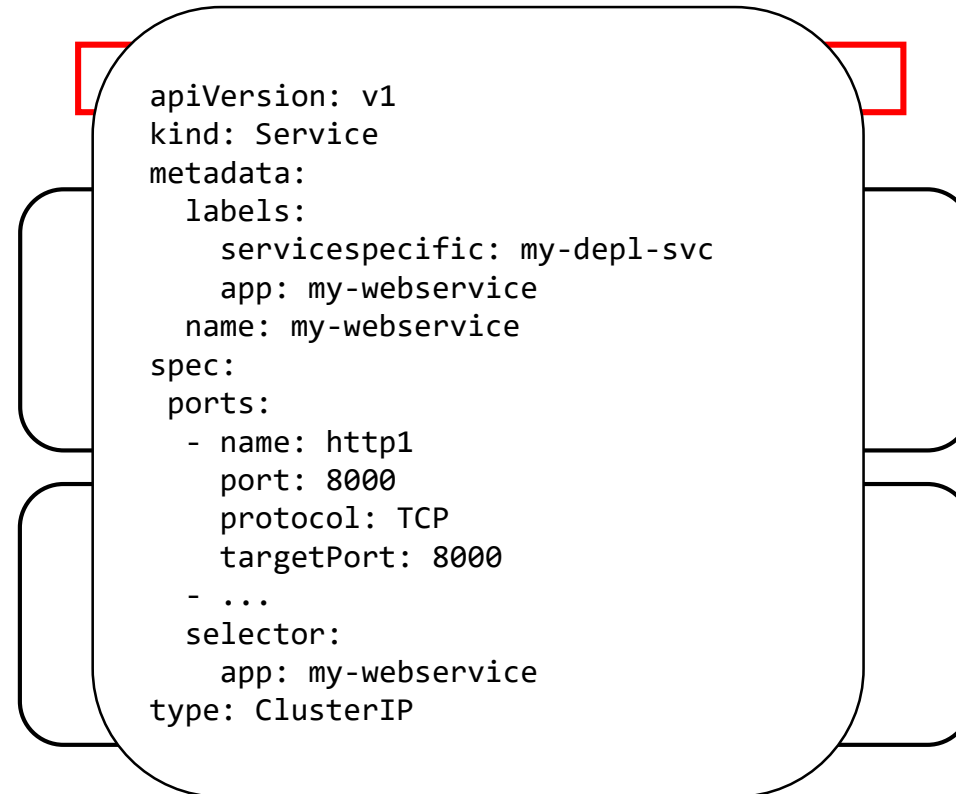
Resources - Service



KUBERNETES

Resources - Service

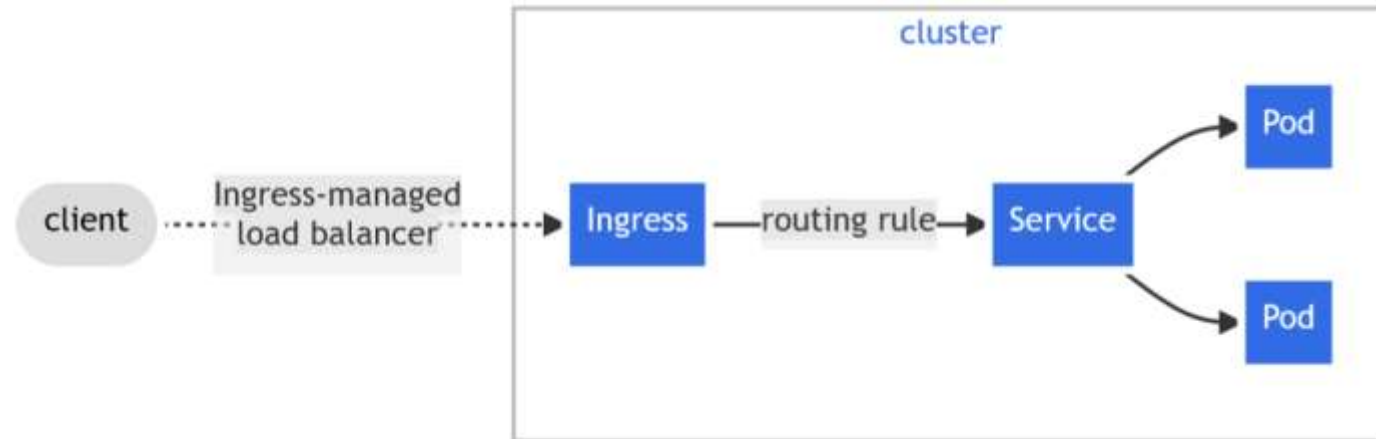
-  Node / VM
-  Deployment
-  Pod
-  Container



 Service

KUBERNETES

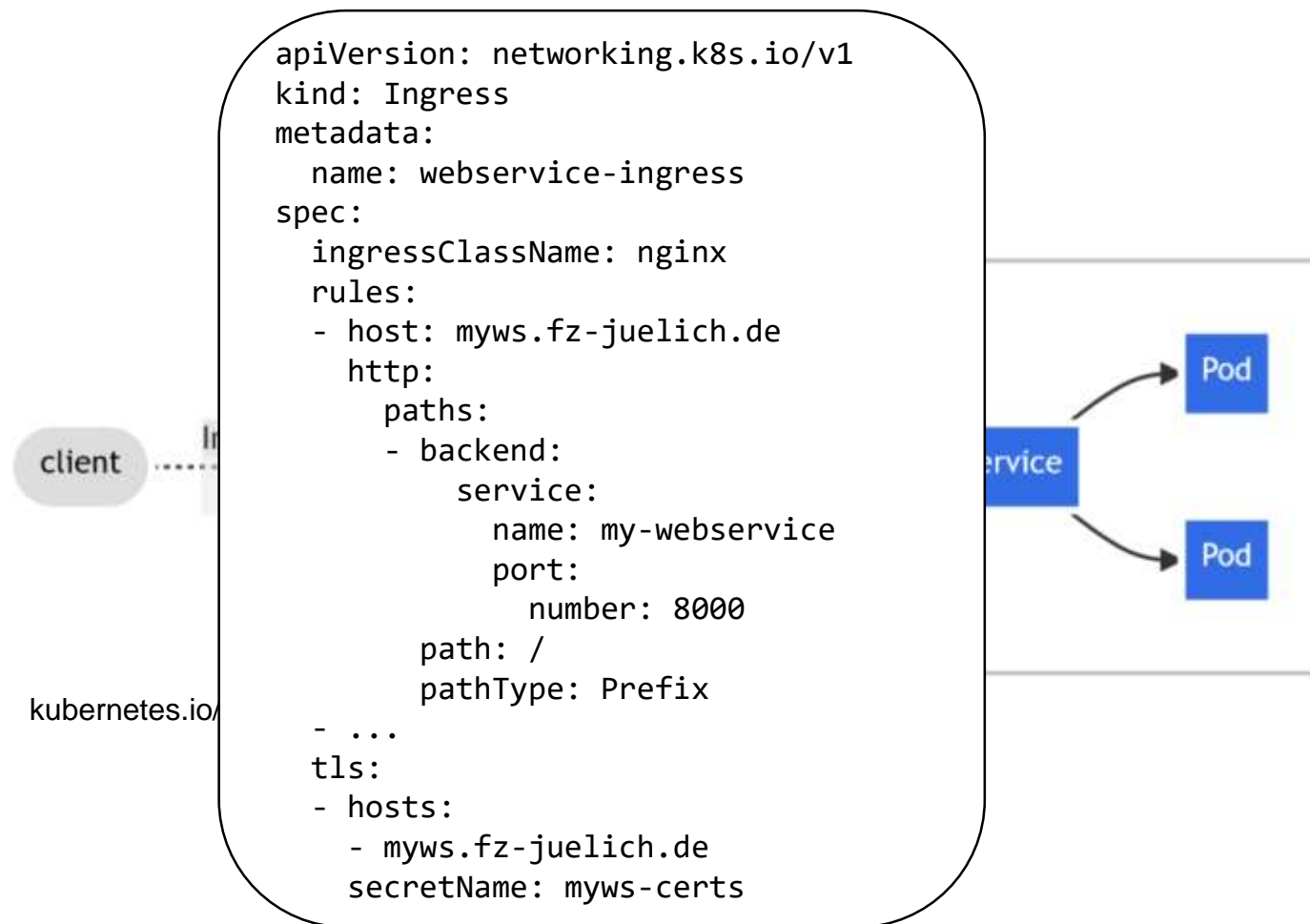
Resources - Ingress



kubernetes.io/docs/concepts/services-networking/ingress/

KUBERNETES

Resources - Ingress



WHAT TO EXPECT

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OPENSTACK

Create a K8s cluster



rancher.com

RANCHER

Create a K8s cluster

- Multi-Cluster Management
- „Kubernetes-as-a-service“
- Integrated support for
 - Prometheus
 - Grafana
 - Fleet
- Including OpenStack driver

RANCHER

Create a K8s cluster

- OpenStack requirements:
 - Application credentials
 - SSH-Keypair
 - Network / Subnet
 - Security group for subnet
 - One „proxy“ VM

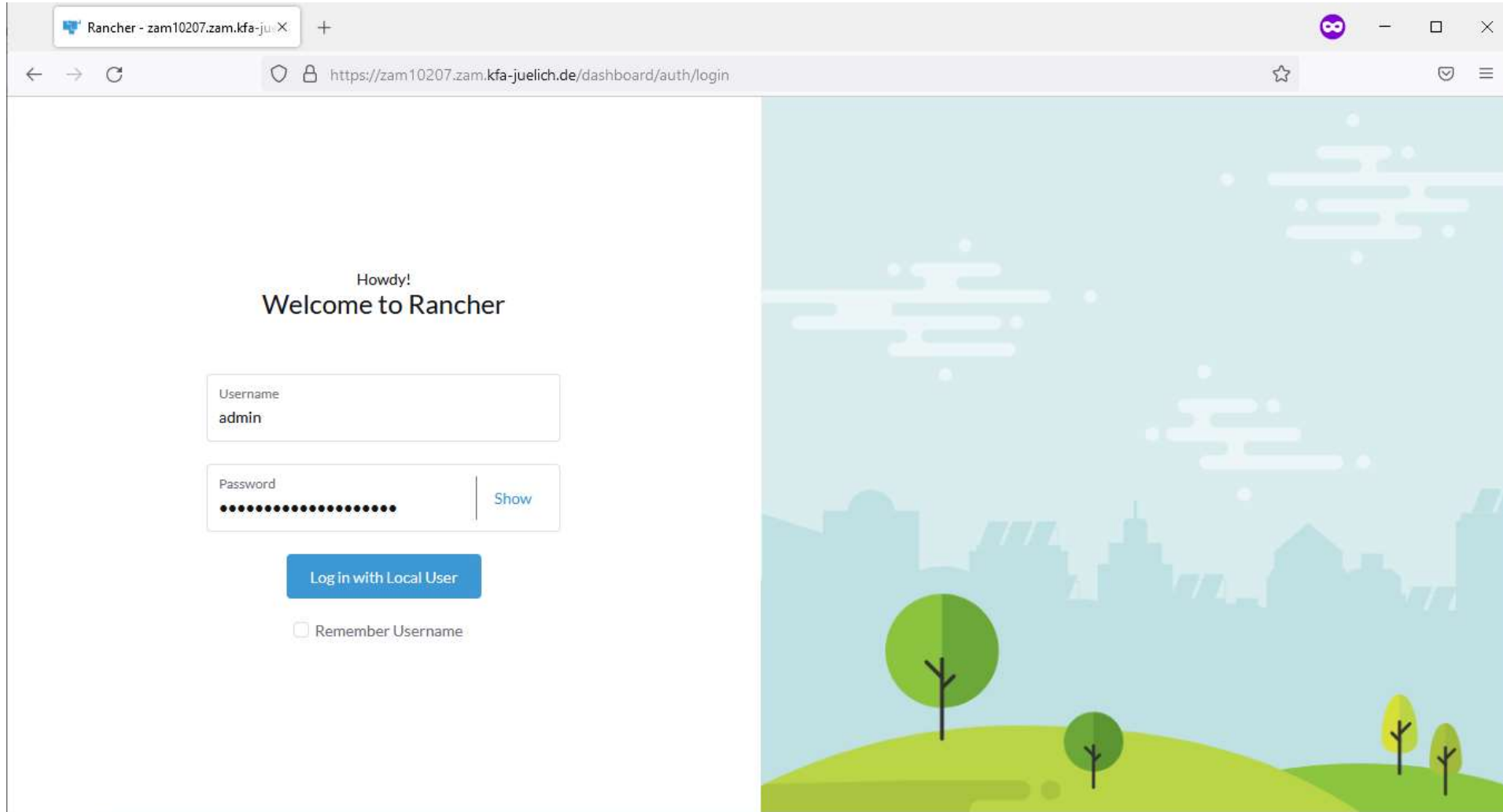
RANCHER

Create a K8s cluster

- „Proxy“ VM:
 - Add Floating IP
 - Accessible for administrators (134.94.0.0/16)
 - Install docker
 - `docker run -d --restart=unless-stopped --net=host --privileged rancher/rancher:v2.8`
- Customization:
 - Persistent Rancher storage (`-v ...:/var/lib/rancher`)
 - Certificate for rancher webservice (`-v ...:/etc/rancher/ssl/`)
 - Install nfs server for your services

RANCHER

Create a K8s cluster



RANCHER

Create a K8s cluster

The screenshot shows the Rancher dashboard interface. At the top, there's a navigation bar with the Rancher logo and a hamburger menu. Below that, a large banner reads "Welcome to Rancher" with a stylized landscape illustration. A blue banner below the banner says "Learn more about the improvements and new capabilities in this version." with a link to "What's new in 2.6".

The main content area is titled "Clusters" and shows a count of 2 clusters. There are buttons for "Import Existing", "Create", and a "Filter" input field. Below this is a table of clusters:

State	Name	Provider	Kubernetes Version	CPU	Memory	Pods
Active	local	k3s	v1.22.7+k3s1	0.1/4 cores	70 MiB/7.77 GiB	6/110
Active	staging	rke	v1.22.9	5.87/9 cores	7.41 GiB/33 GiB	59/550

On the right side, there are two panels: "Community Support" with links for Docs, Forums, Slack, and File an Issue; and "Commercial Support".

RANCHER

Create a K8s cluster

The screenshot shows the Rancher dashboard interface. The main content area displays a 'Welcome to Rancher' message with a landscape illustration. Below this, there is a section for 'What's new in 2.6' and a table of available Kubernetes clusters. The table has columns for Provider, Kubernetes Version, CPU, Memory, and Pods. There are also buttons for 'Import Existing', 'Create', and 'Filter' above the table. On the right side, there are two panels for 'Community Support' and 'Commercial Support', each with a close button (X). The left sidebar contains navigation links for Home, EXPLORE CLUSTER (local, staging), GLOBAL APPS (Continuous Delivery, Cluster Management, Virtualization Management), and CONFIGURATION (Users & Authentication, Global Settings). The bottom of the dashboard shows 'Get Support v2.6.4 English' and a URL: https://zam10207.zam.kfa-juelich.de/dashboard/c/c-jg2mn/manager.

Provider	Kubernetes Version	CPU	Memory	Pods
s	v1.22.7+k3s1	0.1/4 cores	70 MiB/7.77 GiB	6/110
e	v1.22.9	5.87/9 cores	7.41 GiB/33 GiB	59/550

RANCHER

Create a K8s cluster

Rancher - zam10207.zam.kfa-ju... X

https://zam10207.zam.kfa-juelich.de/dashboard/c-c-jg2mn/manager/provisioning.cattle.io.cluster

Cluster Management

Clusters 2

Cloud Credentials

Drivers

Pod Security Policies

RKE1 Configuration

Node Templates

RKE Templates

Advanced

Clusters

Import Existing Create

Filter

State	Name	Version	Provider	Machines	Age	
Active	local	v1.22.7+k3s1	Local K3s	1	101 days	Explore
Active	staging	v1.22.9	OpenStack RKE	6	101 days	Explore

v2.6.4

RANCHER

Create a K8s cluster

The screenshot shows the Rancher web interface at the URL `https://zam10207.zam.kfa-juelich.de/dashboard/c-c-jg2mn/manager/pages/rke-drivers`. The left sidebar is titled 'Cluster Management' and includes sections for Clusters (2), Cloud Credentials, Drivers (selected), Pod Security Policies, RKE1 Configuration, and Advanced. The main content area displays a list of drivers with their status and source links:

Driver Name	Status	Source Link
DigitalOcean	Inactive	https://github.com/cloudscale-ch/docker-machine-driver-cloudscale/releases/download/v1.2.0/docker-machine-driver-cloudscale_v1.2.0_linux_amd64.tar.gz
Exoscale	Inactive	Built-In
Google	Inactive	Built-In
Harvester	Inactive	Built-In
Linode	Inactive	Built-In
Nutanix	Inactive	https://github.com/nutanix/docker-machine/releases/download/v3.1.0/docker-machine-driver-nutanix_v3.1.0_linux
Oracle Cloud Infrastructure	Inactive	https://github.com/rancher-plugins/rancher-machine-driver-oci/releases/download/v1.1.0/docker-machine-driver-oci-linux
OpenStack	Active	Built-In
Open Telekom Cloud	Inactive	https://github.com/rancher-plugins/docker-machine-driver-otc/releases/download/v2019.5.7/docker-machine-driver-otc
Equinix Metal	Inactive	https://github.com/equinix/docker-machine-driver-metal/releases/download/v0.6.0/docker-machine-driver-metal_linux-amd64.zip
Pinganyun ECS	Inactive	https://drivers.rancher.cn/node-driver-pinganyun/0.3.0/docker-machine-driver-pinganyunecs-linux.tgz

The version number v2.6.4 is visible in the bottom left corner of the interface.

RANCHER

Create a K8s cluster

The screenshot shows the Rancher Node Templates page in a web browser. The browser address bar shows the URL: `https://zam10207.zam.kfa-juelich.de/dashboard/c/c-jg2mn/manager/pages/node-templates`. The page title is "Cluster Management". The left sidebar contains a navigation menu with the following items: Clusters (2), Cloud Credentials, Drivers, Pod Security Policies, RKE1 Configuration, Node Templates (selected), RKE Templates, and Advanced. The main content area displays a table of Node Templates. Each row represents a template with columns for a checkbox, status, name, role, provider, cloud provider, and a menu icon. The templates listed are: staging-main-v2, staging-monitoring-v1, staging-monitoring-v2, staging-usernode-v1, staging-usernode-v2, and staging-worker-v1. Each template has a "monitoring=true" or "usernode=true" label. The version number "v2.6.4" is visible in the bottom left corner of the page.

Checkbox	Status	Name	Role	Provider	Cloud Provider	Menu
<input type="checkbox"/>	Active	staging-main-v2	Default Admin	OpenStack	HDFCloud	N/A
			node-role.kubernetes.io/master:NoSchedule	main=true		
<input type="checkbox"/>	Active	staging-monitoring-v1	Default Admin	OpenStack	HDFCloud	N/A
			monitoring=true:NoExecute	monitoring=true		
<input type="checkbox"/>	Active	staging-monitoring-v2	Default Admin	OpenStack	HDFCloud	N/A
			monitoring=true:NoExecute	monitoring=true		
<input type="checkbox"/>	Active	staging-usernode-v1	Default Admin	OpenStack	HDFCloud	N/A
			usernode=true:NoExecute	usernode=true		
<input type="checkbox"/>	Active	staging-usernode-v2	Default Admin	OpenStack	HDFCloud	N/A
			usernode=true:NoExecute	usernode=true		
<input type="checkbox"/>	Active	staging-worker-v1	Default Admin	OpenStack	HDFCloud	N/A

RANCHER

Create a K8s cluster



```
"activeTimeout": "200",  
"applicationCredentialId": "...",  
"applicationCredentialName": "<credentialName>",  
"applicationCredentialSecret": "****",  
"authUrl": "https://cloud.jsc.fz-juelich.de:5000/v3",  
"bootFromVolume": true,  
"domainId": "default",  
"flavorId": "<flavorId>",  
"imageId": "<imageId>",  
"keypairName": "<keypair>",  
"netId": "<subnet_id>",  
"privateKeyFile": "****",  
"region": "JSCCloud",  
"secGroups": "<security_groups>",  
"sshPort": "22",  
"sshUser": "ubuntu",  
"tenantDomainId": "default",  
"tenantId": "<project_id>",  
"userDataFile": "#cloud-config\n ...",  
"volumeSize": "40",
```

RANCHER

Create a K8s cluster

Rancher - zam10207.zam.kfa-ju. X

https://zam10207.zam.kfa-juelich.de/dashboard/c/c-jg2mn/manager/pages/rke-templates

Cluster Management

Clusters 2

Cloud Credentials

Drivers

Pod Security Policies

RKE1 Configuration

Node Templates

RKE Templates

Advanced

Cluster Options

View as YAML

Expand All

Kubernetes Options

Customize the kubernetes cluster options

Kubernetes Version
v1.22.9-rancher1-1

Network Provider
canal

Project Network Isolation
false

CNI Plugin MTU Override
0

Only applied if the value is non-zero. When applied, the MTU value is explicitly configured for the chosen network provider (disabling auto-discovery). The override must be calculated from the host's MTU minus the CNI plugin's required overhead.

Cloud Provider ⓘ
generic

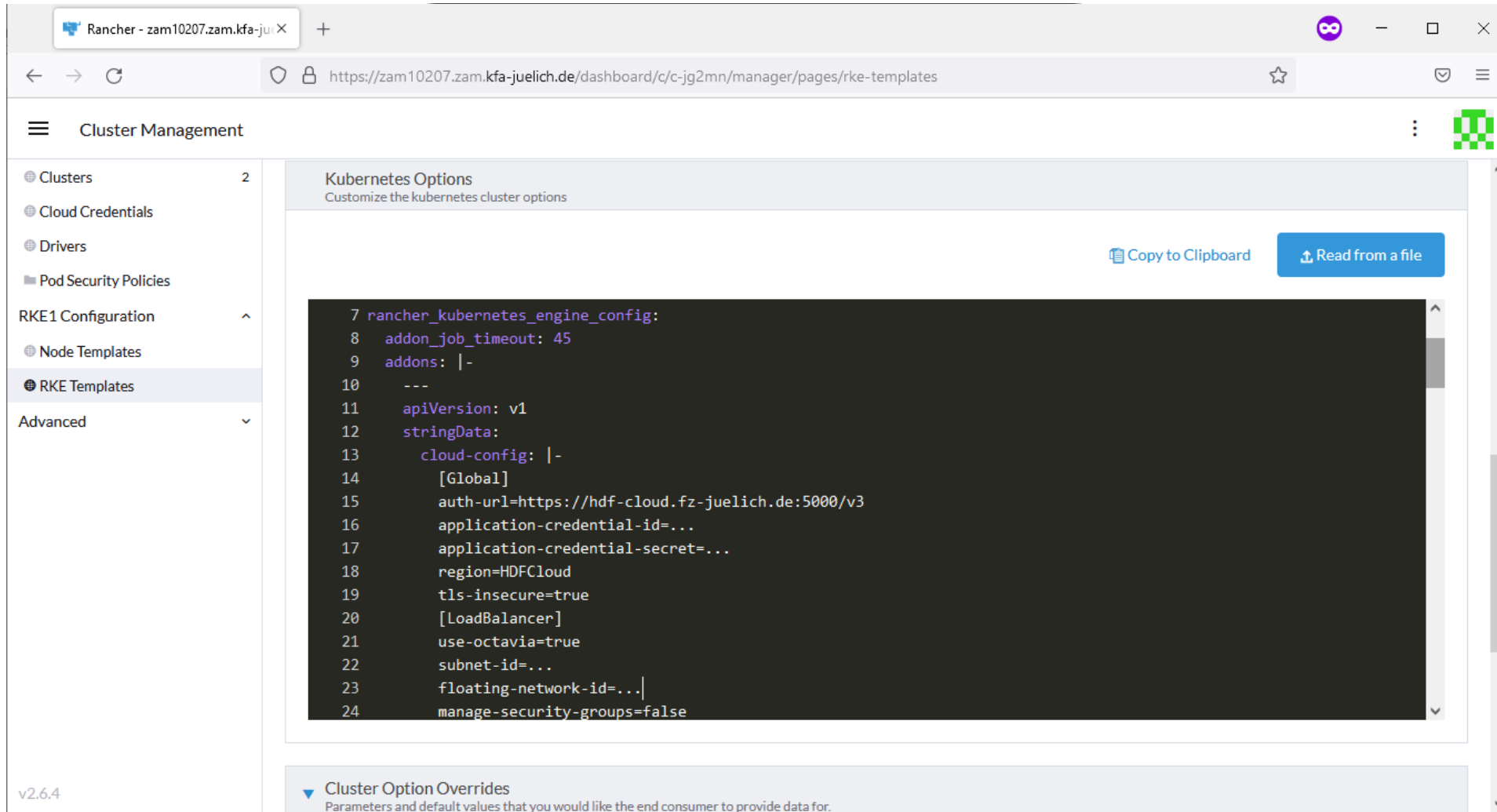
Private Registry

Configure a default private registry for provisioning RKE cluster components. When enabled, all system images required for RKE cluster provisioning and system add-ons startup will be pulled from this registry.

v2.6.4

RANCHER

Create a K8s cluster



Rancher - zam10207.zam.kfa-ju X

https://zam10207.zam.kfa-juelich.de/dashboard/c-c-jg2mn/manager/pages/rke-templates

Cluster Management

- Clusters 2
- Cloud Credentials
- Drivers
- Pod Security Policies
- RKE1 Configuration
 - Node Templates
 - RKE Templates**
- Advanced

Kubernetes Options

Customize the kubernetes cluster options

[Copy to Clipboard](#) [Read from a file](#)

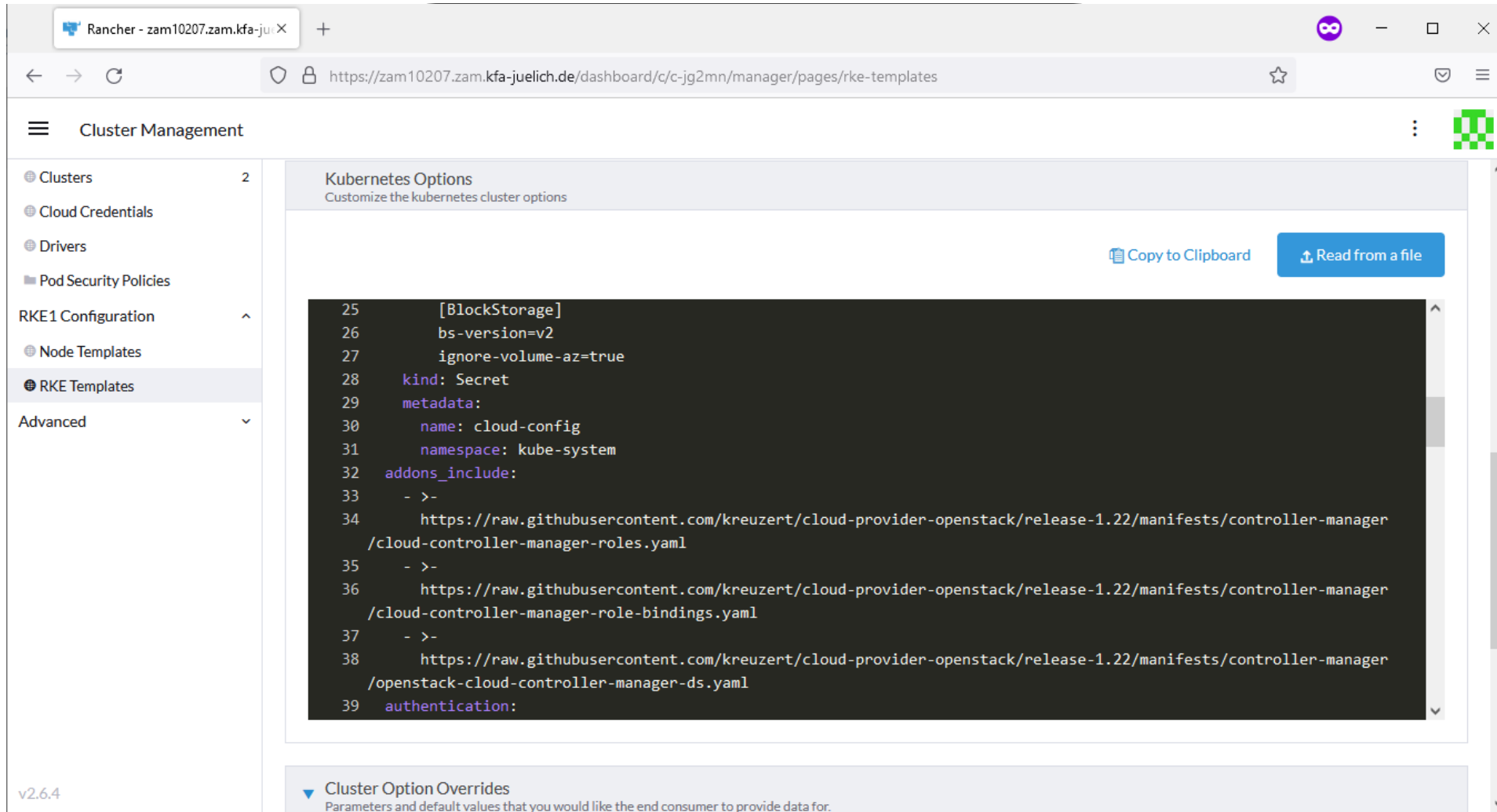
```
7 rancher_kubernetes_engine_config:
8   addon_job_timeout: 45
9   addons: |-
10    ---
11   apiVersion: v1
12   stringData:
13     cloud-config: |-
14       [Global]
15       auth-url=https://hdf-cloud.fz-juelich.de:5000/v3
16       application-credential-id=...
17       application-credential-secret=...
18       region=HDFCloud
19       tls-insecure=true
20     [LoadBalancer]
21     use-octavia=true
22     subnet-id=...
23     floating-network-id=...
24     manage-security-groups=false
```

v2.6.4

Cluster Option Overrides
Parameters and default values that you would like the end consumer to provide data for.

RANCHER

Create a K8s cluster



The screenshot shows the Rancher web interface in a browser window. The address bar displays the URL: `https://zam10207.zam.kfa-juelich.de/dashboard/c/c-jg2mn/manager/pages/rke-templates`. The page title is "Cluster Management". The left sidebar contains a navigation menu with the following items: Clusters (2), Cloud Credentials, Drivers, Pod Security Policies, RKE1 Configuration, Node Templates, RKE Templates (selected), and Advanced. The main content area is titled "Kubernetes Options" and includes the subtitle "Customize the kubernetes cluster options". At the top right of this area are two buttons: "Copy to Clipboard" and "Read from a file". Below these buttons is a code editor displaying the following YAML configuration:

```
25     [BlockStorage]
26     bs-version=v2
27     ignore-volume-az=true
28     kind: Secret
29     metadata:
30       name: cloud-config
31       namespace: kube-system
32     addons_include:
33     - >-
34       https://raw.githubusercontent.com/kreuzert/cloud-provider-openstack/release-1.22/manifests/controller-manager
35     /cloud-controller-manager-roles.yaml
36     - >-
37       https://raw.githubusercontent.com/kreuzert/cloud-provider-openstack/release-1.22/manifests/controller-manager
38     /cloud-controller-manager-role-bindings.yaml
39     - >-
40       https://raw.githubusercontent.com/kreuzert/cloud-provider-openstack/release-1.22/manifests/controller-manager
41     /openstack-cloud-controller-manager-ds.yaml
42     authentication:
```

At the bottom of the page, there is a section for "Cluster Option Overrides" with the description: "Parameters and default values that you would like the end consumer to provide data for."

RANCHER

Create a K8s cluster

Rancher - zam10207.zam.kfa-ju... X

https://zam10207.zam.kfa-juelich.de/dashboard/c/c-jg2mn/manager/provisioning.cattle.io.cluster/create?type=openstack

Cluster Management

Clusters 2

Cloud Credentials

Drivers

Pod Security Policies

RKE1 Configuration

Advanced

Cluster Name: my-cluster

Add a Description

Name Prefix	Count	Template	Auto Replace	Drain Before Delete	etcd	Control Plane	Worker	Taints
main-	3	(+)	0 minutes	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Taints -
worker-	3	(+)	minutes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Taints -

Number of nodes required:

+ Add Node Pool

Member Roles
Control who has access to the cluster

Labels & Annotations
Configure labels and annotations for

staging-airflow-v1
staging-airflow-v2
staging-main-v1
staging-main-v2
staging-monitoring-v1
staging-monitoring-v2
staging-usernode-v1
staging-usernode-v2
staging-worker-v1
staging-worker-v2

1, 3, or 5
1 or more
1 or more

None

v2.6.4

Edit as YAML

RANCHER

Create a K8s cluster

The screenshot shows the Rancher web interface for creating a new OpenStack cluster. The browser address bar displays the URL: `https://zam10207.zam.kfa-juelich.de/dashboard/c/c-jg2mn/manager/provisioning.cattle.io.cluster/create?type=openstack`. The page title is "Cluster Management".

The left sidebar contains the following navigation items:

- Clusters (2)
- Cloud Credentials
- Drivers
- Pod Security Policies
- RKE1 Configuration (expanded)
- Advanced (expanded)

The main content area is titled "Cluster Options". It features a checked checkbox for "Use an existing RKE Template and revision". Below this, there are two dropdown menus: the first is set to "rke" and the second is set to "v1 - Default (Created 3 months ago)". A "Collapse All" link is visible on the right side of the options section.

The "Kubernetes Options" section is expanded, showing the following configuration:

- Kubernetes Version: v1.22.9-rancher1-1
- Network Provider: canal
- Project Network Isolation: false
- CNI Plugin MTU Override: 0
- Cloud Provider: Enabled

The version number "v2.6.4" is displayed in the bottom left corner of the interface.

RANCHER

Create a K8s cluster

The screenshot displays the Rancher web interface for managing a Kubernetes cluster. The browser address bar shows the URL: `https://zam10207.zam.kfa-juelich.de/dashboard/c/c-jg2mn/manager/provisioning.cattle.io.cluster/fleet-default/c-jg2mn#node-pools`. The interface includes a sidebar for navigation and a main content area with tabs for Machine Pools, Provisioning Log, Snapshots, Conditions, and Related Resources. The Machine Pools tab is active, showing a table of nodes with columns for State, Name, Node, OS, Roles, and Age. Three machine pools are listed: staging-main-1, staging-usernode-1, and staging-airflow-1, each with one active node.

Cluster Management

Provisioner: RKE Machine Provider: OpenStack Kubernetes Version: v1.22.9
Labels: provider.cattle.io:rke stage:staging

Machine Pools Provisioning Log Snapshots Conditions Related Resources

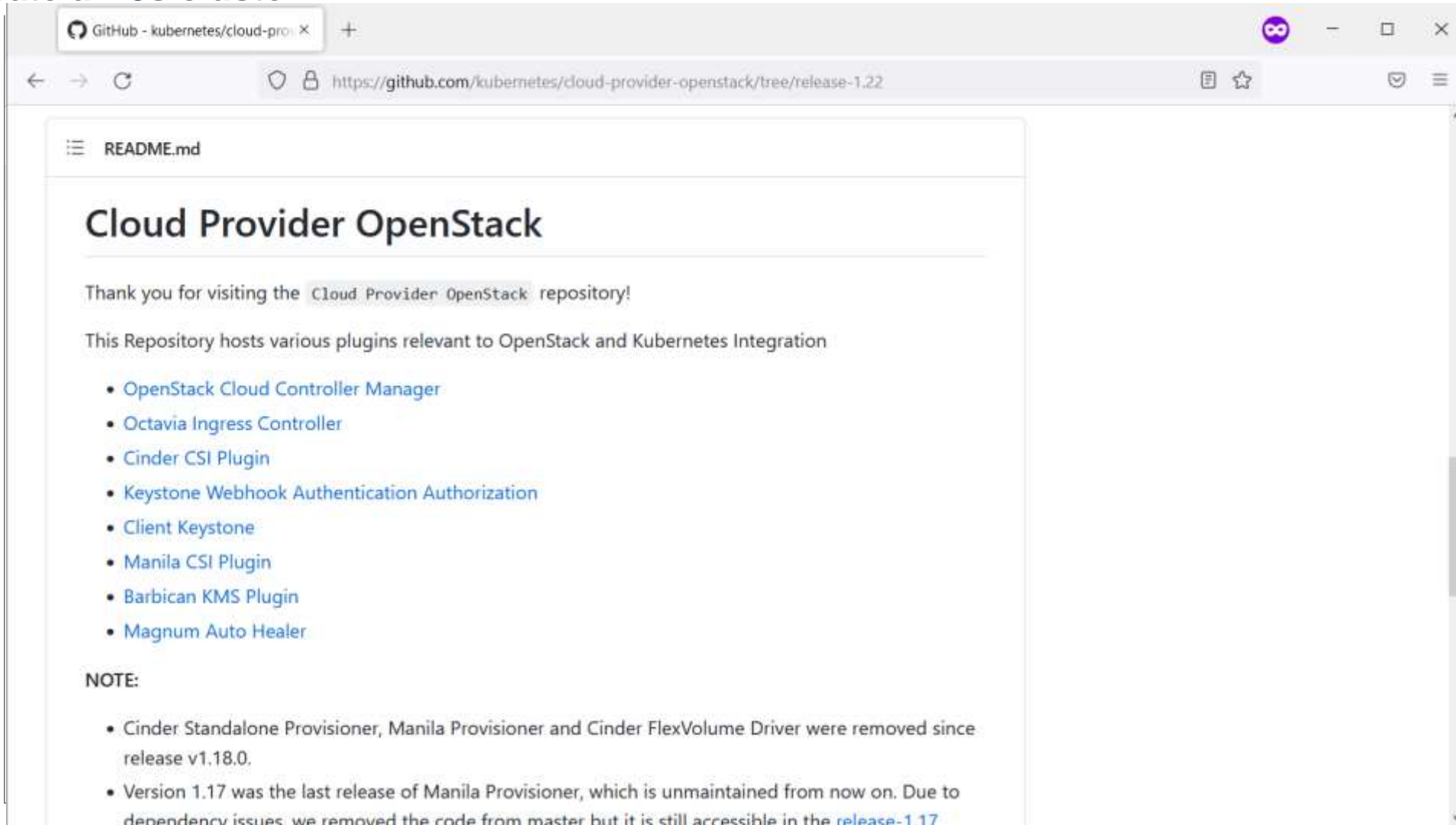
Filter

State	Name	Node	OS	Roles	Age
Pool: staging-main- (1) OpenStack - HDFCloud / No Size (staging-main-v2)					
Active	m-7c595	staging-main-2	Linux	Control Plane, Etcd	7 days
Pool: staging-usernode- (1) OpenStack - HDFCloud / No Size (staging-usernode-v2)					
Active	m-9tvs8	staging-usernode-2	Linux	Worker	12 days
Pool: staging-airflow- (1) OpenStack - HDFCloud / No Size (staging-airflow-v2)					
Active	m-s2vv8	staging-airflow-1	Linux	Worker	7 days

v2.6.4

RANCHER

Create a K8s cluster



The screenshot shows a web browser window displaying the GitHub repository page for 'kubernetes/cloud-provider-openstack'. The browser's address bar shows the URL 'https://github.com/kubernetes/cloud-provider-openstack/tree/release-1.22'. The page content includes a 'README.md' file with the following text:

Cloud Provider OpenStack

Thank you for visiting the `Cloud Provider OpenStack` repository!

This Repository hosts various plugins relevant to OpenStack and Kubernetes Integration

- [OpenStack Cloud Controller Manager](#)
- [Octavia Ingress Controller](#)
- [Cinder CSI Plugin](#)
- [Keystone Webhook Authentication Authorization](#)
- [Client Keystone](#)
- [Manila CSI Plugin](#)
- [Barbican KMS Plugin](#)
- [Magnum Auto Healer](#)

NOTE:

- Cinder Standalone Provisioner, Manila Provisioner and Cinder FlexVolume Driver were removed since release v1.18.0.
- Version 1.17 was the last release of Manila Provisioner, which is unmaintained from now on. Due to dependency issues, we removed the code from master but it is still accessible in the [release-1.17](#)

PLUGINS

Connect Kubernetes and OpenStack

- Cloud Controller Manager
 - Manage load balancers

- Cinder CSI Plugin
 - Use cinder volumes as persistent storage

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RANCHER

Manage your Cluster

The screenshot displays the Rancher Cluster Dashboard for a cluster named 'staging'. The dashboard provides a comprehensive overview of the cluster's health and resource utilization. Key metrics include 133 total resources, 6 nodes, and 25 deployments. The capacity section shows that 13.09% of pods, 65.22% of cores, and 22.45% of memory are reserved, with 32.46% of cores and 39.39% of memory currently in use. The dashboard also indicates that the cluster was created 101 days ago and is running on RKE1 with Kubernetes version v1.22.9. A sidebar on the left offers navigation options for various cluster components, and a bottom status bar shows that the Etcd, Scheduler, and Controller Manager services are all operational.

Cluster Dashboard

Provider: RKE1 Kubernetes Version: v1.22.9 Created: 101 days ago [Add Cluster Badge](#)

Metric	Value
Total Resources	133
Nodes	6
Deployments	25

Capacity

Resource	Reserved	Used	Percentage
Pods	72 / 550	-	13.09%
Cores	5.87 / 9	2.92 / 9	65.22% / 32.46%
Memory	7.41 / 33 GiB	13 / 33 GiB	22.45% / 39.39%

Cluster Tools: ✓ Etcd ✓ Scheduler ✓ Controller Manager

RANCHER

Manage your Cluster

The screenshot shows the Rancher web interface for a cluster named 'staging'. The URL is `https://zam10207.zam.kfa-juelich.de/dashboard/c/c-jg2mn/explorer#cluster-metrics`. The dashboard provides an overview of the cluster's health and resources.

Cluster Dashboard Overview:

- Provider: RKE1
- Kubernetes Version: v1.22.9
- Created: 101 days ago
- Buttons: Add Cluster Badge

Resource Summary:

- 133 Total Resources
- 6 Nodes
- 25 Deployments

Terminal Output (Kubectyl Shell):

```
# Run kubectyl commands inside here
# e.g. kubectyl get all
> kubectyl --namespace database get pod
NAME                                READY  STATUS   RESTARTS  AGE
ceticadminer-5cb68bcd5c-g8g8v       2/2    Running  0          7d5h
jupyterjisc-cronjobs-daily-db-backup-staging-27687000--1-pg7x9  0/1    Completed  0          12h
postgresql-0                         2/2    Running  0          7d5h
```

RANCHER

Manage your Cluster

The screenshot shows the Rancher UI interface for managing a cluster. The main content area displays the 'Pods' page for the 'database' namespace. The table below lists the pods:

State	Name	Image	Ready	Restarts	IP	Node	Age
Running	ceticadminer-5cb68bcd5c-q8g8v	adminer:4.8.1-standalone + 1 more	2/2	0	10.42.8.10	staging-worker-1	
Completed	jupyterjsc-cronjobs-daily-db-backup-staging-27687000--1-pg7x9	postgres:14.2-alpine	0/1	0	10.42.7.93	staging-worker-2	
Running	postgresql-0	rancher/mirrored-istio-proxyv2:1.12.6 + 1 more	2/2	0	10.42.8.12	staging-worker-1	7 days

A context menu is open over the 'postgresql-0' pod, showing the following options:

- Execute Shell
- View Logs
- Edit YAML
- Clone
- Download YAML
- Delete

RANCHER

Manage your Cluster

Rancher - zam10207.zam.kfa-ju ×

https://zam10207.zam.kfa-juelich.de/dashboard/c/c-jg2mn/explorer/pod

staging database ×

Download KubeConfig

Create from YAML

Download YAML Delete

Filter

State	Name	Image	Ready	Restarts	IP	Node	Age
Running	ceticadminer-5cb68bcd5c-q8g8v	adminer:4.8.1-standalone + 1 more	2/2	0	10.42.8.10	staging-worker-1	7 days
Completed	jupyterjsc-cronjobs-daily-db-backup-staging-27687000--1-pg7x9	postgres:14.2-alpine	0/1	0	10.42.7.93	staging-worker-2	12 hours
Running	postgresql-0	rancher/mirrored-istio-proxyv2:1.12.6 + 1 more	2/2	0	10.42.8.12	staging-worker-1	7 days

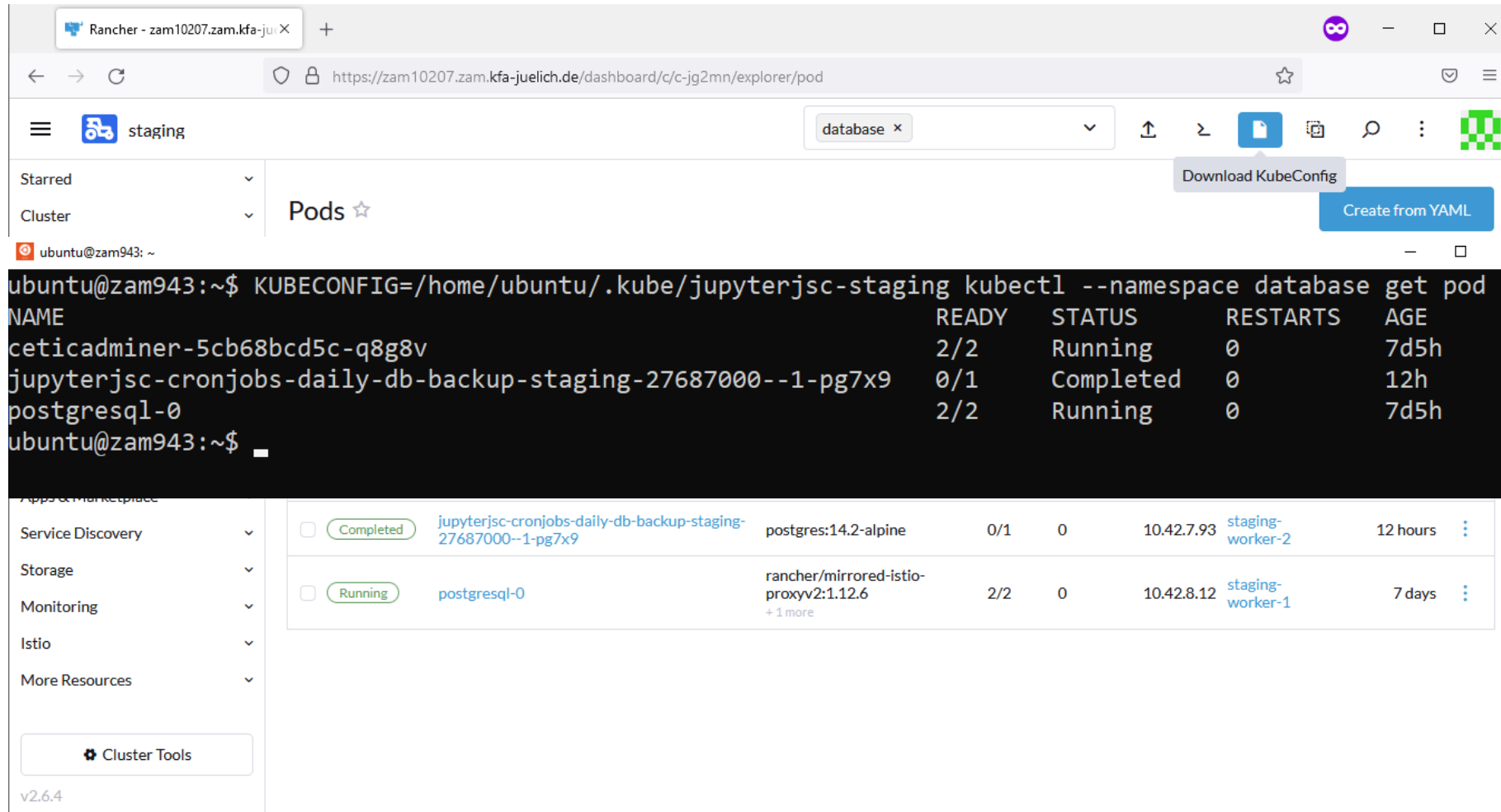
Namespace: database

Cluster Tools

v2.6.4

RANCHER

Manage your Cluster



The screenshot displays the Rancher dashboard interface for a cluster named 'staging'. The user is viewing the 'Pods' page in the 'database' namespace. A terminal window shows the execution of the command `kubectl --namespace database get pod`, resulting in the following output:

```
ubuntu@zam943:~$ KUBECONFIG=/home/ubuntu/.kube/jupyterjsc-staging kubectl --namespace database get pod
NAME                                READY   STATUS    RESTARTS   AGE
ceticadminer-5cb68bcd5c-q8g8v       2/2     Running   0           7d5h
jupyterjsc-cronjobs-daily-db-backup-staging-27687000--1-pg7x9  0/1     Completed 0           12h
postgresql-0                         2/2     Running   0           7d5h
ubuntu@zam943:~$
```

The dashboard table below provides a visual overview of these pods:

Pod Name	Phase	Image	Ready	Status	Restarts	IP	Node	Age
jupyterjsc-cronjobs-daily-db-backup-staging-27687000--1-pg7x9	Completed	postgres:14.2-alpine	0/1	Completed	0	10.42.7.93	staging-worker-2	12 hours
postgresql-0	Running	rancher/mirrored-istio-proxyv2:1.12.6	2/2	Running	0	10.42.8.12	staging-worker-1	7 days

WHAT TO EXPECT

Why you're here and what you will learn

- Kubernetes in 3 minutes
- Create a kubernetes cluster on OpenStack
- Manage your cluster – Browser and CLI
- Deploy services – the easy way
- Deploy services – the right way

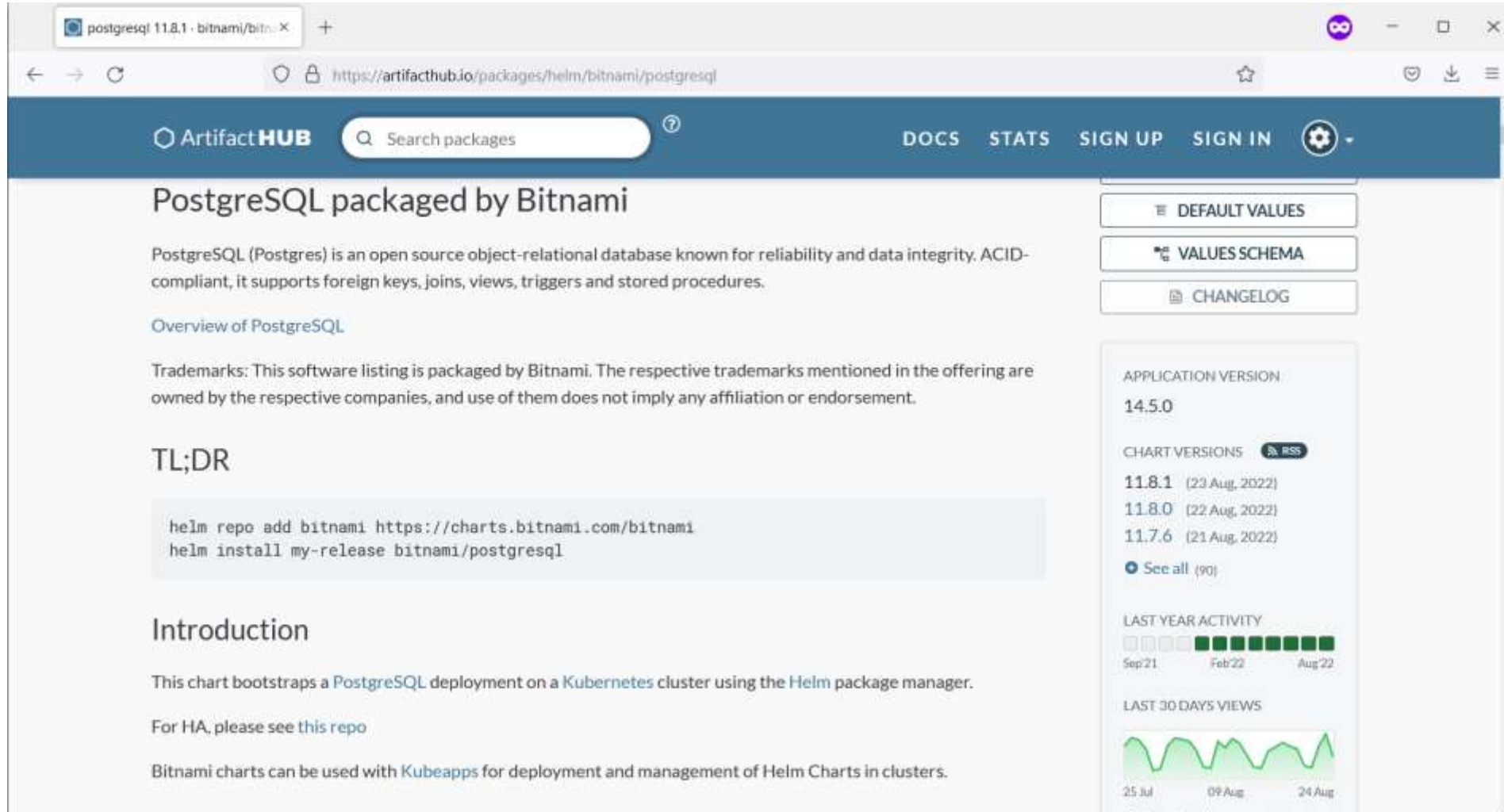
INSTALL SERVICES

Helm Charts

- Debian: apt – Fedora: yum – Kubernetes: helm
- Public repositories hosting thousands of charts
 - Listed at artifacthub.io
 - Used directly as git repository
- Versioning, rollouts, rollbacks
- Templates / parameters to fit your needs
- Create your own Helm charts

INSTALL SERVICES

Helm Charts



The screenshot shows the ArtifactHub page for the PostgreSQL Helm chart by Bitnami. The page includes a search bar, navigation links (DOCS, STATS, SIGN UP, SIGN IN), and a sidebar with buttons for DEFAULT VALUES, VALUES SCHEMA, and CHANGELOG. The main content area features a title, a description of PostgreSQL, an overview section, a TL;DR section with installation commands, an introduction section, and a right-hand sidebar with version information and activity charts.

PostgreSQL packaged by Bitnami

PostgreSQL (Postgres) is an open source object-relational database known for reliability and data integrity. ACID-compliant, it supports foreign keys, joins, views, triggers and stored procedures.

Overview of PostgreSQL

Trademarks: This software listing is packaged by Bitnami. The respective trademarks mentioned in the offering are owned by the respective companies, and use of them does not imply any affiliation or endorsement.

TL;DR

```
helm repo add bitnami https://charts.bitnami.com/bitnami
helm install my-release bitnami/postgresql
```

Introduction

This chart bootstraps a PostgreSQL deployment on a Kubernetes cluster using the Helm package manager.

For HA, please see [this repo](#)

Bitnami charts can be used with [Kubeapps](#) for deployment and management of Helm Charts in clusters.

APPLICATION VERSION
14.5.0

CHART VERSIONS 35 RSS

- 11.8.1 (23 Aug, 2022)
- 11.8.0 (22 Aug, 2022)
- 11.7.6 (21 Aug, 2022)

[See all \(90\)](#)

LAST YEAR ACTIVITY

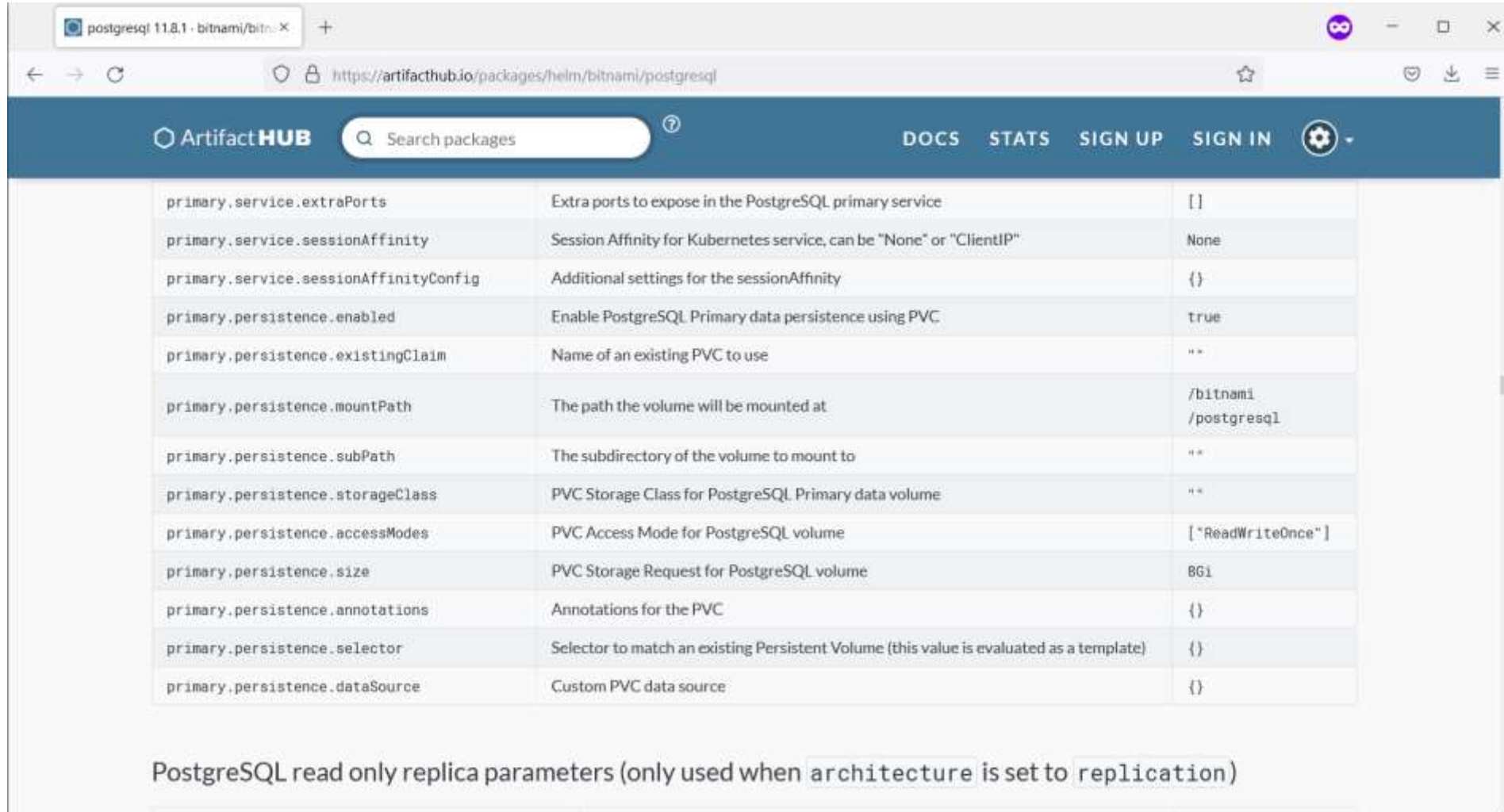
Sep'21 Feb'22 Aug'22

LAST 30 DAYS VIEWS

25 Jul 09 Aug 24 Aug

INSTALL SERVICES

Helm Charts



Parameter	Description	Default Value
<code>primary.service.extraPorts</code>	Extra ports to expose in the PostgreSQL primary service	<code>[]</code>
<code>primary.service.sessionAffinity</code>	Session Affinity for Kubernetes service, can be "None" or "ClientIP"	<code>None</code>
<code>primary.service.sessionAffinityConfig</code>	Additional settings for the sessionAffinity	<code>{}</code>
<code>primary.persistence.enabled</code>	Enable PostgreSQL Primary data persistence using PVC	<code>true</code>
<code>primary.persistence.existingClaim</code>	Name of an existing PVC to use	<code>""</code>
<code>primary.persistence.mountPath</code>	The path the volume will be mounted at	<code>/bitnami/postgresql</code>
<code>primary.persistence.subPath</code>	The subdirectory of the volume to mount to	<code>""</code>
<code>primary.persistence.storageClass</code>	PVC Storage Class for PostgreSQL Primary data volume	<code>""</code>
<code>primary.persistence.accessModes</code>	PVC Access Mode for PostgreSQL volume	<code>["ReadWriteOnce"]</code>
<code>primary.persistence.size</code>	PVC Storage Request for PostgreSQL volume	<code>8Gi</code>
<code>primary.persistence.annotations</code>	Annotations for the PVC	<code>{}</code>
<code>primary.persistence.selector</code>	Selector to match an existing Persistent Volume (this value is evaluated as a template)	<code>{}</code>
<code>primary.persistence.dataSource</code>	Custom PVC data source	<code>{}</code>

PostgreSQL read only replica parameters (only used when `architecture` is set to `replication`)

INSTALL SERVICES

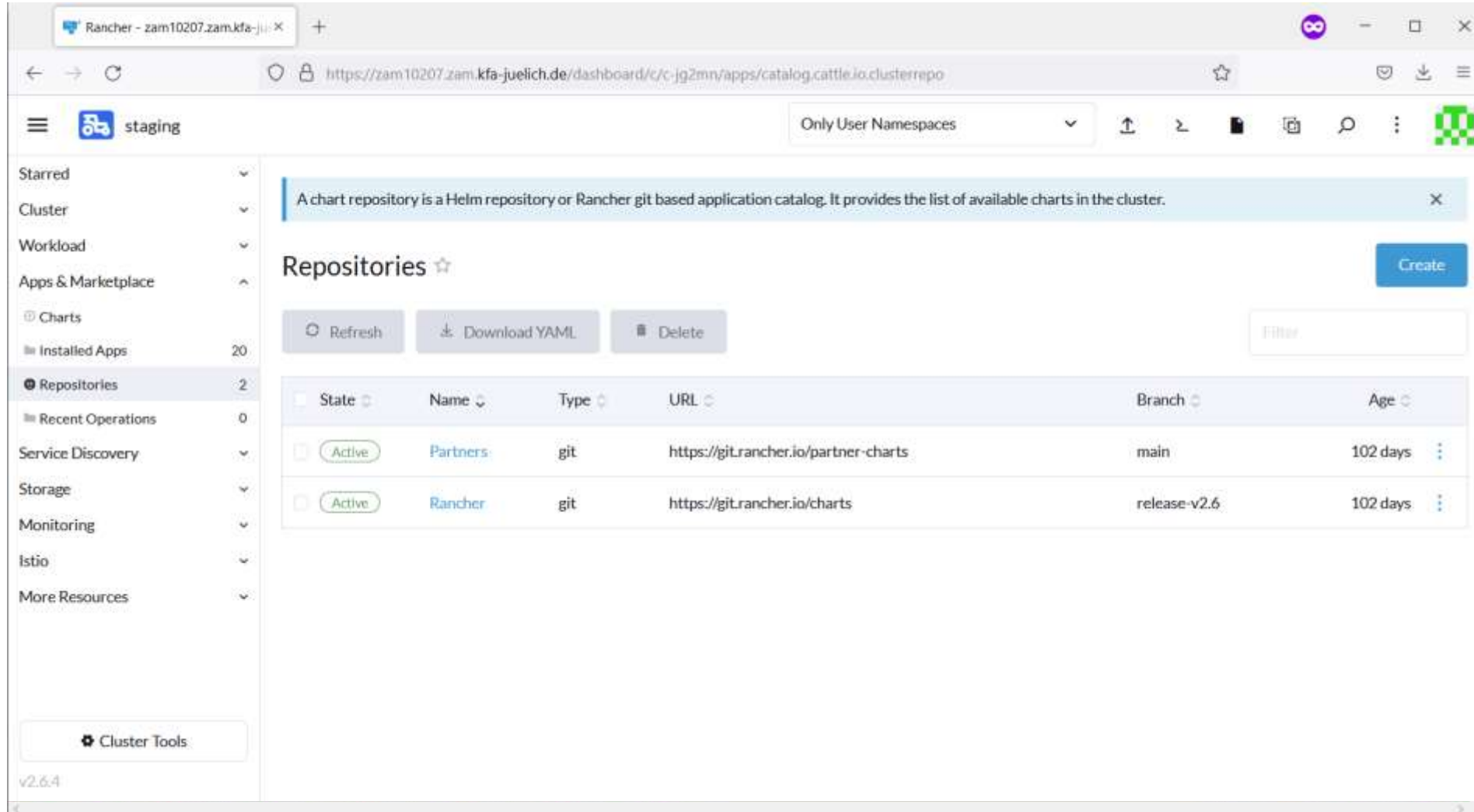
Helm Charts

```
ubuntu@zam943: ~  
ubuntu@zam943:~$ # helm repo add bitnami https://charts.bitnami.com/bitnami  
ubuntu@zam943:~$ # helm install my-database --set primary.persistence.enabled=false bitnami/postgresql  
ubuntu@zam943:~$ cat values.yaml  
primary:  
  persistence:  
    enabled: false  
ubuntu@zam943:~$ # helm install my-database -f values.yaml bitnami/postgresql  
ubuntu@zam943:~$
```

[0] 0:bash 1:bash 2:bash 3:bash 4:bash 5:bash* 6:bash- "zam943" 15:52 24-Aug-22

INSTALL SERVICES

Helm Charts



A chart repository is a Helm repository or Rancher git based application catalog. It provides the list of available charts in the cluster.

Repositories ☆

[Create](#)

[Refresh](#) [Download YAML](#) [Delete](#)

State	Name	Type	URL	Branch	Age
Active	Partners	git	https://git.rancher.io/partner-charts	main	102 days
Active	Rancher	git	https://git.rancher.io/charts	release-v2.6	102 days

Cluster Tools

v2.6.4

INSTALL SERVICES

Helm Charts

Rancher - zam10207.zam.kfa-juelich.de

https://zam10207.zam.kfa-juelich.de/dashboard/c/c-jg2mn/apps/catalog.cattle.io/clusterrepo/create

staging Only User Namespaces

Name *
bitnami

Description
Any text you want that better describes this resource

Target

http(s) URL to an index generated by Helm

Git repository containing Helm chart or cluster template definitions

Index URL *
https://charts.bitnami.com/bitnami

Authentication
None

Labels
Add Label

Annotations
Add Annotation

Cluster Tools

v2.6.4

Cancel Create

INSTALL SERVICES

Helm Charts

The screenshot shows the Rancher dashboard interface. The browser address bar displays the URL: `https://zam10207.zam.kfa-juelich.de/dashboard/c/c-jg2mn/apps/charts?q=postg`. The dashboard header includes the Rancher logo, the environment name "staging", and a filter dropdown set to "Only User Namespaces".

The left sidebar contains a navigation menu with the following items: Starred, Cluster, Workload, Apps & Marketplace, Charts (selected), Installed Apps (20), Repositories (3), Recent Operations (0), Service Discovery, Storage, Monitoring, Istio, and More Resources. A "Cluster Tools" button is located at the bottom of the sidebar.

The main content area is titled "Charts" and features a notification banner: "All charts have at least one version that is installable on clusters with Linux and Windows nodes unless otherwise indicated." Below the banner are three filter dropdowns: "All", "All Categories", and "postg".

Two chart cards are displayed:

- postgresql**: PostgreSQL (Postgres) is an open source object-relational... *Linux only*
- postgresql-ha**: This PostgreSQL cluster solution includes the... *Linux only*

The version number "v2.6.4" is visible at the bottom left of the dashboard.

INSTALL SERVICES

Helm Charts

Rancher - zam10207.zam.kfa-juelich.de

https://zam10207.zam.kfa-juelich.de/dashboard/c/c-jg2mn/apps/charts/chart?repo-type=cluster&repo=bitnami&chart=postgresql

staging Only User Namespaces

All charts have at least one version that is installable on clusters with Linux and Windows nodes unless otherwise indicated.

Charts: postgresql (11.8.1)

Linux only

PostgreSQL (Postgres) is an open source object-relational database known for reliability and data integrity. ACID-compliant, it supports foreign keys, joins, views, triggers and stored procedures.

PostgreSQL (Postgres) is an open source object-relational database known for reliability and data integrity. ACID-compliant, it supports foreign keys, joins, views, triggers and stored procedures.

[Overview of PostgreSQL](#)

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TL;DR

```
helm repo add bitnami https://charts.bitnami.com/bitnami
helm install my-release bitnami/postgresql
```

Introduction

This chart bootstraps a [PostgreSQL](#) deployment on a [Kubernetes](#) cluster using the [Helm](#) package manager. For HA, please see [this repo](#). Bitnami charts can be used with [Kubeapps](#) for deployment and management of Helm Charts in clusters.

Prerequisites

Chart Versions

11.8.1	Tue, Aug 23 2022
11.8.0	Mon, Aug 22 2022
11.7.6	Sun, Aug 21 2022
11.7.5	Sat, Aug 20 2022
11.7.4	Fri, Aug 19 2022
11.7.3	Thu, Aug 18 2022
11.7.2	Tue, Aug 16 2022
11.7.1	Thu, Aug 11 2022
11.7.0	Thu, Aug 11 2022
11.6.26	Tue, Aug 9 2022

[Show More](#)

Application Version

14.5.0

Home

[https://github.com/bitnami/charts/tree/main](#)

Cluster Tools v2.6.4

INSTALL SERVICES

Helm Charts

Rancher - zam10207.zam.kfa-juelich.de

https://zam10207.zam.kfa-juelich.de/dashboard/c/c-jg2mn/apps/charts/install?repo-type=cluster&repo=bitnami&chart=postgres

staging Only User Namespaces

All charts have at least one version that is installable on clusters with Linux and Windows nodes unless otherwise indicated.

postgresql 11.8.1 Install: Step 2 Change how the App works

Linux only

```
210   periodSeconds: 10
211   successThreshold: 1
212   timeoutSeconds: 5
213   name: primary
214   nodeAffinityPreset:
215     key: ""
216     type: ""
217     values: []
218   nodeSelector: {}
219   persistence:
220     accessModes:
221       - ReadWriteOnce
222     annotations: {}
223     dataSource: {}
224     enabled: true
225     existingClaim: ""
226     mountPath: /bitnami/postgresql
227     selector: {}
228     size: 8Gi
229     storageClass: ""
230     subPath: ""
231     volumeClaimTemplate: {}
```

Cluster Tools v2.6.4

Cancel Previous Install

WHAT TO EXPECT

Why you're here and what you will learn

- Kubernetes in 3 minutes
- Create a kubernetes cluster on OpenStack
- Manage your cluster – Browser and CLI
- Deploy services – the easy way
- **Deploy services – the right way**

FLEET

Continuous Delivery

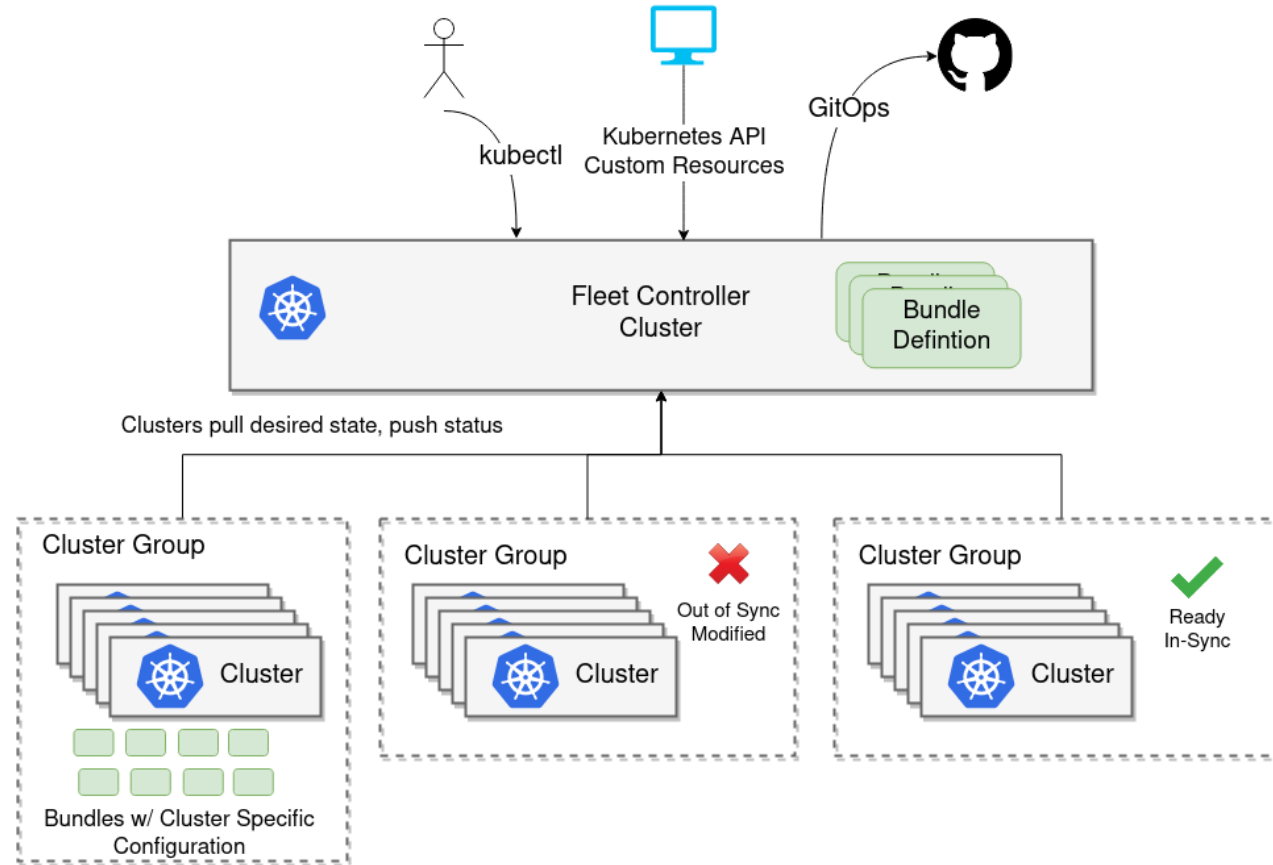
- Container management and deployment engine
- A Rancher project
- Integrated UI in Rancher
- GitOps – get desired cluster state from git
- Scalability – Manage up to a million clusters - or just one
- Cluster specific configuration possible

FLEET

Continuous Delivery



FLEET



fleet.rancher.io

FLEET

Continuous Delivery

The screenshot shows the Rancher dashboard interface. The left sidebar contains navigation options: Home, EXPLORE CLUSTER (local, staging), GLOBAL APPS (Continuous Delivery, Cluster Management, Virtualization Management), and CONFIGURATION (Users & Authentication, Global Settings). The main content area displays a 'Welcome to Rancher' banner with a landscape illustration. Below the banner, there is a section for 'What's new in 2.6' with 'Import Existing' and 'Create' buttons. A table lists cluster configurations:

Provider	Kubernetes Version	CPU	Memory	Pods
s	v1.22.7+k3s1	0.1/4 cores	70 MiB/7.77 GiB	6/110
t	v1.22.9	6.09/9 cores	7.99 GiB/33 GiB	63/550

Additional elements include a 'Community Support' sidebar with links for Docs, Forums, Slack, and File an Issue, and a 'Commercial Support' section at the bottom.

FLEET

Continuous Delivery

The screenshot shows the Rancher Continuous Delivery Dashboard. The browser address bar indicates the URL: `https://zam10207.zam.kfa-juelich.de/dashboard/c/c-jg2mn/fleet`. The dashboard is titled "Continuous Delivery Dashboard" and shows the "fleet-default" workspace selected. The left sidebar contains navigation options: Dashboard, Git Repos (2), Clusters (1), Cluster Groups (0), and Advanced. The main content area displays two workspace summaries:

- Workspace: fleet-default**
 - Repositories: 2, Clusters: 1, Cluster Groups: 0

Repository Name	Clusters Ready	Bundles Ready	Resources Ready
basics	✓ 1/1	✓ 9/9	✓ 288/288
jupyterjsc	✓ 1/1	✓ 14/14	✓ 86/86
- Workspace: fleet-local**
 - Repositories: 1, Clusters: 1, Cluster Groups: 1

Repository Name	Clusters Ready	Bundles Ready	Resources Ready
basics-rancher	✓ 1/1	✓ 1/1	✓ 5/5

v2.6.4

FLEET

Continuous Delivery

The screenshot shows the Rancher Fleet Continuous Delivery dashboard. The browser address bar indicates the URL: `https://zam10207.zam.kfa-juelich.de/dashboard/c/c-jg2mn/fleet/fleet.cattle.io.gitrepo`. The page title is "Continuous Delivery" and the current cluster is "fleet-default".

The left sidebar contains navigation options: Dashboard, Git Repos (2), Clusters (1), Cluster Groups (0), and Advanced. The "Git Repos" section is currently selected.

The main content area is titled "Git Repos" and features an "Add Repository" button. Below this are control buttons: Pause, Force Update, Download YAML, and Delete. A search filter is also present.

The table below lists the Git Repositories:

State	Name	Repo	Target	Clusters Ready	Resources	Age
Active	basics	gitlab.jsc.fz-juelich.de/jupyterjsc/kBs/fleet-deployment-basics-staging @ 7cc8c56	Advanced	1/1	288	102 days
Active	jupyterjsc	gitlab.jsc.fz-juelich.de/jupyterjsc/kBs/fleet-deployment-jupyterjsc-staging @ ed33f01	Advanced	1/1	86	102 days

FLEET

Continuous Delivery

The screenshot shows the 'Git Repo: Create' form in the Rancher Fleet interface. The browser address bar shows the URL: `https://zam-10207.zam.kfa-juelich.de/dashboard/c/c-jg2mn/fleet/fleet.cattle.io.gitrepo/create`. The page title is 'Continuous Delivery' and the current cluster is 'fleet-default'. The left sidebar shows a navigation menu with 'Git Repos' selected, showing 2 items. The main form fields are:

- Name ***: `fleet-cattle.io.gitrepo`
- Description**: `Any text you want that better describes this resource`
- Repository URL**: `https://github.com/rancher/fleet-examples.git`
- Watch**: `A Bra...`
- Branch Name ***: `master`
- Git Authentication**: `None`
- Helm Authentication**: `None`
- TLS Certificate Verification**: `Require a valid certificate`

At the bottom, there is a 'Paths' section.

FLEET

Continuous Delivery

Rancher - zam10207.zam.kfa-juelich.de

https://zam10207.zam.kfa-juelich.de/dashboard/c/c-jg2mn/fleet/fleet.cattle.io.gitrepo/create

Continuous Delivery

fleet-default

Deploy To

Target

Advanced

No Clusters

All Clusters in the Workspace

Advanced

Clusters

staging

```
1 # values: [bar, baz]
2 # clusterGroup: foo
3 # clusterGroupSelector:
4 #   matchLabels:
5 #     foo: bar
6 #   matchExpressions:
7 #     - key: foo
8 #       op: In
9 #       values: [bar, baz]
10 #
11 #
12 #
13 #
14 #
15 #
16 #
17 #
```

Service Account Name
Optional: Use a service account in the target clusters

Target Namespace
Optional: Require all resources to be in this namespace

Labels

Add Label

v2.6.4

FLEET

Continuous Delivery

```
ubuntu@zam943: -
tkreuzer@proxy-staging:/opt/rancher/manifests/rancher$ cat basics.yaml
apiVersion: fleet.cattle.io/v1alpha1
kind: GitRepo
metadata:
  name: basics
  namespace: fleet-default
spec:
  branch: basics-staging
  clientSecretName: deployment-fleet-default
  repo: https://gitlab.jsc.fz-juelich.de/jupyterjsc/k8s/fleet-deployment.git
  targets:
  - clusterSelector:
    matchLabels:
      stage: staging
tkreuzer@proxy-staging:/opt/rancher/manifests/rancher$
```

[0] 0:bash 1:bash 2:bash 3:bash 4:bash 5:bash- 6:bash 7:ssh* "zam943" 16:30 24-Aug-22

FLEET

Continuous Delivery

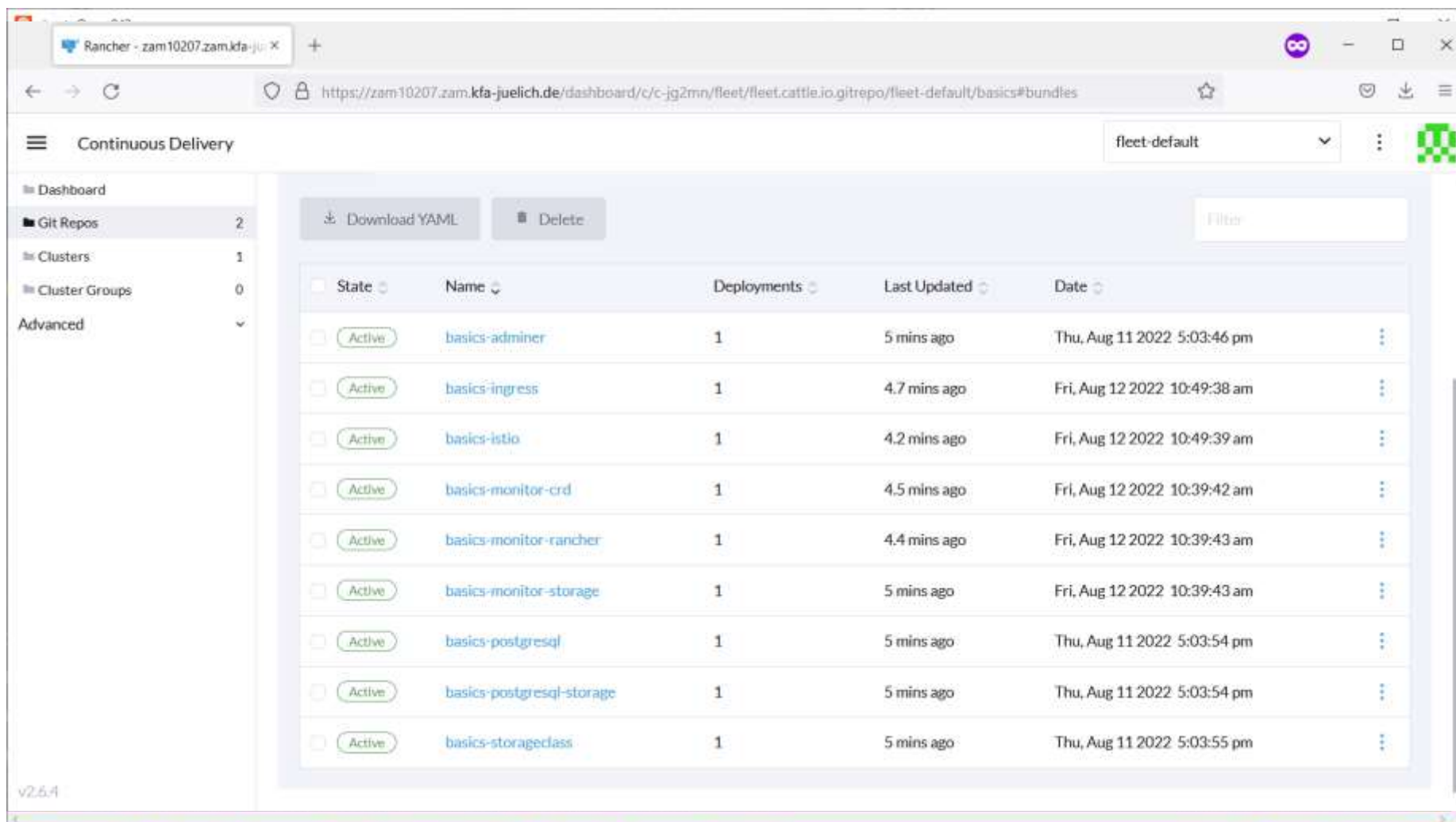
The screenshot shows a web browser window displaying a GitLab repository page for 'fleet-deployment'. The browser's address bar shows the URL: `https://gitlab.jsc.fz-juelich.de/jupyterjsc/k8s/fleet-deployment/-/tree/basics-staging`. The page features a sidebar on the left with navigation options like 'Project information', 'Repository', 'Files', 'Commits', 'Branches', 'Tags', 'Contributors', 'Graph', 'Compare', 'Issues', 'Merge requests', 'CI/CD', 'Security & Compliance', 'Deployments', 'Packages & Registries', 'Infrastructure', and 'Monitor'. The main content area displays a table of files and folders with their last commit and update dates.

Name	Last commit	Last update
adminer	testing	2 months ago
ingress	allow old tls version, may fix websocket errors	1 week ago
istio	Disable some prometheus monitoring	1 week ago
monitor	Configure prometheus to track explicit jupyter...	1 hour ago
postgresql	add jupyterhub juniq to database	1 month ago
storageclass	testing	3 months ago
README.md	initial commit	3 months ago
fleet.yaml	basics-k3d	3 months ago

Below the table, the content of the selected `README.md` file is shown. It includes the title 'fleet-deployment' and a section 'Getting started' with introductory text: 'To make it easy for you to get started with GitLab, here's a list of recommended next steps. Already a pro? Just edit this README.md and make it your own. Want to make it easy? Use the template at the bottom!'

FLEET

Continuous Delivery



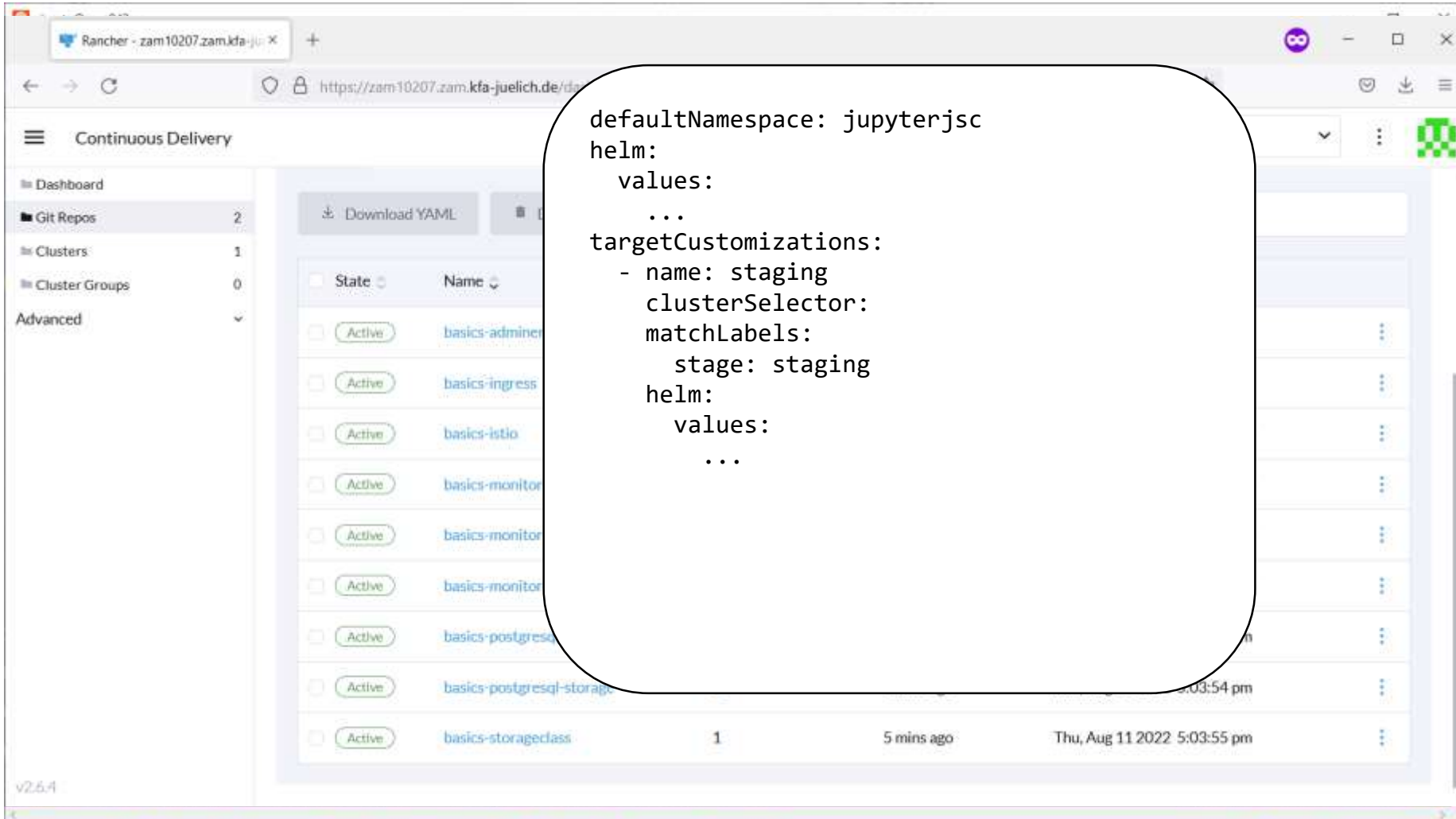
The screenshot displays the Rancher Fleet Continuous Delivery dashboard. The browser address bar shows the URL: `https://zam10207.zam.kfa-juelich.de/dashboard/c/c-jg2mn/fleet/fleet.cattle.io.gitrepo/fleet-default/basics#bundles`. The dashboard title is "Continuous Delivery" and the current cluster is "fleet-default".

On the left sidebar, the navigation menu includes: Dashboard, Git Repos (2), Clusters (1), Cluster Groups (0), and Advanced (expanded). The main content area features a "Download YAML" button, a "Delete" button, and a "Filter" input field.

State	Name	Deployments	Last Updated	Date
Active	basics-adminer	1	5 mins ago	Thu, Aug 11 2022 5:03:46 pm
Active	basics-ingress	1	4.7 mins ago	Fri, Aug 12 2022 10:49:38 am
Active	basics-istio	1	4.2 mins ago	Fri, Aug 12 2022 10:49:39 am
Active	basics-monitor-crd	1	4.5 mins ago	Fri, Aug 12 2022 10:39:42 am
Active	basics-monitor-rancher	1	4.4 mins ago	Fri, Aug 12 2022 10:39:43 am
Active	basics-monitor-storage	1	5 mins ago	Fri, Aug 12 2022 10:39:43 am
Active	basics-postgresql	1	5 mins ago	Thu, Aug 11 2022 5:03:54 pm
Active	basics-postgresql-storage	1	5 mins ago	Thu, Aug 11 2022 5:03:54 pm
Active	basics-storageclass	1	5 mins ago	Thu, Aug 11 2022 5:03:55 pm

FLEET

Continuous Delivery

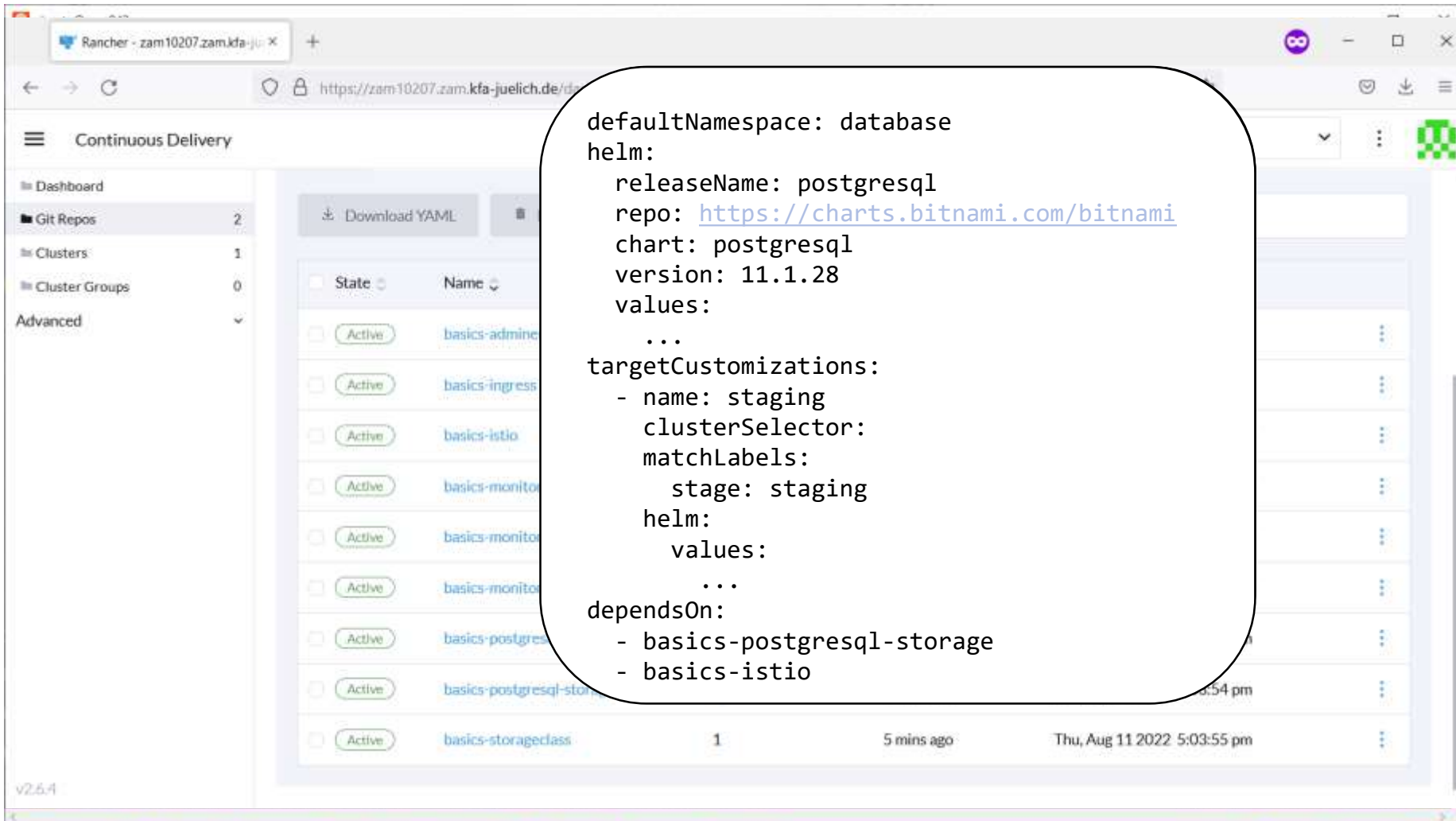


The screenshot shows the Rancher Continuous Delivery interface. On the left, there is a navigation menu with options like Dashboard, Git Repos (2), Clusters (1), Cluster Groups (0), and Advanced. The main area displays a list of services, each with a checkbox, an 'Active' button, and a name. The services listed include basics-adminer, basics-ingress, basics-istio, basics-monitor, basics-monitor, basics-monitor, basics-postgres, basics-postgresql-storage, and basics-storageclass. A code snippet is overlaid on the right side of the interface, showing the following Helm chart configuration:

```
defaultNamespace: jupyterjsc
helm:
  values:
    ...
targetCustomizations:
- name: staging
  clusterSelector:
    matchLabels:
      stage: staging
  helm:
    values:
      ...
```

FLEET

Continuous Delivery

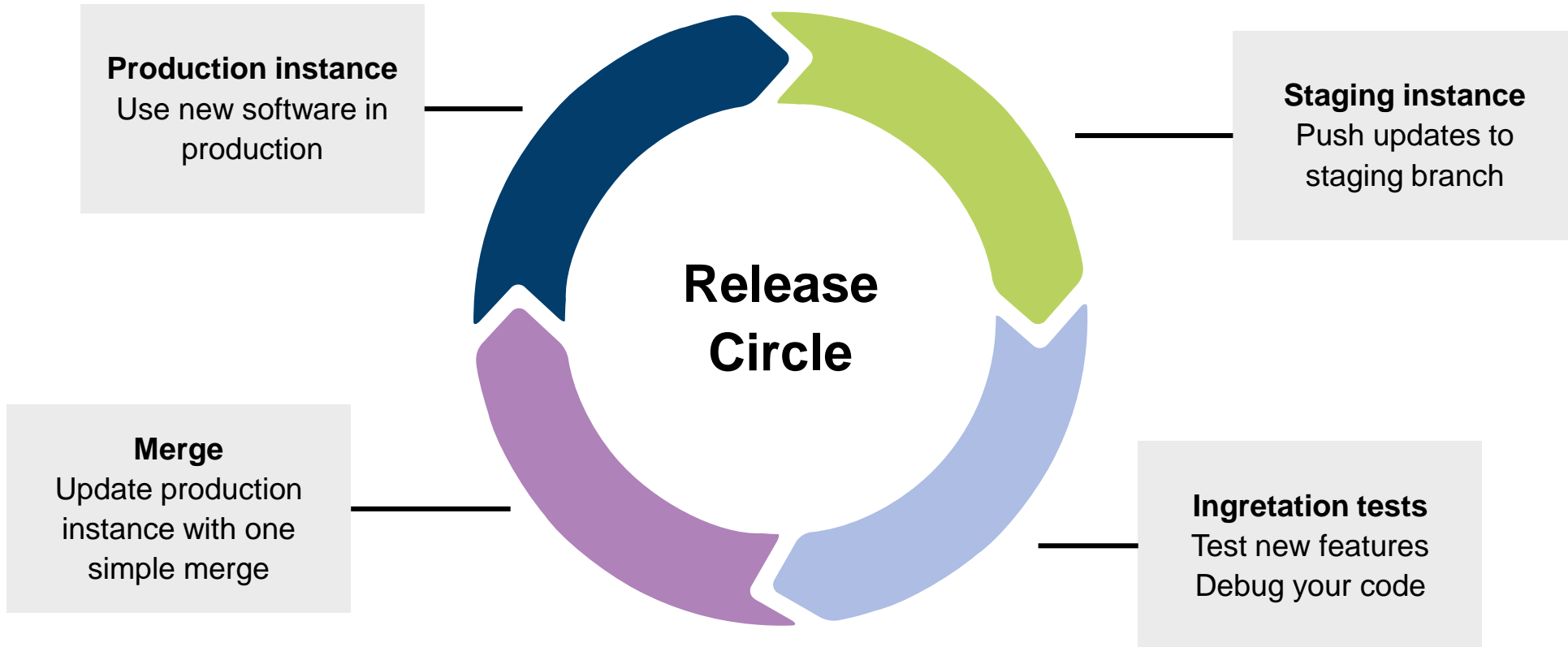


The screenshot shows the Rancher Continuous Delivery interface. On the left, there is a navigation menu with options like Dashboard, Git Repos (2), Clusters (1), Cluster Groups (0), and Advanced. The main area displays a list of services, each with a checkbox, a status (Active), and a name. A callout box highlights the Helm chart configuration for a service.

```
defaultNamespace: database
helm:
  releaseName: postgresql
  repo: https://charts.bitnami.com/bitnami
  chart: postgresql
  version: 11.1.28
  values:
    ...
targetCustomizations:
- name: staging
  clusterSelector:
    matchLabels:
      stage: staging
  helm:
    values:
      ...
dependsOn:
- basics-postgresql-storage
- basics-istio
```

FLEET

Continuous Delivery





KUBERNETES ON OPENSTACK

Cluster creation, management and service deployment

12.06.2023 | TIM KREUZER

APPENDIX

Make life easier

- Monitoring with Prometheus & Grafana
- CLI – Manage multiple clusters in one terminal
- Local cluster with K3s
- How To Kubernetes – starting point

APPENDIX

Monitoring

- Install Rancher monitoring app
- Integrated in Rancher UI
- More than 40 dashboards by default
- Add mail configuration to monitor chart
- Add Grafana alerts to monitor your services
- Default username/password: admin/prom-operator

```
values.yaml:  
  
grafana.ini:  
  smtp:  
    enabled: true  
    from_address: your-svc@fz-juelich.de  
    from_name: Your Service  
    host: mail.fz-juelich.de:25
```

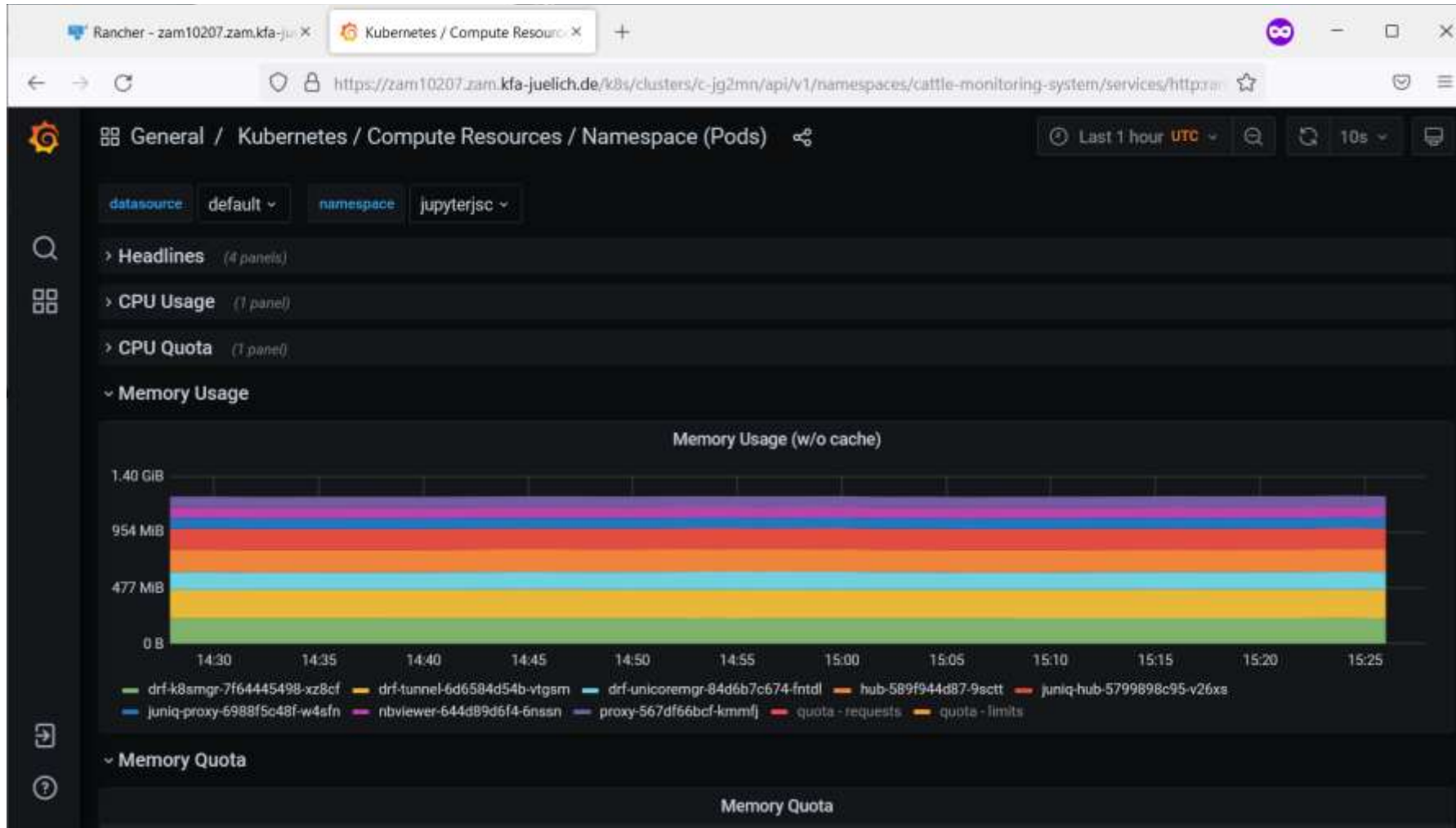

APPENDIX

Monitoring

The screenshot shows the Rancher monitoring dashboard in a web browser. The browser tab is titled "Rancher - zam10207.zam.kfa-juelich.de". The address bar shows the URL: `https://zam10207.zam.kfa-juelich.de/dashboard/c/c-jg2mn/monitoring`. The dashboard is titled "Dashboard" and is powered by Prometheus. The left sidebar contains a navigation menu with categories: Starred, Cluster, Workload, Apps & Marketplace, Service Discovery, Storage, Monitoring (selected), Monitors, Routes and Receivers, Advanced, Istio, and More Resources. The Monitoring section is expanded, showing sub-items: Alertmanager, Prometheus Graph, Prometheus Targets, Grafana, and Prometheus Rules. The main content area displays five monitoring components: Alertmanager (Active Alerts), Grafana (Metrics Dashboards), Prometheus Graph (PromQL Graph), Prometheus Rules (Configured Rules), and Prometheus Targets (Configured Targets). At the bottom, there is a section for "Active Alerts" with a URL: `https://zam10207.zam.kfa-juelich.de/k8s/clusters/c-jg2mn/api/v1/namespaces/cattle-monitoring-system/services/httpprancher-monitoring-grafana/80/proxy`.

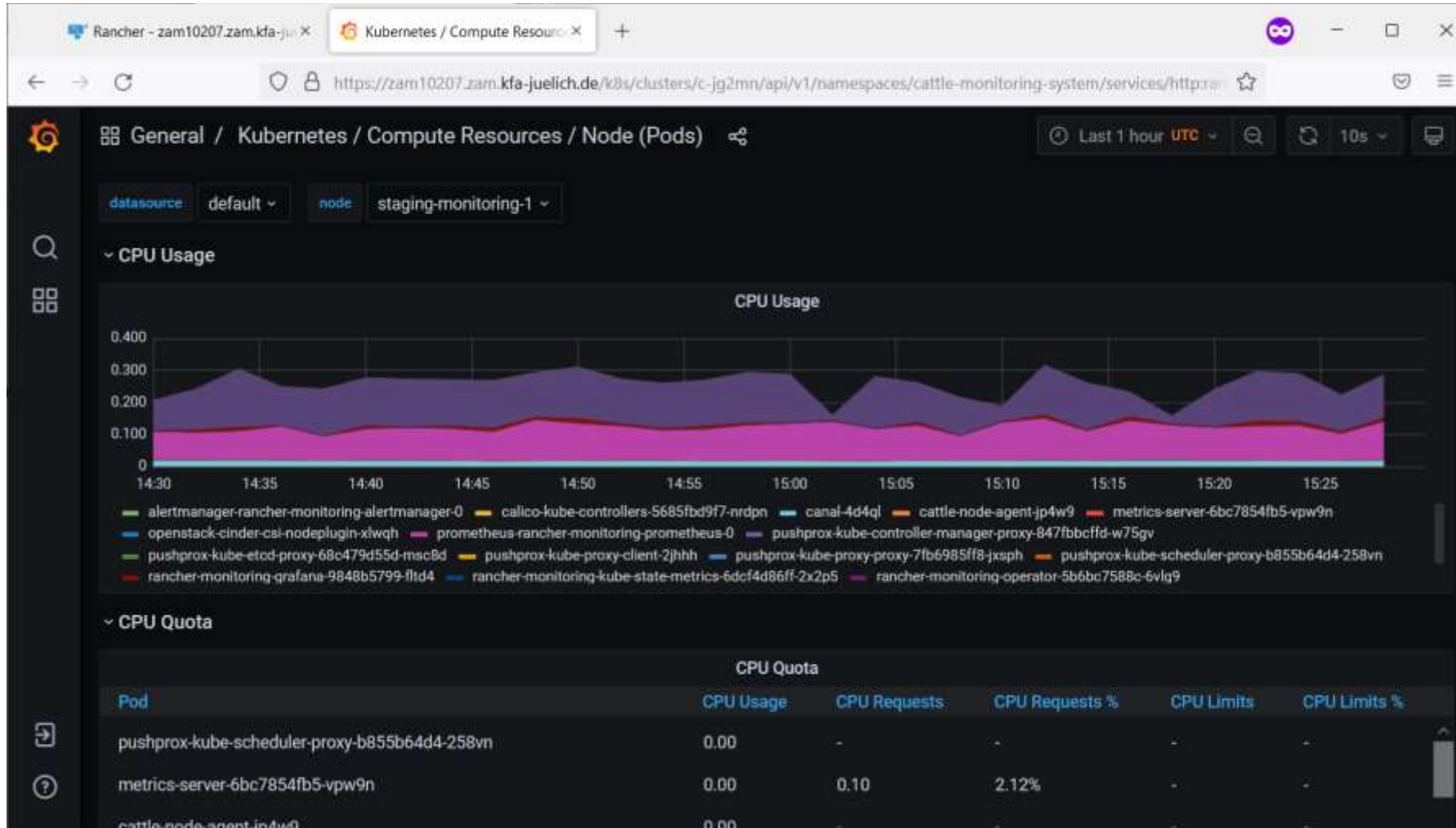
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Monitoring



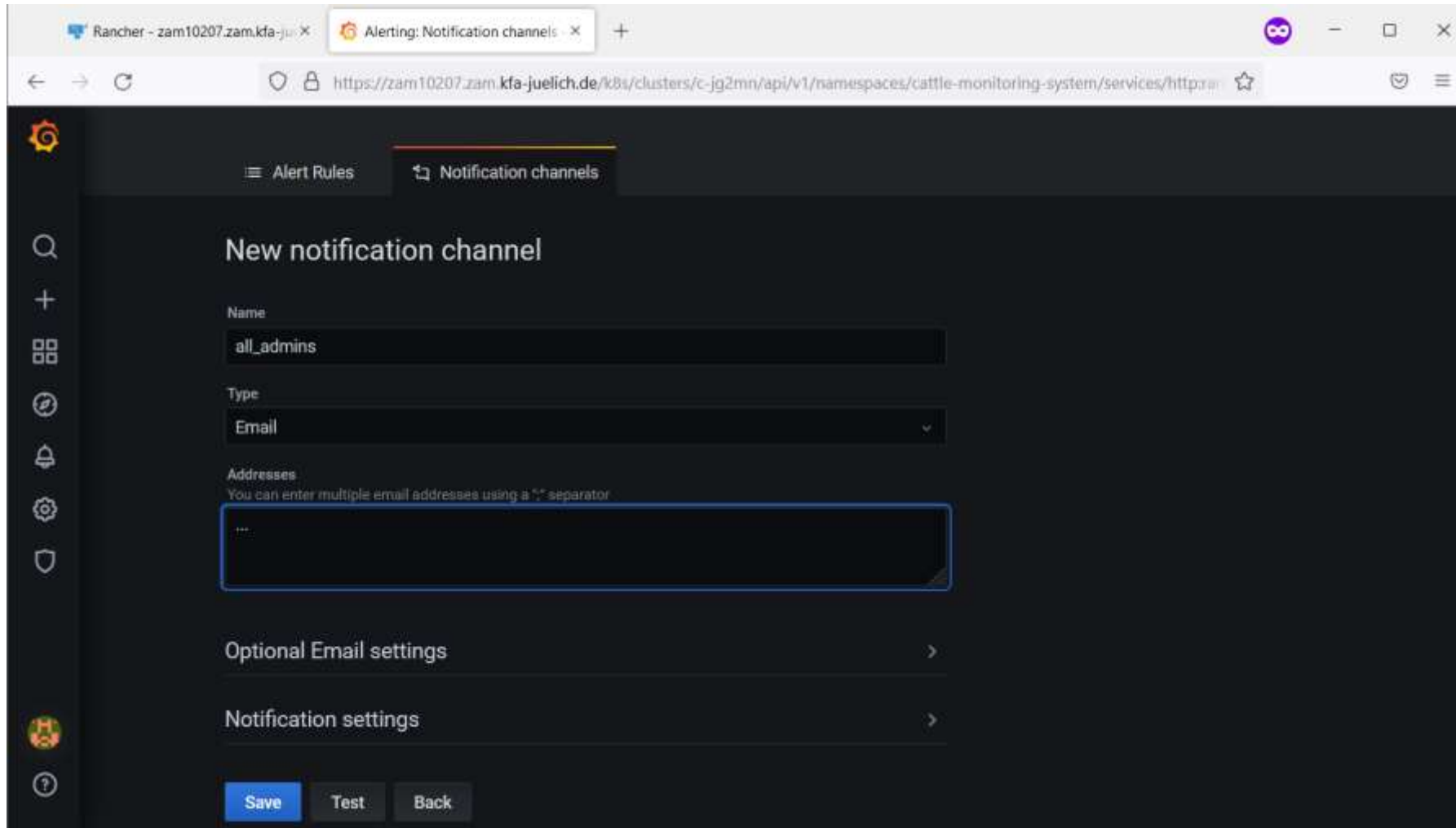
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Monitoring



APPENDIX

Monitoring



APPENDIX

Make life easier

- Monitoring with Prometheus & Grafana
- CLI – Manage multiple clusters in one terminal
- Local cluster with K3s
- How To Kubernetes – starting point

APPENDIX

CLI

- Install kubectl: <https://kubernetes.io/docs/tasks/tools/install-kubectl-linux/>
- Set env variable KUBECONFIG to your current cluster configuration
- Bash completion: <https://kubernetes.io/docs/tasks/tools/included/optional-kubectl-configs-bash-linux/>
- Aliases are your friend (but enemies of bash completion)

```
ubuntu@zam943:~$ alias skj
alias skj='KUBECONFIG=/home/ubuntu/.kube/jupyterjsc-staging kubectl -n jupyterjsc'
ubuntu@zam943:~$ alias pkj
alias pkj='KUBECONFIG=/home/ubuntu/.kube/jupyterjsc-production kubectl -n jupyterjsc'
ubuntu@zam943:~$ alias jkcms
alias jkcms='KUBECONFIG=/home/ubuntu/.kube/jupyterjsc-jusufcloud kubectl -n cattle-monitoring-system'
```

- Another way: Everything in one config file. `kubectl config` to switch between clusters

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K3S

Lightweight Kubernetes

- Built for IoT, CI & Edge computing
- <50Mb binary
- Great for development & first local tests
- K3d
 - Another Rancher project
 - Lightweight wrapper to run k3s
 - One Node in K8s == One Container in K3s
 - K3s cluster with n main and m workers -> n+m+1 container on your machine
 - Cluster started and ready within 3 minutes

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KUBERNETES

How To

- <https://kubernetes.io/docs/tutorials/>
- https://www.youtube.com/playlist?list=PLy7NrYWoggjwPggqtFsl_zMAwwG0SqYCb
- Short videos (10-15 min) for multiple Kubernetes topics