



Tools & Concepts for Cloud Deployments

Solution for Exercise 6

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Answers to questions

Lesson 1: Container Orchestration with Docker Swarm

Questions: Docker Swarm

In the Swarm terminology, what are services, tasks, and containers?

A service is a declarative description of a task, executed by a container. Several (replicated) tasks may serve as a service, while the task uses a container to run software to fulfil its purpose.

Where in our Cloud Stack do you place Docker Swarm?

The virtual machines have to be created externally. Docker engines have to be assigned to a Swarm cluster. Swarm automates from Containers on upwards.

Cloud Stack	Example	Deployment Tool
Application Component	Mediawiki	Dockerfile/Bash
Containers	Docker	Docker Swarm
Virtual Resource	Instance m1.small	Terraform
Cloud Platform	OpenStack	-

Lesson 2: Container Orchestration with Rancher

Questions: Rancher

Where in our Cloud Stack do you place Rancher?

Rancher offers the full cloud stack: from allocating resources to container placement and triggers application deployment via Docker.

Cloud Stack	Example	Deployment Tool
Application Component	Mediawiki	Dockerfile/Bash
Containers	Docker	Rancher
Virtual Resource	Instance m1.small	Rancher
Cloud Platform	OpenStack	-

Yet, Rancher does not automate the resource allocation depending on demands (e.g. http requests per second, or cpu load). This feature has to be added separately.

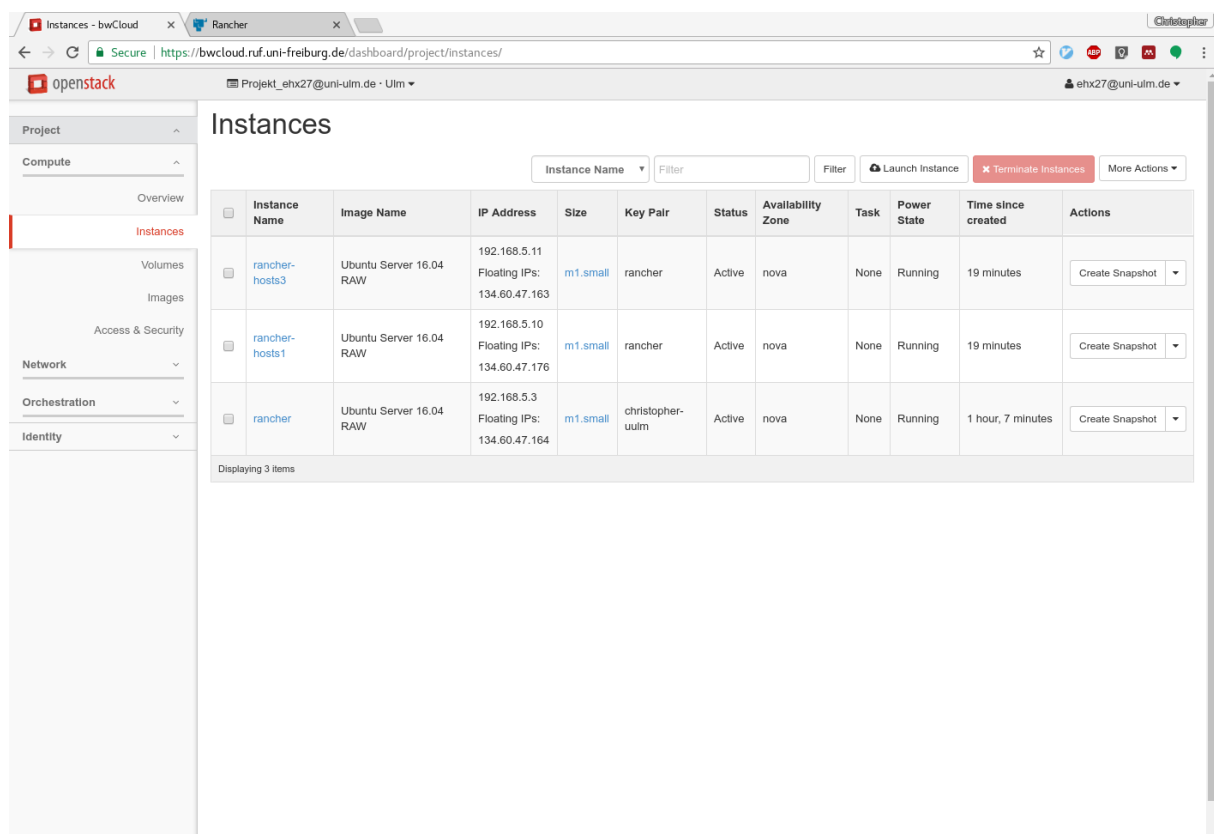
Solution for practical part

Docker Swarm

Docker Swarm works without additional software, since it is integrated in Docker. Yet it does not automate the creation of nodes when all available nodes are fully packed with containers. Scaling and updating containers works within seconds. Loadbalancing is partially replaced by Swarm's networking: services are accessible from any of the joined nodes.

Rancher

Rancher starts virtual machines in bwcloud, and adds them as hosts to Rancher.

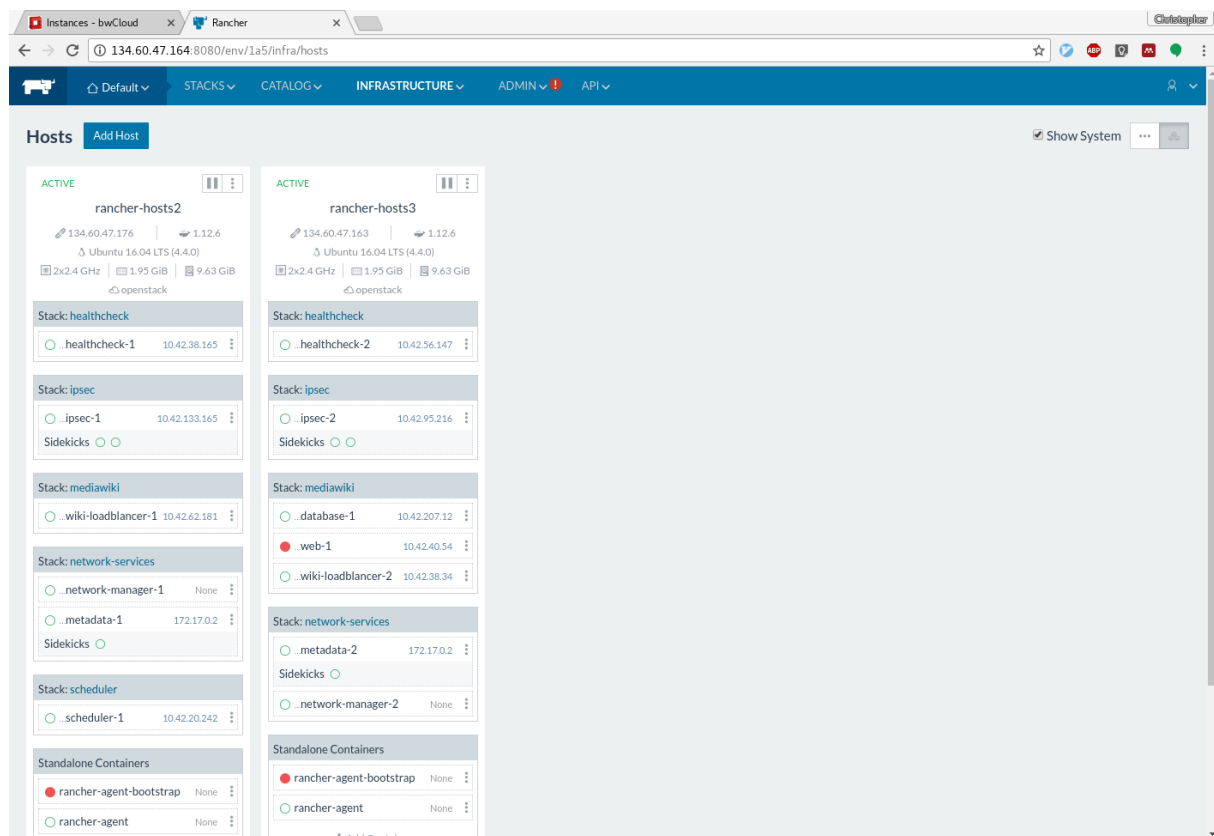


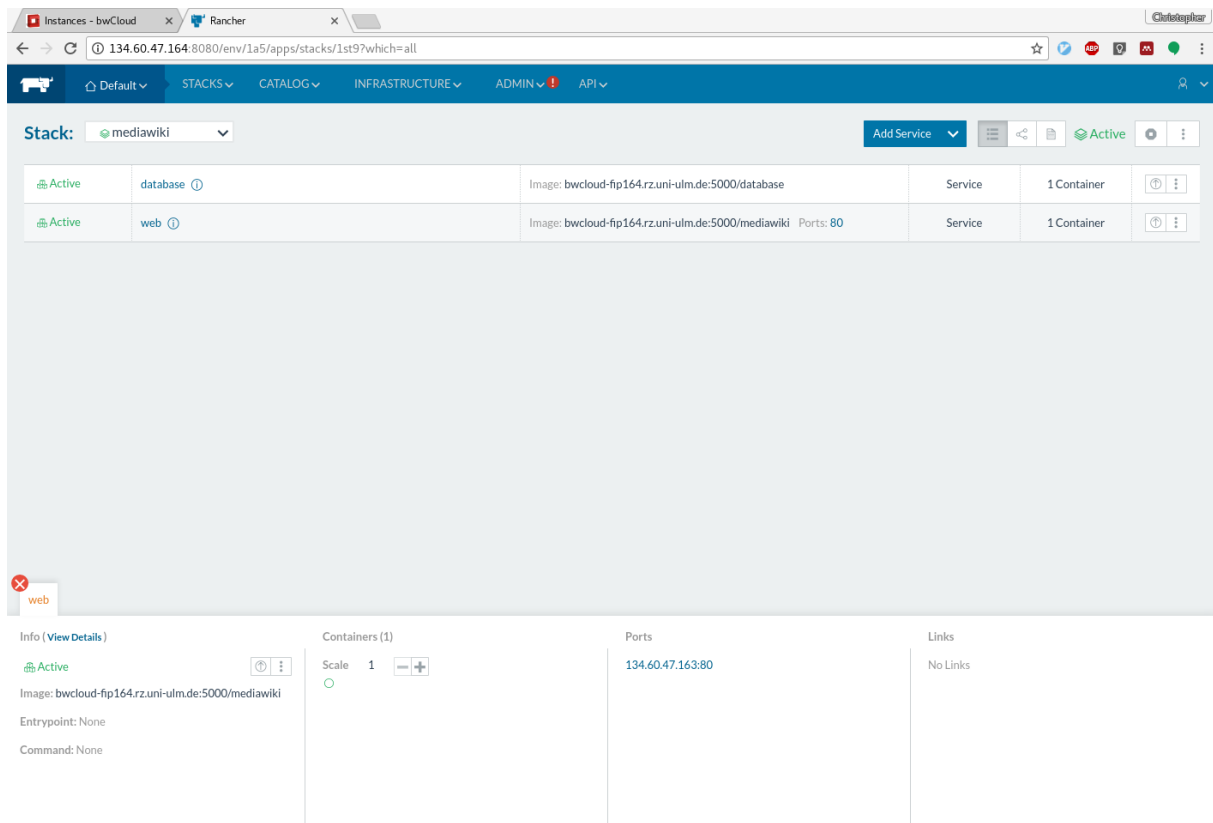
The screenshot shows the Rancher web interface in a browser. The left sidebar contains navigation links: Project, Compute, Overview, Instances (highlighted), Volumes, Images, Access & Security, Network, Orchestration, and Identity. The main panel is titled 'Instances' and displays a table of running instances. The table has columns for Instance Name, Image Name, IP Address, Size, Key Pair, Status, Availability Zone, Task, Power State, Time since created, and Actions. Three instances are listed: 'rancher-hosts3', 'rancher-hosts1', and 'rancher'. Each instance is running on an 'Ubuntu Server 16.04 RAW' image, using the 'm1.small' size, and is in the 'nova' availability zone. The 'rancher' instance has been running for 1 hour and 7 minutes, while the others have been running for 19 minutes. Each instance has a 'Create Snapshot' button in the Actions column.

Instance Name	Image Name	IP Address	Size	Key Pair	Status	Availability Zone	Task	Power State	Time since created	Actions
rancher-hosts3	Ubuntu Server 16.04 RAW	192.168.5.11 Floating IPs: 134.60.47.163	m1.small	rancher	Active	nova	None	Running	19 minutes	Create Snapshot
rancher-hosts1	Ubuntu Server 16.04 RAW	192.168.5.10 Floating IPs: 134.60.47.176	m1.small	rancher	Active	nova	None	Running	19 minutes	Create Snapshot
rancher	Ubuntu Server 16.04 RAW	192.168.5.3 Floating IPs: 134.60.47.164	m1.small	christopher-ulm	Active	nova	None	Running	1 hour, 7 minutes	Create Snapshot

Figure 1: rancher-bwcloud

Rancher defines so called Stacks, which contain services. A service refers to a docker image, which is used to deploy a container to serve the service.

Figure 2: *rancher-hosts*



The screenshot displays the Rancher web interface for managing a stack named 'mediawiki'. The top navigation bar includes links for Default, STACKS, CATALOG, INFRASTRUCTURE, ADMIN, and API. The main content area shows the stack details with a table of services:

Status	Service Name	Image	Service Type	Containers
Active	database	bwcloud-fp164.rz.uni-ulm.de:5000/database	Service	1 Container
Active	web	bwcloud-fp164.rz.uni-ulm.de:5000/mediawiki Ports: 80	Service	1 Container

Below the table, there is a detailed view for the 'web' service, showing its status as 'Active', the image used, and the command executed. The 'Containers' section shows a scale of 1. The 'Ports' section lists the exposed port 134.60.47.163:80. The 'Links' section indicates no links are present.

Figure 3: rancher-stackg

Rancher provides monitoring, control, and overview of hosts and containers.

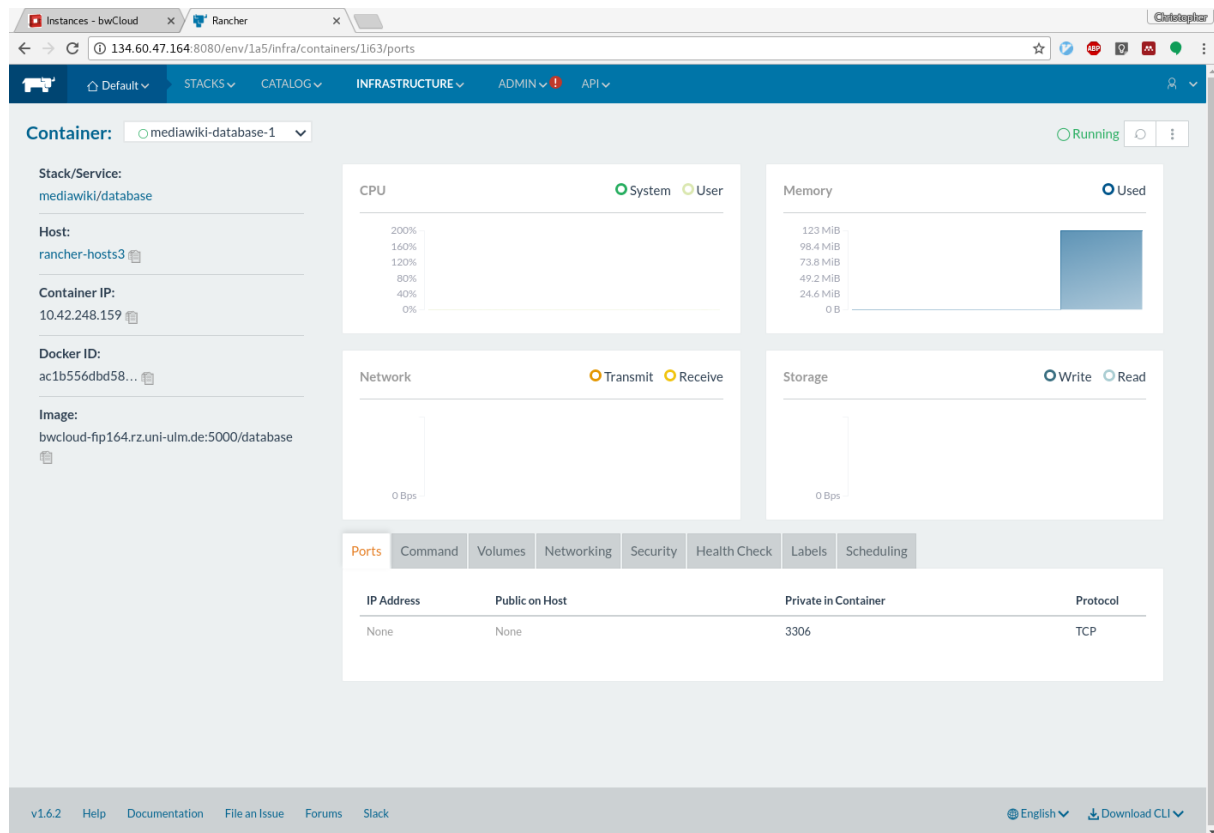


Figure 4: rancher-containerview