

# bwCloud: cross-site server virtualization

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STEINBUCH CENTRE FOR COMPUTING - SCC



# Agenda

- About
- Use Cases
- Architecture
- Usage
- Monitoring
- Next steps
- Summary
- Q&A

# About bwCloud project

- Project objectives
  - Prototypical implementation of a university-Cloud
  - Development of a concept for a national service
- Project partners
  - University Mannheim (Project Management)
  - BelWü
  - KIT Karlsruhe (SCC)
  - University Freiburg
  - University Ulm
  - University Stuttgart
- Duration
  - 2 Years (till 31.12.2016)
- Service Model: IaaS
  - VM Software Container, Operating system level
- Deployment model: on-site Community Cloud
  - Distributed / Federated Cloud Infrastructure
  - Distributed user management (centralized authentication component is coupled to bwIDM)

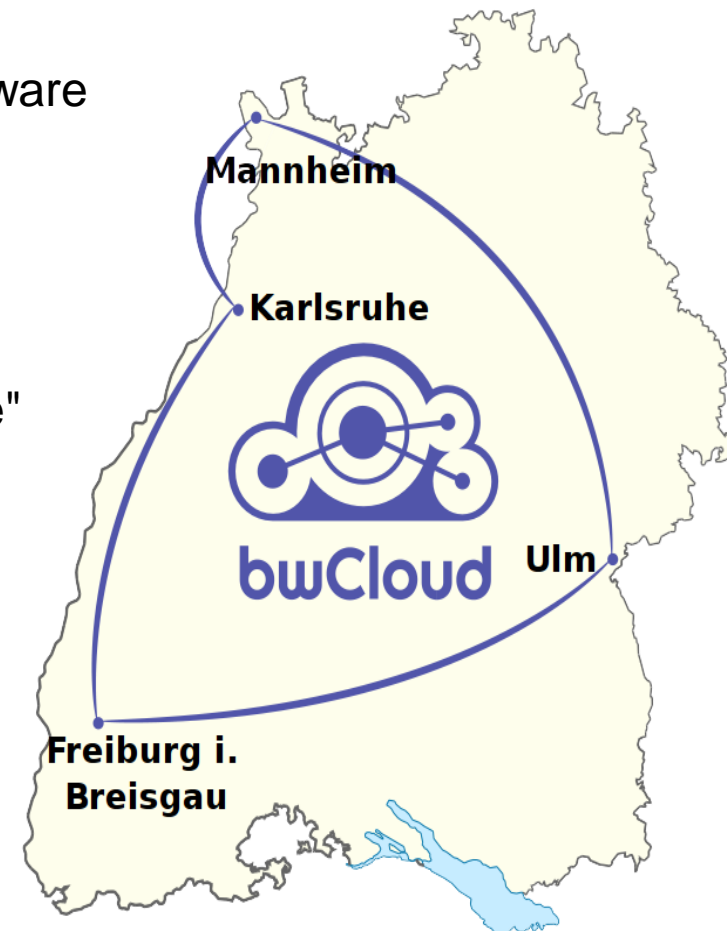


# Use Cases

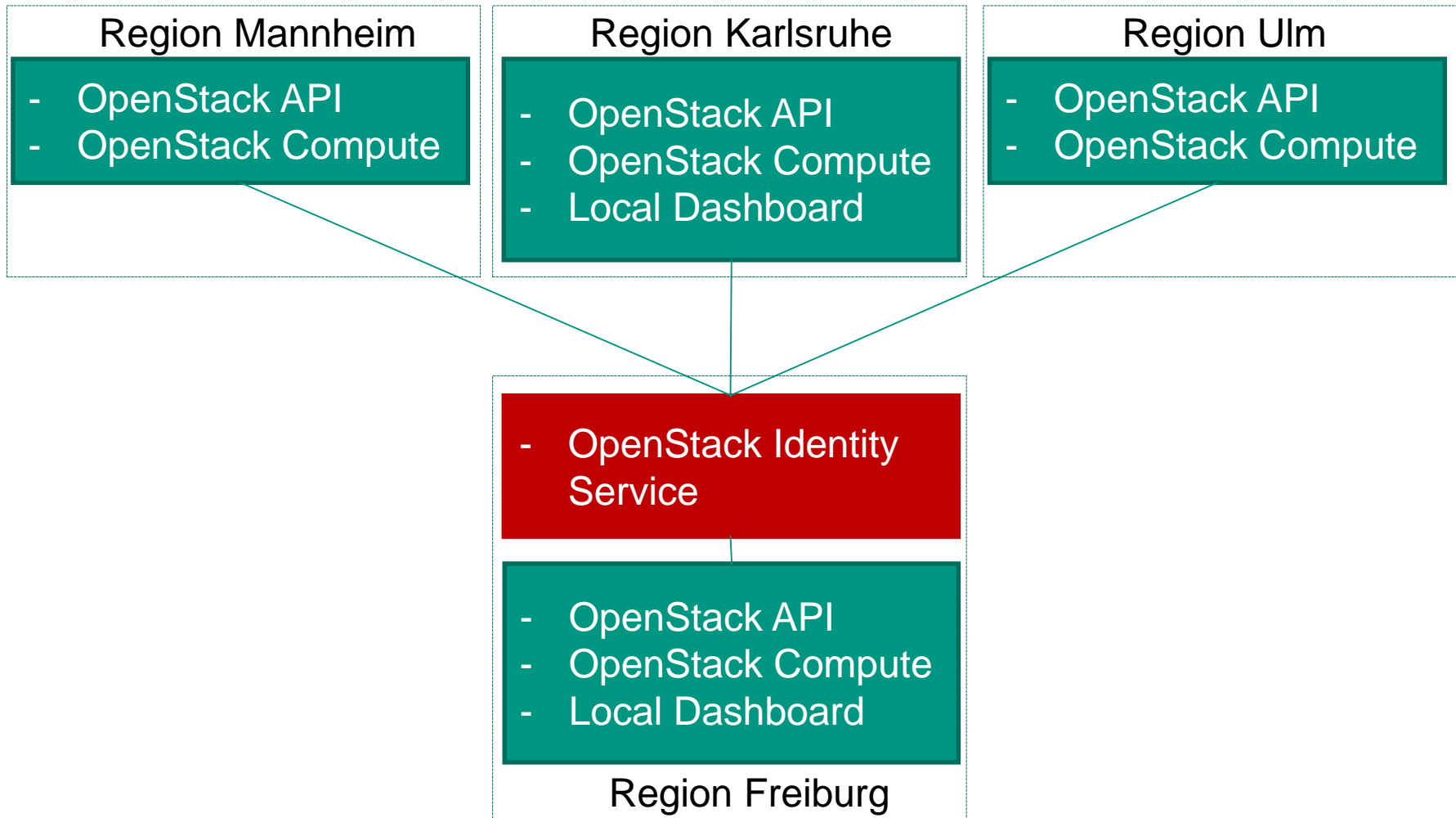
- Case 1: “Student-VM”
  - Students who need resources (virtual machines) during their studies
  - The usage time & resource consumption of VMs are limited
  - Collective billing
- Case 2: “Institut-/Scientist-VM”
  - Multiple instances (Web server + database)
  - API access to the Cloud Services
  - Use separate storage services for permanent data
  - Individual billing
- Case 3: “Site operation/administration”
  - In principle, an unlimited resource consumption
  - The main question: which Data center would like to participate?

# Architecture

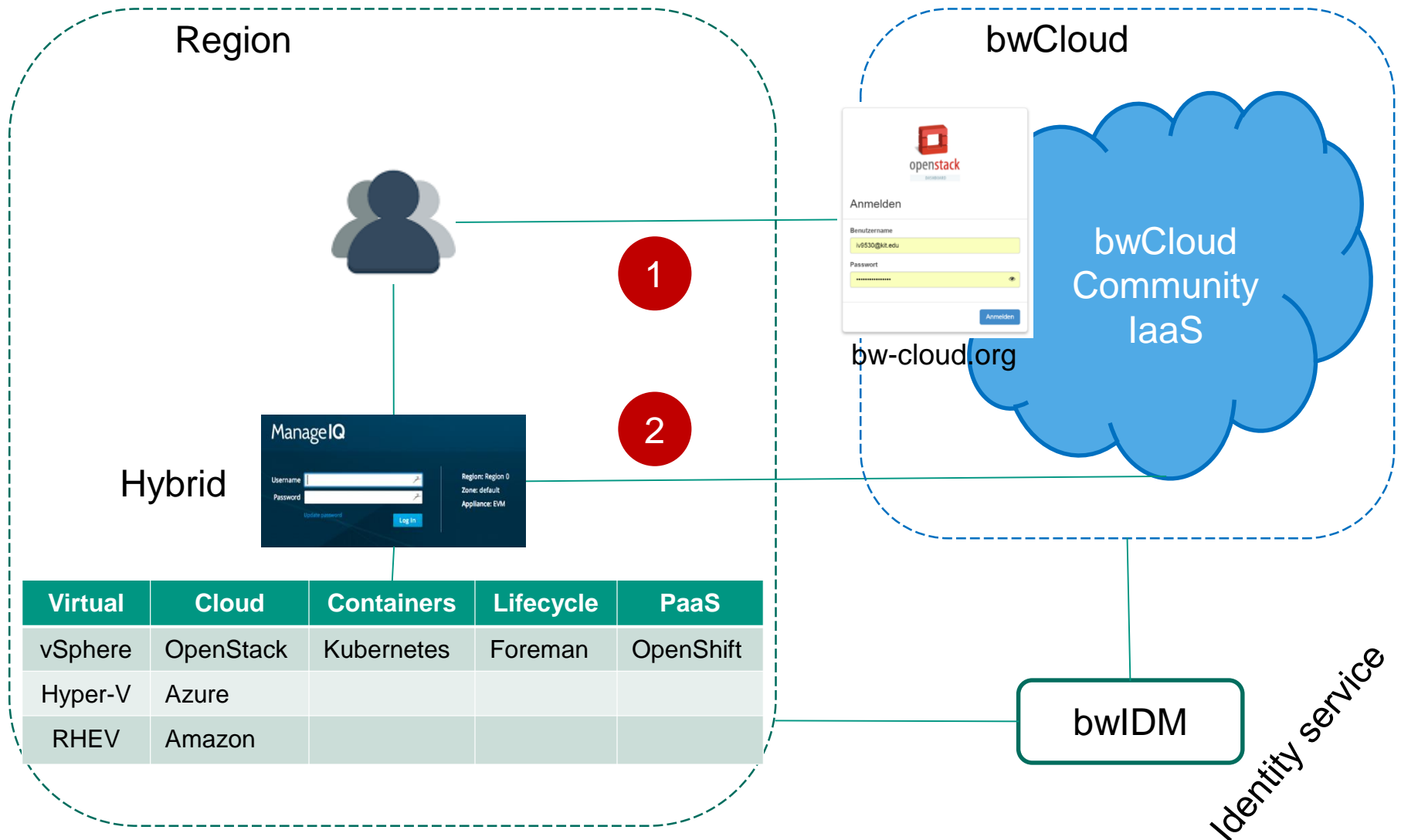
- Prototype includes four sites
  - Mannheim, Karlsruhe, Freiburg, Ulm
- Objectives
  - Building and networking of distributed hardware
  - Evaluation of new technologies / concepts
  - Building capacity in distributed operating (OpenStack) environments
  - Mounting and preparation of processes / procedures / know how for "national service"
- Status: Current hardware equipment (total):
  - 18 Nodes
  - ca. 3,5 TByte RAM
  - ca. 132 TByte HDD
  - 36 CPUs or 280 Cores



# Architecture: Multi-Region OpenStack



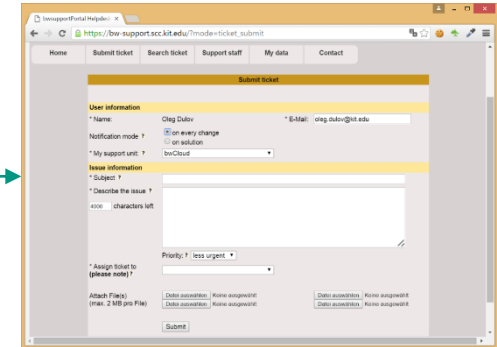
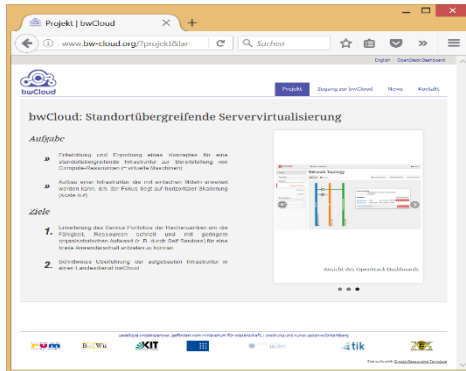
# Architecture: Community (+ Hybrid)



# Usage

Information portal  
<http://www.bw-cloud.org>

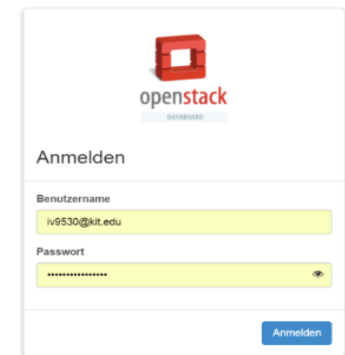
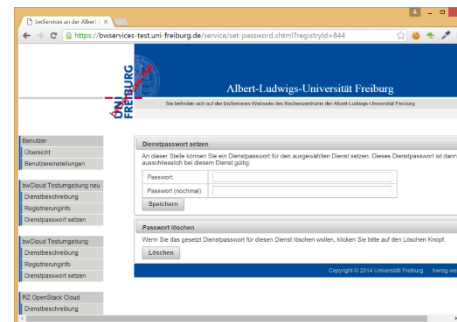
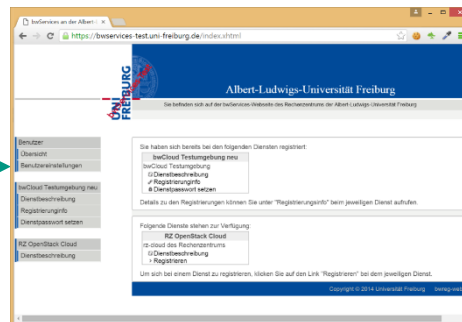
Ticket system



Step 1:  
Register

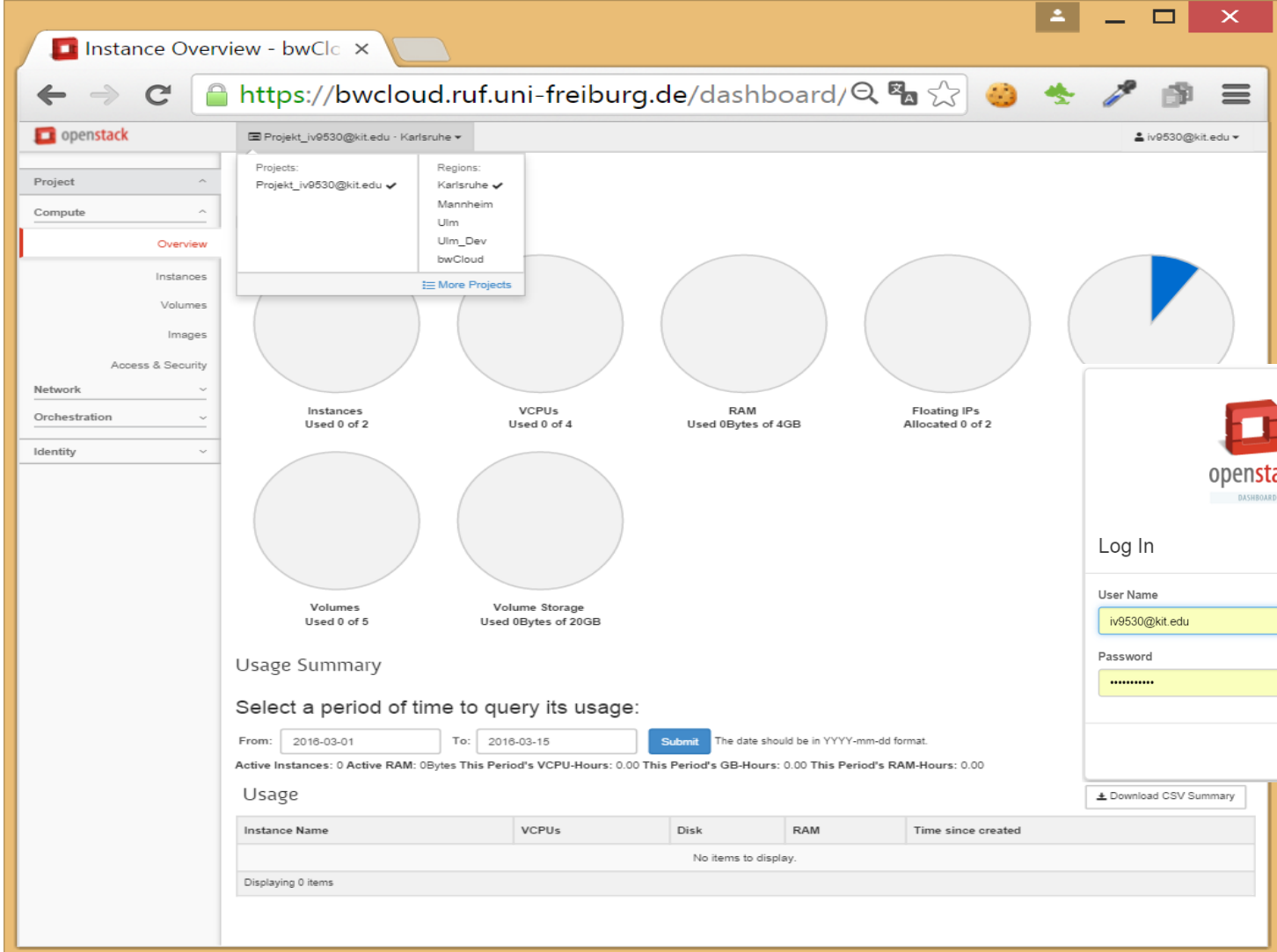
Step 2:  
Set service password

Step 3:  
Use





# Usage: Dashboard



The screenshot shows the OpenStack Instance Overview dashboard for the project 'Projekt\_iv9530@kit.edu' in the 'Karlsruhe' region. The dashboard displays usage statistics for various resources:

- Instances Used 0 of 2
- VCPUs Used 0 of 4
- RAM Used 0Bytes of 4GB
- Floating IPs Allocated 0 of 2
- Volumes Used 0 of 5
- Volume Storage Used 0Bytes of 20GB

Below the usage statistics, there is a 'Usage Summary' section with a date range selector (From: 2016-03-01, To: 2016-03-15) and a 'Submit' button. The summary shows: Active Instances: 0, Active RAM: 0Bytes, This Period's VCPU-Hours: 0.00, This Period's GB-Hours: 0.00, This Period's RAM-Hours: 0.00. There is also a 'Download CSV Summary' link.

At the bottom, there is a table for 'Usage' with columns: Instance Name, VCPUs, Disk, RAM, and Time since created. The table is currently empty, displaying 'No items to display.' and 'Displaying 0 items'.

On the right side, there is a 'Log In' form with fields for 'User Name' (containing 'iv9530@kit.edu') and 'Password' (masked with dots), and a 'Connect' button.

# Usage: Accounting

Accounting summary - O: x

https://openstack.bwcloud.scc.kit.edu/dashboard/migration\_dashboard/account\_panel/

openstack admin - Karlsruhe

## Accounting

Select a period of time to query its usage:

From: 2016-06-01 To: 2016-06-29  The date should be in YYYY-mm-dd format.

### Summary

Project Name	VCPUs	Disk	RAM	VCPU Hours	Disk GB Hours	Memory MB Hours	Costs Euro
Projekt_k5165@kit.edu	8	160GB	16GB	2574.70	51494.09	5272994.46	79.38
Projekt_he9316@kit.edu	8	160GB	16GB	2823.54	56470.72	5782601.72	87.05
Projekt_t5844@kit.edu	1	20GB	2GB	679.11	13582.27	1390824.22	20.94
Projekt_gs8780@kit.edu	1	20GB	2GB	372.06	7441.15	761973.30	11.47
Projekt_pd5470@kit.edu	1	20GB	2GB	136.92	2738.37	280408.86	4.22
Projekt_lv9530@kit.edu	25	500GB	50GB	15139.39	302787.84	31005475.23	466.75
admin	1	20GB	2GB	679.11	13582.27	1390824.22	20.94
cert	0	0bytes	0bytes	4.52	90.48	9265.49	0.14

Displaying 8 items

### Launch Instance

Details \* Access & Security Networking \* Post-Creation Advanced Options

Availability Zone: nova

Instance Name:

Flavor: m1.tiny

Instance Count: 1

Instance Boot Source: Select source

Specify the details for launching an instance. The chart below shows the resources used by this project in relation to the project's quotas.

#### Flavor Details

Name	m1.tiny
VCPUs	1
Root Disk	1 GB
Ephemeral Disk	0 GB
Total Disk	1 GB
RAM	512 MB

#### Project Limits

Number of Instances: 9 of 12 Used

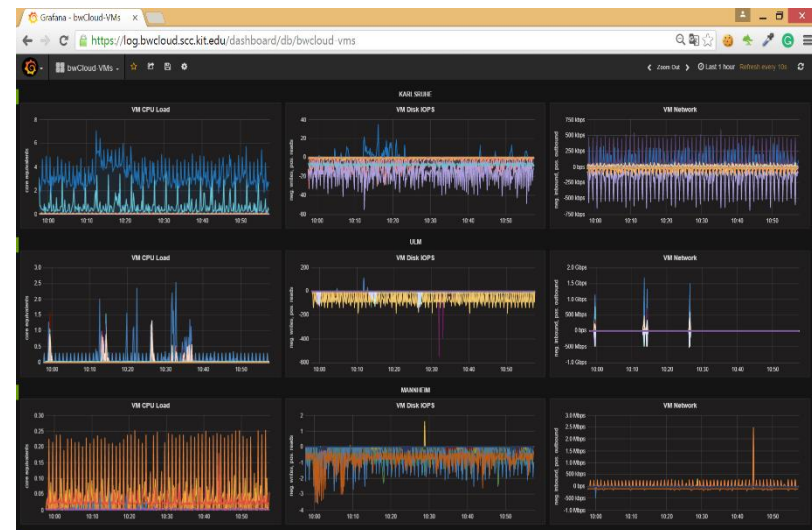
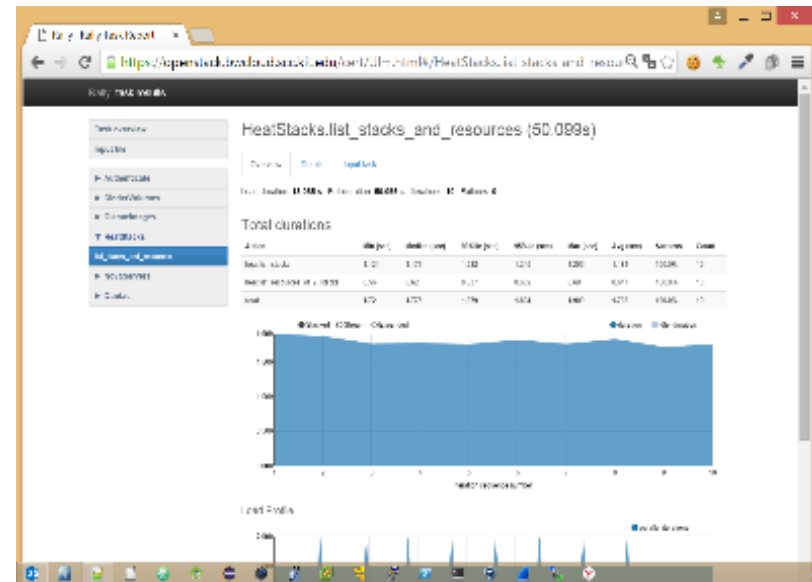
Number of VCPUs: 25 of 32 Used

Total RAM: 51,200 of 85,536 MB Used

Price: 0.776\$/hour (0.186\$/Day, 67.416\$/Year)

# Monitoring

- Blackbox -> central
  - OpenStack Rally
- Whitebox -> every Site
  - Collectd
  - InfluxDB
  - Elasticsearch
  - Grafana -> central
- In evaluation
  - OpenStack Monasca
  - Sensu



# Next steps & plans

## ■ 2016

- Develop concept for service bwCloud, based on experience from prototype evaluation
- VMs Migration between Sites
- Hybrid Model evaluation
- Windows Images on OpenStack
  - Try to avoid Hyper-V

## ■ > 2017

- 1.1.2017: bwCloud goes into production
- Extends Sites with additional Hardware
- “Big storage”, Billing, etc. ...

# Summary

- bwCloud project is
  - Prototype for future Cloud implementation in Baden Württemberg
  - IaaS with cross site infrastructure
  - Based on OpenStack



# Thank you for your attention!

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