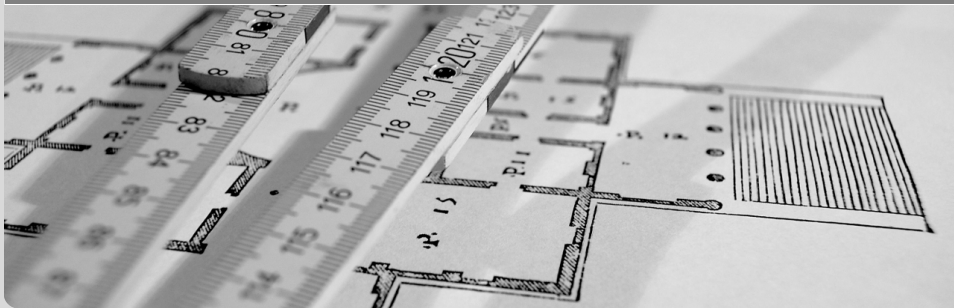# The KOALA Cloud Management Service

A Modern Approach for Cloud Infrastructure Management

CloudCP – 1st International Workshop on Cloud Computing Platforms at EuroSys 2011

Christian Baun, Marcel Kunze | April 10th, 2011

STEINBUCH CENTRE FOR COMPUTING (SCC)

www.kit.edu

The basic stuff

- Cloud services differ in their deployment models
    - **Public cloud services**
    - **Private cloud services**
    - **Hybrid cloud services**
- Several types of cloud delivery models exist
    - **Infrastructure as a Service (IaaS)**
    - **Platform as a Service (PaaS)**
    - **Software as a Service (SaaS)**
- Several cloud-based storage services exist
    - **Object-based storage services**
    - **Volume-based storage services**
    - **Table-based storage services** (Databases)

What tools exist to simplify working with so many different cloud services?

Amazon Web Services API

- Several different cloud APIs exist
- The AWS are a popular collection of different public cloud services
- Some popular AWS services:

Elastic Compute Cloud (EC2)	$\Longrightarrow$	Infrastructure service for virtual server instances
Simple Storage Service (S3)	$\Longrightarrow$	Object-based storage service
Elastic Block Store (EBS)	$\Longrightarrow$	Volume-based storage service

- Several private cloud services implement the AWS API
    - Advantage: Compatibility of tools and libraries
      $\Longrightarrow$ Easy to build up hybrid clouds
    - Customers/users can switch between public und private cloud usage
    - The AWS API is the most popular interface to cloud services

Private cloud IaaS	EC2 API	S3 API	EBS API
CloudStack	subset	—	—
Eucalyptus	full support	full support	full support
Nimbus	subset	subset	—
OpenNebula	subset	—	—

Management of cloud services

- Because of the AWS' popularity and the compatible private cloud solutions the number of compatible tools and libraries increases
- The existing management tools can be classified as follows:
    - **Web applications** – Software as a Service (SaaS)
        - Examples: AWS Management Console, Google Storage Manager, Ylastic
    - **Command-line tools**
        - Examples: AWS API-Tools, Euca2ools, GSUtil, s3cmd
    - **Firefox browser extensions**
        - Examples: ElasticFox, Hybridfox, S3Fox
    - **Locally installed applications with a graphical user interface** (GUI)
        - Examples: EC2Dream, Gladinet, Cloud Desktop, Cyberduck
- All these groups face several limitations

Web applications

- Several public cloud providers run a web application that gives the customers an easy to use interface to their services
- Advantages:
    - Customers only need a browser
    - No software need to be installed locally
    - Customers are not bound to a specific working place
    - Easy to use compared with command-line tools
- Drawbacks:
    - Web applications are usually proprietary
    - Customers cannot extend the functionality
    - Providers have no interest to open their management solution for competitors or private cloud solutions
- Possible solution: Web applications from third-party suppliers (e.g. Ylastic)
    - Customer credentials are stored by the provider of the tool
    - Customers need to trust this provider regarding security and privacy
    - Web applications from third-party suppliers usually are also proprietary

Command-line tools

- Advantages:
    - Usually open source
        - AWS API-Tools, Euca2ools and GSUtil are licensed under Apache v2.0
        - s3cmd is licensed under GPLv2
    - Usually support several different public and private cloud services
        - AWS API-Tools supports EC2, EBS, ELB and compatible private clouds
        - Euca2ools supports EC2, EBS and compatible private clouds
        - GSUtil and s3cmd support S3, GS and compatible private clouds
    - Can be integrated into shell scripts
        - Suitable for the automation of recurrent tasks
- Drawbacks:
    - Lacks usability (for non-experts)
    - Local installation and administration is required
    - Not all operating systems are supported

Firefox browser extensions

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- Advantages:
  - Easy to use compared with command-line tools
  - Usually open source
    - ElasticFox and Hybridfox are both licensed under Apache License v2.0
    - S3Fox is not open source
- Drawbacks:
  - Usually support only few different public and private cloud services
    - ElasticFox and Hybridfox support EC2, EBS and compatible private clouds
    - S3Fox supports only Amazon S3 and not Google Storage (GS)
  - Local installation and administration is required
  - Only work with the Firefox browser
    - Customers that work with other browsers like Internet Explorer, Opera, Google Chrome or Safari cannot work with these tools

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Locally installed applications with a GUI

- Advantages:
    - Better usability compared to command-line tools
    - Integrate well into the local operating system
- Drawbacks:
    - Not suitable for the automation of recurrent tasks
    - Local installation and administration is required
    - Not all operating systems are supported

Conclusion

- All existing management tools face several disadvantages in principle
- A flexible tool for cloud service management should...
    - support several different cloud services
    - be easy to use
    - be open source
    - not force the customers to install any software locally
    - provide the ability to run locally
- No established tool provides all these features
- No established tool supports all AWS-compatible infrastructure and storage services

$$\Longrightarrow \text{KOALA Cloud Management Service}$$

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KOALA cloud management service

- KOALA stands for **K**arlsruhe **O**pen **A**pplication for c**L**oud **A**dministration
  - `http://koalacloud.appspot.com`
- KOALA is a web-based application (a service) and helps working with AWS compatible cloud infrastructure and storage services

Table: Cloud services that are supported by KOALA

Name	Type of Service	API	Public/Private Cloud
Amazon EC2	infrastructure service	EC2	Public Cloud
Eucalyptus	infrastructure service	EC2	Private Cloud
Nimbus	infrastructure service	EC2	Private Cloud
OpenNebula	infrastructure service	EC2	Private Cloud
Amazon EBS	storage service	EBS	Public Cloud
Storage Controller	storage service	EBS	Private Cloud
Amazon S3	storage service	S3	Public Cloud
Google Storage	storage service	S3	Public Cloud
Host Europe Cloud Storage	storage service	S3	Public Cloud
Walrus	storage service	S3	Private Cloud
Amazon ELB	load balancer service	ELB	Public Cloud

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What KOALA can do

- With KOALA the customers can manage all AWS-compatible infrastructure and storage services inside a uniform user interface
- KOALA was designed to run as a service inside the cloud platform service Google App Engine
    - `http://code.google.com/appengine/`
- KOALA runs inside platform services based of AppScale and typhoonAE as well
    - Both solutions are App Engine-compatible
    - AppScale itself can run inside the public cloud infrastructure services EC2 and inside Eucalyptus-based private cloud infrastructures
        - `http://code.google.com/p/appscale/`
    - typhoonAE runs inside any Linux or MacOS X environment and doesn't need an underlying cloud infrastructure service
        - `http://code.google.com/p/typhoonae/`

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Managing a cloud in a private context
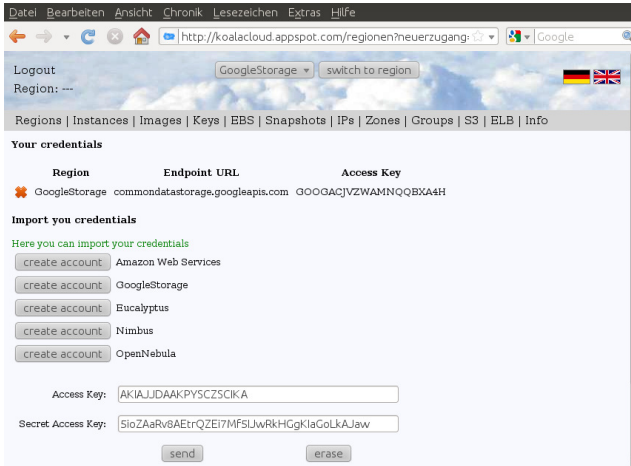
- When running KOALA inside AppScale or typhoonAE it is possible to manage a cloud infrastructure in a private context
  - The credentials are not stored by a third-party supplier like Ylastic
  - No security or privacy issues

What KOALA cannot do
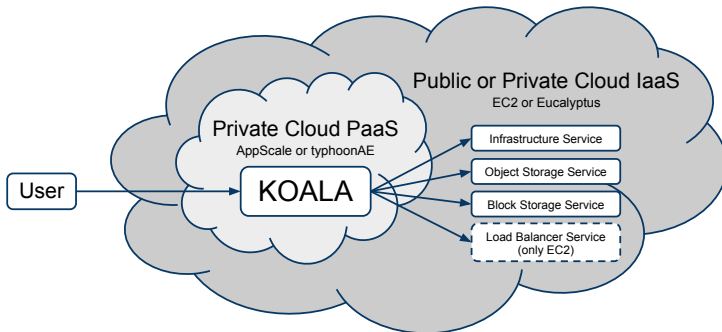
- KOALA is not a marketplace for cloud resources
  - To access public or private cloud services with KOALA the customers need to import their credentials for these services
  - The customers cannot share their credentials or cloud-based resources with KOALA
- Instances and data (S3 buckets, EBS volumes) cannot be moved directly between the resources of different service providers
  - The AWS API does not provide this functions
- Accounting and billing of the used resources is impossible
  - The AWS API does not provide this functions
- It is impossible to request further information about user accounts (email address or full name) with the AWS API
  - Using images or snapshots from other customers or third-party suppliers would be more secure with this feature

Working with KOALA – Part 1

- Import of credentials for an infrastructure service (e.g. EC2)

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Working with KOALA – Part 2

- With this pull-down menu it is easy to switch the active region
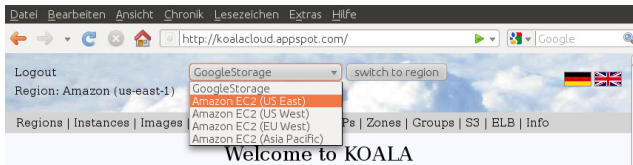
- Status of the availability zones inside the current region
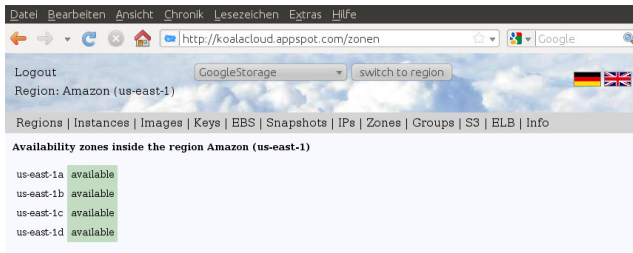
Working with KOALA – Part 3

- Each customer needs at least one security group
- Customers can create new firewall rules and erase existing ones

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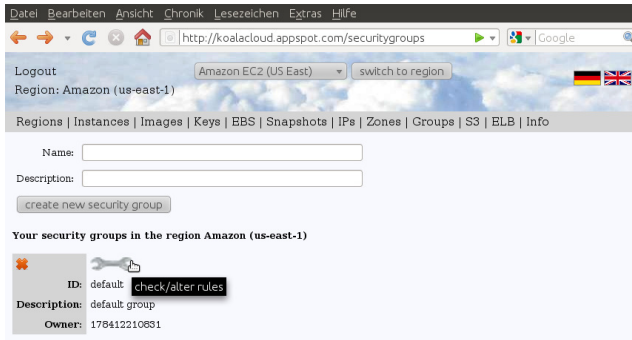
Working with KOALA – Part 4

- Each customer needs at least one keypair to log into his instances without password
- Customers can create new keypairs and erase existing ones

Working with KOALA – Part 5

- Select an image
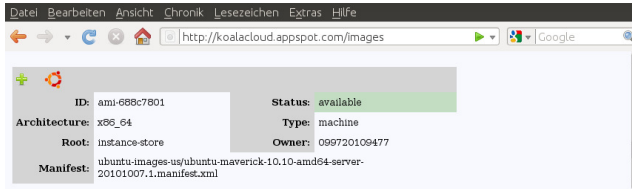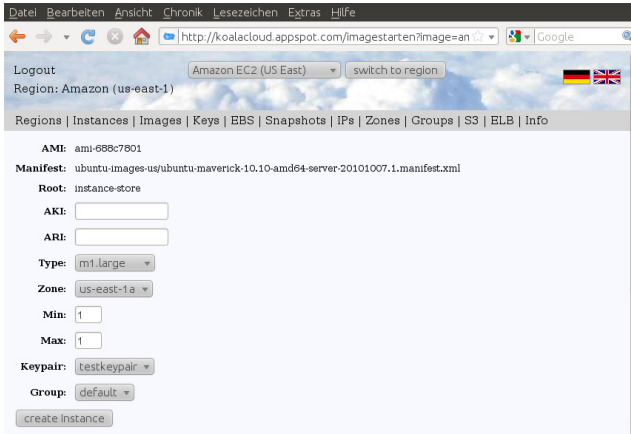
- With images new instances can be created

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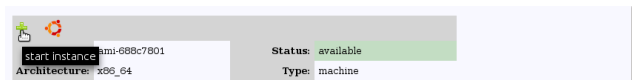
Working with KOALA – Part 6

- Let's start an instance

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Working with KOALA – Part 7

- The running instance

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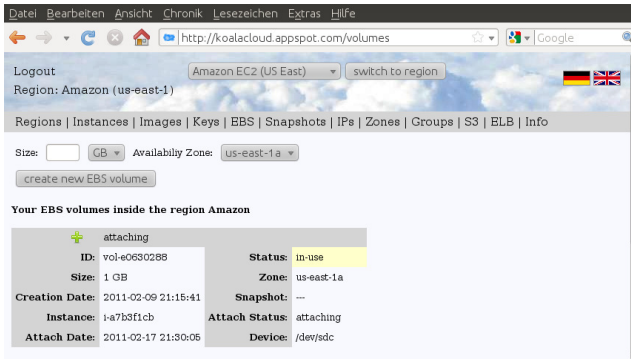
Working with KOALA – Part 8

- Customers can create new elastic IP addresses and assign them to their instances

Working with KOALA – Part 9

- Additional storage in form of EBS volumes can be created and attached to own instances

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Optimized user interface for mobile devices

- The whole user interface is implemented following HTML 4.01
    - No proprietary technologies like Flash or JavaScript are used
    - KOALA can be used with any HTML-compatible browser
- KOALA includes a customized version for mobile phones
    - Provides a user interface optimized for the usage of touch screens

Information about KOALA
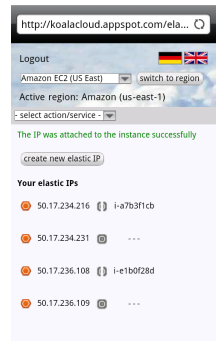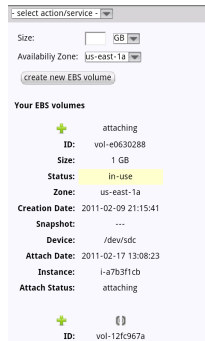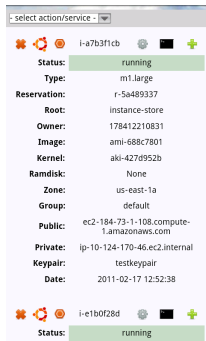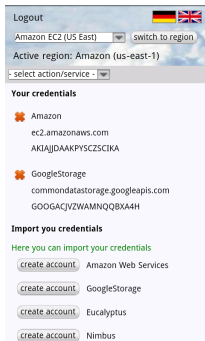
- KOALA running inside the Google App Engine – usage is for free
  `http://koalacloud.appspot.com`
- Project site with source code and documentation
  `http://code.google.com/p/koalacloud/`
- Using the KOALA cloud management service with EC2
  `http://www.youtube.com/watch?v=S8pGPm-vSTk`
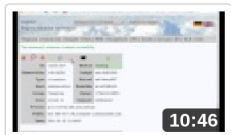
Using the **KOALA** cloud management service with EC2

with subtitles in English | Deutsch This video shows how to use **KOALA** with the cloud infrastructure service (IaaS) Amazon Elastic Compute Cloud **...**

by Neverland23kl | 1 month ago | **238 views**

CC

10:46

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2nd Edition in German language now available

English version will be available in June 2011

Thank you for your attention!

Any Questions?