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Java in der Cloud – Aktuelle Möglichkeiten und Entwicklungen

Eberhard Wolff

Architecture and Technology Manager

adesso AG

Twitter: @ewolff

Blog: http://ewolff.com

About me

- Eberhard Wolff
- Architecture & Technology Manager at adesso
- adesso is a leading IT consultancy in Germany
- Speaker
- Author (i.e. first German Spring book)
- Blog: http://ewolff.com
- Twitter: @ewolff
- eberhard.wolff@adesso.de

- We are hiring

Agenda

- A Few Words About Cloud
- Java and IaaS
- PaaS – Platform as a Service
- Google App Engine
- CloudBees
- Amazon Beanstalk

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A Few Words About Cloud

IaaS – PaaS – SaaS

Infrastructure as a Service	Platform as a Service	Software as a Service
> Virtual Servers > Similar to Virtualization > Manage Everything Yourself	> Virtual App Server > Handles Scale-Out > Mostly Managed by Provider	> Software or Service that you use > Components that you add/integrate into your app

amazon web services™

vmware®

salesforce.com
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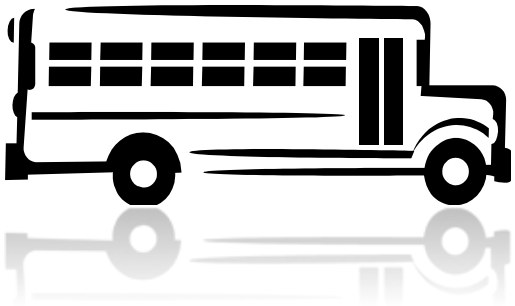
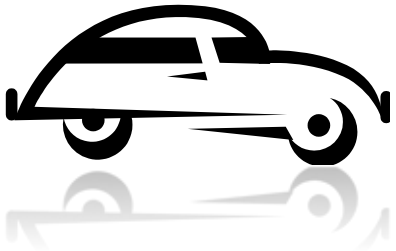
Google mail

Cloud Deployment Model

- Public
  - Available to general public



- Private
  - Available to only one organization



- Community
  - Available to several organizations

- Hybrid
  - Combination of multiple models

Why Cloud: Economics

- Public Cloud:
  - Pay only what you need (Pay-as-you-go) (Public Cloud)
  - No CapEx
  - Handle load peaks cheaply
  - Transparent cost model

- Private Cloud:
  - Better Resource Utilization
  - Costs can be accounted for
  - Next logical step after virtualization

amazon web services™ SIMPLE MONTHLY CALCULATOR

NEW! - Amazon RDS for Oracle, Custom Metrics in Amazon CloudWatch and Dedicated Instances in Amazon VPC

FREE USAGE TIER: New Customers get free usage tier for first 12 months ☑

Language: English

Services | Estimate of your Monthly Bill ($ 60.90)

- Amazon EC2
- Amazon S3
- Amazon SQS
- Amazon SES
- Amazon SNS
- Amazon Route 53
- Amazon CloudFront
- Amazon RDS
- Amazon CloudWatch
- Amazon SimpleDB
- Amazon VPC
- Amazon Elastic MapReduce
- AWS Import Export
- AWS Premium Support

Choose region: US-East (Northern Virginia) & US-Standard — Outbound Data Transfer is 1 GB free per region per month ☑

Amazon Elastic Compute Cloud (Amazon EC2) is a web service that provides resizable compute capacity in the cloud. It is designed to make web-scale computing easier for developers. Amazon Elastic Block Store (EBS) provides persistent storage to Amazon EC2 instances.

Add To Bill | Clear Form

Compute: Amazon EC2 On-Demand Instances:

	Instances	Description	Operating System	Instance Type	Usage
⊖	4	Load Peaks	Linux/OpenSolaris	Small	0 Hours/Month

Compute: Amazon EC2 Reserved Instances:

	Instances	Description	OS	Type	Term
⊖	1	Grundlast	Linux	Small	3 yr term

Storage: Amazon EBS Volumes:

	Volumes	Description	Provisioned Storage	Average IOPS in volume	Snapshot Storage*
⊖	10		10 GB-month	20	0 GB-month of Storage

Elastic IP:

Number of Elastic IPs: 0

Elastic IP Non-attached Time: 0 Hours/Month

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Estimate of Your Monthly Bill

☑ Show First Month's Bill (include all one-time fees, if any)

With AWS, You only pay for what you use. Below you will see an estimate of your monthly bill. Expand each line item to see cost breakout of each service. To save this bill and input values, click on 'Save and Share' button. To remove the service from the estimate, click on the red cross.

Save and Share

⊖ Amazon EC2 Service (US-EAST)		$ 412.00
Compute:	$ 0.00	
Transfer:	$ 0.00	
EBS Volumes:	$ 10.00	
EBS I/O Requests:	$ 52.00	
EBS Snapshots:	$ 0.00	
Reserved Instances (One-time Fee):	$ 350.00	
Elastic IPs:	$ 0.00	
Elastic LBs:	$ 0.00	
Data Processed by Elastic LBs:	$ 0.00	
⊕ AWS Data Transfer In		$ 0.00
⊕ AWS Data Transfer Out		$ 0.00
Free Tier Discount:		$ -1.10
Total One-Time Payment:		$ 350.00
Total Monthly Payment:		$ 60.90

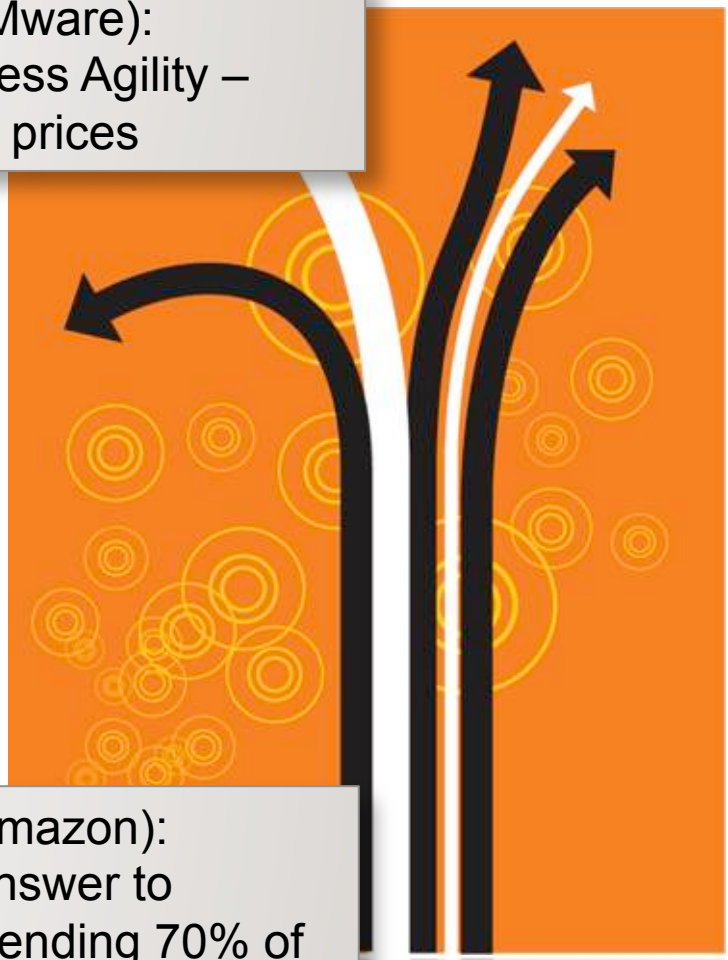
Common Customer Samples

- Free Website on AWS
- AWS Elastic Beanstalk Default
- Marketing Web Site
- Web Application
- Media Application
- HPC Cluster
- Disaster Recovery and Backup
- European Web Application

Why Cloud: Business Agility

- From development to production with just one click
- Much faster
- Much simpler

Adrian Colyer (CTO VMware):
Customers want Business Agility – even if it means higher prices



- Application scales automatically
  - > Higher load means more resources are used automatically
- Create a test envrionment with just one click
  - > Production-like sizing
  - > Cheaply (only paid during the test)

Werner Vogels (CTO Amazon):
Amazon Cloud is the answer to Amazon developers spending 70% of their time with scalability and technology

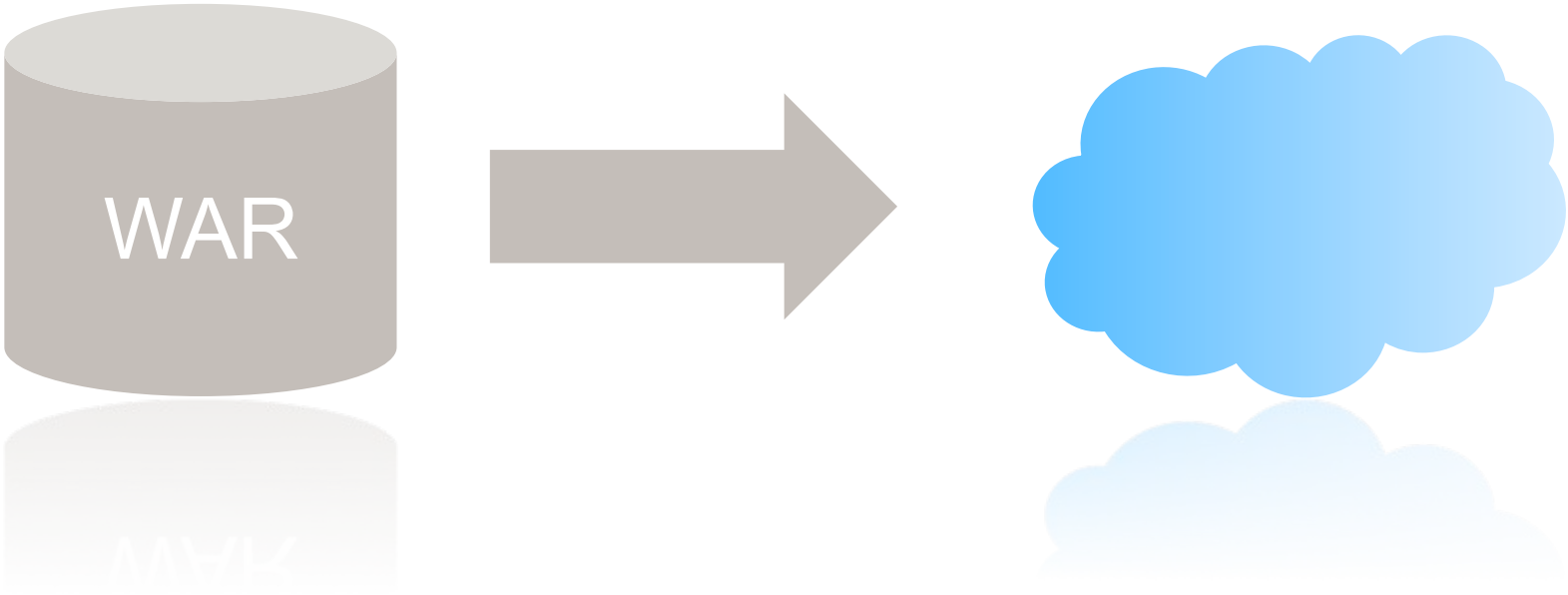
Why Cloud ? Platform of the Next Generation

- Based on cheap commodity technologies
- No costly high available hardware
- Individual server may fail
- Network may fail

- But:
- Data and application can be held redundantly in multiple data centers
- Automatic distribution
- Starting new computers trivial

- Cheap systems with high availability and high data durability
- Just like Google, Amazon, Facebook...
- Needs different architectures

What this is all about...



So, let me get started

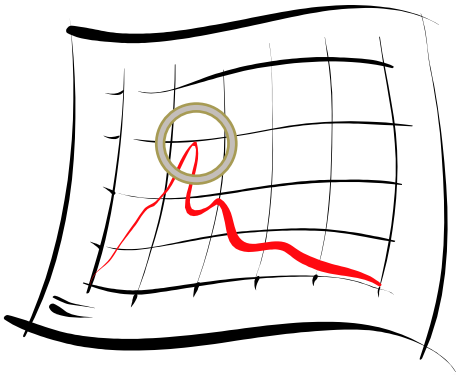
- Get an account at an IaaS provider
- …or virtualize your data center and create a self service portal

- Install your (Java EE) environment
- Install your (Java) application
- Done

- Wow, that was easy!

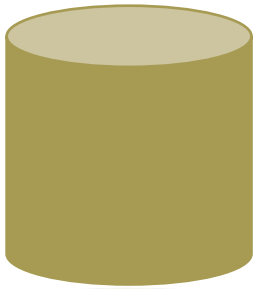
That is not enough

- How do you deal with peaks? Need more app server instances
- The server instances must be shut down after the peak
- …otherwise you would pay for them
- Traditional middleware does not allow for that
- Elastic scaling



- RBMS prefer scale up (larger server)
- In the cloud it is easier to scale out (more server)
- That is why Amazon and Google use NoSQL / key-value stores

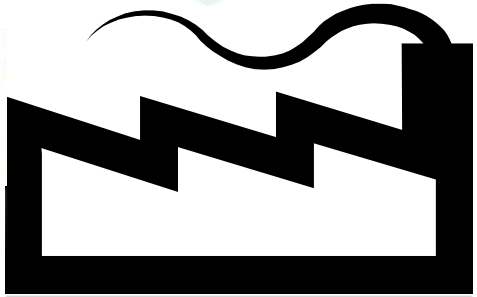
- Map / Reduce for analyzing large data sets



What you will eventually come up with

- A tool to take an Application
- …and create a VM with all needed infrastructure etc
- Dynamically i.e. scale up and down

- Need tools to
  - Install software
  - Manage infrastructure
  - Configure infrastructure
  - Set up user etc
  - Puppet, Chef etc.



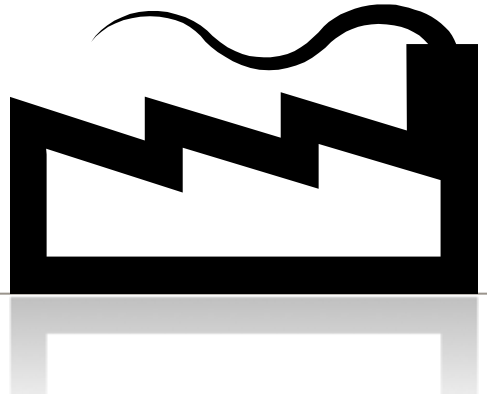
- Like a factory for VMs
- Works on Private Cloud, Public Cloud or your local machine
- Vagrant for local environments

So…

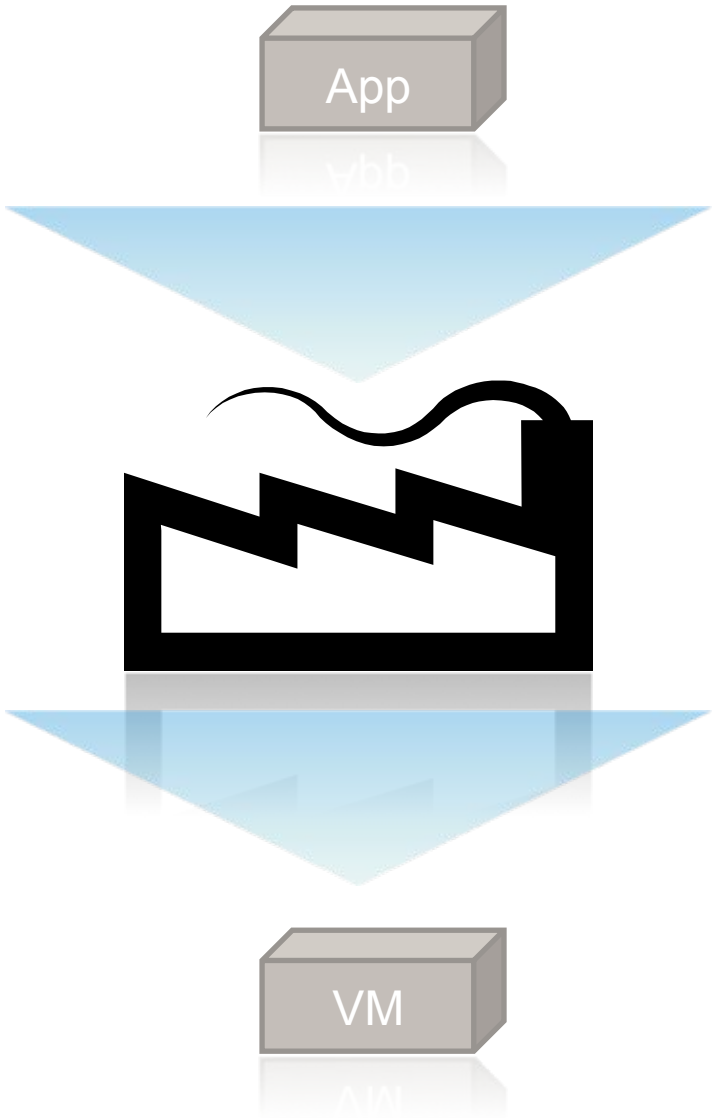
- Very flexible
- Works for any IaaS and any software to be installed
- Works for complex environments with many infrastructure pieces
  - Install a database server, some Tomcats, a load balancer and a cache server
  - Install your own and totally proprietary special solution
  - Fine tune all the parameters
- Can deploy different parts of the application to special nodes

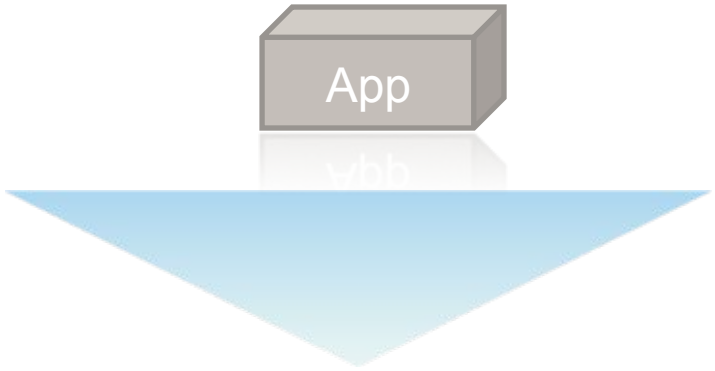
- But often developers just want a platform to run applications on
- No fine tuning

- Also: Developers need other non-Java-EE services



Not just automated…





PaaS

PaaS

- Platform as a service (PaaS) is the delivery of a computing platform and solution stack as a service.

PaaS: Advantages and Disadvantages

- Advantages
  - More useful than IaaS: You would need to install a server anyway
  - Automatic scaling
    - Resources automatically added
  - Can offer additional service
    - Tuned for Cloud
    - Technical e.g. data store, messaging, GUI elements
    - …but IaaS does the same (Amazon)
- Disadvantages
  - Less flexible
    - Pre-defined programming model
    - Defines environment
  - Programming model might be different
    - Hard to port existing code
    - Need to learn

Google App Engine

Google App Engine

- Pioneer: Very early in the market
- Very restrictive environment
  - Java classes white list
  - Limited sandbox
  - Focus on NoSQL while typical Java applications use RDBMS
  - Limit on start up time of application etc
  - Limit on response time (30 seconds)
  - No control or access to operating system
  - Not even the web server
- So specialized frameworks have been created (Gaelyk for Groovy)
- Benefits?

Amazon Elastic Beanstalk

Amazon Web Services

- Collection of Cloud Offerings (mostly IaaS)
- Elastic Compute Cloud (EC2)
- Elastic Map Reduce
- Auto Scaling
- SimpleDB : Big Table like NoSQL database
- Simple Queue Service (SQS)
- Simple Notification Service (SNS)
- Simple Email Service (SES)
- Virtual Private Cloud (VPC)
- Simple Storage Service (S3)
- Elastic Block Storage (EBS)

- Third party offerings like https://mongohq.com/ for MongoDB and https://cloudant.com/ for CouchDB

Amazon Elastic BeanStalk

- Based on the Amazon EC2 infrastructure
- …and Auto Scaling and S3
- Add Linux, OpenJDK, Tomcat

- Currently in beta
- …and only in US-East

- Eclipse Plug In available
- Supports version handling of applications
- Supports elastic scaling depending on load indicators
- Simple Monitoring built in
- Detailed control over the environment (Tomcat parameters, used AMIs, log in to machine etc.)

Amazon Elastic BeanStalk

- Access to Tomcat logs etc.
- Access to the OS
- Fine tuning of Tomcat parameters possible
- Easy, yet powerful

- Videos to get started
- Demo application based on Spring
  - Uses also S3 (storage) and Simple Notification Service (SNS)

- Add Relational Database Service (RDS) for enterprise scale MySQL
- …and all the other Amazon Web Services (AWS)

Amazon Elastic BeanStalk

- Much like your average Enterprise Java environment
- =Tomcat + RDBMS

- Cloud features like elastic scaling available
- Can easily add other AWS elements
- Runs on a proven environment

- But: 1 server = 1 virtual machine
- GAE can run multiple applications on one machine
- More cost efficient (?)

CloudBees

CloudBees: DEV@Cloud

- In fact two services: DEV@Cloud and RUN@Cloud
- DEV@Cloud: Developer services
- Continuous Integration (Jenkins)
  - Good application of the Cloud: Peaks and high load only during working hours
  - Standardized and universally applicable service
  - Some Essentials Plug Ins in free version
  - More in Base / Pro / Enterprise pay version
  - Also more parallel build in pay version
  - …and faster build machines
- Git / SVN / Maven repository
- Potentially other services

CloudBees: DEV@Cloud Eco System

- JFrog (Artifactory) as a binary repository
- Sauce Labs manual and Selenium-driven cross-browser testing on the Cloud
- SonarSource for Sonar in the Cloud
- Cloudant CouchDB in the Cloud
- NewRelic Monitoring and performance management

CloudBees: RUN@Cloud

- Tomcat on EC2
- Easily deploy a WAR
  - either by web interface
  - or command line utility (bees SDK)

- Free with 128MB per app and five apps
- Paid for with elastic scaling
- Simple monitoring (web / command line)

- MySQL database
  - Rather simple (i.e. just one server, but backup included)
  - 2GB on a shared database
  - Could use Amazon RDS instead

VMware Cloud Foundry

VMware Cloud Foundry

- Open Source
  - At GitHub under Apache2 license
- Pretty new
  - No commercial offering yet
  - Hosted at cloudfoundry.com, currently closed beta
- Can run Java, Ruby and Node.js
  - Spring, Grails, Scala / Lift, Rails, Sinatra & Node supported
  - Erlang, PHP, Python, Play created by communitay
  - Support for other languages currently in development by the community
- Can be hosted anywhere
  - IaaS integration is not part of the open-sourced components
- Eclipse Plug In available
- Supports elastic scaling depending on load indicators
  - Well… you can build it ☺

VMware Cloud Foundry

- Much like your average Enterprise Java environment
  - =Tomcat + RDBMS
- Cloud features like elastic scaling available
- Runs on a proven environment (Ubuntu)
- Allows access to Tomcat's log files
- 1 virtual machine = n servers

VMware Cloud Foundry Services

- Relational Database Service (MySQL)
- Key-Value Store (Redis)
- Document Store (mongoDB)
- Messaging Service (RabbitMQ)

- More to come in the future

- API to build your own service

* Proprietary API

Cloud

- Cloud is interesting because
  - Economics
  - Business Agility
  - Platform of the Future
- Google App Engine is the pioneer but now outdated
- Amazon Beanstalk: Standing on the shoulders of giants
- CloudBees: Developer Focus
- Cloud Foundry: Open Source platform with a lot of innovation

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- Teilnahme am adesso-Stand möglich!

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