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## Seminar in Cloud Computing IaaS Systems

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# Affidavit

I hereby declare that the following dissertation "Put your thesis title here" has been written only by the undersigned and without any assistance from third parties.

Furthermore, I confirm that no sources have been used in the preparation of this thesis other than those indicated in the thesis itself.

Linz, on November 14, 2015

Markus Hiesmair

# Acknowledgment

# Summary

Summary ...

# **Abstract**

Abstract ...

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# Abbreviations

**IaaS** Infrastructure as a Service

**PaaS** Platform as a Service

**SaaS** Software as a Service

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## Chapter 1

# Introduction

### 1.1 Overview on Cloud computing

Nowadays software isn't just installed on an arbitrary computer for a specific user who can fulfil his given requirements by solving a task with it. Quite the contrary is the case as the significance of software has increased dramatically throughout any kind of business sector. The demand on software products these days is immense and therefore also the complexity and variety has experienced a huge growth over the last decade. Many years ago the Internet built up the fundament of accessing and sharing information worldwide and today applications and services, relying on complex and huge software ecosystems, give people around the globe the opportunity to use them any time and anywhere they want to satisfy their needs. To make this work this obviously needs a lot of resources accessible in the global network.

Here the famous and hyped term "Cloud computing", which describes the process of moving application and services to the internet (due to the schematic metaphor also denotes as "cloud"), comes into play. [1] In such intensive businesses with rare resources as we have it nowadays people have to concentrate on their specific tasks to be as productive, competitive and flexible as possible. Cloud computing supports this by providing a pool of resources allowing for sharing and scalable deployment of services, as needed, from almost any location, and for which the customer can be billed based on actual usage. [1]

How these resources are provided and shared depends on the specific requirements and can vary. Due to the common patterns of usages some different cloud types describing the strategy have established over time. [1]

- **Private Cloud:** The sharing of resources stays in-house and a specific organization is responsible for operating and maintaining the cloud infrastructure.

- **Community Cloud:** Several organizations having a common interest operate and maintain the shared cloud infrastructure. For the participating organizations such a solution can be very cheap if they agree on the community model.
- **Public Cloud:** An organization renting the cloud infrastructure from a specific provider who is responsible for it. The infrastructure is publicly available on a commercial basis.
- **Hybrid Cloud:** This is a mixture of the other existing types which can be tailored based on the concrete requirements for optimizing productivity. This can be for instance used if some data should be necessarily kept in-house and the rest could be outsourced in a Public Cloud.

Over the years different service models depending on the type of the provided resource have been established. Basically they can be divided into three different types organized in a cloud computing stack with increasing abstraction level bottom-up.

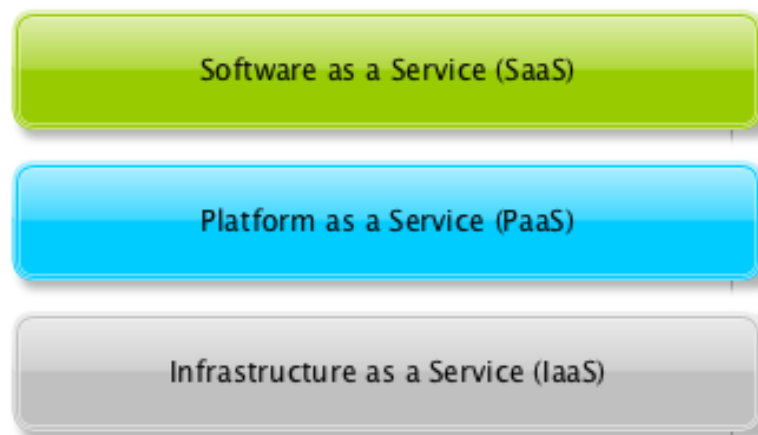


Figure 1.1: Stack of service models

**IaaS** basically means providing a shared pool of compute, storage and networking resources to end-users on a self-service basis. [2] This should help the end-users avoiding additional costs by buying dedicated hardware and setting up the instances to run their applications. They can easily manage and control the systems, in terms of operating system, network connectivity and storage and applications running on these instances but do not have to care about controlling and maintaining the cloud infrastructure. [1]

**PaaS** as the name already indicates provides the whole platform "out-of-the-box" to the end-user. This includes things like the operating system or network connectivity which

are completely managed by the provider. The user only has to deploy her applications to the cloud. [1]

**SaaS** abstracts the platform and infrastructure and serves the software living in the cloud as a usable service to the end-user. [1] This gives users instant access to such software without any special requirements such as downloading or installing and enables cross-platform as well as cross-device possibility.

## **Chapter 2**

# **Related Work**

## **Chapter 3**

# **Technical Details**

### **3.1 Load Balancing**

### **3.2 Resilience Planning**

### **3.3 Backup Strategies**

### **3.4 Monitoring**

## Chapter 4

# Results and Discussion

We have already looked at the details of IaaS and how it works technically. Now it's time to give you some insights how such cloud infrastructures are implemented in real life and how resources can be provided and used by the consumers. Therefore we want to illustrate some concrete representatives who are operating as a successful IaaS provider in practice in the following chapter.

### 4.1 Amazon Elastic Compute Cloud (Amazon EC2)

#### 4.1.1 A first glance on Amazon's world

Amazon EC2 is part of the big Cloud Platform of the famous and globally well-known internet company Amazon.com, Inc., namely Amazon Web Services (AWS). AWS started offering IT infrastructure services to businesses using this Cloud computing model already in 2006. Today it's probably the most popular representative in this kind of IT sector offering highly reliable, scalable and low-cost infrastructure platform in the cloud used by a huge number of businesses in currently 190 countries around the world. They emphasize and try to implement the several benefits Cloud computing brings with it. Consumers should avoid high initial costs to get their infrastructure running, instead a variable cost model with a pay-as-you-go price model should make their work much more cost-effective. Furthermore setting up and maintaining infrastructure components should not be a common task businesses should care about. In contrast the focus should be set on the major issues regarding the concrete business and infrastructure capacity can be provided by AWS with just a click on-demand. AWS truly offers a broad variety of several different services distinguished by its provided resource type. A typical key benefit someone often face when talking about and using AWS is the perfect interoperability of all the platform components comprising it. That's probably a major point

what makes AWS so beloved by customers around the globe. Next to storage(Amazon S3) or networking (Amazon VPC) compute resources, managed by Amazon EC2 are essential to every business as these are the physical machines services need to be alive. [3]

#### 4.1.2 EC2 Insights

Amazon EC2 is designed for web and system administrators to make their lives easier. It provides easy manageable compute capacity available in the cloud. Via a web interface the administrator can request more or less capacity with just a few clicks within minutes. Some more minutes later the required instances are fully set-up with the desires of the user and ready-to-go. This allows the user to scale up and down (which means renting more or compute capacity) on the fly depending on the current demand and without any need to configure them manually. To give this explanation further importance and motivate why Amazon EC2 is the right choice for so many businesses, we want to look at some key benefits this cloud technology introduces in contrast to buying just traditional dedicated hardware at the provider of your trust.



## **Chapter 5**

# **Conclusions and Future Work**