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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 15, 2015

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Acknowledgment

Summary

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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 commerical 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. Bascially they can be divided into three different types organized in a cloud computing stack with increasing abstraction level bottom-up.

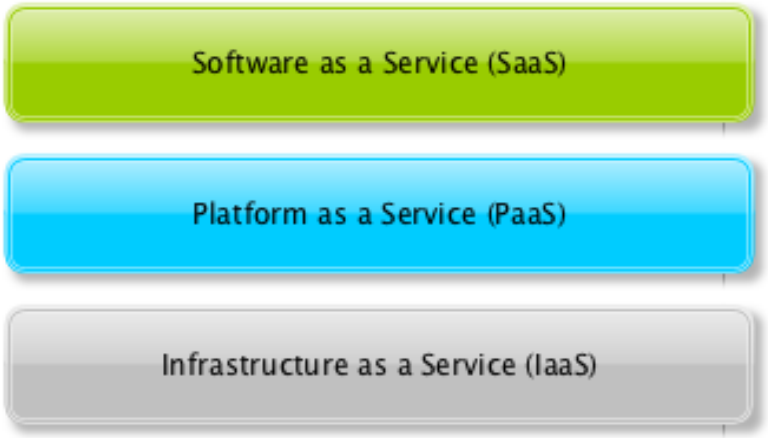

Figure 1.1: Stack of service models

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

Advantages and Disadvantages of Cloud Computing Systems

The classical approach of deploying software, which was the case before the invention of cloud computing, is called ”Dedicated Hardware”. Using this approach companies buy hardware on their own which is dedicated only for the intended software, which should run on it. To provide a good level of service, usually companies buy hardware which can handle worst case scenarios and load peaks [1].

The problem of this approach is, that if the system runs on average work load, the full hardware capacities are not used and therefore resources are wasted (e.g. CPU cycles, storage space or RAM). If there are peaks in the work load this can result in a huge waste of resources or in a poor service of the software, if the hardware is not designed for such high peaks. Figure 2.1 shows some of these problems [1].

In cloud computing this waste of resources can be prevented by dynamically assigning resources when needed. For example, if the cloud computing system identifies that there is an overload, it can just add another virtual machine which can also handle requests. Later if there is less workload this VM can be shutdown and the available resources can

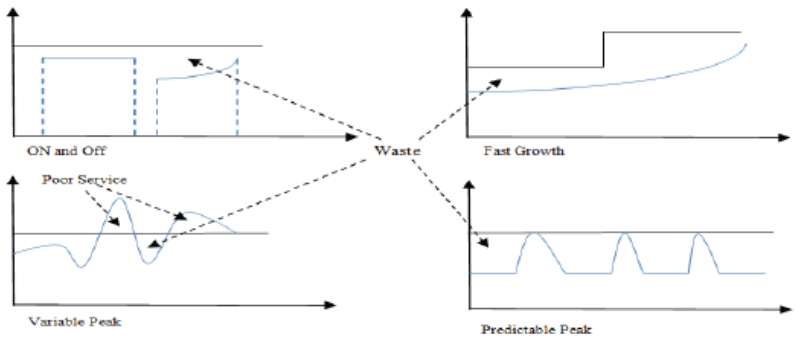

Figure 2.1: Dedicated Hardware Model - Utilization Waste [1]

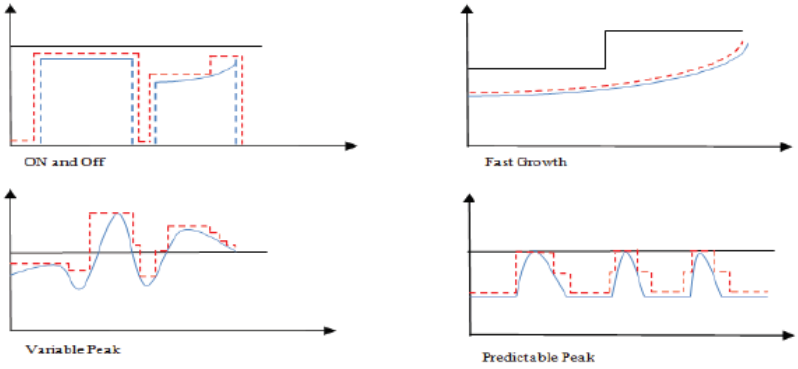

Figure 2.2: Cloud Computing Model - Dynamic Resources [1]

be used for other services. Figure 2.2 shows the dynamic resource allocation of cloud computing [1].

Another advantage is, that the cloud computing user does not have to care about backing up data, load balancing and resilience planning and still has highly scale-able and highly available applications.

Probably the only disadvantage is, that you have to fully trust the cloud computing provider, because the every system acts like a black box. This means that the user does not know where the applications and data are stored, how they are protected against unauthorized access. So for high sensitive data, (e.g. online banking systems) cloud computing is probably not a good choice.

Chapter 3

Technical Details

3.1 Load Balancing

3.2 Resilience Planning

3.3 Backup Strategies

3.4 Monitoring

Chapter 4

Results and Discussion

Chapter 5

Conclusions and Future Work

Bibliography

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