

A Review of Cloud Computing Service Models

Agam Srivastava, Animesh Ojha, Archana Shaji, Arti Sharma, Rashmi Pandey

Department of Computer Science, ITM Gwalior, Madhya Pradesh, India

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ABSTRACT

Cloud computing provides an infrastructure to process all types of data resources and also used for computing the data resources. It provides a good environment to work with data of large amounts. Despite all the technologies it has become the most important technology of the 21st century.

In IT departments it focuses on strategic projects rather than to keep the data in running form. By understanding the solitary attributes and deliberation linked to each model. Any business or company can use it to take selective decision when they will worry about to select most profitable cloud computing for the maximum and specified requirement and ambition or intention.

In this research paper we will present a comprehensive review on the different types of cloud computing services model. These models are used to provide intuition for consortium and to make decision- creator to purchase cloud technology. We are also discussing about the benefits, characteristics and comparison among IaaS, PaaS and SaaS.

Keywords : SaaS, IaaS, PaaS, VLAN, Security

I. INTRODUCTION

The word “cloud” in cloud computing can be define as like in real world clouds which are the collection of water and different types of molecules in same way “cloud” in cloud computing is the collection of networks.[1]

Whenever demanded the user can use the procedures of cloud computing Limitlessly Rather than creating their own set up for this.

There is a required mediator to provide the services of the internet in cloud computing. Cloud computing was

developed by Josephcarl Robnett Licklider in 1960s to make a communication or to interact between the data from in any place at any time, it was developed for his work on ARPSNET. Later in 1983 a small amount of space in disk is presented by CompuServe that was in used to stockpile any files which they chose to upload it.

The internet works with a pricing of pay-as-you-go which is simply mean by that cloud computing is used

by the purpose of storing and retrieving the data and programs from internet in place of by the use of the hard disk of any computer cloud computing indicates two servers one is the application delivered as services over the internet and second one is the hardware and the system software, both services has been cited to as Software-As-a-Service (SaaS) some retailer use term such as IaaS (infrastructure as a Service) and PaaS (Platform-As a Service)

This technology has become popular because of its consumers and business alike to provide benefits to people including to provide easier access with lower cost and by a reducing the management cost.

In a technical definition of cloud computing clouds have 5 desideratum - mannerism:

On-demand self-service

1. Broad network access
2. Resource pooling
3. Rapid elasticity
4. Measured services

Service Model Types

In this research paper we are going to discuss about the different types of services models and their classification according to their characteristics and their behaviour:

Three types of service models are as follows:[2]

- Infrastructure-as-a-service (IaaS)
- Software-as-a-service (SaaS)
- Platform-as-a-service (PaaS)

Infrastructure-as-service: Infrastructure-as-a-service provides access to physical machines, virtual machines, and virtual storage. It offers virtual LAN (VLANs) that is it provides network devices, IP address, software bundles, load balancers and disk storage. The virtual machines are operated by a technique or device known as hypervisor. Amazon web services, Google compute engine are the examples of the company that provide IaaS services.

IaaS services can be purchased on demand by paying for the time and resource you used it for.

Benefits of IaaS:

1. Using IaaS, cloud provider can freely locate infrastructure over the internet in cost-effective manner.
2. Global accessibility.
3. Easy integration of devices.
4. Scalability is easy.
5. Availability is high.
6. Flexibility
7. Full Control to virtual machine.
8. The virtual machines communicate with the help of hypervisor and then the hypervisor communicates with the computer.

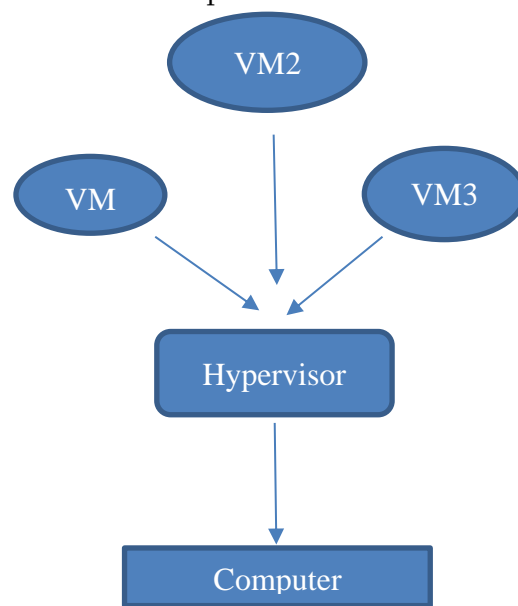


Figure:1

Figure 1- Virtual-hypervisor communication.

This figure illustrates the communication between virtual machines and hypervisor and between hypervisor and computer.

Various virtual machines are supported by the hypervisor to provide services to the user.

Characteristics of IaaS: - [3]

1. Pre-Installed software.
2. Pre-Installed Operating System.
3. Resources on demand.
4. Multiple copy of data.
5. Scalability of computing.

6. Issues related to IaaS: -
7. Compatibility: Consumer need to use only legacy software so this may increase the cost.
8. Virtual Machines: It is mismatched between virtual machine security and cloud provider security version.
9. Robustness: Splitting of single system resource into multiple virtual machines.
10. Data Deletion: If client deletes the data, then provider should also delete it permanently.

Software-as-a-service (SaaS): Software-as-a-service is a layer three among the services provide by cloud. It offers software application as a service to user through online medium. [4] It provides applications like CRM (Customer Relationship Management), Example of CRM application is Sales force, Help desk, HR (Human Resource) solution, billing and invoicing. In software-as-service maintenance in done by vendor. User do not have to install or download the software on their machines. Software-as-a-service reduces the cost of hardware and the maintenance of the machine. It is generally used by end users.

Benefits of SaaS: --

1. We will get modern software to use.
2. We will provide platform independence to the user.
3. Efficient use of software licenses by the client.
4. Multitenant solution.
5. Centralized management.
6. It is cost effective (pay-as-per-use by the client).
7. Scalability.

Characteristics of SaaS: - [5]

1. It is providing ability of software over the internet.
2. In this maintenance of software is done by vendor and user do not have worry about upgradation of software.
3. User have subscription or usage-based licenses.
4. On demand Availability that is it is available anywhere, anytime for the client they just need to have internet connection.
5. Works on shared model.
6. Client get to work on the latest version of software.

Issues of SaaS: -

1. Browser based risk: A user working on its browser via internet and if visit unwanted website then its harmful code installed or attached to the browser then it access the software on cloud. Then the file may get infected by the code.
2. Network Dependence: Software availability is dependent on interconnection that is a continuous internet connection is required.
3. Portability issue: Among different SaaS cloud, if user's work is on one cloud and if they want to access their work through other cloud then portability issues occur.
4. Application that requires extensive customization are not good candidate for SaaS, typically this includes most complex core business application that will not be the best suit for SaaS.

Platform-as-a-Service: Platform-as-a-Service offers runtime environment for the application which means it provide platform to develop application. Here the platform is a computing platform, computing platform is a certain hardware architecture, operating system and libraries. User can easily use these facilities to build web application. Google App Engine, Force.com are some examples of the PaaS service provider [6]. These services are hosted on cloud and accessed by user through web browser. In PaaS, user do not have any control over infrastructure. User will interact with the UI only and OS is provided by vendor. Software and Hardware are managed by the PaaS provider.

Benefits of PaaS: -

1. Cost effective (pay as per use).
2. No need to purchase expensive servers, software or data storage devices.
3. We can scale up or scale down anytime as per the requirement.
4. Software management (that means update or switch to new software) manage by provider.
5. Easy deployment of web application also.
6. Administration is done by cloud provider.

Characteristics of PaaS: -

1. Browser based environment for the development of application.
2. It gives secure and scalable web services.
3. Easy workflow and approval process.
4. Easy integration with other application.

Issue in PaaS: -

1. Portability issue among PaaS cloud provider.
2. Event based processor scheduling.
3. Security is major issue, latest cryptographic algo should be used.

Conclusion:

According to the review of the all 3 types of different services models – SaaS, PaaS and SaaS all have their own different merits and de-merits on the basis of the explanation above about all the three Services models:

1. **Control:** when it comes to control over the infrastructure IaaS offers it. Any user can customize their environment according to their need and they also have access to underlying of the virtual resources, while in PaaS users are required to access a pre-built platform for the development of applications so it offers less control over it [9].

In SaaS users only have the access to the applications not the infrastructure of underlying so it has least control.

2. **Flexibility:** flexibility depends when user can construct their own virtual machines and operating system also has the flexibility to make the scale up and down needed accordingly.

IaaS offers the most flexibility.

When the user has limitation to the tools and environment assigned by platform it has less flexibility.

PaaS offers less flexibility. And SaaS has the least flexibility.

Responsibility for security: In the IaaS model, the customer is responsible for securing the virtual machines, operating systems, and applications they deploy on the cloud infrastructure. In the PaaS model, the provider takes on more responsibility for securing the platform and underlying infrastructure, but the

customer is still responsible for securing their own applications and data. In the SaaS model, the provider is responsible for securing the entire application and infrastructure stack.

Customizability: In the IaaS model, customers have more control over the security configuration of their infrastructure, which allows them to implement more granular security policies. In the PaaS model, customers have less control over the underlying infrastructure, but the platform is typically designed with security in mind, so there are fewer customization options. In the SaaS model, customers have very little control over the security configuration of the application.

Compliance: In all cloud service models, compliance with industry standards and regulations is a shared responsibility between the provider and the customer. In the PaaS model, providers typically offer compliance controls and tools to help customers meet their compliance requirements.

Data protection: Data protection is a critical security consideration in all cloud service models. In the PaaS model, data protection is typically a shared responsibility between the provider and the customer. Providers may offer encryption at rest and in transit, access controls, and data backup and recovery services to help customers protect their data.

Overall, the PaaS model offers a good balance between security and ease of use. PaaS providers typically have robust security controls in place to protect their platforms and the data and applications stored on them, but customers still have some responsibility for securing their own applications and data. PaaS customers also benefit from the pre-built platform and services that make it easier to develop, test, deploy, and manage applications securely.

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