

## A COMPARATIVE ANALYSIS OF THE CLOUD COMPUTING SERVICE MODEL

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### ABSTRACT

Due to the numerous security flaws in cloud computing, researchers have forced to concentrate on winning consumers over to cloud computing. This paper outlines the software program security risks associated with each of the service models: infrastructure as a service (IaaS), platform as a service (PaaS), and service as a service (SaaS). A comparison analysis of three service models was also provided, with performance being evaluated based on particular criteria including features, general control levels, and consumer, provider, and consumer activity.

### I. INTRODUCTION

The two primary components of cloud computing technology are software and hardware resources. They need to have storage, CPU, specialized apps, and a ton of other things. which are offered to users as a service that requires money and that you may access online. These resources have the ability to provide clients with both upward and downward scaling of demand. The cloud computing characteristics that include payroll, high scalability, user-friendliness, decreased risk, and cost maintenance are also included. John McCarthy began providing utilities such as gas, water, and electricity to future guests in 1960. Any Time Machine networks established the concept of the "cloud" in 1990. Google CEO Eric Schmidt offers users a service in 2006 that allows users to see a detailed online business replica. Thus, starting in 2006, the cloud computing concept gained popularity and excitement in brand names, defining numerous other facts. The three primary categories of cloud computing services are as follows: SaaS, PaaS, and IaaS.

#### 1. Saas (software as a service)

##### SaaS technology review:

This solution is designed to rent and use the application without requiring the user to install it on their own computer. With the client's permission, this application will be used in Internet Explorer and Google Chrome. Software as a service (SaaS) is a platform development activity that is supported by the PAAS layer. Applications developed by cloud developers are able to manage and approach SaaS applications that are connected to end-to-end user scenarios with ease. The supplier is in charge of managing and controlling the infrastructure. Few clients used configuration, and those that did were limited to using a set of preset configuration settings to personalize their apps. Heavy-duty applications can be obtained in the best possible methods with the SaaS paradigm. The issue with the SaaS model is that it is a Slowing Network Model, which causes data processing to lag when it is being used heavily, like in the case of 3D gaming material. While some applications charge users based on usage, this one only costs a nominal price each time.

##### One of the benefits of SaaS technology is:

The benefits of the SaaS model are listed below:

1. Software licensing will be less expensive.
2. Cloud computing technology enables users to execute a SaaS application simultaneously and to switch it across one or more clients.
3. It will restrict and regulate SaaS application use, which will have an impact on the providers' accountability.
4. No infrastructure is needed. since it makes use of the cloud's own infrastructure.
4. Applications built on the SaaS model can be configured using an API; however, they cannot be modified in their entirety.

**SaaS technology security:**

Customers under the SaaS model depend on service providers to offer adequate security. The security concerns associated with SaaS are strikingly similar to those of web applications.

Data Protection Users must transmit data online in order for it to be stored or retained in the cloud. As a result, data should be protected using efficient encryption techniques, and data access should be authorized and verified using different techniques.

**2. Paas or platform as a service**

**PaaS technology review:**

Without having to set up or maintain a development environment, it offers developers an easy platform or environment to create software for the PaaS network. Customers can rent virtualized servers and extra services from PaaS in order to run, test, and upgrade applications. Customers have control for the programs they use and their settings, but they do not have control over surroundings like servers, networks, storage, or operations. The following criteria will be used to determine service costs: data transmission per gigabyte, model usage per hour, input/output per million requests, and storage consumption.

**Benefits of PaaS technology include:**

The benefits of the PaaS model are listed below:

1. Decrease server load and streamline the development process.
2. Direct translation sent.
3. Offer safety and reinstallation together with security.
4. Cut expenses by leasing tangible assets and do away with the requirement for process management specialists.
5. The ability to adjust to changes in the surroundings is known as adaptability.
5. Because PaaS operates on a one-to-many model, several developers can collaborate on the same project.

**PaaS technology security:**

Security concerns with PaaS are a big deal and fall under the purview of both suppliers and developers. It will be the responsibility of developers to maintain their own systems, and that of service providers to manage their computing and web development platforms. With the PaaS approach, developers are not able to access the cloud's vital infrastructure. As a result, the cloud developer must ensure that specific application is protected. The PaaS model's development tools are used in the creation of SaaS applications. Developers are uncertain about the security of tools created by PaaS, despite having control over their apps.

**3. IaaS or infrastructure as a service**

**An analysis of IaaS technologies.**

Through web services, it offers virtual machinery and raw materials for building, controlling, and destroying virtual machines and storage. As a result of the rise of popular virtual private servers during the past few years, the IaaS concept was created. IaaS companies give their clients access to virtual servers and one or more CPUs with a range of processing capabilities. You can rent virtual computers for one hour or for as long as you require. Depending on the demands of the customer, infrastructure resources can be scaled up or down. The customer will be billed according to the cost, time, and extra services used to generate the virtual machines. A virtual private network (VPN) is one way that some providers enable VR to connect to a partner business, turning it into a scalable IT system. The three primary services that bear the most of the blame are those that manage, host, and operate client infrastructure. Customers have control over the operating system, applications used, memory, storage, CPU, and some restricted network resources. Almost the same implementation costs apply to PaaS.

**IaaS technology benefits:**

The benefits of the PaaS model are listed below:

1. Clients are able to adjust the process to their needs.
2. Clients can use virtual computers since virtualization is offered as a service.
3. Network as a service, which consists of hardware for firewalls, routers, and load balancing.

4. Lower the price of hardware and human resources.
5. Lowering entry barriers and the risk-adjusted investment returns.
6. Streamlining and scaling automatically.

**IaaS technology security:**

The virtualization manager lacks security, and the IaaS standard offers strong security management. Additionally, while a virtual machine can theoretically address these difficulties, there will still be some security concerns in real-world applications. The integrity of the data kept by the hardware supplier will be another crucial consideration. Regardless of the data's physical location, giving the data owner maximum control over their data will become crucial as "everything" in the information society becomes more and more virtual. It takes the application of numerous technologies to provide cloud computing with the highest level of security and dependability. It is the customer's responsibility to guarantee the security of all IT-related information, data, and processes.

## II. CONCLUSION

We look at three different kinds of cloud services in this article: SaaS, PaaS, and IaaS. The security concerns, benefits of each model, and a comparison of them are all covered in this article. This comparison analysis assists cloud users in determining the kind of service they require and the level of risk associated with each model.

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