

A Brief Analysis of Cloud Computing Infrastructure as a Service (IaaS)

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Abstract:- Cloud computing is a rapidly growing technology in every field. Cloud architecture help and assures to remove expensive and heavy computer hardware maintenance. Cloud architecture introduces an IT environment to create a remote infrastructure which is scalable and measure resources. It is used as a service over the internet. It provides cloud services to the users with full reliability, flexibility, and scalability. In this paper, I will cover all the cloud computing concepts, its services and brief analysis of Cloud Infrastructure as a Service. In cloud computing infrastructure as a Services vendor provide the resources in form of infrastructure user just pay and start their work on it and develop applications or any development project which required heavy system to develop such kind of systems.

Keywords:- Cloud Computing; Cloud Services; Infrastructure as a Service; IaaS Workloads; IaaS Network;

I. INTRODUCTION

Cloud computing is an advanced field with a lot of flexibility and reliable on-demand computing resources. In cloud computing, consumers can easily connect from anywhere and anytime and access cloud resources via the internet. All these resources are managed in a flexible way. Cloud computing is a model of enabling technologies that provide facilities of on-demand network access and cloud computing resources that are in different forms for example (network, server, storage, application, services) [1].

There are different types of cloud computing models which are private, public, hybrid and community cloud [2]. According to these models, the cloud provides the services which are Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS). As I describe the topic of discussion is Infrastructure as a Service (IaaS) which is the most basic cloud computing model. It is a set of a complete package provided virtual resources from a cloud service provider. On this infrastructure user can install their own software by using these virtual resources. IaaS vendor creates a hardware utility service where the consumer uses virtual resources according to their requirements.

A. Understanding of Infrastructure as a Service

Infrastructure as a Service provides the basic fundamentals of computing resources such as processing, network, storage, and applications [2]. In IaaS users can

easily run the different software applications and operating systems. In the cloud infrastructure service underlying network managed by the cloud service provider but the overlying infrastructure such as the operating system and the software applications managed and control by the user [3] – [4]. The given figure - 1 explains the IaaS network Users can install multiple operating systems on the virtual machine images. In this way, user can pay on the basis of the allocated resources.

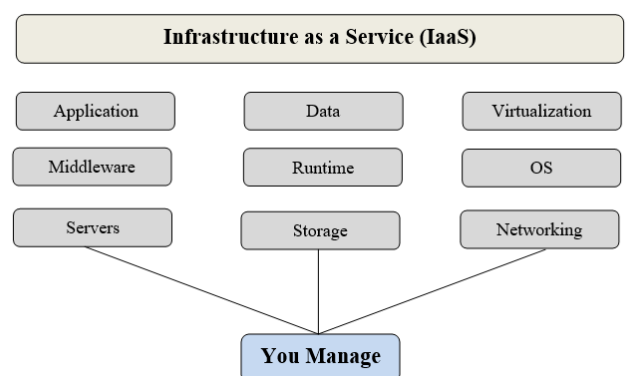


Fig 1: IaaS service network

IaaS model components include Computer Hardware, Network and Internet Connections, Platform Virtualization Cloud Storage, Cloud Software, Utility Computing and Service Level Agreement (SLA). IaaS Communicate with developers to create Virtual private servers, Virtual private storage and Virtual private networks. In IaaS all virtual resources are mapped on the physical system. When the consumer interacts with IaaS service, it requests the resources from the virtual system and these requests are directly forward to the real server which actually works on the user requests.

B. IaaS Security Model

The security model for IaaS is a complete guide for enhancing the security of each level of the IaaS model as shown in the figure – 2 IaaS components of the security model and restriction level. The given figure - 2 front side shows the components – [5]. In this model the three security entities covers the whole components of IaaS. The first entity is the Secure Configure Policy which provides the guarantee of a secure configuration of each component which means each layer in the IaaS either hardware or software is secured. Secured management policy controls the management roles

of each layer of the security model [5] – [7]. The third and the last entity are the Security Policy Monitoring and Auditing which is responsible for the system life cycle. So all these layers are securing the IaaS security of cloud computing.

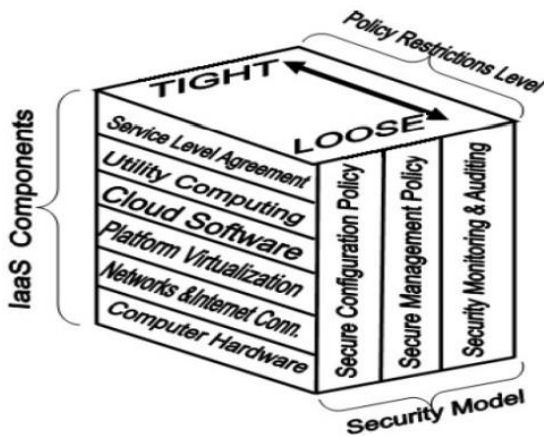


Fig. 2 IaaS Security Model [5]

There are some major security challenges in cloud computing security such as Third Party Handling Data, Cyber Attack, Insider Attack, Government Intrusion, Lack of Standardization, Data Integrity, Lack of transparency and Insecure API's. As the advancement Of every technology, these challenges are faced and resolved time to time. Cloud Computing provider also focus on all these challenges and resolve these issue.

II. REVIEW OF CLOUD IAAS PROVIDERS

Today, many cloud providers exist that are providing their IaaS services for the public as well as the private clouds. Several providers are available for this purpose including some well-known service providers such as Amazon Web Services (AWS), Rackspace, Media Temple, Google cloud, Flexiscale, Joyent Accelerator. I have identified well-known cloud providers that provide IaaS. A brief overview of these providers is given below: [4] – [7]

A. Amazon Web Service

AWS cloud is a solution to deliver ready to use their resources as needed. AWS launched in 2006 from the internal infrastructure of Amazon.com which handles amazon online operations [6]. Amazon is one of the top companies that introduce the method of pay as you need a cloud computing model that provides users with complete infrastructure and resources as needed. Today AWS provides many cloud services which can be categorized as Compute, Storage Database, Data Management, Migration, Hybrid Cloud, Networking, Development tools, Monitoring, Security, Analytics, and Artificial Intelligence (AI).

AWS includes many tools and services to help the users to manage their data in its public cloud. Amazon also partnered with various other providers which help to develop a hybrid cloud for Amazon EC2 is the product which uses to provide IaaS service - [7].

B. Rackspace

Rackspace is a cloud computing provider that offers cloud storage, virtual private cloud, load balancers, database, and backup monitoring - [7]. Rackspace launched in 2006, as a utility computing offering. In 2011 the Rackspace cloud has become as Rackspace.com. In 2014, Rackspace has become the company that managed the cloud. Rackspace services includes Cloud files, API's, Security, Use Cases, Caveats, and Cloud Servers. Rackspace has contributed to the open-source code project which is the OpenStack under the provisioning of the Apache License. Rackspace launched the OpenStack cloud to compute service. OpenStack offering the database, server monitoring, block storage, and the virtual network in the OpenStack new control panel [13] – [15].

C. Media Temple

Media temple is a cloud service provider that provides the infrastructure for the development of web hosting and cloud hosting services. Media temple is mostly used for web designing, development, and creative content. Media temple launched GoDaddy in 2013 as a cloud web development service [17] – [19]. Media temple cloud products are Linux-based systems. Media temple offers Grid hosting, WordPress hosting, VPS hosting, Dedicated servers, Managed AWS. Media temple offers a 99.99% guarantee of its Dedicated Virtual (DV) hosting. Which includes VPS plans and also the company's hosting plan [20] – [21].

D. FlexiScale

FlexiScale cloud provides Infrastructure as a Service, delivered as a web-based control panel which allows users to access and use cloud resources according to their need. FlexiScale is one of the independent public cloud providers in Europe which provides the cloud infrastructure as a public cloud. FlexiScale is the public cloud that host on the basis of pay as you go service [20].

E. Joyent Accelerator

Joyent is basically a software services providing company which is leading in providing cloud services Infrastructure as a Service. In 2016 Joyent was acquired by Samsung. Joyent introduces a storage service in 2013 with the name of Manta [11]. For the networking vendor, Joyent introduces Riverbed which offers the networking content deliver.

III. PROPOSED AREA TO IMPROVE IAAS CLOUD SERVICE

In a cloud computing I deeply research about the Cloud Infrastructure as a Service. On the basis of the research, I purposed some solutions the IaaS services to improve some areas of the Cloud IaaS for the better resource provides to the users. The following are the proposed areas of IaaS to improve.

A. IaaS workloads

In IaaS a server is reserved for customer provisioning. Which manage the amount of cloud computing resources according to the user needs for this purpose, users can reserve a server space required for their need which can easily run

their workloads. The infrastructure of IaaS runs the servers placed in data centers that offer the services to the cloud users [17] – [18]. The main three layers of the IaaS infrastructure are the RAID storage, virtualized machines, and the interface capacity. These layers are physically systems partitioned as logical units.

B. IaaS Network

In IaaS infrastructure is assigned the private network of user. As like Amazon Elastic Computer Cloud (EC2) behaves every user has its own private separate network not only this you can develop your own private cloud that can be virtualized. Rackspace cloud computing service also follows the Amazon Web Service AWS in the IP assigning model – [19].

C. Pods

Workloads support a specific number of the users. When you reach the limit of the maximum number of virtual machines you need to make a clone for the additional support of the users. A group of them within a particular limit of a cloud computing system is called a pod. The pods are managed by the cloud computing control system (CCS). In AWS, the cloud control system is the AWS management console that manages the Amazon cloud pods [21].

D. Availability Zone.

As we discuss the pods which manage the cloud computing services. Pods also divided into pools within the IaaS region or site called the Availability zone. When a large IaaS infrastructure network pods fail to manage these networks then the zones support the cloud infrastructure to maintain the network and provides the services. In the AWS IaaS infrastructure, the availability zones organized over the company's data centers.

E. Silos

Silos are the cloud computing equivalent of the compute island which is the processing domains which are the outsides of the network infrastructure. When we create a private network within the IaaS framework then the silos help. Silos restrict the users within a certain infrastructure. Silos are responsible for the flexibility of the cloud computing system [19].

With the rapid growth of cloud computing, every organization wants its own private cloud infrastructure which means we improve the cloud computing efficiency to keep maintain and fulfills the customer's requirements. So, here are some major points which can improve cloud efficiency:

- Utilize WANOP and Load balancing
- Optimize your storage environment
- Converged Infrastructure
- Software-defined technologies
- Optimize the end-user experience
- Modernized the end-point
- Monitor and monitor
- Create better security
- Invest in more virtualization
- Automation and orchestration

These above mentioned areas and points are improved, the cloud IaaS service can deliver maximum support to the customers and achieve cloud optimization.

IV. DISCUSSION

A. Cloud IaaS benefits

- Cloud infrastructure has several benefits which includes
- Costs of building the new infrastructure resources will reduce by using the shared application resources instead of building a new infrastructure network.
 - Management of the single infrastructure is more easy and efficient than many individual network infrastructures.
 - To deploy the applications on cloud infrastructure is shorter and easy.
 - Cloud infrastructure development is easy to build your own private network in collectively you can use the cloud resources on the pay as you go basis and use as your own private cloud network.

B. Cloud IaaS and 5G

The introduction of 5G in the mobile network enables various numbers of new services that provide shorter latency and higher bandwidth in the network. Cloud-native technologies and edge computing are the cloud infrastructure in 5G [21]. Edge computing provides distributed cloud infrastructure resources close to new business opportunities. Cloud infrastructure is distributed close to the data traffic and consumed more efficient equipment installed.

C. Cloud IaaS transformation philosophy

In this age ultimately everyone needs cloud infrastructure and the 5G accelerates [20]. It ensures the cloud computing service providers to the transformation of cloud infrastructure from the physical network to a cloud environment. The main features of the cloud transformation philosophy includes System Verified, Optimized, Cloud Native and Solution Life Cycle Management.

V. CONCLUSION

Cloud computing IaaS gives an environment where the users can easily and securely build their applications and use cloud computing services based on the user requirement. So with this information, we understand what cloud computing IaaS is. In this paper, I analyze a brief introduction about the cloud computing IaaS, its benefits, and different cloud IaaS providers that provide cloud computing services especially cloud IaaS. Also, I learn what major areas are required for more research on cloud computing IaaS and discuss the cloud computing IaaS components.

Cloud computing is a different platform and have different security challenges because of its open source services which offers the researchers to more explore but I discuss an overview for our topic related things. As we all know that every technology has two affect one is the positive which leads the prosperity and the other is the negative in form of the technology security and challenges. As the same cloud computing also face the various challenges related to its security. But it is no doubt that the cloud computing is the

most advance and valuable technology of any field which it use.

Although many cloud computing platforms provide the cloud infrastructure as a service for both public and private cloud. This paper is brief details about the IaaS services. The platforms which cover more characteristics of the cloud infrastructure are more efficient.

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