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Cloud Computing : Amazon Web Services (Infrastructure on Demand)

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Abstract : ***Cloud computing is the on-demand delivery of IT infrastructure and applications via the Internet with pay-as-you-go pricing Objective. Today many start up organizations and growing organizations are thinking about reduction of their IT infrastructure, network and software cost by means of cloud technology. Cloud computing provides different services like infrastructure as a service , platform as a service and applications as a service etc. as utility services over internet which opens the new door to think in different way to meet the business challenges of IT industries. This paper describes the important of cloud computing in IT industries with comparative study of Amazon (Amazon Web Service or AWS) which is the leader in cloud computing platform.***

Keywords: IT Infrastructure, Service provider, Comparative study, On-premises, Deployment

I. INTRODUCTION

THE Cloud computing is a new trend of computing where resources like storage, computation power, network, applications etc. are delivered as services. This services are available to the customers as subscription-based model i.e. pay-as-you go. In this model, customers can get these services on their demands regardless of where these services are hosted and customers have to pay depending on their usage of services. In cloud computing, resources are made virtual and unlimited. Also, the resources can be provisioned from anywhere i.e. always available at any location. So, cloud computing is a new paradigm where we can provision resources dynamically, deploy applications, and can access platform independent services. Cloud computing, successor of internet computing, is a technology, where the concept of utility, scalability, on-demand services are incorporated.

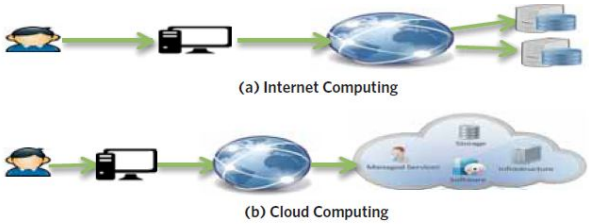

Fig. 1: "Internet Computing" vs. "Cloud Computing"

. Figure above illustrates "Internet Computing" vs. "Cloud

Computing". Defining Cloud in IT According to the U.S. National Institute of Standards and Technology (NIST), Cloud is a classical model which enable omnipresent, convenient, on-demand network access to a publicly accessible pool of configurable resources like servers, storage, network components, applications; that can be accessed, manipulated and released with minimal management effort, less cost and minimal service provider
interaction. Cloud computing can be defined by the following important properties.
On demand services: Cloud users can use services on their demands, whenever they need from any place and at any time without making any direct communication with cloud service provider.
Wide network access: Services can be accessed over the network using different devices (like laptops, mobile phones, PDA, tablets, office computer etc.). Services can be provisioned in any platform, which means cloud services are platform independent.
Pooled Resources: In cloud computing, resources are pooled together so that cloud providers can offer multi-tenant services. Multi-tenant supports multiple users to be served at a time with physical and virtual resources. These resources can be dynamically

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assigned and released according to the user's choice. Increased elasticity: There is no limit for provisioning resources via cloud. So services can be easily and quickly scale in and scale out. For example, an online shopping site uses the resources from the cloud in terms of users. Now suppose for any reason there is a hike in the number of a user on a particular day. In that particular day cloud dynamically allocates additional resources to handle the additional users. When the headcount comes down, he cloud automatically restores in its normal condition.

High Transparency: A distributed system is able to expose itself to clients and applications as if it is a single coherent computer system. For example, end-users may not have any information about the resource's exact locations but will be able to specify their preferred location.

Metered service: In cloud computing, services are measurable like other type of utility services (like electricity, water etc.) according to the usage. Cloud system provides transparent view of usage of services to the end-users as well as providers. This characteristic allows cloud users to use the services on pay-as-you go basis.

II. LEADING CLOUD PLATFORM AWS

A. Amazon web Services

AWS is a public cloud. It provides a range of IT services that can be used as building blocks for creating cutting-edge, robust, and scalable enterprise grade solutions. It can be used to host everything from simple static websites
to complex three-tier architectures, scientific applications to modern ERPs, online training to live broadcasting events (that is, sports events, political elections, and so on).

According to Gartner's Magic Quadrant, AWS is a leader in cloud IaaS AWS is way ahead of its competitors after it pioneered the cloud IaaS market in 2006.

The Magic Quadrant (MQ) is a series of market research reports published by Gartner, the United States based research and advisory firm. It aims to provide a qualitative analysis into a market, its direction, maturity, and
participants. Gartner's reports and MQs are respected in industries worldwide.

Figure 1. Magic Quadrant for Cloud Infrastructure as a Service, Worldwide

AWS provides many cloud services that you can combine to meet business or organizational needs . AWS provides a highly reliable, scalable, low-cost infrastructure platform in
the cloud that powers hundreds of thousands of businesses
in 190 countries across the world.

As of 8th August 2017 there are 98 distinct services.

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Some of the major services provided by AWS cloud platform are.

B. Amazon Elastic Compute Cloud (Amazon EC2)

Amazon Elastic Compute Cloud (Amazon EC2) is a web service that provides resizable compute capacity in the cloud. It allows organizations to obtain and configure virtual servers in Amazon's data centers and to harness those resources to build and host software systems.

Organizations can select from a variety of operating systems and resource configurations (memory, CPU, storage, and so on) that are optimal for the application profile of each workload. Amazon EC2 presents a true virtual computing environment, allowing organizations to launch compute resources with a variety of operating systems, load them with custom applications, and manage network access permissions while maintaining complete control.

C. AWS Lambda

AWS Lambda is a zero-administration compute platform for back-end web developers that runs your code for you on the AWS Cloud and provides you with a fine-grained pricing

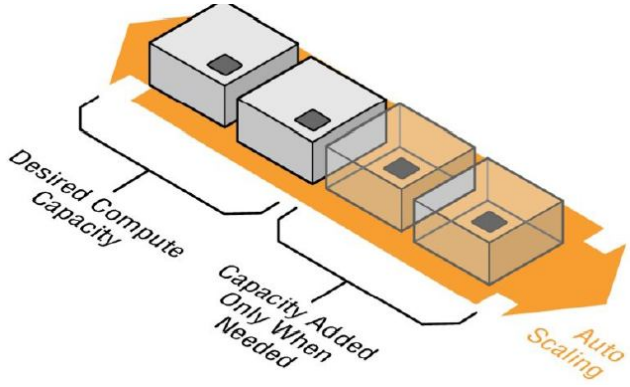
structure. AWS Lambda runs your back-end code on its own AWS compute fleet of Amazon EC2 instances across multiple Availability Zones in a region, which provides the high availability, security, performance, and scalability of the AWS infrastructure.

D. Auto Scaling

Auto Scaling allows organizations to scale Amazon EC2 capacity up or down automatically according to conditions defined for the particular workload (see Figure below). Not only can it be used to help maintain application availability and ensure that the desired number of Amazon

EC2 instances are running, but it also allows resources to scale in and out to match the demands of dynamic workloads. Instead of provisioning for peak load, organizations can optimize costs and use only the capacity that is actually needed. Auto Scaling is well suited both to applications that have stable demand patterns and to

applications that experience hourly, daily, or weekly variability in usage.



E. Elastic Load Balancing

Elastic Load Balancing automatically distributes incoming application traffic across multiple Amazon EC2 instances in the cloud. It enables organizations to achieve greater levels of fault tolerance in their applications, seamlessly providing the required amount of load balancing capacity needed to distribute application traffic.

F. AWS Elastic Beanstalk

AWS Elastic Beanstalk is the fastest and simplest way to get a web application up and running on AWS. Developers can simply upload their application code, and the service

automatically handles all the details, such as resource provisioning, load balancing, Auto Scaling, and monitoring. It provides support for a variety of platforms, including PHP, Java, Python, Ruby, Node.js, .NET, and Go. With AWS Elastic Beanstalk, organizations retain full control over the AWS resources powering the application and can access the underlying resources at any time.

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G. Amazon Virtual Private Cloud (Amazon VPC)

Amazon Virtual Private Cloud (Amazon VPC) lets organizations provision a logically isolated section of the AWS Cloud where they can launch AWS resources in a virtual network that they define. Organizations have complete control over the virtual environment, including
selection of the IP address range, creation of subnets, and configuration of route tables and network gateways. In addition, organizations can extend their corporate data center networks to AWS by using hardware or software *virtual private network (VPN)* connections or
dedicated circuits by using AWS Direct Connect.

H. Amazon Simple Storage Service (Amazon S3)

Amazon Simple Storage Service (Amazon S3) provides developers and IT teams with highly durable and scalable object storage that handles virtually unlimited amounts of data and large numbers of concurrent users. Organizations can store any number of objects of any type, such as HTML pages, source code files, image files, and encrypted data, and access them using HTTP-based protocols. Amazon S3 provides cost-effective object storage for a wide variety of use cases, including backup and recovery, near line archive, big data analytics, disaster recovery, cloud applications, and content distribution.

I. Amazon DynamoDB

Amazon DynamoDB is a fast and flexible NoSQL database service for all applications that need consistent, single-digit millisecond latency at any scale. It is a fully managed database and supports both document and key/value data models. Its flexible data model and reliable performance make it a great fit for mobile, web, gaming, ad-tech, Internet of Things, and many other applications.

III. SECURITY AND IDENTITY

AWS provides security and identity services that help organizations secure their data and systems on the cloud. The following section explores these services at a high level.

A. AWS Identity and Access Management (IAM)

AWS Identity and Access Management (IAM) enables organizations to securely control access to AWS Cloud services and resources for their users. Using IAM, organizations can create and manage AWS users and groups and use permissions to allow and deny their access
to AWS resources.

B. AWS Key Management Service (KMS)

AWS Key Management Service (KMS) is a managed service that makes it easy for organizations to create and control the encryption keys used to encrypt their data and uses
Hardware Security Modules (HSMs) to protect the security of your keys. AWS KMS is integrated with several other AWS Cloud services to help protect data stored with these
services.

C. AWS Directory Service

AWS Directory Service allows organizations to set up and run Microsoft Active Directory on the AWS Cloud or connect their AWS resources with an existing on-premises Microsoft Active Directory. Organizations can use it to manage users and groups, provide single sign-on
to applications and services, create and apply Group Policies, domain join Amazon EC2 instances , and simplify the deployment and management of cloud-based Linux and Microsoft Windows workloads.

D. AWS Certificate Manager

AWS Certificate Manager is a service that lets organizations easily provision, manage, and deploy Secure Sockets Layer/Transport Layer Security (SSL/TLS) certificates for use with AWS Cloud services. It removes the time-consuming manual process of

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purchasing, uploading, and renewing SSL/TLS certificates. With AWS Certificate Manager, organizations can quickly request a certificate, deploy it on AWS resources such as Elastic Load Balancing
or Amazon CloudFront distributions, and let AWS Certificate Manager handle certificate renewals.

E. AWS Web Application Firewall (WAF)

AWS Web Application Firewall (WAF) helps protect web applications from common attacks and exploits that could affect application availability, compromise security, or consume excessive resources. AWS WAF gives organizations control over which traffic to allow or
block to their web applications by defining customizable web security rules.

IV. BENEFITS OF USING AWS CLOUD OVER TRADITIONAL DATA CENTERS

A. The Benefits of aws are Significant And are Listed as Follows

1) *Switch Capital Expenditure (CapEx) to Operational Expenditure(OpEx)*: No need to bear the huge upfront cost of purchasing hardware or software and provision CapEx for the same in the budget. With AWS,pay only for what services you use on a monthly basis as OpEx..
2) *Cost benefit from massive economies of scale: Since* AWS purchases everything in bulk, it gives them a cost advantage. AWS passes on the benefit from this cost advantage to their customers by offering the services at low cost.
3) As the AWS cloud becomes larger and larger, these massive economies of scale benefit AWS as well as end customers.No need to guess required infrastructure capacity: Most of the time, before actual IT implementation, guessing IT infrastructure requirement leads to either scarcity of resources or wastage of resources when actual production begins. AWS makes it possible to scale the environment up or down as needed without guessing infrastructure need.
4) *Increased speed and agility:* While building an on-premises data center, businesses have to wait to get the desired hardware or software from vendors for an extended period of time. With AWS, it becomes easier for the business to quickly get started and provision the required infrastructure on AWS immediately, without depending on third party vendors. They neither need to raise a purchase order nor wait for delivery, just log in to their AWS account and have everything at their disposal.
5) *Global Access:* AWS has data centers and edge locations across the globe. Take advantage and host your infrastructure near to your target market or at multiple locations across the globe at a very nominal cost.

V. DEPLOYMENT MODEL

Deployment model of cloud computing describes how the cloud is located. It defines the boundary in which the services are employed. There are four deployment models of cloud computing: Public, Private, Hybrid, and Community. A comparative study of these providers are given in table below.

Parameters\Type	Public Cloud	Private Cloud	Hybrid Cloud	Community Cloud
Description	In public cloud, services are available for public users.	Private cloud is build up with existing private infrastructure. This type of cloud has some authentic users who can dynamically provision the resources.	Hybrid cloud is a heterogeneous distributed system, resulting from a private cloud, which incorporates different types of services and resources from public clouds.	Different types of cloud are integrated together to meet a common or particular need for some organizations.
Scalability	Very High	Limited	Very High	Limited
Reliability	Moderate	Very High	Medium to High	Very High
Security	Totally Depends on service provider	High class security	Secure	Secure
Performance	Low to medium	Good	Good	Very Good
Cost	Cheaper	High Cost	Costly	Costly
Examples	Amazon EC2, Google AppEngine	VMWare, Microsoft, KVM, Xen	IBM, HP, VMWare vCloud, Eucalyptus	SolaS Community Cloud, VMWare

Table 1: Comparison among Public, Private, Hybrid and Community Cloud

In cloud there are two types of resources: on-premises (clients home) and off-premises. In Fig. 3, we have explained the nature of these resources in hybrid, private, public, community cloud and also the relationship among those.

VI. CONCLUSION

Cloud computing has taken the I.T world by storm. Many big firms as well as small Start-ups are shifting their infrastructure to cloud because of its Scalability ,flexibility ,availability, reliability and reduced cost .Amazon web services is dominating the cloud

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market and is the leader in cloud platform because of its competitive pricing and large numbers of services available then any other cloud provider.

Although cloud provider's implement tight security in their infrastructure and provides additional security for data stored in the cloud and data while in transit .

Many big companies are skeptical about storing their critical data on the 3rd party cloud provider platform.

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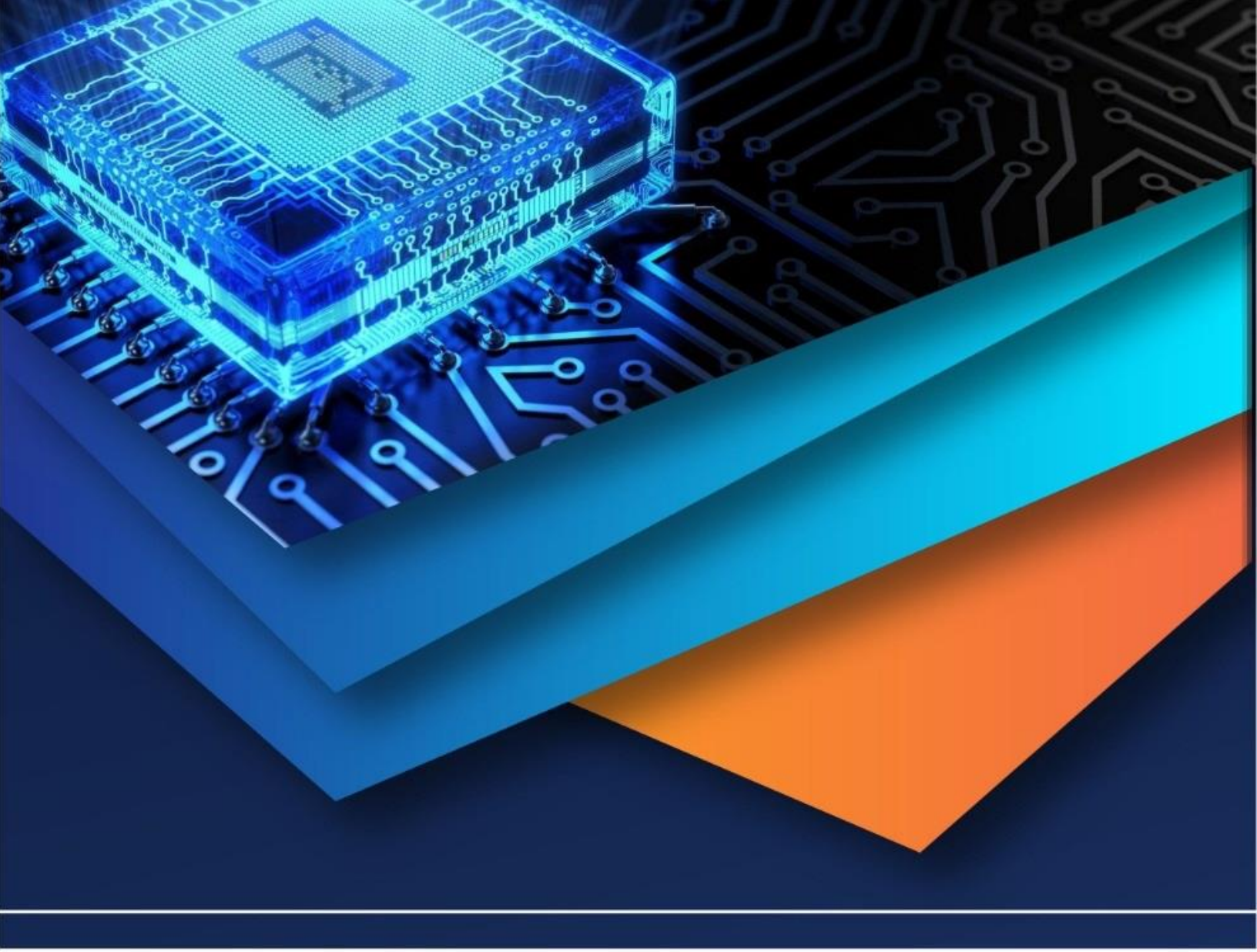

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