A Comparitive Study of various Cloud Service Platforms

Article · February 2019

CITATION
1

READS
1,296

4 authors, including:

Sumit Kumar
Chandigarh Group of Colleges
17 PUBLICATIONS **15** CITATIONS
SEE PROFILE

Sunil Kumar Chawla
Chandigarh Group of Colleges
25 PUBLICATIONS **52** CITATIONS
SEE PROFILE

STM JOURNALS

Journal of Advanced Database Management & Systems
ISSN: 2393-8730 (Online)
Volume 6, Issue 1
www.stmjournals.com

A Comparative Study of Various Cloud Service Platforms

Sumit Kumar*, Sunil Kumar, Manpreet Singh Bajwa, Himani Sharma
Department of Computer Science and Engineering, Chandigarh Group of Colleges, College of Engineering, Landran, Punjab, India

Abstract

Cloud computing is the latest computing model where IT services and applications are served over world-wide-web. On-demand services are relatively faster to deliver. They are demanded over the internet and are explained as internet-centric software. Cloud is also capable of providing scalability for applications by providing virtualized resources dynamically. Schedulers for cloud computing decide which jobs of a workflow should be allocated on which processing resources. On theoretical fronts, Scheduling for cloud computing is in advance stage with a lot of awareness among users, which also includes increasing popularity among the cloud era. In a cloud environment, it is known as platform-as-a-service (PaaS). There are many cloud platform providers in computing and other significant industries. Some of the major CSPs are AWS, Google Cloud, Windows Azure platform, etc. We present a comparative study among various cloud service platforms so that choosing the optimal one for deployment and research development turn out to be easy. The objective of this study is to present the novice with the knowledge of various platforms so that they can choose whichever is suitable for them.

Keywords: *BLOB, Cloud stack, IAAS, PAAS, SAAS, scalable, virtualization.*

****Author for Correspondence*** E-mail : sumit.coeapplied@cgc.edu.in.

INTRODUCTION

In the current era, most of the world is connected through the internet. Recent advancements in the field of computer network made possible for us, to access anything which is stored on WWW, from anywhere, through the internet. "Cloud" is the latest development in the field of internet computing which allows users to access the internet-based application and resources from anywhere in the world through the internet. These services are accessed by general Internet protocols and networking principles. In the case of Cloud Computing, resources are virtual and even unlimited [2]. Moreover, configurations of machines on which cloud-related software runs, are abstracted from the end-user. Various cloud services are studied under Cloud service models which are of three types

i) IaaS
ii) ii) Paas and
iii) iii) SaaS.

These cloud services are represented by a stack just like OSI or TCP/IP stack; known as Cloud-stack. The middle layer of this stack is PaaS (Platform-as-a-service). When an in-house application ready to be exported to third-party cloud is developed, much of the application's prerequisites already exist there. A Cloud-based OS provides fundamental support for the implementation of the application, interacting with storage, meanwhile, other machines in the surroundings offer services such as remote storage [3-7]. Development teams who wish to create a cloud app must call for a cloud platform which provides cloud-based services for creating other supporting apps. New SaaS app can be built on a cloud platform rather than building a customized base. In recent times, a number of cloud platform technologies have been invented and developed. This paper presents the comparative study of three major platforms i.e. Amazon, Window Azure and Google.

BACKGROUND

A short overview of the cloud computing environment is provided in this section as a

background. It formally defines cloud computing, presents various cloud computing models (both services and operations); followed by related work and comparative study with concluding remarks to end with.

Cloud Computing

The term cloud is analogous to the internet and informally these can be used interchangeably. Therefore, cloud computing refers to "a type of Internet-based computing," where diverse services like servers, storage, and applications are delivered to machines and devices through the Internet. Cloud Computing facilitates real-time network access to a distributed pool of configurable computing resources such as networks, servers, memory, apps, and services [8-12]. Cloud services are meant to purchase the services instead of hiring them. According to famous cloud scientist and researcher Buyya and his team [1]: "Cloud is a parallel and distributed computing system consisting of a collection of inter-connected and virtual machines that are dynamically provisioned and presented as one or more unified computing resources based on service-level agreements (SLA) established through negotiation between the service provider and consumers." Cloud computing environment is shown in Figure 1.

Cloud Service Models

A generalized cloud service model is represented as a cloud-stack in Figure 2. Cloud Computing service models are known as reference models. Cloud computing relies on these models significantly. These models can be categorized into three as listed below [13-16]:

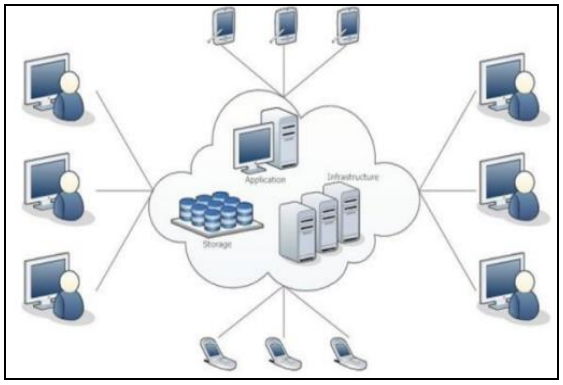

Fig. 1: *Cloud Computing Environment.*

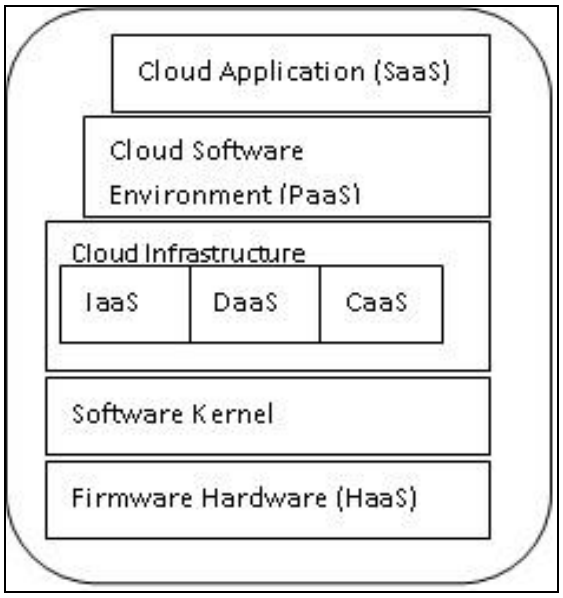

Fig. 2: *Cloud Service Models.*

Infrastructure-as-a-Service (IaaS)

IaaS is a means to provide access to the infrastructure part of the cloud such as fundamental resources like physical and virtual machines, virtual memory, etc. The capability of each user is to make use of basic functionalities like processing, storage, networks where the user can implement and execute arbitrary software which includes operating systems and other application software [17].

Platform-as-a-Service (PaaS)

PaaS provides the runtime environment for applications (apps), development and deployment tools, etc. The capability provided to the user as PaaS is to install the above-created cloud infrastructure or other obtained applications created using programming languages and tools supported by the Cloud Service Provider (CSP) [18].

Software-as-a-Service (SaaS)

SaaS model allows using software applications as a fundamental service to end users. SaaS is the basic term that points to software in cloud services. It is typically the capability with the consumer to use the applications provided by CSP; running on the cloud IaaS. These applications can be used from different client end machines with the help of a user-interface like a web browser or web-based email app like Gmail.

Cloud Deployment Model

Cloud Deployment Models are the reference models that are used to identify the kind of access to the cloud. Cloud deployment models are of four types: Public, Private, Hybrid and Community.

Public Cloud

It enables frameworks and functionalities to be effectively available to the end users. It might be more prone to vulnerabilities due to its receptiveness. Public clouds are usually employed by third parties; they distribute better economies of scale, as the IaaS costs are due to varieties of users, offering every customer an economically effective model, "Pay-as-you-go". Every client shares a similar infrastructure with constrained configuration, security assurances, and accessibility differences. These are looked after and taken care by Cloud Service Provider (CSP); just like Internet Service provider (ISP). One significant advantage of a Public cloud is real-time scalability i.e. capability to scale flawlessly in real time, according to user's needs [19].

Private Cloud

It permits "systems and services" to be reachable inside an association. It presents improved security features due to being private. Private clouds are made up entirely for a single endeavor. Unlike Public Cloud, they target to address issues on data and information security and offers better control. Two variants of a private cloud are:

In-house Private Cloud

Also known as On-premises private clouds or internal clouds; this kind of clouds are hosted within a user's self-owned data center.

Externally-hosted Private Cloud

Externally hosted by a CSP, where the provider guarantees the full privacy.

Community Clouds

It is a multi-client infrastructure shared among a number of organizations from a particular group with common computational issues. A community cloud serves any one of general or specifically assigned strategies, security, regulatory compliances and needs.

Hybrid cloud

It is a blend of first two kinds of clouds; having features of both. However, the vital actions are executed through private cloud whereas the less important actions are done using the public cloud. It joins many clouds into one (private, public, community) where these clouds keep hold of their individual existence, but at the same time, are bound as a single unit to offer the benefits of numerous deployment models [20].

Related Work

There has been a number of comparative studies reported on the comparison of cloud computing systems. This section provides a summary of such studies. This section first introduces some cloud platforms then presents comparative study.

Amazon Web Services

"Amazon Elastic Compute Cloud" also known as Amazon EC2 offers scalable computing in the "Amazon Web Services (AWS)". It provides "as and when required" computing resources and services and that too in the cloud, with "pay-as-you-go" costs. It allows users to manage the scale in order to handle the fluctuations in needs or spikes in popularity, thus we do not need to forecast traffic.

Some common uses of AWS are as follows:

- Public or Private data storage.
- Static or a Dynamic website hostage.
- Support for students to do online training programs like MOOCs.
- Processing business and scientific data.
- Handling peak loads with ease.

Google App Engine

GAE is a PaaS that enables us to implement and execute apps on Google's universally available infrastructure. These applications are *"easy to build"*, *"easy to maintain"*, and *"easy to scale"* as the traffic and data storage requirements alter. With App Engine, we do not have to maintain any servers. We just upload our app and it is ready to go within a few seconds. GAE easies "build and deploy" of an application, and due to app engine only, applications run reliably, even if there are heavy load and traffic [21]. It includes the following characteristics:

Table 1: *Comparison of Various Cloud Computing Platforms on the basis of the above criteria*

Parameters	Amazon AWS	Window Azure	Google App Engine
Services	It provides PaaS and IaaS.	It provides PaaS and IaaS.	It provides PaaS and SaaS.
Computation	It offers a virtual environment for computing and facilitates computational capacity which can be resized according to needs. Users can use a pre-configured Amazon Machine Image or create their own AMIs.	It is the same as Amazon as far as computational capacities are concerned. Creating a Virtual Machine, choosing a virtual hard disk drive (VHDD) for the Virtual Machine's image. Users are free to use VHDDs provided by either Linux or Microsoft. They can even upload their own VHDDs.	It consists of a set of products that lets clients develop apps and websites and run them. This also enables the user to store and analyze data on Google's infrastructure. GCEs are the IaaS cloud platforms allowing flexible Virtual Machines.
Storage	Amazon Web Services Elastic Block Store (EBS) presents persistent storage to various instances of EC2 and do not depend upon instance life. EBS provides block level storage volumes. There are two kinds of EBS volume: i) Standard volume and ii) Provisioned IOPS volume. Amazon S3 – It stores objects up-to 5GB and Volumes ranging from 1GB to 1TB in size.	WA provides storage to store large amounts of unstructured data. A blob is a file of any type and size. There are two types of blobs in Windows Azure Storage: i) block blobs and ii) page blobs. Block blobs consist of blocks (each block up-to 4MB) and are efficient when uploading large blobs. Page blobs are a set of 512 byte pages; optimized for random Read (R) and Write (W) operations.	It has a transient disk of size 10GB (by default) tied to the Virtual Machine's instance lifetime. Developers can store objects and files up-to-the size of TBs and are able to control access to the data (access-control). Auto-scaling is an inbuilt feature of App Engine. No matter how many users are active or how much data the apps store, GAE can scale with flexibility.
Networking	AWS Direct Connect (AWS-DC) is suited to high bandwidth and delay sensitive apps. AWS-DC employs IEEE standard 802.1Q VLANs to set up a dedicated and private connection between premises to AWS and vice versa. Since it is hard for VPN H/W to support high-speed data transfer rates (above 4Gbps), users can easily achieve greater network speed using multiple connections, each connection with a 1 Gbps or 10 Gbps capacity [22]. Amazon's Route53 which is a DNS web-service due to which users can create and administer public DNS records.	It provides agent-based machine to machine connections. With WA Connect, Virtual Machines can join the domain on premises. So VMs in WA have IP addresses that look like other networked resources in the same domain rather than using external virtual IP addresses.	Each Virtual Machine instance in GCE is a member of a single unique network, which defines the address range and gateway address of all instances connected to it. Users can detail firewall rules for a particular instance. An instance can get an external IP address upon initiation.
Caching	Supports Cache Clusters	Supports cache clusters	Shared memory cache is the free default service for AE apps. It gives cache capability on a best-effort basis; subject to the overall demand of all apps served by AE.
Language Supported	Any language can be used. Users can quickly launch multitier web applications with a Cloud Formation template [23].	It supports VB.NET, C# , PHP and java languages	It supports Java, Python and Go Languages
Paas technology	Windows Server 2003/2008, Red-hat Enterprise suite, Oracle Enterprise, Microsoft SQL Server Standard 2005, Fedora Gentoo Linux.	Windows 7, Windows Server 2008, Windows Vista	It only supports Linux based virtual machines. It provides a Java Runtime Environment and Python Runtime Environment.
Big data Support	Amazon supplies Elastic MapReduce (Amazon EMR) to instantly provision according to the users need for data concentrated applications. With the help of Big Data Support offered by AWS, users can concentrate on data analysis rather than the time-consuming setup [24].	Microsoft also provides Hadoop service on WA for the same purpose. On WA, blob storage keeps the data a MapReduce job requires and works upon.	Google doesn't provide any Hadoop like service right now. Google's Big Query allows users to analyze quickly and interactively against very large datasets like up to billions of rows.

- Constant storage with sorting, queries and transactional capabilities.
- Real-time load balancing.
- Auto Scaling
- Asynchronous job queues for executing tasks even outside the scope of a request.
- Scheduled tasks for triggering activities at prior known timings or regular intervals just like in a round robin manner.
- Integration with other Google cloud services and Application Program Interfaces.

Window Azure

Microsoft's Window Azure is a set of tools, each one offering a particular collection of services to App. Developers; providing a well-known and flexible setting to drive and support specific requirements and services of the developers' team, customers and users. It comprises of following four components.

*Windows Azure***:** This is a Windows environment for executing apps; storing data and information on machines; specifically in data-centers.

*SQL Azure***:** Presents relational data services in the cloud; based on Microsoft's SQL Server.

*Windows Azure AppFabric***:** AppFabric being a set of Cloud-based infrastructure services runs apps either over the cloud or on-premises.

*Windows Azure Marketplace***:** Marketplace is an online store for buying cloud data and apps.

COMPARATIVE STUDY OF VARIOUS CLOUD SERVICE PLATFORMS

Various cloud platforms can be compared with each other on the basis of following eight-point criteria.

i. Services
ii. Computation
iii. Storage
iv. Networking
v. Caching
vi. Language supported
vii. Paas Technology
viii. Big data Support

CONCLUSION

This paper provides introductory background to the cloud computing, cloud service models and cloud deployment models. It also presents a comparative study of three cloud computing platforms namely Amazon's web services, Google's Application Engine and Window's Azure. These platforms have been compared on the basis of criteria such as Computation, Storage, Networking, Caching, Paas technology, Big data Support, Content Delivery Network, Metric Monitoring, etc. Summary of this paper is this that every service provider is having many of the features the same with different terminologies. None of the service providers are weak and they can be chosen as per the convenience of the user.

REFERENCES

1. Buyyaa R, Yeoa CS, Venugopala S, Broberg J, Brandic I. Cloud Computing and Emerging IT platforms: Vision, Hype, and Reality for Delivering Computing as the 5th Utility. *Future Generation Computer Systems*. 2009; 25: 599-616p.
2. W. Publishing, and J. Wiley, Sosinsky B. *Cloud Computing Bible*. Wiley Publishing, Inc; Indianapolis, IN, 2011, Wiley Publishing, Inc.
3. Googlecom. (2019). Google Cloud. Retrieved 23 April, 2019, from https://cloud.google.com/appengine/docs/the-appengine-environments
4. Ibmcom. (2019). Ibmcom. Retrieved 23 April, 2019, from https://www.ibm.com/it-infrastructure/storage/resources/products-atoz
5. Wikipediaorg. (2019). Wikipediaorg. Retrieved 23 April, 2019, from https://en.wikipedia.org/wiki/IBM_cloud_computing
6. Luitinfotechcom. (2019). Luitinfotechcom. Retrieved 23 April, 2019, from http://www.luitinfotech.com/kc/what-is-cloud-computing.pdf
7. Dummiescom. (2019). Dummies. Retrieved 23 April, 2019, from https://www.dummies.com/programming/cloud-computing/hybrid-cloud/what-is-hybrid-cloud-computing/
8. Cloudtweakscom. (2012). CloudTweaks. Retrieved 23 April, 2019, from

https://cloudtweaks.com/2012/07/4-primary-cloud-deployment-models/
9. Availablefromhttp://cloud.cio.gov/topics/cloud-computing-deployment-models
10. Techopediacom. (2019). Techopediacom. Retrieved 23 April, 2019, from https://www.techopedia.com/definition/26814/virtual-private-cloud-vpc
11. Availablefromhttp://blog.appcore.com/blog/bid/167543/TypesofCloudComputing-Private-Public-and-Hybrid-Clouds
12. Amazoncom. (2019). Amazon Web Services, Inc. Retrieved 23 April, 2019, from https://aws.amazon.com/getting-started/
13. Amazoncom. (2019). Amazoncom. Retrieved 23 April, 2019, from https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/concepts.html
14. Wikipediaorg. (2019). Wikipediaorg. Retrieved 23 April, 2019, from https://en.wikipedia.org/wiki/Google_App_Enginee
15. Googlecom. (2019). Google Cloud. Retrieved 23 April, 2019, from https://cloud.google.com/appengine/docs/the-appengine-environments
16. Scribdcom.(2019).Scribd.Retrieved23 April, 2019,from https://www.scribd.com/document/209644841/HighTech-Whitepaper-Windows-Azure-09-2011
17. Chappell D. *Introducing the Azure services platform an early look at windows azure, .net services*. 2008.
18. Wikipediaorg. (2019). Wikipediaorg. Retrieved 23 April, 2019, from https://en.wikipedia.org/wiki/Cloud
19. Chappell D. *A short introduction to cloud platforms*. Microsoft Corporation, 2008
20. Varia J, Mathew S. *Amazon Web Services Overview of Amazon Web Services*., Amazon Web Services, Inc., 2014.
21. Microsoftcom.(2019).Yung Chou on Hybrid Cloud.Retrieved23 April, 2019,from https://blogs.technet.microsoft.com/yungchou/2013/01/06/windows-azure-features-overview/
22. Vorsite corporation. (2019). Vorsitecom. Retrieved 23 April, 2019, from https://www.vorsite.com/
23. Amazon Web Services, Windows Azure, Google Cloud Platform, VMWare and Others (Fall 2012)
24. Googlecom. (2019). Google Cloud. Retrieved 23 April, 2019, from https://cloud.google.com/appengine/docs/standard/python/memcache/

Cite this Article
Sumit Kumar, Sunil Kumar, Manpreet Singh Bajwa, Himani Sharma. A Comparative Study of Various Cloud Service Platforms. *Journal of Advanced Database Management & Systems*. 2019; 6(1): 7–12p.

