Cloud Computing Fundamental

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1. Introduction

Cloud computing is an on-demand computer system services and cover a huge scope of choices now, from the essentials of storage, systems administration, and preparing power through to normal language handling and computerized reasoning just as standard office applications. Essentially any help that doesn't expect you to be actually near the PC equipment that you are utilizing would now be able to be shared through the cloud (Steve Ranger, 2018). Cloud computing can be divided into three services which infrastructure as a service, platform as a services and software as a services (Margaret Rouse, 2020). A cloud can be private or public. A public cloud offers administrations to anybody on the web. A private cloud is a restrictive organization or a server farm that provide facilitated administrations to a set number of individuals, with certain entrance and authorizations settings. Private or public, the objective of cloud computing is to give simple, adaptable admittance to registering assets and IT services (Margaret Rouse,2020). Rather than having their own framework or data center, organizations can lease permission to anything from applications to capacity from a cloud service provider. One advantage of utilizing distributed computing administrations is that organizations can dodge the upfront expense and difficulty of possessing and keeping up their own IT framework. In this cloud computing all things being equal, users pay their cloud provider a membership expense or pay for just the assets they use. By filling in form provided, users can set up records and turn up virtual machines or arrangement new applications (Eric Knorr, 2018). The purpose of this paper is to explore more detail about cloud computing and its benefits.

2. Comparative Evaluation

I. Service Model

Services	AWS	Azure	GCP
Iaas	Amazon Elastic Compute Cloud	Virtual Machine	Google Compute Engine
Paas	AWS Elastic Beanstalk	App Service and Cloud Services	Google App Engine
Serverless function	AWS Lambda	Azure Functions	Google Cloud Functions

credit: https://intellipaat.com/blog/aws-vs-azure-vs-google-cloud/

AWS offered more than 200 services, Azure offered more than 100 services and more than 60 services offered by Google Cloud Platform.

II. Virtual Machine

The table show the types of instances that offered by AWS, Azure and Google Cloud followed by RAM.

Types of Instances

Instance type	AWS Instances	AWS RAM (GiB)	Azure VMs	Azure RAM (GiB)	Google VMs	Google RAM (GiB)
General purpose	m5.xlarge	16	B4MS	16	n1-standard- 4	15
Compute optimized	c5.xlarge	8	F4s v2	8	n1-highcpu-4	3.6
Memory optimized	r5.xlarge	32	E4 v3	32	n1-highmem-4	26
GPU instances	g3s.4xlarge	30.5	NC 6	56	NVIDIA@Tesla@ P4	64

credit: https://www.simform.com/compute-pricing-comparison-aws-azure-googlecloud/

III. Storage

Services	**AWS**	**Azure**	**GCP**
Object Storage	Amazon Simple Storage Service	Blob Storage	Google Cloud Storage
Virtual Server Disk	Amazon Elastic Block Store	Managed Disk	Google Compute Engine Persistent Disk
Cold Storage	Amazon Glacier	Azure Archive Blob	Google Cloud Storage Nearline
File Storage	Amazon Elastic File System	Azure File Storage	ZFS/Avere
Backup	Glacier	-Archive Storage -Recovery backups -Site recovery	-Nearline -Coldline

credit: https://intellipaat.com/blog/aws-vs-azure-vs-google-cloud/

This is the storage services that provided by AWS, Azure, and GCP. There is different platform to manage the storage by each cloud.

IV. OS environments offered

These is the operating system that supported by each cloud.

AWS	Azure	GCP
Windows, SLES, CentOS, CoreOS, OpenSUSE, RHEL, CloudLinux, Debian, FreeBSD, Ubuntu, Oracle Linux	Windows, SLES, CentOS, CoreOS, OpenSUSE, RHEL, Debian, FreeBSD, Ubuntu, Oracle Linux	Windows, SLES, CentOS, CoreOS, OpenSUSE, RHEL, Debian, FreeBSD, Ubuntu, Oracle Linux

credit: https://www.whizlabs.com/blog/aws-vs-azure-vs-google/

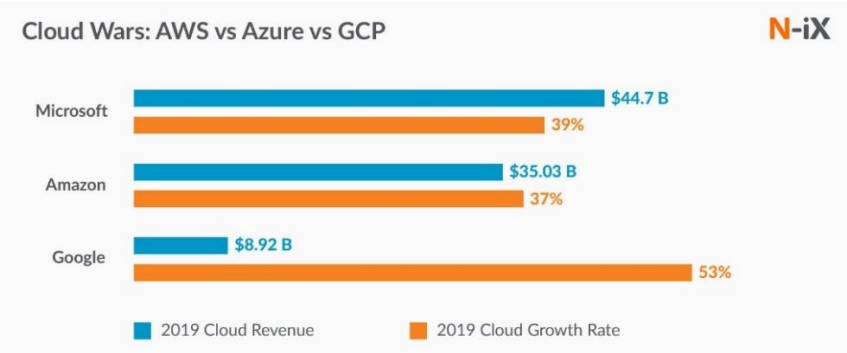
V. Security

AWS	Azure	GCP
AWS Security Hub	Azure Security Center	Security Command Center

credit: https://www.n-ix.com/comparing-big-3-aws-azure-gcp/

AWS Security Hub manage security alert and automate security check. Azure Security Center manage and threat protection for hybrid cloud overload by using Azure Defender. Security Command Center manage security and risk for Google Cloud Platform.

VI. Performance and scalability



The figure has shown the percentage of cloud revenue and cloud growth rate in 2019.

credit: https://www.n-ix.com/comparing-big-3-aws-azure-gcp/

VII. Pricing model

AWS	Azure	GCP
Charge per hour	Charge per minute	Charge per minute

Pricing calculator for Azure and GCP will be charged per minute for usage. However, AWS usage charged per hour.

credit: https://www.n-ix.com/comparing-big-3-aws-azure-gcp/

VIII. Auto-scaling

auto-scaling will increase and decrease the instance automatically.

AWS	Azure	GCP
Automatic scaling	Manual or Metered scaling (app service plan) or sub-second automatic scaling (consumption plan)	Automatic scaling

credit: https://github.com/tonghuikang/serverless_functions

IX. Monitoring tools

AWS	Azure	GCP
-CloudWatch -CloudTrail	-Azure Monitor -Log Analytics	-Stackdriver

credit: https://www.datamation.com/cloud-computing/aws-vs-azure-vs-google-cloud-comparison.html

The table show monitoring tools for AWS which is CloudWatch and CloudTrail. For Azure is Azure monitor and log analytics. For GCP is stackdriver.

3. Advantage and disadvantages of different types of cloud platforms

Cloud Platforms	Advantages	Disadvantages
Amazon EC2	• has a wide range of settings for computers • can have proper system configurations as per the specifications • has high level security • extremely economical and low-impact	• a bit difficult to consume • all information lost if the key provided to enter the VPS lost • uncontrollable shutdowns
Google Cloud Platform	• many regions available to store data • easy to integrate with other cloud platforms • less interruption as users implement new features • Google hires leading security experts.	• Small components and difficult to start • Everything costs • Lacks features
Microsoft Azure	• High availability and redundancy • Cost-effective and budget friendly • Allows to use any framework, language or tool • Can access files from anywhere in the world	• Need to manage the data effectively • Speed can be an issue for some businesses • Requires platform expertise to operate it
Alibaba Cloud	• Provides more processors • innovate faster in the market and gain a competitive edge • serves international customers • Provides a budget for a starter kit with reduced rates	• not provide support for most of the services • more difficult to trust the services • lack of tutorials
IBM Cloud	• setup high-performance cloud servers • have ability to choose the suitable cloud platform • accelerated service delivery • more coordinated and simplified	• not have a backup program in the cloud • the price is quite high • unable to create more than one compute product

4. Opinions

In my opinion, I would like to choose Amazon Web Services (AWS) as my selection in cloud computing. As you know, AWS is the biggest cloud computing platform in the world, featuring over a million users and annual sales of $10 billion. And despite the recent rise of cloud-based rivals including Google Cloud and Microsoft Azure, AWS still controls almost 40 percent of the market share of cloud computing. AWS has different methods of backup. Even if your primary development environment is taken offline due to a failure, it will not impact the backup data. Besides, the pricing structure of the platform could be the most common of all the reasons for choosing AWS because the users just have to pay for what they need. Furthermore, AWS also provided the same level of international security, so the cloud services of the client maintain the highest quality.

5. Conclusion

What can we summed up from this paper is cloud computing truly bringing positive impact to technology world. We can say that cloud computing services give a huge platform to share or deliver information and data between users. cloud computing likewise lead technology development into a more efficient system as it reducing expense as the users don't have to put any massive costs on maintaining system, equipment or utilities. What's more, client can get access to information and data that stored in cloud anytime and anywhere, it prove that cloud computing system are portable and user-friendly.

REFERENCE

1. Margaret Rouse, (December 2020), Cloud Computing https://searchcloudcomputing.techtarget.com/definition/cloud-computing
2. Eric Knorr, October 2018, What Is Cloud Computing? Everything You Know Now https://www.infoworld.com/article/2683784/what-is-cloud-computing.html
3. Steve Ranger, December 2018, What Is Cloud Computing? Everything You Need To Know About The Cloud Explained https://www.zdnet.com/article/what-is-cloud-computing-everything-you-need-to-know-about-the-cloud/
4. Google Cloud vs AWS: Difference Between AWS and GCP. (n.d.). Retrieved from https://www.guru99.com/google-cloud-vs-aws.html#9
5. Gartner, I. (n.d.). Alibaba Cloud Cloud Infrastructure and Platform Services. Retrieved from https://www.gartner.com/reviews/market/public-cloud-iaas/vendor/alibaba-cloud
6. Gaille, B. (2018, October 04). 15 Microsoft Azure Advantages and Disadvantages. Retrieved from https://brandongaille.com/15-microsoft-azure-advantages-and-disadvantages/
7. Top 7 Advantages of Choosing Google Cloud Hosting (2021). (2020, December 31). Retrieved from https://kinsta.com/blog/google-cloud-hosting/