International Journal on Cloud Computing: Services and Architecture (IJCCSA)
Vol. 12, No. 2/3/4/5/6, December 2022

ANALYSIS OF THE COMPARISON OF SELECTIVE CLOUD VENDORS SERVICES

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ABSTRACT

Cloud computing refers to a location that allows us to preserve our precious data and use computing and networking services on a pay-as-you-go basis without the need for a physical infrastructure. Cloud computing now provides us with powerful data processing and storage, exceptional availability and security, rapid accessibility and adaption, ensured flexibility and interoperability, and time and cost efficiency. Cloud computing offers three platforms (IaaS, PaaS, and SaaS) with unique capabilities that promise to make it easier for a customer, organization, or trade to establish any type of IT business. We compared a variety of cloud service characteristics in this article, following the comparing, it's straightforward to pick a specific cloud service from the possible options by comparison with three chosen cloud providers such as Amazon, Microsoft Azure, and Digital Ocean. By using findings of this study to not only identify similarities and contrasts across various aspects of cloud computing, as well as to suggest some areas for further study.

KEYWORDS

Cloud Computing, Trending Cloud Providers, cloud Service feature.

1. INTRODUCTION

Cloud Computing is being lauded as the next-generation shift that combines the internet and computing, allowing software, material and data to be kept on remote servers that are accessible via the web from anywhere in the world by computers, phones, and televisions, etc. Needless to mention, cloud computing isn't a replacement idea. Indeed, John McCarthy a computer pioneer, predicted, in 1961 that Count would one day be organized as a public-service corporation, and went on to invest in how it could happen. With the passage of your time, we have a brand new have to analyze huge data, thus motivating a greatly increased demand for computing. The field of cloud computing has seen enormous growth in recent years, with a variety of cloud providers emerging. Some providers have concentrated on the computing elements, offering end-users services such as CPU, storage, databases, and networking. Cloud computing is a pricing mechanism that is based on the quantity and duration of services or resources used. Cloud computing offers a wide range of cloud-based services. All clouds have different features, storage capacities, billing systems and different methods to produce the services from other clouds. Differing kinds of service models like Infrastructure-as-a-Service (IaaS), Platform-as-a-service (PaaS) and Software-as-a-service (SaaS) are supported.

All of those approaches had drawbacks, such as high infrastructure costs or inefficient resource consumption. Cloud computing gives people a better option. It consists of big data centers with a collection of tightly coupled resources. The needs of the end-user are met by dynamically regulated resources. Similar to conventional utilities, Consumers can use computing resources

DOI: 10.5121/ijccsa.2022.12601

from a large pool of resources. The recent problem is that folks don't seem to be aware that which cloud is suitable and consistent with their requirements, they can't ready choose the suitable cloud for or their services among the various clouds managed by different cloud providers. Various cloud computing service companies have emerged over time. Over the last few years, cloud computing has been the subject of significant research, with a range of concerns being debated. Security, privacy, energy management, virtualization, and data management are just a few of the topics being debated. These providers provide various deployment schemes and repair models. Realizing this issue, this research paper conducts a comparative analysis of the current major cloud computing providers. A comparative analysis of various service providers is then provided.

2. RELATED WORK

This study conducted completely highlights the attempts from the standpoint of next-generation cellular networking, as well as the open research areas to gain the maximum value from the combination of telecommunication and cloud computing.[2] This paper's comparative results show that the features of each cloud storage system play a significant role in the decision-making process when switching to cloud services.[3] From an economic standpoint, this paper compares several cloud service providers. It computes the costs of services offered by providers in various circumstances.[4] They give a measuring analysis of three main Personal Clouds in this paper: DropBox, Box, and SugarSync. They investigated key components of Personal Cloud storage services in order to define their performance, with a focus on data transmissions. [6] Researchers demonstrated Cloud computing from several perspectives, including definitions, characteristics, and technology. They've depicted a number of representative platforms for Cloud computing. [7] The benefits and drawbacks of cloud computing, cloud storage systems, and infrastructure built using web services like Amazon Web Services are discussed in this article.[8]. They highlighted continuing work on a heterogeneous ocean research platform based on modern decentralized computer and networking architecture.[13] The purpose of this paper is to investigate Microsoft's Windows Azure technology as well as commonly utilized servers.[14]

3. AN OVERVIEW OF CLOUD MODEL AND PLATFORM

Simply interpretable that instead of storing a file in a local device or computing in a physical workplace, cloud computing allows you to save any file or access it through the internet and make it secure, reliable and scalable. Basically, the cloud computing model is divided into two categories. They are the development model and the service model, each model also has four categories. Here is a brief of them sequentially.

3.1. Cloud Deployment Model

1) Public cloud: It is accessible and usable for everyone. Public clouds operate in the local network and anybody can access them for their regular needs. It is mainly used to connect globally.
2) Private cloud: It's only accessible by a required company or an organization. A private cloud is secure to use and owned by a single organization or a person which is mainly for high-security purposes.
3) Hybrid cloud: Basically it refers to all the functionalities of both public cloud and private cloud into a system named a hybrid cloud. When a company or organization needs all the qualities of both private and public cloud then it's very helpful to use. The private cloud makes the organization secure and the public cloud shares the content and activities of the organization with the customers.

4) Community cloud: When a joint organization needs to exchange its data effectively then it's the perfect solution to exchange their data by using the community cloud. Bank organization is the best example of it.

3.1.1. Cloud Service Model

1) Infrastructure as a service (IaaS): IaaS provides the basic computing infrastructure and it's used only for IT administrators by allowing remote servers.
2) Platform as a service (PaaS): PaaS provides a platform where you can develop, test and manage any kind of small or large applications by a software developer.
3) Software as a service (SaaS): SaaS provides to hosts and manages the software applications on a pay-as-you-go pricing model. Google drive is the best example of it and it's used by end customers.
4) Unified communication as a service (UCaaS): UCaaS is based on a technology which is called voice over internet protocol (VOIP). UCAS provides support for enterprise telephone, meetings, unified messaging, instant messaging and presence, mobility, and communications-enabled business processes. It's similar to the software-as-a-service (SaaS) model.

Table 1. A Qualitative and Quantitative Comparison table on Amazon, Azure and Digital Ocean

Points/Provider Name	Amazon	Azure	Digital Ocean
Launched	2007	2010	2011
Data-Center	84	42	12
Services Amount	100+	200+(divided into 18 categories)	8+
The company take services	Facebook, Netflix, twitch, LinkedIn, BBC, Adobe, Canon, Docker etc	Verizon, MSI Computer, LG electronics, NTT America, Wikimedia Foundation, News Crop, Intel etc	Cerberus-tech, Line-up, Easysize, EMR-bear, Adeva, Hact the box, cloudways, Digital Stage, Obo, JQuery, GitLab, etc
Global Market Occupied	32%	21%	8%
Service Model	IaaS, PaaS, SaaS	IaaS, PaaS, SaaS	IaaS, SaaS
Server OS Type	Any OS	Windows, Linux	Windows, Linux
Feature Products	1. Amazon EC2.(Virtual servers in the cloud) 2. Amazon Simple storage.(Scalable storage in the cloud) 3. Amazon	1. Virtual Machines. (Provision Windows and Linux VMs in seconds) 2. Azure Virtual Desktop. (Enable a secure, remote desktop from	1. Droplets. (Scalable virtual machines) 2. Kubernetes. (Managed Kubernetes clusters) 3. App Platform. (Get apps to market faster) 4. Databases. (Worry-free setup & maintenance)

	Aurora. (High-performance managed relational database) 4. Amazon DynamoDB.(Managed NoSQL database) 5. Amazon RDS. (Managed MySQL, PostgreSQL, Oracle, SQL Server, and MariaDB) 6. AWS Lambda. (Run code without thinking about servers) 7. Amazon VPC.(Isolated cloud resources) 8. Amazon Lightsail. (launch & manage virtual private servers) 9. Amazon SageMaker.(Build ,train and deploy machine learning models at scale)	anywhere) 3. Azure SQL. (Modern SQL family for migration and app modernization) 4. Azure Cosmos DB.(Build or modernize scalable & high-performance apps) 5. Azure Kubernetes service. (Deploy and scale containers on managed Kubernetes) 6. Azure Cognitive services.(add cognitive capabilities to apps with APIs and AI service) 7. App Service. (quickly create powerful cloud apps for web and mobile) 8. Azure Playfab. (everything you need to build and operate a live game on one platform) 9. Azure Functions.(execute event-driven serverless code with an end-to-end development) 10. Azure Quantum. (jump in & explore a diverse selection of today's quantum hardware, software and solutions)	5.Spaces.(Simple object storage)
Solutions	Archiving, Backup and restore, Blockchain, cloud migration, cloud operations, containers, content delivery, database migrations, data lakes and	Application development, Data and Analytics, Security and governance, AI, Hybrid cloud and infrastructure, Cloud migration and modernization, Internet of things, Energy, Financial	Website hosting, Web & Mobile Apps, Video steaming hosting, Gaming development, Cloud VPN, Bid data computing, Startups, SaaS Development, Agency & Web dev shops, Managed cloud hosting providers

	analytics, DevOps, E-commerce, Edge computing, Front-End web & mobile, High performance computing, Hybrid Cloud Architecture, Internet of Things, Machine learning, Modern application development, Remote Work, Scientific Computing, Serverless computing, websites, Power and utilities, Semiconductor, sports, etc. *Amazon provides 45+ solutions.	support, Media and Entertainment, Gaming, HealthCare, Retail, and Manufacturing. *Azure provides 45+ solutions.	etc *Digital Ocean provides 10+ solutions.
Supporting Programming Language	Java, python, ruby, PHP, Node Js, Scala Haskell, Perl etc	C#, Java, Node Js, TypeScript ect	Clojure, Go, Java, .NET, iOS, Haskell, Node.js, Perl, python, Ruby, Scala, TypeScript
Compute Service	EC2, AWS Lamda, Amazon Lightsail, Elastic BaenStalk	Azure Virtual Machine(VMs), Azure Container Service, Azure App Service, Azure Batch and Azure Service Fabric	Droplets, Kubernetes, App Platform
Storage Service	Amazon S3, EBS, S3 Glacier, Flie Storage	Disk Storage, Blob Storage, File Storage, Queue Storage	Block Storage, Space Storage
Networking Services	Amazon VPC, Amazon Route 53, Elastic Load Balancing	Azure CDN, Express Route, Virtual Network, Azure DNS	Virtual Private Cloud, Cloud Firewalls, Load Balancer, Floating IPs DNS
Type of Load Balancing	Application, Network, Gateway Load Balancer	Azure Load Balancer, Internal Load Balancer(ILB), Traffic Manager	Application, Network, Classic Load Balancer

Kubernetes	Elastic Kubernetes Service	Azure kubernetes Service	Digital Ocean Kubernetes (DOKS)
Algorithm	The A9 & A10 Algorithm. But A10 Algorithm is very similar to A9.	It has a large library from classification, recommender systems, clustering, anomaly detection, regression and text analytics families for azure machine learning.	Elliptic Curve Digital Signature Algorithm (ECDSA) instead of RSA.
Support available	24/7, Forums, self-help resources, documentation	24/7, forums, live chats, telephonic communications, documentation	Automated Backups, 24/7 Real-Time Monitoring, Q&A, tutorial, product doc, API doc, etc.

4. CLOUD SERVICE PRODUCT AND COST

Cloud computing provides network, compute and storage services that are simple to use and access over the internet.

4.1. Networking Service

Cloud networking service refers to connecting the networking resources as a third-party provider. Every cloud provider has its own networking system and it works in a certain way and is supported by certain things. We focused only on these selective providers' Amazon, Azure and Digital Ocean (As mentioned) networking services. First of all, we know that networking services mainly provide Load balancer, Support IPv4 and IPv6, Virtualization Network, Content delivery network, DNS, Private link and DDos Protection.

In computing, load balancing is a term used to refer to the act of allocating a collection of jobs among a set of resources in order to increase overall processing efficiency. It mainly works to improve the performance of response time. The load balancer monitors the incoming network traffic from the clients and finds the next route request to deliver to the registered destination. It also tracks the suitable destination to ensure the final destination to deliver the resources. There are many types of load balancers which are mentioned below. IP(Internet Protocol) address is also known as a unique address. It is mainly used to identify a device. The difference between IPv4(version 4) and IPv6(version 6) is their size. The size of IPv4 addresses is 32 bits long and IPv6 addresses are 128 bits long.

In the table, all of these three cloud providers provide IPv4 service. For IPv6, Amazon and Azure both supported ipv6 but Digital Ocean does not support ipv6.

Devices can share the same capabilities as a traditional physical network across multiple locations thanks to virtual networking. This feature allows the virtualization method.

The content delivery network feature distributes the networking content in groups where the distribution process is geographically and all of them are connected to servers. It's mainly used

for the fast delivery of the content for the clients in different locations which are interconnected with the servers globally. DNS (Domain Name System) is a hierarchical distributed database that lets you store and look up IP addresses and other data by name and Amazon, Azure and Digital Ocean all provide Domain name system services.

In this table, some features are given by the selective cloud providers.

Table 2. A Comparison table on Networking Services

Features	Amazon	Azure	Digital Ocean
Load Balancer	Yes	Yes	Yes
Types of Load-Balancer	1.Classic Load Balancer, 2.Network Load Balancer(NLBs), 3.Application Load Balancer(ALBs), 4.Gateway Load Balancer(GWLBs)	1.Azure Traffic Manager, 2.Azure Load Balancer, 3.Azure Application Gateway, 4. Azure Front Door	1.Resize Load Balancer, 2. Scale Load Balancer
Support IPv4 & IPv6[2]	Yes	Yes	No (Don't Support IPv6)
Virtual Network[3]	Yes	Yes	Yes
Content Delivery Network	Yes	Yes	Yes
Provide DNS	Yes	Yes	Yes
Provide Private Link	Yes	Yes	No
DDos Protection	Yes	Yes	No(Cloud Flare)

4.2. Compute Service

Computing Services refers to all information technology and computer systems (including software, application service provider services, hosted computing services, information technology and telecommunication hardware, and other equipment) related to the transmission, storage, maintenance, organization, presentation, generation, processing, or analysis of data and information, whether in an electronic or non-electronic format, whether in an electronic or non-electronic format. We focused on the top three cloud providers in this paper: Amazon, Azure, and Digital Ocean. All of these companies offer a variety of computer services to their clients. As a result, we select one computing service from each of these cloud providers. We use AWS Lamda for Amazon, Azure VM for Azure, and Kubernetes for the Digital Ocean. In this table, we compare these computing services based on a variety of factors such as their billing system, working method, supported languages, and more.

Table 3. A Comparison table on Compute Services

Features	AWS Lamda	Azure_VM	Kubernetes
Automatic Scaling	Scaling is done automatically on the size of the workload. It scales the application running the code in response to each trigger. The number of requests that a client's code can process is limitless. Within milliseconds of an incident, AWS Lambda typically starts running your code. Because Lambda scales dynamically, efficiency remains stable as the a number of events grows.	Azure Virtual Machines (VM) is one of several forms of scalable, on-demand computing resources offered by Azure. An Azure VM gives you virtualization flexibility without the need to purchase and maintain the physical hardware that runs it.	To enable autoscaling on an existing node pool, navigate to cluster in the Kubernetes section of the control panel. using Autoscaling in Response to Heavy Resource. A walkthrough that builds an autoscaling cluster and demonstrates the interplay between an HPA and a CA.
Billing	Pay only for the code running time	Pay only for what you use	Pay-as-you-go payment mechanism
Supported languages for computing	C#, Java, python, ruby, PHP, Node Js, Scala Haskell, Perl etc	C#, Java, Node Js, TypeScript , Run time SQL Server, SPA , Oracle ect	Clojure, Go, Java, .NET, iOS, Haskell, Node.js, Perl, python, Ruby, Scala, TypeScript
Customer	Coca Cola, Benchling, Stedi, etc	Sentara, Pearson, Canadian Imperial Bank of Commerce, Accela, Forever21	Line-Up, Batch, Kea, Adeva, Zuar, CloudWays etc
Service Model	Over 200 AWS Services and SaaS application serverless compute service	PaaS	IaaS
Back-up	AWS offers a framework for server-less computing called AWS Lambda. Lambda facilitates the development of event-responsive,	Backup Storage is an auto-scaling, reliable set of storage accounts managed by Azure Backup and isolated from customer tenants to provide	Kubernetes Backup is a data protection solution for vessels assigned as a Kubernetes cluster. Kubernetes backup applications can completely back up

	on-demand apps. Without needing to manage any additional infrastructure, you may create your own backup routines. It's the perfect computing environment for running code and establishing acompletely automatic backup system.10:40 PM	additional security. Charges for storage are separate from the cost of Azure Backup Protected Instances.	all files in containers, incremental backups, or differential backups. It is best to run the Kubernetes backup software frequently and periodically to protect files, configurations, and constantly changing data.

4.3. Storage Service

Traditional network storage and hosted storage are essential to the advancement of cloud storage. The benefit of cloud storage is that you may access your data from anywhere. Cloud storage services can store everything from a single piece of information to an entire company's warehouse. Customers will pay the cloud storage provider based on what they use and how they transmit data to the cloud. Essentially, the cloud storage client replicates the data to any of the cloud storage providers' data servers. Duplicates of data are provided on all or opposite data servers of cloud storage providers so that there is redundancy in availability which ensures that even if something goes wrong the customer's data is protected. Most of the systems store identical data server that uses different power supplies. Because of the rapid development of data and the need to keep it more secure and longer, businesses must integrate how they handle and use the information from the moment the information is created until it is destroyed. We now have the option of storing all of our data on the Internet. Third parties provide and manage this off-site storage over the Internet. Cloud Storage implies that a big pool of storage was available for use with three distinct features: access via the Web Services API over a shaky network connection, quick availability of enormous amounts of storage, and payment for what you use. It supports fast scalability. Cloud storage is an offer of cloud computing. Amazon Web Services, Azure, and Digital Ocean offer many storage tools, but it's not clear which one is best for your needs. Here's the most popular AWS storage are Amazon S3 (Simple Storage Service), Amazon EBS (Elastic Block Store), and Amazon S3 Glacier. Azure storage is Disk Storage, Blob Storage, File Storage, and Queue Storage. And also Digital Ocean storage is Volumes Block Storage, Space Object Storage. We're here to give you an overview of storage, what they're designed for, how they differ, and how to use each service.

Table 4. A Comparison table of Storage services

Features	AWS	Azure	Digital Ocean
Storage-related Services	Simple Storage Service (S3), Elastic Block Storage (EBS), Elastic File System (EFS), Storage Gateway File Storage	Blob Storage, Queue Storage, File Storage, Disk Storage, Data Lake Storage	Block Storage, Space Object Storage
Database-related services	Aurora, DBS, DynamoDB, ElastiCache, Redshift, Neptune, Database Migration Service,	SQL, MySQL, PostgreSQL, Data Warehouse, Server Stretch Database, Cosmos DB, Table Storage, Redis Cache, Data Factory,	MySQL, PostgreSQL, MongoDB Redis, Memgraph, EdgeDB, PhpMyAdmin
Backup services	S3 Glacier	Archival Storage Recovery Backups, Site Recovery	Droplet Snapshot **(snapshot**-based **backup** system**)**

Table 4.1. A Comparison table of Storage services

Features	Amazon	Azure	Digital Ocean-
Disk Storage	Yes	Yes	No
Data Backup	Yes	Yes	Yes
Store and access unstructured data	Yes	Yes	Yes
File storage	Yes	Yes	No
Data transfer and edge compute	Yes	Yes	Yes

4.4. Pricing Structure

In this table, we examine pricing types and the price differences for different types of virtual CPUs for these suppliers.

Table 5. A Comparison table on pricing type

	Amazon	Azure	Digital Ocean
Pricing Type	Pay-as-you-go, On-demand	Pay as you go, on-demand per second billing	Pay as you go pricing.

Table 6. A Comparison table on basic virtual machine cost

Virtual CPU	Amazon	Azure	Digital Ocean
1 vCPU	8.50$	7.59$	5$
2 vCPU	15.23$	15.11$	15$
4vCPU	60.91$	60.74$	40$
8 vCPU	121.50$	121.18$	80$

From the below chart, we are analysis the market growth rate from those (Amazon, azure and Digital Ocean) cloud service providers in last previous three years. Now we are analysis the revenue growth rate and profit growth rate in the year of 2019-2021.For Amazon, their revenue in 2021 is $469.822B, 2020 is $386.064B and in 2019 the amount is $280.522B. Amazon annual revenue growth in the year of 2021 was 21.7% increase from 2020, for 2020-the revenue growth was 37.62% increase from 2019 and for 2019, it was 20.45% increase from 2018. On the other hand, Azure annual revenue for 2021 was $168.088B, a 17.53% increase from 2020. For 2020, Azure annual revenue was $143.015B, a 13.65% increase from 2019 and the last revenue was 125.843B and revenue growth rate is 14.03%. Digital ocean annual revenue for 2021 was $428.56M, a 34.61% increase from 2020 and in 2020 is $318.38M and its revenue growth rate 24.94% from the previous year. In 2019, their revenue was $254.82M and revenue growth rate is 25.45%. It's not the matter of amount what you invest, it's matter of their growth revenue increase or not. For the comparison, Digital Ocean increases their revenue growth year by year.

Now we are discuss about the profit growth rate for these cloud providers. From the below chart, we see that in the year of 2021, Digital Ocean's profit rate is too much high from both Amazon and azure. That means Digital Ocean profit huge amount of money in the year of 2021. In 2020, Azure profit growth rate is 16.88% where Amazon and Digital Ocean Profit growth was 32.85% and 30.39%. So we assure that Amazon And Digital Ocean's profit growth rate looks like similar but Azure's profit growth rate didn't play a vital role to compare with them and final if we can see the in the year of 2019, Digital Ocean's profit growth rate is as high as in 2021 year from those cloud providers.

We know that, Digital Ocean is new in the cloud market and Digital Ocean can't compare with those big giant company, But Digital Ocean increases their market value and their profit growth rate day by day to provide their best service features with a good manner. So, if we compare the profit growth rate in last previous three years, Digital Ocean take places in the first position, then 2nd one in Amazon and last one is Azure.

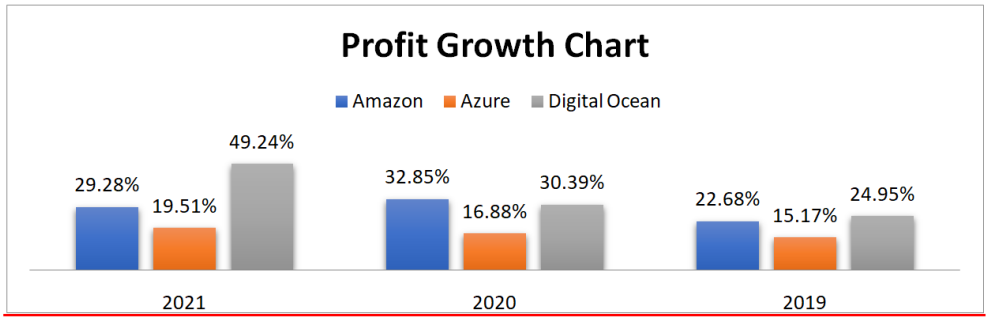

Figure 1. Profit Growth

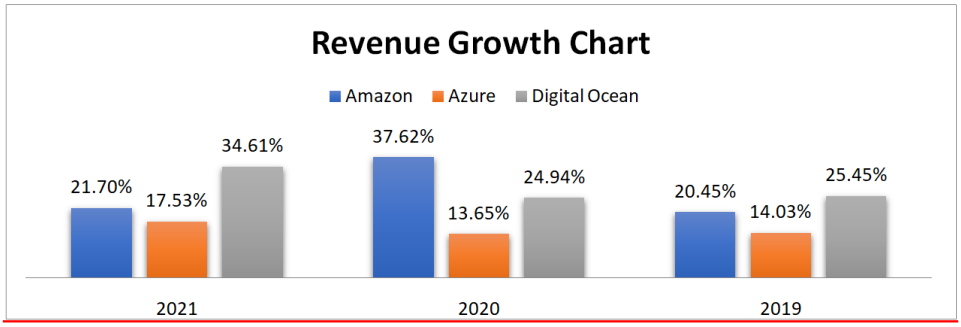

Figure 2. Revenue Growth

5. Analysis of the Comparison on Amazon, Azure and Digital Ocean

The analysis of the above comparisons shows the following result: Amazon and Azure deliver Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS), whereas DigitalOcean provides Infrastructure as a ser Service (IaaS). AWS and Azure are better for large scalable applications, whereas Digital Ocean is better for developers and tiny apps. Digital Ocean, mainly suitable for small developers and modest enterprises who need to rapidly set up a small high-performance instance, is its target market. Even still, when it comes to VM performance on the two platforms, Amazon is being beaten by the scrappy rival. Each provider is the best for a variety of different tasks. But overall DigitalOcean is best in terms of VPS Performance based on network speed, CPU usage, web server capacity, CPU-intensive operation rate, and Sequential read/write rates in our selective three cloud providers. [18]

So simply says that “Digital Ocean is not really an Amazon and Azure competitor”. But in their continuous triangle pricing battle, Amazon, Microsoft Azure, and Digital Ocean are as formidable as ever. If you expect a lot of data outflow, you should search for companies that offer a substantial provision rather than those that charge by the GB. This is particularly true when data transmission is not interzonal. Unfortunately, all three cloud companies fail to convey relevant subscription information in a logical manner, resorting to price structure obfuscation that borders on nonsense (though Microsoft is a bit better than Amazon and Digital Ocean in this regard). And, while their cloud products may differ in various ways, Amazon's information page appears positively byzantine when contrasted with Digital Ocean's no-nonsense approach.

Table 7.

FEATURE	**AWS**	**AZURE**	**DIGITAL OCEAN**
Cost	Depending on the networking, hardware, and software options selected, AWS prices are calculated using a pay-as-you-go basis. AWS customers can pay for a single virtual machine or computer cluster. In terms of subscriptions, Amazon offers protection for the purchased systems.	Cost-wise, Microsoft Azure is comparable to AWS. There are various use cases where Azure is more cost-effective compared to AWS. However, Google Cloud is less expensive than AWS and Azure. There is currently no uniformity among cloud service providers; no two cloud service providers provide the same price in the same manner.	Digital Ocean is far less expensive and more accessible than AWS and Azure. The development time and expenses are decreased since it is simple and quick to set up. This is a wise decision for new businesses.
Payment system	Credit cards and debit cards	credit cards, debit cards, and check wire transfer	Credit cards and paypal
Target Audiences	The AWS system is available to anyone who requires a significant quantity of hardware.	AZURE system is good for start up also for big companies	Developers of small-scale applications are the focus of DigitalOcean.
STRENGTH	AWS is a market leader in the bulk of cloud solutions offered globally and holds the biggest market share in both IaaS and PaaS. More often than any other cloud provider, large companies deploy mission-critical workloads to Amazon. The firm also has a strong network of managed service providers. More often than any other cloud provider, large companies deploy mission-critical workloads to Amazon. Strong managed service provider network exists at the organization.	Because the corporation offers so many service options, Microsoft Azure has a wide range of applications. Azure's capabilities are further increased via agreements with Oracle, VMware, and SAP. With 32 partners, Microsoft Azure has a sizable managed service provider network.	Virtual private servers are a subset of the servers offered by DigitalOcean. They have less computer capability than the physical structure but provide an interface powered by the Linux operating system. The company's success was attributed to the machine's great storage efficiency and cheap cost of input for user hardware.
Weakness and challenges	Although stated price cuts, several services, such as the AWS computing service, have remained the same in cost for a long time. If a	The cost of Microsoft support is high. Additionally, compared to other cloud service providers, Microsoft Azure has a lower percentage of availability zones. Improvements to service	There are no cloud computing instances with GPUs available from DigitalOcean. useful for training in data sciences, AI, and

	client is dependent on Amazon products, it could be difficult to migrate to a different service provider because AWS focuses on their finest cloud services. Utilizing fewer acquired services, which is sometimes difficult and time-consuming to re-engineer and optimize, is another difficulty. Overall costs for AWS services are reasonable, but if they aren't managed, they might become quite costly.	accessibility and initiatives for adaptability reconfiguration are still possible, nevertheless. Additionally, Azure doesn't provide any capacity guarantees to its customers, including those for which was before contracts and reserved instances.	machine learning. Like AWS and Azure, they don't provide as many services. SSH host keys may cause security problems. employs RAID-based local storage rather than a SAN Comparing DigitalOcean to AWS and Azure, it has less regions.
Benefits	With a strong track record of client success spanning from small and medium-sized organizations to big enterprises, AWS is the most experienced and enterprise-ready supplier. Being early users of new services constantly pays off for businesses that use Amazon. Users may test out more than 100 items from Amazon Web Services without cost. The business offers a selection of always-free database, developer, and mobile tools and services. Additionally, AWS provides brief free trials for ML, analytics, computing, security, and compliance as well as a 1-year trial for some goods.	For businesses utilizing Microsoft services, Azure is a particularly good fit. Microsoft Azure is a major player across all use cases and consistently delivers services in the cloud. This includes edge and all-encompassing cloud services, in which other cloud suppliers are less skilled. For 30 days, new customers of Microsoft Azure are given a $200 credit.	Digital Ocean is ideally suited for developers, small businesses, and apps. They benefit from the best price and quickest server installations. Physical security is provided by DigitalOcean in their data facilities, which is beneficial. To avoid unwanted infiltration, these centers have secure infrastructure that is insulated from physical harm. DigitalOcean should be your choice if you want a MySQL instance.

6. CONCLUSIONS

This paper provides an overview of the cloud functionalities provided by major service providers. We compare the most popular cloud providers, including Amazon, Azure, and Digital Ocean. This document explains the many sorts of disparities between these providers in terms of various attributes. This study focuses on the primary services provided by various cloud providers, such as storage, computation, and network services. Data storage, servers, databases, networking, and software, as well as other tools and applications. are some examples of the resources. In recent

years, any commercial organization has shifted its operations to the cloud, which has shown to be profitable and attracted the interest of many others. The information gathered in this research paper will help cloud customers choose the significant cloud provider according to their needs as well as the services provided by the selected cloud provider.

7. FUTURE WORK

This paper enhances in our understanding of cloud services. Despite the fact that we did not discuss the security provided by these cloud providers. In the future, we plan to expand our analysis to include more elements, such as how service providers replicate data and identify some of the top security dangers associated to cloud data, with data loss being the most serious security concern. Cloud computing will be one of the most in-demand occupations in software development, with implications for cloud infrastructure security. Industry lacks the necessary skills to ensure integrity, which is a serious worry. The shortage of trained cyber security specialists is a moderate to significant worry for 93 percent of business.[17]

ACKNOWLEDGEMENTS

We, the authors of this paper, would like to express our gratitude to our mentor, for his assistance in completing this research. And thanks to my university Daffodil International University, Bangladesh for support.

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