WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

AWS Services and their Characteristics: A review

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ABSTRACT—

Cloud computing has really become a game-changer, not just for big businesses but also in our everyday lives. It's like the digital Swiss Army knife. Companies, for instance, are all in on cloud computing because it's seen as the safe and reliable way to manage stuff, especially tracking their inventory. Imagine cloud computing as this magical service where you can stash your data and projects, and then, poof, easily access them whenever you need. It's kind of like your personal digital vault. Leading the pack in this cloud revolution is Amazon with its Amazon Web Services (AWS). They're like the rock stars of cloud computing, letting you store your data on their platform. But here's the catch: AWS has a weak point, and it's called "denial of service." For businesses that rely heavily on AWS, this could spell trouble. Now, let's talk about how cloud computing is a game-changer for small and medium-sized enterprises (SMEs). It's like the great equalizer in the business world, giving the little guys a shot at the big leagues. Most SMEs seem to have a soft spot for AWS. It's like the efficient and budget-friendly choice. So, when new companies are born, they're more likely to cozy up to AWS for their cloud computing needs. But, and there's always a but, there are concerns about the safety of the data we toss up into the cloud and how user-friendly the whole system is. This paper dives deep into the pros and cons of cloud computing, the nitty-gritty of cloud storage systems, and the techie stuff involving web services like Amazon Web Services. It's like taking a magnifying glass to the whole cloud computing shebang.

Keywords: Cloud computing, Amazon web services, Small and Medium size Enterprise, Cloud storage systems.

I. Introduction

Cloud computing is like a tech magic that lets you store and access data and programs without cluttering up your device with bulky data banks. According to the National Institute of Standards and Technology (NIST), cloud computing is like having a handy model that gives you easy access to a shared pool of customizable computing resources. These resources can be quickly set up or let go with minimal fuss from your service provider. NIST's way of looking at it could be a game-changer, especially for folks and organizations dealing with limited resources but hefty computational demands.. It provides a smarter and more budget-friendly approach to store and access data and associated services when compared to conventional methods. Amazon Web Services (AWS) stands out as a cloud computing platform and storage service, empowering businesses, government entities, and individuals to securely store their data. Additionally, it furnishes an Artificial Programming Interface (API) for enhanced functionality. API, a subsidiary of Amazon, has physical data centers located worldwide, and it is the preferred choice for most customers due to its efficiency in service delivery. According to a report [13], "Amazon dominates nearly 50% of the public-cloud infrastructure market, valued at over $32 billion." AWS serves thousands of customers across more than 190 countries [9]. Another compelling reason for AWS being the top choice is its affordability compared to other providers. With its extensive market presence and prominence, examining the sub peri in the content of AWS can lead to easily applicable findings.

II. Justification for the study

It's evident that cloud computing has become a potentially tricky intersection of advancements in computing power, data transmission speed, and the use of the internet and mobile communications. This convergence has been validated by real-world challenges.

Cloud computiing is essentially preescribed as a "form of reimagined shared-resource computing, where computing resources are consolidated in large external data centers and accessed by a wide range of users via the internet." Researchers [12] conducted a study to explore what users require from cloud computing services, and they identified two main dimensions of customer expectations, as follows:

The Technological Aspect of Cloud:

a. Equivalence:

Users want technical support that is, at a minimum, equivalent in terms of security, latency, and availability to what they experience when using traditional IT systems locally.

b. Variety:

Users desire services that offer a variety that corresponds to the purpose for which the service will be used.

c. Abstraction:

Users seek technical services that abstract unnecessary complexity to simplify the services they receive.

d. Scalability:

Users wish to receive services that can scale to meet their evolving needs.

The Service Dimension of Cloud:

e. Efficiency:

Users are interested in services that help them become more economically efficient.

f. Creativity:

Users aspire to receive services that promote innovation and creativity.

g. Simplicity:

Users want services that are easy to comprehend and use.

Over time, the field of cloud computing has evolved significantly, and so have the needs of its users. It's essential to identify these evolving needs in a more general manner to guide further research and development efforts. We should take another look at the aspect of security when it comes to using cloud computing. Mosca and his team in a study from 2014 pointed out three key challenges in adopting cloud computing and storage. They mentioned that clients often lack control over the hardware, software, and data. Also, multiple clients' data might be stored on the same physical machine, creating a vulnerability for potential attacks like algorithm breaches and flooding attacks. Moreover, due to the vast amount of data and complex calculations involved, traditional security tools may not be sufficient. There are various factors to consider in understanding the security standards for cloud computing, such as the risks associated with cloud APIs and the potential for account hijacking. It's crucial to note that clients' perception of cloud services greatly influences their satisfaction. Therefore, it's essential to identify and evaluate the aspects of cloud services that impact the perceived quality, allowing academics and developers to prioritize their focus and tasks accordingly.

In the following sections, we'll delve into customer needs and perceptions, which serve as the foundation for this study.

III. Aims and Objectives of the Study

The purpose of this investigation is to uncover the specific technical and service requirements of users in the realm of cloud computing. We aim to comprehend the partiicular factor that influences how customers percieve the quality of these services.

Our study has the following goals:

1. Examine the service offerings provided by AWS.

2. Assess the current perceptions held by users regarding these services.

3. Identify the needs of customers when it comes to moderrn cloud compuuting services.

4. Determined the factors that impact the way users perceive the quality of cloud computing.

5. Pinpoint areas for further research to enhance the quality perception.

IV. Research Queries

In line with our objectives, we've formulated the following research questions to steer our investigation:

- What services are available through AWS?

- How do users view the services offered by the company?

V. Exploration of the Issues

A. AWS and Its Services

AWS empowers user to enhance their applications and make them user-friendly through its intuitive interface. It offers a seamless framework suitable for a wide range of industries. Managing your own infrastructure can be a daunting task that demands substantial investment. As noted in [7], AWS addresses this challenge, providing a platform that caters to users from diverse industries, making their work scalable and appealing. Its user base spans content delivery, e-commerce, media hosting, search engines, web hosting, and more. In essence, AWS is a comprehensive suite of services available in one package.

Amazon EC2, or Elastic Compute Cloud, is like a digital powerhouse that brings flexible computing power to the cloud. Then there's Amazon Simple Storage Service (Amazon S3), a handy tool giving you easy access to loads of data from anywhere, whenever you need it. Developers love it for the strong access and dependable data storage it offers. Amazon's tech muscle ensures your content is always available and your data stays safe during its travels. Amazon SQS, or Simple Queue Service, is the superhero managing data transmissions seamlessly, from machinery to complex biomedical stats – all neatly integrated into the cloud.

Now, let's dive into Amazon Web Services, your go-to for all things computing. It caters to system operators, hooking you up with CPU, memory, networking, and an operational system. But, even with all these cool features, dealing with massive amounts of data during transmissions still comes with its challenges, especially when it comes to scalability and security.

Zooming into the biomedical world, everything's gone digital, residing in the cloud for security and easy access. Yet, there's a hitch – figuring out costs for big data projects can be tricky, as data might need a forever home. Physical resources, on the other hand, have upfront costs and can spread their love over 4-5 years, flexible for other projects. The catch with AWS in biomedical computing? Predicting future prices and getting upfront cost estimates is like trying to catch a cloud.

And now, the showdown – Amazon Web Services vs. the others. With AWS, you pay only for what you use over the web – a win for your wallet. It's a favorite among the cloud-savvy crowd, offering savings on hefty data storage setups. AWS stands out for being user-friendly, secure, and globally available. It's a reliability champ with smooth scalability and nifty automation features. Plus, its multi-layered security is like having a digital fortress, setting it a step ahead of the competition.

VI. Risks and Challenges in Amazon Cloud Services

Throughout the years, numerous concerns have been brought to light by various sources, all of which could potentially impact the smooth operation of cloud services [1]. One significant concern highlighted is the threat of Denial of Service (DoS) attacks. Cloud computing, due to its very nature, is susceptible to these types of attacks. The mere fact that malicious attacks targeting other entities on the same network can jeopardize the security and integrity of a user's data and processes is quite unsettling. This vulnerability is a real cause for concern. Another critical aspect is the potential scale of damage that isolated issues could inflict, especially considering the enormous volume of data stored in shared data centers (Cloud Security Alliance 2010). [2] carried out research focusing on the security issues related to Amazon EC2 service and uncovered some concerning findings. They pointed out that both customers and suppliers of public resources might suffer from the hazards arising from possible security vulnerabilities within EC2 [13].

Furthermore, it's important to note the infrastructure's limitations. Users of AWS across more than 180 countries have faced issues related to information privacy (Dutta and Dutta). They emphasized that, despite AWS's dominance in the public cloud industry, it's inaccurate to assume it provides the best solutions . In a comprehensive analysis conducted by Gandhi and Chan in 2015, they examined the network performance between pairs of AWS instances hosted across various regions. Their research revealed significant disparities in network performance in different regions. Overlooking these variations can lead to severe performance degradation for AWS users [8].

Lastly, another study delved into the security concerns at different layers of cloud computing and highlighted various inadequacies, which are illustrated

Vulnerability	Consequent effects
Vulnerabilities in virtualization	Bypassing the security barriers can allow access to underlying hypervisor.
Vulnerabilities in Internet protocol	Allow network attacks like ARP spoofing, SYN-flood, DoS/DDoS etc.
Unauthorized access to management interface	An intruder can gain access control and can take advantage of services to harbor attacks. Access to administrative interface can be more critical.
Injection vulnerabilities	Unauthorized disclosure of private data behind applications.
Vulnerabilities in browsers and APIs	Allow unauthorized service access.

VII. Cloud Computing Expectations and How People See It

We conducted a survey to get the lowdown on how folks at small and medium-sized enterprises (SMEs) view cloud computing services. What we discovered was that things like "saving costs, virtualization, and keeping space" might just be the solution to the money problems and resource challenges faced by SMEs. Security, as you can see in Figure 2, is a big deal when it comes to cloud computing, and it has some serious consequences. Now, take a look at Figure 1, showing the market share of different cloud platforms, according to Alqahtani and Gull in 2018. It's clear that security is a top concern for users, especially when it involves government and security-conscious entities. We also noticed that small companies tend to feel more secure when using AWS, believing they couldn't get the same level of security anywhere else. This, in a way, levels the playing field for new and emerging companies.

But it's not just about security; speed matters too. Users care about latency equivalence, and it's a big deal for them. So, in a nutshell, here's what we found in our study: Customers have certain needs, and we've identified them as Equivalence, Variety, Abstraction, Scalability, Efficiency, Creativity, and Simplicity. On the flip side, personal preferences, worries about security and privacy, and a lack of awareness are the main roadblocks when it comes to embracing new technology. We also noted that while there's no direct link between how risky something seems and how good it is, there is a significant connection between how good something is and how satisfied people are when using it. So, understanding the gap between what academics know about security and how it affects how people see things is something that needs more exploration.

VIII. Conclusion

Cloud computing has really made life easier for businesses. It's not just about convenience; it's been a game-changer for small and medium-sized enterprises (SMEs), giving them a boost. When it comes to cloud computing providers, Amazon Web Services (AWS) is like the go-to for individuals, organizations, and tons of businesses. It's got this reputation for being super efficient and cost-friendly, outshining its competition. AWS has kind of nailed it by offering services that don't break the bank, and that's why it's a big shot in the global arena.

But hey, it's not just about business. Cloud computing is spreading its magic into places like biomedicine. Researchers are loving Infrastructure as a Service (IaaS) because it lets them tackle big projects without burning a hole in their pockets. And let's talk security – everyone's got their eyes on it, especially when it comes to keeping their data safe. Small and Medium Enterprises are finding a sweet spot with Amazon Web Services. It's not just secure; it's also budget-friendly, making AWS the top choice for new and upcoming companies.

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