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Cloud Computing Services: A Comparative Study of Its Features

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ABSTRACT

Cloud computing has become a continuously growing platform and revolutionized how users can use and access technology. Due to its emergence, cloud computing has instigated the continuing technological development occurring within society, particularly in providing ease of service in daily routines. Cloud computing consists of various platform services, commonly seen nowadays, such as IAAS, PAAS, and SAAS. As the brink of technological advancement emerges within society, the more cloud computing continues to play an integral role. This paper explored how cloud computing services have revolutionized access to technology, with offerings ranging from basic storage and processing power to artificial intelligence. Cloud computing has revolutionized access to and utilization of technology, significantly influencing societal and organizational operations. This paper provided a comparative analysis of three primary cloud computing service models—Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS). These models vary in scalability, cost-efficiency, and user control, making them suitable for diverse applications. By enabling on-demand access, reducing infrastructure costs, and improving operational flexibility, cloud computing models have transformed various industries such as e-commerce, healthcare, and education. This study offers a clearer understanding of their characteristics and broader implications for businesses and technology users, emphasizing the strategic advantages of adopting cloud solutions.

Keywords: *accessibility and scalability, cloud computing services, daily applications, on-demand access, service models, technological advancement*

Introduction

Cloud computing has emerged as a cornerstone of modern technology, redefining how organizations access, store, and process data. Its flexibility and scalability have made it indispensable across industries, enabling cost reductions, improved efficiency, and seamless collaboration. The adoption of cloud services has evolved from basic data storage solutions to complex applications involving artificial intelligence and big data analytics, reflecting its dynamic growth.

Key to this paradigm are the three primary service models: Software as a Service (SaaS), Platform as a

Service (PaaS), and Infrastructure as a Service (IaaS). These models cater to varied business needs, offering services that range from pre-configured software to full control of virtualized IT infrastructure. For instance, SaaS provides ready-to-use applications such as customer relationship management tools, while IaaS allows businesses to manage virtual servers and storage. The ongoing innovations in cloud computing, such as edge computing and hybrid cloud solutions, have further cemented its role in addressing modern challenges. This paper explored the distinct characteristics and comparative advantages of SaaS, PaaS, and IaaS, providing insights into their application in various industries.

Furthermore, the ubiquitousness of cloud computing platforms fostering a vast array of computing resources has been integral throughout the internet. This paradigm shift has transformed how people access and utilize technology, particularly in real-life applications, such as daily activities relying on Pen and Paper Processing in a virtualized environment; all of these consisting of various cloud computing resources for different purposes. Aside from this, this platform also possesses basic hardware and software components that pose advantageous factors to society (i.e. storage and backup, etc.). In addition, cloud computing offers diverse services applicable to numerous devices, and even locations based on the report of Rainess (2016).

This paper explored the evolution of cloud services, highlighting their transformative impact on businesses and society. The introduction begins with a general overview of cloud computing, tracing its origins and evolution to the current paradigm of service models: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS). These models cater to diverse organizational needs, from scalable infrastructure to ready-to-use software applications.

Cloud computing has emerged as a transformative technology, redefining how organizations access and utilize computational resources. Despite its widespread adoption, many businesses and institutions face challenges in selecting the appropriate service model for their needs. These challenges stem from the varying functionalities, cost structures, and scalability options offered by cloud computing services. This study aims to address these issues by conducting a comparative analysis of the three primary cloud service models: IaaS, PaaS, and SaaS. The study aimed to address several key questions related to cloud computing services. It sought to identify the distinguishing features of IaaS, PaaS, and SaaS, while examining how these services differ in terms of control, responsibility, and user focus.

Additionally, the study explored the cost implications and scalability options associated with each model. Furthermore, it investigated the variations in deployment models, vendor lock-in, customization, compliance, and security across these services. By addressing these questions, the paper aimed to provide a comprehensive understanding of cloud computing services and their practical implications for businesses and organizations as well as to provide a comprehensive comparison of cloud service models and their implications for businesses.

Cloud computing's innovation became pivotal in terms of catering services from the internet and to the community (in terms of technological applications). Its technological advancement aimed to revitalize current issues regarding present services based on Alam (2020).

As seen in Figure 1, cloud environments provide on-demand access to storage and servers and empower

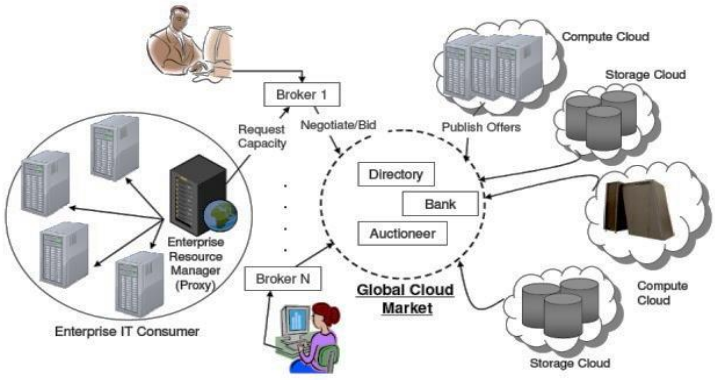

Figure 1. *Cloud Computing Resources in Organizations (Singh et al., 2016).*

collaboration through integrated tools (Singh et al., 2016). This technological breakthrough fosters faster development cycles, reduces hardware and maintenance costs, and grants global accessibility – a stark contrast to traditional, on-premise IT infrastructure. Considering this, cloud computing builds upon the foundation of grid computing, which focuses on providing shared resources to ensure effective and efficient computing. However, according to Ikechukwu (2016), cloud computing is only limited to catering to the evolving needs of modern IT, such as analyzing massive datasets.

Furthermore, cloud computing possesses numerous characteristics, which are integral to organizations and businesses. Rani and Ranjan (2014) explained that cloud computing helps reduce further costs in maintenance and parts replacement due to current technological trends – virtualization. As a supporting notion, the cloud provides wide arrays of resources, which allows users to configure, access, overwrite, or perform any process relevant to user needs. On the subject of up-to-date services, the provider has sole responsibility for updating all platform components for ease of use for users.

Figure 2 shows that most IT-oriented people articulate the paradigm that cloud computing only possesses three notable services, namely IAAS, PAAS, and SAAS, as per a study of Yasrab (2018). However, recent studies highlighting the advancements of cloud concur that cloud computing rapidly evolves beyond the said initial paradigm; thus, opening the door to exploring new possibilities and innovations within the cloud computing landscape from Khan et al. (2011).

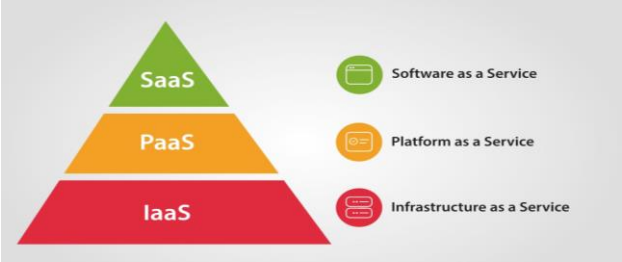

Figure 2. *Cloud Computing Service Tiers (Khan et al.,*

In a previous study, it was explained that cloud computing traditionally encompasses three service models: IaaS for remote access to fundamental resources, PaaS for application development platforms, and SaaS for on-demand and complete application access. Nowadays, this paradigm has instigated further developments, particularly a proactive approach towards providing ease of service amongst users with adherence to its advancements technologically. According to Zabolotnyi (2015), several companies worldwide shifted to flexible approaches [such as embedding cloud computing services] into their organizational processes and pursuing its beneficial effects, in terms of quality service.

As a cloud paradigm, according to Ranger (2022), platform-as-a-service offers a development-centric environment dedicated to configuring applications and services. Some of the notable technologies under the said platforms include the following, namely, Salesforce.com, Heroku, and Amazon Web Services. Moreover, cloud computing has revolutionized the access and utilization of computer technology, particularly in shifting to primitive techniques and into a more service-oriented model, with PaaS at the forefront. This paradigm offers a flexible approach to deploying business applications, eliminating the need for extensive hardware management and infrastructure investment.

Methods

This study evaluated the cloud computing service models—SaaS, PaaS, and IaaS—by analyzing their key characteristics: scalability, control, and security. Scalability was assessed based on the ability of each model to handle increasing workloads, measured through resource elasticity and automated scaling features. Control was examined by evaluating the level of user authority over infrastructure, platforms, or applications, categorized as minimal in SaaS, moderate in PaaS, and complete in IaaS. Security, on the other hand, was analyzed by reviewing the robustness of safeguards against threats, focusing on data encryption, compliance standards, and shared responsibility models. The

data for this analysis was gathered through literature reviews, case studies, and comparative frameworks proposed by previous research.

The methods employed in this study are rooted in a qualitative approach, designed to provide a deep and distinct understanding of the three primary cloud service models. By leveraging a combination of literature review and a structured comparative framework, the study systematically evaluated these models to identify their unique characteristics and practical implications. This methodological approach ensures a comprehensive and analytical examination of the topic, contributing valuable insights to the field of cloud computing.

The first step in the methodology involved the identification of the key features and attributes of IaaS, PaaS, and SaaS. This was accomplished through an extensive review of scholarly articles, technical documentation, and industry reports. These sources provided a wealth of information about the architecture, functionality, and applications of each service model, forming the foundation for a detailed comparative analysis. By synthesizing insights from these diverse sources, the study ensures that the analysis is well-grounded in both academic research and real-world industry practices.

Following this, the study employed a comparison matrix to systematically evaluate the three service models. The matrix was designed based on a set of critical criteria, including service model characteristics, levels of control and responsibility, user focus, scalability options, cost considerations, deployment models, vendor lock-in risks, customization potential, compliance requirements, and security features. This structured framework not only highlights the similarities and differences among the models but also provides a clear visual representation of their relative strengths and weaknesses, making it easier to draw meaningful conclusions.

Finally, the data from the comparison matrix was analyzed to assess the strengths and limitations of each service model. This analysis went beyond a surface-level comparison, delving into the specific contexts where each model excels or encounters challenges. For instance, the flexibility and control offered by IaaS may be advantageous for large enterprises with complex IT needs, while the simplicity and user-friendliness of SaaS might be more suitable for small businesses. Similarly, the scalability and development flexibility of PaaS were explored in relation to its potential drawbacks, such as dependency on specific vendors. By presenting these insights, the study equips businesses and organizations with the knowledge required to select the most appropriate cloud service model for their unique needs.

Ethical Considerations

This research adhered to responsible scholarship by ensuring the ethical treatment of source materials. All data and findings presented here were derived from published research articles, studies, books, and other credible sources. The utmost integrity was maintained in handling these sources.

Results and Discussion

Services Overview

Cloud-computing services offer a wide range of resources, namely software, hardware, and networking, including standardized office applications. In addition, this service has led to the further virtualization of the workplace – and even the continuing emergence of quantum computing. Cloud computing service models possess various indicators in terms of distinguishing the types of services to be offered.

Figure 3 illustrates the salient key points on how the three services vary from one another. Considering this, some prominent examples include providing hardware and software resources, a user-friendly interface for development, etc. In addition, these models are classified into three, namely SaaS, PaaS, and IaaS.

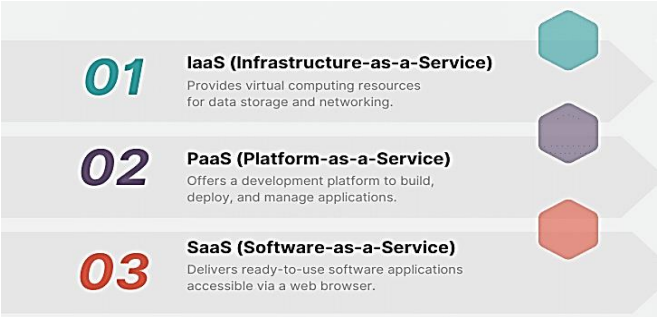

Figure 3. *IaaS, PaaS and Saas Comparison (Höfer & Karagiannis, 2011).*

Software as a Service (SaaS)

Khan et al. (2011) coined that SaaS applies to business areas with standardized processes, where pre-developed resources are embedded to improve the business landscape and overall processes. Höfer and Karagiannis (2011), on the contrary, concur that SaaS provides pre-configured applications where customers share no management access nor control in the said infrastructure; thus, limiting possible user-specific configurations.

Furthermore, Laszewsika and Nauduri (2012) discussed that SaaS are applications delivered as a service to end users over the internet. Coined as the earliest model of cloud computing, software companies commonly use this type of service to sell their solutions to businesses based on the number of users with a given set of service-level requirements. Some of the notable platforms under SaaS include Oracle (with its CRM on Demand solution), Salesforce.com, and Google (with its Google Apps). Shazhadi et al. (2017) agreed and further added that SaaS is a demand-based application, which is hosted, maintained, and managed by cloud service providers through a central location.

Moreover, Singh et al., (2021) further added that it is a way of delivering software to end users by having the service itself delivered to them through the internet. Moreover, it frees users from software struggles, such as program versioning and other configuration settings. Mohammed and Zeebaree (2021) highlighted the key characteristics of Software as a Service in their study. As mentioned, SaaS is capable of hosting software for third parties and is accessible through a web interface.

Platform as a Service (PaaS)

Khan et al. (2011) study focused on the functions of PaaS, particularly in application development. In relation, he further derived that PAAS can provide the required resources in hosting, including other web application properties. Adhering to their findings, Höfer and Karagiannis (2011) also mentioned that PaaS offers a strong infrastructure management feature, capable of building and deploying application classes, with the support of structured programming languages and virtual environments.

As a supporting notion, Laszewsika and Nauduri (2012) fortified their findings and explained that PaaS is a platform designed for application development with fortified components to complement its functions promptly. Some of the notable examples of platforms under this service are Amazon Elastic Compute Cloud (EC2) and Savvis. Considering both studies, Shahzhadi et al. (2017) stated that PaaS is essential to platforms capable of handling multiple clients. To further add to Laszewsika and Nauduri (2012), it also uses a platform designed for application development, consisting of integrated databases and web services.

Regarding the previous findings, Singh et al. (2021) also concluded that a PaaS also involves authoritative management towards developing applications, including the presence of a virtual environment used to simulate its service; thus, later embedded through web services. Mohammed and Zeebaree (2021) added other notable PaaS characteristics, namely, in multi-tenant architectures and pre-constructed features, such as granular access, and sharing of security, etc.

Infrastructure as a Service (IaaS)

Khan et al. (2011) added that IaaS allows users to access required services, and later hosted for improving ease of service. Considering the previous findings, Höfer and Karagiannis (2011) agreed and stated that the IaaS platform can provide configuration features for virtual machines, including control management.

Laszewsika and Nauduri (2012) further elaborated that IaaS focuses on the delivery of server, storage, and network hardware resources as a service. Among the profound platforms under IaaS is the Amazon EC2, under Amazon Web Services (AWS). In addition, Shazhadi et al. (2017) also added that users in IaaS utilize virtual resources for system deployment and application software, as required by their user needs.

In numerous studies, Singh et al. (2021) strongly posed that IaaS supports the software, and it includes things like networks, storage, and computers. Thus, IaaS paved the way for companies to control all organizational infrastructures better. Aside from the prominent findings on its functionalities, Mohammed and Zeebaree (2021) discussed the characteristics of IaaS as a Cloud Service Provider (CSP). In their study, IaaS has distributed infrastructure services, permitting dynamics, possessing user-friendly modeling at economical prices, and further providing a wide array of resources to its multiple users.

Choosing the right service model is based on distinct factors, namely technical expertise, budget, desired level of control, and application requirements. Considering the three [out of the many] cloud computing services mentioned, each varies distinctly based on its functionalities, properties and components involved, and objectives.

Studies have shown how it can be applied to businesses and organizations, and its salient points to discuss when distinguishing one cloud computing service from the other.

Feature	SaaS (Software as a Service)	PaaS (Platform as a Service)	IaaS (Infrastructure as a Service)
Control	Least control	Moderate control	Most control
Responsibility	Provider manages most	Shared responsibility	User manages most
User Focus	End-users	Developers	IT professionals
Scalability	Automatic, based on user needs	Scales development environment	Granular control over individual resources
Cost	Pay-as-you-go pricing	Tiered pricing based on features and resources	Variable costs based on resource consumption

Figure 4. *Comparison of Cloud Computing Services Based on Control, Responsibility, User Focus, Scalability, and Cost (Mohammed & Zeebaree, 2021).*

Figure 4 presents a tabular summary of the salient points in differentiating the three cloud computing services based on the following features: service model, control, responsibility, user focus, scalability, and cost.

Service model. Buyya et al. (2011) cited that in terms of service models, SaaS possesses pre-built, multi-tenant applications, which are standardized, ready-to-use applications accessible through a web browser or API. On the other hand, PaaS is geared towards further development and deployment programs; thus, providing a complete environment with tools and resources for building and deploying custom applications. In addition, IaaS provides the fundamental infrastructure requirements.

Control. Golightly et al. (2011) exemplified that SaaS has the least to no control over the application, whereas customization options are only limited to user settings and configurations within the framework. In relation, PaaS possesses more control and can manage not only user configurations but also application code, and development tools within the platform limitations. Lastly, Infrastructure as a Service can manage everything, including operating systems, middleware, applications, security, and resource allocation.

Responsibility. Mell and Grance (2011) discussed that Software as a Service (SaaS) involves the least user responsibility, whereas the vendors can manage underlying infrastructure limitedly. Compared to this, PaaS possesses more control, specifically in the development, deployment environment, and other platforms involved. Lastly, IaaS embeds a strong sense of control and management for the entirety of infrastructure resources.

Feature	IaaS	PaaS	SaaS
Service Model	Infrastructure	Platform	Software
Deployment Model	Public, Private, Hybrid	Public, Private, Hybrid	Public, Private, Hybrid
Vendor Lock-in	Low (High Flexibility)	Medium	High (Limited Flexibility)
Customization	High (Full Control)	Medium (Application Customization)	Low (Limited Customization)
Compliance	Requires careful configuration based on specific regulations	May offer pre-built compliance features	May require integration with additional compliance tools
Security	High (Provider Responsibility for underlying infrastructure, but user manages OS, applications, and data security)	Moderate (Shared Responsibility Model - provider secures platform, user secures applications and data)	Low (Provider Responsibility for application and platform security)

Figure 5. *Comparison of Cloud Computing Services Based on Deployment Model, Vendor Lock-In, Customization, Compliance, and Security (Mell & Grance, 2011).*

User Focus. Golightly et al. (2011) derived that SaaS, which offers pre-built applications, targets end-users, requires minimal technical expertise, and is designed for ease of use. Platform, consequently, is focused on developers, particularly in providing more control in application codes and platform configurations. In addition, infrastructure combines both services because it caters to IT professionals by offering fundamental infrastructure resources, thereby having general control over the entire infrastructure and possessing the highest technical expertise.

Scalability. Buyya et al. (2011) concluded that considering scalability, SaaS offers on-demand scaling by upholding services automatically, such as allocating resources (storage, processing power) and handling activity spikes without manual intervention. In terms of Platform as a Service, it focuses on providing a scalable environment for development, where it involves adding more virtual machines or increasing database capacity. Furthermore, IaaS provides granular control, which is pivotal to scaling infrastructure resources**.**

Cost. Mell and Grance (2011) explained that the three mentioned cloud computing services vary distinctly, particularly in their cost. For instance, SaaS offers a pay-you-go price model feature, capable of providing utmost cost-effectivity for businesses and organizations. PaaS has a tiered structure of pricing, which is based on the scale of features and resources available and/or offered. Of these two services, Infrastructure as a Service has the most variable, which varies distinctly on the consumption of resources needed, particularly in the required workloads.

Apart from the notable features discussed, some studies have also delved more into their technical features. Figure 5 shows the other features as follows: deployment model, vendor lock-in, customization, compliance, and security.

Deployment Model. Rani and Ranjan (2014) clarified that IaaS, PaaS, and SaaS are deployable across a variety of models. According to their study, public is where cloud providers host access to resources through the internet, which varies distinctly to private where it dedicates resources through a single organization only. Rani and Ranjan also mentioned the concept of a community cloud, which serves as a supporting notion to the model varieties. In addition, a hybrid combines both public and private cloud elements.

Vendor Lock-In. Bhokari et al. (2016) conferred that SaaS has the highest level and can lock in applications and data in a provider's platform. For PaaS, providers under this tier require further code changes or re-platforming because it only has a minimized lock-in due to APIs and platform tools. Lastly, IaaS possesses flexible lock-in features, particularly utmost management with minimal complexity.

Customization. Concerning the findings of Golightly et al. (2011) in their study, Gorelik (2013) also added customization as a similar feature. In their study, SaaS offers limited customization to applications only. PaaS, on the other hand, can customize application code and integrate with external services. More so, IaaS has the highest level of customization to the entirety of the infrastructure stack.

Compliance. Mohan et al. (2017) highlighted the pivotal role in the level of compliance. For instance, in their study, SaaS requires integration with additional compliance tools depending on the specific regulations. Similar to this, PaaS offers pre-built compliance features that align with common regulations. Furthermore, IaaS requires careful configuration to meet specific industry regulations since organizations have the utmost control over every infrastructure.

Security. Considering both control and responsibility as the key features, security is also an integral aspect of the three services. For SaaS, the vulnerability of stored data is a possible threat, whereas the use of SSL and TLS are integral to preventing attack occurrences. Similar to this, the platform as a service normalizes the use of homomorphic encryption, wherein it allows ciphertext operations for added security; and thus, employs data encryption.

Among the two cloud service models, IaaS uses SecLaaS as its sole security feature, which provides the required security techniques to be embedded within the platform. Freet et al. (2015) also added that it also prevents further violation of data integrity. Freet et al. (2015) concurred that security is generally the provider's responsibility since SaaS providers invest in security measures (such as encryption) to protect their platform and customers.

Table 1. Table of Comparison Among SaaS, PaaS, and IaaS Models

Parameter	SaaS	PaaS	IaaS
Scalability	Automatic scaling of resources.	Scales development environments	Granular control over resources.
User Control	Minimal (limited to user settings).	Moderate (customizable applications)	Complete (full access to infrastructure).
Security	Provider-managed; encryption (e.g., SSL/TLS).	Shared responsibility encryption with homomorphic methods.	User-managed; flexible but requires expertise
Cost	Pay-as-you-go is cost-effective for small businesses	Tiered pricing based on resource needs	Variable; depends on resource usage.
Primary Use Case	End-user applications (e.g., Google Workspace)	Application development (e.g., Heroku)	IT infrastructure (e.g., AWS EC2).

Table 1 visually represents various distinctions, aiding readers in understanding how each model suits specific business needs.

Case Studies Results

To illustrate the practical impact of cloud computing service models, the following case studies highlight their real-world applications:

SaaS: CRM Integration for Small Businesses. A small business adopted Salesforce (a SaaS platform) for customer relationship management. This reduced the need for in-house IT support while improving customer engagement through pre-configured tools. The SaaS model allowed the business to scale user licenses as needed, optimizing costs and efficiency.

PaaS: Streamlining Application Development. A software development company utilized Microsoft Azure's PaaS offerings to build and deploy applications rapidly. By leveraging pre-built development tools and integrated databases, the company cut development time by 40%, enabling faster time-to-market for its software products.

IaaS: Scalable Infrastructure for E-Commerce. A growing e-commerce platform transitioned to Amazon Web Services (AWS) IaaS to manage its infrastructure. By scaling virtual servers during high-traffic periods, the company maintained seamless user experiences while minimizing downtime and operational costs.

The Comparative analysis presented through figure is shown in Figure 6.

Figure 6. *Comparison of Cloud Computing Services Based on Scalability, User Control, Security, and Cost.*

Cloud Service Models

Software as a Service (SaaS). SaaS provides pre-configured software applications delivered over the internet. End-users can access these applications via web browsers, eliminating the need for local installations or updates. Popular examples include Google Workspace and Salesforce. While SaaS offers ease of use and minimal technical expertise, it limits user control over the underlying infrastructure. For small businesses requiring standardized processes, SaaS is an ideal solution. However, vendor lock-in and limited customization remain significant drawbacks.

Platform as a Service (PaaS). PaaS offers a development-centric environment where users can create, test, and deploy applications without managing the underlying infrastructure. Notable examples include Heroku and Microsoft Azure App Services. PaaS strikes a balance between control and ease of use, making it suitable for developers focusing on application development. However, its reliance on platform-specific tools may pose integration challenges for some organizations.

Infrastructure as a Service (IaaS). IaaS provides fundamental computing resources, such as virtual machines and storage, allowing organizations to manage and configure their environments. Prominent examples include Amazon EC2 and Google Compute Engine. While IaaS offers unparalleled control and flexibility, it demands significant technical expertise to manage and secure the infrastructure. This makes it a preferred choice for enterprises requiring customized solutions but may be less suitable for organizations with limited IT resources.

Comparative Analysis

Control and Responsibility

SaaS offers minimal control, as vendors manage the infrastructure and applications. PaaS provides moderate control, enabling users to manage applications and development tools. IaaS grants full control over the infrastructure, including operating systems and security configurations.

Scalability and Cost

SaaS supports automatic scaling and operates on a pay-as-you-go model, making it cost-effective for small businesses. PaaS provides scalable environments for development but follows a tiered pricing structure. IaaS offers granular scalability but incurs higher costs due to resource consumption.

Emerging Trends

Recent advancements in cloud computing, such as serverless computing and edge computing, are reshaping the landscape. Serverless computing eliminates the need for infrastructure management, allowing developers to focus solely on code. Edge computing enhances performance by processing data closer to the source, reducing latency. AI-driven platforms, such as IBM Watson and Google AI, are also integrating with cloud services, enabling advanced analytics and decision-making capabilities.

Challenges

Security Concerns. Data security and privacy remain critical challenges in cloud computing. SaaS models are particularly vulnerable due to centralized data storage. Homomorphic encryption and Security as a Service (SecLaaS) have been proposed as solutions, but implementation complexities persist.

Vendor Lock-in. Organizations often face difficulties migrating between cloud providers due to proprietary technologies and data formats. Hybrid cloud models aim to mitigate this issue by combining public and private cloud elements, offering greater flexibility.

Conclusion and Future Works

This study compared SaaS, PaaS, and IaaS cloud computing models, focusing on their scalability, user control, and security features. While SaaS offers convenience for end-users, PaaS provides developers with a flexible environment for application development, and IaaS grants IT professionals complete control over infrastructure. However, this research acknowledges its limitations, including its focus on the three primary models and reliance on secondary data. Future studies could explore emerging models such as Function-as-a-Service (FaaS) and advancements in hybrid and edge computing. Moreover, an in-depth analysis of cybersecurity concerns across models, particularly in data-intensive industries, is recommended to address evolving challenges. Cloud computing continues to shape technological innovation, offering scalable and cost-effective solutions for diverse sectors. By understanding the unique features of each service model, organizations can make informed decisions to leverage the full potential of cloud technology.

This research paper has discussed the comparison between the various cloud computing services, based on their distinct functionalities. Aside from this, it has also exemplified the importance of cloud computing nowadays, particularly in providing wide arrays of resources and ease of service to its clientele, particularly to the technology market. Considering businesses and their users, Cloud computing focuses on how to utilize technology in these fields. Cloud services provide the resources, foster collaboration, and reduce costs. This platform also offers different service models, such as IaaS, PaaS, and SaaS. Cloud computing benefits businesses by reducing hardware costs (no local installations) and offering a large, on-demand resource pool. Providers handle software updates, and APIs enable easy interaction with cloud software.

Cloud computing's varieties of resources and services serve as fundamental properties to provide quality service at the utmost demands of clientele. Cloud services are delivered through various models, namely SaaS, PaaS, and IaaS. Considering this, it has concurred that SaaS is ideal for standardized business processes and offers pre-built applications accessible through the internet, whereas PaaS is focused on application development, deployment, and provision of resources to users, such as pre-built functions and virtual environment to sustain the application development and deployment. Out of the three, IaaS offers the highest level of control for users, allowing them to manage virtual machines, storage, and networking components. Furthermore, findings from preceding studies on the comparison of the various features were fortified using distinct factors and considerations, namely service model, control, responsibility, user focus, scalability, and cost.

From this, it can be concurred that in terms of technical expertise, SaaS requires the least expertise, while IaaS requires the most and PaaS falls somewhere in between. Second, considering the utmost control, users have the most control over IaaS, followed by PaaS and then SaaS. Third, out of all the three cloud computing services, SaaS has been able to handle more responsibility than IaaS followed by PaaS. Fourth, in focusing on which user can access a particular service, SaaS targets end-users, PaaS focuses on developers, and IaaS caters to IT professionals. Fifth, scalability is a pivotal factor to be considered among the three, whereas it was derived that SaaS offers automatic scaling, PaaS scales the development environment, and IaaS provides granular control over resource scaling. Lastly, all three services vary distinctly in their cost-effectivity. For instance, SaaS has a pay-as-you-go model, PaaS has tiered pricing, and IaaS costs vary based on resource consumption. Concerning other features, all three cloud computing services can utilize various deployment models, whether public (easy access, scalability), private (high security, control), hybrid (combines both), and community (targeted resources). In terms of vendor lock-in, SaaS has the highest level, followed by PaaS with the second-most highest, and IaaS as the most flexible among the three.

Similar to its control features, SaaS has limited access to customization followed by PaaS and IaaS with the highest level among the three. For compliance, additional tools are required for SaaS, while PaaS already possesses

pre-built compliance features and IaaS has careful configuration due to the possession of a higher level of control among the three. Lastly, SaaS has a shared security feature responsibility, whereas CSPs under this model handle more security aspects. PaaS, on the other hand, requires moderate expertise due to its diversified infrastructure. As for IaaS, it demands the utmost knowledge of security. Moreover, cloud computing continues to evolve, offering new possibilities and innovations in accessing and utilizing technology. Differentiating the three models [SaaS, PaaS, IaaS] varies distinctly on various factors and their functionalities in businesses and/or organizations.

This study highlights the unique characteristics of SaaS, PaaS, and IaaS, emphasizing their roles in addressing diverse organizational needs. While SaaS is suitable for standardized processes, PaaS caters to developers, and IaaS provides maximum control for IT professionals. Emerging trends, such as serverless computing and AI integration, are poised to further enhance the cloud computing landscape. Future research should explore the interplay between these service models and hybrid cloud architectures, focusing on overcoming challenges like security and vendor lock-in. By understanding these dynamics, organizations can make informed decisions and leverage cloud computing effectively.

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Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.