Implementation and Adaptation of Cloud Service

Jonothan Kim

Abstract:

As businesses strive to stay competitive in today's environment, the development of cloud service has come across as a new technology trend. The trend of implementing cloud services for IT businesses over the use of premises servers was due in part to the efficiency of productivity and cost effectiveness of the cloud services. This survey focuses to address the implementation of a cloud service over the world, and to analyse the various advantages and comprehensive view of its efficiency. Additionally, we have explored the result of implementing a cloud service in a business, the importance of maintaining good security practices in a cloud service, and to analyse the previous attacks and discuss adaptations made to security protocols.

1. Introduction

Cloud service has been drastically grown up over the past decade followed up with the interests from both enterprises and individuals. The cloud service has been replacing the premises servers within google, amazon, azure and many more, due to the rising number of IT start-ups having low budget to begin the business. Google Cloud, the most well-known public cloud-based service, generated a revenue of 13 billion U.S. dollars [1], as well as Amazon Web service generated an average revenue of 45.37 billion U.S. dollars from 2013 to 2020 [2]. These services can keep costs low by charging users by a subscription-based model. The maintenance cost and manpower of a Premises server is also excluded from any costs as Cloud service subscriptions cover these costs. The labour required to maintain these services are also subsidized to the Cloud service provider. Cloud services have an additional benefit of utilizing less floor space compared to the Premises server counterpart [3]. Tech giants such as Google and Amazon both established themselves as top contenders, belonging with the advanced data protection, flexibility, and accessibility, which provides an attractive offer to enterprise and individual users [4]. Security concerns play a major role in the decision process that individuals consider when signing up to the service. This is due to the adaptation of a new technology, which has not been fully recognised as a mainstream [5]. Thus, this survey will demonstrate the previous weaknesses before the cloud adaptation, and the reinforcement after the implementation of cloud service.

2. Related Work

There is a large range of resources available for reference that share a similar data pool to this survey related to the implementation and development of cloud services.

2.a. Companies joining cloud services

Priyanshu Srivastava [6] introduced a brief evaluation of cloud computing and the advantages of utilizing the cloud service. The implementation of cloud service technology enhances the enterprises' operations, aiding in keeping costs low, allowing more flexibility from its employees, and greatly enhancing security. This is due to the benefits of a cloud service in comparison to an on-premises server, where it hosts servers over the internet on a scalable, and virtual infrastructure. It allows enterprises to share resources without purchasing, installing, and operating the computing resources [3]. On-premises servers require many prerequisites regarding installation, which leads to enterprises preferring a cloud service as a replacement. The cost efficiency provided by cloud implementation is highly beneficial. Purchasing an on-premises server may cost between $1000 to $3000 for a small business, meanwhile the cloud server charges $40 per month. Small businesses must invest thousands of dollars to begin operating a on-premises server, with additional expenses for management, security

fee and networking [7]. By utilizing a cloud service, additional expenses will be excluded, allowing the creation of small businesses without an egregious sum of money as an investment to jumpstart server hosting services. This proposal is the core argument for the switch from an on-premises server to a cloud service.

Priyanshu Srivastava [6] also investigated on different types of cloud services; Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS). SaaS is the way of carrying application as a service on the internet, which assists users to manage the complex software and hardware [8]. This is only accessible with the internet connection but does not require any others besides the installed software, ex. Microsoft Office and Google Apps. PaaS provides the development environment to the users to construct their own applications that can run on the provider's infrastructure, ex. Linux, MySQL, Ruby [8]. IaaS offers fundamental infrastructure of virtual services, network operating systems and data storage drives. IaaS is the most common model of cloud service and is the main purpose of a variety of enterprises transferring from premises server to cloud. These services allow the enterprise to decide their own needs of service, also to interact with each other to form one comprehensive cloud computing.

2.b. Successful cases (how cloud services have advanced large companies)

Sourav Mukherjee's [4] analysis on the cloud service providing company, Amazon Web Service (AWS), provides insight on its rise to the top of the IT industry. The main benefits of AWS contain cost-effectiveness, data protection and scalability. Amazon's interpretation to cost-effectiveness was to minimise the running time of the cloud service, and in doing so only charge users based on the usage whilst excluding unnecessary traffics [9]. Data protection is an important practice for a cloud service. AWS resolved it by using National Institute of Standard and Technology approved encryption standard algorithm to encrypt the stored data, purge sensitive data in caches and logs, and implement data encryption on the device and server. In terms of scalability, AWS uses Dynamo DB auto-scaling to optimise the capacity allocation for cost and usage [10]. The minimum and maximum capacity allocation for autoscaling is determined through Dynamo DB, which maximises the performance and scalability of a cloud service. Within these benefits, enterprises consider relying on AWS to provide them with hosting servers.

2.c Previous attacks

Anthony Bisong and Syed M. Rahman [5] concerned about security threats, risks, and vulnerabilities on cloud service within the rising of popularity for both enterprise and individuals. Cloud computing security became a serious issue after Google, a leading provider of cloud computing services, was attacked by hackers from China [12]. This is due to the cyber hackers treating the cloud service as a new frontier to steal private information, and course harm to the enterprise, as many businesses are implementing the cloud service nowadays.

Muhammad Kazim [13] states location flexibility may not be a beneficial feature for cloud services. Cloud services do not rely on physical locations, therefore, can be breached by anyone with access to the internet. Furthermore, cloud providers struggle to apprehend overseas black hat hackers, as different national jurisdictions may result in an inadequate punishment.

2.d Reinforcement

Edward J. [11] introduced steps for cloud providers to protect against security threats. These include understanding the cloud structure, reinforcing the internal security, and to monitor the development or changes in the cloud technology. By having an in-depth understanding of cloud service, the cloud provider can supply detailed information on its security architecture and can make changes depends on the vulnerability that came across throughout the audit. Reinforcing internal security can be done by using advanced firewalls and access controls to avoid any future threat that can occur due to the leak of technology [14]. Monitoring the development is not the solution that can be applied in the current

stage, however, is one of the most important and simple acts to be done. If any changes are made from the development to improve the security issue, by simply applying its update, most of the potential threats can be resolved. As cloud service is a growing technology, the update can be released often over time.

3. Summary

With the increase amount of cloud service implementation over enterprises and public, this survey has overviewed and summarised cloud related articles about the purpose and its benefits, successful cases, and the security issues of the implementation. The benefits were mostly focused on cost, efficiency and enhanced security compared to the on-premises server, and the success of the case was due in part to having the enhanced benefits that came with the in-house technology. The security problems encountered in the google case study have proven to be a serious issue, bringing the reinforcement and development of safety features to the forefront of the industry's goals.

References

[1] J. Rottgers. (2018, August), Snapchat loses 3 million daily users, but beats expectations in q2 earnings. [Online]. Available: https://variety.com/2018/digital/news/snap-posts-q2-revenue-beat- but-daily-users-down-for-first-time-1202898312/

[2] Lionel Sujay Vailshery. (2022, Feb 16), Annual revenue of Amazon Web Services from 2013 to 2020. Statista. Available: https://www.statista.com/statistics/233725/development-of-amazon-web-services-revenue/

[3] Garrison, Gary, Sanghyun Kim, and Robin L. Wakefield. (2015, April 7) "Success factors for deploying cloud computing. Available: https://dl.acm.org/doi/abs/10.1145/2330667.2330685

[4] Mukherjee, Sourav. "Benefits of AWS in modern cloud." (2019, July 9) Available: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3415956

[5] Bisong, Anthony, and M. Rahman. "An overview of the security concerns in enterprise cloud computing." (2011) Available: https://arxiv.org/abs/1101.5613

[6] Srivastava, Priyanshu, and Rizwan Khan. "A review paper on cloud computing." (2018 June) Available: https://www.researchgate.net/publication/326073288_A_Review_Paper_on_Cloud_Computing#:~:text=It%20improved%20System%20Reliability%2C%20offer,run%20your%20infrastructure%20more%20efficiently.

[7] Mark Lahn. "How much does a server cost for a small business in 2022?" (2022 February 12) Available: https://www.servermania.com/kb/articles/how-much-does-a-server-cost-for-a-small-business/#:~:text=The%20average%20cost%20to%20rent,3000%20for%20a%20small%20business.

[8] Yang, Haibo, and Mary Tate. "A descriptive literature review and classification of cloud computing research." (2012) Available: https://aisel.aisnet.org/cais/vol31/iss1/2/

[9] Aws, "Cost-effective resources" Available: https://docs.aws.amazon.com/wellarchitected/latest/framework/cost-cereso.html

[10] DeCandia, Giuseppe, et al. "Dynamo: Amazon's highly available key-value store." (2007) Avaliable: https://www.allthingsdistributed.com/files/amazon-dynamo-sosp2007.pdf

[11] Edwards, J. (2010). Defending the cloud - and your business. Webhostingunleashed.com. (2010 March 9) Avaliable: http://www.webhostingunleashed.com/features/defendingcloud-090208/

[12] Markoff, John, and David Barboza. "2 china schools said to be tied to online attacks." (2010 Feb 18) Available: https://www.nytimes.com/2010/02/19/technology/19china.html

[13] Kazim, Muhammad, and Shao Ying Zhu. "A survey on top security threats in cloud computing." (2015 March) Avaliable: https://www.researchgate.net/publication/273950623_A_survey_on_top_security_threats_in_cloud_computing

[14] Hashizume, Keiko, et al. "An analysis of security issues for cloud computing." (2013) Available: https://jisajournal.springeropen.com/articles/10.1186/1869-0238-4-5