A Comparative Analysis of Cloud Computing Service Providers

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Introduction

Cloud computing is a delivery of IT as the services such as storage, database, software, networking through the internet. The information in the cloud can found remotely in the cloud or a virtual space. The cloud is simply third party server or any internet location which is owned by people personally. In current technological era, cloud computing is so demanding because it is so flexible.. Nowadays, many people are choosing cloud computing because can cut down the maintenance cost for the hardware and the software. If we look back, the idea of cloud computer was started in 1960s when Larry Roberts and Bob Taylor created a network named ARPANET (Advanced Research Projects Agency Network). It was the world's first network that allows sharing resources digitally among computers that is in different location. Then on 1970s, IBM releases an operating system named Virtual Machine and then on 1990s VPNs has been discovered. 2000s is the years where cloud computing system became popular among people. Currently, there are three main cloud computing giants in the world which are Amazon Web Services (AWS), Microsoft Azure and Google Cloud Platform. The Amazon Web Services (AWS) was launched on 14th March 2006, Microsoft Azure was released on 1st February 2010 and the Google Cloud Platform was launched on 7th April 2008. From here we can see that all this companies have more than 10 years of experience on cloud computing and its existence for more than a decade shows its demand from people. Some industry observers expect cloud computing to continue to increase in popularity in the years to come. Chrome books are one example of how all personal computers can grow in future under this trend which is device with less local storage and some local applications in addition to web browser where online applications and services are accessed. The Cloud computing process occurs when you upload your data to a website and then the data you have saved can be accessed from somewhere else, from another computer, another laptop, tablet computer or from any mobile phone via internet connection. For example, Apple sees Cloud Computing as a process that has its own future. Their seriousness is evident, the proof that Apple created the iCloud application to allow cloud computing activities to be done through their devices such as MacBook, iPhone or iPad. Cloud computing can be run anytime, from anywhere, usually using free websites or free web applications like Google Docs. The best example of understanding cloud computing or cloud computing is like 4shared, where in this website hundreds of thousands of 4shared users upload their favorite songs to share with other users whom they do not know and have never met, but have an interest for the song. Other users who like a similar song access the 4shared site, view the uploaded song, like it and then download the song or share the link with other friends. Cloud computing is increasingly being used. Large companies also use cloud computing as a space for employees to share data while trying to complete a task without meeting face to face, but interacting at the same time. They also use Cloud Computing as a place to 'back up' important data. It can save paper, save time, save energy and save our money too.

Comparative Evaluation

Table 1. Comparative evaluation of Cloud Computing Service Providers.

Comparative points	Amazon EC2	Google Cloud Platform	Microsoft Azure
Service model	IaaS [1]	IaaS, PaaS, SaaS[2-3]	IaaS, PaaS, SaaS[4]
Virtual Machine (VM) instance types offered	Nano, micro, small, medium, large, metal[5]	micro, small, medium, large [6]	Small, medium, large [7]
Storage	Block storage, archive storage, data transport, file storage, scalable storage, backup [17]	Block storage, object storage, archival storage, file storage, data transfer, and file storage [18]	File, Blob, Queue, Table, Archive [19]

OS environments offered	Amazon Linux, Ubuntu, Windows Server, Red Hat Enterprise Linux, SUSE Linux Enterprise Server, Fedora, Debian, CentOS, Gentoo Linux, Oracle Linux, and FreeBSD [8]	CentOS, Container-Optimized OS, Debian, Fedora CoreOS, Red Hat Enterprise Linux, SQL Server, SUSE Linux Enterprise Server, Ubuntu LTS, Windows client, and Windows Server [9]	CentOS, Windows client, Windows Server, Amazon Linux, Debian, Red Hat Enterprise Linux, Oracle Linux, OpenSUSE, SUSE Linux Enterprise Server, and Ubuntu LTS [10]
Security	Infrastructure security, interface VPC endpoints, resilience, data protection, identity and access management, key pairs, security groups, update management and compliance validation [11]	Infrastructure security, network security, endpoint security, Data security, Identity and access management, application security, security monitoring and operations [12]	Infrastructure security, identity management and access control, network security, data security, key, secrets and certificate management, and security center [13]
Performance and scalability	Target tracking scaling, Step scaling, and Simple scaling [14]	Automation, Loose coupling, and Data-driven design [15]	Cache-Aside, CQRS, Event Sourcing, Deployment Stamps, Geodes, Index Table, Materialized View, Priority Queue, Queue-Based Load Leveling, and Throttling [16]
Pricing model	On-Demand, Spot instances, Savings Plans, Reserved Instances, Dedicated Hosts [17]	Free, Bring your own license, Usage-based pricing [18]	Pay as you go, Reserved Virtual Machine Instances, Spot Pricing [19]
Auto-Scaling/Elasticity	Scheduled Scaling, Dynamic Scaling, Predictive Scaling [20]	CPU utilization, the serving capacity of an external HTTP(S) load balancer, Cloud Monitoring metrics, Schedules [21]	Metric-based, Time-based [22]
Monitoring tools/service provided	System status checks, Instance status checks, Amazon CloudWatch alarms, Amazon CloudWatch Events, Amazon CloudWatch Log, and Amazon EC2 Dashboard [23]	SLO monitoring, custom metrics, Google Cloud integration, Monitoring agent, Logging integration, Dashboards, Group/cluster support, Alering, and Uptime monitoring [24]	Autoscale, Visualizations, Dashboards, Workbooks, Power BI, Event Hub, Logic Apps, and API [25]

Cloud Platform

Table 2. Advantages and disadvantages of cloud platform

SERVICE	**Cloud Service**				
	Dropbox	**AWS (Amazon web service)**	**Azure Cloud**	**Google Drive**	**pCloud Storage**
Free to used	×	✓	×	✓	✓

		(Only 20 GB)	(Cost-efficient)	(Only 15GB)	(Only 10 GB)
Easy to used	✓	✓	×	✓	✓
Have a good security	×	✓	✓	×	×
Can sharing a big file once	×	×	✓	×	✓
Have a high speed data transfer	×	✓	×	×	✓

Opinion

Table 3. Opinion for best cloud platform

Name	Opinion
Kabilashwaran A/L Selvarajan	In my opinion, I will select Microsoft Azure as my service provider for my software development. For software development, programming is one of the most important part. Since the open source system supports Linux, I can do programming with ease because it can provide such development tool. So, developers no need to be worried about compatibility with it because it allows to write, compile and run algorithms. Azure also comes up with hybrid cloud model which provide world class security. Azures provide high level security so I can be always feel secured about their data. Threat Intelligence, Advanced Threat Analytics, Azure Information Protection, and Multi-Factor Authorization are the ways Microsoft Azure taken to scan for threats on the spot and reacts to it accordingly to provide best possible security to the users.
Muhammd Khalif Arbai	If I want to choose cloud service for my Software development I would choose Google Drive. I choose this service because Google drive provide cheapest package for my company. Not just that, if I using Google drive, I can connected my account into Google team which have many service that I can used to my company. I can easily upload my file to only 1 space that only required internet and google account. Many people would say that Google is not safe. Yeah I agree with that, but we can increase our file security for example make the file have a password, hide a link only for your friends or team and many others.
Ng De Ken	In my opinion, I will select Google Cloud Platform for my software development as it is easier to use, cheap, easier to calculate prices and Google has great reputation in AI and Machine Learning.
Pavunraj A/L Sivakumar	The cloud service provider that I have chosen for software development is Amazon. We know that internet actually gives us wide range of selection of products and various prices. Hence, we can just choose the desired item from the available website and also can check the price of the item. Moreover, it is easier for public to find discounted items offered by related websites. There is also some disadvantages on their services. For instance, the quality of the product is not good enough for the user to operate it. This is because, we did not get the chance to test the product before purchasing. If the seller is dishonest, an element of fraud can occur. Hence, it might destroy the expectation of user on cloud services. But users can notify the supplier in timely manner so that they can solve the problem.

CONCLUSION

In a nutshell, cloud computing is the development and use of computer technology based on the internet. Cloud computing services provide the common use of online businesses accessed through web browsers while their software and data are stored on their servers. These services are divided into the following categories such as Software as a Service (SaaS), Utility Computing, Web Services, Platform as a Service (PaaS), Managed Service Provider (MSP), Service Commerce, and Internet Integration. We can conclude that every cloud computing service provider have advantages and disadvantages itself. Microsoft Azure is also commonly used by community. This cloud services are designed to guide people on how to solve a problem that relates to daily life. This service is fully secure and people can trust their cloud. Moreover, any languages are applicable and it also supports all framework. There are also some disadvantages in Microsoft Azure services. For instance, the user unable to upload custom images in their cloud. Other

than that, azure needs a specific management especially for monitoring server consistently. In short, people should realise that every cloud service provider consist of pros and cons. Hence, they should act smartly to acquire the benefits of those services and ignore the negativity.

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