

Cloud Computing Fundamentals - Literature Review on Cloud Computing Service Providers

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1. Introduction

The rapid development of computer technology in developed countries makes researchers more "thirsty" for computing power that can answer the challenges and problems they face. Even though they already have a super computer with a very high capacity and working speed, what is there is still lacking, because they are trying to solve even bigger problems, cloud computing technology appears. Cloud computing is a metaphor for computer / internet networks, where the cloud is a depiction of a computer network / internet that is abstracted from a hidden complex infrastructure. In cloud computing resources such as processor / computing power, storage, network, software to be virtual and provided as a service on the network / internet. So you could say cloud computing is a combination of computer network technology, virtualization and clusters.

2. Evaluation Comparative

2.1 Service model

We have three common service models that have been used in the big companies for cloud service. These services are (IaaS, PaaS, SaaS). **Firstly, SaaS** which means Software as a Service this model has been used by Google drive service. The SaaS also known as cloud application services, represents the most commonly utilized option for businesses in the cloud market. Most SaaS applications run directly via your web browser, meaning they do not need any client-side downloads or installations. SaaS Advantages are its reducing the time and money that spent in tedious tasks such as installing upgrading and managing softwares. As we mentioned that Google uses the SaaS model so when do we have to use Google Cloud? If we have small business SaaS will be the best choice for you because Google will prove you everything you need for small business. Also if you have an application that needs both web and mobile access you should consider working with Google cloud. **Secondly, PaaS** this model has been used by Amazon EC2 which means Platform as a Service which provides cloud components PaaS advantages are simple, cost-effective development and deployment of apps, highly available and scalable. Although PaaS has some cons for example Customization of legacy systems which means that its not plug-and-play solution for existing apps and service. so the existing apps are not advisable to switch to Azure services because of that Azure may limit the value of the investment. When to use Azure if you need to create customized applications because Azure can provide great speed and flexibility to the entire process. **Lastly, IaaS** this model is known from Microsoft Azure services and it means Cloud infrastructure services, known as Infrastructure as a Service. IaaS enables companies to buy on-demand and as-needed resources instead of having to buy hardware directly. IaaS pros are its The most flexible cloud computing model and easy to automate deployment of storage, networking, servers, and processing power. Then again it has some disadvantages. Security. While the customer is in control of the apps, data, middleware, and the OS platform, security threats can still be sourced from the host or other virtual machines (VMs).

2.2 Virtual Machine (VM)

Virtual Machines are image service instances that provide on-demand and scalable computing resources with usage-based pricing. A virtual machine behaves like a server: it is a computer within a computer that provides the user the same experience they would have on the host operating system itself. There are many instance types of virtual Machines. The general types of virtual machine are General purpose use for testing and small databases, Memory optimized for in-memory analytics, High Performance Computing for work efficiency, Storage optimized for Big data, GPU for Video editing. The functions of each type are matched with name. Every Cloud service has the same type of virtual machines the different are just the codename and specification they use.

2.3 OS environments offered

Operating system system software that manages computer hardware, software resources, and provides common services for computer programs for example Windows. Every Cloud Services have the same type of VM operating system except for MacOS cause you need Apple Hardware to use MacOS. Every cloud service has the same Os option like Windows, Linux, Debian, Redhat or even CentOS.

2.4 Security

Security is a primary priority for all three of the big players in public cloud computing services. AWS and Microsoft Azure rely on Fortinet to provide robust security features. However, there are some differences in the way they use this technology. Fortinet on **AWS** offers Virtual Private Cloud (VPC) security measures in many regions on a demand basis. In the case of **Microsoft Azure**, Fortinet provides enhanced data and application security while removing the additional security overhead required during the migration. **Google Cloud** relies on the FortiGate Next-Generation Firewall to provide advanced protection, as well as to use it as a firewall.

2.5 Storage

Storage is the place you store your data. every cloud services has their own way to clasificate storage. Microsoft Azure has 5 specific storage **Azure Blobs**, **Azure Files**, **Azure Queues**, **Azure Tables** and **Azure Disks**. Google Clouds Storage have **Standard Storage**, **Nearline Storage**, **Coldline Storage** and **Archive Storage** for data that can be stored for at least 365 days, including regulatory archives. Then Amazon EBS provides durable, block-level storage volumes that you can attach to a running instance, Instance storage for Many instances can access storage from disks that are physically attached to the host computer, **EFS storage** for creating an EFS file system and configure your instances to mount the file system and **Amazon S3** provides access to reliable and inexpensive data storage infrastructure. It is designed to make web-scale computing easier by enabling you to store and retrieve any amount of data, at any time.

2.6 Performance and scalability

Azure uses the Azure Import/Export Service which will be on-premise to cloud transfer via appliance with built-in encryption and data integrity features. While **Amazon** uses Amazon Snowball which is on-premise to cloud transfer via appliance with easy to use transfer client. Also Amazon performance up to 10 GB/sec and 500,000 IOPS. Meanwhile, **Google** uses Storage Transfer Service which can explain it allows scheduled data transfer from any online source. Another thing, Google performs fully managed and tightly integrated with Kubernetes for easy data sharing.

2.7 Pricing model

In order to meet users' requirements, cloud service pioneers offer a simple pricing system. Each of the three cloud service providers offers their own pricing model. You don't have to buy the cloud solution, but you will pay as per usage.

How much you have to pay your cloud service provider depends on the number of services you use. At **Amazon Web Services**, the amount is calculated based on the total number of hours used. There are three types of pricing models that AWS makes available: On-demand - no upfront cost, pay for what you use, Reserved - Book instances for 1 or 3 years at an upfront cost, depending on the type of use and Spot Customers pay for additional available capacity.

Google Cloud users. And unlike AWS, Google Cloud offers a flexible payment plan if you reserve. **Microsoft Azure** charges its users based on the total minutes consumed. It also offers short-term liabilities, in addition to discounts.

2.8 Auto-Scaling/Elasticity

Amazon auto scaling across all cloud services is smooth and highly integrated. **Azure**, auto scaling can be activated without combining other monitoring services through system metrics. **Google** in combination with auto-healing and auto-updating, bi-directional autoscaling is supported.

2.9 Monitoring tools/service provided

To optimize the cloud services, they need monitoring tool. for Amazon EC2 it has **CPU Utilization, Network Traffic, Disk I/O, Application Manager ,Out-of-the-box Performance Reports, SLO monitoring ,Custom metrics** instrument your application to monitor application and business-level metrics via Cloud Monitoring. Google Cloud integration discovers and monitors all Google Cloud resources and services, with no additional instrumentation, integrated right into the Google Cloud console. Azure has Overall view for view general information about the virtual machines deployed in your Azure VM environment from availability to performance history, Memory utilization ,Monitor disk utilization details is the disk utilization metrics gives an idea regarding the amount of memory being used and the free memory in each partitioned space of your server's memory, Network Metrics is applications Manager's Microsoft Azure performance monitoring tool, view elaborate graphs, along with information about the activities of the network interface,

3. Opinion

Ikhwan : My opinion on the best cloud computer services is the Amazon Web Services. This is because Cloud security is the highest priority for AWS. As a customer, you'll enjoy a knowledge center and specification built to satisfy the wants of the foremost security-sensitive organizations. AWS security offers services like infrastructure security, DDoS mitigation, encoding , inventory and configuration, monitoring and logging, identity and access control, and penetration testing.

Christian: For me Google Clouds is the best cloud computer service. They have fresh and attractive UI design. besides that it is easier to use Google Cloud than any cloud services. They organize the data well and specify the classification neat. They have a great security policy, to prevent any attacks of data that are stored in. They have many types of Virtual Machines and good pricing for each purpose.and can Use it in OS.

Abdulrahman: In my way of thinking I prefer to use Google service because I have been using all google services and that gives me the full experience of using Google service because it implements the Ecosystem which makes my life easier by using their products. I believe Google has the best service for my using nowadays but even in the future if there is something much better than Google i will still use google biscaly because its will make my life easier and its enough for my needs.

Bintang: In my opinion, in the future Cloud Computing will have very broad users, maybe everyone can use cloud computing and only secret files don't use this method. This cloud-based computer technology is a technology that makes the internet a central server for managing user data and applications. This technology allows users to run programs without installation and allows users to access their personal data through a computer with internet access.

4. Conclusion

Cloud computing is often divided into three major categories, Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS). IaaS offers entire IT computing infrastructure, provisioned and managed over the web. The key components of IaaS are accustomed to replace existing development and test environments, virtual machines, website hosting, storage, backup, networking, servers, operating systems, middleware, data, and applications, and high-performance computing (HPC). The PaaS component of cloud computing offers an overall development and deployment environment within the clouds, including development, test, quality analysis, debugging, and deployment tools and services. SaaS is a software developed and hosted by some other person. Businesses or individuals are ready to use them as required. According to the 'Magic Quadrant' in www.gartner.com, the two main 'players' in the cloud computing services provider are the 'Amazon Web Services' and 'Microsoft Azure' followed by Google, Alibaba etc. So, in this report we shared our opinion on what is the best cloud computing provider. In terms of what is the best provider, it totally depends on the user preferences, what OS the user uses, type of storage they prefer and maybe the price offered. In conclusion, one size doesn't fit everyone. We have to figure out what our needs are and which clouds fit us.

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