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Literature Review: Cloud Computing Service Providers

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Cloud Computing Fundamentals – Literature Review on Cloud Computing Service Providers.

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1 Introduction

Everyday life activities, such as banking, email, media streaming, and e-commerce, all use the cloud. On the Company side, Software, Infrastructure, Storage, and Sales/CRM all have their presence in the cloud. Cloud computing is heralded as the next generation transition that incorporates the Internet and computing, so that software, information and data can be housed in distributed libraries run by other firms or by a customer and accessible from anywhere in the world by machines, phones and TVs through the Internet. The cloud is like another term that is used to describe the Internet. Cloud has the ability to deliver high-demand computer services such as storage and processing power over the internet. In certain aspects that we miss, cloud computing is changing our lives.

The main objective of this paper is to give comparative study about Cloud Computing and compare between different types of cloud computing.

This paper is organized into a few sections. First section is the introduction about the Cloud Computing and how it been use in our daily life. Section 2.0 is a detail of the cloud computing background. Section 3.0 is about three different types of models in Cloud Computing. Section 4.0 is the content, which includes the research on the most prominent Cloud Computing Service Providers; ***Amazon EC2, Google Cloud Platform, and Microsoft Azure.*** Section 5.0 analyzes the advantage and disadvantages of different types of cloud platforms. Section 6.0 is the conclusion of the literature review.

2 Background of Cloud Computing

Cloud computing is a paradigm for enabling convenient on-demand network access to shared computing resources (e.g., networks, servers, storage, applications, and services) and a model for managing, storing & processing data online with minimal management effort by using Internet technologies.

Cloud computing works as a provider for the companies to rent access to anything from applications to storage from a cloud service provider rather than owning their own computing infrastructure or data center. Cloud computing services cover a vast range of options and give you instant access to a broad range of technologies so you can innovate faster, from infrastructure services such as storage, networks, applications, computing power and databases to Internet of Things, machine learning, data analytic and much more. One of the benefits of using cloud computing services is that companies can reduce their upfront cost in hardware and complexity of owning and maintaining their own physical data centers and serve by only paying for IT as you consume it.

3 Three delivery models of cloud computing

First is SaaS or Software as a Service. It is a service that gives quick access to cloud-based applications and offers on-demand pay per use of application software to users. Saas is an Independent Platform where you don't need to install or download the software on your PC because many SaaS applications run directly through web browsers. These applications run a single instance on the cloud and you can use them by either paying a license for subscription or using it for free but with limited access.

Second is Platform as a Service or PaaS. It is a cloud base where the different applications for your company can be developed, tested, organized and updated. Implementing PaaS simplifies the production phase of enterprise apps. The PaaS-provided virtual runtime environment offers a favorable space for application creation and testing. PaaS contains the operating systems needed to operating software applications, middleware, development tools, and database management systems. Many of the tools required to build for several platforms such as computers, mobile devices and browsers can be very costly. PaaS is also subscription-based and gives you flexible pricing options depending on your business requirements.

Lastly, IaaS or Infrastructure as a Service is a virtual provision of computing resources over the cloud. In addition to maintenance and support, an IaaS cloud provider will offer users the full spectrum of computing infrastructures, such as storage, servers and networking hardware in a data center, but allows users to modify those virtualized services entirely to suit their particular needs. With IaaS, customers can buy, install, customize and manage any software they want to use, such as operating systems, middleware, applications, business analytics, and development tools.

4 Contents

4.1 Cloud Computing Service Providers: Amazon EC2

Amazon Web Services (AWS) is a subsidiary of Amazon.com that offers on-demand cloud computing platforms to individuals, businesses and countries, on a paid membership basis. The technology enables subscribers, via the Internet, to have a virtual cluster of computers at their disposal, available all the time.

The virtual machine version of AWS emulates much of a real computer's characteristics, including hardware (CPU(s) & GPU(s) for encoding, local/RAM memory, hard disk/SSD storage); operating system choice; networking; and pre-loaded application software such as web servers, databases, CRM, etc.

Amazon EC2 storage offers customers with versatile, cost-effective and easy-to-use data storage solutions for consumer needs. Amazon EC2 uses instance stores to store things. Many instances can access storage from disks that are physically bound to the host computer. This disk storage is referred to as an instance store. For instance Store, temporary block-level storage is given for instances.

OS environments offered - EC2 service provided Linux and after that Sun Microsystems' OpenSolaris and Solaris Express Community Edition. In October 2008, EC2 included the operating systems Windows Server 2003 and Windows Server 2008 to the catalog of accessible operating systems. NetBSD AMIs became available in March 2011. In November 2012, Windows Server 2012 support was introduced. Amazon officially approved running FreeBSD in EC2 in November 2012.

Amazon has its own Linux distribution based on Fedora and Red Hat Enterprise Linux as a low-cost offering known as Amazon Linux AMI. On 30 November 2020, Amazon announced that they will add macOS to the EC2 service. Initial support has been announced for MacOS Mojave and MacOS Catalina running on Mac mini.

AWS aims to provide customers with resources that users can access in a safe way. Third-party auditors routinely test and check the efficacy of AWS EC2 protection as part of the AWS Compliance Services. In addition, AWS offers services that help secure users' records, identities, and workloads from unauthorized access. AWS data security services include encryption and key control and vulnerability monitoring services that constantly track and secure the accounts and workloads. AWS Identity Services helps users to handle accounts, resources and permissions on a scale in a secure manner. AWS protects web applications by filtering traffic on the basis of the guidelines that users make. AWS detects risks by constant analysis of network operation and account activity within the cloud environment

To make EC2 more fault-tolerant, Amazon has built Availability Zones that are developed to be insulated from faults in other availability zones. EC2 provides its users with control over the geographical location of instances that enable for latency optimization and a high degree of redundancy.

Amazon EC2 is typically priced on a case-by-case/hour basis. However, each instance can often be leased on a monthly basis. The instances are priced on the basis of their "size" which is about how much CPU and RAM should be used. Amazon EC2 price varies from $2.5 per month for "nano" instances with 1 vCPU and 0.5 GB RAM on board to "xlarge" type of instances with 32 vCPU and 488 GB RAM billed up to $3997.19 per month.

Amazon launched its own auto-scaling feature and Elastic Load Balancing as part of the Amazon Elastic Compute Cloud. Autoscaling is accomplished via a web browser or command line application on Amazon Web Services. Various best practice guidelines for AWS use recommend that the auto scaling feature be used even in situations where loading is not variable. This is because autoscaling has two other advantages: the automated replacement of any cases that can become unhealthful for any cause (such as hardware failure, network failure, or application error), and automatic replacement of spot instances that are disrupted for price or capacity reasons, making it more possible to use spot instances for manufacturing objectives.

4.2 Cloud Computing Service Providers: Google Cloud Platform

Google Cloud Platform (GCP) is a cloud computing service that runs on the same infrastructure that Google uses internally for its end-user products, such as Google Search, Gmail, File Storage and YouTube. In addition to a set of management tools, it offers a range of modular cloud services, including computing, data storage, data analysis, and machine learning. Registration requires credit card or bank account details. Google Cloud Platform provides infrastructure as a service, platform as a service, and serverless computing environments.

Google Cloud Storage is a RESTful online file storage web service that stores and accesses data on the Google Cloud Platform infrastructure. The service combines the performance and scalability of the Google Cloud with advanced security and sharing capabilities. OS environments offered – Container-Optimized OS from Google is an operating system image for your Compute Engine instances that is optimized for running Docker containers. The Google Cloud platform infrastructure uses multiple layers of security. Because redundancy is built into the progressive layer of security, no event will break the Google Cloud infrastructure.

Google Cloud's serverless platform offers managed computing, databases, and other services that can quickly scale from zero to high requests, and you only pay for what you use. Google cloud services are available across regions and regions**.** Google Cloud Platform offers a free trial. Google Cloud Platform pricing starts at $0.01. Google Cloud Platform provides automated scaling, allowing your applications to gracefully handle increased traffic and reduce costs when the demand for resources is low. After you define the autoscaling policy, the autoscaler performs automatically based on the measured load. Monitoring tools/service provided in Google Cloud Platform are Storage, Databases and Networking

4.3 Cloud Computing Service Providers: Microsoft Azure

Azure is Microsoft's cloud computing platform. Azure is an ever-growing suite of cloud services that help your organization meet your current and future business challenges. Microsoft Azure we are free to build, manage, and deploy Software on a massive global network using Favorite Tools and Frameworks.

Microsoft Azure consists of three building components that can run cloud storage. First there is Compute, which has the task of managing all the computational processes that occur, including the foreground or background. Then there is Storage, a component whose job is to store all existing data.The third component in Microsoft Azure is Fabric. Fabric is an important part that functions as a regulator or brain of this storage system, many processes are managed including scheduling, resource allocation, and management. There are two types of storage in Windows Azure, the first is Azure Storage which is useful for storing data in the form of tables, clouds, and blobs. Meanwhile, another form of storage is SQL Azure which is a version of SQL Server that runs in the cloud. **OS environments offered-**Linux and Microsoft Windows It is important for us to get data protection and privacy, putting all data on cloud computing makes us afraid of the dangerous threat of data loss. Microsoft Azure has a good cyber security standard with ISO 27018 certification.

Microsoft Azure runs using a Microsoft data center called the Worldwide Network of Microsoft Managed Datacenters. Strict security controls and 99.95% SLA (Service Lever Agreement), or the equivalent of a maximum downtime of 22 minutes in a month, ensures Microsoft Azure's ability to provide optimal cloud-based IT infrastructure services. The services covered by Azure Autoscale can scale automatically to match requests to accommodate workloads. They will scale to ensure capacity during peak workloads and the scaling will automatically return to normal when peaks drop. This is why azure has a good performance.

Azure has a pay-as-you-go model, where users only pay for the services used. This method has been tested with the results can be cost savings as needed. Plus a combination of discounts and offers from azure for a significant reduction in cloud prices. Elasticity in Azure refers to a cloud service that allows automatic scaling of Azure host resources with configured requests and parameters. With Azure's elasticity, Azure Administrators can scale Azure infrastructure and resources automatically. Scalable and self-adaptive auto-scaling methods can maintain the efficiency of cloud server needs because this method will adjust user needs to the cloud resources used. Auto scaling is one of azure's great features to use according to application user demand.

5 Opinions

There are typically three cloud service models: SaaS (Software as a Service), PaaS (Platform as a Service), and IaaS (Infrastructure as a Service). Each has its own benefits and differences.

Advantages	Disadvantages
1. No hardware costs 2. No initial setup costs 3. Automated upgrades 4. Cross-device compatibility 5. Accessible from any location 6. Pay-as-you-go model 7. Scalability 8. Easy customization	1. Loss of control 2. Limited range of solutions 3. Connectivity is a must

Table 1 shows the advantages and disadvantages of SaaS

Advantages	Disadvantages
1. The most flexible cloud computing model 2. Automated deployment of storage, networking, servers, and processing power is easy 3. Hardware can be purchased based on consumption 4. Give customers complete control over their infrastructure 5. Resources can be purchased as needed 6. The height is scalable	1. Data security issues due to multitenant architecture 2. Vendor outages make customers unable to access their data for a while 3. The need for team training to learn how to manage new infrastructure

Table 2 shows the advantages and disadvantages of IaaS

Advantages	Disadvantages
1. Make application development and deployment simple and cost-effective 2. Extensible 3. Highly available 4. Enables developers to create custom applications without having to maintain software 5. The amount of coding is greatly reduced 6. Automate business policies 7. Allows easy migration to hybrid models	1. Data security issues 2. Compatibility of existing infrastructure (not every element can be cloud-enabled) 3. Dependency on vendor’s speed, reliability and support

Table 3 shows the advantages and disadvantages of PaaS

I prefer SaaS because it's easy to use, doesn't require users to have any special skills, and in most cases can start using SaaS applications in minutes or even seconds. They also typically have lower

predictable costs. Most SaaS vendors charge users a monthly fee, so businesses can know their monthly bills in advance.

4 Conclusion

Cloud computing can provide a means for an organization and the methods necessary to ensure financial stability and high-quality organizational services. Global cooperation is needed if the cloud computing process is to be optimal general safety and operational standards. Good cloud computing can manage and make important data safer to be stored.

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