Comparative evaluation of Cloud Computing Service Providers

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1 Introduction

Technology has impacted the manner in which businesses are handled in many ways since the Information Age. As businesses continued to grow, there was an ever growing need for data storage and server access for applications and products that customers use. The old method to achieve this was by companies establishing and running their own server environment to host and execute applications on their property. Nowadays, cloud computing is being developed as a revolution towards businesses and their operations. According to Rutherford (2020), this relatively new technology emphasizes on virtualisation to provide companies with data storage, computing power and various other cloud services as required. These services are supported by service providers at isolated data centers so that users don't have to supervise everything on their own.

Table 1. Cloud computing service providers background information.

Service provider	Owner	Launch date	Website
Amazon EC2	Amazon	March 19, 2006	https://aws.amazon.com/ec2/
Google Cloud	Google	April 7, 2008	cloud.google.com
Microsoft Azure	Microsoft	February 10, 2010	azure.microsoft.com

2 Comparative evaluation

Table 1. Table of comparison for three service providers

Comparative points	Amazon EC2	Google Cloud	Microsoft Azure
Service model (Iaas, Paas, Saas)	-IaaS allows user to easily access applications from anywhere.	-Gmail is a commonly used SaaS product. -App Engine is a PaaS product.	-Use IaaS and PaaS to make their server operating system available as service. -Use the SaaS to provide online syncing.
Virtual Machine (VM) instance types offered (General purpose)	-Small to medium.	-Small to medium.	-Small to medium.
Storage	-Simple Storage Service (S3), Elastic Block Storage (EBS), Elastic File System (EFS), Glacier, Storage Gateway, Snowball, Snowball Edge, Snowmobile.	-Cloud storage, Persistent disk, Local SSD, Filestore, Transfer appliance, Data Transfer service, Cloud Storage for Firebase, Google Workspace.	-Blob Storage, Queue Storage, File Storage, Disk Storage, Table Storage.
OS environments offered	-Linux and Windows.	-Linux and Windows.	-Linux and Windows.
Security	-Data encryption is available, but not by default.	-Encrypts all data in transit between Google, its customers, and its data centers, as well as all data in Google services.	-Azure Active Directory is the single source of truth for authorization and permissions management.
Performance and scalability	-Offers a wide range of cloud services such as IaaS, PaaS, and SaaS.	-Enables us to use a high-speed Internet service to access Google applications.	-Helps us to use a wide variety of services with no extra hardware parts, without arranging and buying them.
Pricing model	-Free to try. -Complex, with little transparency.	-Give steep discounts and other incentives.	-Pricing options are mainly situational. -Free to try.
Auto-Scaling/Elasticity	-Includes features such as fleet management, dynamic scaling and predictive scaling to add or remove EC2 instances.	-Uses user-defined autoscaling policy.	-Uses scheduled autoscale method.
Monitoring tools/service provided	-Artificial Intelligence/ Machine Learning. (11 tools) -IoT. (8 tools) -Serverless. (2 tools)	-Artificial Intelligence/ Machine Learning. (6 tools) -IoT. (1 tool) -Serverless. (1 tool)	-Artificial Intelligence/ Machine Learning. (3 tools) -IoT. (4 tools) -Serverless. (1 tool)

For comparative discussion on the service models used (IaaS, Paas, Saas), Amazon EC2 contributes the most in IaaS, which is for infrastructure, allowing users to easily access applications from anywhere, in a more versatile, portable, virtualized and automated modular architecture. While windows Azure is a stable model usage where they use IaaS and PaaS to make their server operating system available as service and use the SaaS to provide online syncing in their Office 365 products. In SaaS, Google Cloud Platform has the largest contribution that the end user of software often knows Gmail, a common SaaS product Google Cloud Platform. For Virtual Machines instance types offered, all three service providers have the same range of types for general purposes. In terms of storage, both Amazon EC2 and Google Cloud have 8 categories of storage types offered while Azure has only 6 types. Amazon prioritizes elastic control of the storage while Google Cloud emphasizes on cloud based storage. For all three service providers, their services are available on both Linux and Windows OS. In terms of security, Google Cloud Platform (GCP) enciphers all data in passage between Google, its users, and their data centers by default. In Amazon Web Services (AWS), the opposite is true. In Azure, Azure Active Directory is the single unit for authorization and permissions administration. Unlike AWS, where users need to arrange coalition, users, and access for each account, Azure enables it all to be supervised from a single directory. In terms of performance and scalability, AWS offers a wide range of cloud services. AWS has the biggest community. Most organizations use AWS to extend their business. Furthermore, Azure helps us to use a wide variety of services with no extra hardware parts. Microsoft Azure offers numerous information services. Google Cloud helps us to use Google search engine apps such as Gmail, YouTube, and others. Many businesses use this network for the simple construction, movement and implementation of cloud applications. It enables us to use a high-speed Internet service to access these applications. For the pricing model, Amazon EC2 is free to test. There are five options for Amazon EC2 instances: Spot Instances, Reserved Instances, Savings Plans, and On-Demand. As a component of their free tier, the service has the option for 750 hours of EC2 administration for each month, leading up to a year. Azure pricing are basically situational with a final objective to take the new and different requirements of each client into account. Similar to AWS, every year, Azure provides 750 hours of the Windows or Linux B1S expansion of their key process stage which are Virtual Machines. For Google pricing, this is one estimated point where Google tries to stand separated from the others by making their valuing structure rather less vague and more client inviting. Google's free tier motivator includes an F1 miniature sample every month for as long as a year. Amazon EC2 Auto Scaling allows users to have a computerized addition or removal of EC2 instances based on conditions defined by users. Users can use the fleet management features to support the health and readiness of the fleet. Users can also use the predictive and dynamic scaling aspect to increase or decrease EC2 instances. Google Cloud allows the user to define the autoscaling policy. Azure uses scheduled autoscale, which allow users can to scale down all of their virtual machines when unused, and have it ready for use later. For the monitoring tools and services provided, based on three primary categories, AI/machine learning, IoT, and serverless, Amazon provides the most with 21 tools total, while Google and Azure both only provide 8 tools each.

3 Opinions

In our opinion, the Amazon EC2 service provider is the best choice because it is easily accessible through its IaaS structure as well as it has a wide range of cloud services. Furthermore, due to it having the largest community following compared to the others, a lot of companies use their services to extend their business. It also provides various autoscaling features that are unique to them and can help manage virtual instances. Amazon also provides numerous tools to help users monitor their services at about 21 tools total, which gives users a wide range of options to choose from.

4 Conclusion

In conclusion, each cloud computing service provider has their own advantages and disadvantages in certain areas. In order to truly benefit from any of them, we must do research on the details of each service provider so that we can make the best decision for the situation that we need them. In the end, we must always keep in mind what we intend to use the products for, rather than the overall strengths of an individual product.

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