Fundamentals of Cloud Computing
(Google Cloud Platform, Microsoft Azure, Amazon EC2)

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Introduction

Cloud computing is an on-demand of IT resource that can be delivered via the internet depending on the request of the customer. Rather than managing your own server, it can be accessed to services such as cloud storage, computer machines and databases. Businesses can reduce their cost to manage and service their IT infrastructure by just paying what they only need to use. Companies such Google, Amazon Web Services and Microsoft are currently providing cloud computing services for everyone.

These companies are gaining revenue from the clients that renting the services and the clients can access them through network which need to be very good network connection as a medium throughout the process. Cloud computing offers several services that are based on three delivery models and that is, Infrastructure as a Service (IaaS), Software as a Service (SaaS) and Platform as a service (PaaS). IaaS model offers computing resources in virtual environment that can be accessed by multiple clients. PaaS is a service for building and running application like, dev tools, operating system (OS) and database management which can be used for developers. SaaS model that allows users to access any software without installing it on their own computer this is very useful for users that have low-spec computers.

Body Content

Service Model

Amazon EC2 uses IaaS model that offers computer engines. A lot of available computing infrastructure that the users can pick based on their needs. Their service is elastic meaning that the users can extend or shrink their infrastructure by launching or terminating new virtual machines (VM). Microsoft Azure is a public cloud platform that provide solutions such as Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS) that can be used multiple services such as virtual computing, storage, networking, analytics and more. It can also be used to replace or improve your on-premise servers. The PaaS offering that can be used for streaming, encoding, content protection or analytics. Google Cloud Platform uses IaaS model that allows its client to use their resources for free. Google Cloud Platform also uses PaaS as a provider that helps customers to use their resources when they need them, but it is their job to create, deploy, and configure business applications as the end-user. Customers handle the applications and data in this specific model and the provider handles everything else.

Virtual Machine (VM)

Amazon EC2 provide different combinations of instances to optimize for different cases. This includes different CPU's, memory, storage and networking ability to give the users the flexibility to pick the best combination of resources for their application and uses. Microsoft Azure Compute enable users to deploy and manage VMs and also supports remote access to applications. Compute resource created from the Azure cloud can be configured for public IP and private IP depending on the user to decide whether the resources can be used by other people. Azure Backup is a service that protect the user's data with minimal operating costs. It runs your virtual machines on Windows and Linux. This prevents from errors that can corrupt your data and human errors can introduce bugs in your application that leads to security threats. As for Google, instances of the Compute Engine can run Linux and Windows Server images by Google, private custom images that users can build or import from their existing systems. Each instance is part of a Google Cloud Console project, and there may be more than one instance in one project. Users can specify the zone, operating system (OS) and machine type when creating an instance. Customers can add more storage options to their instance if running applications need more storage space.

Storage

Instances can access storage from disks that are physically attached to the hosts computer. This type of disk storage is called as an instance store. Amazon EC2 uses Amazon Elastic Block Store (EBS) that offers block-level storage for user's instances. EBS volumes are a perfect use for primary storage for storage servers, and databases. Google Cloud provide several options for automatic redundancy options, users can store your data with multiple automatic redundancy options. Whether the user is optimizing for fast response time, creating an emergency recovery plan, and also customize where and how the users want to store their data. The Azure Storage is a cloud storage solution for modern data storage situations. Core storage services offers massively scalable object store for data objects, disk storage for VMs, cloud file system service, NoSQL store and a messaging store for reliable messaging.

Pricing model:

1. Amazon Elastic Cloud which is called amazon EC2 is like a web-based service that provides us secure and believable compute capacity in the sector of cloud computing. Amazon EC2 has AWS pricing features which means that you only pay for the service that you are used to or consumed. This means that one person only needs to pay for the individual service that he/she consumed, electricity bill, and water bill. They will never charge any additional cost for this. Once I stopped to using it then they will not charge any cost for it. Amazon EC2 also offers 12 months free trial feature starting from after you signed up.

2. Google cloud computing is a cloud computing service from google. After creating an account you can get $300 in free credits to run and test your workload. And all customers can get 20+ products for free up to the monthly usage limit. Goggle cloud computing has pay-as-you-go feature. This means you only pay for the services you are using. No need to pay extra charges. You can save up to 57% on workloads. You can control your spending and also can estimate your cost.

3. Microsoft Azure is a cloud computing service from Microsoft. It also got the same features as EC2. I mean to say that it also has an AWS pricing service for the users. This means you need to pay only for the services that u used no need to pay the extra payment for other services. This is a good feature for cloud computing.

Service provided:

1. Service provided by Amazon EC2 are compute, storage, databases, networking, developer tools, management etc.

2. Service provided by Google cloud computing are computing, hosting, database tools, networking, big data, machine learning.

3. Service provided by Microsoft azure are azure data services, azure storage, azure development services, azure compute services, azure compute services etc.

OS environment offered:

1. Amazon EC2 supports Linux, macOS, Raspbian, Windows servers this operating system.

Amazon Linux			
Versions	**Intel 32-bit (x86)**	**Intel 64-bit (x86_64)**	**ARM 64-bit (arm64)**
2012.03 – 2018.03	✓	✓	

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macOS

Version	**Intel 32-bit (x86)**	**Intel 64-bit (x86_64)**	**ARM 64-bit (arm64)**
10.14.x (Mojave)		✓	
10.15.x (Catalina)		✓	

Windows Server

Version	**Intel 32-bit (x86)**	**Intel 64-bit (x86_64)**	**ARM 64-bit (arm64)**
2008	✓	✓	
2008 R2		✓	
2012 and 2012 R2		✓	
2016		✓	
2019		✓	

2. Google cloud computing runs on Linux, windows, macOS etc.
   Windows

Windows 10 x64	N/A	Via migration	BYOL
Windows 10 x86	N/A	Via migration	BYOL
Windows 8.1 x64	N/A	Via migration	BYOL

Windows 8.1 x86	N/A	Via migration	BYOL
Windows 7 x64[2]	N/A	Via migration; EOL	BYOL
Windows 7 x86[2]	N/A	Via migration; EOL	BYOL

3. Microsoft azure only runs in windows. It doesn't support macOS, Linux, or other OS for its environment.

	Amazon Ec2	Google cloud	Microsoft azure
Security	Amazon EC2 offers isolation on bodily hosts in which the same hosts are remoted from every different even though they may be on separate bodily hosts. It also controls community traffic and helps integrating extra community safety controls as proxy servers, in-line gateways and various community monitoring options.	Google users use various kinds of layers encryption to protect customer data .It is built on a foundation of strong security. GCP is constructed using secure hardware infrastructure, garage services, identification services, and community communications, supplying a real defense-in-intensity architecture.	Microsoft Azure offers Security Center that unify security control and allow more suitable security mechanism through hybrid cloud tasks, Application Gateway that allows customers to construct a secure, scalable and fairly accessible net front, Azure Active Directory that coordinate on-site directories and allows unmarried sign-on, Azure DDoS Protection that protects user's packages from DDoS attacks, Key Vault that will shield and sustain manipulate of keys and different secrets and techniques and Azure Information Protection that protects any touchy information
PERFORMANCE	Amazon EC2 can accommodate varying designs (bare metal, GPU, Windows, Linux, and more) and might be used with various protection and network solutions, GCP's Google Compute Engine, GCE service is relatively recent to the cloud compared to alternative CSPs and is Espejo in its service of the catalog wherever GCE offers a VM may be a distributed system with a spread of sample forms of forms superior computing, Ai, and it based on XML user will choose from a wide variety of models obtainable according to on their purpose of use. EC2 will be both re-size and automatic-scale to accommodate enhancements in specifications that take away the need for management for nuanced	THE GCE service Google Compute Engine form GCP is relatively new in the cloud compared to alternative CSPs and is reflected in its catalog service. in which GCE offers an uncomplicated variety of functions that starts from Windows and Linux instances, RESTful APIs, load balancing, data storage and networking, CLI and GUI interfaces as well as fast scaling	Azure VMs are a dynamic and stable stable scalable compute system with a range of instance shapes designed for containers of high-performance computing, Ai and ML-based computing, with azure's focus on computing hybrid, multi-OS support, Microsoft applications and Computerital services. Scale sets are used to automatically resize instances.

AutoScaling/Elasticity	Have AWS auto scaling monitor	Cloud Functions permits mechanically scale according to traffic or period use	Virtual Machine Scale Set provides an AutoScaling function.
Monitoring tools/Service provided	Sage Maker, Comprehend, Lex, Polly, Rekognition, Machine Learning, Translate, Transcribe, Deeplens, Deep Learning AMIs, Apache MXNet on AWS, TensorFlow on Aws.	Cloud Machine Learning Engine, Diagflow Enterprise Edition, Cloud Natural Language, Cloud Speech API, Cloud Translation API, Cloud Video Intelligence, Cloud Job Discovery	Machine Learning, Azure Bot Service, Cognitive Service, Stream Analytics, Time Series Insights

Opinions

Advantages and disadvantages:

Amazon EC2:

Amazon EC2 is a cloud computing service provided by amazon already mentioned before. It allows user to enjoy a simple web service interface which allows him/her to obtain and configure with minimal friction. And also, its pricing system is quite good and friendly. It has also an automatic scaling monitor which is also a good feature. We can run it easily with any operating system because it allows you to select your operating system and give you the right version for use. It is also a good feature. They offer the fastest processors in the cloud computing service and they are the only service provider that provides 400Gbps Ethernet networking. They also got the power full GPU for graphics works and overloads. And one more thing to say this is the only cloud service that supports macOS.

Its disadvantages are not very serious problems. But quite difficult to be accepted. Only 20 users can use this per region it's a default limit and its volume are 20 tib. Otherwise, all the features are good and that why we choose it.

Microsoft Azure:

Microsoft Azure is a cloud computing service provided by Microsoft. Its service is called Azure synapse analytics service which provides data integration, enterprise data, warehouse, and also big data analysis. It is a trustworthy service for cloud computing because it has got a unified data governance service. It is also quite good at security because it has its own azure defender which can protect your data.

Microsoft Azure is only available in Windows OS we can't use it on Linux or macOS. It's the biggest disadvantage of azure. And its features are not very compatible with other cloud computing services.

Google Cloud Platform:

Their simple computing platform, creatively named Google Compute, is that the hallmark of their service portfolio. They endorse each Windows and Linux, and users will customize the platform or have a predetermined model of system. the target of GCP is on the implementation of Kubernetes, a field of specialization for Google. additionally, to their AI growth, Google stands proud for providing the way for advanced technology to control ones' budget. On this network, users will get basic rates for basic services that are still revolutionary and special in their own way. Storage choices are wherever Google is mis sing, largely thanks to the shortage of backup options. They do, however, give each SQL and NoSQL support. The resources and features accessible seem to be in development. Google Cloud incorporates a sensible start; however, they still have the way to travel if they want to stay up with AWS.

Conclusion

Based on our findings, we picked Amazon Web Services (AWS) for cloud computing. AWS currently on of the biggest coverage of cloud computing platforms in the world with millions of users. Despite having competitors such as Google and Microsoft, it holds 40 percent of cloud computing market. With distinct backup approaches which will affect the backup data even when the primary development environment is offline. Moreover, AWS users just have to pay for what they need with their friendly pricing system. It also ensures client's cloud services achieve the highest standard.

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