



CLOUD COMPUTING AND GLOBAL INFRASTRUCTURE OF MOST POPULAR SERVICE PROVIDERS

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ABSTRACT

Cloud computing is the commercial availability service to fulfil the individual's computing needs. The cloud services is delivered by a third party cloud service provider and almost always delivered remotely. Cloud provider basic services include processing, networking, disk and storage, database, desktops etc. and at the higher level services like Artificial Intelligence (AI), Machine Learning (ML), Blockchain, Internet of Things (IoT) and many more. Customer can use as many services as needed and they only pay for what is used. In this paper review the basic of cloud computing and infrastructure strength of three (AWS, Azure and Google cloud) popular and global cloud service providers.

KEYWORDS: cloud, AWS, Azure, Google cloud, cloud infrastructure

INTRODUCTION TO CLOUD COMPUTING

The National Institute of Standards and Technology (NIST) Define Cloud Computing as “ Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g. networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.”[1]

ESSENTIAL CHARACTERISTICS

- On-demand self-service
- Broad network access
- Resource pooling
- Rapid elasticity.
- Measured service

SERVICE MODELS

- Software as a Service (SaaS)
- Platform as a Service (PaaS).
- Infrastructure as a Service (IaaS)

DEPLOYMENT MODELS

- Private cloud

- Community cloud
- Public cloud
- Hybrid cloud

BENEFITS OF CLOUD COMPUTING

- Cost
- Speed
- Global scale
- Productivity
- Performance
- Reliability
- Security

POPULAR AND GLOBAL CLOUD SERVICE PROVIDERS

1. Amazon Web Services (AWS).
2. Microsoft Azure.
3. Google Cloud.

Amazon Web Services (AWS)

Amazon Web Services (AWS) is part of the e-commerce retailer, amazon.com. AWS provides featured services like Amazon EC2, Amazon Simple Storage Service (S3), Amazon Aurora, Amazon DynamoDB, Amazon RDS, AWS Lambda, Amazon VPC, Amazon Lightsail, Amazon SageMaker and many more[3].

Microsoft Azure

Azure is the Cloud offering from Microsoft. Azure features services such as Virtual Machines, Windows Virtual Desktop, Azure SQL, App Service, Azure Cosmos DB, PlayFab, Azure Kubernetes Services (AKS), Azure Functions, Azure Cognitive Services and Azure Quantum more over Azure provide 200+ services [2].

Google Cloud

The Google Cloud Platform provides Cloud services such as Infrastructure as a Service, Platform as a Service, and Function as a Service. Google cloud featured products include Compute Engine, Cloud Storage, Cloud SDK, Cloud SQL, Google Kubernetes Engine, BigQuery, Cloud CDN, Dataflow, Operations, Cloud Run, Cloud functions, Anthos and 100+ more products [4].

CLOUD INFRASTRUCTURE

Cloud infrastructure is a collection of software and hardware components that are needed for cloud computing. In other words infrastructure is the set of tools needed to build a cloud. It includes computing power, network resources, storage, abstracted resources and an interface for users to access virtual cloud resources [5][6].

CLOUD GLOBAL INFRASTRUCTURE OF AWS, AZURE AND GOOGLE CLOUD

❖ AWS

AWS now spans 77 Availability Zones within 24 geographic regions around the world, and has announced plans for 15 more Availability Zones and 5 more AWS Regions in India, Indonesia, Japan, Spain, and Switzerland. Figure 1 shows the global infrastructure regions of AWS.



Figure 1: AWS Global Infrastructure [7]

- 24 Launched Regions (Each with multiple Availability Zones (AZ's))
- 5 Announced Regions
- 77 Availability Zones
- 2 Local Zones and 5 Wavelength Zones (For ultralow latency applications)
- 245 Countries and Territories Served
- 97 Direct Connect Locations
- 220+ Points of Presence (210+ Edge Locations and 12 Regional Edge Caches)[7]

❖ Azure

Azure has 28 Available regions and one Announced region having 12 Available zones available and 12 Announced available zones. It also has 9 Announced regions with available zone. Figure 2 shows the regions and zones representation in the world map. It also shows the different edge sites available to connect with the network and layout of WAN links.



Figure 2: Azure Global Network. [9]

❖ Google Cloud

Google cloud now has 73 Availability Zones within 24 geographic regions around the world. It has 144 Network Edge Connectivity Locations and available

in more than 200 Countries and Territories. [8]. Figure 3 shows the current and future regions in the world map. Figure 4 shows the network layout with edge points.



Figure 3: Google Cloud Global Infrastructure (Region View) [8]



Figure 4: Google Cloud Global Infrastructure (Network View) [8]

Cloud service provider provide infrastructure so that the customer can focus on developing their product and services rather than invest on the infrastructure. This is a big advantage because purchasing, and maintaining the expensive hardware is sometime beyond the current capacity of many small to medium scale companies. Moreover there is complexity in installing and implementing hardware, and also it takes lots of time. So for customers, this represents a huge savings in computer infrastructure, hardware and licensing time. Customer uses the

services as needed and scale up and down without any overhead.

CONCLUSION

Cloud is the fastest growing technology. Cloud provides hundreds of services in the cost effective manner. There are many advantages of using cloud such as cost, global scalability, better performance, high speed etc. There are many cloud service provider AWS, Azure and Google Cloud are the most popular among them. AWS is in the top with highest market share followed by Azure and Google Cloud.

<https://azure.microsoft.com/en-us/global-infrastructure/global-network/> (Assessed at 10/11/2020)

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