



A STUDY ON AWS ARCHITECTURE

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Abstract:-

In current days, cloud computing has proved itself as a thriving technology. It offers better utilization of IT framework, services and applications. As the cloud computing is dispersion throughout the planet, so accordingly cloud transmission is flourishing more and more in the organizations.

Cloud computing generally focuses on two most important factors. The first one is communicating in between two or more clouds and the second one is security. With the emergence of cloud computing, the word hybrid cloud is becoming more and more common. Hybrid cloud mainly deals with functioning of data centers and basically handles different operations on huge amount of data.

A number of organizations have used a mix of cloud frameworks. In this paper, we mainly focus on hybrid cloud with Amazon Web Services (AWS). Amazon Web Services (AWS) delivers IT resources like compute, storage, database, and more through an integration of AWS cloud services with on-permission and extremity framework. We have discussed this paper on AWS framework along with main issues.

Keyword: - Hybrid cloud, AWS Framework, HPC, Amazon RDS.

1. Introduction:-

Similar to original clouds which are the accumulation of water molecules, the word 'cloud' in cloud computing is the accumulation of networks. In general words, cloud computing means data accessing, storing data and program on the internet instead of user's personal computer. The basic purpose of cloud computing is to facilitate multiple users to access a data centers. User can also access data from a remote server [7]. Example of cloud services are Amazon Web Services, Microsoft Azure, Google cloud etc. Cloud computing have three main deployment models, those are Public cloud, Private cloud, and Hybrid cloud. Public deployment model provides a shared platform that is used mainly B2C (Business to consumer). Public cloud has lack of security because it works for multiple organization and users can access data easily. Private deployment models are deployed in one particular organization. This model works for intra-business transaction. This model is expensive and more secure in comparison to public cloud. A hybrid deployment model or hybrid cloud is the mixture of public deployment model and private deployment model or on-premise resources. This deployment model is an IT framework that assimilates some level of workload motility, orchestration, and it manages multiple environments.

Companies have more control over their computer resources and security in private cloud and on-premise environments. On the other side, public deployment model or public cloud is flexible and easy to regulate, because the cloud providers take care of the maintenance of the infrastructure. Hybrid cloud contains benefits of both public and private cloud so it is more energetic, secure and useful. Many organizations adopt hybrid cloud to manage both merits and demerits of private and public infrastructure. As demand and price requirement changes, organizations can transfer work between their private cloud and public cloud. It provides flexibility and security they need and give them a scalable and cost-effective solution.

The architecture of hybrid cloud typically includes an Infrastructure as-a-services (IaaS) platform [8]. The main Infrastructure as-a-service's platform is Amazon Web Services, Azure and Google cloud. AWS (Amazon Web Services) is a comprehensive, evolving cloud computing platform provided by Amazon that includes a mixture of infrastructure as-a-services (IaaS), platform as-a-service (PaaS) and packaged software as-a-service (SaaS)

offerings [9]. It provides number of tools and solutions for companies and software developers. AWS services have usages in different area like government education and private sector etc.

2. Literature Review:-

[1] Mr. Ujas Bhadani [2020] studied the hybrid cloud and discover how cloud computing put into an effect in the educational institutes and also discussed how a hybrid cloud deployment mannequin is followed in the educational society and that is the sign of starting the new era of an Indian schooling society. [3] Anukrati Dubey, Gunjita ShriVastava and Sandeep Sahu [2013] discussed the hybrid cloud protection and proposed a security algorithm. They also talk about a security the verbal exchange over the cloud and autonomic and the utility computing. [4] Dutta, Pranay, and Prashant Dutta [2019] purposed an analysis in between three market leaders of cloud services specifically Amazon, Azure and Google cloud. And a comparison in between AWS, Azure and Google cloud on the basis of computing services, storage services, and network services and also described advantages and disadvantages of AWS, Azure and Google. [5] Kamal, Muhammad Ayoub, et al.[2020] discussed about the characteristics of cloud computing, describing exclusive offerings of the cloud, exceptional cloud computing offerings such as Google cloud engine, Amazon Web Services, Azure IoT Edge, along with an integration of IoT and the area of data science. [6] Priyanshu Srivastava, Rizwan Khan [2018] talked over the components of the cloud computing and services such as IaaS, PaaS, SaaS and benefits of the cloud computing.

3. Hybrid Cloud with Amazon Web Services-

Our testimony is everywhere and anyplace in every form comprehensible and maturing minute by minute. It's cumulated and stored beyond private cloud and public cloud because every location provides unique prosperity. A perfect hybrid deployment infrastructure doesn't keep the user's raw hostage. It facilitates and delivers all necessary functionality which is required by customer for digital transformation and growing the business in forward direction.

3.1 Amazon Web Services:-

Amazon Web Services is a cloud-based rostrum that is used for building solutions for business using inter-connected web services [10]. It provides different pre-built facilities which provide facilities to the Business Organizations so that they can create and develop custom cloud-based application as per their needs.

In current days, Business Organizations are growing with cloud computing. AWS (Amazon Web Services) plays a very important role in this context, as developers use AWS to create, secure and store organization's information.

AWS give authentication to customer to create the code. Then after creation the code AWS takes all responsibility of the information completely. Many industries are taking cloud computing as a key aspect of their own premise technology. The organizations are shifting their jobs to the AWS cloud for availing larger agility, cutting expenses, better performance, easy accessibility and scalability. This hybrid cloud framework can assist to execute and regulate our applications whenever we require. As many applications execute in cloud, so in some situations, some application may require specific position due to less latency and local information processing.

With AWS, we can utilize the equal facility, tools, infrastructure and APIs whenever we require it from the cloud. Developers want to create and execute their applications utilizing the same AWS infrastructure, APIs, services, and tools wherever their applications may require to reside to meet low latency, local data processing or data residency requirements [11].

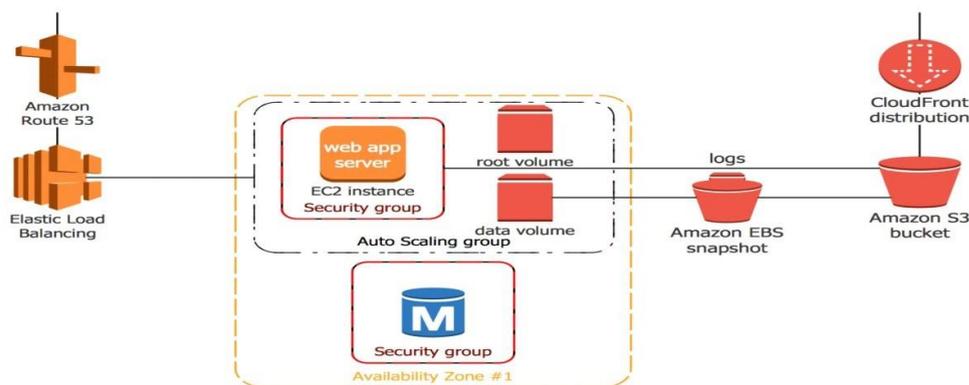
3.2 AWS Architecture-

The framework of hybrid deployment model typically involves an IaaS (infrastructure as-a-services platform). The important IaaS platforms are AWS, Google cloud and Azure cloud platform. Hybrid deployment model management needs a WAN (wide area network) to join both Private and public deployment model.

In shortly Amazon Web Services is called as 'AWS' which has getup with a set of cloud computing facilities that often utilized by most industries, government agencies, startups and enterprises. It assists the companies to manage huge traffic to keep videos and an enormous volume of data. Amazon Web Services (AWS) was launched in 2006, and has since converted other largest popular cloud platforms presently accessible in the market [12]. This cloud computing is increasing in a rapid manner from the last few years. It moves up with greater performance flexibility, accuracy, agility and authority with certain plan and rules to execute AWS on system ability.

The hierarchy of AWS EC2 mainly distributes the customers in the operation of several virtual machines with various pricing options, different outline options, and mapping of separate servers etc. EC2 stands for elastic compute cloud, and it is the most used and basic service of AWS. EC2 is another essential factor of AWS environments. AWS EC2 services trades a lot of profits such as auto-scaling, pay-as-you-go, developed security, flexibility. Amazon EC2 instances eliminate the up-front transaction for hardware, where the user don't require preserve any leased hardware [13]. It gives privilege to the user to create and execute applications faster. In AWS, we can utilize EC2 to lunch as huge virtual servers as we required.

2.1 Diagrammatic representation of AWS architecture-



AWS architecture [14] Figure-1

The above figure represents the fundamental structure of Amazon Web Services (AWS) architecture or AWS EC2. The architecture contains cloud computing facilities along with functionalities. It displays the general AWS services, such as Route 53, EC2, security groups, Elastic Load balancing, CloudFront, and Amazon S3 bucket etc. [14]. Basically EC2 (Elastic compute cloud) which will permit the customers for using different outlines in their individual projects or techniques as per their need. There are also various pricing options, incredible options such as specific server mapping, and outline server etc. Simple storage service (S3) which is existing in the AWS architecture or framework. By utilizing the simple storage service (S3), companies can efficiently store and restore information through different data types adopting API (application programming interface) calls. API works at small and as nicely as large-scale and advice developers to regulate, spectator, create and grant protection to the API's [15]. They don't have any computing element. The AWS framework provides the prime facilities to users based on net offering technology.

Major Key points of AWS Architecture-

Some major key points of AWS architecture are -

- A) Load balancing
- B) Elastic Load balancing
- C) Amazon Cloud Front
- D) Elastic Load balancer
- E) Security management
- F) Elastic cache
- G) Amazon RDS

Discussion on the major key points:-

- A) Load balancing:-

In the AWS design, the load balancing component aids in proper enhancement of application and server efficiency. According to the above figure of AWS architecture, the Load balancer hardware is basically utilized as the regular network device in the infrastructure of conventional web purpose to function load balancing. But with the AWS Elastic load balancing service the load balancing has inclined greater capability. Traffic is freely dispersed to EC2 instances crossing different opportunity areas in Amazon Web Services. The traffic is dispersed to productive inclusion as well.

- B) Elastic Load balancing:-

This is mainly used to provide the needed traffic to the web servers, and it assists to increase the function in a greater extent. It also fixes the huddles to achieve progressive routing services.

C) Amazon CloudFront:-

This is a content delivery network (CDN) operated by AWS [16]. It helps to provide the data and applications, securely to the customers. CDN restores the information from Amazon S3 bucket and delivers it to variety of information center locations. Customer can send request to the content from any nearest station in a mechanized way, which eventually enlarges the functionality.

D) Security management-

Amazon Web Services is mostly established for its secured environment where the customer can store data and work undoubtedly. Controlling AWS security is a factor of hybrid cloud network security.

E) Elastic cache:-

Amazon ElastiCache is a famous choice for real-time use instances like Caching, Session Stores, Geospatial Services, Gaming, Queuing, and Real-Time Analytics [17]. It helps to regulate memory to stores data in cloud.

F) Amazon RDS:-

AWS has strong database. It has capacity to store huge amount of data securely in database. Amazon Relational Database is shortly known as Amazon RDS. It has the approach which is identical to Microsoft SQL and MySQL. The queries, tools and applications will be very effective in the Amazon RDS as well.

4. Comparative Study:-

In this survey we studied different illustration between AWS, Microsoft Azure, and Google Cloud Platform (GCP) which is analyzed by different authors. In Table-1 we discussed some comparison of computing services which is used in AWS, Azure, and GCP and Table-2 represents comparison of different storage services which is utilized in AWS, Azure, and GCP.

Table-1:- comparison of computing services in between AWS, Azure, and GCP

Reference/Authors	Services	AWS	Microsoft Azure	GCP
[18]John Emmitt	IaaS	Amazon Elastic	Virtual machines	Google Compute Engine(GCE)
[4]Pranay Dutta, Prashant Dutta	Compute Services	Elastic Compute Cloud(EC2)	Virtual machine scale sets	Compute engine
[19]	Platform as a Services	Elastic Beanstalk	Cloud services	Google app engine
[20]	contained delivery	CloudFront	CDN	Cloud CDN
[5] Muhammad Ayoub Kamal, Hafiz Wahab Raza, Muhammad Mansoor Alam, Mazliham Mohd Su'ud	Virtual Private Server	LightSail	Virtual machine image	Not Available
[21] Neeru Jain – May	Automatic scale instances	Auto Scaling	Azure app Service Scale Capability (PaaS)	Instance Group

Table-2:- comparison of storage services in between AWS, Azure, and GCP

Reference/Authors	Vendor	Storage Services	Database Services	Backup Services
[22]	AWS	1.Simple Storage Services(S3) 2.Elastic Block Storage(EBS) 3.Elastic File System(EFS) 4.Storage GateWay 5.Snowball 6.Snowball edge	1.Aurora 2.RDS 3.DynamoDB ElasticCache Redshift 6.Neptune 7.Database migration service	Glacier
		7.Snowmobile		
[23]	Microsoft Azure	1.Blob Storage Queue Storage File Storage 4.Disk Storage 5.Data Lake Store	1.SQL Database 2.Database for Postgrestorage 3.Data ware house 4.Server Stretch Database 5.Cosmos DB 6.Data Factors	1.Archive Storage site Recovery
[24]	GCP	1.Peristent Disk 2.Tranfer Appliance Cloud Storage 3.Transfer Services	1.Cloud Bigtable Cloud Spanner Cloud SQL 4.Cloud Database	None

5. Analysis:-

Amazon, based in 1994, is the world's biggest on-line store of books, clothing, electronics, songs and different items and, in 2020, earned internet sales revenue of over 380 billion U.S.dollars [25]. In 2006 Amazon Web Services started providing IT infrastructure services to organizations in the form of web services now generally known as cloud computing [26]. Now AWS is the tycoon of cloud computing rostrum.

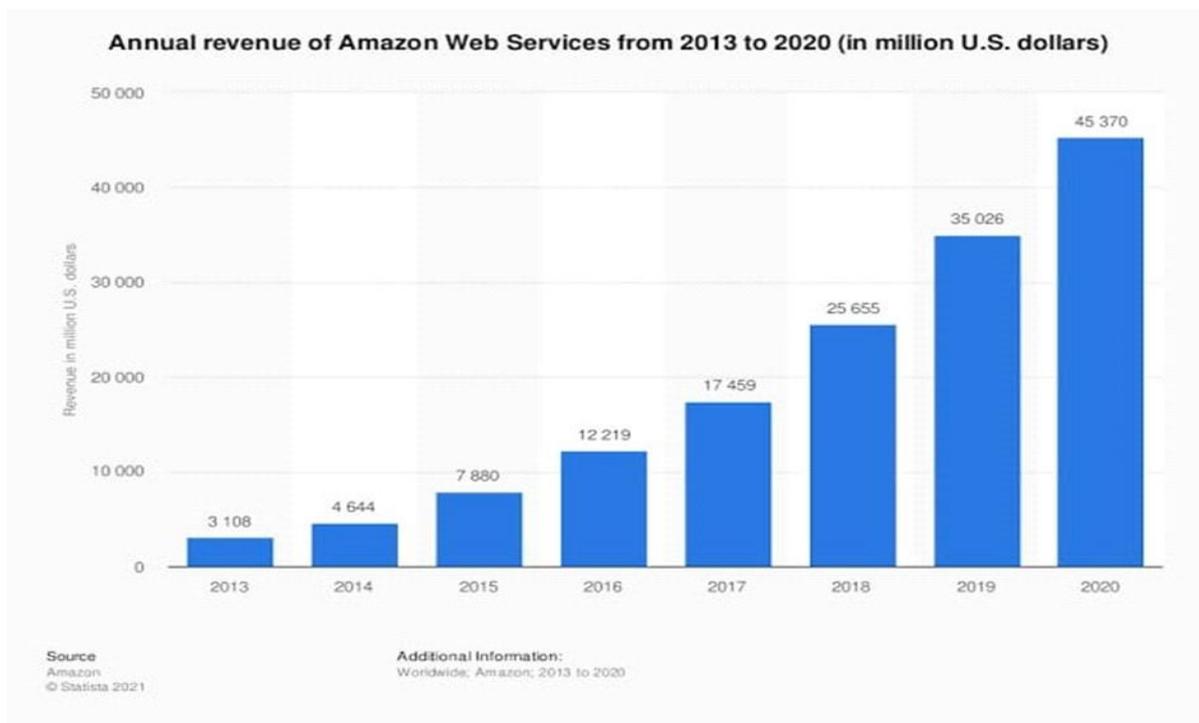


Figure-2[27]

The statistics illuminate the revenue growth of Amazon Web Services cloud computing and hosting solution 2013-2020 [27]. According to this report (Figure-2) in 2020 AWS generated revenue of 45.370 U.S. dollars.

5.1 Performance Analysis:-

Gartner has expected global public cloud spend to develop 18% in 2021, with 70% of institution using cloud to growth cloud spending in the wake of COVID-19[28]. Figure-3 represents Amazon Earning Reports, In Millions per Fiscal Quarter.



Figure-3[29]

As per Canlys report of April 2021, global cloud market grew 35% this quarter to \$41.8 billion and in cloud market AWS play important role. In cloud market AWS, Microsoft Azure and Google-Cloud contain 32%, 19% and 7% market shares respectively. Figure-4 represents all details of cloud market share as follows-

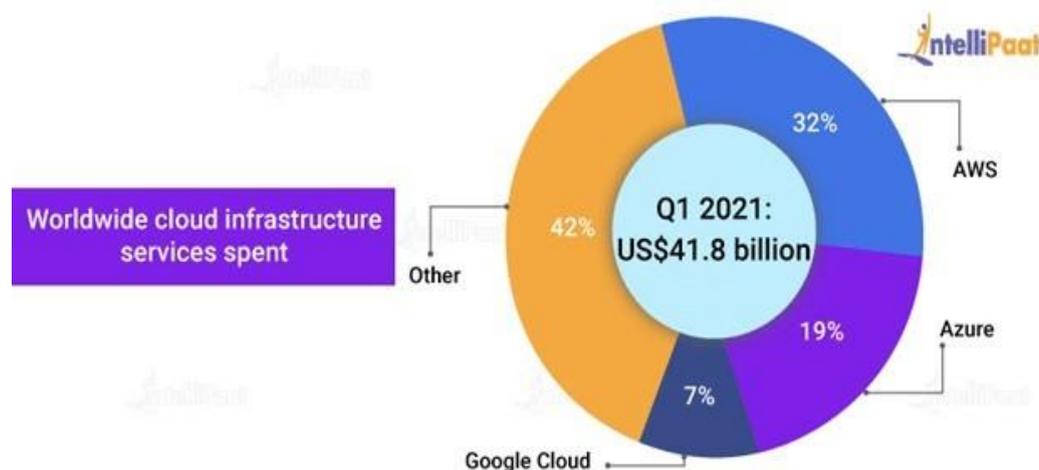


Figure-4[30]

6. Discussion:-

In this paper we have analyzed the different features along with usages of AWS. Here we have represented some important beneficial points as follows -

Amazon Web services are cloud rostrums which assist the user create applications on the cloud. Many organization and industry prefer AWS because AWS provides huge profits. Some important benefits are

- 1) User-friendly
- 2) Adjustable
- 3) Security
- 4) Cost-efficient
- 5) Reliable

1) User-friendly:-Many organizations use AWS because it is very easy to access and secure. AWS is very user friendly because it assists the customer to change their data whenever and whatever they want. In AWS customer can access data on his convenience.

2) Adjustable- It is very impressionable that's why many organization adopt AWS. It always let user to use those operating systems, programming language, and web application platforms that you are comfortable with [31]. AWS provide all the benefit services what your application needs to work smoothly.

3) Security- Amazon Web services provide best security facility to the user. The customer can easily trust services of AWS. It provides an immensely secure infrastructure to assure the aloofness user's raw.

4) Cost-efficient- AWS is always thinking how to help users to reduce cost and help how to save. AWS enables user to take control of cost and optimize the spend, while building modern, Scalable application to meet the needs [32]. AWS component and prosperity are more exclusive or cheaper than the regular computing method. It endeavors pay for use cost method, that means a organization will only give price for the services that it requires and has utilized for limit of time.

5) Reliable- AWS service provides the highest accuracy for its users.

6) Scalable- One more benefits of Amazon Web services is the facility to quickly add and eliminate assets of the application for meeting user requirement and regulate price. Since AWS has an exceptional infrastructure, the users can utilize computing and storage resources when ever required [33].It provides facilities that are cost- effective for business with large traffic. It assists the customers by beneficence ecommerce and repository elucidation that assists abutment their business.

7) Highly performance-HPC (High-Performance computing) is the capability to process an extensive quantity of data at immense agility organizations finds it more necessary for productiveness and to challenge with other industries. It

provides facility of HPC services so that organization doesn't anguish about the activity.

7. Conclusion:-

As we have analyzed and discussed on the basis of different aspects, so it may be concluded that AWS (Amazon Web services) is one of the more prominent cloud platform as it maintains consistency in providing services.

AWS is also having better security, flexibility and reliability in comparison to AZURE, GOOGLE CLOUD etc. It assists to growth of large and small enterprises. It is very cost-effective and very helpful to the users. Research should be in the area of implementing sustainability in AWS architecture, so that AWS will also be environmentally beneficial.

References:-

- [1] Bhadani U. Hybrid Cloud: The New Generation of Indian Education Society. International Research Journal of Engineering and Technology (IRJET) Volume: 07 Issue: 09/sep2020
- [2] <https://d1.awsstatic.com/whitepapers/hybrid-cloud-with-aws.pdf>
- [3] Dubey, Anukrati, Gunjita Shrivastava, and Sandeep Sahu. "Security in hybrid cloud." Global Journal of Computer Science and Technology (2013). Volume 13.
- [4] Dutta, Pranay, and Prashant Dutta. "Comparative study of cloud services offered by Amazon, Microsoft & Google." International Journal of Trend in Scientific Research and Development 3.3 (2019): 981-985.
- [5] Kamal, Muhammad Ayoub, et al. "Highlight the features of AWS, GCP and Microsoft Azure that have an impact when choosing a cloud service provider." International Journal of Recent Technology and Engineering (IJRTE) (2020).
- [6] Srivastava, Priyanshu, and Rizwan Khan. "A review paper on cloud computing." *International Journal of Advanced Research in Computer Science and Software Engineering* 8.6 (2018): 17-20.
- [7] <https://www.guru99.com/cloud-computing-for-beginners.html>
- [8] <https://cloudian.com/guides/hybrid-it/hybrid-cloud-architecture/>
- [9] <https://searchaws.techtarget.com/definition/Amazon-Web-Services>
- [10] <https://data-flair.training/blogs/aws-features/>
- [11] <https://aws.amazon.com/hybrid/>
- [12] <https://www.visual-paradigm.com/guide/cloud-services-architecture>
- [13] <https://intellipaat.com/blog/what-is-amazon-ec2-in-aws/>
- [14] <https://intellipaat.com/blog/what-is-aws-architecture/>
- [15] <https://data-flair.training/blogs/aws-architecture/>
- [16] https://en.wikipedia.org/wiki/Amazon_CloudFront
- [17] <https://aws.amazon.com/elasticache/>
- [18] <https://securityboulevard.com/2021/05/aws-vs-azure-vs-google-cloud-comparing-cloud-platforms/>
- [19] <https://embee.co.in/blog/aws-vs-azure-vs-google-cloud/>
- [20] <https://www.blog.simpliv.com/aws-vs-azure-vs-google-cloud-which-is-better-for-career-and-job-demand/>
- [21] <https://www.whizlabs.com/blog/aws-vs-azure-vs-google/#>
- [22] <https://www.datamation.com/cloud/aws-vs-azure-vs-google-cloud/>
- [23] <https://www.veritis.com/blog/aws-vs-azure-vs-gcp-the-cloud-platform-of-your-choice/>
- [24] <https://www.stechies.com/difference-between-aws-vs-azure-vs-google-cloud/>
- [25] <https://www.statista.com/topics/4418/amazon-web-services/#topicHeader-wrapper>
- [26] <https://aws.amazon.com/about-aws/>
- [27] <https://www.statista.com/statistics/233725/development-of-amazon-web-services-revenue/>
- [28] <https://www.parkmycloud.com/blog/aws-vs-azure-vs-google-cloud-market-share/>
- [29] <https://www.geekwire.com/2021/optimal-prime-amazons-giant-quarter-reveals-post-pandemic-potential/>
- [30] <https://intellipaat.com/blog/aws-vs-azure-vs-google-cloud/>
- [31] <https://intellipaat.com/blog/aws-benefits-and-drawbacks/>
- [32] <https://aws.amazon.com/aws-cost-management/aws-cost-optimization/>
- [33] <https://www.kcsitglobal.com/blogs/detail-blog/why-aws-is-the-most-reliable-service>