Excel Journal of Engineering Technology and Management Science
(An International Multidisciplinary Journal) (Impact Factor 2.119) IIFS
Vol. I No. 15 December – January 2019 - 20 (Online) ISSN 2277-3339

Amazon Web Services

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I. INTRODUCTION:

Amazon Web Services (AWS) is a subsidiary of Amazon that provides on-demand cloud computing platforms to individuals, companies and governments, on a metered pay-as-you-go basis. In aggregate, these cloud computing web services provide a set of primitive, abstract technical infrastructure and distributed computing building blocks and tools. One of these services is Amazon Elastic Compute Cloud, which allows users to have at their disposal a virtual cluster of computers, available all the time, through the Internet. Amazon Web Services (AWS) is a platform of web services offering solutions for computing, storing, and networking, at different layers of abstraction. Amazon markets AWS to subscribers as a way of obtaining large scale computing capacity more quickly and cheaply than building an actual physical server farm. All services are billed based on usage, but each service measures usage in varying ways. Auto Scaling allows you to scale your Amazon EC2 capacity up or down automatically according to conditions you define. With Auto Scaling, you can ensure that the number of Amazon EC2 instances you're using increases seamlessly during demand spikes to maintain performance, and decreases automatically during demand lulls to minimize costs. Auto Scaling is particularly well suited for applications that experience hourly, daily, or weekly variability in usage. Auto Scaling is enabled by Amazon CloudWatch and available at no additional charge beyond Amazon CloudWatch fees. With the AWS Architecture diagram, one can easily understand and acquire clear knowledge about architecting, building and running applications on AWS technology. AWS S3 simply stands for Simple Storage Service that allows users to store and retrieve different types of API calls. AWS Security Hub gives you a comprehensive view of your high-priority security alerts and compliance status across AWS accounts. There are a range of powerful security tools at your disposal, from firewalls and endpoint protection to vulnerability and compliance scanners. But oftentimes this leaves your team switching back-and-forth between these tools to deal with hundreds, and sometimes thousands, of security alerts every day. With Security Hub, you now have a single place that aggregates, organizes, and prioritizes your security alerts, or findings, from multiple AWS services, such as Amazon GuardDuty, Amazon Inspector. Cloud security at AWS is the highest priority.

II. REVIEW OF LITERATURE

1. **Overview of Amazon Web Services AWS Whitepaper**

   Overview of Amazon Web Services: AWS Whitepaper Copyright © 2019 Amazon Web Services, Inc. and/or its affiliates. All rights reserved. Publication date: December 2018 (Document Details (p. 64))

https://docs.aws.amazon.com/aws-technical-content/latest/aws-overview/aws-overview.pdf

2. **Getting Started with AWS**

   Getting Started with AWS Copyright © 2014 Amazon Web Services, Inc. and/or its affiliates. All rights reserved.

https://awsdocs.s3.amazonaws.com/gettingstarted/latest/awsgsg-intro.pdf

3. **Overview of Amazon Web Services January 2014 Jinesh Varia/Sajee Mathew**

   Getting Started With AWS 1. How do I get started with AWS? 2. Choosing a Cloud Platform 3. AWS Whitepapers 4. AWS Global Infrastructure 5. AWS Economics Center 6. AWS Security Center 7. AWS Architecture Center 8. AWS Webinars and Videos 9. AWS Training

4. **Amazon Web Services in Action**

   BY MICHAEL WITTIG ANDREAS WITTIG

   FOREWORD BY Ben Whaley

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https://s3-ap-southeast-1.amazonaws.com/tv-prod/documents%2Fnull-Amazon+Web+Services+in+Action.pdf

III. OBJECTIVE OF STUDY

1. To Study different applications of AWS
2. To Study AWS Auto Scaling
3. To Study the Architecture of AWS
4. To Study Benefits of AWS Security

Amazon provides a fantastic suite of web services that enables developers to create dynamic and robust applications. Deploying on AWS can save you time, money and manpower compared to building and maintaining more traditional systems. Amazon Web Services offers a selection of enterprise productivity applications that run as a service in the AWS Cloud.

These applications for corporate email & calendaring, document collaboration, and virtual desktops make it easy to meet the usability, performance & reliability expectations of employees, while simultaneously delivering on the security and compliance requirements of the most demanding enterprise IT organizations. You can use these services either together or separately, based on the needs of your organization. All AWS Enterprise IT applications feature simple pay-as-you-go, monthly pricing so there are no up-front payments required for server hardware or software licenses, and no long term commitments.

- Amazon WorkSpaces
- Amazon WorkDocs
- Amazon WorkMail

As the name suggests, auto scaling allows you to scale your Amazon EC2 instances up or down automatically as per the instructions set by the user. Parameters like minimum and maximum number of instances are set by the user. Using this, the number of Amazon EC2 instances you're using increases automatically as the demand rises to maintain the performance, and decreases automatically as the demand decreases to minimize the cost. Auto Scaling is particularly effective for those applications that fluctuate on hourly, daily, or weekly usage. Auto Scaling is enabled by Amazon CloudWatch and is available at no extra cost. AWS CloudWatch can be used to measure CPU utilization, network traffic, etc.

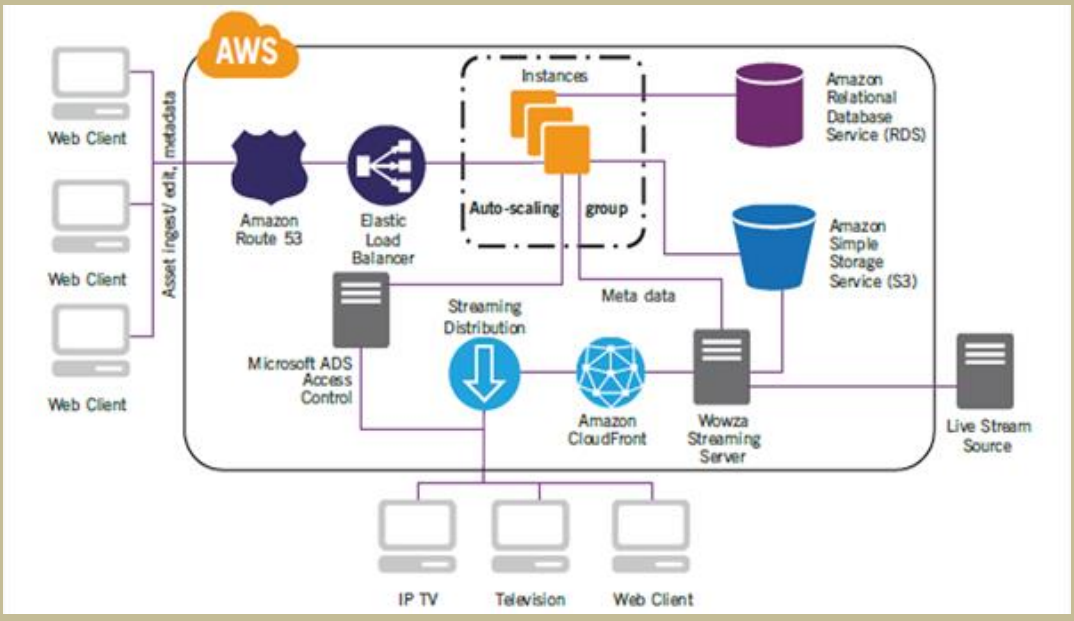

Fig: AWS Architecture

The 5 Pillars of AWS Architecture Framework

- Security
- Reliability
- Performance Efficiency
- Cost Optimization
- Operational Excellence

AWS Security Hub gives you a comprehensive view of your high-priority security alerts and compliance status across AWS accounts. There are a range of powerful security tools at your disposal, from firewalls and endpoint protection to vulnerability and compliance scanners. With Security Hub, you now have a single place that aggregates, organizes, and prioritizes your security alerts, or findings, from multiple AWS services, such as Amazon GuardDuty, Amazon Inspector, and Amazon Macie, as well as from AWS Partner solutions. We know customers care deeply about privacy and data security. That's why AWS gives customers ownership and control over their customer content by design through simple, but powerful tools that allow customers to determine where their customer content will be stored, secure their customer content in transit or at rest, and manage access to AWS services and resources.

IV. DATA ANALYSIS AND INTERPRETATION

Objective 1: DIFFERENT TYPES OF APPLICATIONS

1. Amazon WorkSpaces

Amazon WorkSpaces is a managed desktop computing service in the cloud. Amazon WorkSpaces allows customers to easily provision cloud-based desktops that allow end-users to access the documents, applications and resources they need with the device of their choice, including laptops, iPad, Kindle Fire, Android tablets, and zero clients. With a few clicks in the AWS Management Console, customers can provision a high-quality cloud desktop experience for any number of users at a cost that is highly competitive with traditional desktops and half the cost of most virtual desktop infrastructure (VDI) solutions.

2. Amazon WorkMail

Amazon WorkMail is a secure, managed business email and calendaring service with support for existing desktop and mobile email clients. Amazon WorkMail gives users the ability to seamlessly access their email, contacts, and calendars using Microsoft Outlook, their web browser, or their

native iOS and Android email applications. You can integrate Amazon WorkMail with your existing corporate directory and control both the keys that encrypt your data and the location in which your data is stored.

3. Amazon WorkDocs

Amazon WorkDocs is a fully managed, secure enterprise storage and sharing service with strong administrative controls and feedback capabilities that improve user productivity. Users can comment on files, send them to others for feedback, and upload new versions without having to resort to emailing multiple versions of their files as attachments. Users can take advantage of these capabilities wherever they are, using the device of their choice, including PCs, Macs, tablets and phones. Amazon WorkDocs offers IT administrators the option of integrating with existing corporate directories, flexible sharing policies, audit logs, and control of the location where data is stored.

Objective No. 2: AWS AUTO-SCALING

➔ As the name suggests, auto scaling allows you to scale your Amazon EC2 instances up or down automatically as per the instructions set by the user. Parameters like minimum and maximum number of instances are set by the user. Using this, the number of Amazon EC2 instances you're using increases automatically as the demand rises to maintain the performance, and decreases automatically as the demand decreases to minimize the cost.

Auto Scaling is particularly effective for those applications that fluctuate on hourly, daily, or weekly usage. Auto Scaling is enabled by Amazon CloudWatch and is available at no extra cost. AWS CloudWatch can be used to measure CPU utilization, network traffic, etc.

- Elastic Load Balancing

  Elastic Load Balancing (ELB) automatically distributes incoming request traffic across multiple Amazon EC2 instances and results in achieving higher fault tolerance. It detects unfit instances and automatically reroutes traffic to fit instances until the unfit instances have been restored in a round-robin manner. However, if we need more complex routing algorithms, then choose other services like Amazon Route53.

- ELB consists of the following three components.

  a) Load Balancer

This includes monitoring and handling the requests incoming through the Internet/intranet and distributes them to EC2 instances registered with it.

b) Control Service

This includes automatically scaling of handling capacity in response to incoming traffic by adding and removing load balancers as required. It also performs fitness check of instances.

c) SSL Termination

ELB provides SSL termination that saves precious CPU cycles, encoding and decoding SSL within your EC2 instances attached to the ELB. An X.509 certificate is required to be configured within the ELB. This SSL connection in the EC2 instance is optional, we can also terminate it.

Objective No. 3: AWS ARCHITECTURE

Amazon Web Services is shortly called as AWS which has come up with a set of cloud services that often used by most of the organizations, startups and government agencies. It helps the companies to handle high traffic to store videos and a massive amount of data. The Structure of AWS EC2 mainly delivers the users in the usage of various virtual machines with different configurations as per the requirements. Normally, EC2 stands for Elastic Compute cloud that allows different pricing options, various configuration options and mapping of individual servers etc. Here is the quick way to know 5 Pillars

- SECURITY - Security is the basic thing that matters a lot in AWS Technology. It is entirely an infra design that can easily serve complete data protection, infrastructure protection, privilege Management of all AWS accounts and identifying the security breach with certain detective controls reliably. Basically, it follows certain design principles that are
- RELIABILITY - AWS is the good architecture one that has come up with well-planned foundations and monitoring in place with various mechanism rates to handle demand rates as per requirements. The system can easily detect the failure and must come out with an optimized solution. The design principles are in the given way like
- PERFORMANCE EFFICIENCY - The Performance Efficiency is kept focus in the efficient use of computing resources to meet the given requirements in a reliable manner. It is also to maintain the efficiency as the demand changes and technological evolving. The design principles go in the given way.

- COST OPTIMIZATION - It is one of the main pillars of AWS Architecture that is completely optimizing costs, unused, elimination or else sub-optimal resources. It is most probably considered with the matching supply with demand and being aware of expenditure and optimizes over costs. The following design principles are delivered in the cost optimization are
- OPERATIONAL EXCELLENCE - Generally, this Operational Excellence of the product is checked for reliability, agility and performance. The most optimized way is to standardize and manage the workflows in an efficient manner. It mostly suggests various principles like, Performing Operations with code, Making of some regular incremental changes, Test for certain responses to unexpected events.

Objective No. 4: AWS SECURITY

- **Benefits of AWS Security**- More controls and increased privacy - all at a lower cost
    1. **Keep Your Data Safe** - The AWS infrastructure puts strong safeguards in place to help protect customer privacy. All data is stored in highly secure AWS data centers
    2. **Meet Compliance Requirements** - AWS manages dozens of compliance programs in its infrastructure. This means that segments of your compliance have already been completed.
    3. **Save Money** - Cut costs by using AWS data centers. Maintain the highest standard of security without having to manage your own facility.
    4. **Scale Quickly** - Security scales with your AWS cloud usage. No matter the size of your business the AWS infrastructure is designed to keep data safe.

AWS's policy regarding the use of security assessment tools and services allows significant flexibility for performing security assessments of your AWS assets while protecting other AWS customers and ensuring quality-of-service across AWS. AWS understands there are a variety of public, private, commercial, and/or open-source tools and services to choose from for the purposes of performing a security assessment of your AWS assets. The term "security assessment" refers to all activity engaged in for the purposes of determining the efficacy or existence of security controls amongst your AWS assets, e.g., port-scanning, vulnerability scanning/checks, penetration testing, exploitation, web application scanning, as well as any injection, forgery, or fuzzing activity, either performed remotely against your AWS assets, amongst/between your AWS assets, or locally within the virtualized assets themselves.

Cloud security at AWS is the highest priority. As an AWS customer, you will benefit from a data center and network architecture built to meet the requirements of the most security-sensitive organizations.

An advantage of the AWS cloud is that it allows customers to scale and innovate, while maintaining a secure environment. Customers pay only for the services they use, meaning that you can have the security you need, but without the upfront expenses, and at a lower cost than in an on-premises environment.

V. RESEARCH TYPE: The present research is the descriptive research.

VI. CONCLUSION

To remember, the objective of this project was to know and study the different types of services provides by Amazon in term of Amazon Web Services. The first research question was to study the different application of AWS, Amazon Web Services offers a selection of enterprise productivity applications that run as a service in the AWS Cloud. These applications for corporate email & calendaring, document collaboration, and virtual desktops make it easy to meet the usability, performance & reliability expectations of employees, while simultaneously delivering on the security and compliance requirements of the most demanding enterprise IT organizations. This report evaluates different services provided by the leading cloud provider, AMAZON. It shows how to create/own/access elastic compute cloud instance in all the possible ways. It deals with issues like bringing the machine up and down at any time and creating users in a secure way with authenticated keys, which are very useful for an organization like universities, non-IT based companies that are willing to join Amazon Cloud. Another research was to study Auto-Scaling in AWS. Hence, we studied Amazon Web Services Automatic Scaling monitors the applications and automatically adjusts capacity to maintain steady, predictable performance while maintaining the economy. With AWS Auto scaling, the applications always have the right resources available at the right time.

With the AWS Architecture, which is another part of the research, one can easily understand and acquire clear knowledge about architecting, building and running applications on AWS technology. AWS S3 simply stands for Simple Storage Service that allows users to store and retrieve different types of API calls. This Amazon Web Services Architecture has come up with

various product sections. AWS Serverless architecture helps to build and run applications without a second thought of servers. AWS provides several security capabilities and services to increase privacy and control network access. These include: Network firewalls built into Amazon VPC, and web application firewall capabilities in AWS WAF let you create private networks, and control access to your instances and applications.

- Encryption in transit with TLS across all services
- Connectivity options that enable private, or dedicated, connections from your office or on-premises environment

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