Amazon Web Services: Simplified Application Management Tool

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***Abstract***

**Cloud computing is a recently emerged model which has gained immense popularity due to the fact that it allows computing resources to be shared and available to user on demand, without active management by the user. The resources available are scalable as per the need of the user which makes it an efficient and cost-effective model. There are many cloud services providers today like Amazon’s AWS, Microsoft Azure, Google App Engine etc. This paper is focused on services provided by Amazon’s subsidiary AWS or Amazon Web Services. It is one of the most popular public cloud where services are available over a network which is open to public. AWS offers a broad spectrum of cloud-based products such as compute, databases, storage, analytics, networking, developer tools, management tools etc. These all and other services come with pay-as-you-go pricing. In this study report I will cover the motivation behind AWS, its uses, its advantages, ways to access AWS, navigation of AWS management console, AWS global infrastructure, security measures, storage and content delivery**

**and computing and networking services of AWS.**

History of AWS

AWS was officially launched in 2006, However to create the AWS was initiated in 2003 by Chris Pinkham and Benjamin Black in their paper on retail computing infrastructure. They proposed infrastructure should be standardized and completely automated. It was envisioned that amazon would be exclusively dependent on web services for its internal storage requirements and will offer services using virtual servers to other organizations[[1]](#footnote-1)[[2]](#footnote-2).

Milestone Events

**November 2004 -** AWS designed their first service called Simple Queue

**March 2006 -** AWS launches simple storage service (S3)

**August 2006 -** AWS launches EC2 for public

**November 2010 -** Amazon.com retail web services were moved to AWS

**April 2013 -** AWS started providing certification courses[[3]](#footnote-3)

**May 2013 -** Awarded as an Agency Authority to operate from the US department of Health and Human Services

**April 2015 -** BBC reported AWS as a profitable organization

Models of Cloud Computing

Cloud computing makes the IT resources available on demand through a public, private or hybrid cloud. There are three models of cloud computing:-

* Infrastructure as a Service
* Platform as a Service
* Software as a Service

A screenshot of a cell phone screen with text

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Introduction – AWS :-

Amazon uses decentralized or distributed IT infrastructure to make several IT resources available on demand. Since the inception of Amazon, it has spent billions of dollars in building and managing its infrastructure. Amazon launched AWS in 2006. AWS is a cloud computing platform to allow other organizations to take the advantage of reliable IT infrastructures. There are numerous examples in which AWS is an efficient option for running web applications or organization portals.

Use Case:-

* A small enterprise can use its expertise and expanding business through quality production while leaving the IT management to AWS.
* A large enterprise can utilize AWS to deliver training to its distributed workforce.
* An architecture consulting company can be used for high compute rendering for its construction prototypes.
* Media company can use it for audio, e-books , video for its worldwide customers.

Concept of Pay-As-You-Go

AWS charges its client on the basis of the usage of its services instead of charging them on the cost of leasing the infrastructure. Meaning, as the customer uses API and calls to use the services, users gets charged accordingly.[[4]](#footnote-4)

Navigation of AWS Management Console:-

AWS management console is a user-friendly web interface. To access the console user requires an AWS account. It manages all the elements of a user’s account which include monthly expenditure of services, manage security permissions, create new IAM users. In addition to the web-based management it is also available as mobile app for android and iOS users.[[5]](#footnote-5)

A screenshot of a cell phone

Description automatically generated[[6]](#footnote-6)

With AWS console authorized users can perform operation tasks , manage applications, manage CloudWatch alarms and some of the task can be managed using mobile application.

AWS management console manages all elements of user’s AWS account like monitor monthly expenditure of each service, manage security permissions, create new IAM users etc. AWS management console displays the navigation bar, navigation pane and current page. To manage easy navigation amazon offers some features like accessing services, accessing history list, editing navigation bar, selecting the region among others. By default, AWS management console displays all AWS services.

Navigation of Management Console:

1. AWS Services: View and access the service groups from all AWS services in the services menu. The menu items further contain enclosed list of relevant services.
2. History List: contains up to 6 of the most recently used services.
3. Edit Feature: enables to customize the way AWS services should appear on navigation bar.
4. AWS Region: displays list of various AWS region which can be selected to view and manage resources in that region.
5. User Account and Support: it can be used to view and modify details of one’s account and access the provided support in form of forums, documentation, training and other resources.

AWS global Infrastructure[[7]](#footnote-7)

Amazon has its own datacenters across different regions of the world to host AWS infrastructure. Different product suites are available for each of the regions. By placing resources in distinct regions one can design and host website or an application such that it is closer to its targeted customer and also fulfills legal and other requirements. Each data center site is known as region. Each region has two or more distinct sites known as Availability Zones. Currently, AWS cloud spans across 61 Availability Zones(AZ) within 20 geographic regions. AWS regions provide multiple physically separated and isolated Availability Zones which are connected with low latency, high throughput and high redundant networking. AZ offers customers easier and more effective way to design and operate applications and databases thereby making them more highly available, fault tolerant and scalable than traditional datacenter infrastructure.

Every zone is designed to be isolated from failures detected in other zones. By placing resources in different availability zones one can shield data, site or application from failure at one location.

Characteristics of Region

A region is an isolated physical location or a geographical area in the world. It is used to run applications and workloads. It minimizes the latency for end users, manages long term commitments and tackle challenges to scale and manage a global infrastructure. It consists of minimum of two availability zones connected through low latency links.

Characteristics of Availability Zones

It is an isolated location with single or multiple advanced datacenters. Presence of multiple availability zones enable customers to distribute their computing resources among several tier-1 Internet Service and Power providers.

Security Measures by AWS[[8]](#footnote-8)

The AWS provides data security by employing the state-of-the-art datacenters and network architecture that help you meet security related objectives like:-

* Visibility
* Manageability
* Auditability
* Alertness

This feature enables you to obtain the desired security without bearing the additional cost of an on premises environments.

* Security Benefits
  + AWS is designed to offer highest of data security and robust safety mechanism to ensure data privacy and segregations.
  + Provides highly automated infrastructure to manage security.
* Provides experts guidance
  + Provide free access to documentation of its products and services which proves to be excellent education and training material to solve customers’ ongoing issues.
  + Offers trusted advisor an online tool to identify security gap.
* Access to different tools who’s some key features are
  + Ensures infrastructure security by providing mechanism such as data encryption and build in network firewalls.
* Evaluates applications for weakness or deviations using tools such as Amazon inspector.
* Defining user account permissions and hardware-based authenticator using AWS Identity and Access Management and AWS Multi factor authentication.
* Monitoring and maintaining logs of access and changes in the customer’s AWS environment.
* Privacy
* Data Protection

AWS Storage and Content Delivery[[9]](#footnote-9)

Amazon offers six different data storages namely:

1. Amazon Simple Storage Service(Amazon S3)
2. Amazon CloudFront
3. Amazon Elastic File System(Amazon EFS)
4. Amazon Glacier
5. Amazon Storage Gateway
6. Amazon Import/Export

*Amazon Simple Storage Service(Amazon S3)*

S3 is the most popular storage option provided by Amazon. It provides safe and secure storage to developers. It has user friendly interface which enables storing and accessing any amount of data any time. A file in Amazon S3 is known as an object. The object representation of the file consists of actual data portion which is not visible to Amazon and other part is metadata which stores information about data. S3 enables user to store data in 3 easy steps:

1. Select the region
2. Create a bucket
3. Store the data

A bucket enables user to store one or more objects. An account holder can create maximum of 100 buckets where each bucket is a logical container for multiple objects. Furthermore, each object is identified by a key. Size of a single object can be up to 5 TB. Access permissions to objects and buckets can be set and access logs can be maintained to keep a track of the buckets used.

*Amazon CloudFront*

It is an economical and dynamic content delivery network(CDN). It enhances user experience of accessing static and dynamic contents of the website. It administers an association of edge locations to store copies of frequently accessed files in proximity to its users. An edge location refers to the boundaries between locations of major cloud servers. Whenever user request desired contents, be it dynamic, static or streaming, Amazon CloudFront makes it available from the nearest network of edge locations. This results in objects travelling shorter distances, thus improving website performance. CloudFront supports users requesting data using both web browsers and mobile devices. This makes it an ideal choice to distribute frequently accessed static and dynamic contents such as videos, pictures, software products and dynamic web applications over HTTP. The two key advantages of CloudFront is its ability to scale according to requirement which allows user to start small and grow as traffic increases. The CloudFront services automatically manages the traffic load without any intervention. Second advantage is its flexible cost model. There is no minimum monthly commitment or a fixed term contract to dynamically deliver content using Amazon CloudFront. User is expected to pay only for the content he delivers using CloudFront.

*Amazon Elastic File System(Amazon EFS)*

Amazon EFS enables users to create and set up file storage to quickly access files with ease. It is said to be elastic as it automatically maintains storage whenever a file is created or deleted. Amazon EFS service enables storing Amazon EC2 instances. Amazon EC2 is a file storage service which supports NFSv4 protocol. This enables seamless working between latest tools and applications and Amazon EFS. Amazon EFS is capable of connecting multiple Amazon EC2 instances. This ensures applications running on multiple instances would still have a common data source. Amazon EFS too, like Amazon CloudFront charges user only for data usage or storage. It is ideal choice for organizations that seek solutions to manage content repositories, maintain multiple development and test environments, scale performance of Big Data applications and managing users accessing data and shared datasets from a remote location.

*Amazon Glacier*

It is an economical storage solution to store data that would remain forever, but rarely accessed. Hence it makes an ideal choice for data backup and archiving. It provides data security of the highest level and offers flexibility in storing and retrieving data. Amazon Glacier eases the hardship of maintaining historical data which can be difficult as it adds to the administrative liability of managing and storing huge amounts of data. It has features like capacity planning, hardware provisioning, detecting and repairing hardware failure, data replication and hardware migration. Amazon Glacier stores data as archives which can be a single file or a combination of several files. Archives are arranged in Vaults which can be accessed using AWS IAM service. It stores data in transit via SSL and uses 256-bit advanced encryption system. Amazon Glacier supports data storage in following use cases

1. Archiving off-site enterprise information.
2. Backing up media assets
3. Storing research and scientific data
4. Preserving digital data
5. Replacing magnetic tapes.

*Amazon Storage Gateway*

Amazon Storage Gateway provides an uninterrupted and secure connection between the AWS cloud storage and the organization’s on premises data storage devices or data centers. It is a scalable and economical amalgamation of user’s office IT and AWS storage infrastructure. This ensures widely accepted storage protocols working in harmony with user’s current applications, minimizes latency by managing recurrently accessed data stored on physical locations and stores data in an encrypted form in Amazon S3 or Amazon Glacier. It is an ideal choice to back up applications in an encrypted form, plan for disaster recovery by creating a mirror of entire production environment and file sharing within the corporate environment. Amazon Storage Gateway supports 3 configurations

1. Gateway-Cached Volumes – enables preserving most accessed data and stores it in Amazon S3. It is economical and users experience no latency while accessing the data.
2. Gateway-Stored Volumes – is used when user need quick access to the data. Data is stored locally on user’s device and in Amazon S3. This enables recovering the data locally or from Amazon EC2 in case of disaster.
3. Gateway-Virtual Tape Library – offers low cost solution to archive the data stored in a tape-based backup application

*Amazon Import Export*

The AWS import/Export allows easy transfer of considerable volumes of data from and to AWS without using the Internet, but physical storage devices. AWS utilizes its high-speed internal network to load the data onto the devices and offers two features

1. AWS Import/Export Snowball – it is a cost-effective data transfer solution which is capable of transferring up to 50 TB of data. It handles challenges of high network costs, unending transfer queues and data security. Transferring data through snowball is 5 times cheaper than to transfer data over high-speed Internet. It becomes ideal choice when expensive network infrastructure upgrades are beyond budget or capacity, when there is huge backlog of data, or when data is stored in a location where high-speed Internet is not available.
2. AWS Import/Export Disk – enables data transfer from end to physical premises using Amazon’s high-speed internal network. It is an ideal choice to transfer small amounts of data. Disks provide users to import data to Amazon S3, Amazon EBS and Amazon Glacier, unlike snowball which supports importing of data only to Amazon S3. In addition, it supports exporting data from Amazon S3 to on premise data centers.

*Elastic Block Storage*

Amazon EC2 Instance Storage is an ephemeral storage offering instance during storing. Storage is for temporary use and will lose its contents when system is rebooted. Amazon Elastic Block Storage or EBS is used mainly in stateless web hosts, transcoding, caching and High Performance Computing. It has 2 types of constructions:

1. Magnetic Storage – It is slower, older Elastic Block Storage, providing up to 150 Input-Output Operations per Second(IOPS).
2. SSD construction – is again of 2 types
3. General purpose IOPS – possesses the capability to provide 3 IOPS per GB of provisioned storage. It is used for small websites and small and medium databases
4. Provisioned IOPS – enables user to specify the IOPS as per their requirement. It is used for applications and databases where there is a significant amount of traffic.

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