

Assignment No.2

Explore and compare the similar types of services provided by AWS, Azure and Google cloud platform.

AWS (amazon web services), Azure (microsoft azure) and GCP (Google cloud platform) all provides different cloud services of similar types.

1) Compute Services:

Amazon EC2 (Elastic compute cloud):

Amazon provide EC2 for computing services. These virtual machines are preconfigured with operating system and some of the required software. Instead of managing the infrastructure AWS will do that so person launch & terminate EC2 instance whenever he want.

Used for deploying applications, scaling application based on demands, Deploy ml models, cost-effective etc.

Types of EC2 instances:

General purpose instances

Compute optimize instances

Memory optimize instances

Storage optimize instances

Accelerate Computing instances.

### Azure Virtual machines :

Microsoft Azure provide Azure virtual machines for computing services. Virtual machines are like digital versions of actual computers. They also have memory, CPU and disk to store the data.

#### Usage of Azure virtual machine:

- we can build and deploy applications on virtual machine.
- can used to run various application on operating system that are not originally made for them.

#### Type of Amazon virtual machines :

General purpose ( B-series , D-series , E-series )

Compute optimize ( F-series , H-series , m-series )

Memory optimize ( M-series , G-series , GS-series )

Storage optimize ( L-series , H-series )

### Google Compute Engine :

Google Compute Engine is a component of IaaS (Infrastructure as a Service) of GCP. It offers virtual machines running in Google's data centers connected to world wide fiber network. Enables users to launch virtual machines on demand.

It is cost-effective and reliable compute engine.

2) Storage Services:

Amazon S3 (Simple Storage Service):

Amazon offers wide range of storage services that can be configured based on project requirements.

S3 (Simple Storage Service) stores files like photos, audio and video etc. as object providing more scalability and security.

It allows user to store or retrieve data at any point in time from anywhere through web.

Amazon S3 Bucket is fundamental storage container feature in AWS S3 service.

Allows user to store in S3 bucket facilitating features like versioning and lifecycle management.

Azure Blob Storage:

Azure Blob Storage is a cloud based storage services a part of Azure storage services.

It is designed to store and manage large amount of data of unstructured data - including media storage, log files and data backup.

Easily accessible through Azure storage API from any corner of the world.

Provides high scalability and durability i.e. data is protected from any uncertain events such as hardware failures, outages and massive natural disasters.

Provides security features including encryption at rest and transport.

### Google Cloud Storage:

We can store our data on remote servers with Google Cloud Storage and we can access that data whenever we need to. In addition, Google Cloud Storage provides number of Cloud Storage services such as:

- Google Cloud Persistent Disk (Block storage)
- Google Cloud Filestore (Network File storage)
- Google Cloud Storage (Object Storage)
- Google Cloud Storage Firestore
- Google Cloud Storage Transfer Services

### Google Cloud Storage (Object Storage):

Object Storage is scalable, durable and secure. One can store our data in object storage. It can be accessed from any location.

Data is stored in form of objects which is suited for data like videos, photos etc. i.e. static data.

### ② Database Services:

All of above i.e. AWS, Azure and GCP provides both relational as well as non-relational database. We will discuss about No-SQL database services.

### Amazon DynamoDB:

DynamoDB allows users to create database capable of storing and retrieving any amount of data and comes in handy while serving any amount of traffic.

It dynamically manages each customer's request and provides high performance by automatically distributing data and traffic over servers.

It uses HTTP requests and API operations. It offers encryption at rest for data protection, provides on-demand backups.

#### Azure cosmos db:

Cosmos DB is NoSQL database provided by Microsoft Azure. It provides high-level horizontal scaling. It is consequence of two techniques: Partitioning and replication.

Physical partition is actual unit of storage that physically fits in the Azure region that we selected. Logical partitioning is the logical groups across items within our data set.

In replication within region our data is replicated 3 times improving fault tolerance. In replication outside region that we selected resulting in high availability.

#### Google cloud firestore:

Google Firestore is a part of Google Firebase application development platform. Fundamentally it is cloud hosted NoSQL database for storing and syncing data. Can be accessed by mobile or web through native SDKs. Firestore enables automatic scaling, enhanced performance, ease of use, and also provides high-level scalability.

Cloud firestore from google facilitates convenient offline usage through robust database on user's device. Firestore is considered to be cost-effective as it offers pay as you go service.

#### 4) DevOps and CI/CD:

##### AWS CodePipeline:

AWS CodePipeline is continuous delivery services you can use to model, visualize and automate the step required to release your software. You can quickly model and configure the different stages of software release process. AWS CodePipeline leverages management tools already in the AWS environment such as AWS CodeCommit, AWS CodeDeploy, Amazon ECR, AWS Identity, Amazon ECS, Amazon CloudWatch etc.

It does not limit itself to aggregating only internal services. User can also create integration with tools such as GitHub and Jenkins.

##### Azure DevOps Services:

Azure DevOps is a set of tools and service that helps DevOps team provisions and manage their production environments. It helps team automate, orchestrate and manage application and service delivery.

It optimizes source control, build test, and release

To enables continuous delivery. Assume pipeline automatically build and test code, making it available to various projects. It offers combined continuous integration and delivery (CI/CD) pipelines for building and testing code and shipping to target.

#### GCP Cloud Build:

Cloud build is a service provided by Google Cloud Platform that allows you to automate the building, testing and deployment of your software applications. Cloud build can help you improve the speed and reliability of software delivery processes as well as simplifying management of infrastructure.

Cloud build can import code from cloud storage, cloud source repository, Github or Bitbucket, execute a build to your specifications and produce artifacts such as Docker container or Java archives.

- It is fully serverless platform helps in custom development workflows for building.
- Allows you to import your existing Docker file and push images directory to docker images storage.

#### 5) AR/VR services

#### Amazon Sumerian :

Amazon Sumerian is a cloud-based platform developed by Amazon that enables developers to create and deploy interactive 3D, augmented reality (AR) and virtual reality (VR) applications without requiring specialised programming or graphic expertise.

With Sumerian user can quickly build interactive experiences using web-based editor, drag-and-drop interface and templates. This experience can be deployed across various platforms including VR headsets, mobile devices and web browsers, making it accessible to wide audience.

Additionally, Sumerian integrates seamlessly with other AWS services enabling developers to leverage the scalability, security and performance of AWS cloud infrastructure.

#### Azure Spatial Anchors :

Azure spatial anchors enables users to build spatially-aware mixed reality application by providing some capabilities. These applications may support Microsoft Hololens, Photo-based device supporting AR core, and iOS-based devices id based device supporting AR core. Azure spatial anchors facilitates developers to interact with mixed reality platform to acquire spaces; specify precise points of interest; and recognize those points of interest, also refers to as spatial anchors from supported devices.

### Google Cloud Anchors :

Google cloud anchor is a powerful anchored reading (CAR) service offered by GCD. It enables developers to create innovative AR experiences by anchoring digital content to real world locations, allowing users to interact with mixed object in physical space. Cloud Anchors leverages advanced ARCore technology to provide accurate and persistent anchors in mixed digital content, remains aligned with physical environment.

Developers can used cloud anchors to build wide range of AR applications including games, shopping experiences, navigation tools and educational content. One of the key feature is multi-users experiences, where multiple users can interact with same virtual objects simultaneously around in same physical space.

### Big data and Analytics Services :

#### Amazon Elastic Compute Cloud:

Amazon Elastic Compute Cloud makes easy to process large amount of data quickly and cost-effectively. Amazon EMR uses hadoop an opensource framework to distribute your data and processing across resizable clusters of Amazon EC2 instances.

Amazon EMR is used in various applications, including log analysis, web indexing, data warehousing, machine learning, financial analysis, scientific simulation and bioinformatics.

Hadoop also supports analytical based on Apache Spark, Apache Hive, Presto and Apache HBase which integrate with Hive and Pig which are open-source database like tools for Hadoop.

#### Apache Hoonight :

Apache Hoonight is service provided by micronsoft that us to open source framework for big data analytics. Apache Hoonight allows the use of frameworks like Hadoop, Apache Spark, Apache Hudi, YAP, Apache Flink, Apache Storm, & etc. for processing large amount of data. These tools can be used on data to perform extract, transform and load (ETL). Data concatenating, machine learning, IoT etc. Hoonight can be scaled up or scaled down as and when required. The ability to be scaled also means you have to only pay for what you used.

#### Google Dataproc :

Google Dataproc is comprehensively managed cloud service designed for the execution Apache Hadoop and Apache spark workloads. Its purpose is to simplify the process of running distributed Big data workload on Google's cloud platform by automating the configuration and management of cluster resources. This service also include built-in integration with various other GCP services such as storage, Cloud Storage and Bigtable and offers inherent support for popular big data tools and frameworks like Apache Hive, Big and HBase.

2) Identity and Access management:

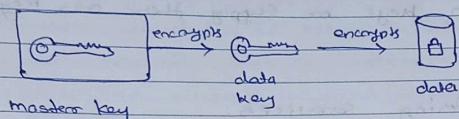
Ans:- Identity and Access management (IAM) :

IAM (Identity and access management) ensures that the right people and people (job role) in your organization (identities) can access the tools they need to do their jobs. Identity management and access systems enables your organizations to manage employee apps without logging into each app as administrator. IAM confirms that the user, software and hardware is who they say they are by authenticating their credentials against database. IAM grants only the appropriate level of access.

Ans:- Active Directory (Azure AD) :

Azure Active Directory (Azure AD) is Microsoft's cloud based solution of Identity and Access management. Azure AD is the backbone of Office 365 system . and it can sync with on-premise Active Directory and provide authentication to other cloud based system via OAuth API to support communication to other web services. Azure AD is flat structure in a single tenant . Think of the tenant as a circle surround is all of your stuff . you can control the shape inside tenant . users and groups are the basic blocks of Azure AD . You can further organize user into groups that

you to encrypt data within your own application



It also integrates with other AWS services including Amazon S3, Amazon SNS and Amazon Redshift to simplify the encryption of your data within these services.

#### Azure Key Vault:

Azure Key Vault enables users to securely store and manage sensitive data like keys, passwords, certificates and other sensitive information. These are kept in centralized storage that is protected by industry standards algorithm and hardware security modules.

Azure Key Vault is used to store control access token, passwords, API keys and other secrets securely. It makes it simple to generate and manage encryption key for your data.

#### Cloud Key Management Services (Cloud KMS):

Cloud data is stored in Google Cloud, it is encrypted at rest by default. So when users use Cloud Key Management Services platform, they can gain greater control over how their data is encrypted at rest and how their encryption keys are managed. KMS provides highly secure and scalable key management solution that meets the requirement of wide range of application and industries.

Cloud VM's allow users to manage software and hardware execution steps or script their own step.

### ⑤ Networking Services:

#### American VM (American private cloud):

American VM can be referred as private cloud inside cloud. It is a logical grouping of resources in specific network. The server that you are going to apply in virtual private cloud (VPC) will be completely isolated from other servers that are deployed in EC2s. You can have complete control over the address to virtual machines and make tables and gateways as well.

Using VM, you can host a fabric-facing website, a single-tier basic web application or just a plain old website. The connectivity between our web servers, application servers and databases can be limited by size.

#### Private virtual network:

Private virtual network is a logical representation of the network in the cloud. So by creating an AWS virtual network, we can define our private IP address range on this and also deploy different kinds of private resources to deploy resources such as virtual machines into virtual network, they will be isolated from other resources. All resources in the virtual network can communicate outbound to internet very different but need to

Virtual private cloud ( Google ) :

Virtual private cloud ( VPC ) network is a virtual division of a physical network that is implemented inside the provider's production network. VPC network provides connectivity from your compute engine virtual machine ( VM ) instance. Network load balancer offers native internal pass-through. Network load balancer and proxy system for external application load balancing or. Connected to on-premise network by using cloud VPN tunnels and VLAN attachment for cloud interconnection. Private traffic from specific cloud external load balancer to its clients.

#### 10) Content Delivery Network ( CDN )

Akamai CloudFront:

Akamai CloudFront is a content delivery network ( CDN ) provided by Akamai. Using CDN, companies can accelerate the delivery of files to their own infrastructure while also reducing the load to their own servers. CloudFront act as a distributed cache from your edge locations around the world as the copy of the file from the source location and places the copy of the files in different edge locations across different countries. So CloudFront speed up the access to your files.

### Azure CDN :

Azure CDN is Content delivery network which offers developers a global solution for rapidly delivering the high bandwidth content to the users by caching their content at strategically placed physical nodes across the world. Azure CDN can also accelerates the dynamic content.

With better performance & user experience to end user, large scaling to better handle instantaneous load, such as start of the product.

Distribution of users request and serving of content directly from the edge cache so that traffic get sent to the original servers.

### Cloud CDN :

Cloud CDN (Content delivery Network) uses google edge network to serve content closer to users, which accelerates your website or application.

Cloud CDN works with global external Application load balancer or the classic application load balancer to deliver content to user. The external application load balancer provides frontend IP address & ports that receive the request and backend that response to the request.

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