

(I) Dropbox :-

→ Dropbox is a file hosting service that allows users to store files online, share them with others and synchronize them across multiple devices like laptops, phones and tablets.

→ It was founded in 2007 by MIT students Drew Houston and Arash Ferdowsi.

→ Initially, Dropbox used Amazon web services for its operation but has since developed its own infrastructure.

Features :-

(i) File storage and synchronization :-

→ store files online and sync them across multiple devices.

(ii) File sharing :- easily share files and folders with others via links.

(iii) Collaboration Tools :-

collaborate in real time with shared folders and tools like Dropbox paper.

(iv) Automatic Backup :- Automatically Backup photos, videos and documents from your devices.

(v) File Recovery :- Recover deleted files and access previous versions.

(vi) Offline access :- Access files without an internet connection.

(vii) Integration with other Apps :- works with apps like Microsoft Office, Slack and Zoom.

(viii) Security features :- include encryption, two-factor authentication and remote device wipe.

④ Predict the cloud services used in virtual meeting (Onmeet, Zoom, etc.)

UNIT - III

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1. Compute and virtual machines :-

Function :- provide scalable computing resources to host meeting applications.

Examples :- Google Compute Engine, Amazon EC2, Azure Virtual machines

2. Real-Time Communication Services :-

Function :- Enable audio and video communication between participants in real-time.

Examples :- web RTC, Amazon Chime SDK, Twilio Programmable Video.

3. Content Delivery Networks (CDNs) :-

Function :- Distribute audio and video streams efficiently to reduce latency.

Examples :- Google Cloud CDN, Amazon Cloud Front, Azure CDN

4. Storage services :-

Function :- store meeting recordings, chat logs and other data.

Examples :- Google cloud storage, Amazon S3, Azure Blob storage

5. Identity and Access Management (IAM) :-

Function :- manage user identities and control access to meeting resources securely.

Examples :- Google Identity, AWS IAM, Azure Active Directory.

(A) Outline about the Cloud Services used in Google Colab.

Google Colab, short for "Colaboratory", is a free cloud service provided by Google Colab that allows users to write and execute Python code in a web-based, interactive notebook environment.

1. Google Compute Engine (GCE) :-

- * Function :- provides the virtual machines for running Colab notebooks.
- * Uses :- offers scalable and powerful compute resources for executing code.

2. Google Drive Integration :-

- * Function :- Allows seamless access and storage of files.
- * Uses :- Users can save and load notebooks and datasets directly from Google Drive.

3. Google Cloud Storage :-

- * Function :- provides durable and scalable object storage.
- * Uses :- storing large datasets and files accessible from Colab.

4. Tensor Processing Units :-

- * Function :- It is a specialized hardware for accelerating machine learning computations.
- * Uses :- Running deep learning models with more efficiency in Colab.

5. Google Cloud AI platform :-

- * Function :- provides tools for building, training and deploying machine learning models.

- * Uses :- Enhances machine learning workflows with Colab, integrating with other AI services.

⑦ Discover the location services used in Google maps.

⇒ main location services used in Google maps

1. Gps (Google positioning system):-

* Function :- provides precise location data by triangulating signals from multiple satellites.

* Uses :- determining exact geographic coordinates

⇒ enabling turn-by-turn navigation.

2. WiFi positioning system:-

* Function :- uses the proximity of wi-fi networks to determine a device's location.

* Uses :- enhancing location accuracy indoors or in areas where Gps signals are weak.

⇒ providing location data in urban environments with dense wifi networks.

3. Cell Tower Triangulation:-

* Function :- estimates a device's location based on its distance from multiple cell towers.

* Uses :- offering location data when Gps and wifi signals are unavailable

4. Bluetooth Low Energy Beacons :-

* Function :- uses Bluetooth signals from beacons for positioning

* Uses :- indoor navigation and proximity-based services.

5. Crowdsourced Data :-

* Function :- Aggregates anonymous location data from users to improve map accuracy and traffic predictions.

* Uses :- updating road conditions and maps

⇒ providing real-time traffic updates.

6. Offline maps and Local data Storage :-

* Function :- stores map data locally on the device for use without an internet connection.

* Uses :- providing navigation and location services in ^{areas} with poor connectivity.

⑥ Analyze the cloud services used in e-commerce applications.

cloud services play a critical role in the infrastructure of e-commerce applications.

1. Infrastructure as a Service (IaaS)

Examples :- Amazon web services, Microsoft Azure, Google cloud platform.

Uses :- scalability :- easily scale up or down based on demand.

Flexibility :- customize the infrastructure to meet specific requirements.

Cost management :- pay only for resources used.

2. Platform as a Service (PaaS)

Examples :- Heroku, Google App Engine, AWS, Elastic Beanstalk.

Uses :-

Development Efficiency :- provides a platform to develop, run and manage applications without worrying about the underlying infrastructure.

Integration :- Simplifies integration with other services and applications.

Speed to market :- Accelerates the development process by providing preconfigured environments.

3. Software as a Service (SaaS)

Examples :- Shopify, Magento, Big Commerce.

Uses :- Ease of use :- Ready to use applications for various e-commerce functions.

Maintenance :- The provider manages updates, security, maintenance.

Accessibility :- Accessible from any device with internet connectivity.

① Hadoop clusters: Analysis:-

(i) Robustness:- Data Replication:- Ensures system resilience and availability.

(ii) Data Disk Failures:-

Replication:- Data is replicated across multiple data nodes.

Automatic Recovery:- Lost blocks are re-replicated.

(iii) Heartbeats and Re-replication:-

Heartbeats:- Monitor DataNode health.

Re-replication:- Replaces lost blocks to maintain replication.

(iv) Cluster Rebalancing:-

Purpose:- Distribute data evenly across the cluster to prevent hotspots.

(v) Data Integrity:-

Checksums:- Validate and correct data corruption.

(vi) Metadata Disk Failure:-

Single point of failure:- Addressed with redundant backup and high availability setups.

(vii) Snapshots:-

Purpose:- Capture filesystem state for backup and recovery.

(1) data transfer b/w nodes = 1 Gb/sec

Encryption overhead = 5% $\Rightarrow 1 \times \frac{5}{100} = 0.05$

Effective ^{data} transfer rate = 1 Gbps \Rightarrow Encryption overhead
 $= 1 - 0.05$
 $= 0.95 \text{ Gbps}$

* Unit - G :-

(2) HDFS Storage Mechanism :-

* Blocks :- Large files are divided into blocks, which are distributed across Data Nodes

* Replication :- Each block is replicated (typically three) to ensure fault tolerance.

HDFS Components :-

* Name Node :- Manages metadata (file structure) but does not store actual data.

* Data Node :- stores actual data blocks and handles write operations.

Architecture Comparison :-

* peer-to-peer :- Each node has equal responsibilities
coordination and consistency are chal

* master-slave (HDFS) :- Name Node manages metadata ; & stores data

simplifies metadata management
tolerance through data replica

* Real-time Examples :-

* Yahoo! Search

* Facebook