Unit-IV

→ Overview of cloud

→ Introduction:

→ CC is a technology which utilizes the Internet & central isolated servers in order to sustain applications & data.

→ Users can access the appln's & data. at any work station. Through the Internet.

→ CC. Technology. permits proficient computing. by consolidating bandwidth & processing
   ↑ — Advanced.
   Beginner. Intermediate.
   Combining data. from diff Sources, cleaning & verifying it and. Storing it in one place.
   data warehouse.

→ Cloud offers Robust Memory Administration.
   no need to sustain memory on personal.
   System (Alter the means by which. Internet & computer are used.).

Essentials of cloud computing :-

→ C.C is a type of computing that provides an off-premise computing facility.
   Storing data on virtual resources. usng. the Internet.

→ the main component. behind C.C is "data center."
   I refers to on-premise h/w facility that is used for many purposes.
   (s/w(or) Appln's —that are installed & operated on the premises of an Organization)

→ The term cloud is defined by NIST as follows :
   National Institute of Standards & Technology.

→ Cloud Computing Is a model for Enabling. ubiquitous, convenient, on-demand n/w access to
   appear any time.
   Shared-pool of configurable. computing. resources (eg: n/w's, servers, Appln's. and services.)
   that can be rapidly. provisioned & released with. minimal management Effort.

→ cloud model is composed of
   i) five Essential characteristics ──────── ┌ on-demand self-service.
   ii) three Service models ──── ┌ Saas ├ Broad n/w access.
   iii) four deployment models. ├ Paas ├ Resource pooling.
                                └ Iaas ├ Rapid Elasticity.
                                        └ measured service.

   Public   Private   Hybrid   Community
   Cloud   Cloud   cloud — cloud.

→ Cloud computing offers services instead of a product, where by shared s/w, information and resources are supplied to computers & other tools efficiently over a n/w.

→ End users frequently access the cloud-based appln's via diverse interfaces such as desktop, a web-browser, (or) mobile Appln's.
are saved on servers at an isolated site.

→ Cloud Appln suppliers attempt to provide Enhanced functioning & service, than that is provided if the s/w are deployed locally on the End user.

→ Cloud computing performs tasks at a faster rate to meet the demands of users.

→ Cloud computing Empowers data centers to offer Enterprises to capability to swiftly obtain and deploy appln's. as well as Efficiently process and work with data.
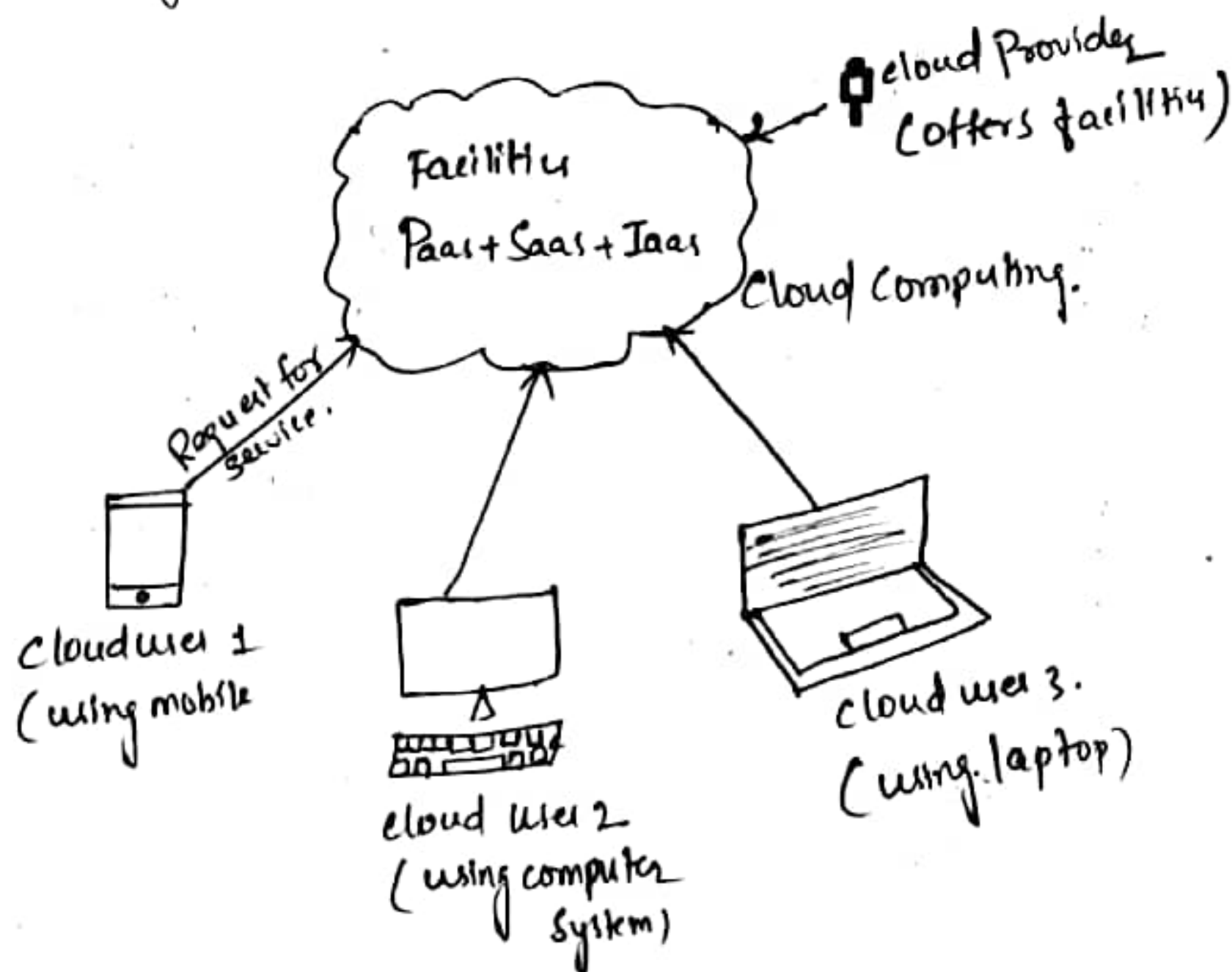(organizations)   (quickly)

→ It needs only Simple Administration

Facility
Paas + Saas + Iaas

Cloud Provider
(offers facility)

Cloud Computing.

Request for service.

Cloud user 1
(using mobile

cloud user 2
(using computer system)

cloud user 3.
(using laptop)

fig: Basic Structure of cloud computing.

→ As shown in the figure, Below facilities and services are offered by cloud providers in a cloud computing Environment.

→ diff users from various locations and various devices can Request for Specific services that are offered

→ cloud computing actually meet the overall s/w & h/w demand of an Organization.
Benefits of cloud Computing are :-
1. It improves parallelism & allocation of resources for fast accessing.
2. offering different Services at a single place.
3. Improves the burden of capital Expenses.

→ Cloud computing is an array of n/w, h/w storage, interface, and services. which facilitate the various services.

→ In cloud architecture there are 5 main components of cloud Infrastructure.

   i) front-End interface for users for simple access & for using cloud resources
   ii) Management for handling n/working resources.
   iii) Storage & virtual machine.
   iv) Constant Storage tool that may be Organized within working virtual machines.
   v) Monitoring tools for including initiating virtual machines on the cloud.

→ There are 2-Types of cloud Environment:

   i) The End-user, who has no idea. about cloud complexity.
   ii) The cloud service provider. who has the liability of controlling the complete cloud Environment & offer services to the consumer.

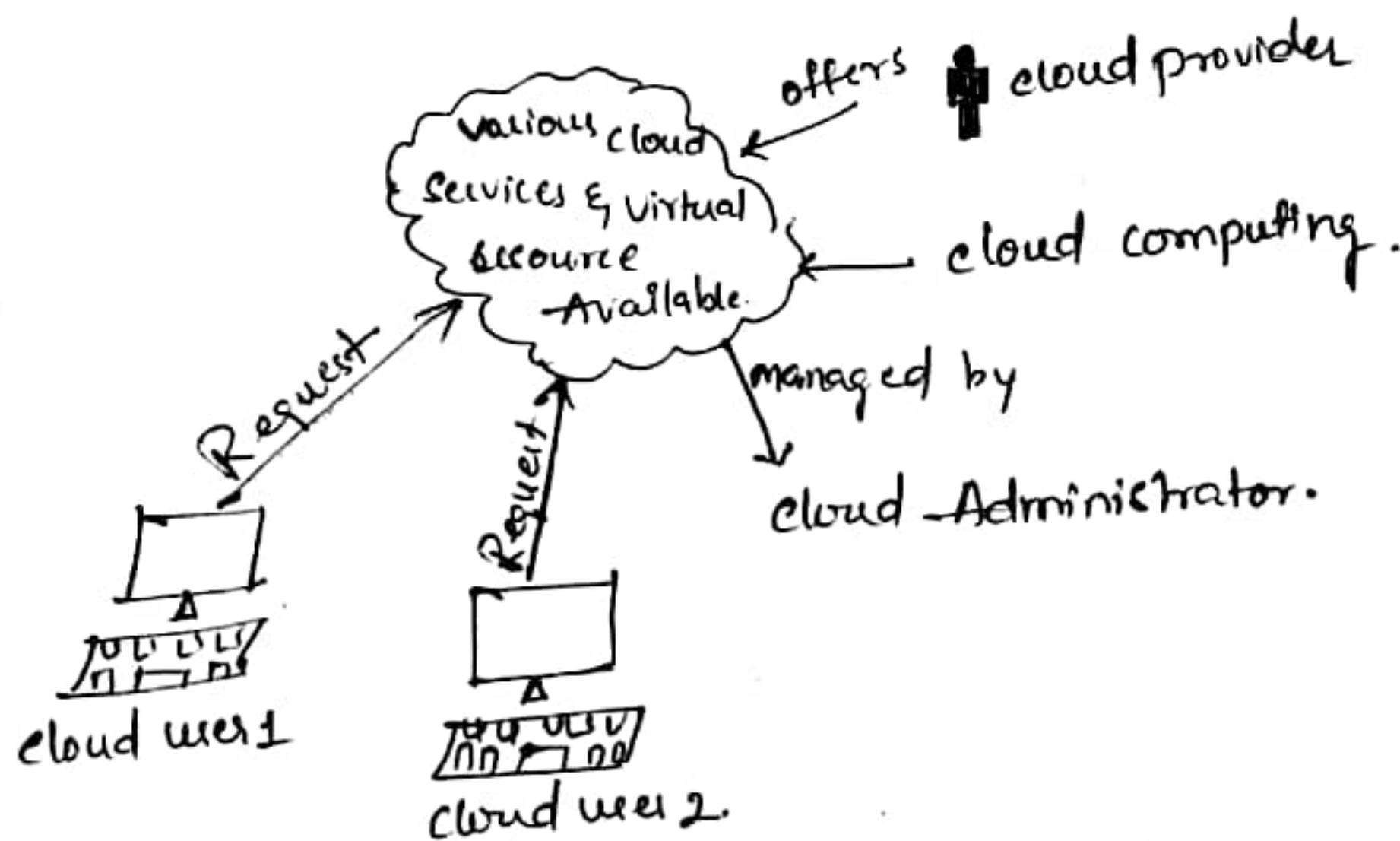fig1: Cloud Resource Management.

Various Services & Resources are provided to users by the cloud provider, as suggested & managed by the cloud administrator in the cloud environment,.
→ one of the jobs of the Supplier is safety. & it assures the consumers the degree to which their data is protected.
→ you require an Internet Connection to access the cloud.
→ the Benefit of this is that you can access that record from. anywhere, by any tool that can access the Internet.
→ Cloud Computing involves a. cloud Consumer, cloud provider, cloud Auditor, Cloud broker, & Cloud Carrier.

Cloud consumer: An individual person (or) Organization that sustains a business relationship with cloud providers and avails the services offered by the provider.

Cloud provider: An individual person (or) Organization, who offers a service and is liable for the services of cloud computing, to the parties that demand it.

Cloud Auditor: A party that conducts evaluation of cloud services such as performance, operation on various systems, & Security among others.

Cloud broker: The management b/w cloud providers and cloud consumers like Presentation & delivery of various Services.

Cloud Carrier: The Mediator Responsible for connectivity & transport of cloud service from service providers to cloud consumers.

Need of Cloud Computing :—

→ Every corporation desires to provide workers with a comfortable platform for working.

→ Cloud computing offers services to users for storing s/w and files distantly, instead of on a server (or) a harddrive at their workplace.

→ There are many Benefits (to) of using cloud computing for world-wide corporations; one of the key Reasons is Elasticity provided by it.

→ Through the Internet, Employees may access information from anywhere; and Employees may also jointly work on documents and files, Even when they are not physically all together.

→ cloud computing is Extremely fast and simple to operate; there is no requirement of purchasing and deploying costly s/w as it is already deployed online and you can operate it from there.

Challenges Associated with a Conventional Infrastructure :—

1) S/w licensing and support.
2) Scalability / flexible.
3) Accountability — responsibility/quality.
4) Modifiability / degrading existing quality
5) Physical Security
6) cost-effective management.

Cloud computing is a new Trend in computing due to its many benefits.

1. Reduced costs
2. Scalability
3. Remote access
4. Disaster Relief
5. Ease of Implementation.
6. Skilled vendors.
7. Responce Time.
8. Easy to customize
9. Virtual Provisioning.
10. fully Automated Storage Tiering

History of cloud Computing:-

CC is an Internet-based service that has evolved after going through a number of phases.

→ Around 1961, John mac charty. Suggested that computing can be sold like utility.
→ In 1999 Saleforce.com came into market & started delivering of Apple's easy a simple website.
→ This was a pioneer of cloud computing.
→ Amazon web services was launched in 2002., which provided customized cloud-based services. Including storage, computation... etc. to cloud users.
→ Another big invention in C.C was in 2009. as web2.0 & google services. through google Apps.

Historical Evolution of computing:-

1. Client. server Technology:— centralized Approach.
→ It is a technology behind cloud computing.
2. peer-to-peer Approach— Every computer has Equal Responsible + facilities.
3. Distributed computing—utilizes idle resource. that one not utilized for some reason.
4. Evolution of cloud computing from. Grid Computing.
5. Autonomic computing.
6. Platform virtualization.
7. Service Oriented Architecture (SOA)
8. Utility computing.
9. web 2.0
10. Parallel computing.

Benefits of Cloud Computing :-

→ Pay as per use.
- Reduced investment & proportional costs.
- Accessibility from Anywhere.
- Increased scalability.
- Increased Availability & Reliability.
- Dynamic provisioning.

Limitations of cloud computing :—

→ many cloud-based Appln's like G.mail have become very successful, still the decision makers continue to refuse to use the cloud.

→ companies mainly just contract Appln's. which comprise less confidential data.

→ the Appln's which ready to move to the cloud still insist on third-party risk appraisal (or) Enquire with cloud suppliers. on the following:

1) By whom the Appln's & data will be Accessed & how will that be Scrutinized?

2) what security methods are used for storage & transmission of data?

3) How data & Appln's from diverse consumers are reserved seperately.?

4) where will the data stored, in terms of Geographical sites?

Some Limitations are discussed below:-

1. Availability of service.
2. Data Lock-in.
3. Data Segregation.
4. Privilege Neglect
5. Scaling Resources.
6. Data Location.
7. Deletion of Data.
8. Recovery & Backup.
9. offline clouds.
10. Unpredictable Performance.

(Cloud Architecture - On the Basis)

Grid Computing - Advantages & challenges.

Introduction:

→ G.C. is the Integration of computer resources for achieving similar objective.

→ Grids are frequently created with middleware s/w. Libraries of a common grid.

Grid Framework:

→ Grids all type of dispersed computing system, whereas a virtualized super computer is made from various n/wed, loosely attached computers. temporarily joined for performing huge tasks.

→ computing Grids are similar to electrical grids.

→ middleware is used in grid computing in order to synchronize various. It resources in a n/w. & make them work as virtual entent.

→ The main objective of Grid computing is to offer users access to the resources as per the requirement.

→ Associate objectives of Grid computing are :-

   1)   Supplying isolated access to IT. resources.
   2).   Building up processing control.

→ Grid is a Technology. which controls 2. factors

     1) Allocation
     ii) Trust.

→ The main resources that can be shared in a Grid are.

   1) Processing & computing power.
   ii) n/wed filed and data storage systems
   iii) Bandwidth & communications.
   iv) Appln. s/w.
   v) Tools. used for scientific purpose.

Grid middleware:-

It is an Exclusive s/w that offers the Essential functionality needed to facilitate. Sharing of various resources & setting up. virtual Businesses

Grid. Computing :- it is fundamentally installed Grid middleware or the computing. Permitted by Grid-middleware. based on Synchronized. resources among. collection of resources & Organizations.

Grid. Infrastructure :- It refers to the union of grid middleware & h/w.

Grid Architecture :-

→ Grid Design offers an outline of Grid constituents. describes objectives & operations; how they all interrelate with Each other.

→ the main concentration is on Interoperability among. users. & Suppliers of resources.

→ Various Layers of Grid Architecture are as follows.

1) ~~Data~~ fabric Layer
2) Connectivity Layer
3) Resource Layer
4) Collective Layer
5) Application Layer.

Fabric Layer :-

It includes physical resources that are shared inside the grid.

It comprises of. - n/w resources,
- Computational resources
- Storage Systems.
- Sensors
- s/w modules &
- Additional System. resources.

2). Connectivity Layer :- It facilitates the switch of data. among the fabric layer resources.

→ the main functionalities are :- identification
- Transfer
- navigation &
- Support. for Safe conversation.

3) Resource Layer :-

It provides the protection of interaction activity as distinguished by the connectivity Layer.

4) collective Layer :- It is liable for the whole world wide Resource management & for interaction with collection of resource.

5) Application Layer :- It involves in user applications which are installed on the grid.

→ the five layers of grid computing are inter-connected to one another.

→ Every layer utilizes the interfaces of the fundamental layer.

The **key functionalities** of Grid middleware are as follows :-

→ Integration & virtualization of various independent resources.

→ Requirement of inf. from resources and accessibility.

→ flexible Resource administration & allotment.

→ Safety and accountability.

→ Quality of service.

Advantages of Grid computing :-

→ Grids control, combines systems mutually into 1 big computer & thus better Computational control to an Assignment & allows better consumption of infrastructure

→ Grid computing allows price savings in IT branches of corporations.

→ It facilitates better scalability of Infrastructure.

→ It enhances the Effectiveness of computing.

→ Grid computing permits a more proficient Business Administration of spread of IT resources.

Challenges of Grid Computing :-

→ Investments are required for making the existing Appln's to work on a grid infrastructure.

→ Lack of values for h.c. makes resource finding difficult & risky.

Similarities & Differences b/w. Cloud Computing & Grid Computing.

→ It could be difficult to understand. because, the two computings are not dependent on each other.

| feature :	G.C.	C.C.
1. Goal	collaborative sharing of resources.	use of service.
2. principle	Grid needs processing from you.	Cloud does the processing for you
3. workflow-management	In one physical node.	In EC_2 Instance (Amazon EC_2+ s_3)
4. functioning	G.C. divides Everything	C.C. assimilates everything into one place.
5. level of abstraction	low.	high.
Architecture.	It follows a distributed computing architecture	It follows client-server computing Architecture.
ownership	In. G.C. grids are owned & managed by. Organization	In. C.C. cloudservers are owned by Infrastructure providers
Operation.	decentralized management system.	It operates as a centralized. management system.
Scalability	high.	medium.
Consumption.	G.C. resources are consumed at cost.	G.C. must first be Established. once. set-up is done. noneed to pay.
Resources	G.C. Centrally. managed.	G.C. managed in a collaboration pattern.
Accessibility	C.C. widely Available. highly	G.C. less. Accessible. compare to cloud
Services	Iaas, Paas, Saas.	Distributed computing, distributed Information are used In G.C.

Characteristics of cloud Computing & Cloud Service Model:

→ cloud computing could be of many types: as. hybrid, public (or) private.

→ fast scalability is the main feature of cloud computing; ie: Alterations and improvements to the Services are done effortlessly and instantly. facilitating the c.c. service to be flexible.

→ for cloud computing. one of the major concern is "safety"

The main features of c.c. are :   → It of Individual.

1) **on-demand self-service**: customer unilaterally provision the service. & scale it up or down by the
ii) **Broad n/w Access**: Service is uninterruptedly accessible.
iii) **Resource pooling**: customer share a universal multi-occupant situation & Resources allocated — dynamical
iv) **Quick Elasticity**: Easy & flexible scaling. upon the requirement of use.
v) **calculated service**: resources are calculated. as per the usage of consumer.
vi) **multi-persistence:** - it refers to the desire for Strategy-focused. Segmentation, invoicing models and service levels for distinct customer areas.

vii) **Dynamic Computing Infrastructure:** - c.c. needs a dynamic computing infrastructure.

→ the basis is. scalable, safe and consistent.

Resource management:
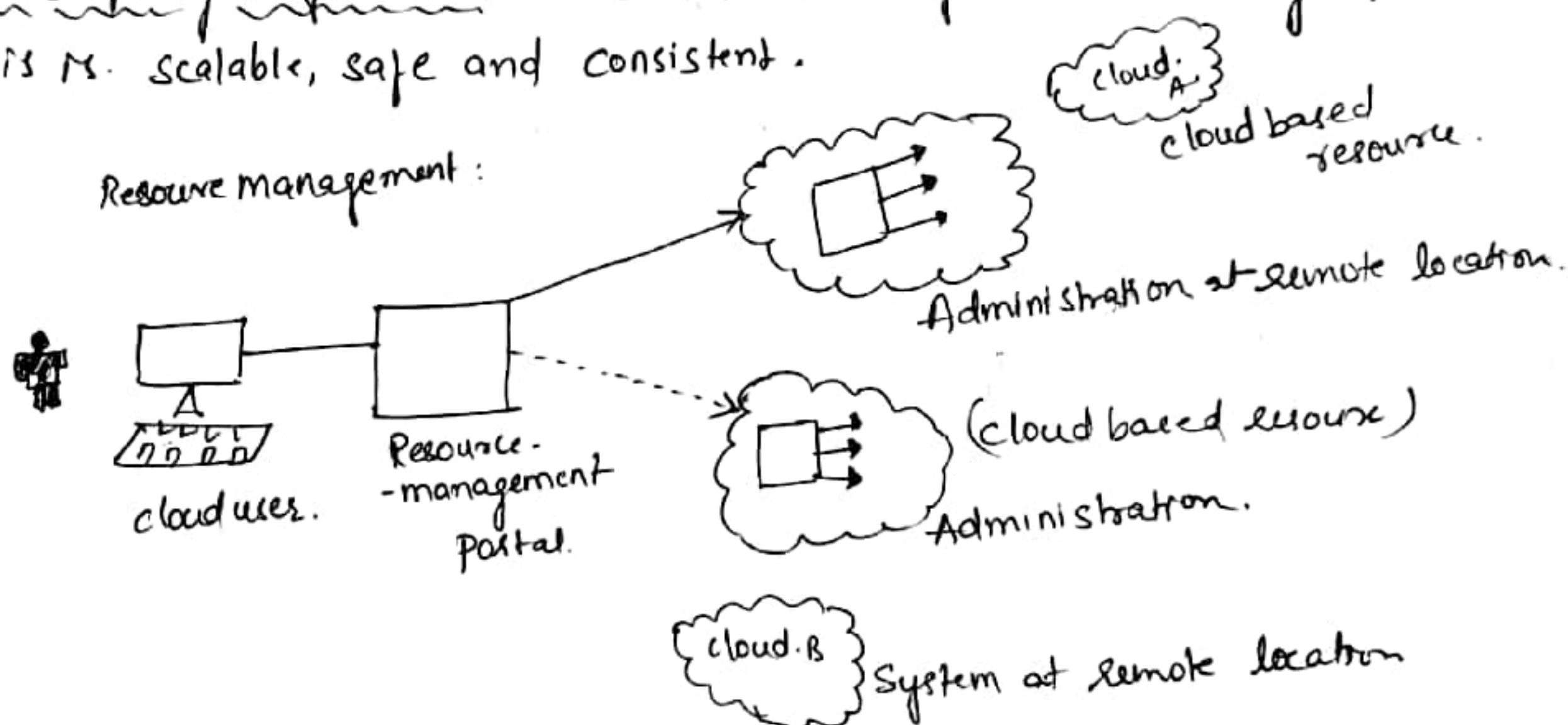
→ A lively computing infrastructure is vital to efficiently. Support the flexible nature of Service Provisioning & de-provisioning. as demaned by the users.

viii) **IT-Service-Centric Approach:-**

→ c.c. is It-service centric; usually cloud users wish to operate applications for a particular objective.

→ By summerizing the Service-centric outlook of the infrastructure, users may effortlessly access strong, pre-defined computing situations.

→ It-service centric method. allows user acceptance & business flexibility.

ix) **Self-service Based usage model:-**

→ self-service - offers users the ability to assemble, upload, plan, install, control & report on their company services on-demand.

→ A self-service could offers simple-to-use, independence. & less managerial participation is required.

x) Self-managed Platform :-

• cloud facilitates self-administration, through software Automation, influencing the following capabilities:

    i). Reserving & Planning. Resource capability.

    ii) Abilities for managing, configuring & reporting to make sure, resources may be assigned and re-assigned to various users.

    iii) Devices for managing access & strategies for how resources could be functioned.

xi) Elasticity & Scalability :-

→ the cloud is flexible, signifying that resource distribution may meet smaller (or) bigger based on the need.

xii) standardized Interfaces :—

cloud services must have consistent API's that offer directives on how two data sources (or) applications can function with one-another.

→ A consistent Interface allows the consumer to connect to cloud services together

Cloud Architecture On the Basis

On the Basis of Load Balancing :—

Unit·5

Models of cloud computing :-

- Cloud computing Deployment Models.
- Cloud Data center Core Elements.
- Replication Technologies & Backup, & Disaster Recovery.
- Security Issues of cloud computing –. Introduction, security concerns.
- Information Security Objectives, Design Principles & Security services.

Introduction :-

→ The cloud computing system is composed of a set of layers upon which distributed Applications are built.

→ These layers include. Iaas, Paas, saas.

Iaas :– this model provides infrastructure-related services and is responsible. for handling h/w related issues, power & cool-management in data. Centers.

Paas :– This model takes the Responsibility of . O.S, d/b-management, server. and Programming language.

Saas :- This model handles S/w related issues & Provides amenities to the. cloud users .

Cloud·Service models.

Saas. Email, Virtual Desktop, Etc ...	layer (TOP.)
Paas. D/b, webserver, development tools.....	Layer 2 (middle)
Iaas. Servers, Storage, n/w, Virtual-machine....	Layer·1 (Bottom)

Cloud. Deployment. Models :–

→ The cloud model is invented with four deployment models.
- Private cloud
- Community cloud.
- Public cloud.
- Hybrid. cloud

Private cloud :— cloud infrastructure is provisioned for exclusive use by a single Organization. comprising multiple consumers

Community cloud :— It is provisioned for exclusive use by a specific community of consumers from Organizations. that have shared concerns

public cloud :— it is provisioned for open use by general public.
→ it Exists in premises of cloud provider.

Hybrid cloud :— it is a composition of two (or) more distinct cloud infrastructures that remain. unique entities, but are bound together by Standardized.

→ The Deployment Models are distinctive by their design, the position, of datacenter and need of consumers. from. Cloud. Supplier.

→ It works as your Virtual computing environment with a choice of deployment model depending on howmuch data you want to store & who has to access to the infrastructure.

Public cloud :

+ The name says it all. It is accessible to the public.
→ public deployment models in the cloud are perfect for Organizations with. growing fluctuating demands
→ It makes a great choice with low-security concerns.

Cloud. Data center Core Elements :—
→ The key component of cloud computing is Virtualization.
→ cloud services have **three distinct characteristics** which differentiate them from Traditional computing (hosting).

    i) Sold on Demand
    ii) It is Elastic
    iii) service is fully managed by the Provider.

The Important cloud Elements are as follows :
    1) clients (ie; mobiles)
    2) Data center (ie: collection of servers).
    3) Distributed servers (geographically)
    4). Storage.

→ A Data-center is a centralized Ordnance for the Storage, Administration & distribution of Information & Data.

→ Data center maintains the Entire Infrastructure. & makes computer systems familiar with each other.

→ The principle components of a cloud Data center (CDC) comprise:

1) Application
2) DBMS
3) Compute.
4) Storage.
5. Network.

(1) Application :— An Application offers an interface b/w the host & the user. and among multiple hosts.

→ Business Appln's employ dlb's which contain a <u>3-Layered design</u>:
- The Appln. uses interface is the front-end Layer
- Computing Sense / Application itself is the middle layer.
- database is the. Back-end Layer.

→ the Data is saved on the Server, when consumer request. the Server replies.
→ Application is a vital Structure that manipulates the whole functioning. of IT-System.
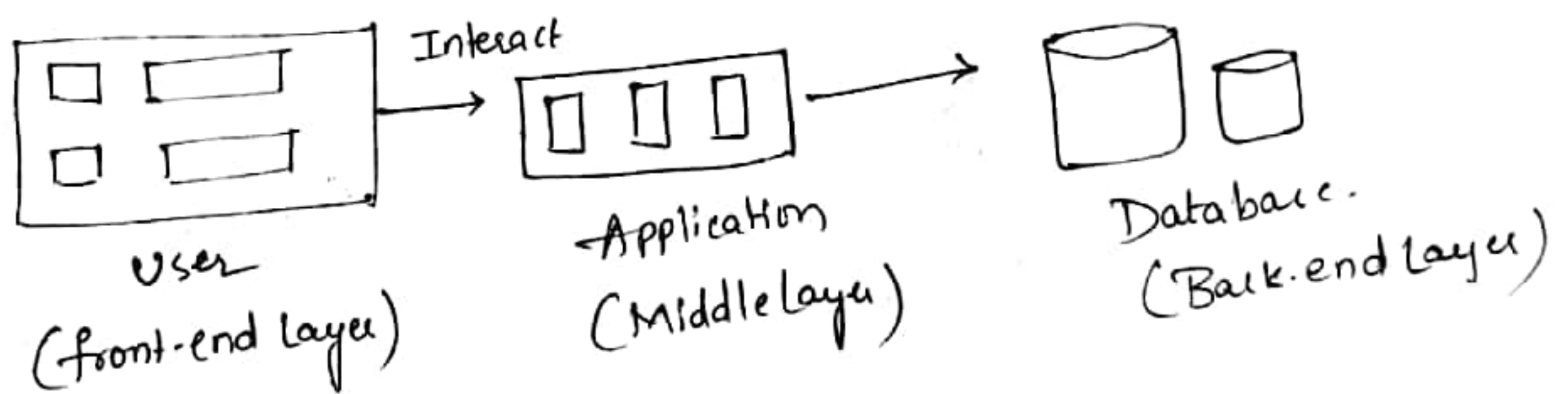

User
(front-end Layer)

Interact

Application
(Middle Layer)

Database.
(Back-end Layer)

fig: 3-layered design.

(2). DBMS :—
→ A dlb is a planned mode to save data in rationally ordered tables which are unified.
→ A dlb assist to optimize the recovery & Storage of data.
→ The DBMS. controls. incoming data, arranges & allows the data. to be Extorted (or) customized by users.

3). Compute:-

→ Compute consists of physical components. (h/w. devices); that communicates with one another using logical component (s/w & protocols).

→ It has 3. chief physical constituents
  i) memory
  ii) cpu.
  iii) I/o (input/output) Tools.

→ memory is used to save data.

→ I/o tools facilitate distribution & acquiring of data. from & to the compute system.

4. Storage:-

Data. Generated by Companies (or) Individuals should be saved so that It is Effortlessly available. when required.

→ Tools intended for Saving data. are known as Storage tools.

→ An intelligent Storage system. consists of four main elements.
  i) Physical Disks,
  ii) cache.
  iii) front. End &
  iv) Back-End.

5). Network:-

In cloud computing, for various communication → TCP/IP. protocol is used for Wide. Area N/w. & Metropolitan Area N/w (MAN)
    (WAN).

→ Ethernet is used for LAN

→ Every compute System is Associated with the N/w via. Network Interface card
                                                                       (NIC)

→ Routers & Switches are the usually used Interconnect tools.

→ A Router is a tool (or) s/w. which decides the subsequent n/w. Spot to which a Package Should be dispatched to Arrive at its Target.

→ Compute Systems converse with storage tools by using n/w(or) channel technologies.

→ N/w. Communication involves Sharing bandwidth among numerous systems.

Replication Technologies, Backup & Disaster Recovery.

1. Replication Technologies:—

→ The procedure of generating an Accurate/Similar replica of data is known as Replication.

→ The Accurate copy of data, that is generated is known as Replica.

→ These Replicas are used for revival and resurrect functions in the occurence of data loss.

→ The main Aim is to allow users to have the chosen data at the correct place; in a condition Suitable to the needs of Revival.

→ Replica's may be used to address a number of Business performances. Such as:

   i) offering an alternating source for Backup, to enhance the Effect on construction.

   ii) offering a source for Rapid Revival.

   iii) Facilitating judgement support Actions, (like reporting)

   iv) Mounting & Analysing projected modification to an Application or an O.S.

   v) Reviving an Application from the copy in the occurence of a malfunction.

→ **Key factors to consider with Replicas:—**

→ Replicas may be continuous (or) point-in-time (PIT)

   i) continuous Replica: The data on the Replica. is matched with the manufacture data during the entire period.

   ii) PIT:— The data on the Replica is a copied picture of a manufactum at a certain timestamp.

→ A Reliable Replica. guarentees the data lessened in the compute system.

→ Local. Replication. is the procedure of replicating data inside a similar Range (or) Similar data. center.

→ These are categorized on the Basis of site, where the replication is carried out.

   i) Compute-Based

   ii) Storage-Array. Based.

→ for Every business function, Replica may be accessed by an alternating Server.

→ Storage-Group-based Regional Replication may be classified as follows

   i) pointer-based virtual Replication.

   ii) pointer-based complete degree Replication.

   iii) Complete Degree Mirroring

→ Remote Replication is the procedure of generating Replicas of data. to be kept in isolated places for safety.

→ The Infrastructure where the data is saved at the chief location is known as Source.

→ The Infrastructure where the Replica is saved at the isolated location. is called Target.

→ The Two fundamental manners of remote replications are as follows

     i) Synchronous Replication. (ii) Asynchronous Replication.

→ for the improvement of Threat Recognized in Two-site Replication, Three-site Replication is Employed.

→ In this, Data from Source-Location is Replicated to two Remote locations

→ Replication might be Synchronous (or) Asynchronous.

→ SAN-based isolated replication permits the data. Replication. among assorted dealer storage groups.

Cloud. Backup :

→ Backup is a Replica of the Manufactured data, generated & maintained for the only intention of improving corrupted (or) deleted data.

→ Backup Technologies, maintenance & Revival necessities for applications & data are vital step to guarantee successful Execution of the Revival & Backup. Solution.

→ Backups are carried out for Three. key Reasons.

     1) Documentation

     2) Operational Restores &

     3) Disaster Recovery.

→ Disaster Recovery tackles the condition to be capable to reinstate. all.

→ Backup. replicas are used for reinstating data. at an alternating location re-storing when the primary location is harmed. because of catastrophe. disaster.

→ Operational Backup

→ Based on necessities, corporations use diverse Backup approaches for catastrophe Recovery.
   Disaster.

→ Operational Backup is a Backup of data. at a point-in-time & used to reinstate data in the occurrence of data loss.

→ Documentation is a general pre-requisite used to protect contract report and other BPO corporation work goods for Rigid Approval.

→ There are 3. kinds of Back-up
        i) full·Backup. ─ uses (PIT)
        ii) Cumulative Back-up ─ distorted since last full back-up.
        iii) Synthetic full·Backup.

→ A Back-up system uses client·server design. with a Backup server & multiple Backup consumers.

→ The Backup server relies on Backup consumers for collecting the data to be backed up.

→ The Backup Metadata is obtained By Backup server from Backup consumer. to carry out its Actions.

Cloud + Disaster Recovery :—

→ The Backup server commences the Backup procedure for distinct consumers according to the Backup program Organized for them

→ The Backup Server Synchronizes the Backup procedure with all the Constituents in a Backup arrangement.

| Consumers | Metadata Transmit | Backup server | Metadata inscribes | Backuplist |

M.D Transmit → Storage joint tool

→ Tape drive. a low-priced alternatives is used for Backup.

Security Issues of Cloud Computing:

Introduction, Security Concerns:-

Introduction :-

→ Reliable cloud computing may be analysed as a computer safety design which is intended to defend the cloud from Malicious Attacks and Impositions.

→ A Reliable cloud system with Appln's & Hypervisors. Against Illegal Access to Information & Apply Encryption to defend Sensitive Data.

→ the Advantages of. c.c. are as follows.
 - upholding Accessibility to services
 - data reliability
 - Simplicity
 - privacy &
 - responsibility.

→ Cloud users are not sure about the Security of data. that they maintain on Public. cloud; whose resources are handled by the External Party.

Security concerns of cloud. computing ⇒ users Encounters while Transferring to and saving data in the cloud.

1. Handling of data by 3rd party — Safety controls.

2. cyber Attacks — data on Internet. risk of cyber attack.

3. Insides Threats — Threats with cloud workers (Unauthorized access)

4. Government. Intrusion — Govt. Supervision prgms & Contents etc. (act of entering into a situation without permission)

5. Legal liability. — Threats associated with cloud are not Restricted to safety,

6. Lack. of Standardization — no definite Rules for cloud Suppliers.

7. Lack of Support :- lack of marketing & Confusing with Schemes,

8. constant risk. — Identity management & access control.

Threats to Infrastructure, Data & Access Control :-

 - Various n/w. Intrusion matter arise.
   i) Denial of Service — cyberattack that disrupt the normal functioning of n/w.
   → main goal is to make the targeted resources un-available to intended users.

2) man in the middle attack → It occurs when 3rd party intercepts and potentially alters the communications b/w 2 parties without their knowledge.

3) n/w. Sniffing.

4) Port Scanning → used to identify open ports on a n/w.

5) SQL. Injection Attack → Special characters are used by hackers to return the data.

6) Cross site Scripting → Enter the correct URL & is re-directed to another site.

③ it is a practice of intercepting & Examining data packets as they travel over a computer network.

④ Encrypted data is hacked via n/w. ie; hacking pswds.