

### Unit-3

#### \* Compare virtualization & cloud computing

Parameter	Virtualization	Cloud computing
① what is it?	Technology	Methodology & principle
② Lifespan	years	Short lived & on-demand
③ Expenditure	High	low
④ skill required to operate	High	low
⑤ Shifting to another vendor	Complex & costly	easy & cheap
⑥ Innovation / changes	slow	Fast
⑦ ownership	owned by one	Shared tenancy

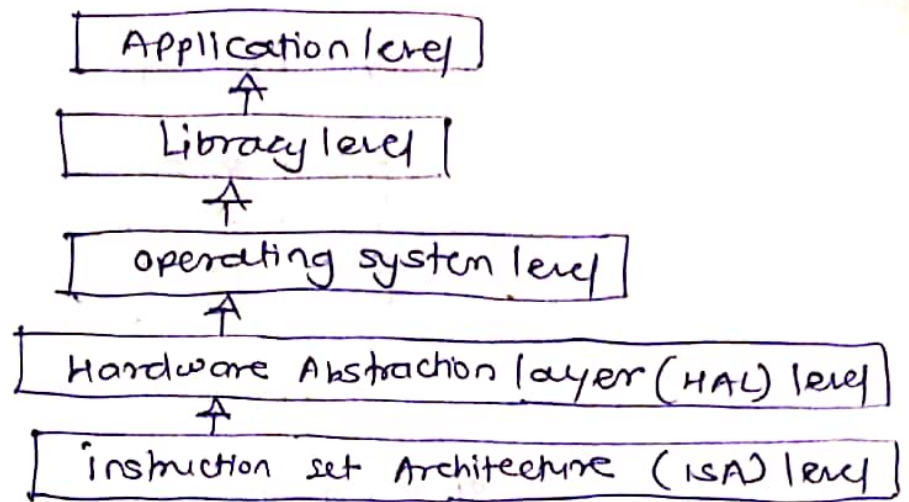
#### \* Advantages of virtualization:-

- ① Server Consolidation and resource optimisation
- ② Improved productivity & operational efficiency
- ③ Cost savings
- ④ Improve security
- ⑤ Improved Resiliency.

#### \* disadv. / limitation of virtualization:-

- ① cloud be a single point of failure
- ② Not Everything can be virtualized
- ③ Requires skilled staff
- ④ virtual machine sprawl
- ⑤ Capacity planning is hard
- ⑥ Managing licenses.

## \* Implementation levels of virtualization

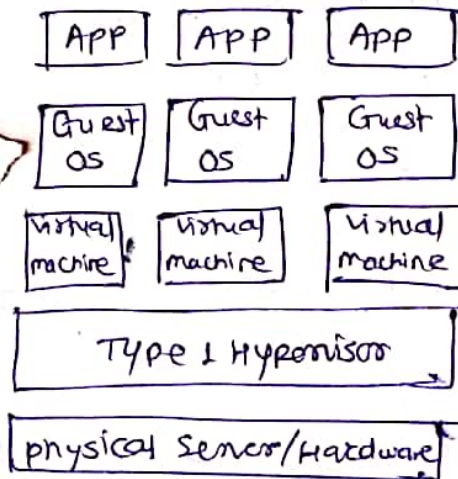


## \* Virtualisation structure (Virtualization Architecture & software)

① Type 1 = Baremetal Hypervisor

② Type 2 = Hosted Hypervisor.

① Type 1 = Baremetal Hypervisor:-



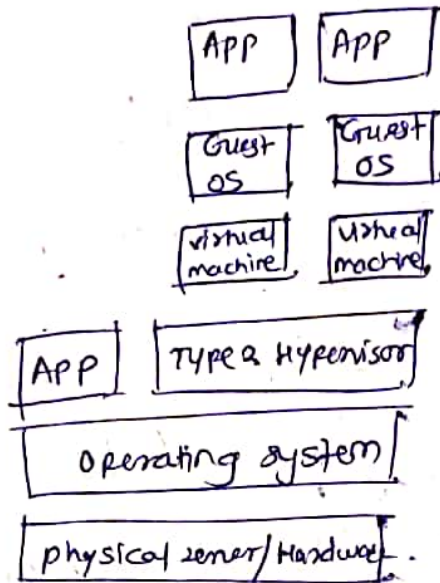
① example:-

1. VMware ESXi
2. Microsoft Hyper-V
3. KVM
4. Xen.

- The Hypervisor runs directly on the underlying hardware without a host OS.
- not required separate operating system.



② Type 2 = Hosted Hypervisor :-



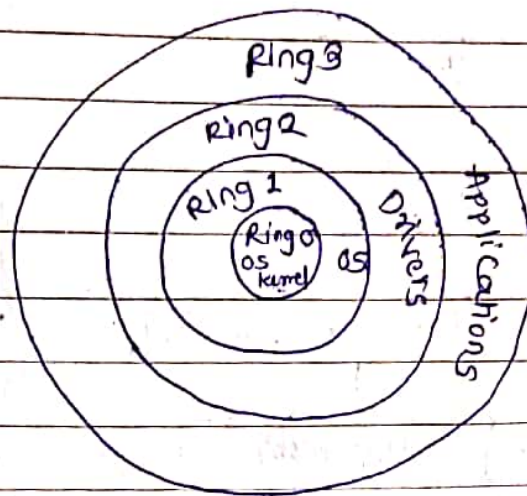
- ③ Example :-
1. VMware Workstation
  2. VMware Fusion
  3. VMware Player
  4. Microsoft Virtual PC
  5. Oracle VM Virtual Box.

- The hypervisor runs on top of an OS
- It requires an operating system.

\* compare type 1 & type 2.

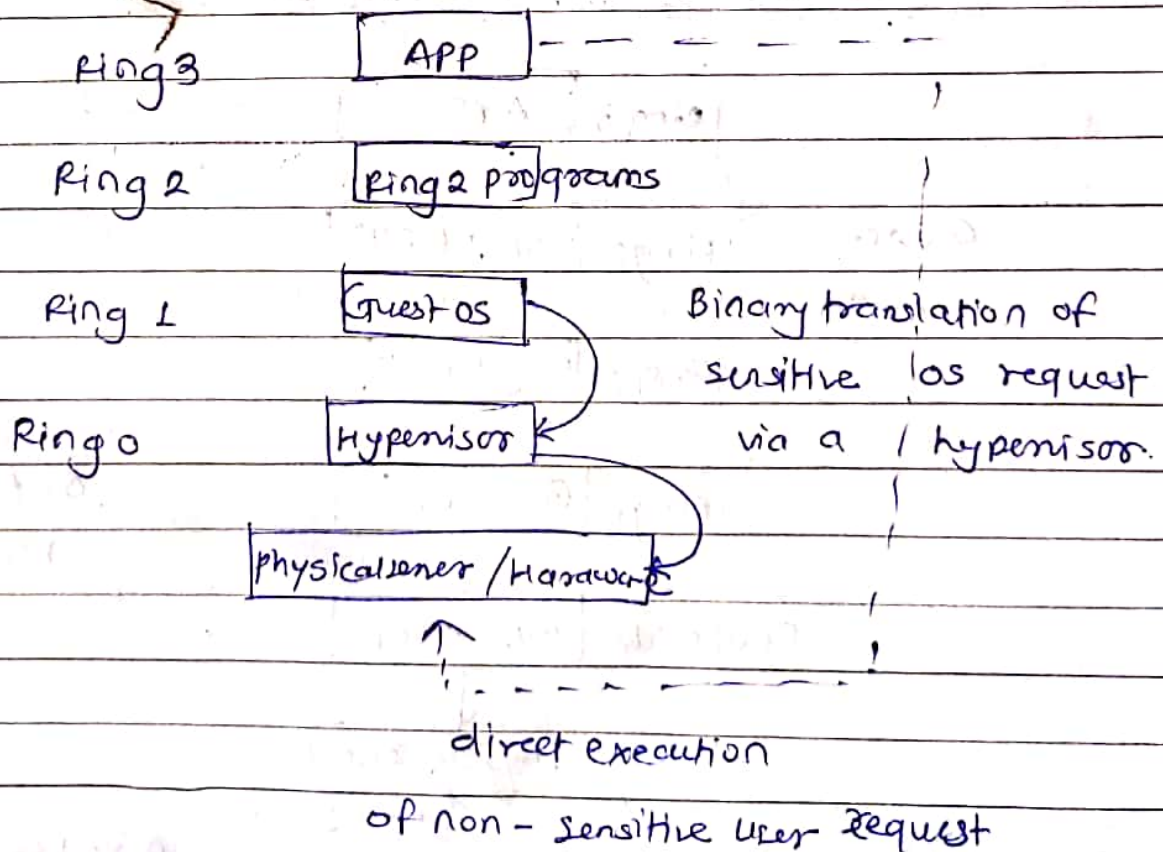
Parameter	Type 1 Baremetal	Type 2 Hosted
① Efficiency	High	Medium
② Separate OS required	No	Yes
③ Performance	Very High	High
④ Cost	High	Low
⑤ OS Security	Not Applicable	Depend on OS
⑥ Example	KVM, Xen	VMware Player VMware Fusion.

## \* Types of Hardware level virtualization :-



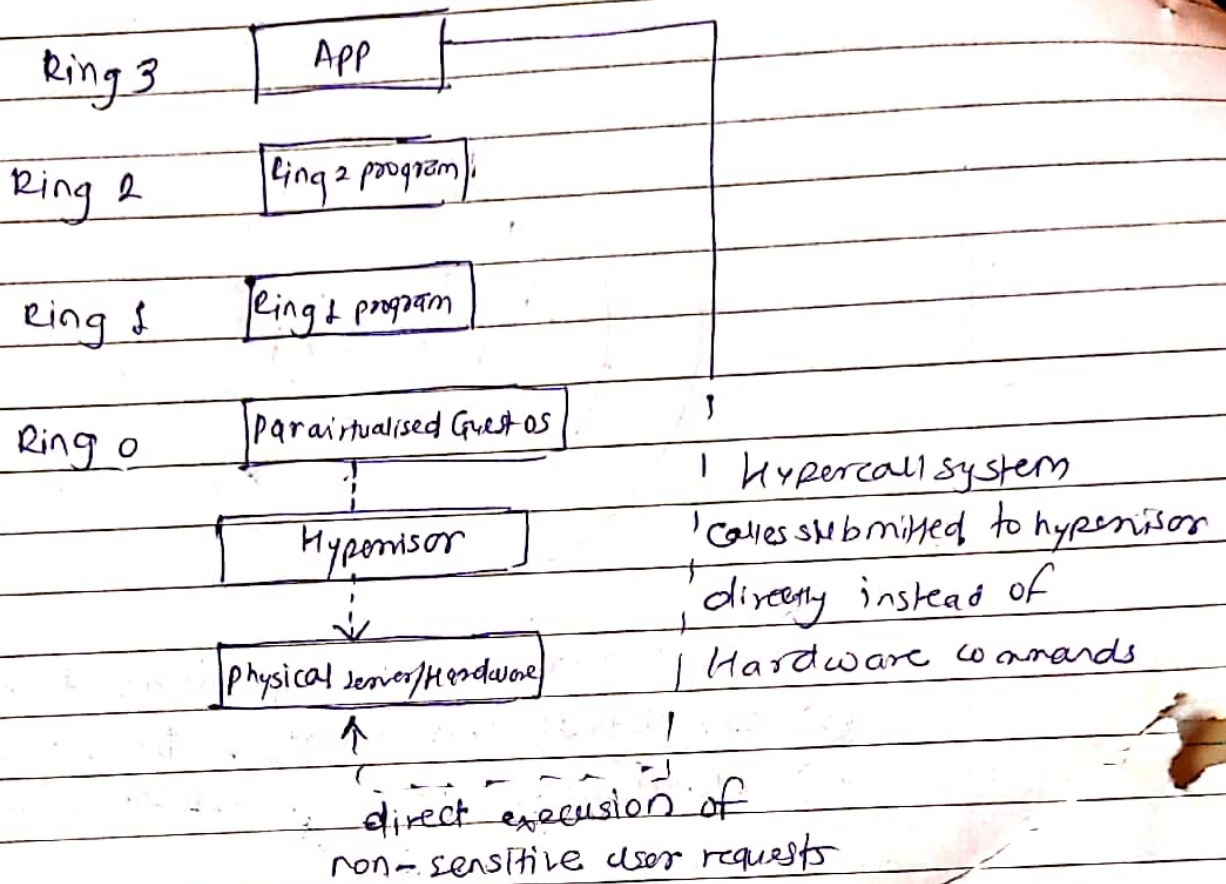
- ① full virtualization using Binary translation
- ② OS Assisted virtualization or Para virtualization
- ③ Hardware - Assisted virtualization.

### ① full virtualization using Binary translation :-

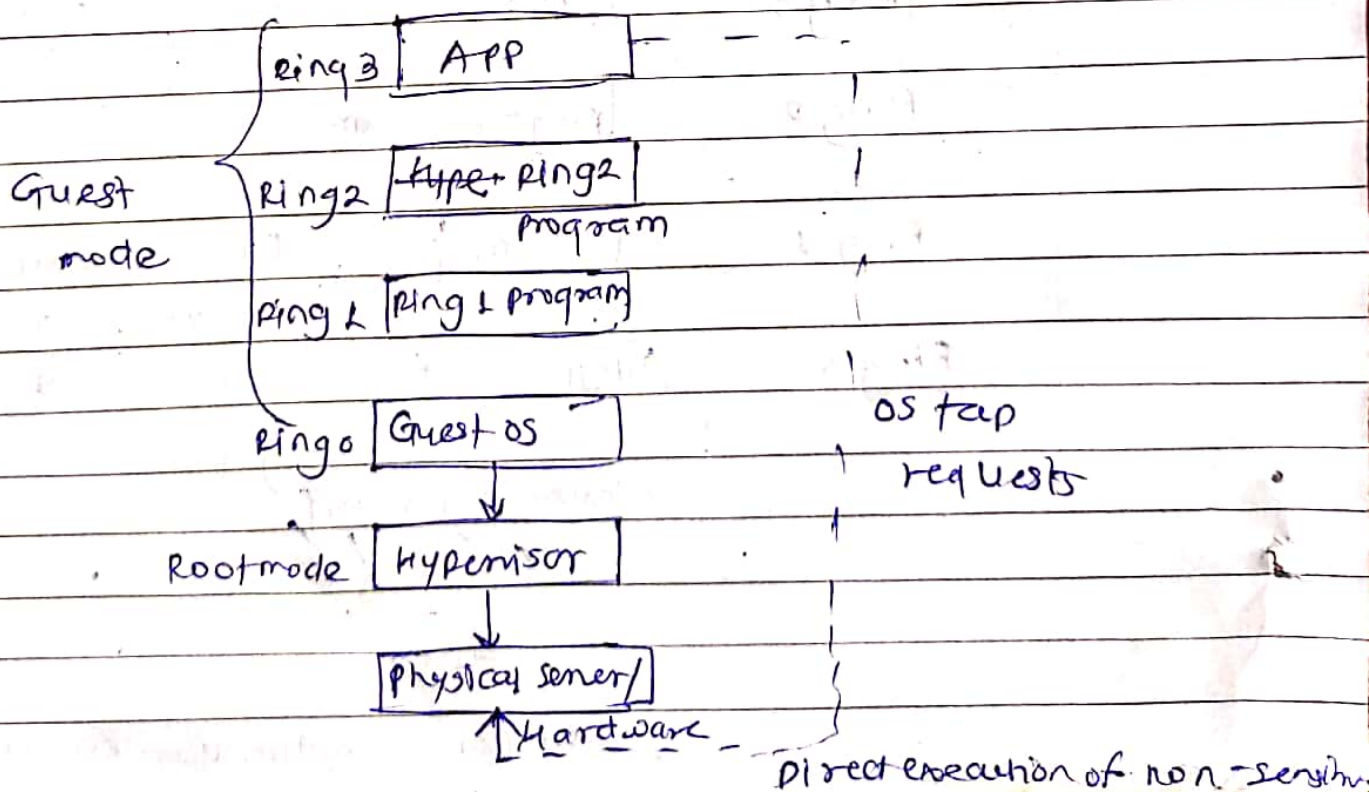




## ② OS Assisted Virtualization or Para-virtualization :-



## ③ Hardware assisted virtualization :-

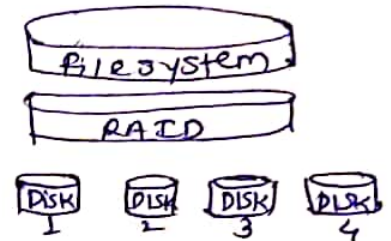


## \* method of Implementing storage virtualization :-

- ① File Based storage virtualization
- ② Block Based storage virtualization.

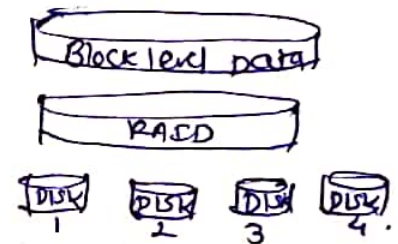
### ① File Based storage :-

- less cost.
- network attached storage device
- more simple to implement
- less expensive to manage
- less flexible

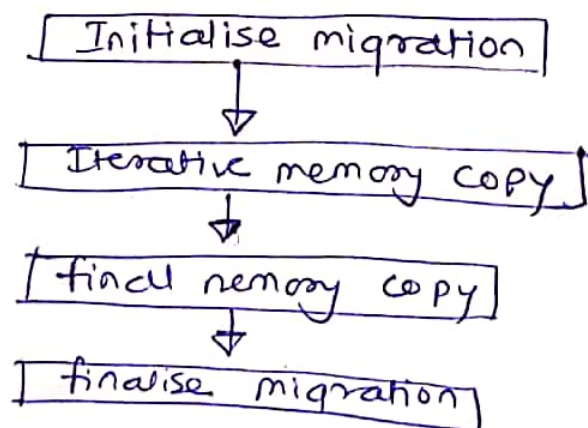


### ② Block Based storage :-

- more cost
- storage area NW
- complex to implement
- more expensive to manage
- more flexible.



## \* live vm migration steps :-





# \* Cloud Computing \*

## Unit - 6

① distributed Computing :- A distributed computer system consist of multiple software components that are on multiple computers but run as a single system.

• Need :- Scalability = The system can easily be expanded by adding more machines as needed.

- Cost effectiveness.
- Efficiency
- redundancy

② Compare distributed & cloud computing :-

parameter	distributed	cloud
① what it is ?	Technology	Methodology & principle
② Expenditure	High	low.
③ Lifespan	<del>short</del> years	short lived & on-demand
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③ enabling technologies for Internet of things :-

- ① wireless sensor network
- ② cloud computing
- ③ Big Data Analytics
- ④ comm<sup>n</sup> protocol
- ⑤ embedded system.

① IOT :- IOT is collection of diverse technologies that interact with the physical world.

② Characteristics of IOT :-

- ① Based on Embedded system
- ② Unique Identity
- ③ In-built intelligence
- ④ Dynamic configuration
- ⑤ Several connectivity options
- ⑥ Integrated with other system
- ⑦ operates at Large scale.

③ Innovation Application of IOT :-

- ① Human - monitoring & managing, wellness improve
- ② Home - Safety, security, energy management
- ③ Retail - Self-checkout, smart customer, layout
- ④ offices - worker monitoring, training.
- ⑤ factories - production Automation, operation management
- ⑥ Vehicles - Condition Based Maintenance, Automatic
- ⑦ cities - public safety & health, traffic control

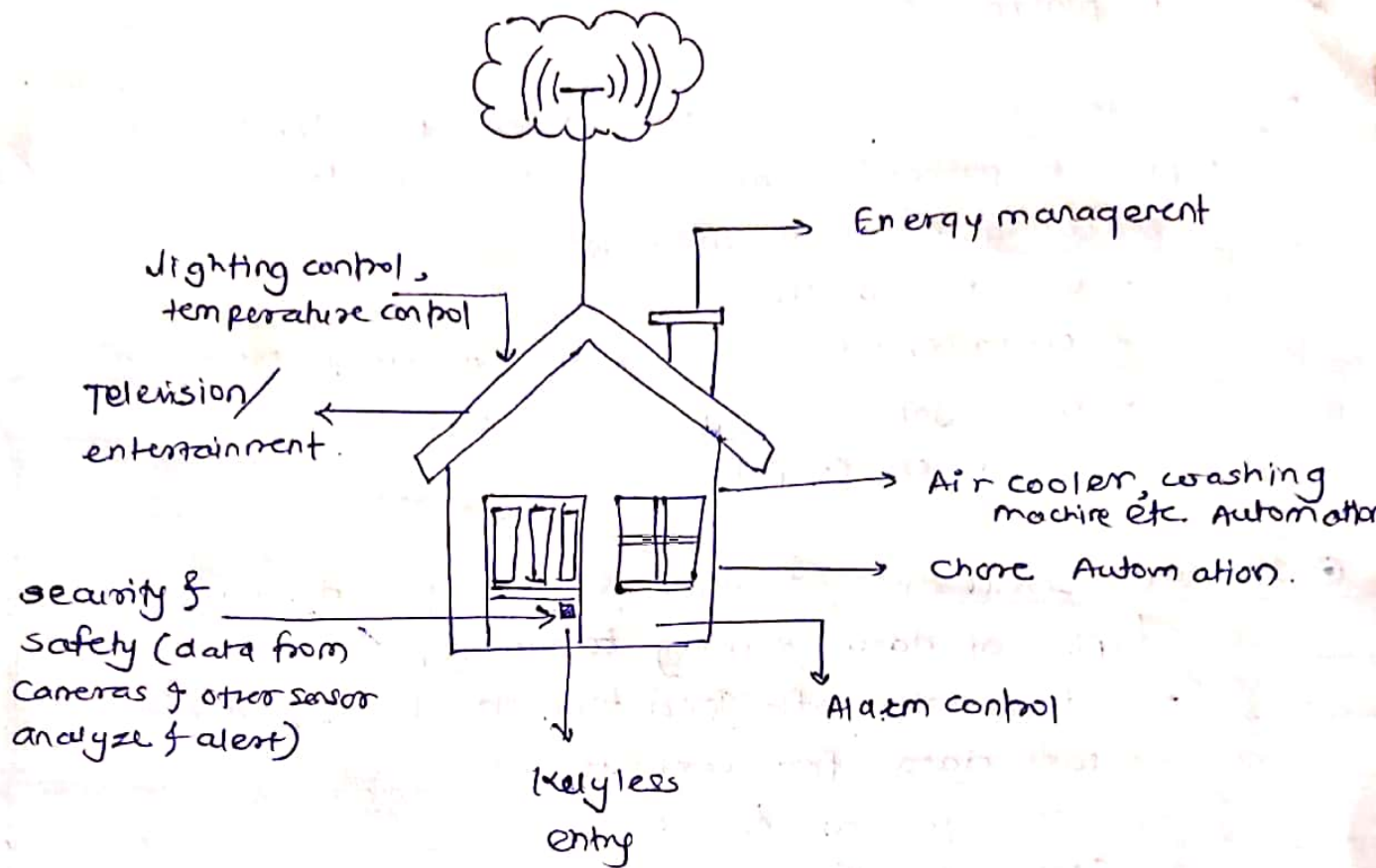
④ social & professional networking :-

\* social :- social networking is used of Internet based social media platforms to get & stay connected with friends & family. Three most popular websites insta, fb & twitter.

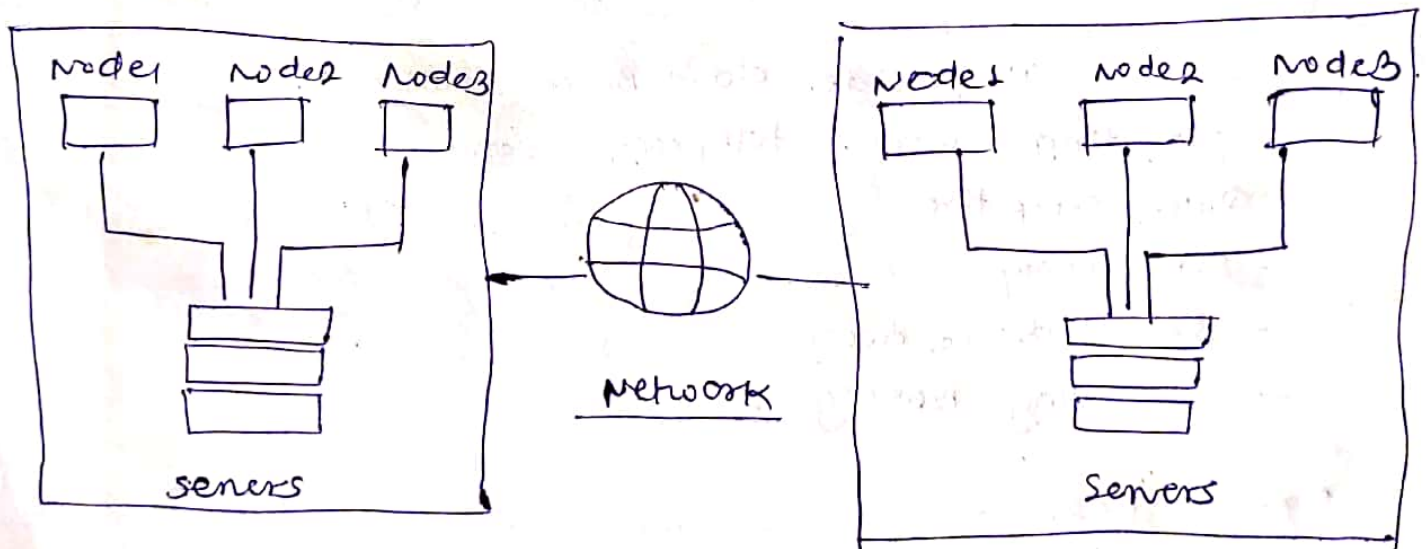
\* professional :- it is type of social N/w service that focuses on interaction and relations for business opportunities & career growth, with less emphasis on activities in personal life. e.g. linkedin



## Home Automation using IoT :-



## \* distributed computing system :-



## Unit -5

### \* Cloud platform :-

① compute services :- compute services provide various types of processing capabilities suitable for executing different workloads.

- Virtual Machine
- Containers (a light-weight Computing Mechanism)
- Batch Jobs
- Serverless computing.

② Storage services :- Storage services provide various types of data storing capabilities

- Store data for long term as backup or archive
- Host data for website
- Store general transaction
- Store other forms of data such as image, files
- Distribute data securely.

③ Comm<sup>n</sup> service :- It provide cloud Based solution for providing various telephony services.

- Quick setup time
- Save money
- Broad device access
- scheduling meeting

④ Amazon EC2 :-

It is web service that provides secure, resizable compute capacity (virtual machine) in the cloud.



## ① Characteristic & Features of EC2 :-

- ① IaaS
- ② Several instance type.
  - General purpose
  - Compute optimized
  - Accelerated computing
  - memory optimized
  - Storage optimized
- ③ Elastic IP Address.
- ④ Auto scaling
- ⑤ Multiple OS to choose from

## ② Microsoft Azure :-

- Azure is cloud computing platform with an ever-expanding set of services.
- Microsoft Azure is one of the major public cloud service providers
- It offers 500 cloud services that you can use for your various computing requirements.
- Azure also provide new capabilities like AI & IoT
- Azure gives you the freedom to build, manage application.
- Azure provide following services.

① compute	⑤ web	① AI
② networking	⑥ database	② DevOps.
③ storage	⑦ IoT	
④ mobile	⑧ Bigdata	

## ③ Windows Azure platform Appliances :-

- Designed for unlimited scale & multi-tenancy
  - identical to hardware in Microsoft datacenter
  - Delivered by a choice of Hardware partners.
- Benefit :-
- |   |   |
|---|---|
| <ul style="list-style-type: none"><li>① Platform as a service</li><li>② physical control</li><li>③ Geographical proximity</li><li>④ Regulatory compliance</li></ul> | <ul style="list-style-type: none"><li>- Windows Azure platform include Windows Azure, SQL Azure, Microsoft specified configuration N/w storage &amp; server hardware.</li></ul> |
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## \* Google App Engine :-

Google App Engine is a cloud service that allows you to run your application code in the cloud without you having to manage the underlying infrastructure.

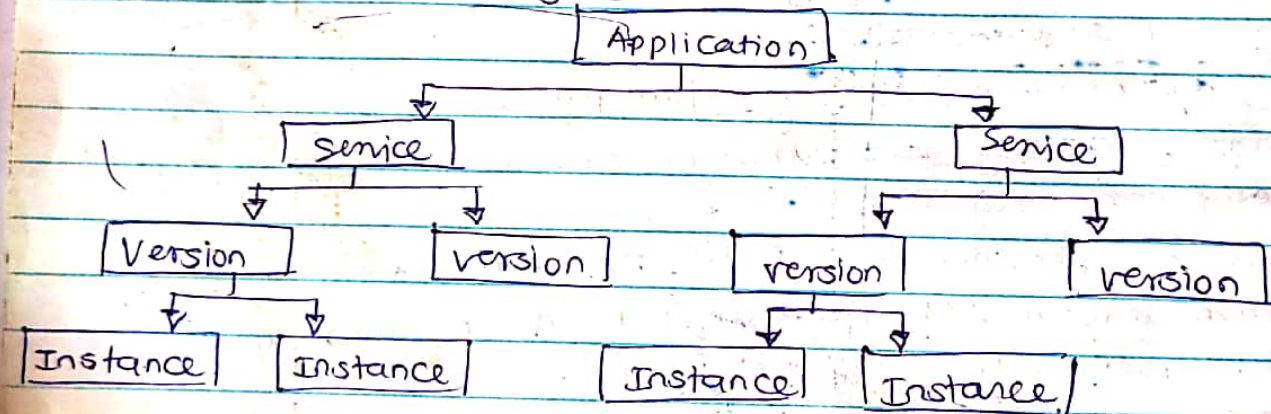
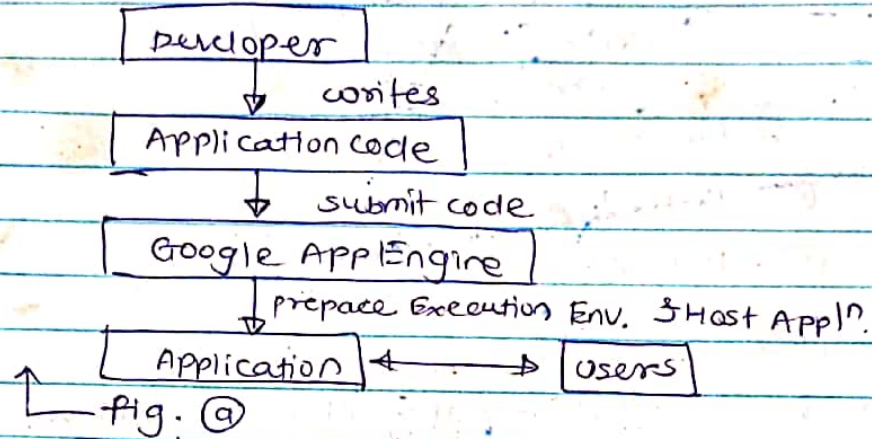


fig (b) →

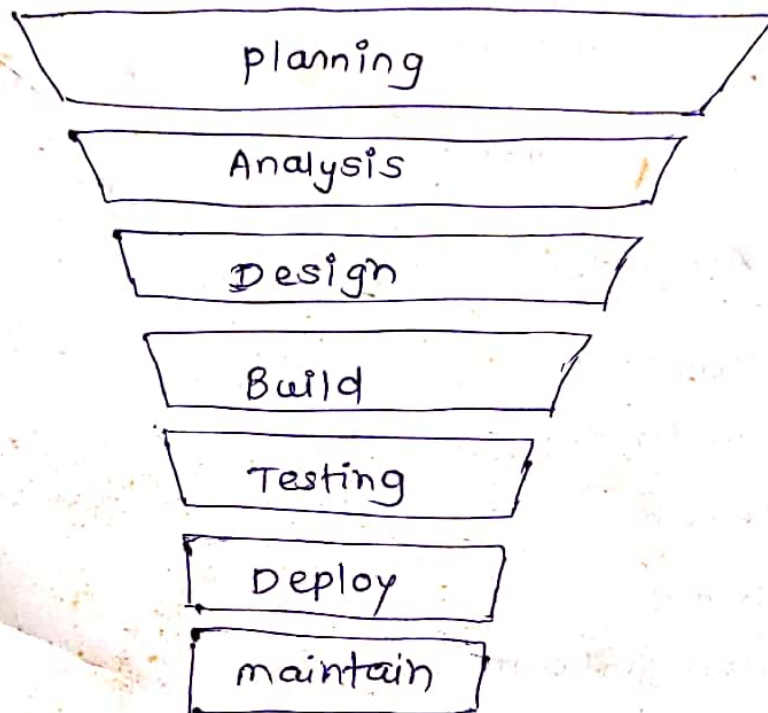
- Google App Engine is a fully managed, serverless platform for developing & hosting web application at scale.



### \* Characteristics and feature of Google App Engine :-

- ① fully managed serverless application platform ;
- ② Support for popular language :- PHP, Java, Python, node
- ③ Autoscaling
- ④ monitoring, logging and diagnosis
- ⑤ Application versioning
- ⑥ Application Security.

### \* Application Lifecycle management (ALM) :-



## Unit - 4

### \* Compare server side and client side Encryption :-

parameter	server side encryption	client side encryption.
① complexity	Low	High
② Encryption/ decryption process	Carried out by server	Carried out by client.
③ Key managed at	server	each client
④ data need to be protected as transit	yes	no.

### \* Cloud computing Architecture :- (components)

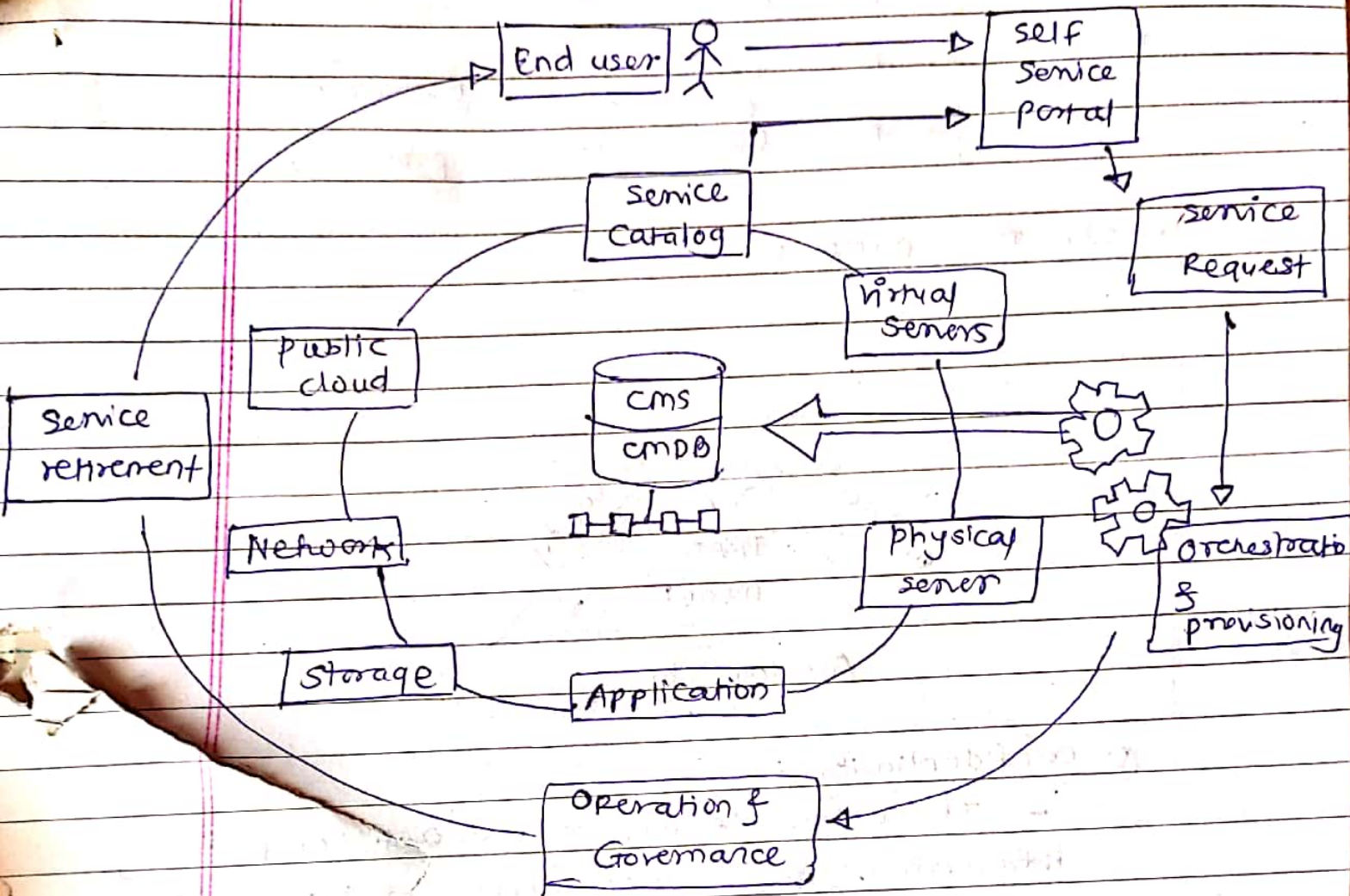
- ① Virtualization
- ② Infrastructure
- ③ middleware
- ④ management
- ⑤ Automation software.

### \* Designing principle :-

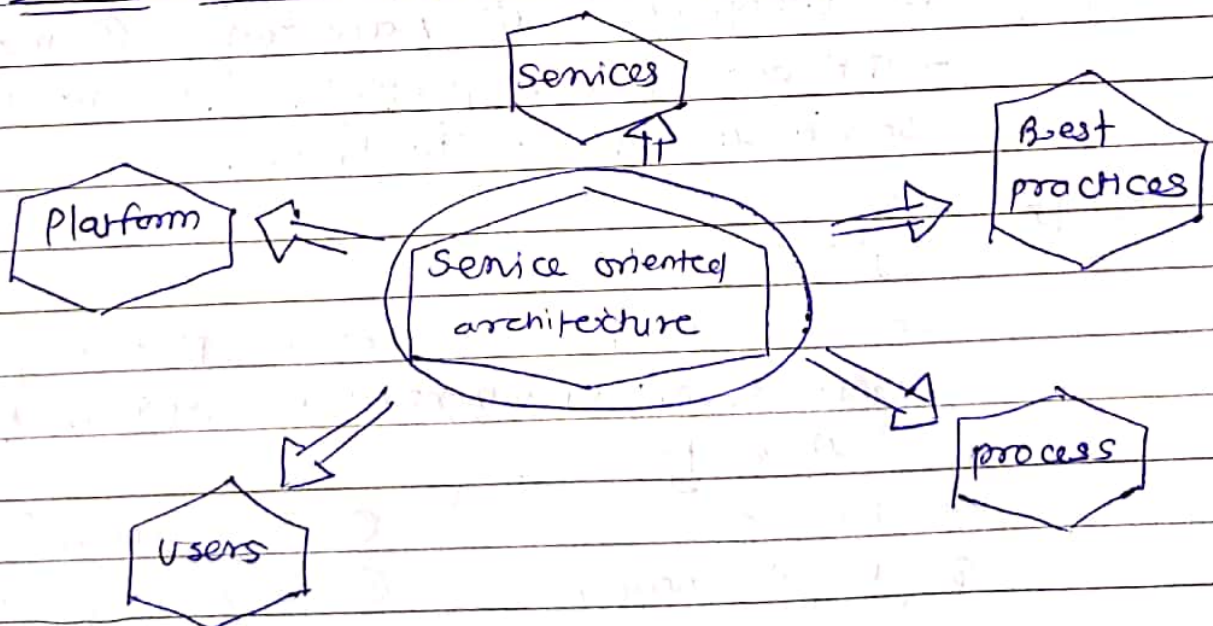
- Designing solution for the cloud requires careful thinking and step-by-step process.
- include reasonable deployment, business continuity, elastic expansion, performance efficiency, security compliance & continuous operation.

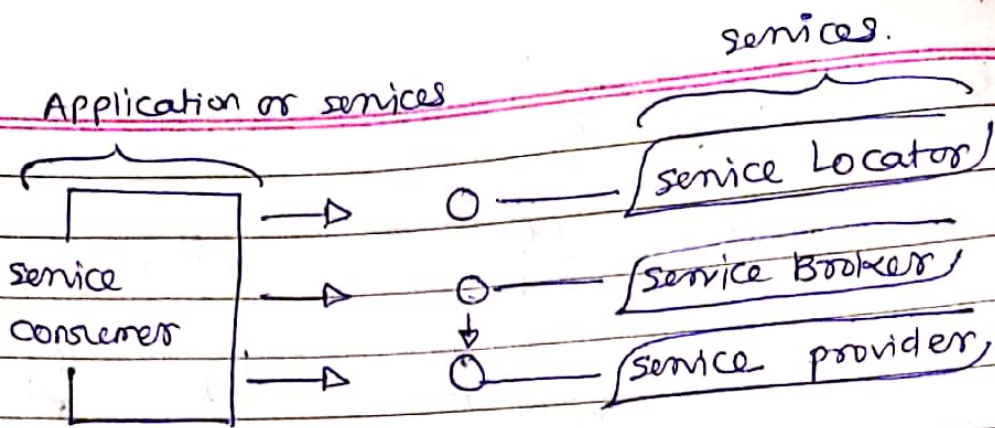


## \* Cloud Computing life cycle :-



## \* Service oriented Architecture (SOA) :-





\* CIA Triad model :-



① Confidentiality :-

- It can be defined as an act of protecting information from unauthorized disclosure to an entity.

① Encryption      ② Access control      ③ Data classification

- It ensure that protected info. is kept secret throughout its lifetime.

② Integrity :-

- Can be defined, as an act of protecting info from unauthorized modification by an entity.

① Hashing

② Data classification

③ Access control

④ I/P & O/P sanitization.



### ③ Availability :-

- Can be defined as, act of protecting information from unauthorized destruction by an entity.

① Access control

④ Disaster recovery

② Backup

⑤ Business continuity processes

③ Isolation

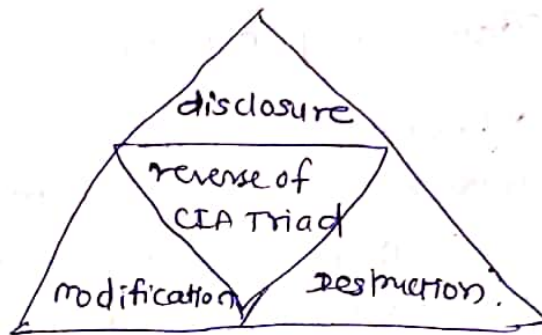


Fig @. ↑

### \* principle for cloud security (cloud computing security Architecture) :-

#### principle for cloud security

- 1. Implement a strong identity foundation
- 2. Implement Auditability
- 3. follow defences in depth
- 4. Automate security Best practices
- 5. protect data
- 6. plan incident management & response
- 7. plan for Business continuity

### \* Cloud security issue & challenges :-

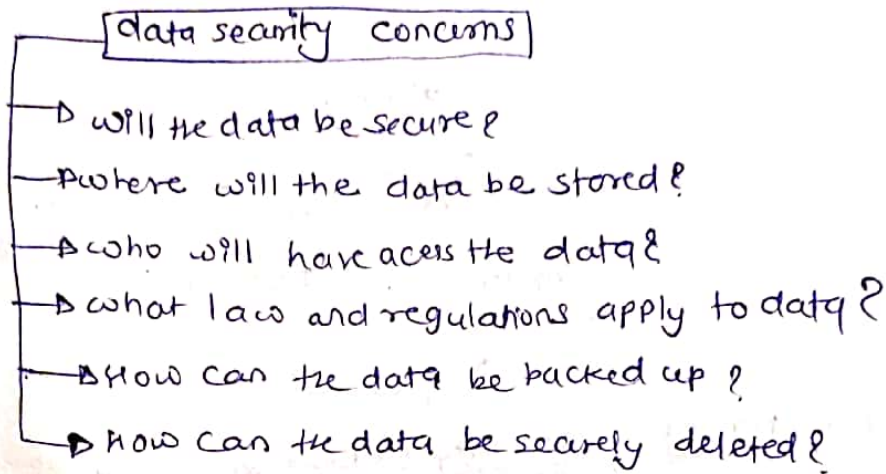
#### ① challenges :-

- ① Lack of Cloud security & skills
- ② Identity & Access management
- ③ shadow IT
- ④ Cloud compliance.

## \* data protection in cloud :- (data security)

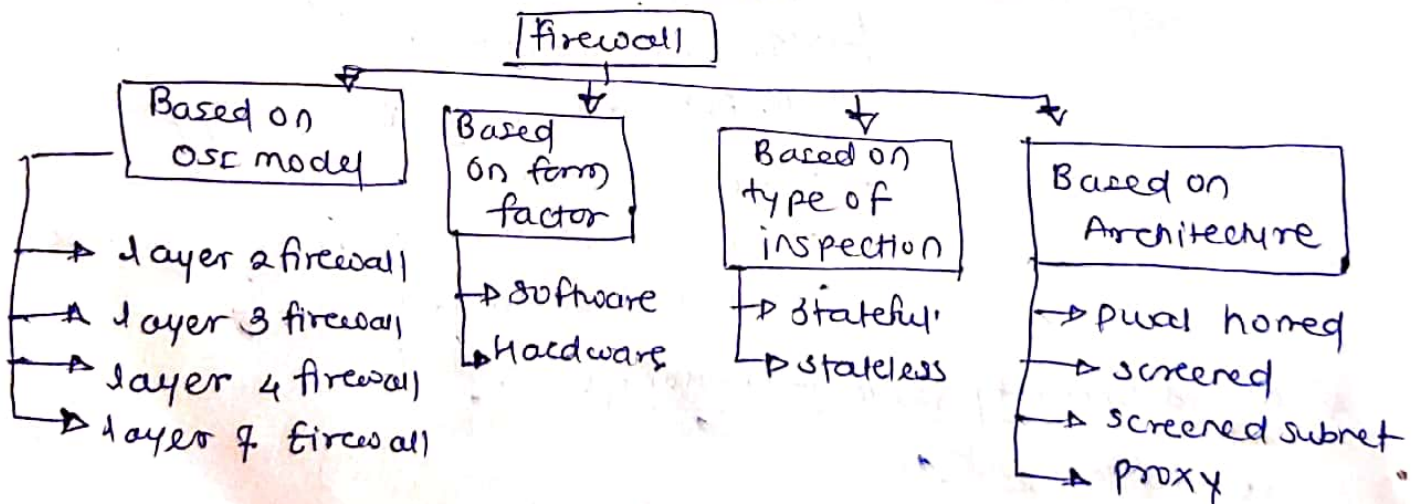
cloud data protection is the practice of securing a company data in a cloud environment, wherever that data is located whether its at rest or in motion, & whether its managed internally by the company or externally by a third party.

## \* Data Security concerns in the cloud :-



## \* Firewalls :-

- Firewall are N/w security system that protect the computing resources on a trusted N/w from unauthorized access.





### \* OSI model :-

- ① Layer 2 :- Data link.
- ② Layer 3 :- Network layer
- ③ Layer 4 :- Transport
- ④ Layer 7 :- Three layer :- Session, presentation & Application.