

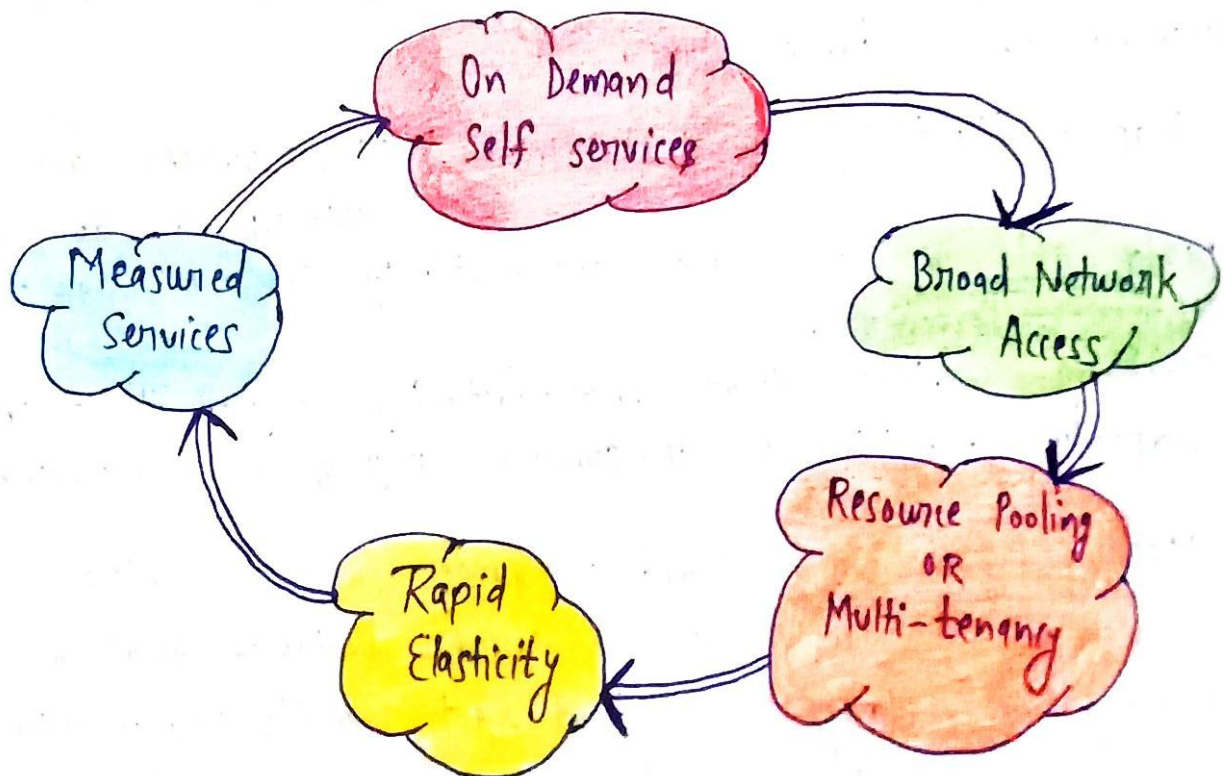
Cloud Computing

- It is the on-demand availability of computer system **resources**, especially data storage and computer power, without direct active management by the user.
- It refers to the "**server**" that are accessed over the **internet**.
- It means **storing**, **managing** & **accessing** the data & programs on the remote servers that are hosted on internet instead of computer's harddrive.
- CC relies on sharing of resources to achieve coherence & economies of **scale**.
- It offers **platform independent**.
as sw is not required to be installed locally on the PC.

Service providers

- Google cloud
- AWS
- Microsoft Azure
- IBM cloud etc.

Characteristic of Cloud Computing ⇒



1. On Demand Self-service: - CC resources can be provisioned without human interaction from the service provider. A manufacturing organization can provision additional computer resources as needed without going through the cloud service provider.

It is a prime feature of CC which allows the user to use CC storage, slw & other resources instantly.

2. Broad Network Access: - Cloud computing resources are available over the network & can be accessed by diverse customer platforms. Refers to resources hosted in a private cloud network that are available for accessed from wide range of devices such as tab, pc.

3. Multi-tenancy / Resource Pooling: - Multi-tenancy allows multiple customers to share the same applications while retaining privacy & security over their information.

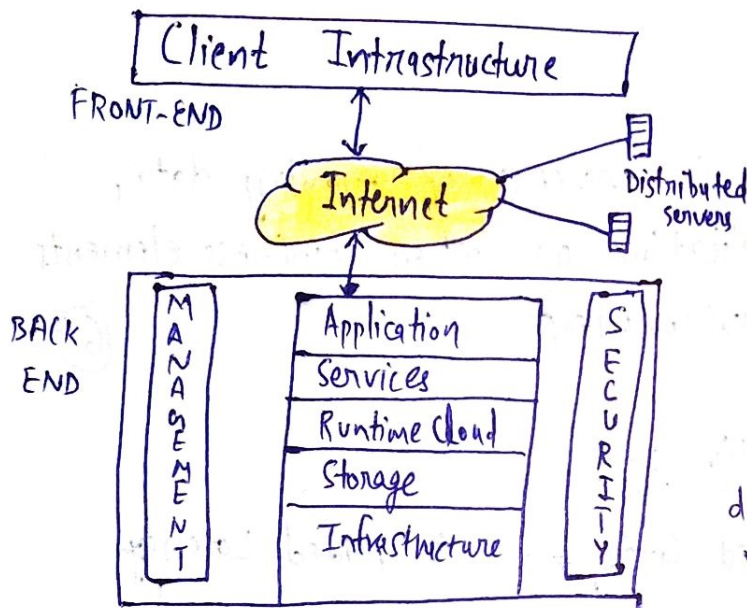
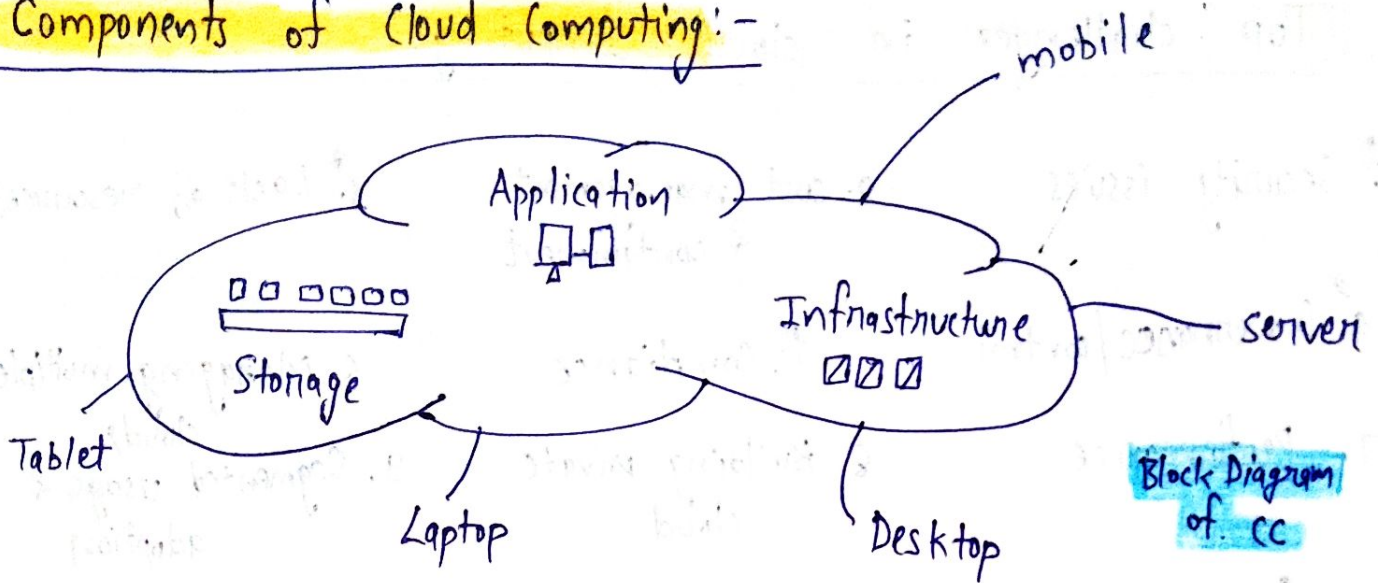
Resource pooling means that multiple customers are serviced from same physical resources.

4. Rapid Elasticity & Scalability: - CC resources can scale up or down rapidly and in some cases, automatically, in response to business demands.

Elasticity implies that manufacturing organizations can rapidly provision & de-provision any of CC resources.

5. Measured Service: - Cloud resource usage - whether virtual server instances that are running or storage in cloud - get monitored, measured & reported by cloud service provider. The cost model is based on "pay for what you use".

Components of Cloud Computing:-



→ Front end is used by client.

It contains all interfaces & applications that are required to cloud platform.

→ Backend manages all resources that are required to provide cloud computing services.

It includes different type of data storage security mechanism, virtual machines, deployment model, servers etc.

Client → A cloud clients consist of computer h/w & s/w which is specifically design for delivery of client services.

→ Client generally fall into 3 category:-

(i) Mobile device

(ii) Thin client - Don't have internal harddrives.

(iii) Thick client - It is regular computer like firefox on Ethernet to connect to cloud.

Datacenter :- It is an array of servers that houses the subscribed application. Progressing IT industry has brought virtualizing servers, where s/w might be installed through utilization of various instances of virtual servers.

SaaS IaaS PaaS

Top challenges in cloud computing:-

1. Security issues
2. cost management & containment
3. Lack of resources
4. Governance/control
5. Compliance
6. Managing multiple clouds
7. Performance
8. Building private cloud
9. Segmented usage & adoption
10. Migration

(f)

Cloud Migration

⇒ It is process of moving data, applications or other business elements to a cloud computing environment.

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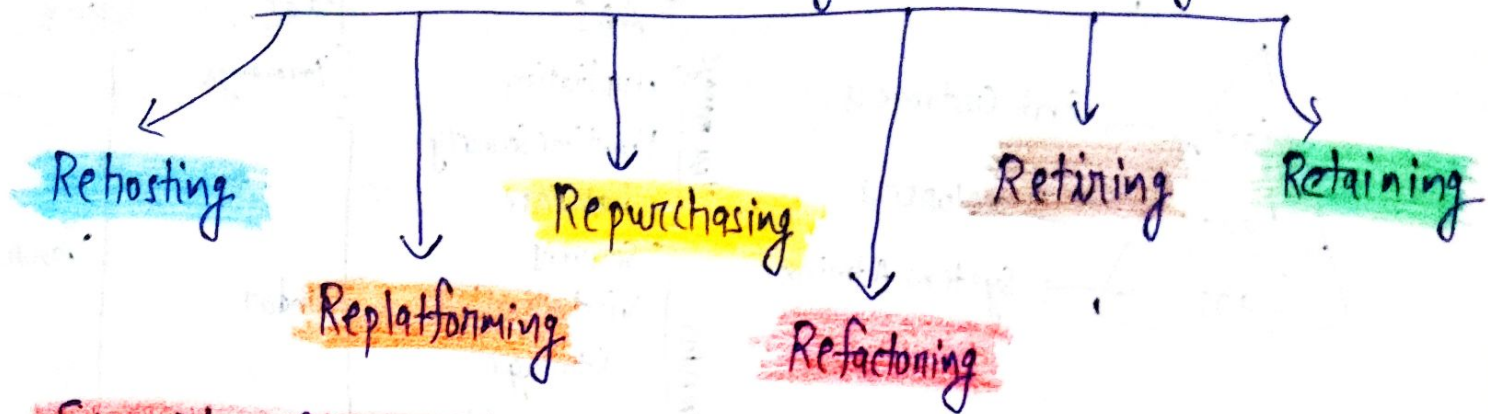
Risk in cloud migration:-

1. Data loss
2. Wasted Costs
3. Added Latency
4. Security
5. Lack of visibility & control
6. Incompatibility of the existing architecture.
7. No clear cloud migration strategy in place.

Challenges in cloud migration:-

1. Financial cost → Rewriting application, investing in people, Training users on new system, Performance issues, bandwidth costs
2. Adoption resistance → People tend to resist change.
3. Skill Shortage → finding people who have skills

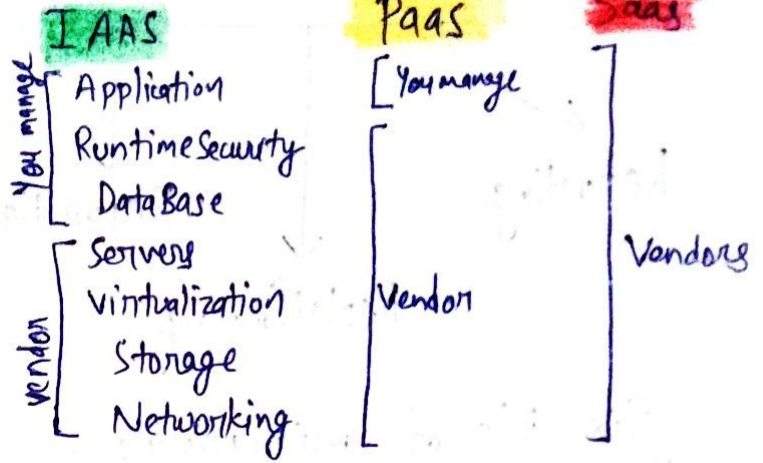
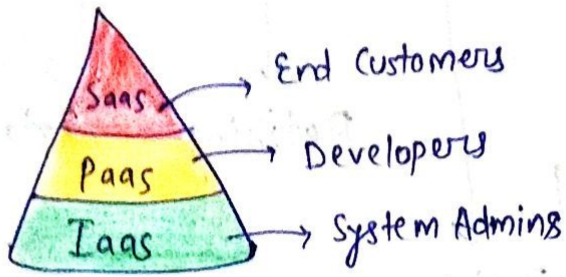
Types of Cloud Migration Strategies



Six R's of migration:

- (i) Rehosting :- This involves lifting your stack & shifting it from on-premises hosting to cloud. You transport an exact copy of your current environment.
- (ii) Replatforming :- It involves making a few further adjustments to optimize your landscape for the cloud.
- (iii) Repurchasing :- Moving your applications to a new, cloud-native product, most commonly a SaaS platform.
- (iv) Refactoring :- It means rebuilding your application from scratch.
- (v) Retiring :- Once you have assessed your application portfolio for cloud readiness, you might find some applications are no longer useful.
- (vi) Retaining :- Plan to revisit cloud computing at a later date. You should only migrate what makes sense for your business.

Cloud Computing Services :-



IaaS [Infrastructure as a Service] :- It is way to rent hardware, storage, servers

& network capacity over the internet.

→ Client needs only computer & internet connection to access these bottomless resources. and pays for it on a per-use basis.

Pros :- Provides Infrastructure
IaaS is flexible
Enhanced Scalability

Cons:- Security Issues
- Network & Service Delays

PaaS [Platform as a Service] :- This service is made up of a programming language Execution Environment, an OS, a Web Service & A database.

Pros >

Cost Effective Rapid Development

Faster Market for developers

Easy deployment of Web applications

Private or public Deployment is possible

cons :- Developers are limited to tools

Migration Issues - Such as Risk of Vendor Lock in

SaaS [Software as a Service]:- It hosts various slw applications and makes them available to customers over the internet.

- Computing Resources Managed by Vendor.
- Available for Multiple End users.
- Don't need to install slw on your PC.

Prions:-

- No concerns about slw buying, installing & maintaining
- Automatic updates
- World wide Access

Cons:-

- Security Issues
- Latency Issues
- Dependency on Internet

Deployment models

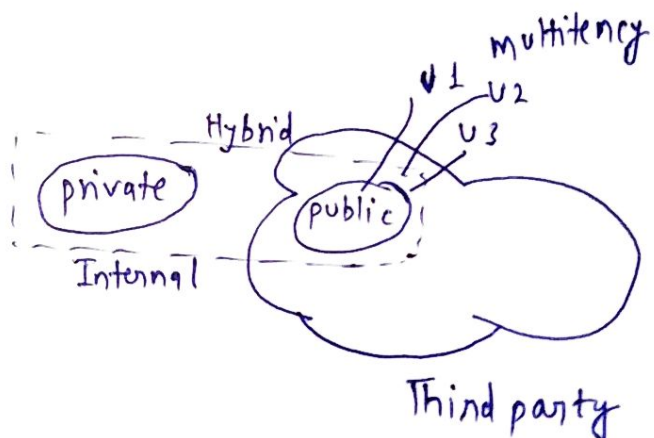
Controlled Cloud

Public Cloud

Private Cloud

Community cloud

Hybrid Cloud



→
(1) Cloud Computing:- It relates to specific design of new tech and services that allows data to be sent over distributed networks through wireless connections to a remote secure location that is usually maintained by a vendor. It usually serve the multiple clients.

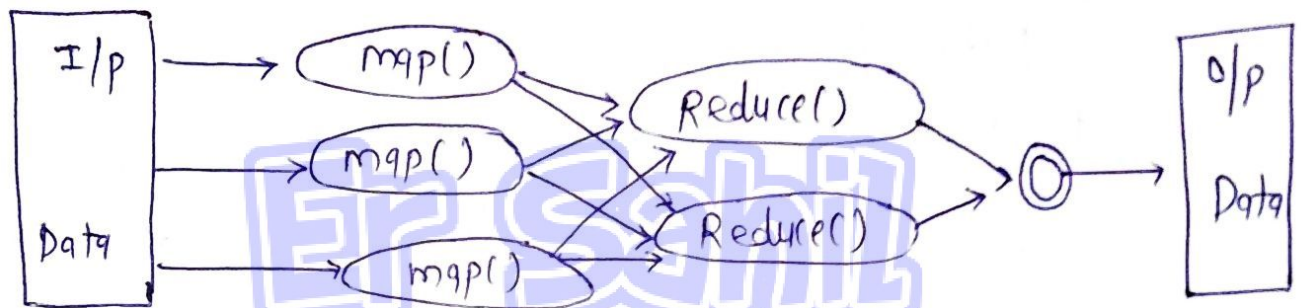
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Mobile Computing:- It relates to emergence of new devices & interface smartphones & devices are mobile ~~com~~ devices that can do a lot of what traditional lp & desktop computers can do. MC functions include accessing the internet through browsers, supporting multiple sw application with a core OS & sending & receiving different type of data.

①) MapReduce :— It is a processing technique and a program model for distributed computing based on Java. This algorithm contains two important tasks, namely Map & Reduce. ⑦

→ Map takes a set of data & converts it into another set of data

→ Reduce takes o/p from map as i/p & combines those data tuples into a smaller set of tuples



Shuffling :— It is the process of transferring data from mappers to reducers, it is obvious that it is necessary for the reducers. Shuffling can start even before map phase has finished. Reduce status greater than 0% (but less than 33%) when map status is not yet 100%.

②) Usage of utility computing ⇒ It is a model in which computing resources are provided to customer based on specific demand. The service provider charges exactly for service provided, instead of a flat rate.

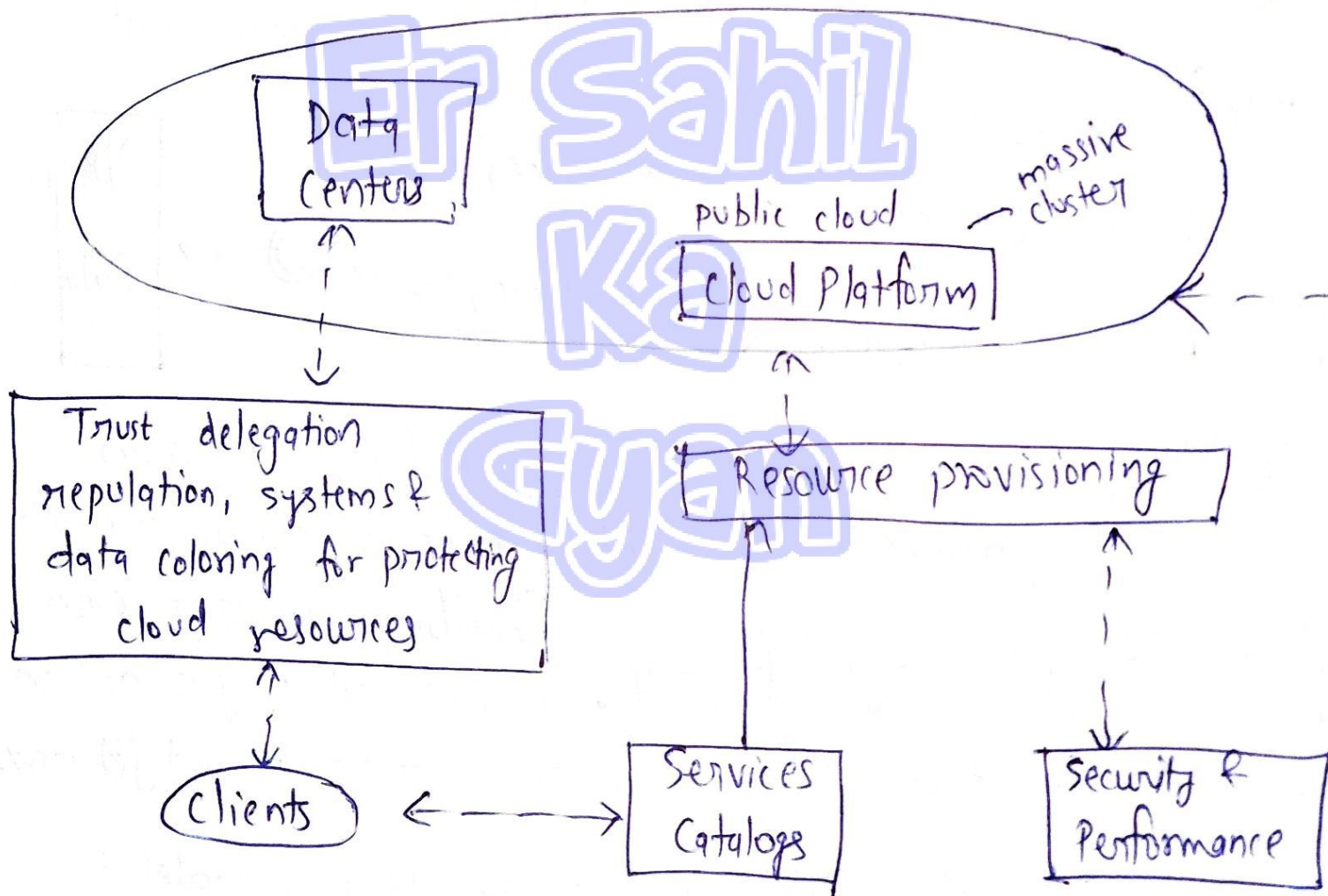
It is used such as computing capabilities, storage space and applications services.

Utility computing helps eliminate data redundancy, as huge volumes of data are distributed across multiple servers.

cloud Architecture Design:-

- (a) cloud platform design goals
- (b) enabling Technologies for clouds
- (c) A generic cloud architecture.

A generic cloud Architecture



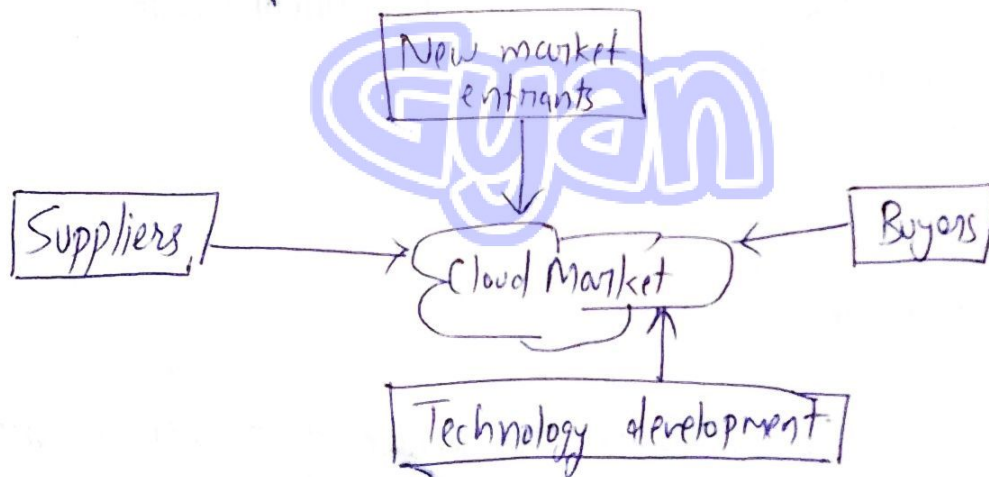
dy - ① Evaluating the Cloud's Business ~~and~~ Impact & Economics -

Large companies are saving costs, reducing staff and improving system scalability by moving from on-site data centers to the cloud. ④

Small companies are leveraging pay-on-demand models to "right size" their computing needs quickly & cost efficiently.

Learning Objectives →

- Discuss total cost of ~~own~~ ownership for an IT solution.
- Compare & contrast the capital expenses.
- Describe supply side savings made available through large-scale.
- Describe & discuss efficiencies gained to providers.
- Describe the "right sizing" process.
- Identify primary costs of data centers.



→ Some main sectors of business which all benefited by CC such as:

- Government
- Healthcare
- Education
- Small & medium Enterprises

dy-① Virtualization :- It is a technique of how to separate service from underlying physical delivery of that service. It is the process of creating a virtual version of something like computer h/w. It involves using specialized sw to create a virtual or sw created version of a computing resource rather than actual version of same resource. ⑤

→ SaaS is used in virtualization. Moreover, virtualization technologies provide a virtual environment for not only executing applications but also for storage, memory & networking.

Types of Virtualization →

- (i) Application Virtualization
- (ii) Network Virtualization
- (iii) Desktop Virtualization
- (iv) Storage Virtualization
- (v) Server Virtualization
- (vi) Data Virtualization

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