

CLOUD COMPUTING

refers to the "servers" that are accessed over the internet. (present at remote location).

In Simple Terms,

It means storing, managing and accessing the data & programs on the remote servers that are hosted on internet instead of computer's hard drive.

or

Cloud Computing is the on-demand availability of computer system resources, (especially data storage / cloud storage & computing power) without direct ... the user

In short,
we store, manage & process data on remote servers.

Service providers

- Google Cloud
- AWS (Amazon web services)
- Microsoft Azure
- IBM cloud
- Alibaba cloud, etc.

Types of cloud

- 1) Public → accessible to all
- 2) Private →
- 3) Hybrid - services accessible within an org.
- 4) Community - → public + private cloud features

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- 4) Community → services accessible by a group of organizations.

100 → 1000
1000 → 10000

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Dropbox
15gb → 150gb

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CHARACTERISTICS of CLOUD COMPUTING

1) On demand self service means that a consumer can request & receive access to a service offering, without an administrator or some sort of support staff having to fulfill the request manually.

2) Broad network access
i.e. the services can be accessed from any location (using any type of device).
i.e. anywhere access & anytime.

3) Resource Pooling
↓
(resource can be storage, memory, n/w bandwidth, virtual machines) i.e. it can be any service which can be consumed by cloud users.

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

4) Measured Services
pay according to the services you use.

5) Rapid Elasticity & Scalability
One of the great things about cloud computing is the ability to ~~have~~ quickly provision resources in the cloud as the organizations need them, (& then to remove them when they don't need them).

6) No maintenance / easy maintenance.

7) Security → copy of our data on various servers. If 1 fails, data is safe on the other.

Benefits **ADVANTAGES & DISADVANTAGES** **CLOUD COMPUTING.**

- (i) resources accessible anywhere, any time.
- (ii) on-demand self service - no third party in between like our receptionist.
- (iii) reduced IT cost (we need not purchase hardware, no maintenance, etc.)
- (iv) Scalability (if traffic on website ↑ we can scale up anytime). & similarly scale down also.

etc. "pay as per use"

⇒ collaboration - people sitting in different countries can do a project.

⇒ offers security - (recovery from failure) as data stored at many places. Independence.

Disadvantages

1) Network Connection Dependency
→ internet is a must.

2) Lack of Support

(eg unable to access your data before a meeting, etc.)
so choose the provider carefully.

3) May not get all the features
- Not all cloud service providers are same. etc.

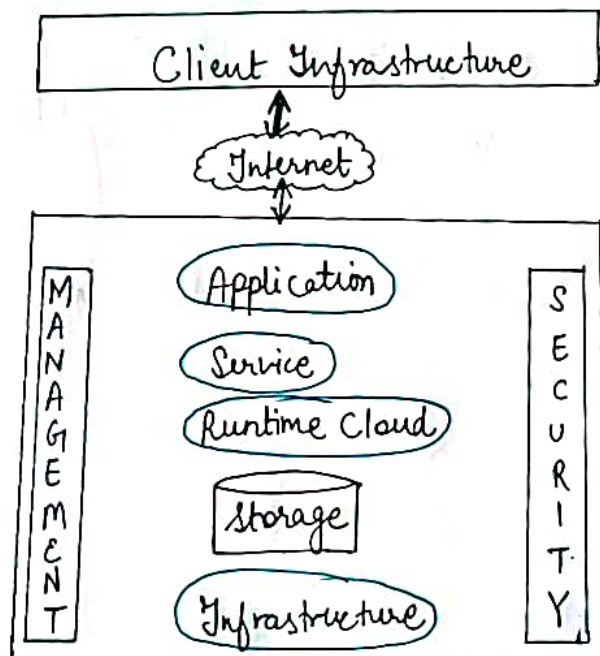
VENDOR LOCK-IN Problem in CLOUD COMPUTING

It is the situation where customers are dependent (i.e. locked-in) on a single cloud provider technology, implementation & cannot easily move in the future to a different vendor without substantial costs, legal constraints, or technical incompatibilities.

problem when transferring

CLOUD COMPUTING ARCHITECTURE

has 2 parts front end
Back end



FRONT END

- * used by client
- * contains all the client side interfaces & applications that are required to access the cloud platform.

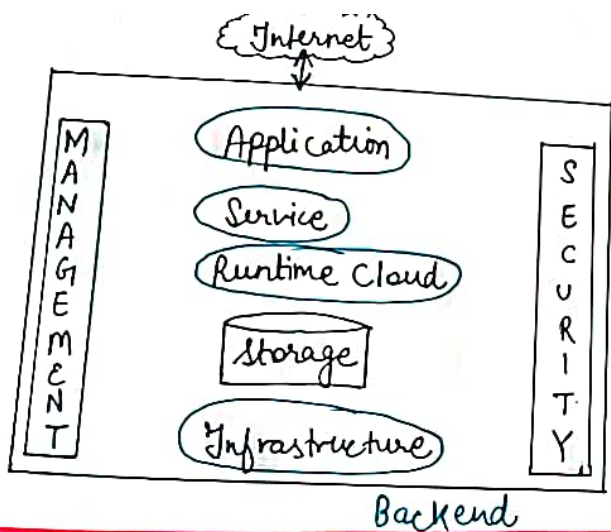
Backend

* used by service provider.

- * It manages all the resources that are required to provide cloud computing services.
- * It includes huge amt. of data storage, security mechanisms, virtual machines, deployment mode servers, etc.

Backend

1. A cloud Computing Architecture 2) Services → manages that which type



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Backend

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Components of Cloud Computing Architecture

- 1) Client Infrastructure → front end component (provides GUI to interact with cloud).
- 2) Application - may be any slw or platform that a client wants to access.

- 3) Services → manages that which type of service you access a/c to client's requirement.

Cloud computing offers:

SaaS, PaaS, IaaS

- 4) Runtime Cloud - provides "execution & runtime environment" to the virtual machines.
- 5) Storage - one of the most important components.
It provides a huge amount of storage capacity in the cloud to store & manage data.
- 6) Infrastructure - cloud infrastructure includes h/w & s/w components such as "servers, storage, n/w devices, virtualization software & other resources needed for cloud computing model."
- 7) Management - manages components (like application, service, infrastructure).

Regular Video Updates

Telegram
Instagram → abhishekdit
→ (facebook page, Linked In, Twitter links in the description)

IMP PLAYLIST

- Cryptography & Network
- Compiler Design
- Interview preparation videos
- Infosys videos
- Linked list for Interview

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7) Management - manages components (like application, service, infrastructure).

8) Security - inbuilt backend component provides security mechanism in the backend.

9) Internet → medium through which frontend interacts.

Instagram → abhishekdit
→ (facebook page, linked in, Tu
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- Java Interview play
- Computer Graphics
- Engineering Econom
- Programming in C
- Pointers - - - -

SaaS SOFTWARE AS A SERVICE

CLOUD COMPUTING

It is a type of Cloud Computing Services.

It is a way of delivering services and applications over the internet.

* Maintenance of ^{& hardware} slw done by the vendor.

* We need not install the slw in our machine.

* so, it removes the cost of h/w and slw maintenance.

* generally used by end users

* Characteristics available over internet

(v) Can be scaled up or scaled down anytime a/c to our need.

(vi) works on shared model. One slw is used by multiple clients.

(vii) slw are automatically upgraded.

Benefits

⇒ efficient use of slw/licenses

(i) platform independence to the user
(we can use android, Mac, windows, etc.)

(ii) multitenant solutions

(iii) scale up or scale down

(iv) Accessible anytime, anywhere.

(v) reduced time (we can use appli. direct from browser).

LIKE

- It is a way of delivering services and applications over the internet.
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LIKE

- Characteristics
- (i) it makes the slw available over internet.
- (ii) slw appli. maintained by the vendors.
- (iii) cost effective (pay as per use)
- (iv) available on demand.

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- (vi) Cost effective (pay as per use).

eg) Dropbox, Cisco Webex, Salesforce, Gm, Office 365, Google Drive.

1443
2005

CLOUD COMPUTING

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LIKE

Characteristics

- (i) It makes the s/w available over internet.
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- (iv) available on demand.

- (v) Can be scaled up or scaled down anytime a/c to our need.
- (vi) works on shared model. One s/w is used by multiple clients.
- (vii) s/w are automatically upgraded.

Benefits

⇒ efficient use of s/w/resource

- (i) platform independence to the user
(we can use android, Mac, windows, etc)
 - (ii) multitenant solutions
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 - (vi) cost effective (pay as per use).
- eg) Dropbox, Cisco Webex, Salesforce, Gmail, Office 365, Google Drive, etc.

PaaS PLATFORM AS A SERVICE IN CLOUD COMPUTING

- developers use it.
- It provides a platform & environment (i.e. runtime envt.) to allow developers to build applications & services over the internet.
- offers development and deployment tools required to develop applications
- PaaS services are hosted in the cloud & accessed by users via web browser.
- no control over the infrastructure. We will interact with the UI only and O.S will be provided by vendor.

our infrastructure.

We don't have control over the cloud infrastructure including network, servers, O.S, or storage, but we have control over the deployed applications and possibly configuration settings for the application-hosting environment.

Advantages

- (i) cost effective (pay as per use)
- (ii) no need to purchase expensive servers, slow or data storage
- (iii) scale up/down anytime.
- (iv) slw management (ie updates fall)

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- It provides a platform & environment (i.e. runtime envt.) to allow developers to build applications & services over the internet.
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- no control over the infrastructure. We will interact with the UI only and O.S will be provided by vendor.
↓
we don't have control over it.
- PaaS provider hosts the h/w & s/w on its

own infrastructure.

We don't have control over the cloud infrastructure including network, servers, O.S, or storage, but we have control over the deployed applications and possibly configuration settings for the application-hosting environment.

Advantages

- (i) cost effective (pay as per use)
- (ii) no need to purchase expensive servers, s/w or data storage
- (iii) scale up/down anytime.
- (iv) s/w management (ie updates fall) managed by the provider.
- (v) easy deployment of web applications.

IaaS

SaaS, PaaS

INFRASTRUCTURE AS A SERVICE IN CLOUD COMPUTING

* provides us infrastructure.

* It is a type of Cloud Computing Service used by system administrators / network architects.

* It simply provides the underlying O.S, security, networking, and servers for developing the applications.

* It provides access to fundamental resources such as physical machines, virtual machines, virtual storage, etc.

or

It is a form of cloud computing that isolates the fundamental compute, network, and storage resources from the consumer on

* we can scale up & shrink the resources as per requirement

IaaS also offers

- virtual m/c disk storage
- IP addresses
- VLANs (virtual local area network)
- load balancers - ...

AWS → Compute → EC2

Web Service

we can get virtual server, m/c etc

we have full control over computing resources through administrative access to VMs (Benefit)

IBM cloud

⊗ more control than

IaaS

SaaS, PaaS

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or

It is a form of cloud computing that delivers the fundamental compute, network & storage resources to the consumer on demand, over the internet & on a pay as you go basis.

IN CLOUD COMPUTING

* we can scale up & shrink the resources as per requirement

IaaS also offers

- virtual m/c disk storage
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- load balancers - ...

AWS → Compute → EC2 } we can get virtual server, m/c etc.
Web Service

We have full control over computing resources through administrative access to VMs.
(Benefit)

egs	IBM cloud	* More control than SaaS & PaaS.
	AWS	
	Oracle cloud	
	Google cloud	

Infrastructure

below the red line → Service provider manages.

IaaS	PaaS	SaaS
Application Data Runtime Middleware O.S.	Application Data Runtime Middleware O.S.	Application Data Runtime Middleware O.S.
Virtualization Servers Storage N/w ing	Virtualization Servers Storage Networking	Virtualization Servers Storage N/w ing

APPLICATIONS OF CLOUD COMPUTING

There are various applications. Some of them are:

(i) Business applications
every organization requires the cloud business application to grow their business

eg.) There are a few business applications of cloud computing

(i) Salesforce → provides tools for e-commerce, sales, etc.

(ii) Paypal → safe payments

2. Data storage & backup applications
→ we can store files, data, images, audios, videos (eg. google drive).

3. educational applications - online distance

eg.) Google Documents, a service provided by Google.,
→ chromebook for education,
→ AWS in Education

4) Entertainment applications
eg. online games, video conferencing apps.

5) Art applications
It offers in various types of art applications for quickly & easily design attractive cards, booklets & images.
eg. Moo → cloud art application (used for designing business cards).

6) Social Applications
Social cloud applications allow a large no. of users to connect with each other on facebook, Instagram, twitter,

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eg facebook, Instagram, twitter, Linked In.

Join Telegram & Insta regular video

TYPES OF CLOUD / CLOUD DEPLOYMENT MODELS

Public Cloud → open to all to store & access information via internet

- pay as per use (for the services)
- managed by third parties (Cloud Service Provider).

Fundamental characteristic of public cloud is MULTITENANCY.

eg) EC2 (Amazon elastic compute cloud), Google App Engine → is a PaaS for developing & hosting web applications
dropbox, Google Drive, etc.



Advantages

- it is maintained by cloud service providers. So, we need not maintain it.
- location independent b/c its services are delivered through the internet
- high scalability
eg) gmail offers 15gb. we can increase any time & dec also after increasing
- cost effective and pay as per use

Disadvantages

- 1) less secure b/c resources are shared publicly.
- 2) less customizable as compared to private cloud

2. PRIVATE CLOUD

→ Services accessible within an organization -
i.e. it belongs to a specific organization

Note → Sometimes also called internal / corporate cloud

→ Can be managed by → organization,
3rd party also.

Advantages

(i) high security - in private cloud, security concerns are less since customer data & other sensitive information doesn't flow out of a private infrastructure.

(ii) data privacy → only authorized people can access the data.

(iii) more customizable → as companies get to customize their soln.

Disadvantages

Private cloud is accessible within an organization, so, the area of operations is limited.

→ High cost → we need to invest in h/w & s/w.

→ limited scalability

3) HYBRID CLOUD

features of public & private cloud

⇒ Critical activities performed by private cloud
Non critical activities by public cloud.

→ Advantage

Scalability, security, Low cost (as compared to private cloud) flexibility.

Disadvantage

... difficult / complex b/c there are

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- Sometimes also called internal/corporate cloud
- Can be managed by → organization, 3rd party also.

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- iii) more customizable → as companies get to customize their soln. as per requirement.
- iv) improved reliability.

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⇒ Critical activities performed by private cloud
Non critical activities by public cloud.

→ Advantage
Scalability, Security, Low cost (as compared to private cloud)
flexibility.

Disadvantage
⇒ Managing is difficult/complex b/c there are more than 1 type of deployment model.
→ dependency on infrastructure.

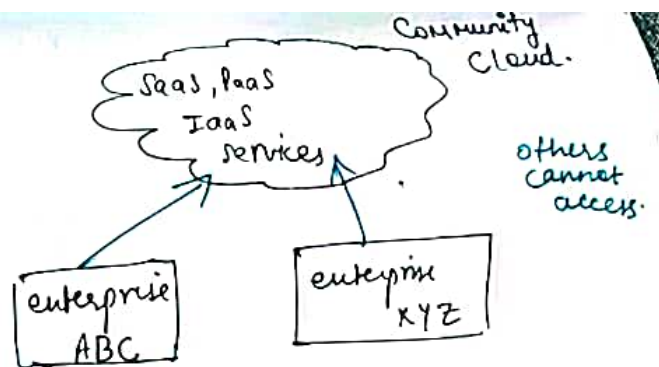
4. COMMUNITY CLOUD

allows services to be accessible by a group of several organizations to share the info b/w the organization & a specific community.

owned, managed & operated by 1 or more organizations in the community or 3rd party.

Advantages

- (i) cost reduction | cost effective.
→ it is cheaper than private cloud.
multiple companies share the bill, which lowers the cost.
- (ii) sharing among companies (the resources)
- (iii) more secure than public cloud. but less than private cloud.



Disadvantages | Challenges

- (i) data is accessible b/w organizations.
(b/c the data is stored at the same location any data stored there might be accessible by others). This can result in overall security concerns about the rules & regulations to compliance within a community cloud.
- (ii) consistent maintenance cost.
- (iii) overall increased cost (vs private cloud)

VIRTUALIZATION IN CLOUD COMPUTING

It is a technique which allows to share single physical instance of an application or resource among multiple organizations or customers.

* All virtual resources will work independently

HOST Machine

→ machine on which virtual m/c is going to be build.

Guest machine → virtual machine

HYPERVISOR (VMM)

eg VMware
Hyper-V

virtual m/c monitor

sw that creates & runs the VMs (virtual machines).
ie. ... virtualization on physical

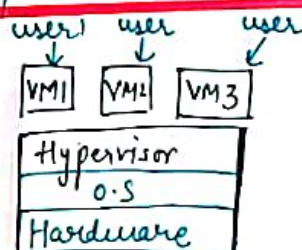
Hypervisors are of 2 Types

- 1) Type 1 hypervisor (bare metal or native hypervisor)
- 2) Type 2 hypervisor (hosted or embedded " ").

BENEFITS of Virtualization

- (i) better resource utilization
- (ii) lowers the cost of IT infrastructure
- (iii) remote access
- (iv) pay per use of the IT infrastructure on demand.
- (v) enables running multiple O.S.
- (vi) if one virtual machine is not working or having any problem, others will not be affected.

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