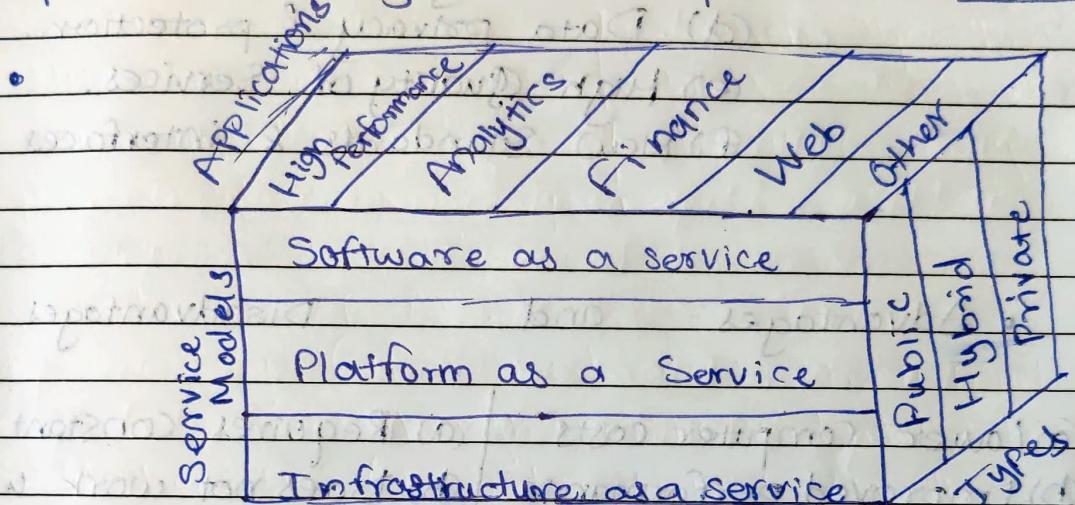


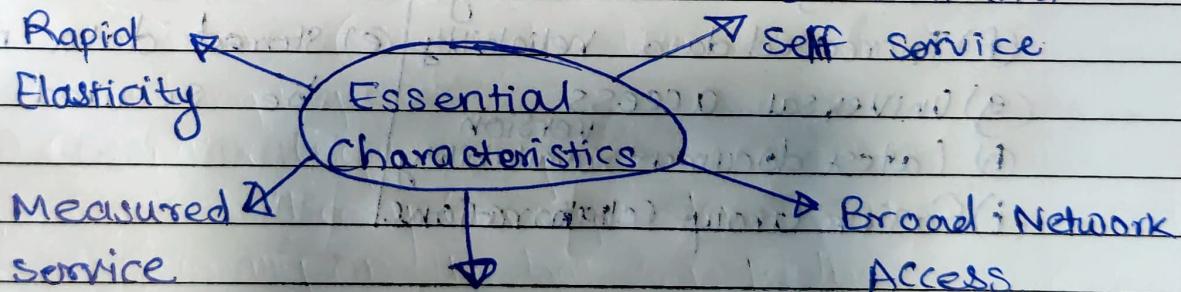
• Cloud Computing •

① Definition:

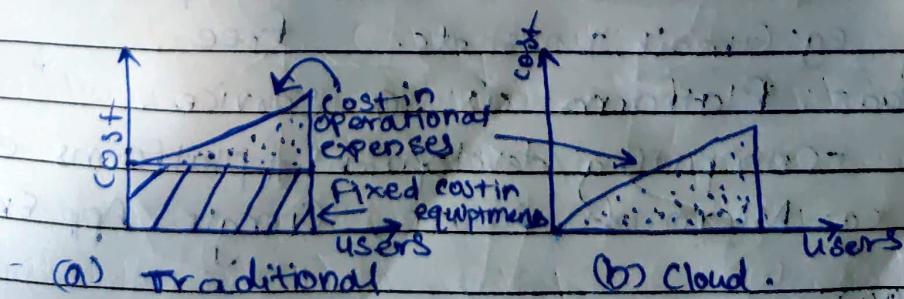
A model for enabling ubiquitous, convenient and on demand network access to a shared pool of configurable computational resources.



- able to provide on demand



- Traditional IT users vs Cloud users:



② Cloud Design:

- Objectives:
 - (a) Shifting from desktop to data center
 - (b) Service provisioning & cloud economics
 - (c) Scalability in performance
 - (d) Data privacy & protection
 - (e) High Quality of Services
 - (f) New Standards & interfaces

Advantages and Disadvantages

(a) Lower computer costs	(a) Required constant Internet
(b) Improved performance	(b) Does not work well with low speed connections
(c) Reduced Software Cost	(c) Features might be limited
(d) Instant software update	(d) Can be slow
(e) Virtually Unlimited storage	(e) Stored data might not be secured
(f) Increased data reliability	
(g) Universal access	
(h) Latest document availability	
(i) Easier Group Collaborations	

③ Service Models (aaS)

(a) SaaS : Software as a Service:

- on demand - subscription based or free.
eg: Gmail, Docs etc.

(b) PaaS : Platform as a Service:

- Computing / development of platforms easily.
eg: Microsoft, Azure, Google App Engine

(c) IaaS:

- Delivering cloud based servers, storage, OS etc. on demand.

④ Deployment Models

(a) Public cloud: Provisioned for open use by general public.

- May be owned & managed by a business / government / School etc.

- Exist on the premises of provider.

eg: Microsoft Azure, Google App Engine, IBM Smart cloud, Amazon EC2

(b) Private Cloud: Provisioned for exclusive use by a specific organization.

- May be owned & managed by an organization or third party or both.

- May exist on or off premises.

eg: Amazon VPC (virtual private cloud), VMware Cloud Infrastructure - Suite etc.

(c) Community cloud: Provisioned for exclusive use by a specific community, for organization having shared concerns.

- May be owned & managed by one or more organizations.

- May exist on or off campus.

eg: Google Apps for government, Microsoft government community cloud.

(d) Hybrid: Composition of two or more distinct cloud infrastructures that remain unique entities.

eg: VMware vCloud, Windows Azure (capable of cloud hybrid cloud.)

- Cloud bursting for load balancing: Configuration set up between a private and a public cloud to deal with peaks in demand.
e.g.: overflow traffic of a private cloud is redirected to a public cloud

④

HPC, HTC, etc.

(a) HPC : High performance Computing.

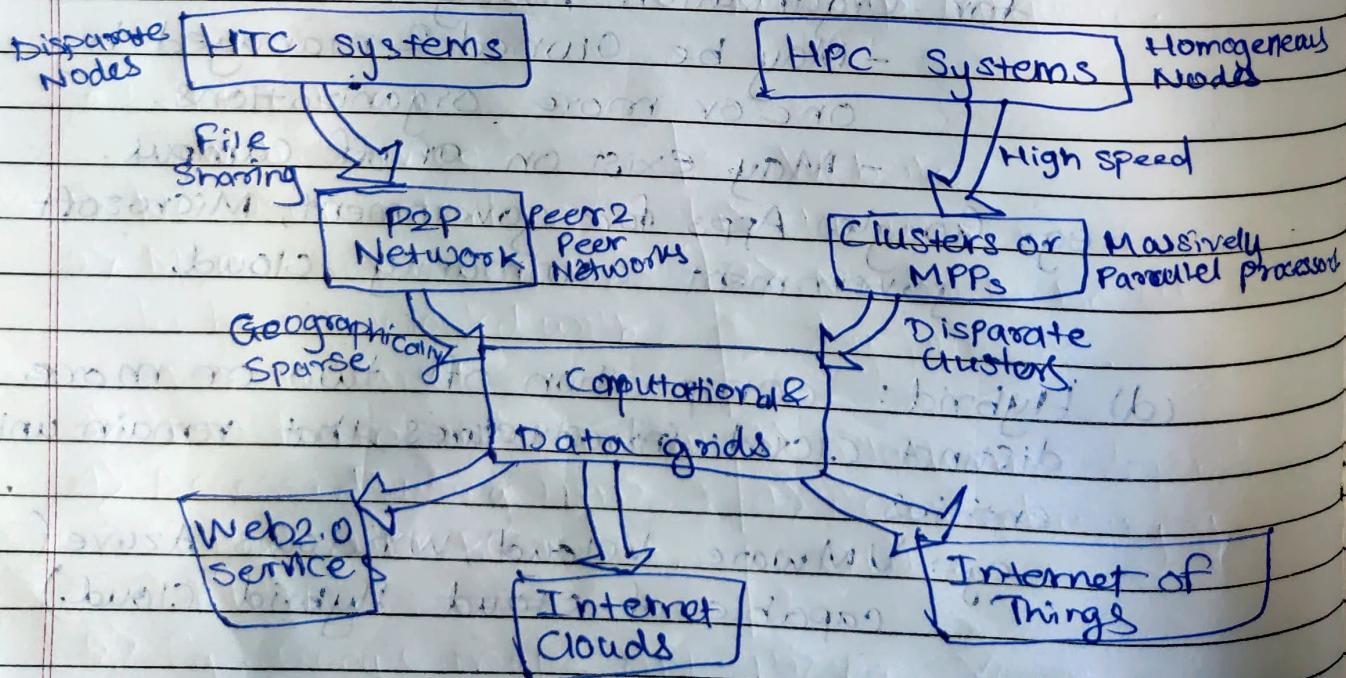
Increased from : GFlops (early 1990s) to PFlops (2010s)

FLOPS : Floating point operations per second.

e.g.: $k\text{ Flops} = 10^3$, $\text{GFlops} = 10^9$, $\text{YFlops} = 10^{24}$

(b) HTC : High throughput Computing :

High Throughput Computing is used in Internet Searches where millions of users access simultaneously.



- Compute Grids & Data Grids

(a) Compute Grids :- Allows you to take a computation & divide into parts to execute them on different grid nodes in parallel.

- Computation will be faster as it can

use resources from all grid nodes in parallel

- Features : Load balancing, fail over, grid events, node metrics.

(b) Data Grids : - Allows you to distribute the data across the grid.

- Main goal is to provide as much data as possible from memory on every grid.

- Features : data replication, data backups,

data partitioning.

Grid Computing is used where, different Subject experts in the same project do not necessarily have to share data AND resources at the same time.

⑤ Building Cloud computing environments :

(a) Application development :

- Applications that leverage cloud computing.

- Influenced by varying workload.

- E.g. class of these Applications :

Web Applications, Resource intensive APPS.

(b) Infrastructure/system development :

- Provides on demand dynamically

- Scalable Solutions

- Offers runtime environments, resources, web applications that mimic desktop apps.
- Leverages Service-Oriented Architecture, developers access these services via REST.

⑥ Web Service:

Means by which computers talk to each other over the web using HTTP or other supported protocols.

- Runs on a web server which exposes web methods to interested callers.

- Listens for HTTP requests & executes and returns results of web methods.

- Uses standardized XML messaging system.

Web services are based on:

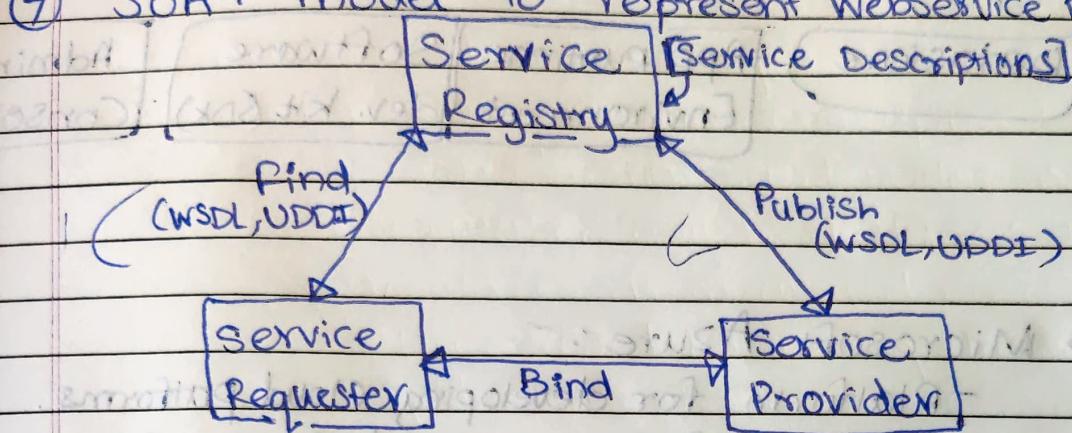
- 1) HTTP (HyperText Transport Protocol)
- 2) UDDI (Universal Discovery, Description & Integration)
- 3) SOAP (Simple Object Access Protocol)
- 4) Web Services Policy
- A) XML: extensible Markup Language.

Difference:

Web Service	Website
1) No user interface.	1) Has user interface
2) Meant for other apps to be interacted with over internet.	2) Meant to be used by humans.
3) Platform independent	3) Platform dependant
4) Accessed using HTTP methods, GET, POST, PUT, DELETE.	4) Accessed using given GUI.
5) Eg: Google maps API	5) Eg: YouTube.

: 349 To explain location

⑦ SOA : model to represent web service interactions.



⑧ Computing platforms & technologies:

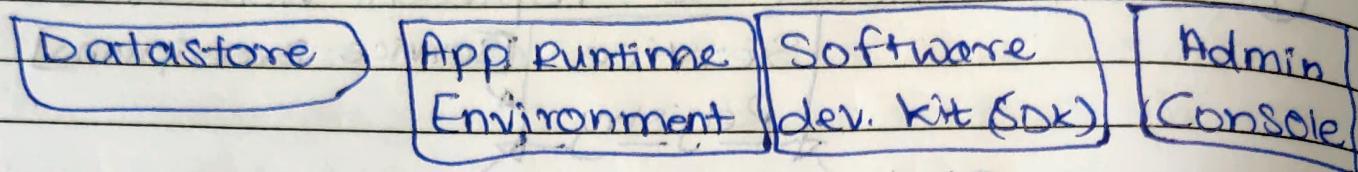
i) AWS : (Amazon Web Service)

- IaaS Model
- Provides virtual computing, storage & networking. (to host VMs)
- Known for Elastic Compute Cloud (EC2) & Simple Storage Service (S3). (Object oriented storage)

ii) GAE : (Google App Engine)

- PaaS Model.
- A platform for developing & hosting web applications in Google managed data centers.
- Supports Java, Python, Go. Provides secure execution & useful collection of services that help in developing scalable & high performing apps.

• Functional Modules of GAE :



3) Microsoft Azure :

- Platform for developing cloud platforms.
- Concept of roles is used :
 - (a) Web Role; is designed to host webApp
 - (b) Worker Role; is a more generic container of Applications
 - (c) VM Role; Provides VM environment in which computing stack can be fully customized