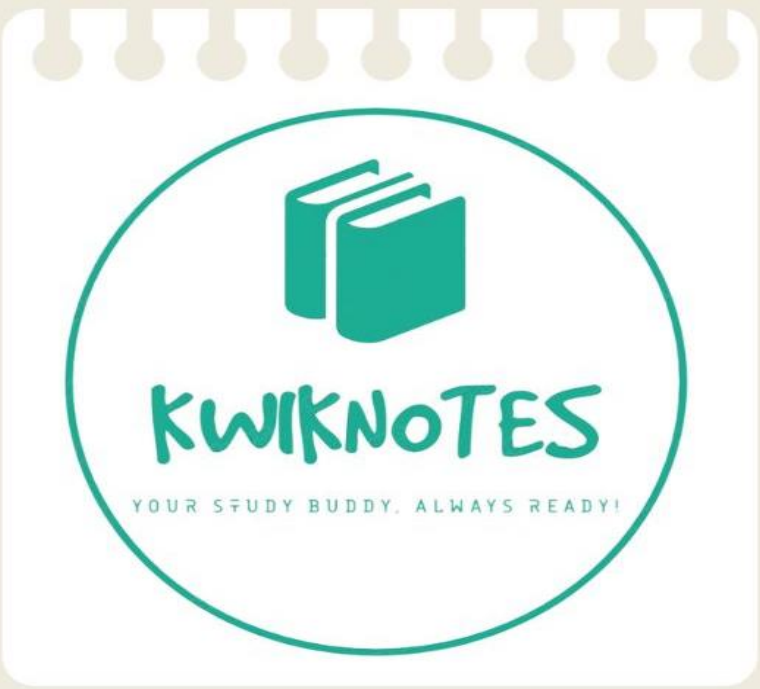

HANDWRITTEN NOTES

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Resources can be scaled up & down as per requirements.
Are not present physically. ex - gmail
Useful when we need resources for a time, not always
Pay for the time we use service

Cloud Computing

it means storing managing & accessing the data & program on remote servers available ~~on~~ hosted on internet instead of computer's harddrive

Cloud computing provide basic & advance concept of CC
Jab traffic zyada ho, we can scale up/down resources

It refers to a network ~~of the~~ over internet
This a technology that uses remote ~~servers~~ servers on internet to store, manage, access data online rather than local servers.
Data can be anything such as files, images, docs, audios, video & more

Operation that can be done.
- Developing new apps & services
- Hosting blogs and websites
- Analyse data
- Delivery of Software on demand
- Storage backup & recovery of data.

Characteristics
- Agility - cloud works in distributed computing env. Share resources among users.
- High availability & reliability
High availability of servers because infrastructure failure are minimum
- High scalability
we can reduce/increase scale on demand
- Device & location Independence
Infrastructure is off site and can be

Ondemand service, Broad n/w access (over hetrog. devices), Elasticity, Resource pooling (Resources are shared), Multi tenancy, Virtualized, Secure, Sustainable

accessed via internet anywhere

- Maintenance - is easier & donot need to be installed on each user's computer & can be accessed from diff places

- pay per use
API (application prog interfaces) are provided to users so that they can access services on ~~internet~~ cloud & pay as per usage.

Advantages

1) Backup & restore data
2) Improved collaboration
- allows people to share info via shared memory.
3) Low maintenence cost
4) Unlimited storage capacity
5) Data Security
6) Mobility
7) Pay per use

Dis

1) Internet connectivity
2) Security - we send sensitive info to a third party i.e cloud

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user on his choice, maintain acc to needs.
OS choice, storage (how much), scalability, maintaince is done by provider. IP add is provided
Service provider

3) Limited Control
Cloud infra is completely owned & manage by service provider

4) Vendor Lock-in ← biggest disad. Org may face problem when transfering services from one vender to another. As diff vender provide differ platform

Service Models — service define 2-3 page bad

Infrastructure As a Service
provide os choice, owner provide IP add, scalable, flexible

Also known as hardware as a service. It is one of the Layers of cloud computing platform.
It is used by system administrator / N/W architects.
It simply provides underlying OS, security networking and server for developing apps.
Provide access to fundamental resources such as physical machines, virtual machines, virtual storage, etc.
Ex- Amazon Web Service (AWS), Microsoft Azure, Google cloud, Linode, DigitalOcean.
To host websites.
It eliminates the need of maintaing IT infrastructure

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In this It infra such as storage, server & n/w ing resources are managed by cloud provides

It is offered in three models - public, private & hybrid.

IaaS provider provides following services -

1) Compute 2) Storage 3) Network
4) Load Balancers

ex- ~~overcoming~~ when we use req OS & applications

PaaS Platform as a Service

OS access is not given only UI (interface) is access

is a complete development & deployment environment in cloud with resources that enable you to ~~dacedep~~ deliver everything from simple cloud based apps.

development & deployment model

It provides a runtime environment

It allows programmers to easily & create test, run and deploy web apps. Pay per use basis & access them using Internet.

No worry to mange infra

End users need not to worry about infrastructure management

Ex- Azure, Amazon AWS

programing lang is also provided by Provider

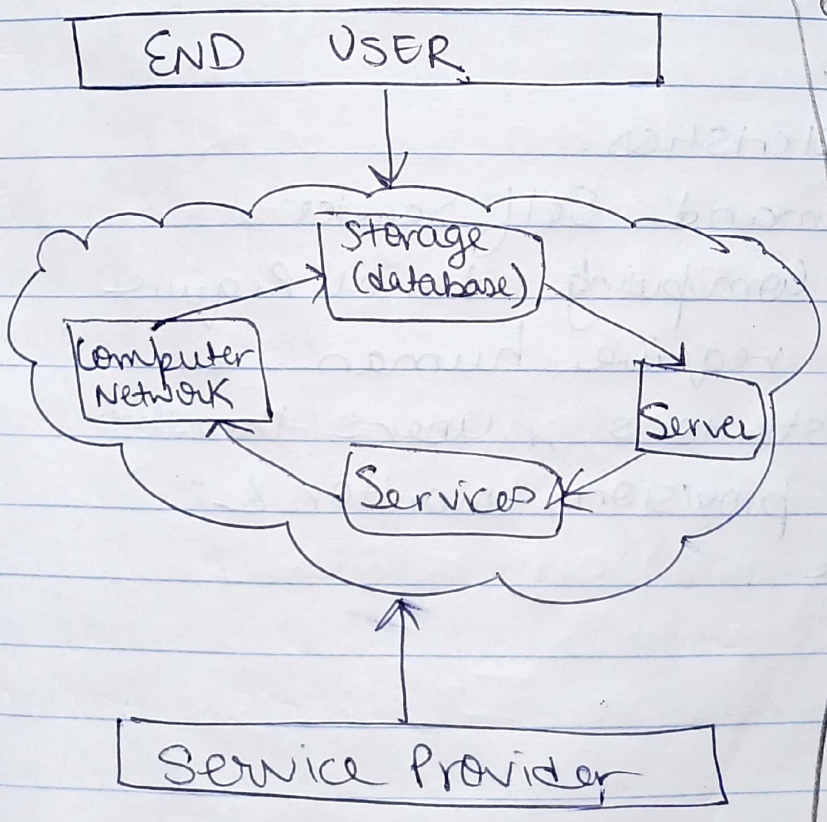
Saas - for end user's, no knowledge about working all resources managed by provider

Paas include infrastructure (server storage & networking) & platform (middleware, development tools, DBMS, business intelligence) to support web app life cycle

It provide
Programming Lang , App framework, databases, tools.

It has a feature of point & click which allows non developers to create web applications.

It offers browser based development env provide built in security, scalability.



saas - on demand software
way of delivering applications over internet
all service hosted by cloud provider
end user never to install any software to access web app
also called web based software, hosted s/w
ex - MS office

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History

Before cloud computing, client Server Architecture was used where all data & control reside on server side. First user need to connect to server then access data. Had disadvantages.
Then distributed computing came in which all computers were networked together to share resources among users.
After that CC was introduced
In 2002, Amazon started AWS to provide storage & computation over internet.

Characteristics.
On demand Self Service.
Cloud computing donot Require doesnot require human administrators, users themselves can do provision, monitor & manage.

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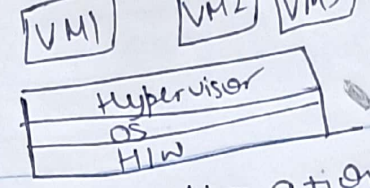

Virtualization - CC providers use virtualizations technology . Cloud create virtual environment that use unlying hardware . CC is not possible without virtualization

Multi tenancy - CC providers support multiple tenants (users) on single set of shared resources.

Security - Cloud providers invest heavily in security measures to protect their user's data & ensure privicy of sensitive data.

- Scalability
- Pay per use
- Broad n/w access - Cloud services are generally provided
- Devica & location Independence.

Hypervisor is a software or program used to create virtual machine

Types of Cloud

1) Public Cloud

A public cloud is a IT model where public cloud service provider make computing services including storage, network, database, develop & deploy environments and application available on demand to organisations and individuals publically over internet

The cloud Resources are managed by third parties which provide cloud services over the internet to public, these services are available as pay per use biling models.

- Help full to handle peak loads on Local infrastructure
- Have global Reach
- Less customized
- They allow multitenancy ie not meant to be for single user
- Can be used by both individual or organisation
- Have minimized IT infra cost

In public cloud, the same storage is used by multiple users at same time

Advantages

1) Low cost - than private as shares same resources with large no. of consumers

2) High Reliability

3) Location independent - as offered on internet

4) Scalability - can add/ remove services

5) Disaster Recovery

Disadvantages

1) Low Security - as resources are shared publically

2) Performance - performance dependent on internet speed

3) Less customizable than private cloud

Ex- AWS, Google, Microsoft.

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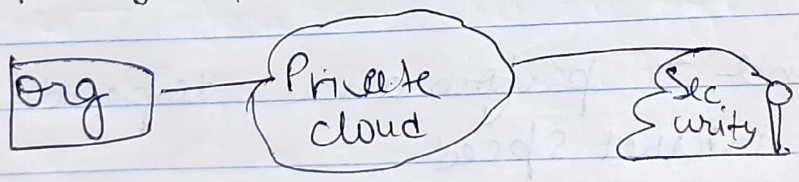
2) Private Cloud

is a computing service offered either on internet or a private internal network and only to selected users instead of general public

- It is also known as internal or corporate cloud
Private cloud provide computing services to private internal n/w (within organisation) and to selected users.
- Provide high level security & privacy to data through firewalls and internal hosting. It ensures operational & sensitive data are not accessible to third party providers.



Ex- HP data centers, Microsoft, Ubuntu, Dell, IBM, Oracle

Advantages

1) More control - over resource & hardware because it is only accessed by selected users.

2) Secure & Private

3) Improved performance - Private cloud offers better performance with improved speed & space capacity

4) Customization

Disadvantages

1) High cost
because of set up & maintaining H/W

2) Restricted area of operation
accessible within org

3) limited Scalability - Can be scaled within capacity of interal hosted resources

4) Skilled people
required to manage & operate cloud Services

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3) Hybrid Cloud

A hybrid cloud is a hetrogeneous distributed systems formed by combining facilities of public & private cloud. for this reason, they are called hetrogeneous.

The aim is to create unified, automated, & well manage computing System

It is used in finance, healthcare & Universities.

It gives a combination of 2 computing environment.

Non critical activities by public & Critical by private cloud

Es— Amazon, Microsoft, Google, Cisco, NetApp.

Advantages

1) Less costly - because it forms distributed System

2) Speed - Efficiently fast
Reduces latency.

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3) Security - It is totally safe & secure & works on distributes system n/w.

4) Flexible - features of both

5) Risk Management - provides

Disadvantages

Reliablity - depends on cloud Servica provider

difficult to maintain

Networking issue - as it becomes complex

COMMUNITY CLOUD

It is a cloud infrastructure that allows systems & services to be accessible by a group of several organisation to share information.

It share infrastructure b/w several organisation from a specific community.

Managed internally by org or third party

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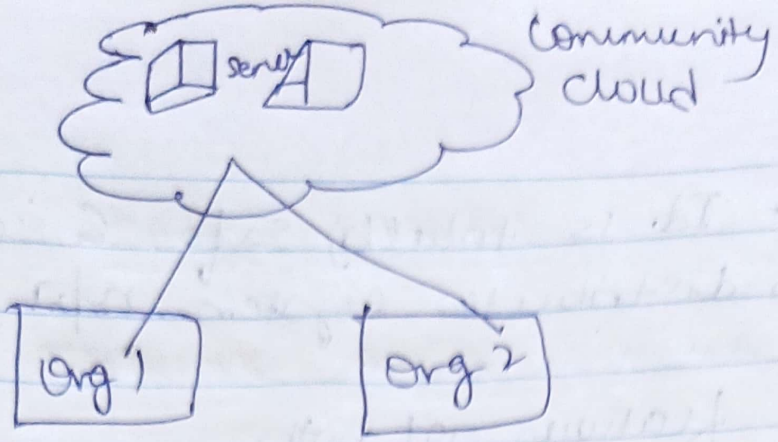

In this, infrastructure is shared between org that have shared / common concern or tasks.

Advantages

Cost effective - as sharable.

Flexible & Scalable - becoz compatible with every user

Security - more secure than public but less than private

Sharing infrastructure - allow to share cloud resources, infra, & other capabilities among various org.

Disadvantages

- Not a good choice.
- Slow adoption to date
- Costly than public
- Sharing Responsibility among org is difficult
- fixed amt of storage.

MULTI CLOUD

It uses multiple cloud computing services from different providers, which allow organisation to use best suited services for their specific need & avoid vendor Lock in

In this org uses services from atleast two cloud providers to run applications.
It include combination of 2 or more public clouds, two or more private cloud or combination of both.

Eg - AWS, IBM

Ad - Flexible, cost Effective, Secure

Dis - Complexity, Increased cost, Compatability Issue.

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Service Model

Network As a Service

Allows us to access n/w infrastructure directly & securely

Naas makes it possible to deploy custom Routing protocol

In this customer rent networking services from cloud providers. It allow customers to operate their own networks without maintaining their own networking infrastructure.

This may include wireless, Security or unified communications services in a public cloud or on virtualized customer premise equipment (vCPE)

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Identity as a Service (I.d aaS)
refers identity and access management services provided through cloud on subscription basis.
It is an application delivery model (like SaaS)

It offers identity information as a digital entity. This identity can be used during electronic transactions.

Remembering different username & passwork for accessing Server is used. But when Employee leaves so account of that user need to be disabled.

It helps to manage digital identies so that Right user can access Resources that are meant for them. Can be used by both business org & consumers.

Cloud Services

Refers to a wide range of services delivered on demand to companies & customer over the internet.
Services are managed by vendors & service providers. So no need for a company to host applications on its own on-premise server.

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Challenges

It is an imp part of life as ...

1) Data Security and Privacy
This is a major concern when switching to cloud computing. User or organisational data is critical & private. Even if provider ensure. It include threat such as identity theft, malfare infection, etc.

2) Cost Management - to decrease cost company end up using multiple clouds which increases IT team

3) High dependence on N/W
All transfer of data & resources are ~~dependent~~ done on network this can prove highly vulnerable in case of limited bandwidth. More internal Bandwidth Required.

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Portability
Apps should be easily migrated from one cloud provider to another
There must not be vendor Lock in.
However it is not possible as diff cloud provider uses different standerd languages

Interoperability means app from one platform should be able to incorporate services from other platform. It is done using web services, which is complex to build.

Applications

1) Art - iMoo, Vistaprint, Adobe Creative Cloud
2) Business - MailChimp, Salesforce Chatter Paypal
3) Data Storage & Backup - Box.com, Mozy, Google G Suite
4) Education - AWS in Education, Google Apps for Education, Chromebooks for Edu

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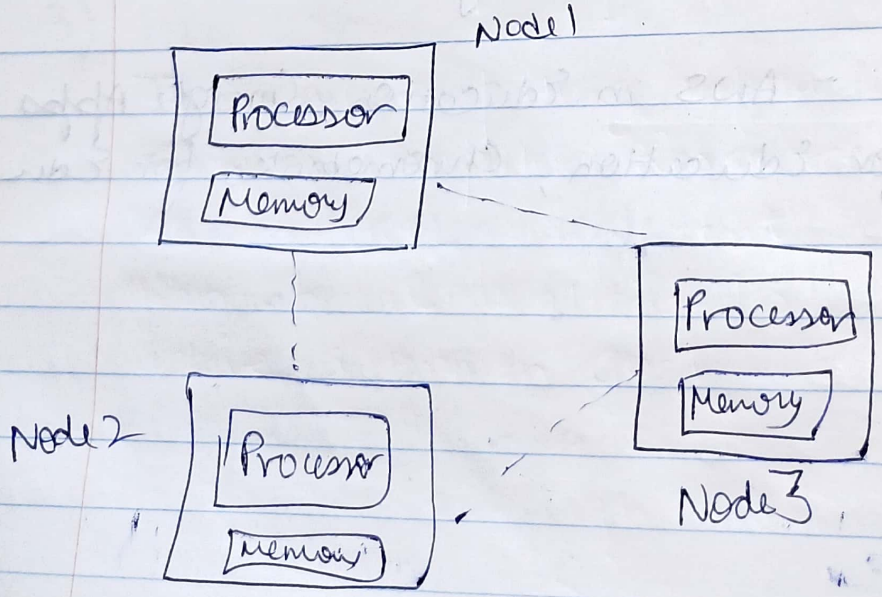
Computing Paradigm

Is a term introduced by Wolfram to describe idea of using simple programs rather than mathematical eqn

1) Distributed Computing:
It is defined as a type of computing where multiple computers system work on single problem Comp are linked together & problem is divided into sub problem

Goal - to increase performance, efficiency & ensure fault tolerance.
Each processor has own local memory & they communicate with eachother.



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Here work is distributed within multiple nodes & system for fast & efficient work

2) Parallel Computing

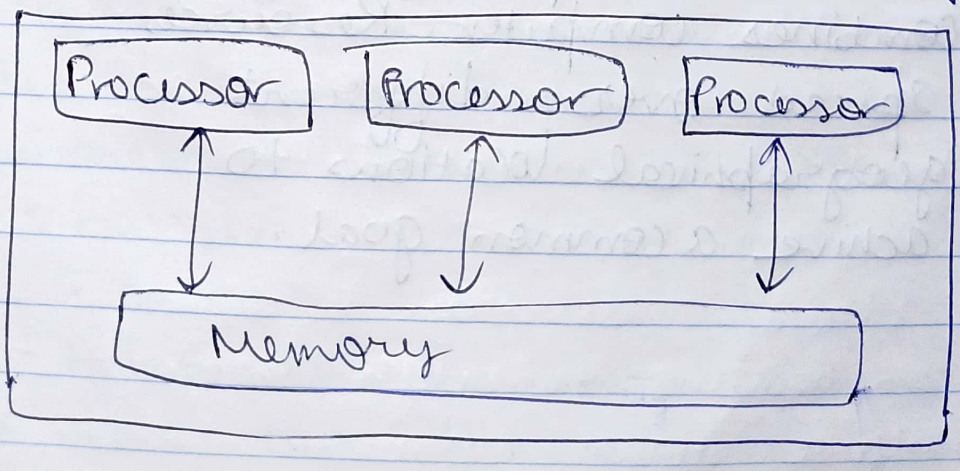
In this multiple computer systems are used simultaeneously. Here problem is broken into subproblem then further broken down into instructions.

These instructions from each subproblem are executed concurrently on different processors.

Calculation & processes carried out Simultaeneously.

It saves time & money as many resources working together will reduce time & cut potential cost.

It helps in faster app processing & task Resolution by increasing available computation



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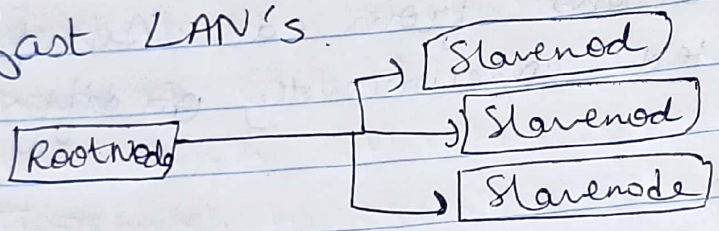
3) Cluster Computing

Is a grp of independent computers that work together to perform given tasks. So that they can be viewed as a single system

It is a collection of tightly or loosely connected computers that work together to act as a single entity

Clusters are connected through fast LAN's



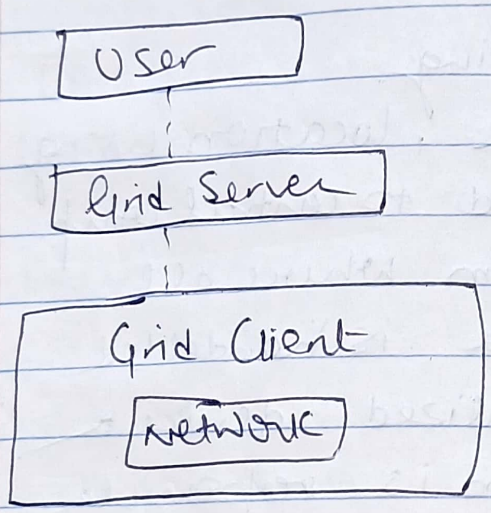
To increase performanance, Scalability & simplicity of system

4) Grid Computing

It is a computing infra that combines computer Resources spread over different geographical locations to achive a common goal.

All unused Resorces from all comp are pooled together to perform a single task

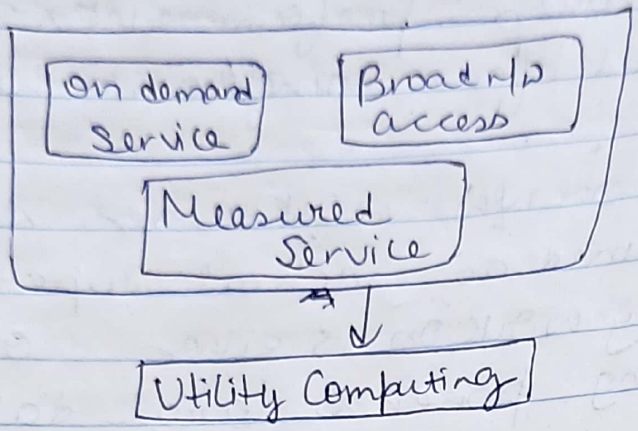
* A network of comp perform tasks that may be difficult for a single machine to handle.
All computer on n/w work under same umbrella termed as virtual Super comp
The task they work on is either of high computing power & large data sets.



5) Utility Computing
It is defined as a computing where service provider provide needed Resources & services to customer & charge them depending on the usage of these resources as per requirement & demand but not a fixed rate
It is a service providing model

Goal - to increase the usage of Resources & be more cost efficient

This computing involve renting of resources such as h/w, software, etc depending on demand & Requirement.



ex - Word

6) Centralized Computing
Done at Central level, location using terminals attached to central comp. It refers to a system where all processing and data is handelled by a single, centralized device system. This system is responsible to request processing, manage data, and all other devices.

Ex - traditional mainframe system
In this user access the mainframe through terminals or other devices that are connected to it.

7) Cloud. - delivery of different services on demand through internet which include storage, database, analytics

Cloud COMPUTING PLANNING

Cloud is considered most cheapest, easy to use technology suitable for almost every business.

Before deploying cloud, we need to pre consider requirements and its post impacts
Some factor to be considered are -

1) Availability - of org data to store
2) Compliance - legality issues to store data
3) Compatibility - org's infra compatibility
4) Monitoring - of data before having cloud

Factors

- Data Security
- Finance Req
- Budget Req
- Type of cloud
- Privacy Requirement
- Training Req
- Data Backup Req
- Client Access Req

Before deploying app to cloud it is necessary to consider business req & data & privacy

1) Strategy Phase

In this we try to find out kind of experience of customer

i) Cloud Computing Value Proportion

In this we analyze req & problem they want to be solved
This include
Simplifying IT management
High quality of service.

Cloud Technologies

1) Virtualization
2) Grid Computing
3) Service Oriented Arch
4) Utility Computing

Virtualization

Process of creating virtual environment to run multiple applications and operating system on same server.
It is creation of a virtual (rather than actual) version of something such as server, desktop, storage device, operating system.

It allows to share resources on single physical instance

The machine on which virtual machine is created is called Host machine & Virtual Machine is called Guest Machine

Types

1) H/W Virtualization
Creation of virtual machine over existing OS & hardware is called H/W virtualization
A virtual machine provides an env that is logically separated from underlying H/W.

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VMS

The virtual machine software or virtual machine manager (VMM) is directly installed on hardware

The main job of hypervisor is to control & monitor processor memory & other hardware

2) OS virtualization.
VMM is installed on host operating system instead of directly on h/w
To Run Multiple OS.

3) Server Virtualization
When VMM or VMS is installed on server system
It is done to divide a single server into multiple on demand or balance the load

4) Storage vir - -
Process of grouping physical storag from multiple n/w storage devices so that it looks like a single storage device.
Can be implemented by Software Apps.

Advantages
1) Allow user to access data from remote loc.
2) Reduce cost
3) Reduce infrastructure
4) Provide security

Dis
High Implementation cost
Scalability issue
Handelled by third party

SOA

Service Oriented Architecture
It is a design pattern which is designed to build distributed system that can deliver services to other applications through the protocol.
It is an architectural approach in which app make use of services available in n/w

SOA allows to combine large no. of facilities from existing service to form a app

Service - is a well defined, self contained function that represent a unit of functionality
A service can exchange info from other service and is not dependent on another service's state.

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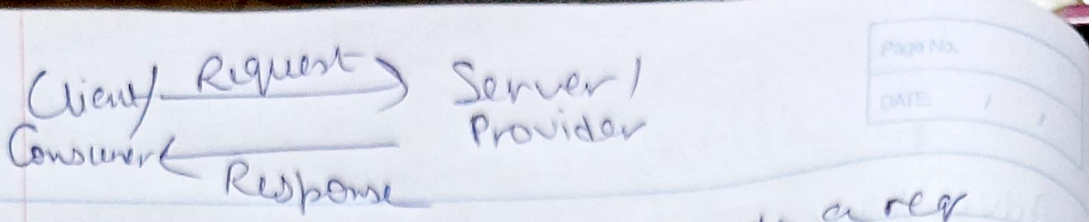

A Servia Consumer sends a req to service provider which in turn response to the req

SOA says down the some protocols for services to communicate with each other

Characteristics

Loosely coupled
Support interoperability
Location transparent
Self contained

Advantages

Easy to integrate
Loosely coupled
Parallel Development
Available
Reliable.

Used in healthcare, gaming, mobile apps

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3) Grid Computing

Also known as distributed computing.
Combines various computing resource from various location to act as one & achive a common goal.

Nodes connected by parallelism to form cluster.
Ex - ATM, Marketing Research

4) Utility Computing.

It provide on demand computing Resources & charge accordingly.

Define characteriss of cloud
Distributive systems, cluster computing
Mainframe comps, all types of computing
Multicloud, Cloud Services (33)
Anything as service, function As Servica
Cloud Servica Setup Req, Benefic, Challenge.
Applicadons, HW as a servica, S/w as a serve
cloud deployment model (public, private, hybrid
Comm, shared private cloud.
SOA & arch. Virtaization & security