Virtualization ?

The main enabling technology for cloud Computing is Virtualization. Virtualization is the adding or spliting of a Single physical Resource or Server into multiple logical Servers.

example for adding Physical Resources -

example 1 : Memory Card

if you have 32 GB internal storage and 16 GB of External Storage total become 48GB you want to store 40 GB of data it's too hard to do when we Remove External storage the data will be ~~distro~~ damage As data is stored in logical Unit Number of sequence order distrub.

example 2 : RAM

when we dose using 4 GB , 4GB two slots in our system if one failed then the other also not work. Both work together.

Case study about add ups.

Data Center (in data Center different Serveres are for different task)

- → 100 acre land
- → 50 servers
- → cooling System
- → 100 or 1000 disk
- → cabling
- → Staff
- → electrical System/ power back ups

like

DNS : English may Name ki verify کرتا ہے۔ IP کی

DHCP : سسٹم sign in کرتا ہے۔ IP کی assign کرتا ہے۔
it assign automatically IPs to system.
also configure routers

Now if we can buy some virtual machies for that then our 100 acre land some part save less Servers buy, Because all the server are Not going to work all time - 24/7

Two types of expenses -

1) CAPEX
2) OPEX — explain at end

The machine on which the virtual machine is created is known as host machine and virtual machine is referred as a guest machine. The virtual machine is mannaged by a software or firmware, called hypervisor.

A hypervisor is a form of virtualization software used in cloud computing to divide and allocate the resources on various hardware. The program that provide partitioning called hypervisor.

The hypervisor is a hardware virtualization technique that allows multiple guest os to Run a Single host system at the same time. it is also called VMM (virtual Machine Manager).

Types

1 **Type 1 Hypervisor**

also known as 'Native Hypervisor', 'Bare metal Hypervisor'.

This hypervisor run directly on underlying host system.

it does not Require any base server operating System.

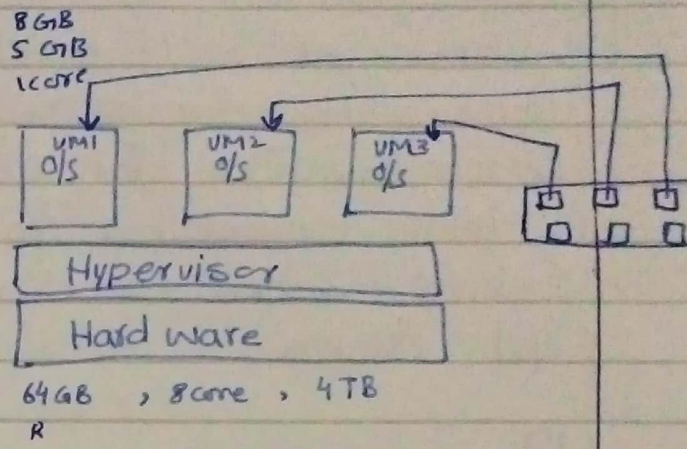
it has direct acess to hardware resources.

Example

VM ware (ESXi 7.0)
Citrix (XenServer)
Microsoft (Hper-V) hypervisor
KVM (kerned Based Machine)
RHEV (Red hat Enterprise Virtualization).

oracle VM ,
Sun xVM ,
→ Enterprise leved
it's a for Companies
or business level.

All Resource are used when
the gest O/S are active-



Pros

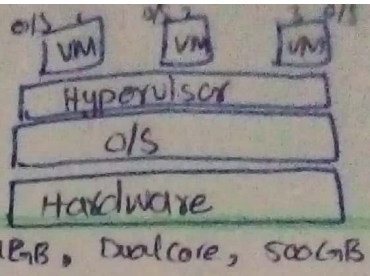
i) very efficient because they have direct access to H·W
ii) it provide more security.

Cons

i) they need dedicated separate machine to perform its operation and ② to instruct different VMs and control host hardware resources.

Type 2 Hypervisor

also know as "Hasted Hypervisor."
it's not run directly over the underlying hardware.
in this type software installed on Operating System. Hypervisor tel ask the operating Systems to make call to hardware.
it often found on endpoints like PC.



Example:
VM player or Paralllel Desktop.
very usedful for engineers, security analyst.

→ Oracle VirtualBox for X86 (oracle corporation Virtual Box 6.1.32)
→ VMware Workstation Pro (VMware Fusion 12.2.1)
→ Solaris Zones 11.3 (oracle)
VM Fusion

Pros:

i) quick and easy acess to guest Operating System alongside the host machine running
ii) The hypervisor usally come with additional useful Feactures for guest machine.
iii) it is used for Learning and testing

Cons:

i) No direct access to the ↑Physical hardware Resources
ii) Security Risk

(1998)

What is VMware Vsphere and Suit of Vsphere Consist of Feature?

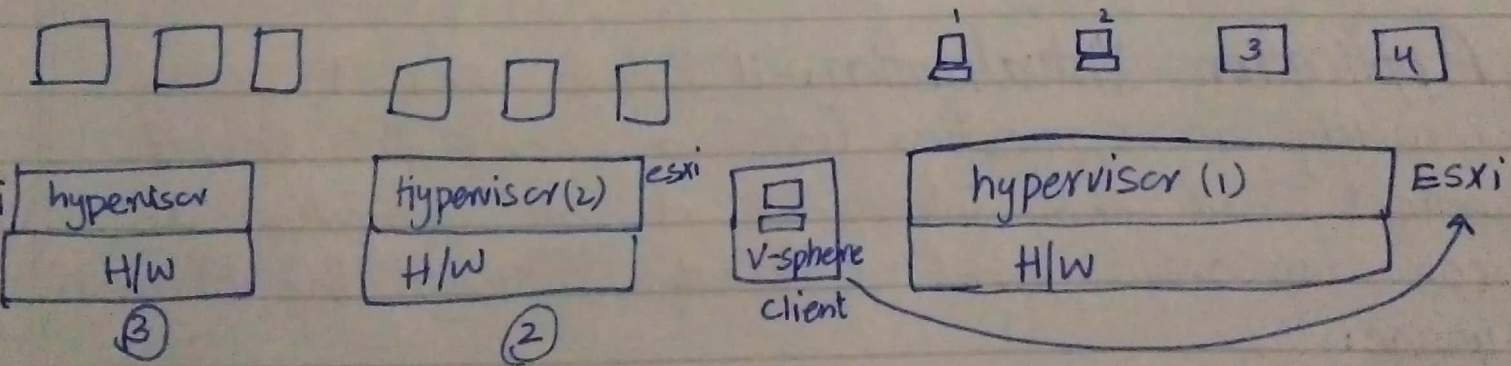
Vmware Vsphere used the power of virtualization to transferm data centers into simplified cloud Computing infrastructure. and enables the iT Organization to deliver Flexible and Reliable iT Service.

The two core components of Vsphere are
1) VMware ESXi
2) VMware Vcenter Sesver
3) VMware Vsphere client
4) V-shpere web client

| or many more like V-motion.

1) VMware ESXi

it help our hardware to perform virtually.
it is a feature of V-sphere.



Why vmware VSphere hold 80% Market

→ it provide Some extra Features.
→ it suport Multiplate form.

VSphere Client

→ when we are far distance from our device and what to access it at our location.

→ it is a GUI interface
→ To access Remotly we access hypervisor ESXi
→ after accessing it we create a virtual machine
→ in VSphere client we can acess one V.M at one time.

Vcenter Server

→ in this we can access multiple ESXi.
it is a single Consol in which we can acess Multiple ESXi (we can manage them)
it's just like a head.

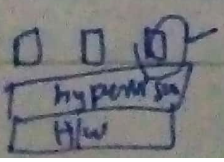
it's also a GUI interfa

VMware Avaliability & Migration

it ~~provide~~ allows (HA) High Availicibilty to companies to provide (HA) to any application running in a virtual machine.
VMware HA IT Organization can : Protect applications with no other failover option. provide cost effective hA

	10A	Down time	Rate
1	90.8+	80 hours Prev	200 $
2	99+	84 hours	500 $
3	99.999	5 min	2000 $
4			

10A = level of agrument. (one year ka hota ha)



examples:
Financal institution.
→ Banking used Hot side
→ ware house (~~warm~~ used cold side).

Note
Warm side Never used.

Data Center Disaster Recovery plane

There are three types of sides for this:
1) cold side
2) Warm Side
3) Hot side.

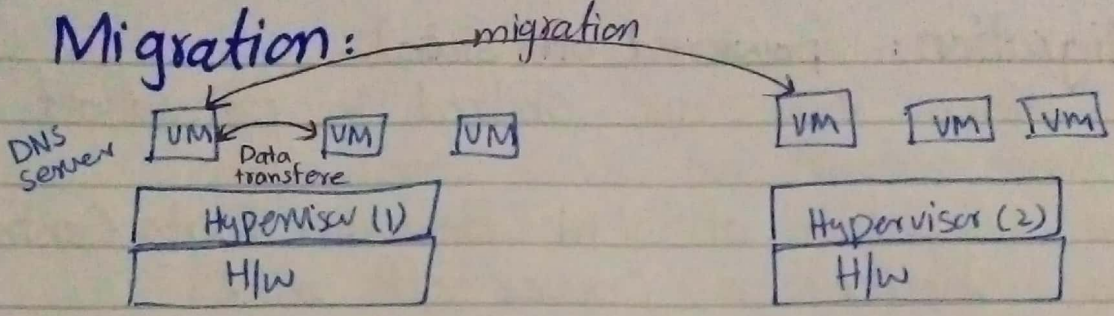
* 100% disaster plan not work.

1) Cold side: (only place without infrastructer).
it is third location (may be in same town, city or in out of country) we buy a place for our data center.
Depend on the Nature of Organization.

2) Warm Side: (place with complete infrastructer No staff).
it is inbetween cold and Hot side.
we cannot or Neaver used Warm side.

3) Hot Side:
it is a complete an other Data center that is running parallel.
in this parallel executation of active site along with this side
May be in cite or country or outside the city of country.
When active site stop due to damage then trafic delay will be manage by this hot side.

Migration:



Migration can be done with in Some or different hypervisor.

Types of Migration:

1) Cloud Migration
2) Suspended Migration
3) V - Motion Migration
4) P2V
5) V2V

Migration is when Virtual Machines from one host to other Host or From one data ~~center~~ store to other data ~~center~~ store

Data store :

all V.M log files,
Virtual disk
iso images
all V.M all configration files
contain By Data Store.

Cold Migration: (powered off state)

When V.M are shifted in powed off state.

i) For the Migration of V.M Between Data Center Machines should be power off and Data Center are one V-center Server For cold Migration-

ii) if V-center are different then cold Migration is not possible. For this both Data Center are on same V-center Server and location of Data Center may vary but should be on same V-center. (or Both Data Center are the part of same V.center)-

iii) the V.M are in off state during Migration So No chance of failure is in cold Migration-

Suspended Migration: (paused state)

it's the next state of cold Migration mean point ii * * be include ha is may only-

So when we do suspended migration our V.M goes in to the paused state and it will Resumed our operation or Application on V.M when Migration is Complete- just like Sleep Mood in laptop-(Backend per all work is stop System is on paused state (running) So it's also called as paused Migration-

Why we do Suspended migration ?

Resone :-

When we have to trouble shoot any ESXi host (issues) For this all the V.M on ESXi host are suspended (paused) then we trouble shoot the ESXi host.

V- Motion : (Live Migration)

In this V.Ms or V.M are migrated from one ESXi to another ESXi (in power on) mode - (operation are working).

For this the clone copy of V.M are created on Second ESXi from first ESXi Server while machines are power on state - when the clonning is Completed all the working Continue from Second ESXi. In this No Down time ~~~

Physical to Virtual (P2V)

when we migrate from Physical environment to Virtual environment.

V-center convert P2V migration -

it is the Feacture used for P2V migration - In this No down time as operation are running or Application are working in physical environment during Migration is continue as its completed then it started Virtually -

Virtual 2 Virtual Migration (V2V)

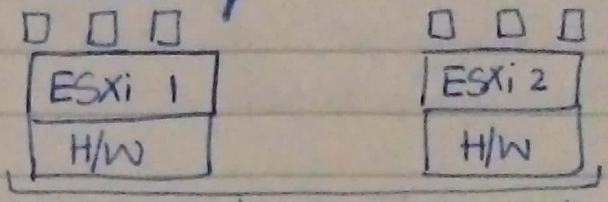
Why we need V2V?

For example we are working at one hyper-V (Buy all it's licence) But Fee is too much (high) or may be Not good experience. Someonne said try Vm ware with same experience But Fee is ~~too~~ not as high as in hyper V. Company Said Migrate from hyper V to Vmware.

In this type of Migration we also have No Down time. just like V-Motion and P2V. The clone copy concept like as we ~~ista~~ install the Vm ware completely Buy it's liences etc. then Clonning is done on it as it Completed we are Migrated with~~o~~ No down time -

High Avaliability

** Must
→ clusters
→ Shared storage
→ V-certer Sever Configuration -



Vm ware send pulses to mointer the Hardware, ESXi etc. just like ICU (Vm ware check it's health). As he Feed uncertainity it can shift VM From ESXi (1) to ESXi (2) · time delay Sometime it's said it take point to mili second.

Built in Feature :

For this we can Built clusters (group of computer performing one type of Functionality).

if there is no cluster then it's hard or difficult to know who is taking off (when one system crashed shifting will be done with in that cluster).

Resource check :

it will automatically check the avaliability of present. (means how much load is bearable)

→ Shared Storage: (all the configration files are save in shared storage).

For Clusters we do shared storages So No deby.

In high availability when we do clustering it's not means for migration. it's something about shifting -

V-center Sever Configure:

Shifting is not done with V-center Sever configure Feacture.

Pre Requisites For High Availability:-

1) all host machines (esxi) are licences.
2) In every Cluster must be at least two Sever (Host)-
3) Every Host name should be unique.
4) Try to allow Static iP's to all essi Severs (iP are of ~~two~~ type (Public, private, static and dynamic)). Static iP like (printer server are Reserve for it) -
5) if using DHIP then make it soure that iP after Rebooting correctly configure or Not.
6) All host DNS must be configure.
7) To check high availibility For Making cluster. (Master slave architecture is used). (Election process) There is one Masters and Remaing will be slaves machines.
8) A machine that have more Data Store will be treated as Master Machine-
9) Master Decide which machine is loaded or shifted on which-
8) Election are conducted again when master Failes. New master will be selected on same condition as machine that have more Data Stores.
9) when the VM (virtual Machines) of Failed master Machine are shifted on other New Master Machine then VM will Be Restore again-

Sever Need Resone for shut done and Restore -

high Avaliability (ESXi per hoti hn)

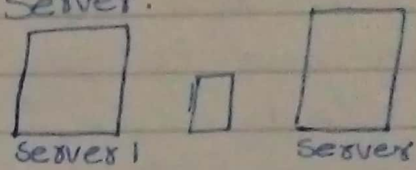
For Virtual Server

1) Clusters
2) Share storage
3) V-center Server Configure

Physical Server

Redundant Server

Same like your Physical Server.



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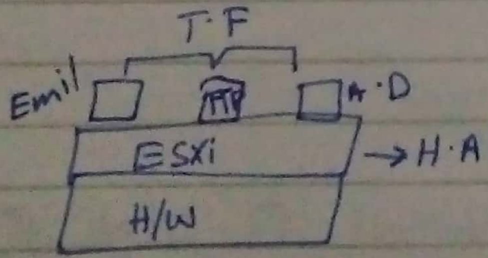
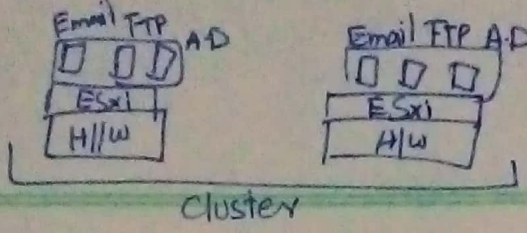
(Fault Tolerance) F.T just like High availability - For V.M when they crashed we can used F.T, used kar just like High Availability - Feacture configure karty option ka hn -

اگر ہم نے H.A کا option on/configure کیا ہوا ہے اور ESXi crashed ہو جاتا ہے
تو ESXi shift کر جائے گی -



critical System

For Example: Satellite manage on cloud
Robotic Searges / autopailot



→ UPS light off
→ Secondary Primary delay
one
→ So No Delay time
Redundant System.

Working technology/Machnizum :-

Lock Step Technology.

When we configure F.T it (cloud) will create Redun
In F.T there are Redundant system create karta ha- We have to pay to For the secondary Machine. on cloud.

- Secondary System/ will Not be on the Same ESXi Primary
- Secondary system will be on other ESXi in Cluster.

This is called Lock Step Technology.

As Primary System of Email crash so that Secondary device Become Primary and load will be Shifted on New primary and New Primary device will automatically create another Secondary device. (This will Be for some short time up to when we Repair our original Primary System) and working will starte same as previous).

Draw Back: ↑ prices.
Aduantage : No Down Time.

V.M Template:

crashed VM When - (Template بنانا پسند کریں) جو چیز آپ کو چاہیئے تو آپ اس کا configure will we template any have you if your from ask it for that.

example : chapati (روٹی), Sever (3 month may Banaya) then

— r motion
— H·A
— accont
- Presentation

server have its template;
if when it crashes it (cloud) will used that template for us (that will be same or familiar environment) (User Friendly)
it also work on common work station -

Tasks

Scalability (ability to expand)

Task :-

Q1 Name of 10 Companies that providing Clouds?

Q1

1) AWS
2) Microsoft Azure
3) Google Cloud Platform
4) IBM Cloud
5) Sales force
6) Ali BaBa Cloud
7) Rack space
8) Oracle web
9) Adobe
10) Liquide web
11) Oracle web
12) Digital Ocean
13) Dell cloud
14) Phoenix NAP
15) kamatera
16) Blue host

Q2. Names of 10 OS

MS-Windows
Ubuntu
Mac OS
Fedora
Solaris
Free BSD
Chrome OS
Cent OS
Debian
Deepin
Syllable
React OS

Task :-

→ 10 names of OS

→ Maxim RAM Capacity (32 GB, 64 GB) (16 TB) (16 Billion TB)

→ Maximum H.D Capacity (20 TB) (15 TB)

Edge Computing

1) Real time data processing.
2) Remote location with limited or No internet Connectivity
3) Highly Sensitive data and strict data laws

Benefits

i) Low Bandwidth
ii) High Security
iii) Quick decision Making
iv) Better Application Experience.

Risk

1) Control and Reliability
2) Security
3) Compliance
4) Compatibility (some iot device generate large data challenging to handle on edge.
5) Contracts and lock-in
we need to take or sign in some contracts and locks in

Cloud Computing.

1) Non-time sensitive data proces
2) Reliable internet Connection

Data in cloud storage is Centerlized

Benefits.

i) Productivity Anywhere:
ii) Low cost of ownership:
iii) Remote Working
iv) More powerful:
v) Easily upgraded.

Risk

i) High Risk (data is centerlized highr data tranfering from edge to clou
2) Look at Security:
3) Longer Outage time.
(data transfer from edge to cloud, it take longe time then edge
4) potential loss: (chance of threats also increase).

Data Cloud	Data center
it is a virtual Resource that the help the business to store, organize and operate data efficiently.	it is a physical Resource that help the business to store, organize and operate data efficiently
less amount of investment for Scalabilitly.	more huge amount of investment for scalability.
low maintaines cost.	high maintaines cost.
Third party need to be trusted for the organizatin	The developer are trusted for data stored center
performance is huge as compare to investment.	performance is less as compared to investut
plan is Requried for customization	no hard plan
It Required internet connection.	iNternet is Not Requ
	Telecome Data Center Enterprise Data Center Hyper scale DataCenter colocation Data Cent

Sever Less Computing:

it does not means it does not have Server.
it is a cloud Native development model.
it allow developers to build and Run application without managing the servers.
Serverless Computing is a method of providing backend end service on an as-useed basic.

Example:

AWS Lambda, Microsoft Azure Function google cloud Function and IBM open Whisk

Advantages

i) cost effiective,
ii) more flexibility
iii) quick time to Release
iv) greater Scalability.

Disadvantages

i) 3rd party Dependencies
ii) less control
iii) user support less
iv) Technical issue.

Task.

Types of Virtualization in

Network Virtualization:

In network virtualization, several sub network can be created on the same physical network, that may or may not be communicate with each other.
it enhances reliability such that disruption in one network will not effect another network and make diagnosis easier.
All the physical part of network (switches and routers) can be combined and their Resource be allocated as Required to any user or devices across a Network.
This is done through a central virtual network management system.

Operating System Virtualization

it is the most common form of virtualization. it involves (putting x Second or multiple sample of an operating System)
when the virtual machine software or virtual machine manager (VMM) is installed on the Host operating System instead of directly on the H/w system is called OS V..
used for testing the application on different platforms of OS.

it involve virtually managing IPs and is accomplished through tools like routing tables, switches, VLAN.

Hardware Virtualization:-

when the VMS or VMM is directly installed on the hardware System is called Hw V.
The main job of hypervisor is to Control and monitoring the processor, memory and other H/w Resources.
it is a Rarer form of virtualization and it's Required for as virtualization.
Usage:-
it is mainly done for the server platforms, Because controlling virtual machines is much easier then controlling a physical server

Sever Virtualization:

is a process of creating multiple server instances from one Physical server. Each server instances represents an isolated virtual environment within each virtual environment you can rum a separate operating system.
usage
it is done because a single physical server can divided into multiple servers on the demand basis and for balancing the load.

Storage Virtualization :-

it is the process of grouping the physical storage from multiple network (syst) devices so that they look like a Single device.
Storage Virtualization is also implemented by using software application.

usage:

storage virtualization is mainly done for back-up and recovery purpose.

Data Virtualization :-

is a process of Retrieve data from various resources without knowing its type and physical location where it is stored.
it collect heterogeneous data from different resources and allows data user across the organization to access the data according to their work Requirement. The heterogenous data can be accessed using any application like web portals, webservices, E-commerce, (Saas) and mobile application.

use:

in the field data integration, business intelligence and cloud computing.

Software Virtualization :-

is a technique that allows one computer server to work with more than one virtual system. The primary Function of software virtualization is to develop virtual software and make the work easier. it just like a virtualization but able to abstract installation procedure and create virtual software installation. (like VMware or virtual box etc)

Desktop Virtualization :- it allows users to access their desktops from anywhere (any device or location) as user's desktops are stored at a Remote server.

use:

Due to applicability of being served remotely, tons of employees could have worked remotely that time (lockdone)-

Application Virtualization :- it allows users to access remotely an application from a server. The server collects all the information of an application and can run over local workstation through the internet.

usage:

Feature of Microsoft Azure :-

Microsoft Azure is used for deploying, desig
anaging applications thraugh a worldwide netwo

feature of 5 companies of cc provider