

UNIT-3 CLOUD DEPLOYMENT MODELS

&

VIRTUALIZATION

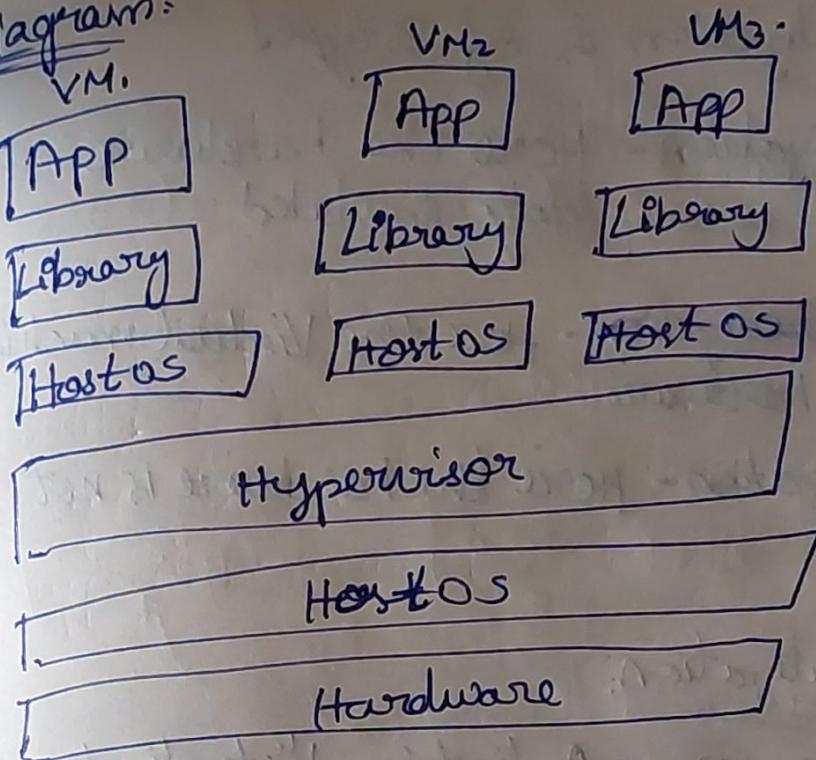
CLOUD DEPLOYMENT MODELS-

Refer UNIT-1 (TYPES OF CLOUD ANSWER)

VIRTUALIZATION

- * It is a process of creating virtual machine which includes hardware, storage, OS, etc.
- * In other words, it is a technique that allows us to share physical instance of resource among multiple customers, organizations.
- * A virtual machine provides an environment that is logically separate from underlying hardware.
- * The machine on which virtualization is going to create (or) run is known as Host Machine.

Diagram:



Advantages:

- 1) It provides high security.
- 2) It reduces work load.
- 3) It is cheaper.
- 4) It is economical.
- 5) Flexible Operations.
- 6) Energy Savings.

Features:

1) Types:

There are mainly 7 types of Virtualization:

1) Hardware Virtualization:

* When the Virtual machine software (or) VMM is directly installed on hardware system then it is known as hardware Virtualization.

* It is also known as Server Virtualization.

Disadvantages:

- 1) Implementation cost is high.
- 2) It takes lot of time.
- 3) Data can be at risk.

+ Hardware Virtualization is of 3 types

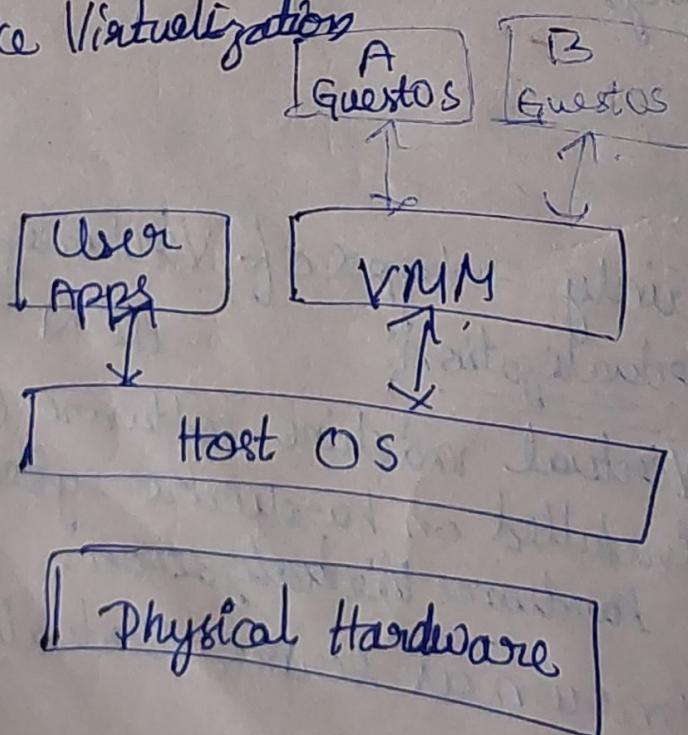
- 1) Full Virtualization - Here the hardware architecture is completely simulated.
- 2) Emulation Virtualization - Here the Virtual machine simulates the hardware.
- 3) Para Virtualization - Here the hardware is not simulated.

2) Software Virtualization:

- + It is also known as Application Virtualization.
- + It is a technique that allows one computer network to work with more than one Virtual system.

Types:

- 1) OS Virtualization
- 2) Application Virtualization
- 3) Service Virtualization



3) Network Virtualization:

- It refers to the management & monitoring of network as a single entity.
- Multiple subnetworks are created on some physical network.

Types:

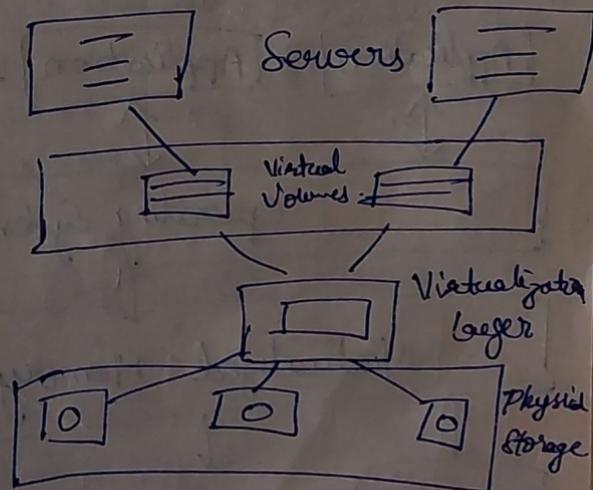
- Internal NV
- External NV

4) Storage Virtualization:

- In this technique, multiple storage devices are grouped together as a single storage device.
- Partitioning hardware into multiple partitions

Types:

- Block SV
- File SV.

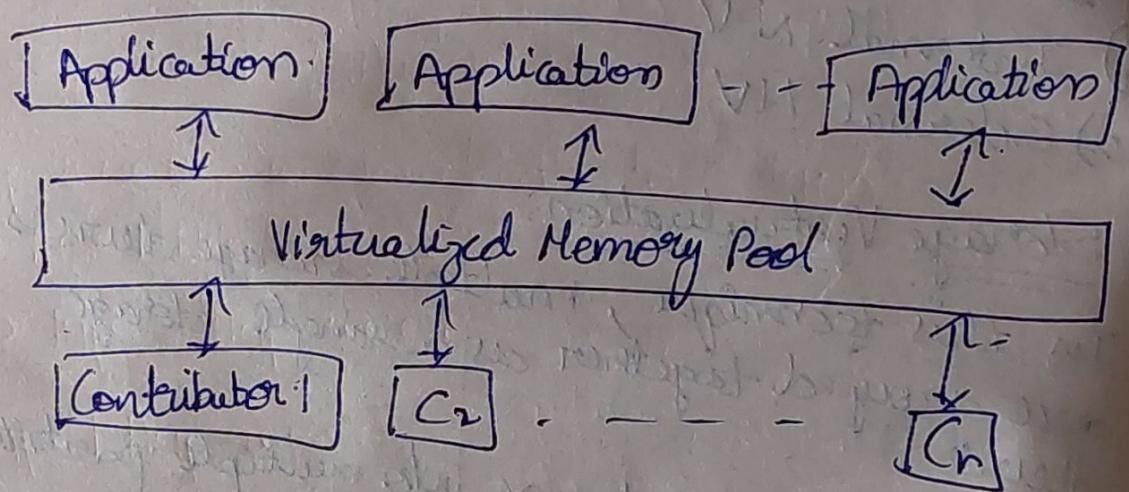


5) Memory Virtualization:

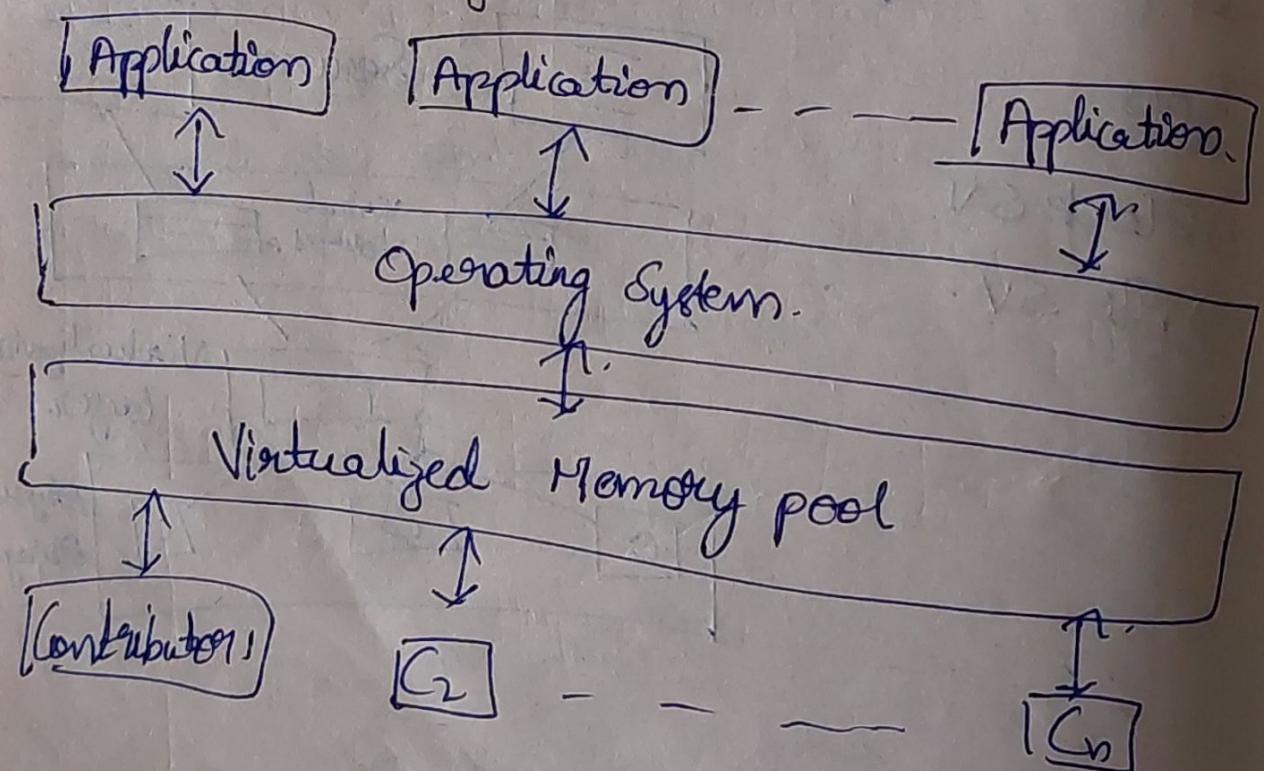
* The way to decouple memory from the servers to provide shared, distributed (or) networked function.

Types:

1) Application Level Integration.



2) OS Level Integration.



6) Data Virtualization:

- * It provides work convenience & security.
- * It decreases data errors & work load.
- * It provides flexibility for lot of employees to work from home.

7) Desktop Virtualization:

- * It is a technique that separates desktop environment and application software.
- * It depends on Application Virtualization.
- * It is a key element for digital workspaces.

Hypervisor

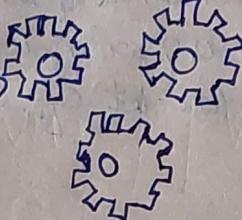
- * Definition: A hypervisor is a software that creates and runs virtual machines (VM's).
- * It is also known as Virtual Machine Monitor(VMM).
- * An hypervisor allows one host computer to support multiple guest VM's by virtually sharing its resources such as memory.

Use of Hypervisor

- * Hypervisor can be quickly switched between servers.
- * Hypervisor, with the help of its features, it allows several virtual machines to operate on a single physical server. So, it helps to reduce:
 - Space Efficiency
 - Energy use
 - Maintenance requirements of server.



Hardware



Hypervisor



#Classifications of Hypervisor

Hypervisors are classified into 2 types :-

- Type 1 Hypervisor.
- Type 2 Hypervisor.

* Type 1 Hypervisor:

- * Also known as bare metal hypervisor.
- * Runs directly on host hardware to manage guest operating system.
- * Doesn't require any base server operating system.
- * Better performance, scalability, & stability.
- * Hardware support is limited.

G.H.S

Guest OS

Guest OS

Guest OS

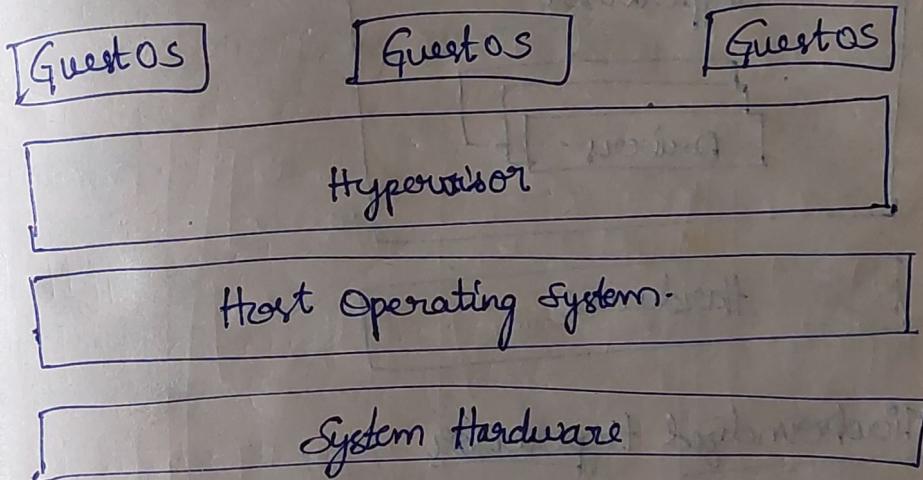
Hypervisor

System Hardware

Type 1 Hypervisor

Type 2 Hypervisor:

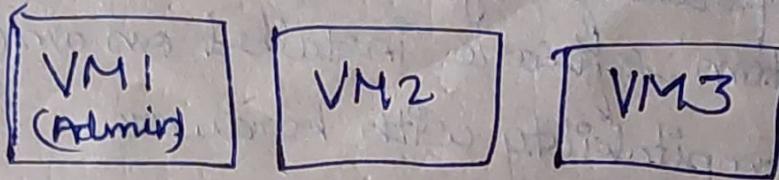
- * Also known as hosted hypervisor.
- * Hosted on main operating system.
- * Basically a system software installed on an OS.
- * It has better compatibility with hardware.
- * Increased overhead affects performance.



Type 2 Hypervisor

- * Type 1 hypervisors are classified into 2 types:
 - 1) Monolithic - Hosts the hypervisor in a single layer.
 - 2) Microkernelized that include components such as kernel, device drivers, I/O stack.
- * Microkernelized - Uses a very thin, specialized hypervisor that only performs the core tasks of memory management.
- * It doesn't include I/O stack & device drivers, kernel.

Monolithic Hypervisor

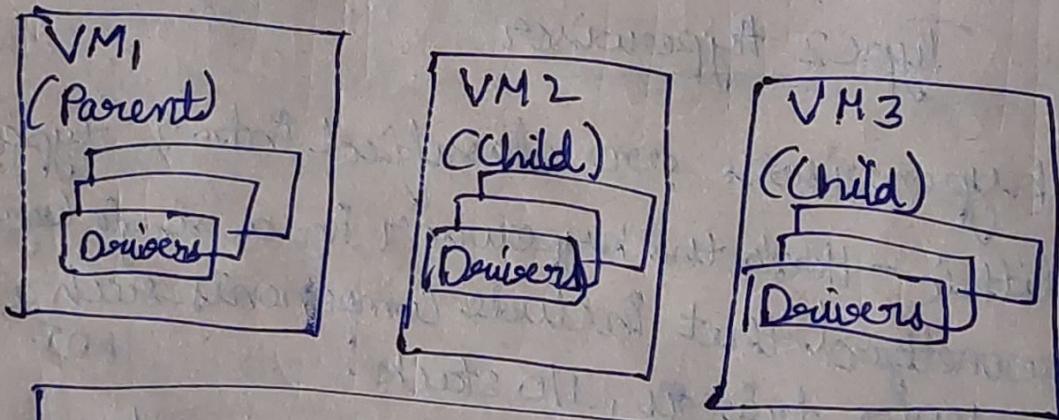


Hypervisor

Drivers

Hardware

Microkernelized Hypervisor



Hypervisor

Hardware

Examples:

Type 1 Hypervisor

- ESXi from VMware
- Oracle VM from Oracle

Type 2 Hypervisor

- VirtualBox from Oracle
- Virtual PC from Microsoft

Benefits:

- * Speed
- * Efficiency
- * Flexibility
- * Portability.

a) Xen Hypervisor

b) Virtual Box

→ a) Xen Hypervisor

- * It is a type-1 hypervisor.
- * It provides services that allow multiple computer operating systems to execute on same computer hardware.
- * Developed by University of Cambridge.
- * Now it is being developed by Linux Foundation with support from Intel.

* Xen is a hypervisor that enables the simultaneous creation, execution and management of virtual machines on same physical computer.

C.E.M of VM.

* Xen was developed by XenSource.

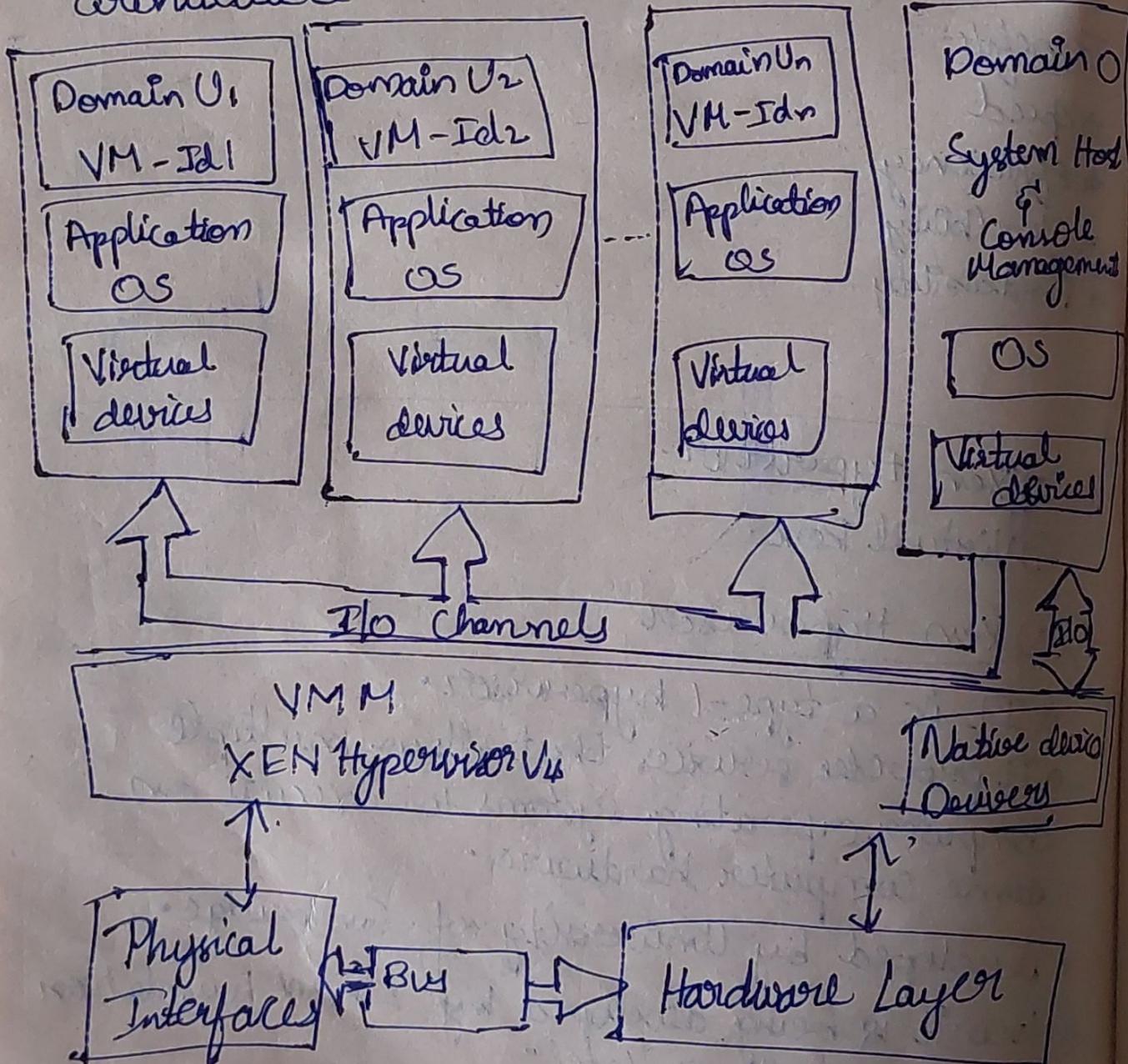
* First Released in 2003.

* It is a open source hypervisor.

* Also comes in Enterprise version.

* Xen can be used on x86, ARM processor architecture.

D.P.V.



→ b) Virtual Box

- * It is a cross-platform virtualization application.
- * It is developed by Oracle Organization.
- * It is designed for IT professionals & developers.
- * It supports large number of guest operating systems.
- * Free Wear.
- * It installs on existing Intel (or) AMD based computers.
- * It acts as a hypervisor, in creating a virtual machine where the user can run another OS.
- * The operating system where Virtual Box runs is known as host OS.
- * The operating system where Virtual Machine runs is known as guest OS.
- * It supports Windows, Linux, Mac OS as its Host OS.

Benefits:

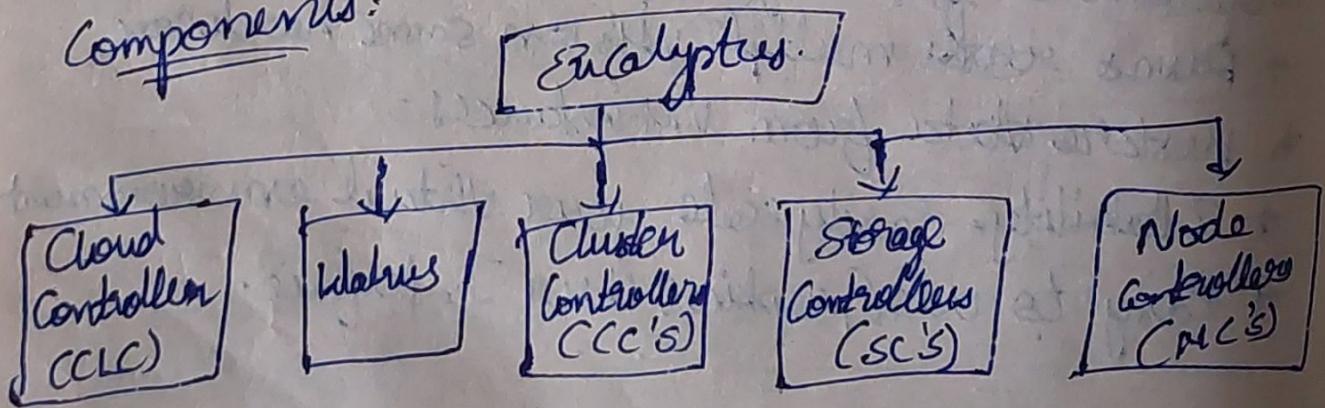
- * Operational flexibility - Operate on multiple OS.
- * Runs ~~one~~ multiple VM's on same hardware.
- * Restore data from VM instances.
- * Scalability - Easily scale your virtual environment.
- * Easy to use Graphical User Interface.

Eucalyptus (Private cloud)

- * Eucalyptus stands for Elastic Utility Computing Architecture linking your programs to useful systems
- * Eucalyptus is a simple open architecture for implementing cloud functionality at IaaS level
- * It is the world's first most widely deployed software platform.
- * It is specifically designed to be easy to install and maintain in a research setting, and that is easy to modify, instrument & extend.
- * Eucalyptus can be modified deployed and executed without modification to the underlying infrastructure.
- * Eucalyptus components have well defined interfaces (described by WSDL documents).
- * Eucalyptus can be dynamically scaled up & down depending on application workloads
- * Eucalyptus is compatible with most popular & widely used Cloud APIs: Amazon EC2, S3.
- * Eucalyptus supports KVM, Xen.

C W.C SN

Components:



Cloud Controller (CC) - It is the entry point into the cloud for administrators, developers, project managers, and users.

Walrus - Walrus allows users to store persistent data, organised as buckets & objects. You can use Walrus to create, delete, list buckets, etc.

- * Walrus is interface compatible with Amazon's Simple Storage Service (S3).

Cluster Controller - It generally executes a cluster front end machine.

- * Connect to nodes running NC's and to machine running CLC.

Storage Controller -

- * The storage controller provides functionality similar to Amazon Elastic Block Store (EBS).
- * The SC is capable of interfacing with various storage systems.

Node Controller -

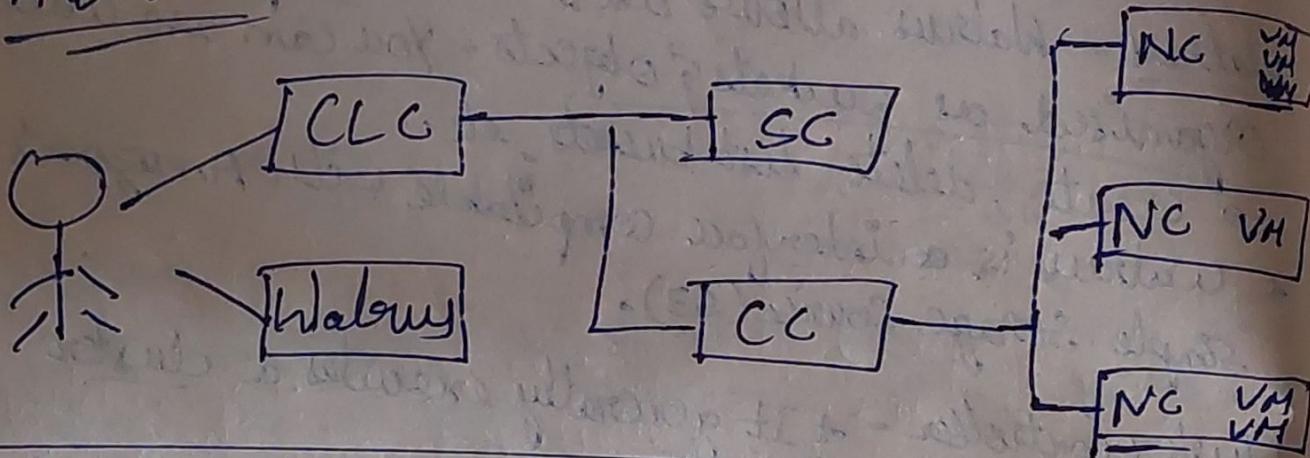
- * The Node Controller (NC) is executed on every node that is designated for hosting VM instances.
- * The Node controller is responsible for management of Node controller endpoint.

Benefits:

- = Scalable data center infrastructure - Eucalyptus clouds are highly scalable.
- * Elastic Resource Configuration - The elasticity of cloud allows users to flexibly reconfigure computing resources as requirements change.

* Eucalyptus has open source innovation. It is highly transparent and extensible.

Architecture:



KVM

* KVM stands for Kernel based Virtual Machine.

* It is a open source virtualization technology built into LINUX.

* KVM is a part of a LINUX.

* KVM turns Linux into a hypervisor; that allows host machine to run multiple VM's.

* First announced in 2006.

* KVM converts LINUX into type-1 (Bare metal) hypervisor.

* All hypervisors need some operating system level components such as I/O stack, device driver, network stack to run VM's.

* KVM has all these components because its a part of LINUX kernel.

* By implementing KVM on supported Linux distribution like Red Hat Linux expands KVM capabilities, letting us swap resources among guests, share common libraries, etc.

Features of KVM:

- 1) Security - KVM uses security-enhanced Linux (SELinux) and Secure Virtualization (S-Virt) for virtual machine security.
- 2) Storage - KVM is able to use any storage supported by LINUX.
- 3) Hardware Support - KVM can use a wide variety of certified, LINUX supported hardware platforms.
- 4) Performance & Scalability - KVM inherits the performance of LINUX.
- 5) Live Migration - KVM supports live migration.