1) Definitions

Migration : the process of moving a virtual machine from one host server to another , storage location to another , one data center to another

Hotspot: any resource exceeds a threshold (or SLA violation) for a sustain period

Downtime : Time during which the VM on the source host is suspended (not available) (less than one second)

Kernal Based Virtual Machine (KVM): it's virtualization module in the Linux kernel that allows kernel to function as a hypervisor

Migration Time : Total amount of time required to transfer a VM from source to destination node without affecting it's availability

Preparation time : resources are reserved on the destination which performed various operations

Resume Time : The instantiation(represent) of the VM on the destination with the same state as suspended source

Pages Transferred: Total amount of memory "Dirty" pages transferred

Total Migration Time : The total time taken in completion of all these

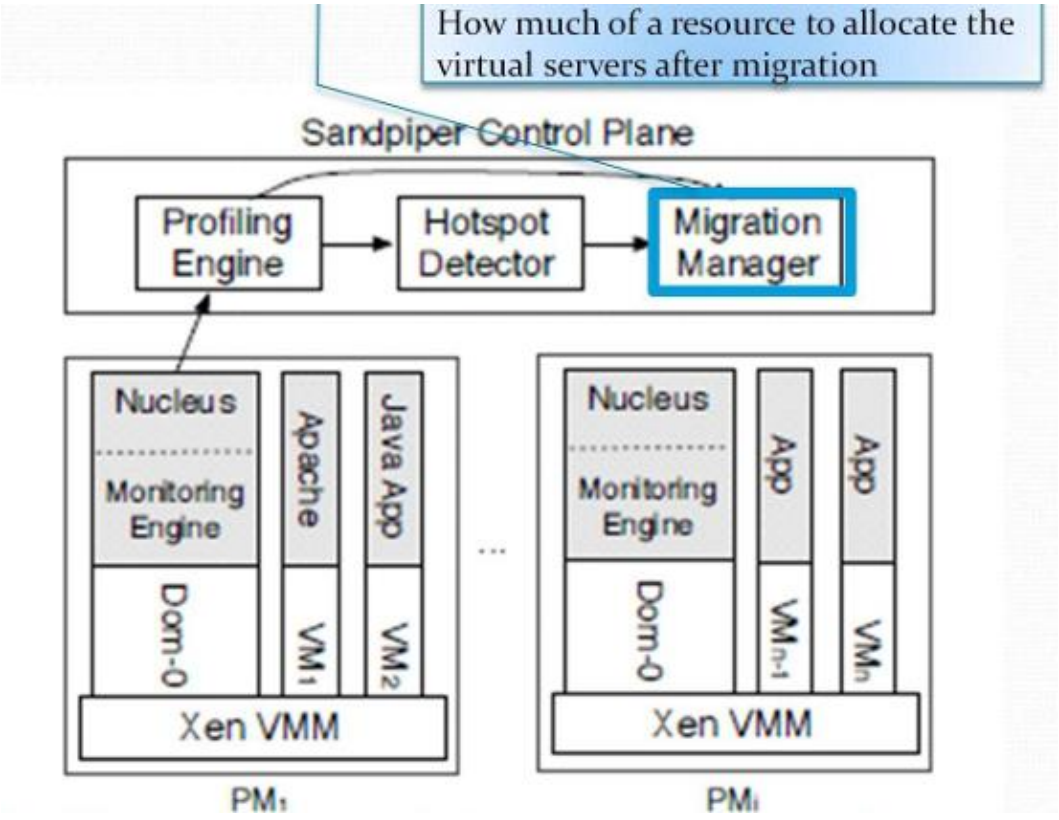
Application Degradation: when VM migrated from one host to another the application performance is degraded (decrease 7ba 7ba) which is running on that VM

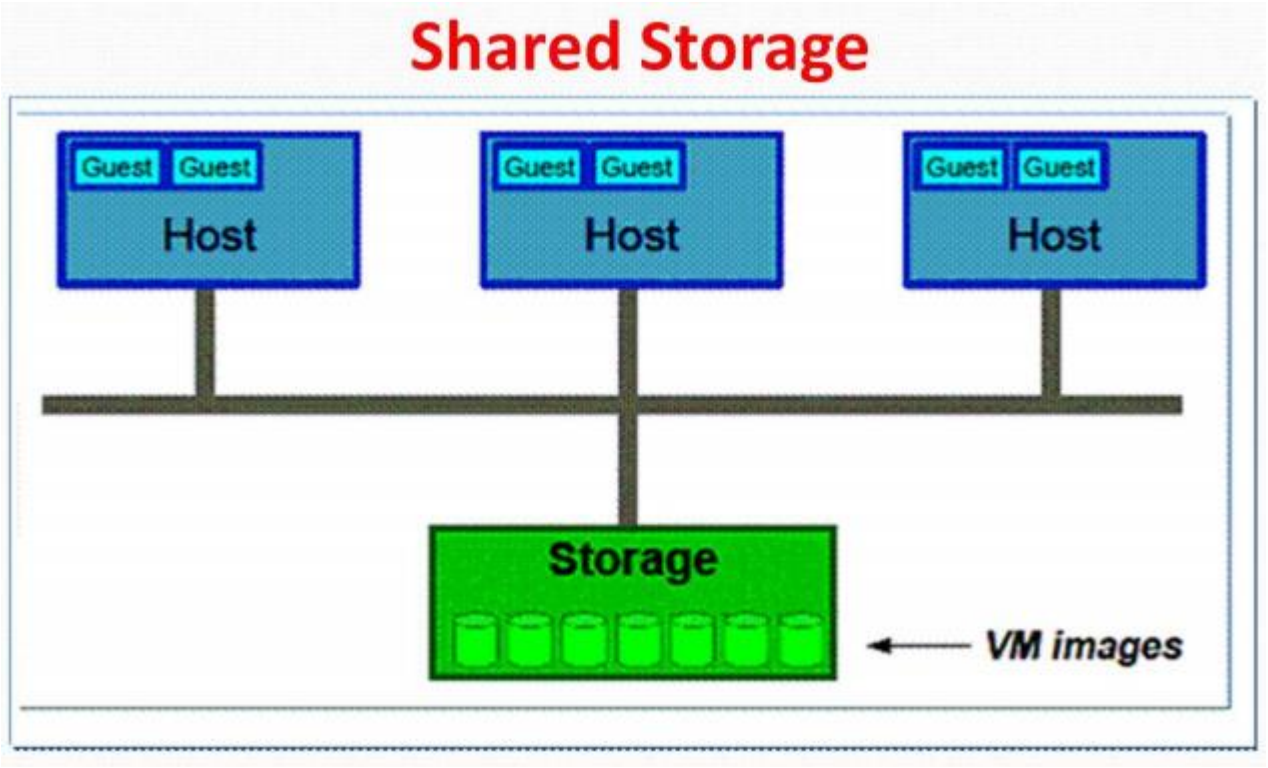
Energy Efficiency : Rearrange loads to reduce A/C needs

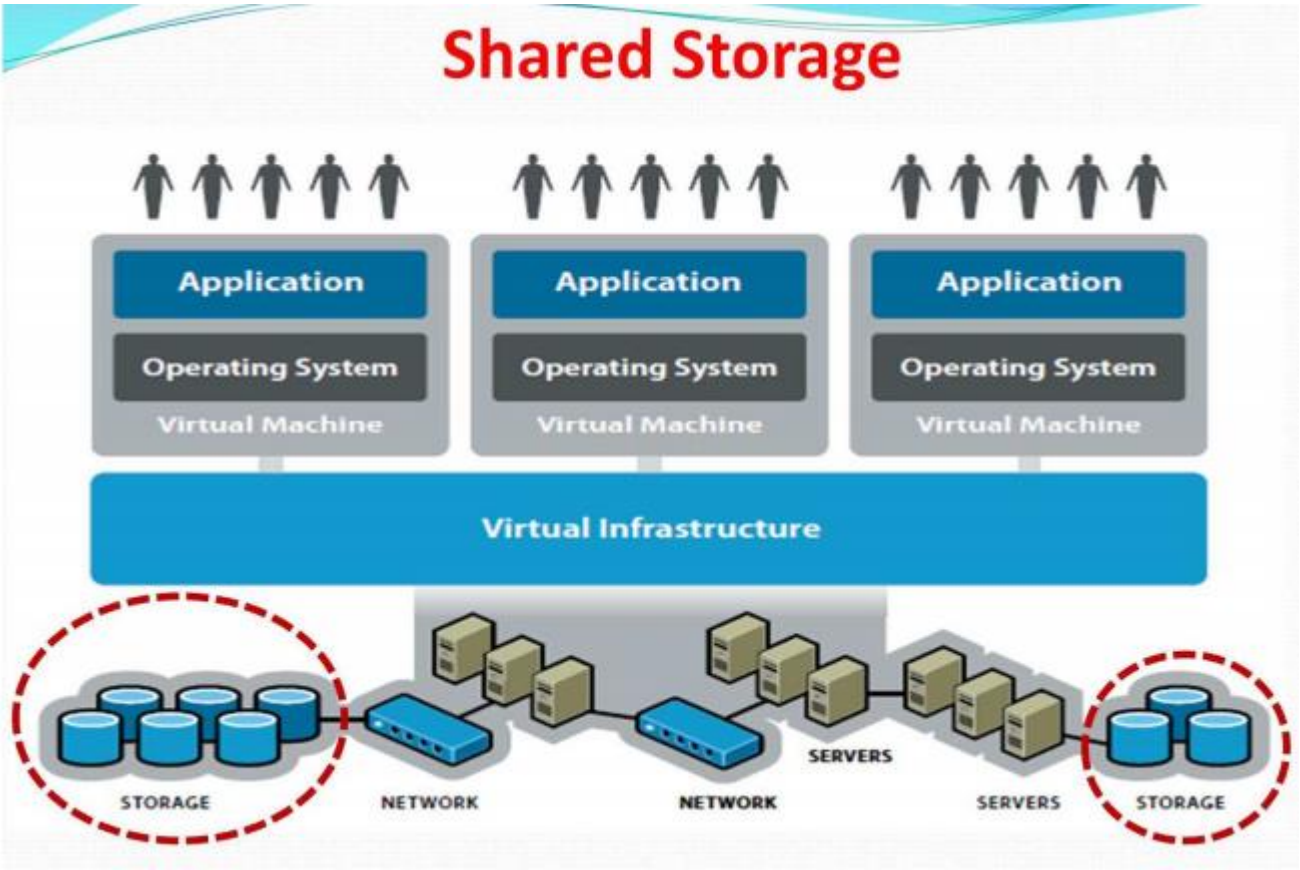
Dirty Pages: Memory pages that have been modified in the source host since last page transfer

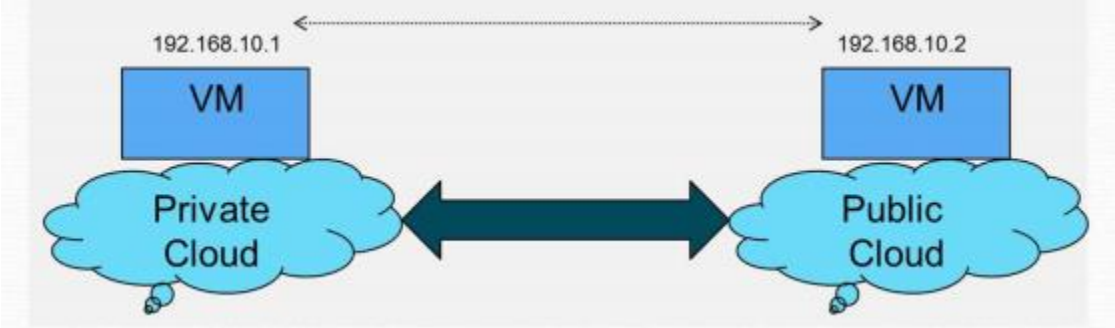
Consolidation (تخفيف احمال, بظبط نفس اللي جيه ف دماغك**):** concerns about reducing the number of active physical machine by migrating VMs into lesser number of active physical machine so that PM with no VM can be converted into sleep state to reduce energy consumption

2)Drawing



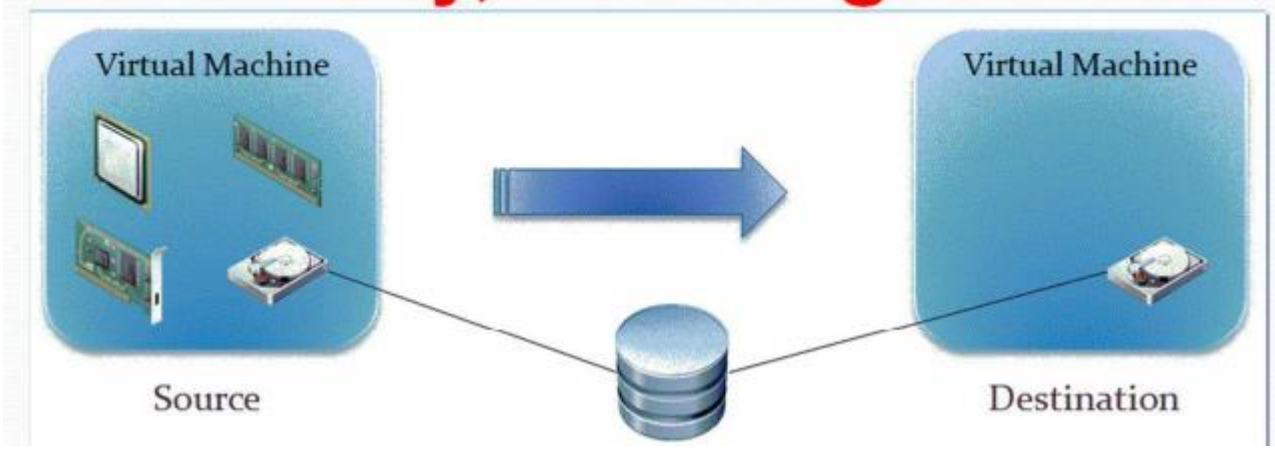

Shared Storage
Guest
Guest
Host
Guest
Guest
Host
Guest
Guest
Host
Storage
VM images


Shared Storage
Application
Operating System
Virtual Machine
Application
Operating System
Virtual Machine
Application
Operating System
Virtual Machine
Virtual Infrastructure
STORAGE
NETWORK
NETWORK
SERVERS
SERVERS
STORAGE

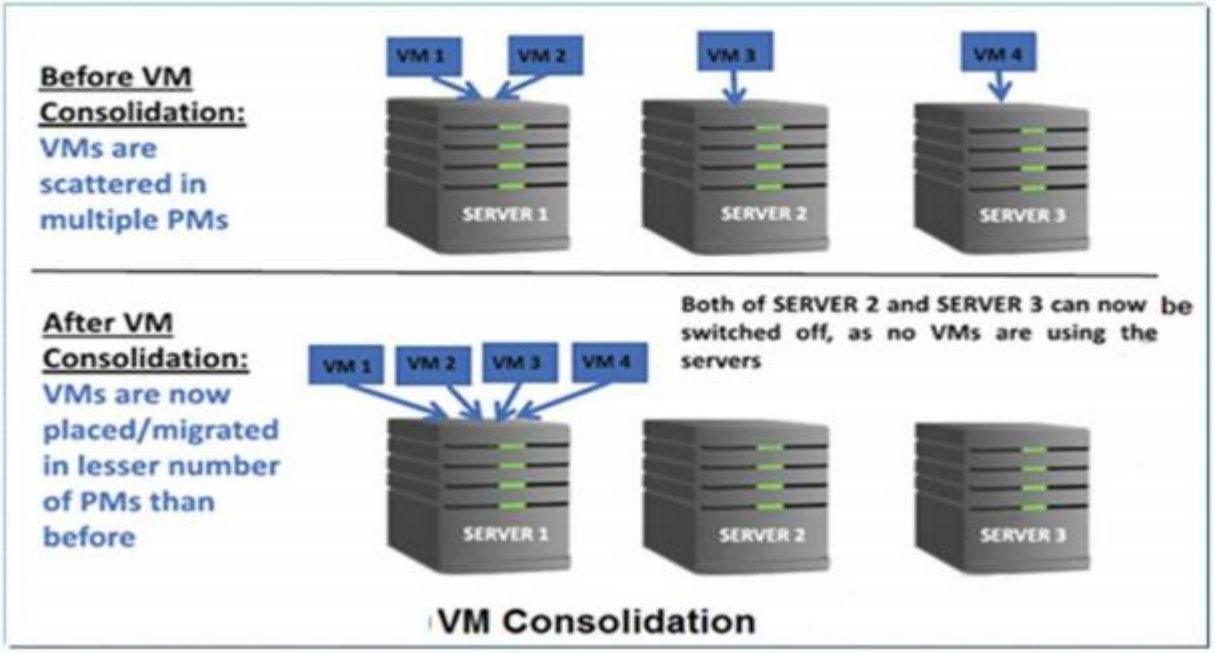

192.168.10.1
192.168.10.2
VM
VM
Private Cloud
Public Cloud

← VM brust

Generally, Live Migration



VM Consolidation- Cont....



3)Comparison

Black Box monitoring	Gray Box monitoring
Hotspot detection technique	Hotspot detection technique
Gather (CPU – processes- Network-devices- memory swap)	Gather OS level statistics an applications log

Cold (Regular) Migration	Warm (Suspended /paused) Migration	Hot (live/Real time)Migration
○ Offline Migration(Shut down) ○ VMs are not required to be on a shared storage	○ Without shutting down ○ Vm state saved in hard disk or RAM	○ Powered on ○ Requires shared memory

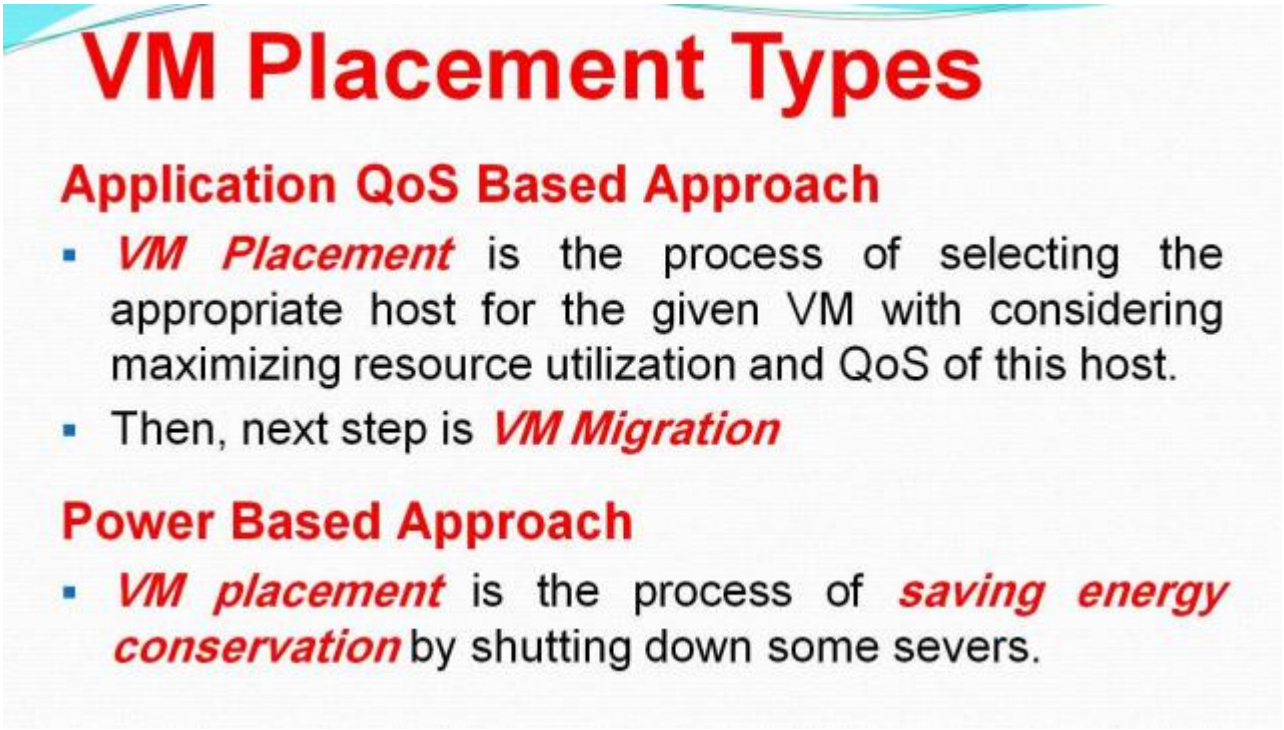
Pre-Copy	Post Copy
○ Memory Transfer Approach ○ Has 2 techniques (Warm Up- Stop& Copy) ○ All updating are available at destination host ○ It can be activated any time ○ (here we copy memory then migrate)	○ Memory Transfer Approach ○ Suspend migration of VM at source side ○ (here migrate then we copy memory)

Warm Up technique	Stop& Copy technique
1. Transferring memory pages to the destination host over a number of iterations *without stopping the execution of the VM in the source*. 2. Then, VM is transferred to the destination 3. *Dirty Pages* must sent again to the destination host. *The Dirty Pages*, ❖ Memory pages that have been modified in the source host since last page transfer. ❖ If the rate of updating of pages is very high, migration time will rise to a very high value.	1. Transferring memory pages to the destination host over a number of iterations *without stopping the execution of the VM in source*. 2. The VM will suspend in source and the remaining *dirty pages* will be copied to the destination, 3. Then, VM will be resumed in destination.

Regular/Cold	Live
Host is powered off	Hosts are powered on
The virtual machines are not required to be on a shared storage.	Needs a shared storage for virtual machines in the server's pool
Not apply CPU compatibility checks	Apply certain CPU compatibility checks between hosts
Simple Process	Less Simple Process

Static Consolidation	**Dynamic Consolidation**
New VM is placed to PM for processing and no migration take place	VMs are migrated from one PM to another whenever a necessity occurs

4)IMP SLIDES



VM Migration

Similarity and Difference between VM Migration for improve performance and M Migration for Consolidation

- ***VM Migration*** is carried out after the ***initial VM placement*** in order to reduce the number of running physical machines by ***migration of few VMs*** and ***consolidate them into reduced number of PMs***
- Four steps are involved in the VM machine migration process
  1. Select the PM which is under loaded
  2. Select one or more VMs from under loaded server
  3. Select the appropriate destination PM where selected VMs can be placed, and
  4. Transfer/ migrate the VMs to destination PM
- Selecting the suitable host is one of the challenging task in the migration process, because wrong selection of host can ***increase number of migration***, ***resource wastage*** and ***energy consumption***