VIRTUALIZATION ESSENTIALS

yazan alshareef

Chapter 1: Understanding virtualization.

virtualization in computing:

Abstracting a physical resource into a logical (virtual) one to use it more efficiently.

The focus here is **computer virtualization**, which means:

Running multiple virtual computers on a single physical machine.

Each virtual computer behaves as if it is a real, independent system.

A **Virtual Machine (VM)** is: complete virtual computer, Includes:

1.Virtual CPU 2. Virtual memory 3. Virtual storage 4. Virtual network

It runs an operating system just like a physical computer.

Virtual Machines

App | App | App
Os | Os | Os
Virtual Machine Monitor or Hypervisor
Physical server

- VMM needs to exhibit three properties in order to correctly satisfy their definition: الشروط الأساسية لنظام المحاكي

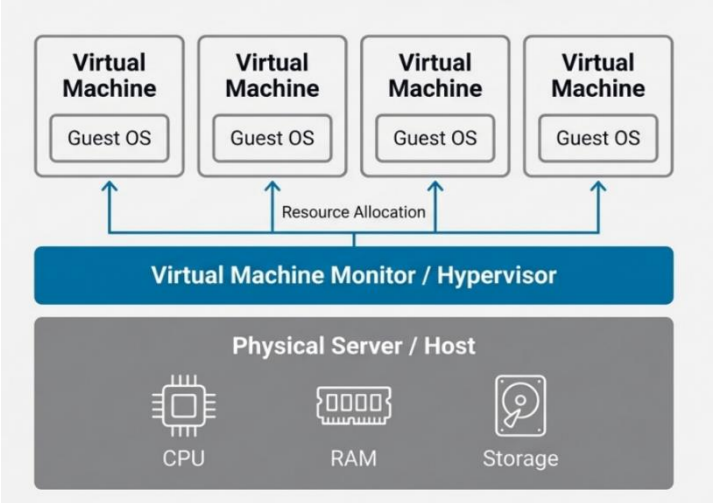
1.Fidelity: The environment it creates for the VM is essentially identical to the original (hardware) physical machine.

2. Isolation or Safety The VMM must have complete control of the system resources.

3.Performance: There should be little or no difference in performance between the VM and a physical equivalent.

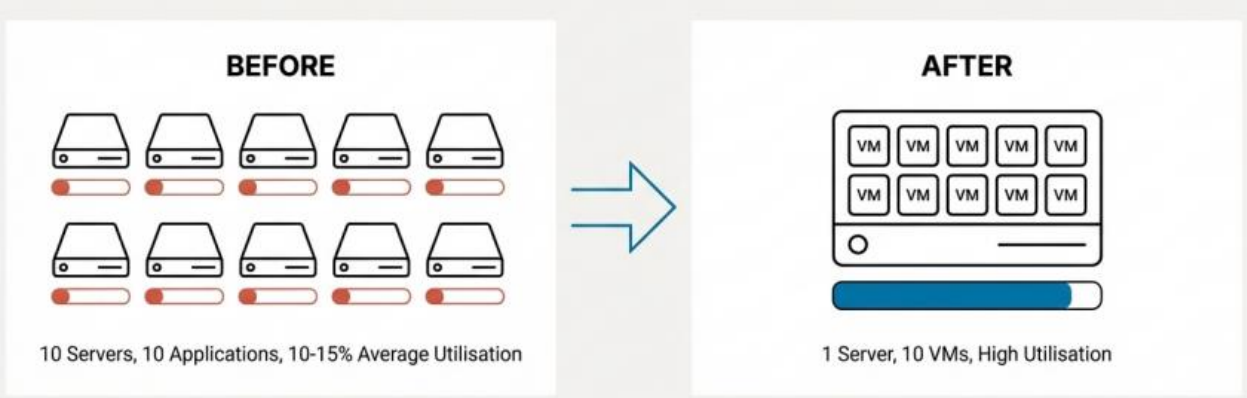
How it works: the Hypervisor

Virtual Machine Monitor (VMM), now commonly called a **hypervisor**, is a layer of software that creates run virtual machines. It is installed directly onto the "bare metal" hardware, abstracting the physical resources and presenting them to multiple VMs.



The Primary Impact: Radical Server Consolidation

Virtualization allows many operating system workloads to run on the same server hardware at the same time, condensing multiple physical servers into a few highly utilized ones.



Consolidation Ratio: The number of VMs running on a single physical host. A modest ratio of 4:1 can remove 75% of the servers in a data center. Today, ratios of 99:1 is possible.

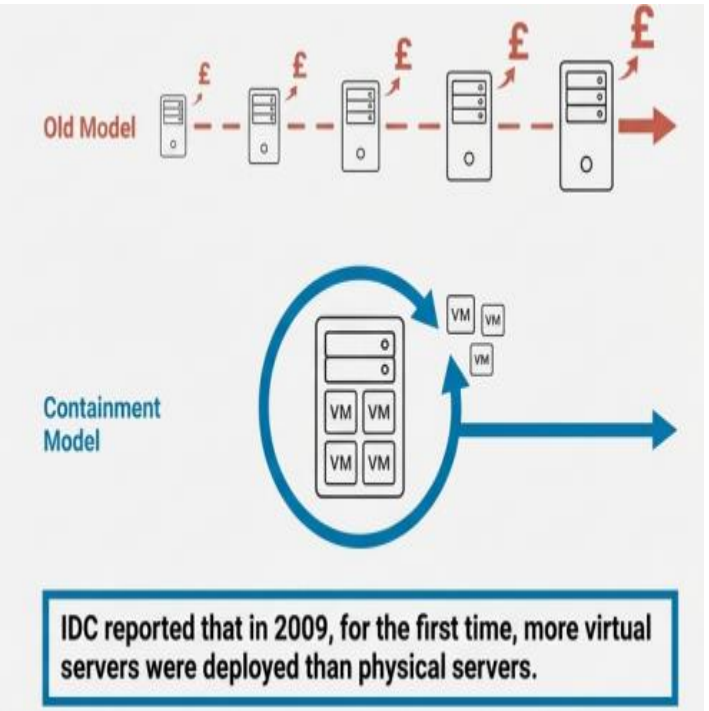
Beyond Consolidation: The Strategy of Containment

1. Problem Moore's Law previously worked *against* the data center model, forcing the purchase of oversized hardware.

2. The Shift With virtualization, Moore's Law now works *for* you. As physical servers become more powerful, they can host even more VMs, increasing consolidation ratios.

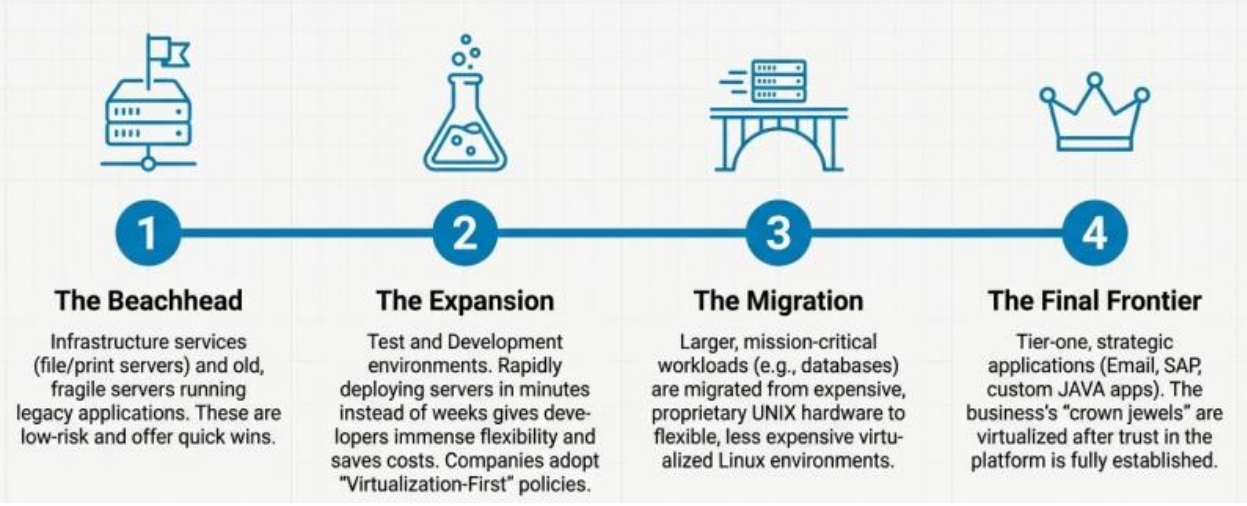
3. Containment Defined Instead of buying new physical servers for new projects or when leases expire, new workloads are deployed as VMs on the existing virtual infrastructure.

4. Impact Companies stop the endless cycle of hardware refreshes, permanently removing future costs for hardware, power, and cooling from the budget.



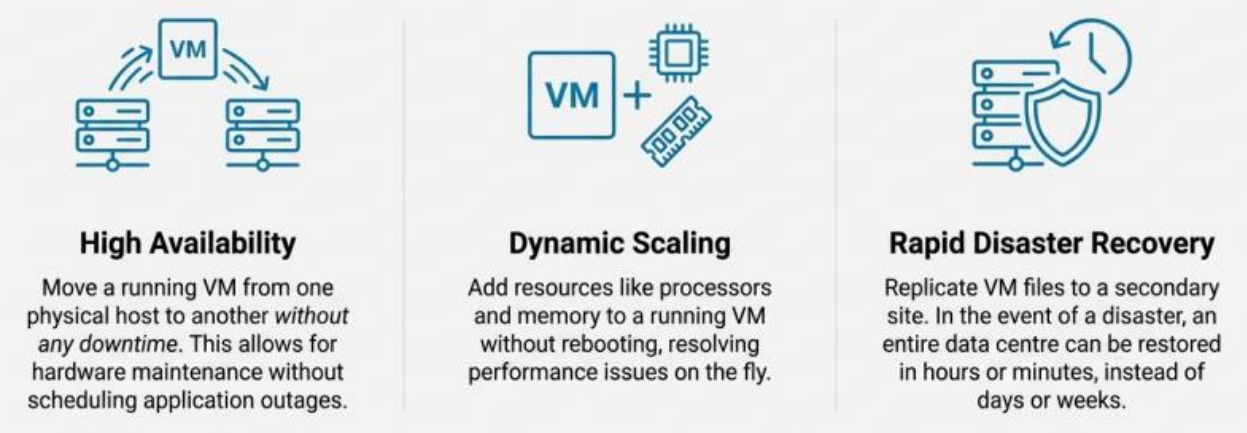
Virtualization's Path Through the Enterprise

Adoption follows a predictable course, building confidence and expertise at each stage.



More Than Cost Savings: A Platform for Agility and Resilience

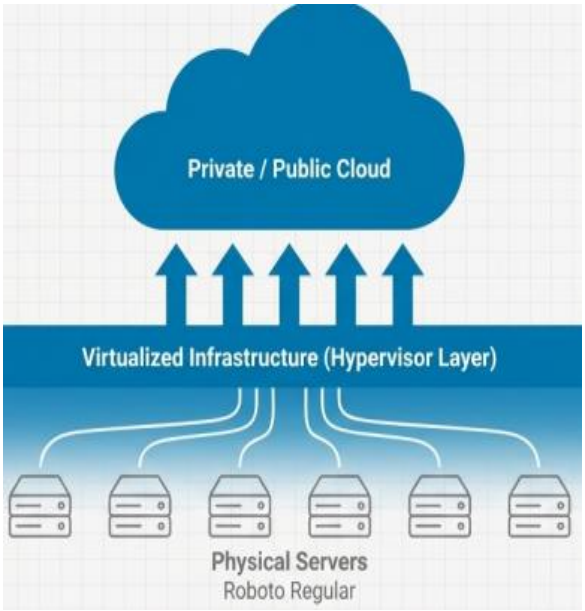
because VMs are just a set of files, they can be managed and manipulated in ways physical servers never could.



- **The Enduring Legacy: The Engine of the Cloud Subtitle:** Virtualization provides the fundamental abstraction layer that drives cloud computing

The Connection:

- Virtualization transforms the hands-on, people-intensive data center into a self-managing, highly scalable pool of resources.
- By abstracting the physical layer, it creates the concept of a "virtual data center".
- Cloud computing delivers resources from this virtual data center on an as-needed basis, like a utility.



The Transformation:

- System administrators shift from spending 70% of their time on routine functions to focusing on innovation.

Footer Quote: Virtualization was not just a solution to a crisis; it was the foundation for the next era of computing.