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Supercomputing
Center**
Centro Nacional de Supercomputación



**UNIVERSITAT POLITÈCNICA
DE CATALUNYA
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AI and Predictive Analytics in Data-Center Environments

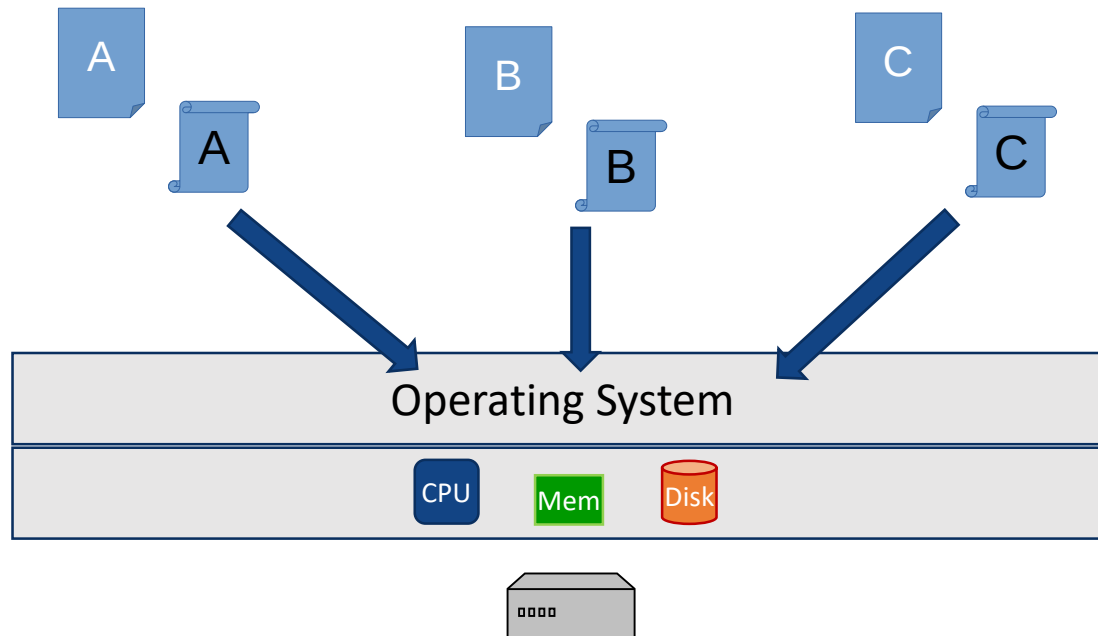
Virtualization & Containers

Introduction

“Independent experiments better be isolated
...in part because we are not alone in the system
...also to have reproducible environments”

Introduction

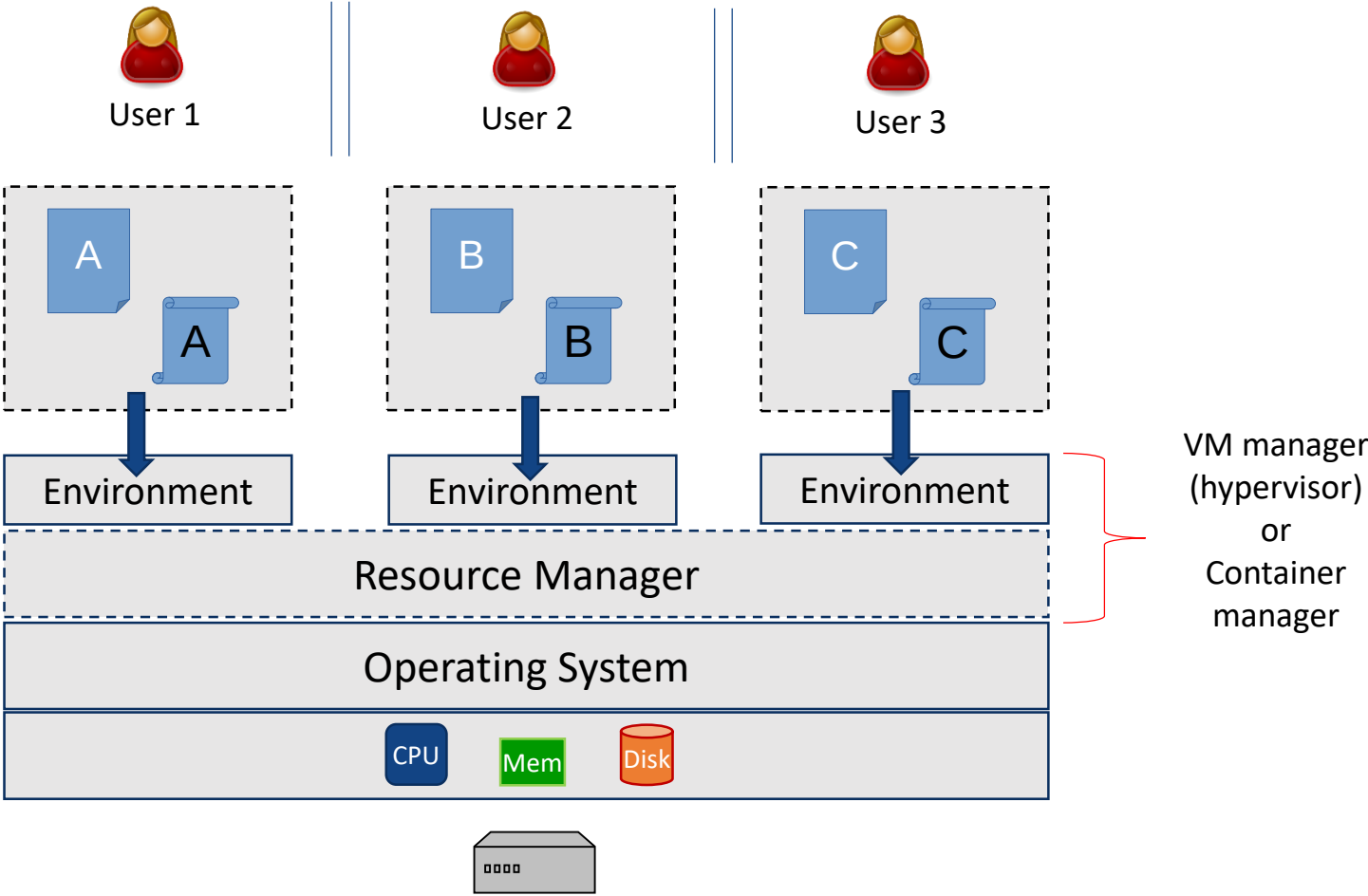
- Isolation/Capsule of experiments



- Prevent our executions to be bothered by other executions, users, configurations

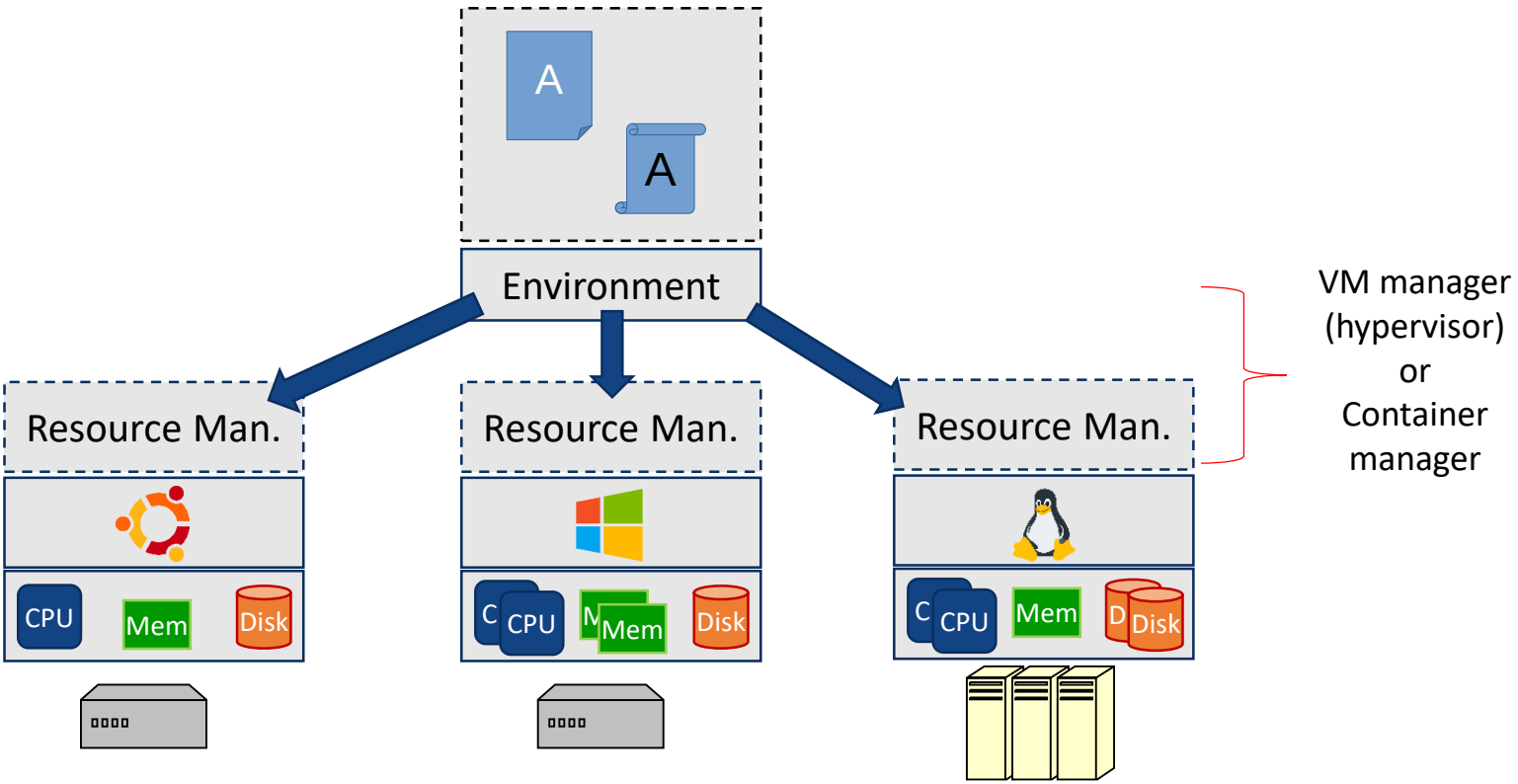
Introduction

- Isolation/Capsule of experiments



Introduction

- Isolation/Capsule of experiments



- To deploy our executions, independently of the underlying infrastructure/platform

Introduction

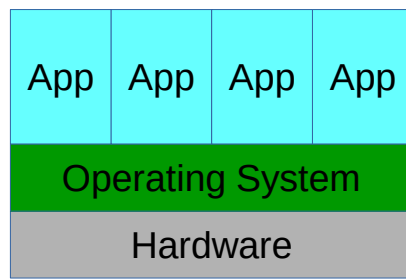
- Different ways
 - Virtual Machines: ~ partial or total emulation of a “real machine” as a running process
 - Containers: ~ separated environments (capsules, “pods”, ...) that share the “base system”

Virtual Machines

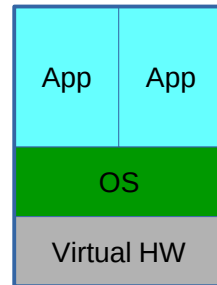
~ partial or total emulation of a “real machine” as a running process

Virtualization

- A “machine” inside your machine



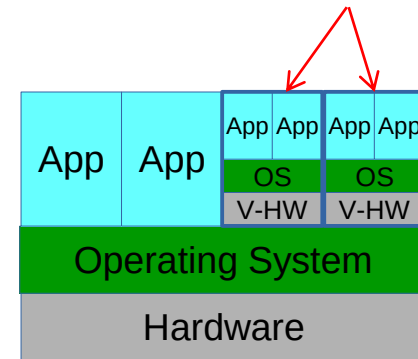
Physical Machine



Virtual Machine

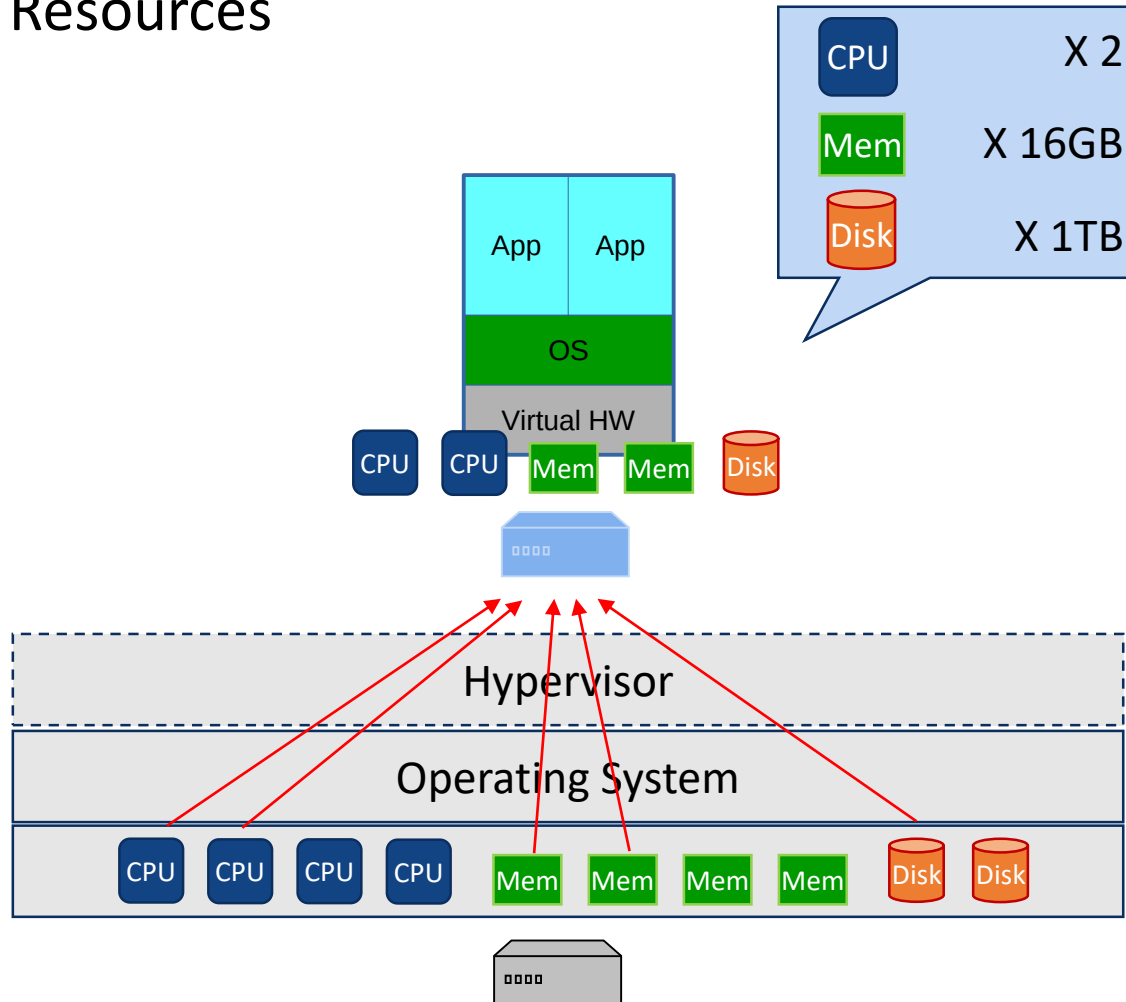


Apps & OS think they are running in a “real” machine



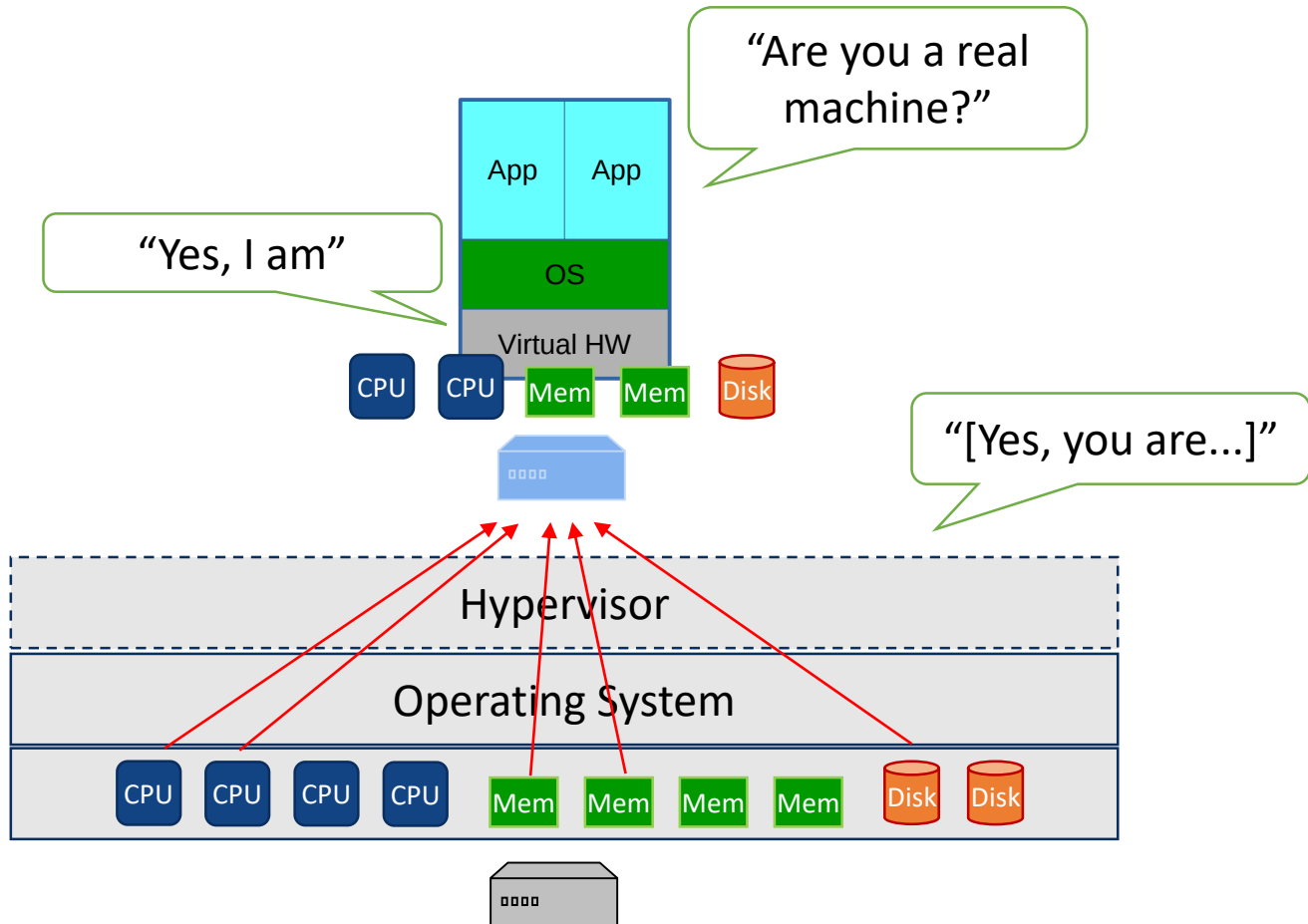
Virtual Machines

- Tailoring Resources



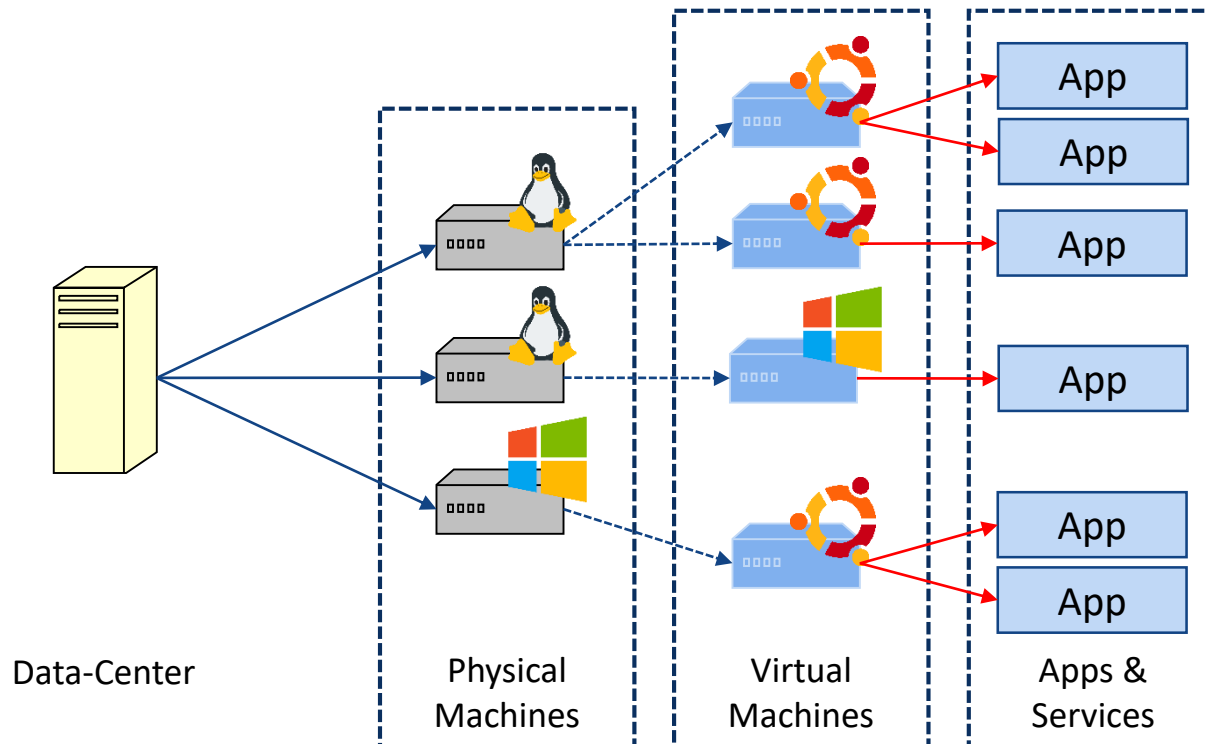
Virtual Machines

- Tailoring Resources



Virtualization in Resource Providers

- Resource providers DO NOT give physical resources, but VMs!

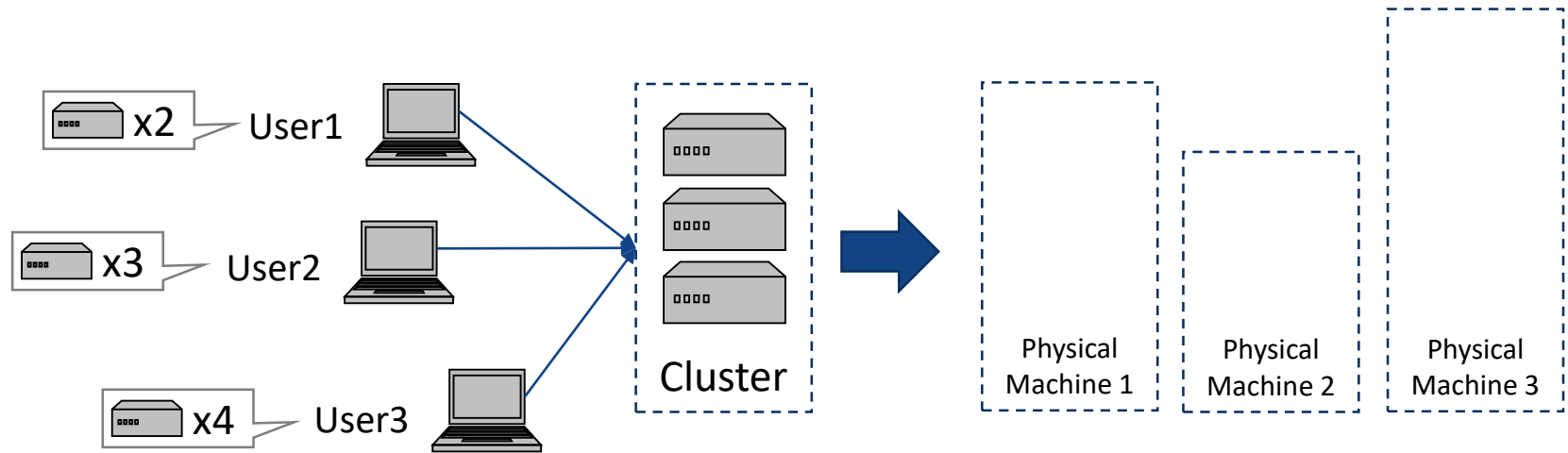


Resource Providers

An Example

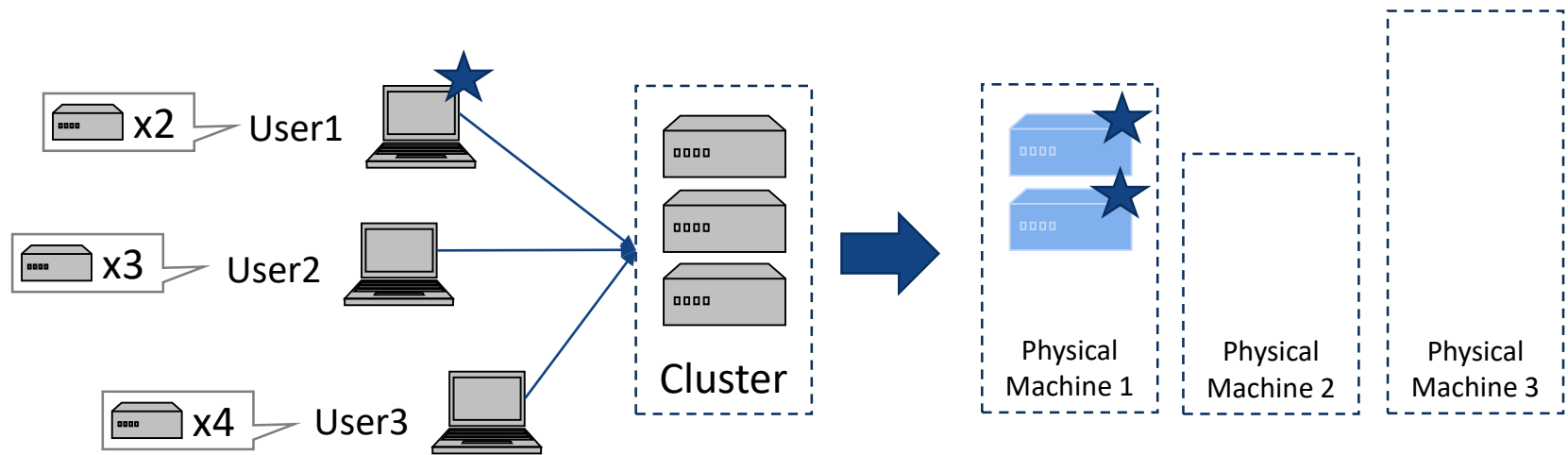
Our framework, Virtualized

- Deploy VMs in our local machine, in our cluster, or in the Cloud



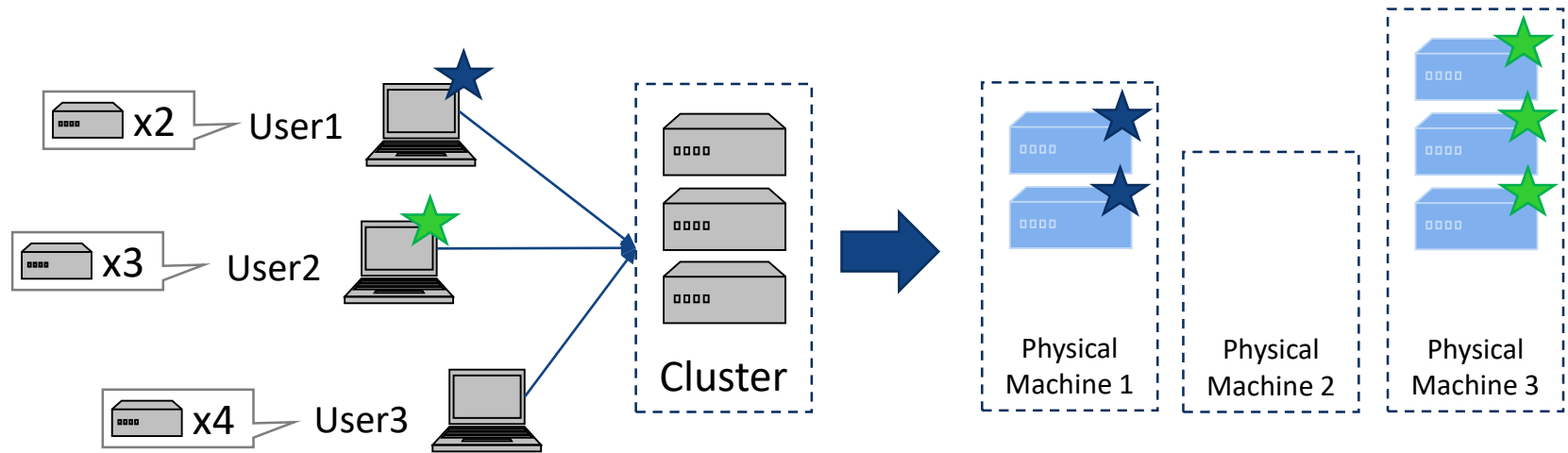
Our framework, Virtualized

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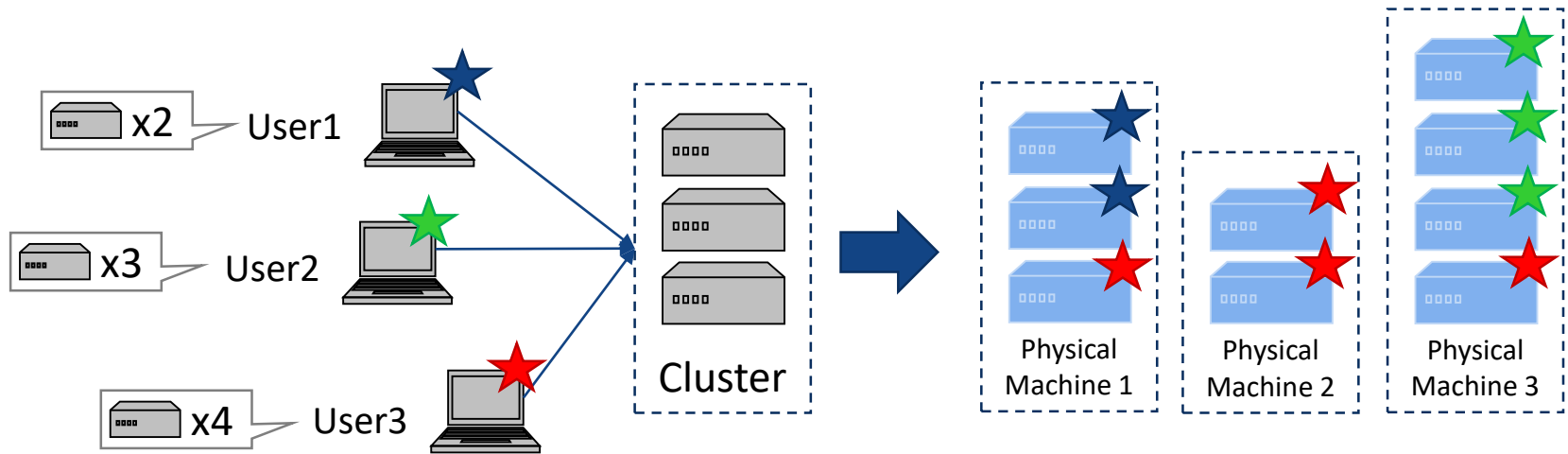
Our framework, Virtualized

- Deploy VMs in our local machine, in our cluster, or in the Cloud



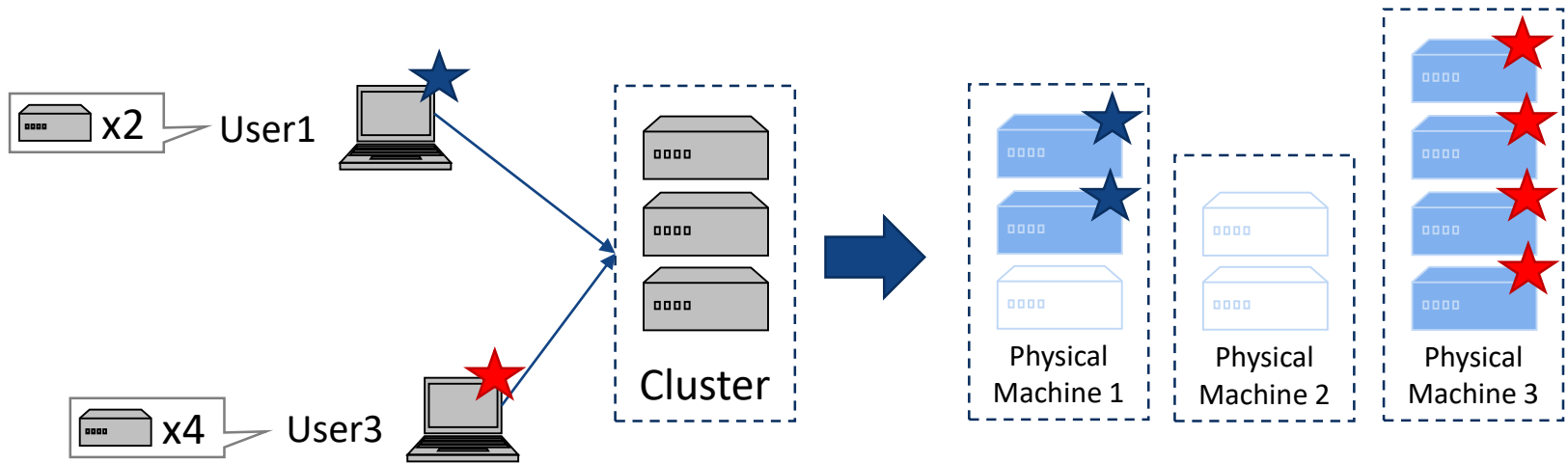
Our framework, Virtualized

- Deploy VMs in our local machine, in our cluster, or in the Cloud
 - We can deploy any number of copies of the VM where available
 - We can have VMs from different users running together but isolated



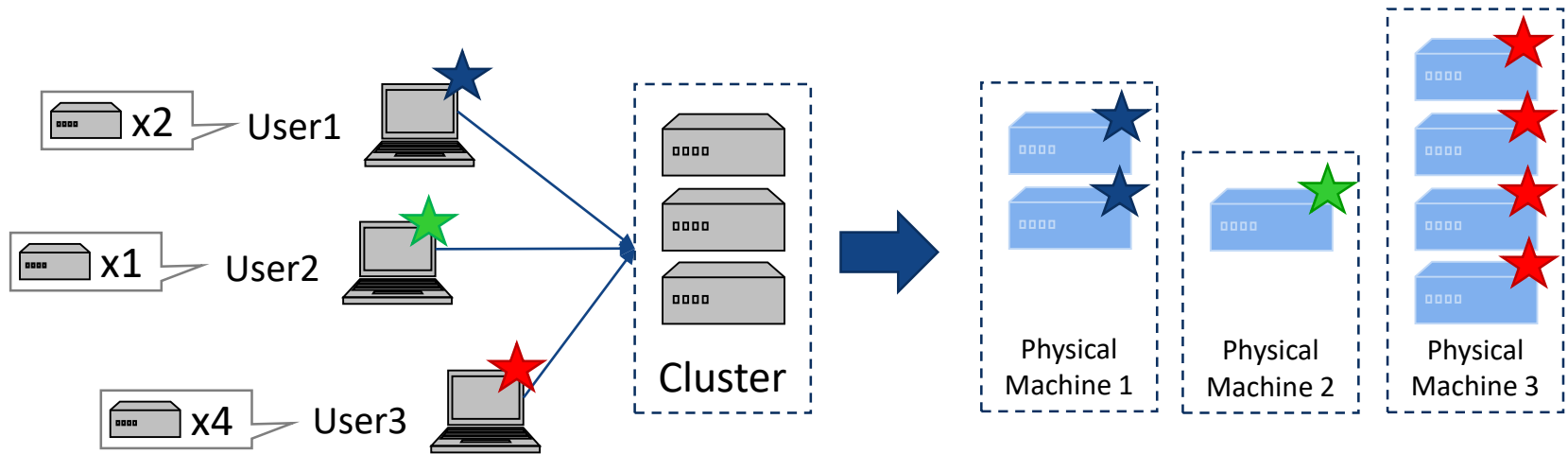
Our framework, Virtualized

- Deploy VMs in our local machine, in our cluster, or in the Cloud
 - We can move or copy the VM to another machine



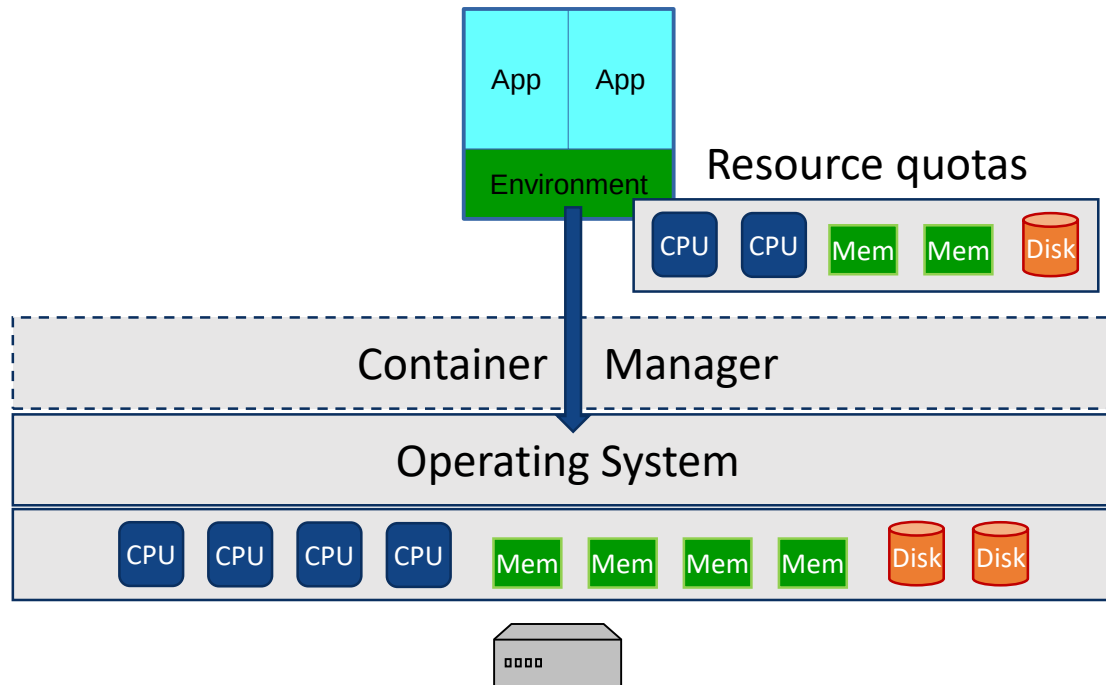
Our framework, Virtualized

- Deploy VMs in our local machine, in our cluster, or in the Cloud
 - We can save the state of the VM, and resume later



Containers

- Virtualization of the “user level”
- Lightweight version of Vms
 - Part of the OS is shared
 - Own environment and specific software and libraries
 - Apps only see their environment



Summary

- Virtualization/Containers allow to
 - Execute applications and services in an “independent” environment
 - Deploy executions (almost) independent of the base system
 - Deploy copies of applications along physical machines
 - Migrate executions across machines
- Cloud providers:
 - Provide users Virtualization/Containers
 - Allow management of physical resources