

Linux Administration

Installing and hosting a Linux system

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Choosing a Linux distribution

- Multiple factors should be considered when choosing a Linux distribution:
 - hardware compatibility
 - available packages and software compatibility
 - technical support
 - cost
 - management, team and personal preferences
- You may need to change your choice later on, and migrate all your systems.

Installation overview

- Most Linux distributions will provide a wizard to help you during the installation process.
- Some steps may be simplified for you, others may not be available.
- Test multiple times to be comfortable with your choices; check the documentation.

Installation process

- Download and validate the ISO image for the distribution.
- Setup the computer to boot from the ISO image.
- Follow the installer process; validate all information used for the configuration (usernames/passwords, network configuration, ...).
- Reboot and complete any post-install configuration.

Creating a template

- Except in rare circumstances, you will need to deploy the same system to multiple machines.
- Create a base template (aka “Gold Image”) either with a minimum base or as close as possible from the final product, depending how homogeneous your deployment is.
- Use scripts and deployment and configuration tools to configure each system individually.

Choosing a platform

Multiple options are available to deploy new systems:

- physical hardware (aka “bare metal”)
- virtual machine
- cloud hosted machine
- container

Physical hardware

- Expensive.
- Require hardware maintenance and support contracts.
- Can be hosted on premises, or in a data center (colocation).
- Less and less common.

Application

Application

Application

Operating System

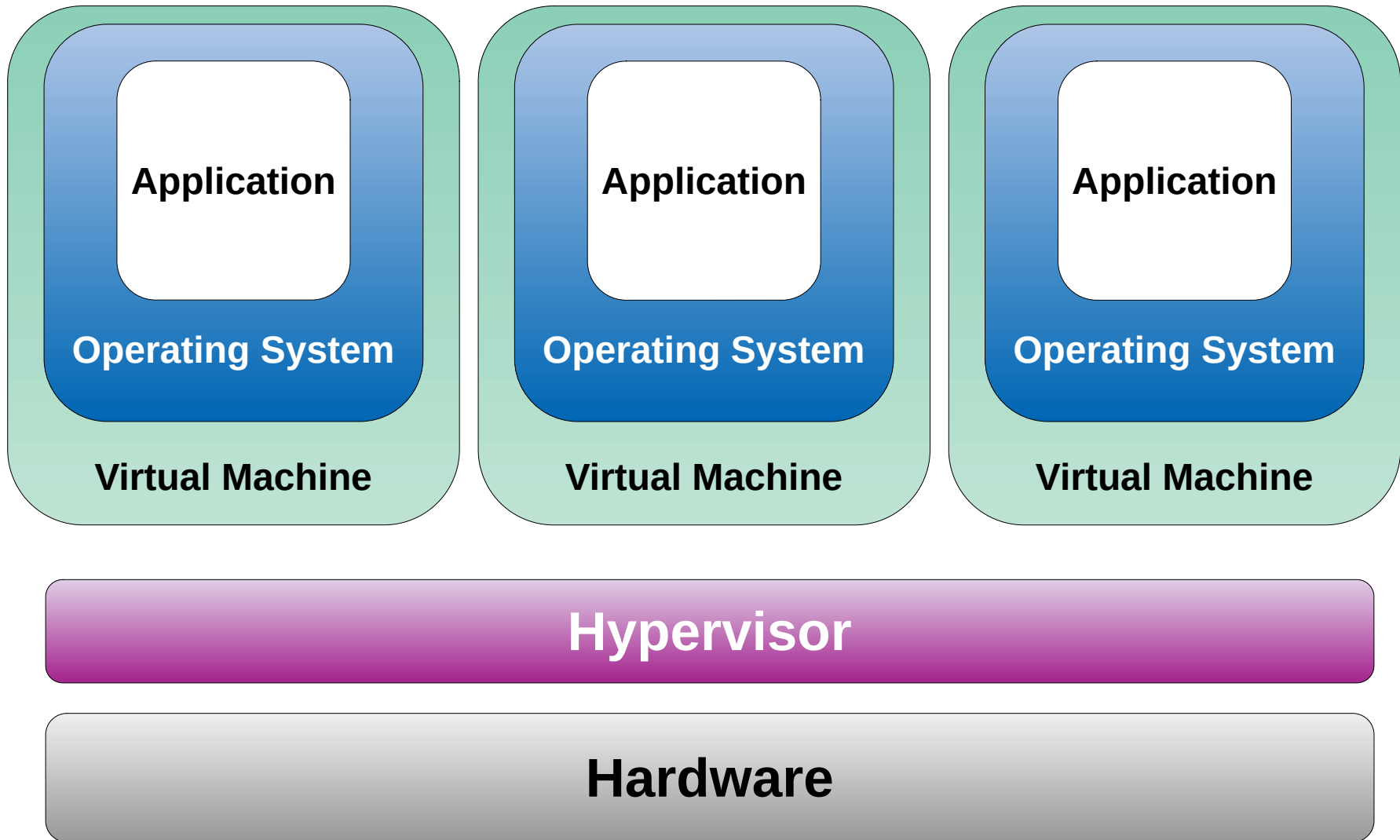
Hardware

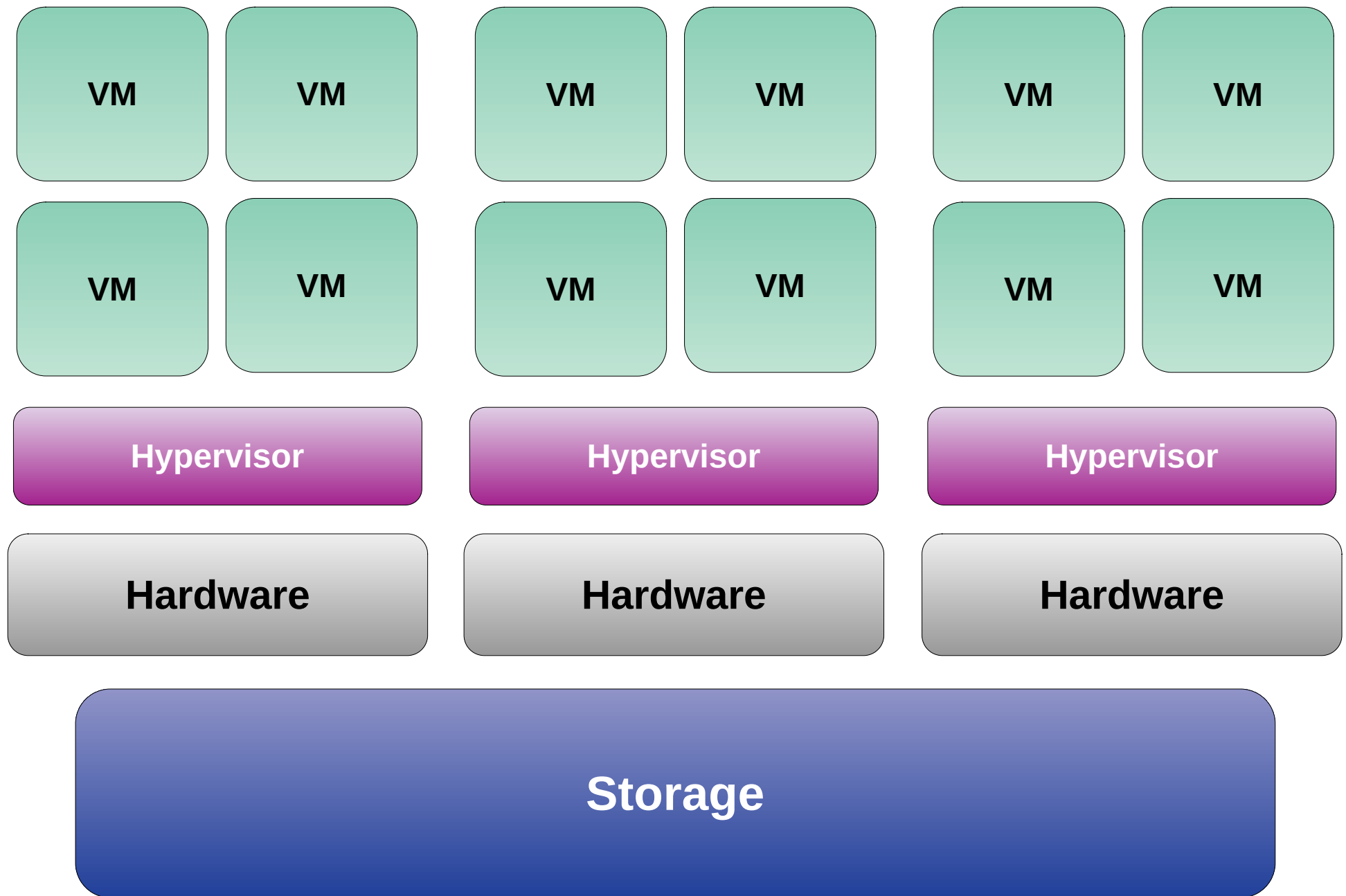
Virtual machine

- Probably the most common solution as of today.
- Can be used as a simple “standalone” system or as a complex, redundant hosting architecture.
- Provides special additional features: snapshots, migration, fail-over.
- A physical server can be converted to a virtual machine.
- A virtual machine can be cloned to create similar systems.
- Vendors: VMware vCenter/ESXi, Microsoft Hyper-V, Xen Project/Citrix Hypervisor, XCP-ng, Proxmox, OpenStack.

Hypervisors

- An hypervisor is the the application that controls and runs virtual machines.
- Two types are available:
 - Type I: running directly on hardware
 - Type II: running on top of a regular operating system
- Hypervisors are responsible for keeping each guest VM isolated (performance, security).





Cloud hosted machine

- A cloud machine is a virtual machine running on hardware that you don't manage.
- Multiple solutions are available, and can be combined.
- Hourly, monthly or yearly billing cycle.
- Major vendors:
 - Amazon Web Services (AWS)
 - Google Cloud Platform (GCP)
 - Microsoft Azure
 - Oracle Cloud Infrastructure (OCI)

Cloud shared responsibilities

Depending on the vendor that you are working with, you must pay attention on who is responsible for:

- System upgrades and patching
- Network access and security
- Application upgrades
- Data security and backups
- User access and permissions (identity management)
- Monitoring and logging

Container

- Used mostly for a specific, limited tasks (micro-services).
- Containers are often used in numbers.
- Disposable.
- Vendors: Docker/Kubernetes, Podman, Singularity



The diagram illustrates a container architecture stack. It consists of three layers: a top layer with three yellow rounded rectangles labeled 'Container', a middle layer with a single blue rounded rectangle labeled 'Operating System', and a bottom layer with a single gray rounded rectangle labeled 'Hardware'. The layers are stacked vertically, with the containers sitting on the operating system, which in turn sits on the hardware.

Container

Container

Container

Operating System

Hardware

Managing hardware

- Multiple commands are available to check on the hardware components detected by the system:
 - lspci - listing PCI devices
 - lsusb - listing USB devices
 - lsblk - listing block (disk) devices
 - lshw - list hardware
 - dmidecode - collect hardware information from the BIOS
- Other pieces of information could be recorded in the kernel log.