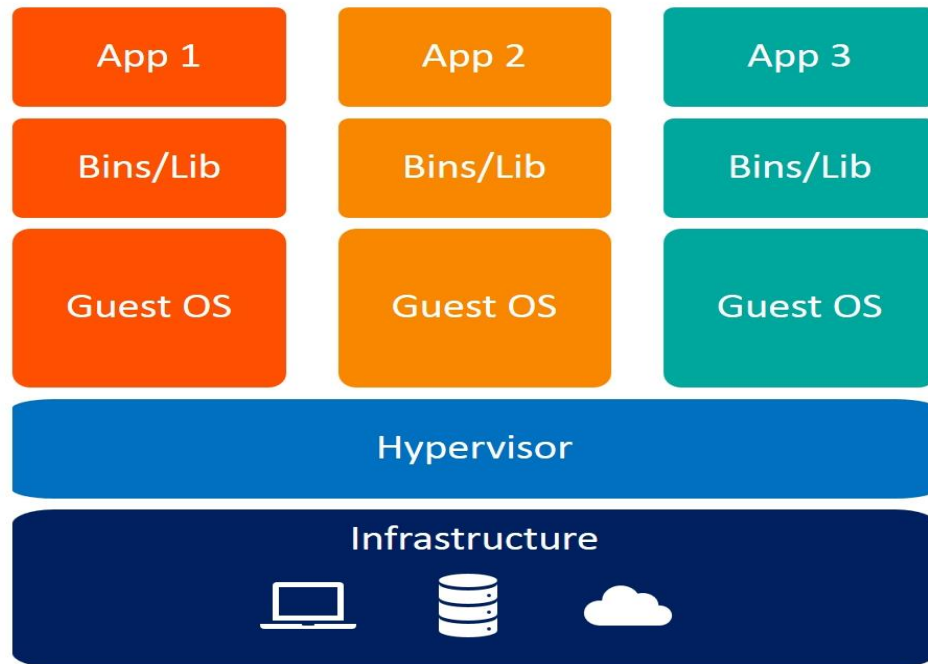# the NeRd Talks

Vagrant – Development Environemnt Made Easy

Relatore: Sergio Borghese

What's a Virtual Machine?

- A Virtual Machine (VM) is

- *a computer system created using software on one physical computer in order to emulate the functionality of another separate physical computer.*

  - Definitions from Oxford Languages

Tell me more...

Virtual Machines

- The **Hypervisor (HV)** is the SW layer emulating the HW that will host the **Guest Operating System** (the VM?!?)

- **Full Virtualization** the HV emulates the HW interfaces

- **Paravirtualization** is a virtualization technique that presents a software interface to the virtual machines which is **similar, yet not identical** to the underlying hardware–software interface.

  - Guest OS need to know it is running on top of an hypervisor

  - Paravirtualized VM are typically more efficient

- Virtualization has been invented by IBM in the **late '60s**

Key Properties of VMs
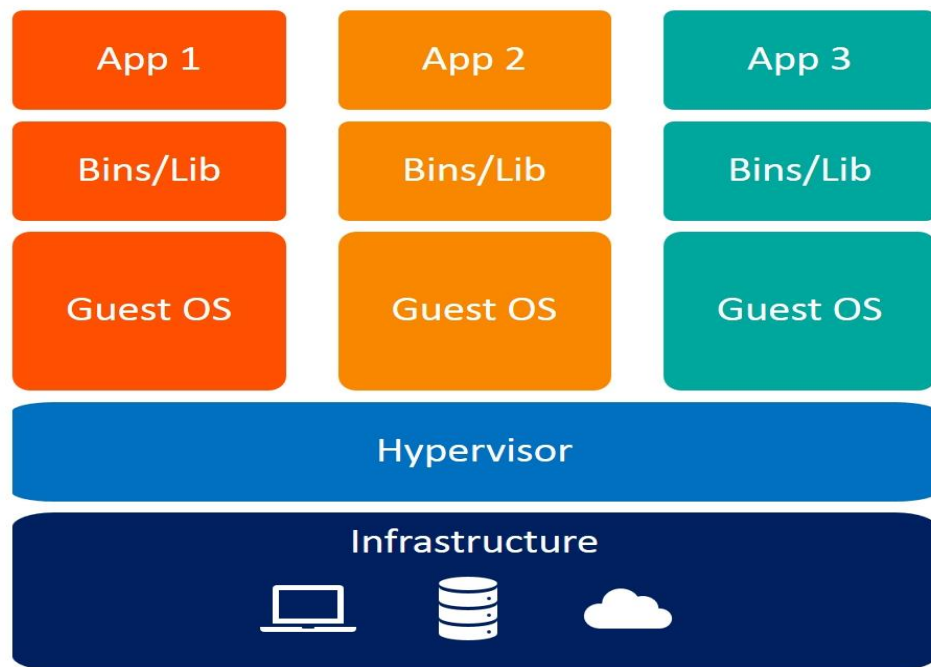
Virtual Machines

- Partitioning
  - Multiple OS on the same physical machine

- Isolation
  - Fault and security isolation
  - i.e. if the kernel crashes... you just reboot the VM!

- Encapsulation
  - Save VM state to disk

- Hardware Independence
  - Migrate a VM across different HW

Enters Vagrant

- **Development Environments Made Easy**

- command line utility for managing the lifecycle of virtual machines.

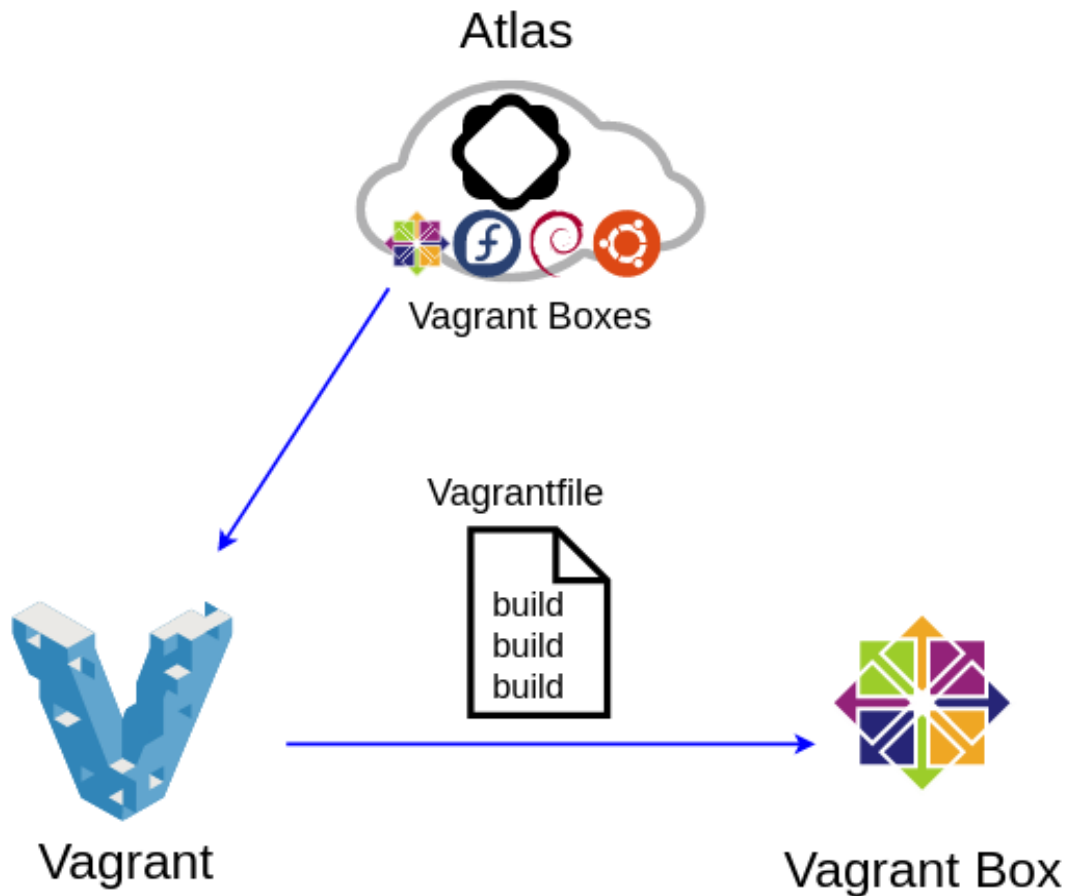- Manage **VMs as Code**

Vagrant in Action

- HowTo create a VM with Vagrant:

  $ mkdir vagrant-test

  $ cd vagrant-test

  $ vagrant init

  $ vim Vagrantfile

  $ vagrant up

  $ vagrant ssh

- Enjoy your brand new VM!

Vagrant Key Concepts

Atlas

Vagrant Boxes

Vagrantfile

build
build
build

Vagrant

Vagrant Box

- **Provider** is the virtualization backend used by Vagrant to manage a VM
  - Virtualbox, VMWare, Hyper-V, Docker, ...

- **VM Provisioning** is the backed used to configure the VM when it is created for the first time
  - shell, ansible, chef, puppet, podman, ...

- **Box** is the VM image + Vagrant metadata

- **Vagrant Hub** is the Vagrant Boxes repo

Vagrant Box Networking

```
+-----------------------------------+
| manager : eth1 - 192.168.22.100 |
+-------------+---------------------+
              ^
              |        +------------------------------------+
              |        +------------------------------------+
              +------->| bot23 : enp0s8 - 192.168.22.23 |
              |        +------------------------------------+
              |
              |        +------------------------------------+
              |        +------------------------------------+
              +------->| bot26 : enp0s8 - 192.168.22.26 |
              |        +------------------------------------+
              |
              |        +------------------------------------+
              |        +------------------------------------+
              +------->| bot30 : enp0s8 - 192.168.22.30 |
                       +------------------------------------+
```

- **Port Forward**
  - allows to map tcp/udp ports between host and guest VM

- **Private network**
  - allow you to access your guest machine by some address that is not publicly accessible from the global internet.
  - Multiple machines within the same private network can communicate with each other

- **Public network**
  - *Are less private than private networks*
  - the exact meaning actually varies from provider to provider,

Vagrant @ Atena & TCoE

```
+-------------------------------+
| manager : eth1 - 192.168.22.100 |
+-------------------------------+
        ^
        |
        |        +-----------------------------------+
        +----->| bot23 : enp0s8 - 192.168.22.23 |
        |        +-----------------------------------+
        |
        |
        |        +-----------------------------------+
        +----->| bot26 : enp0s8 - 192.168.22.26 |
        |        +-----------------------------------+
        |
        |
        |        +-----------------------------------+
        +----->| bot30 : enp0s8 - 192.168.22.30 |
                 +-----------------------------------+
```

- **Development Environment**
  - Easily set-up the ubuntu 1604-64b dev machine on top of the actual O.S. (i.e. ubuntu 20.04-64b, Win10)

- **Dev/Test Environment**
  - set-up multi-machine env. to test Atena manager and BOT

- **TcoE Environment**
  - set-up multi-machine env. to run automated tests with Codeception

Reference

- **Virtualizzazione**
  - https://en.wikipedia.org/wiki/Virtualization
  - https://en.wikipedia.org/wiki/Paravirtualization
  - https://www.vmware.com/solutions/virtualization.htm
  - Intel VM training slides (Kallax alle spalle di Lucettone)
- **Vagrant**
  - https://www.vagrantup.com/docs
  - https://gitlab.netresults.dev:10443/netresults/IT/vagrant