

# Virtualization

September 2021





# Hello!

*I am Miguel Angel Sotomayor*

Senior Data Engineer

You can find me at



<https://www.linkedin.com/in/miguelsotomayorf/>



[@masfworld](https://twitter.com/masfworld)



[miguel.sotomayor@sidesna.es](mailto:miguel.sotomayor@sidesna.es)





## Career

Software Engineer at  
**Ami2**  
2008-2012

1

Senior Data Engineer at



2015-2021

3

  
**EDEM** and **Datahack**  
Lecturer

5

Senior Software Engineer  
and Junior Data Engineer  
at **Ingenia Telecom**  
2012-2015

2



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Senior Data Engineer at  
**birdie**

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NOW IT'S  
YOUR TURN.





## Agenda

1. Virtual Machines

3. Enabling  
Virtualization

2. Hypervisor

4. CI / CD

6. Virtualization in  
Cloud

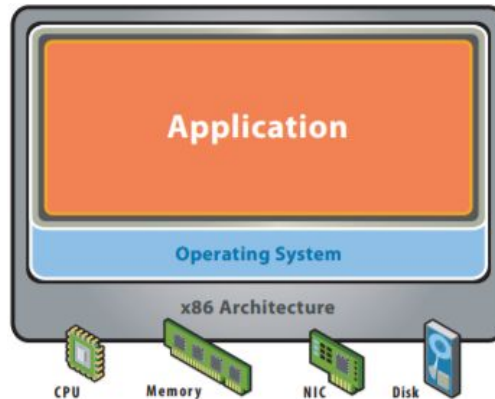
5. Vagrant

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# Virtual Machines

## Before Virtualization

- Servers would traditionally run **one application on one server** with one operating system
  - Even one or more applications and an operating system would run on their own unique physical server
- Expensive hardware were being purchased, but not used
  - Depending on application, most of resources were unused



## Before Virtualization

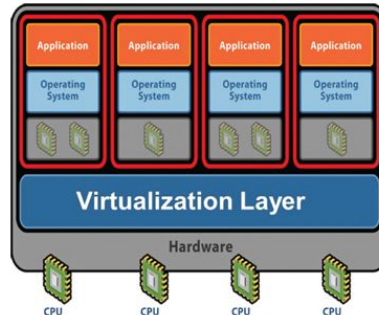
- It was not unusual to see a physical server using less than five percent, or even ten percent, of its CPU and/or memory
- Multiple applications in a single OS, in one operating system have an impact in terms of security





## What is the Virtualization?

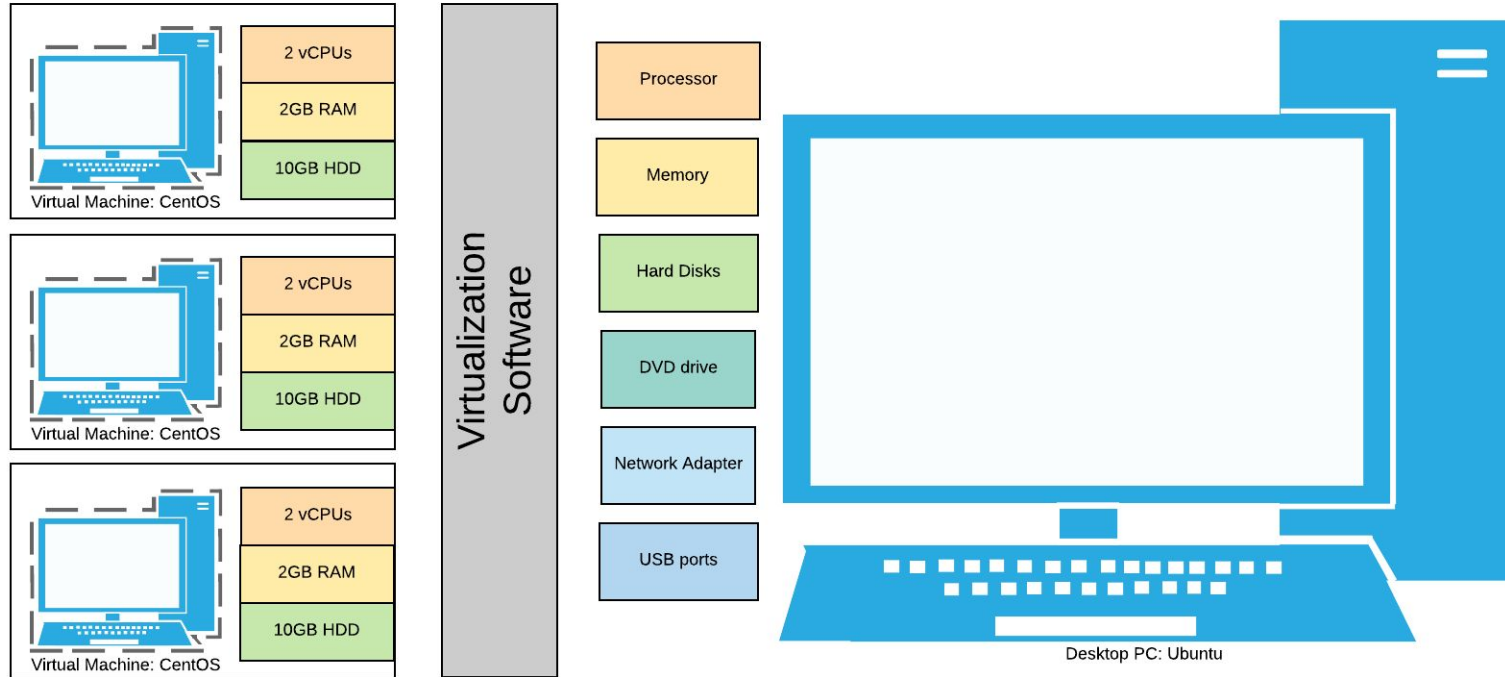
- Virtualization is the process of creating a software-based, or virtual, representation of something, such as virtual applications, servers, storage and networks
- In general, the idea behind virtualization is to make many from one
- It's the single most effective way to reduce IT expenses while boosting efficiency and agility for all size businesses





## What is the Virtualization?

### Hardware Virtualization: a Desktop Virtualization Example

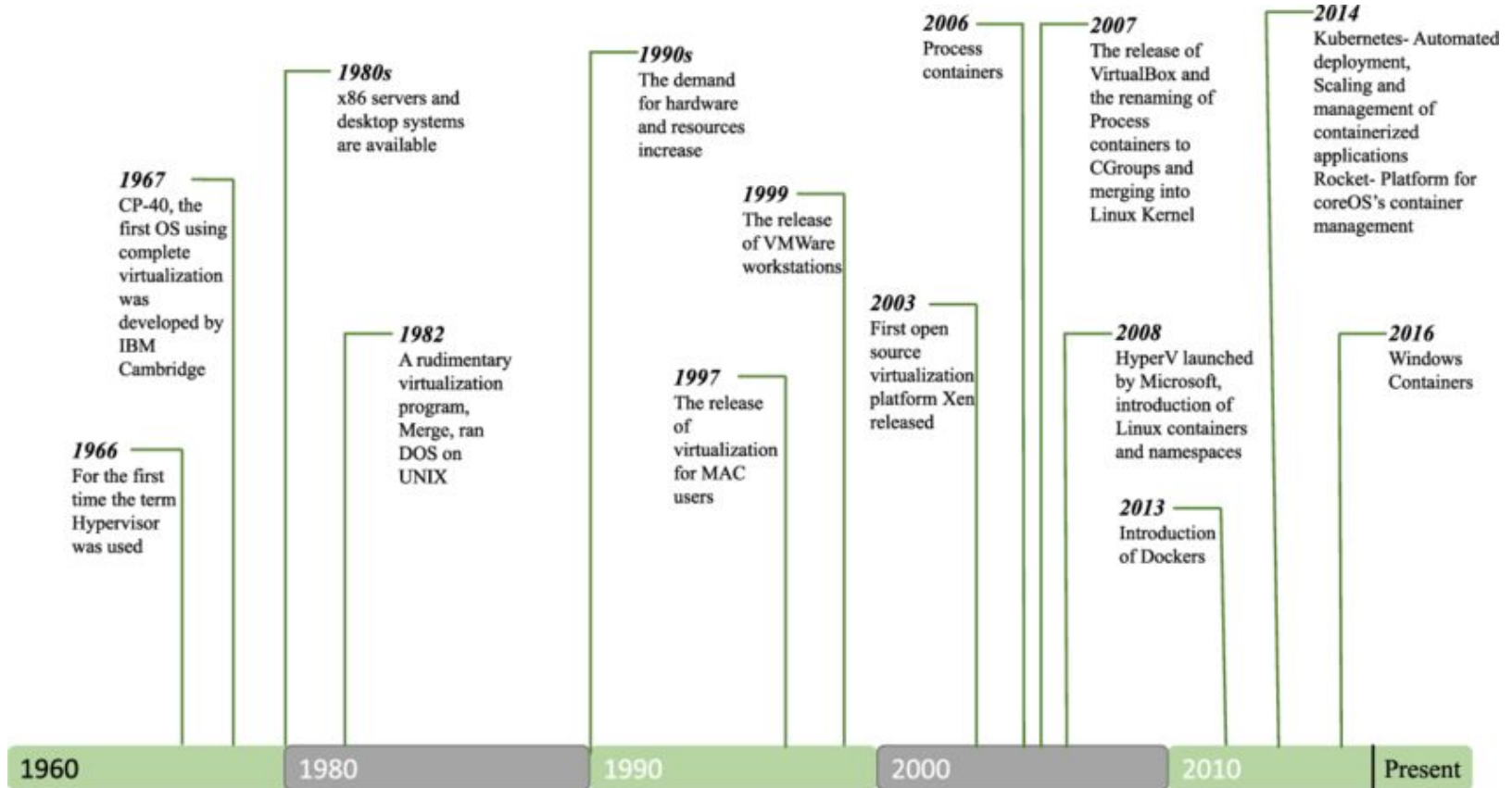




## Origins of Virtualization

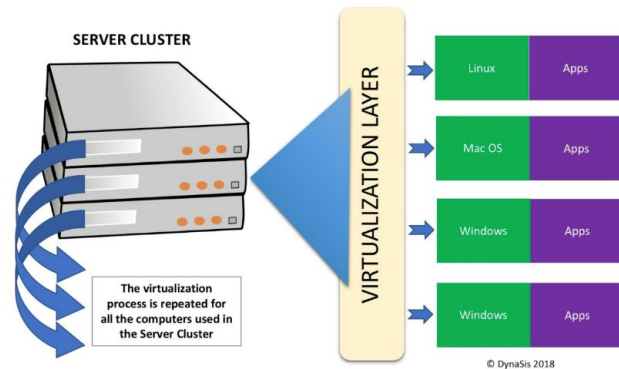
- Paper presented on time-shared computers, by Cristopher Strachey at the June 1959 UNESCO Information Processing Conference
- After this conference, new researches were done:
  - **MIT** developed a Compatible Time-Sharing system
  - **IBM** was pioneered in the early 1960s in terms of virtualization to solve several problems
  - The main problem that IBM wanted to solved was that each new system that they introduced was incompatible with previous systems.

# Origins of Virtualization



# Why Virtualization?

- Issues with traditional systems:
  - Software and hardware tightly coupled
  - Running multiple applications on same machine often creates conflict
  - Underutilized resources
  - Inflexible and costly infrastructure
- Virtualization lets you run more applications on fewer physical servers.
  - Rather than one application running on one server with one operating system, multiple VMs run multiple apps and operating systems on one physical server.





# Types of Virtualization

## • Server Virtualization

- Enables multiple operating systems to run on a single physical server
- Reduced operating costs
- Higher server availability

## • Network Virtualization

- Reproducing a physical network
- Allows applications to run on a virtual network

## • Desktop Virtualization

- Enables IT organizations to respond faster to changing workplace needs and emerging opportunities

## • Storage Virtualization

- Logical view of the physical storage resources

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## Hypervisor



## Types of Virtualization

- A hypervisor is computer software, firmware or hardware that creates and runs virtual machines
- It's a process that separates a computer's operating system and applications from the underlying physical hardware
  - Even though VMs can run on the same physical hardware, they are still logically separated from each other
  - That means that if one VM experiences an error, crash or malware attack, it doesn't extend to other VMs on the same machine





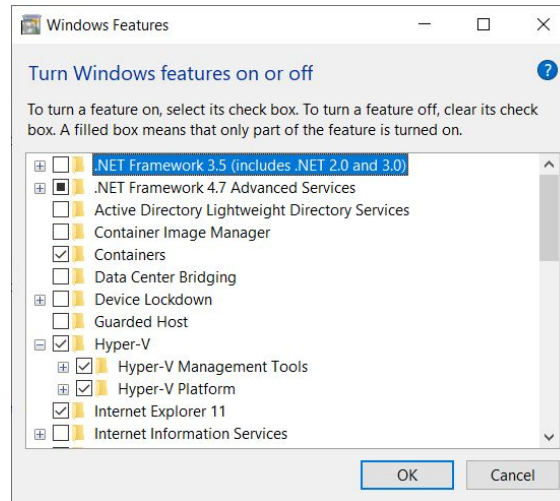
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## **Enabling Virtualization**



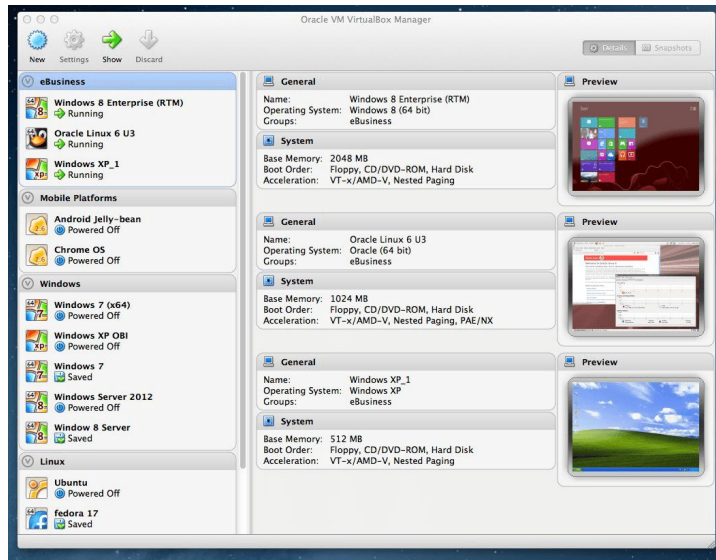
## Hyper-V on Windows 10 Pro

- En esta URL están los detalles de su activación



## VirtualBox

- En esta URL os lo podéis descargar



Windows



Mac



Linux

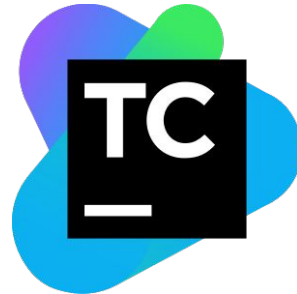


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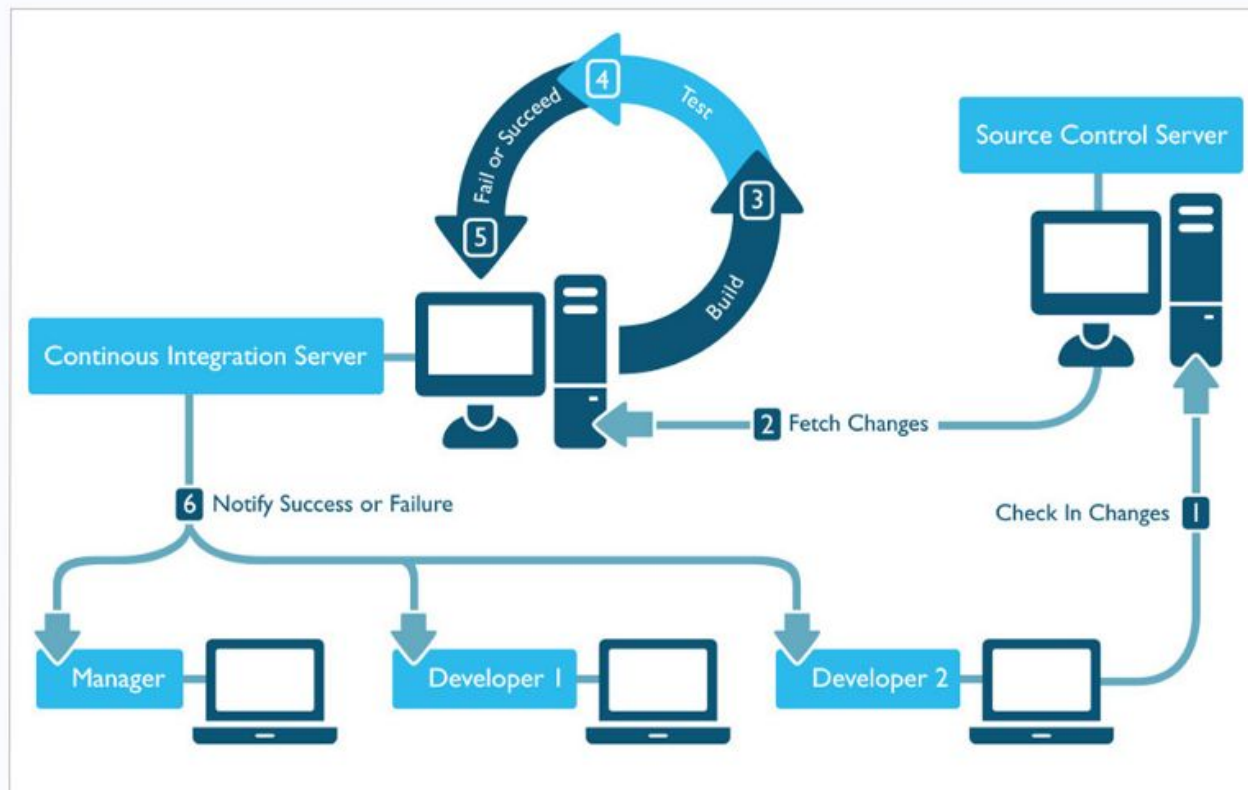
**CI / CD**

## Continuous Integration - CI

- Continuous integration is a coding philosophy and set of practices that drive development teams to implement small changes and check in code to version control repositories frequently
- The idea is to establish a consistent and automated way to build, package, and test applications
- The developer's changes are validated by creating a build and running automated test against the build.

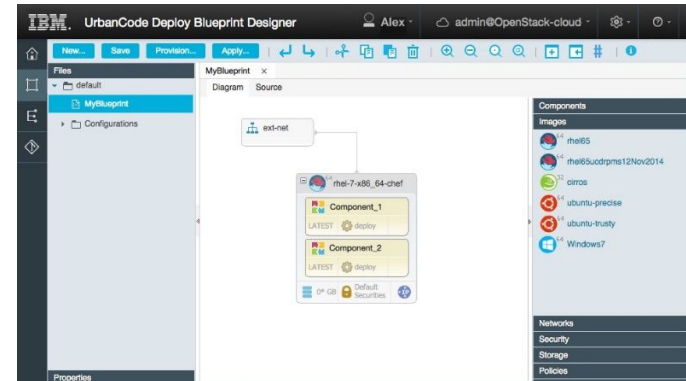


## Continuous Integration - CI



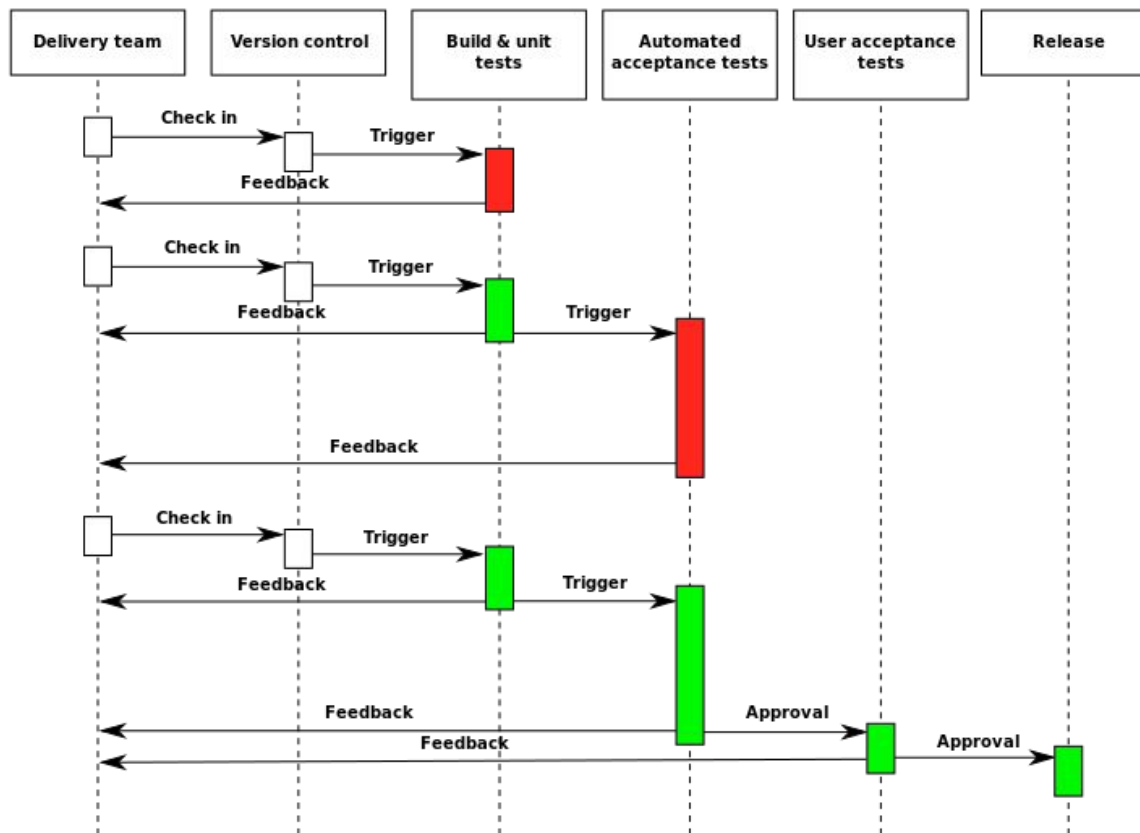
## Continuous Delivery - CD

- Continuous delivery picks up where CI ends. CD automates the delivery of applications to selected infrastructure environments.
  - Most teams work with multiple environments other than productions, such as development and testing environments
- CD ensures there is an automated way to push code changes to them
- You can decide to release daily, weekly or whatever suits your business requirements





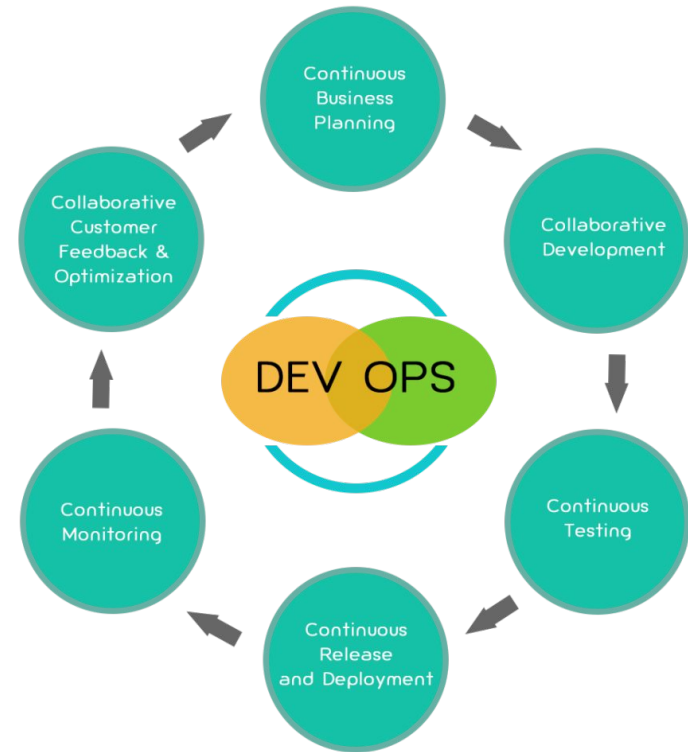
## CD - CI

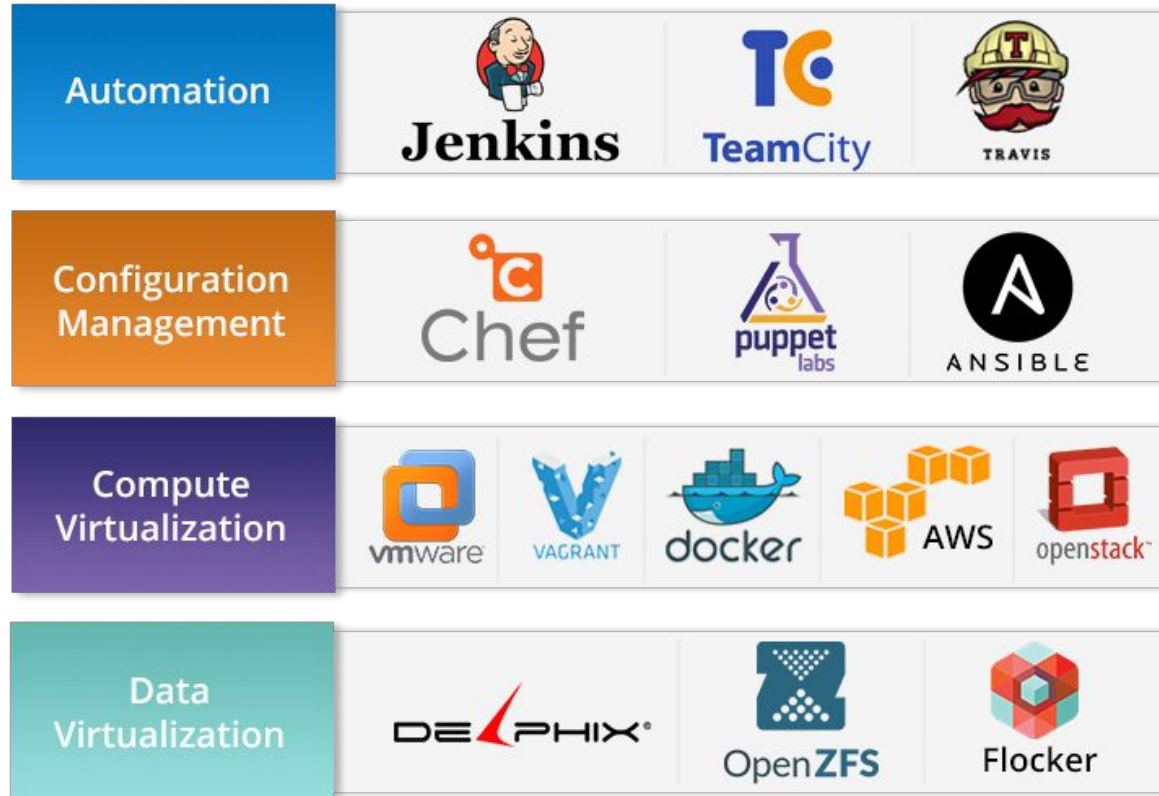




## CD / CI - Virtualization

- Virtualization enables DevOps teams to develop and test within simulated environments that run the full gamut of devices available to consumers while also testing deployment on virtual live environments.
- This level of accuracy in testing makes for vastly reduced deployment times and increased stability





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## Vagrant



## Vagrant

- Vagrant is a tool for working with virtual environments
- Provides a simple and easy to use command-line client for managing these environments
- An interpreter for the text-based definitions of what each environment looks like called Vagrantfiles
- It may be useful to a wide range of people working on different kinds of tasks





# Vagrant

```

1 # Example 1
2 #
3 # Single box with some custom configuration.
4 #
5 # NOTE: Make sure you have the precise32 base box installed...
6 # vagrant box add precise32 http://files.vagrantup.com/precise32.box
7
8 Vagrant.configure("2") do |config|
9   config.vm.box = "precise32"
10   config.vm.hostname = "myprecise.box"
11   config.vm.network :private_network, ip: "192.168.0.42"
12 end

```

```

1 # Example 5
2 #
3 # Separate Web and database servers serving up static/dynamic sites via Puppet.
4 #
5 # NOTE: Make sure you have the precise32 base box installed...
6 # vagrant box add precise32 http://files.vagrantup.com/precise32.box
7
8 nodes = [
9   { :hostname => 'ex5web', :ip => '192.168.0.42', :box => 'precise32' },
10  { :hostname => 'ex5db', :ip => '192.168.0.43', :box => 'precise32', :ram => 512 }
11 ]
12
13 Vagrant.configure("2") do |config|
14   nodes.each do |node|
15     config.vm.define node[:hostname] do |nodeconfig|
16       nodeconfig.vm.box = "precise32"
17       nodeconfig.vm.hostname = node[:hostname] + ".box"
18       nodeconfig.vm.network :private_network, ip: node[:ip]
19
20       memory = node[:ram] ? node[:ram] : 256;
21       nodeconfig.vm.provider :virtualbox do |vb|
22         vb.customize [
23           "modifyvm", :id,
24           "--cpuexecutioncap", "50",
25           "--memory", memory.to_s,
26         ]
27       end
28     end
29   end
30
31   config.vm.provision :puppet do |puppet|
32     puppet.manifests_path = "puppet/manifests"
33     puppet.manifest_file = "site.pp"
34     puppet.module_path = "puppet/modules"
35   end
36 end

```

<https://github.com/patrickdlee/vagrant-examples>

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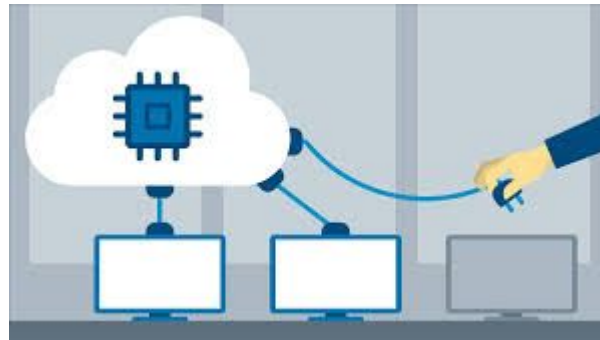
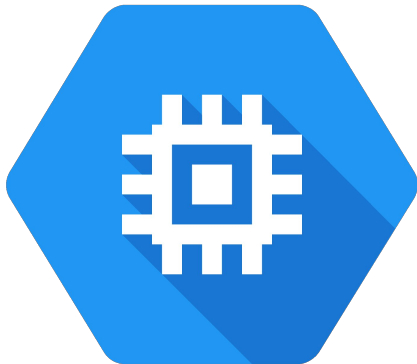
# Virtualization in Cloud

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# Virtualization in Google Cloud

## Google Compute Engine - GCE

- It's the Infrastructure as a Service (IaaS)
- Enables users to launch Virtual Machines on demand
- VMs can be launched from the standard images or custom images
- An image is a persistent disk that contains the OS and root file system that is necessary for starting an instance





# Virtualization in AWS

## Amazon Elastic Compute Cloud – EC2

- Provides scalable computing capacity in AWS
- Launch as many or as few virtual servers (instances) as you need
- Preconfigurable templates for your instances
- Amazon Machine Images (AMIs)



Amazon  
**EC2**



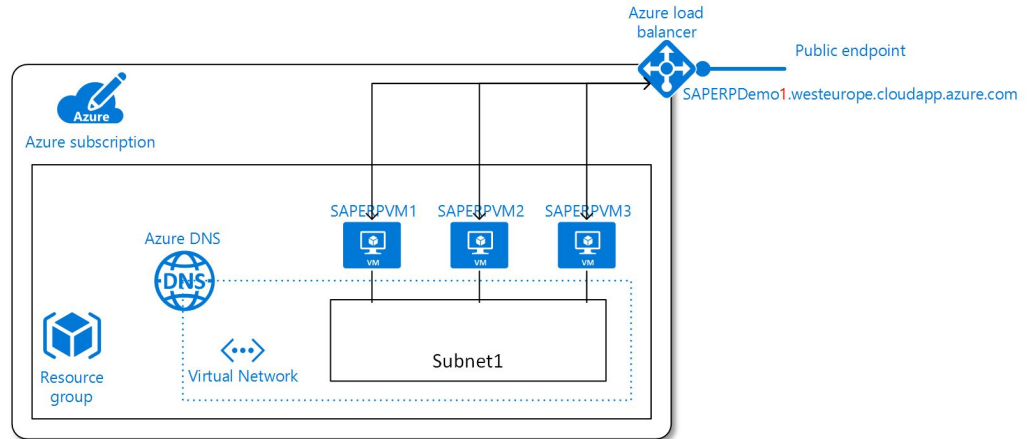
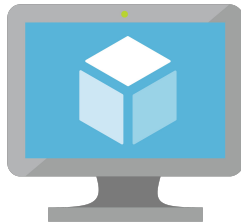


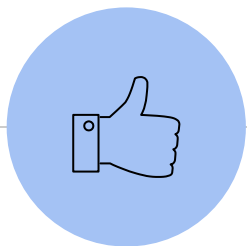


# Virtualization in Azure

## Azure Virtual machines

- Provides scalable computing capacity in Azure
- Deploying virtual machines featuring up to 416vCPUS and 12TB memory
- Templates for your instances





# Thanks!

## Any *questions* ?

You can find me at

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- [@masfworld](#)
- [miguel.sotomayor@sidesna.es](mailto:miguel.sotomayor@sidesna.es)