



# Images, Gold, Silver, or Quicksand

A look at the image proliferation problem

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# Agenda

- **A Brief History Of Computing**
- **Getting on the same page**
- **Images and flavors**
- **Immutable infrastructure**
- **Building images**

# A Brief History Of Computing

# A Brief History Of Computing

A long time ago  
In a Galaxy far away

.....

**NO WE WILL NOT START AT THE  
BEGINNING**



# A Brief History Of Computing

In the not so distant past, and still present...



OS & Apps for pick your CPU arch

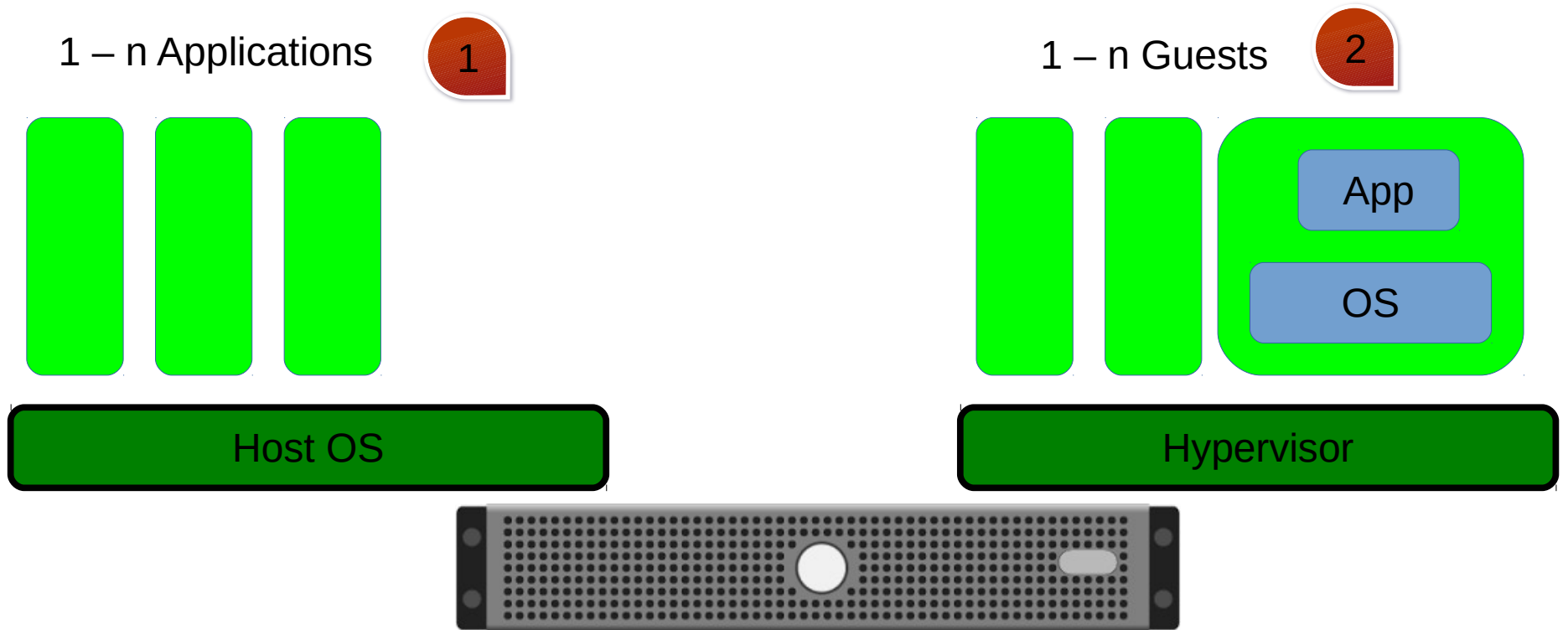


OS & Apps for pick your CPU arch



# A Brief History Of Computing

## Predominant current and emerging models

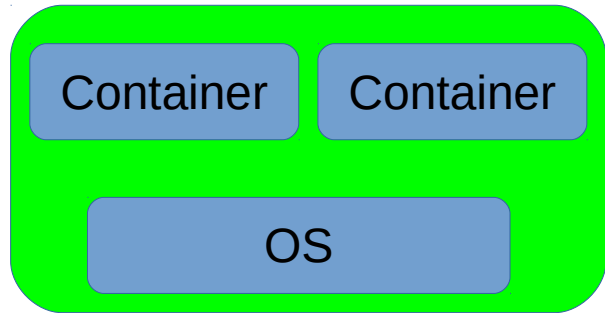


# A Brief History Of Computing

## Predominant current and emerging models

1 – n Guests

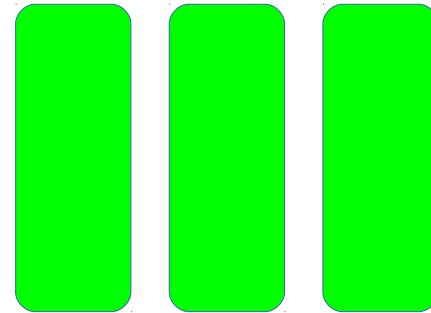
3



Hypervisor

1 – n Containers

4



Host OS

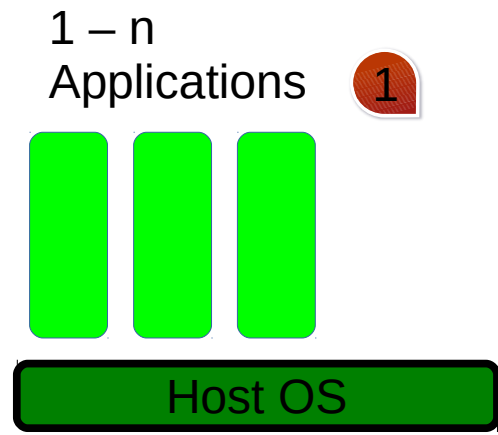


# 1 “Traditional”

- 1 System
- 1 OS
- 1 or more Apps



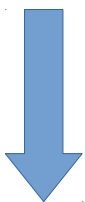
- 1 Image, install from scratch or pre-built



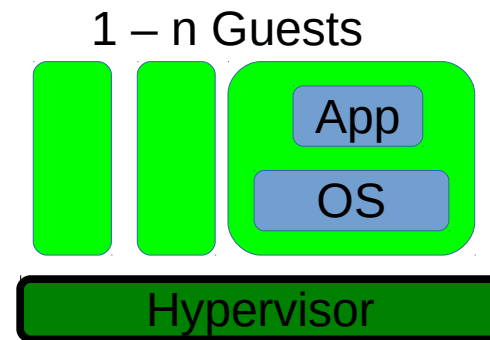


## 2 Virtualization and Cloud

- 1 System
- 1 Hypervisor (OS)
- 1 or many VMs
  - Each VM with OS



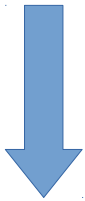
- At least 2 images
  - Hypervisor, install from scratch or image
  - Guest image, install from scratch or image



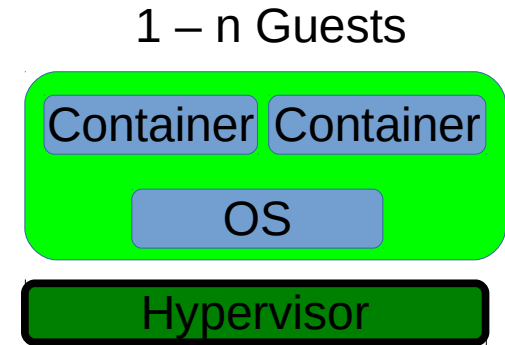
## 3

# Virtualization and Cloud

- **1 System**
- **1 Hypervisor (OS)**
- **1 or many VMs**
  - Each VM with OS
- **1 or many Containers**



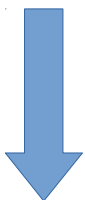
- **At least 3 images**
  - Most likely many more, 1 container image per “App”



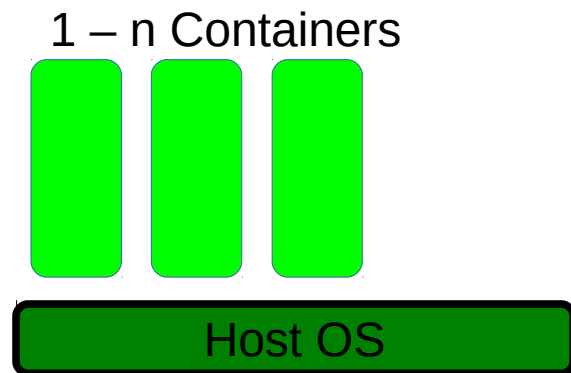
## 4

# Virtualization and Cloud

- 1 System
- 1 OS
- 1 or many Containers



- **At least 2 images**
  - Host, install from scratch or image
  - Container image
  - Most likely many more, 1 container image per “App”



# Getting On The Same Page

# Getting On The Same Page – Golden Image

## - Image is finished

- Runs in target environment
- No Configuration necessary (exceptions apply)
- No additional installation necessary
- Every instance looks the same

# Getting On The Same Page – Silver Images

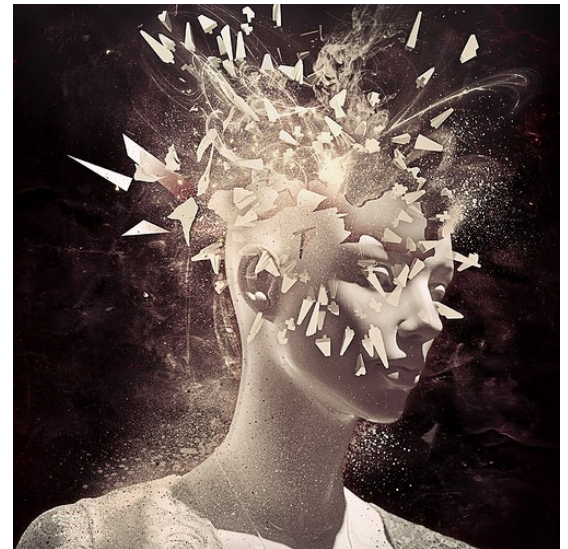
## - Image is a base image

- Additional install
- Configuration
- Pliable to be whatever is needed
- Probably connects to some kind of configuration management system
  - Salt, Chef, Puppet, Cfengine,.....

# Getting On The Same Page – Both Gold & Silver?

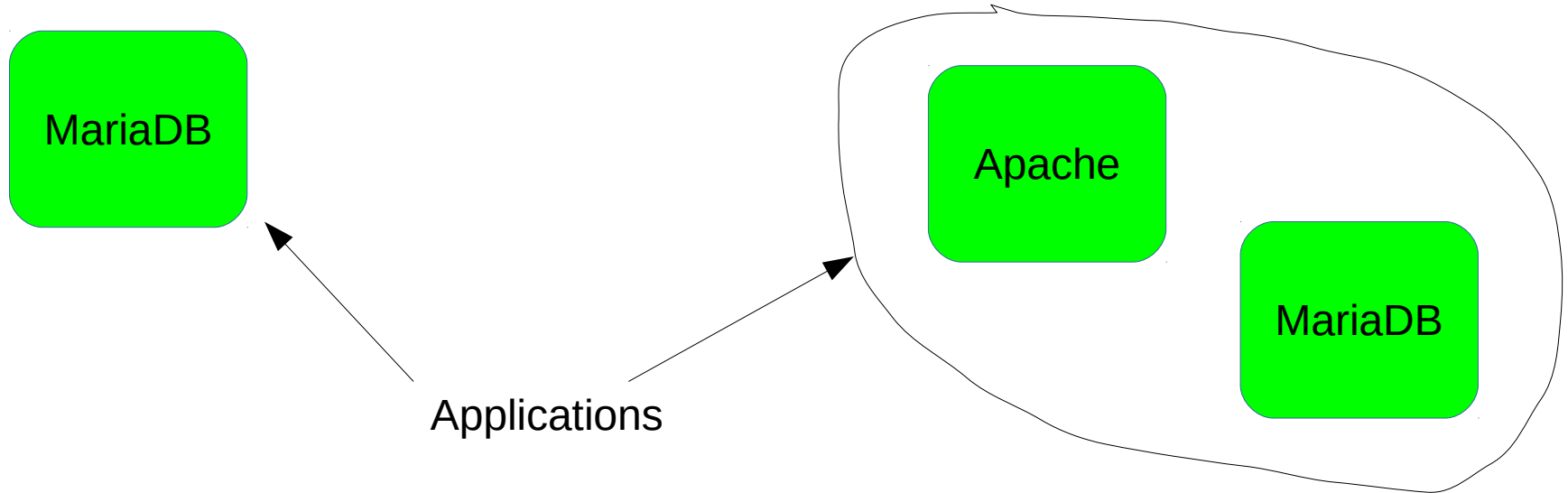
## - The Russian Doll Game

- What if we embed a container image in a VM?
  - The container image maybe Gold or Silver, the VM maybe Gold or Silver



# Getting On The Same Page - Apps

- One would think this is easy, but





# Getting On The Same Page - Apps

- **In this context we primarily consider 1 application to be THE APP**
  - Think along the lines of 1 executable, i.e. MariaDB on previous slide
  - This is also the container “expectation”, i.e. 1 executable app per container
    - A combination of these may make an *application*

# Getting On The Same Page – In Practice

- Containers are closer to Golden images, but often some config is required (etcd)
- VMs are closer to Silver images, often config + install

# Images And Flavors

# Just To Add To The Complexity



# Given The complexity...

- **Manage the source of your images**

- This is the build setup
  - KIWI source directory
  - Docker file

- **Build in a repeatable environment**

- Open Build Service

- **Have glue code that binds it all together**

# Immutable Infrastructure

# Immutable Infrastructure – The Idea

**Prevent: “Oh this is just a simple issue, lets log into the ailing server and make a quick change”**

- We all know the above is dangerous when running multiple copies
- We all know it is human nature, especially when under pressure

**The fix: Run images that cannot be modified**

# Immutable Infrastructure – The Reality

## - Truly Immutable is hard to come by

- All dynamic languages, Python, Ruby, Perl,... have some package install mechanism
  - It is relatively easy to add something to the running system
- A little more difficult for compiled languages, but not all that big of a deal
- Depending on how the image was built it contains an update stack

## - **THUS**

- We still very much depend on training people to do the right thing!





# Building Images

# Building Images

## - VMs – KIWI, SUSE Studio

- Generally we want mutable systems
- Update stack
- Manage with SUSE Manager for push model
- Connect to SCC or SMT for pull model

## - Uploading to the Cloud?

- Use command line tools
  - ec2uploadimage
  - azurectl
  - google-cloud-sdk
  - openstack

# Building Images

## - Containers

- We often want something that is more difficult to change

## - Docker build

- Image contains an update stack => Easily mutable
- Docker added functionality to connect to a container, even if ssh is not installed



## - KIWI build

- Can build image without update stack included

# Summary

# Summary

- Almost impossible to get away without using images
- Use pliable pre-built images whenever possible
- Consider goals, pets vs. cattle
- Consider image management a top priority



Thank you; Questions?



We adapt. You succeed.