CloudOpen
Japan 2014

# DevOps with Vagrant and KVM/qemu


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# Who am I?

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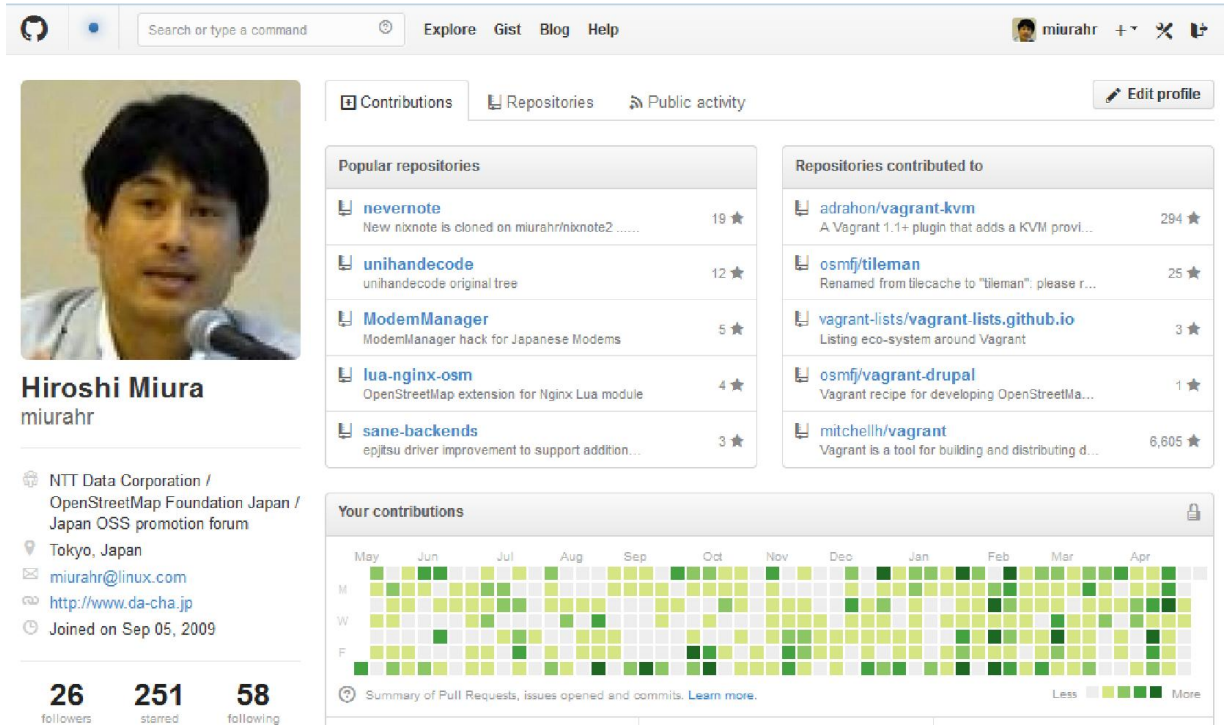
- Production work
  - OpenStack SI team
  - Swift object storage
- OSS devel:
  - Vagrant-KVM
  - Linux Kernel
  - etc...




**Github.com/nttdata-osscloud**

**Github.com/miurahr**

# Agenda

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1. What is DevOps
2. Introduction to Vagrant
3. Vagrant-KVM
4. Infrastructure chages
5. Future

# What is DevOps?

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## Mike Loukides, 2012, @Velocity conference

**“If you're going to do operations reliably,**

**you need to make it reproducible and programmatic.”**

# What is DevOps?

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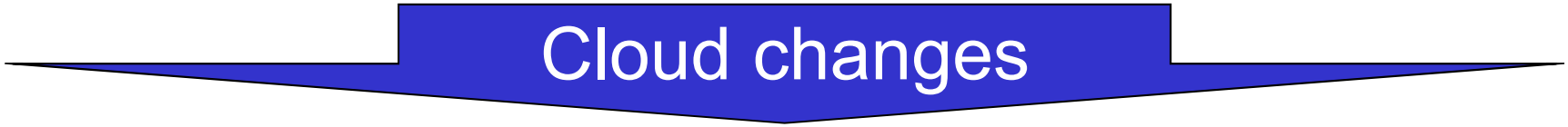
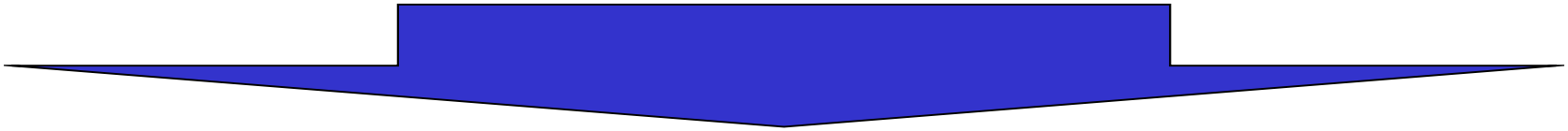
- **The nature of “operations”**




  - **Growing distributed systems**
  - **Software development practice**



- **“cooperation and collaboration” between dev and ops**

# DevOps for developer

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- Gap between Development and Operations
  - Goals
  - Process and approach
  - Tools
- Infrastructure engineering becomes like a development.
  - Infrastructure as a code
  - Adoption of Vagrant


Introduction
To Vagrant

# What is Vagrant

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- development environment on VM, container or cloud
- same
  - among team members.
  - among production and development.
  - VirtualBox, AWS EC2

# What is Vagrant

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**“Mature, stable, proven.”**

**by author,**
**Mr. Mitchell Hashimoto**

# Targeted Vagrant Users

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- **Web application developers**


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# New Vagrant Users

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- Infrastructure engineer programmer
- Deploy on VMwarevCenter, OpenStack
- Test Puppet, Chef or Ansible

# Vagrant work flow

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- **Just run**

  **$ vagrant up**

  **It download “vagrant box” and start and provision guest OS.**
- **Config file: “Vagrantfile”**

# What is Vagrant box

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- Preconfigured VM images
  - Base for environment
  - Community shared
- VagrantCloud.com: shares boxes

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# Brief history

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- Launched at 2010
- 2013, March, Version 1.1+
  - Plugins: 3rd party projects
  - Vagrant-KVM plugin start
- 2014, March
  - Vagrant Cloud

# Vagrant provisioner

- **Shell, Puppet, Ansible, Docker and Chef**
- **3rd party: Salt etc.**


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# Vagrant Plugins

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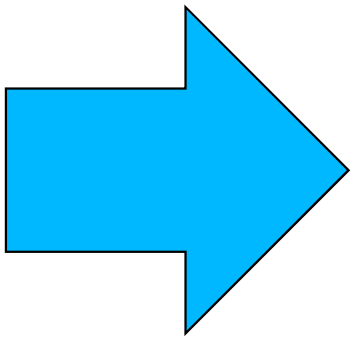
- **Supprted plugins from 1.1+ (2013.2～)**
  - **Provider: Driver for VM monitor**
  - **Provisioner: Configure guest images**
  - **Synced_folder: folder sync between guest/host**



**Now we can made Vagrant work on my Linux and KVM!**

# Supported Providers

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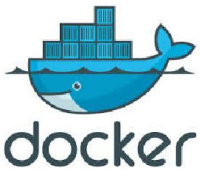
- **Many provider plugins**










Sakura Cloud

VMWare







# Current status of Vagrant-KVM

# Vagrant-KVM

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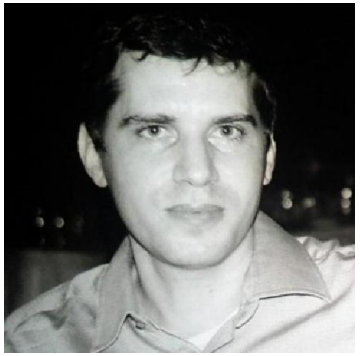
| | |
|---|---|
| Usage | Vagrant provider plugin to utilize KVM |
| Auther | Alexandre Drahon, UK |
| License | MIT |
| Language | Ruby |
| libraries | Ruby-libvirt, libvirt, qemu and kvm |

# Current Status of Vagrant-KVM

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- V0.1.8 March, 2014
  - Basic Vagrant features(private nw, NFS, provisioning, GUI, customize)
  - Plan9 host file share
  - QEMU 1.1 – 1.7
- V0.2.0 will come May, 2014
  - Multiple guests and networks
  - Bridged network
  - Address conflict resolver

# Vagrant-KVM vs. -libvirt

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- **kvm plugin: simple, single host**
- **libvirt plugin: multi-host, multi-vmm**

| Features | Vagrant-KVM | Vagrant-libvirt |
|---|---|---|
| KVM | Yes | Yes |
| Xen | N.A. | Plan |
| Remote | N.A. | Experimental |
| Multiple guests | Yes | Plan |
| File share | Plan9, NFS | NFS, rsync |
| Snapshot | Yes(sahara) | Yes(sahara) |
| Image convert | Yes(mutate) | Yes(mutate) |
| Multiple arch | Plan | N.A. |
| Current Version | 0.1.8 | 0.0.16 |

# Dependencies

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- **There are small amount of dependency.**

| | |
|---|---|
| Name | libvirt |
| Usage | Virtualization abstraction library |
| Language | Ruby, C |

| | |
|---|---|
| Name | Qemu |
| Usage | Virtual Machine emulator |
| Language | C |

| | |
|---|---|
| Name | Ruby-libvirt |
| Usage | Ruby bridge to libvirt |
| Language | C, C++ |

| | |
|---|---|
| Name | rspec/mock |
| Usage | Test framework |
| Language | Ruby |

# Quality and Test

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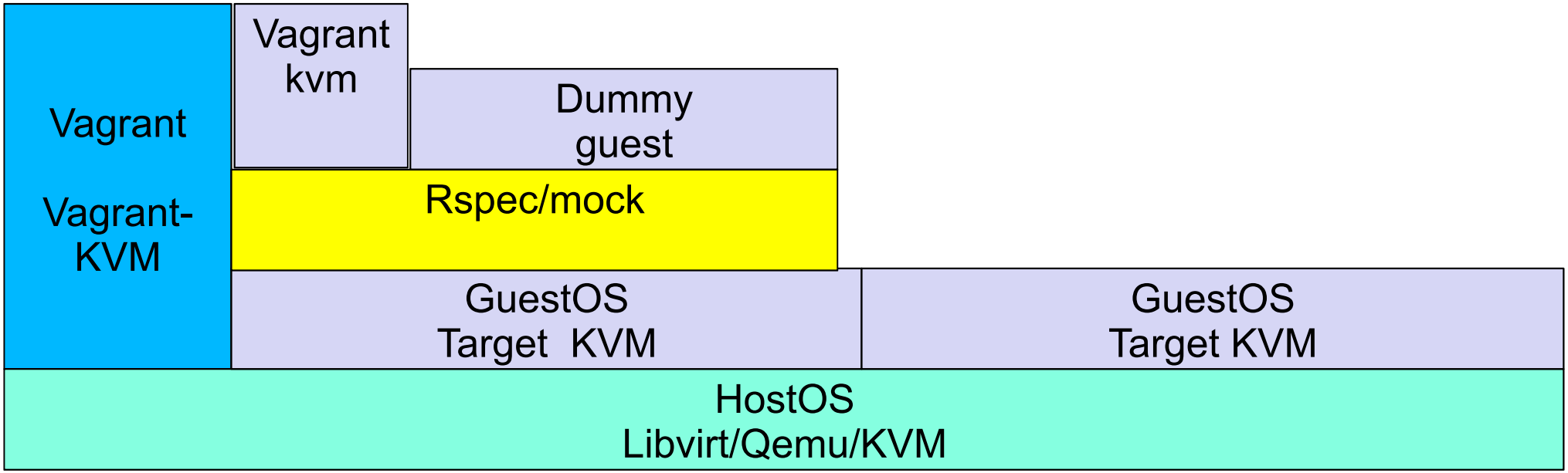
- **Rspec to test the plugins**
- **Test vagrant-kvm in guest OS on KVM prepared by vagrant-kvm.**



# Quality and Test

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- CI: Github/Travis-CI combination
  - Github.com: development platform
  - Travis-CI: test automation platform
  - RVM: Ruby Virtual Machines
    prepare versions of ruby

# OSS and CI

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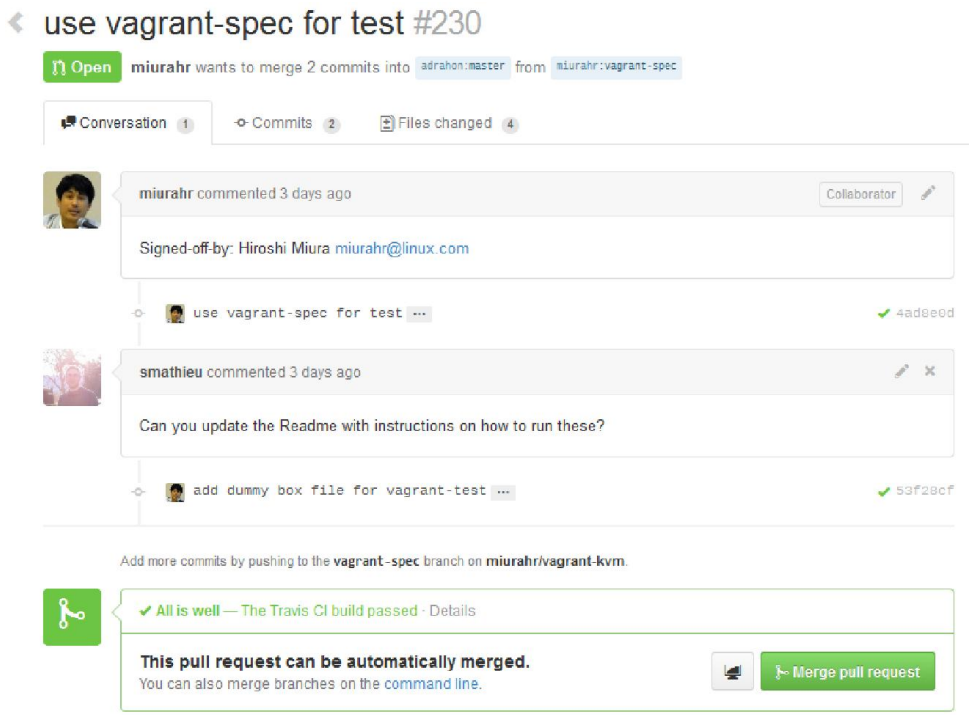
- **Every commit/patch and PRs are tested with Travis-CI and Rspec.**




Github.com
Pull-Request example: Green

# OSS and CI

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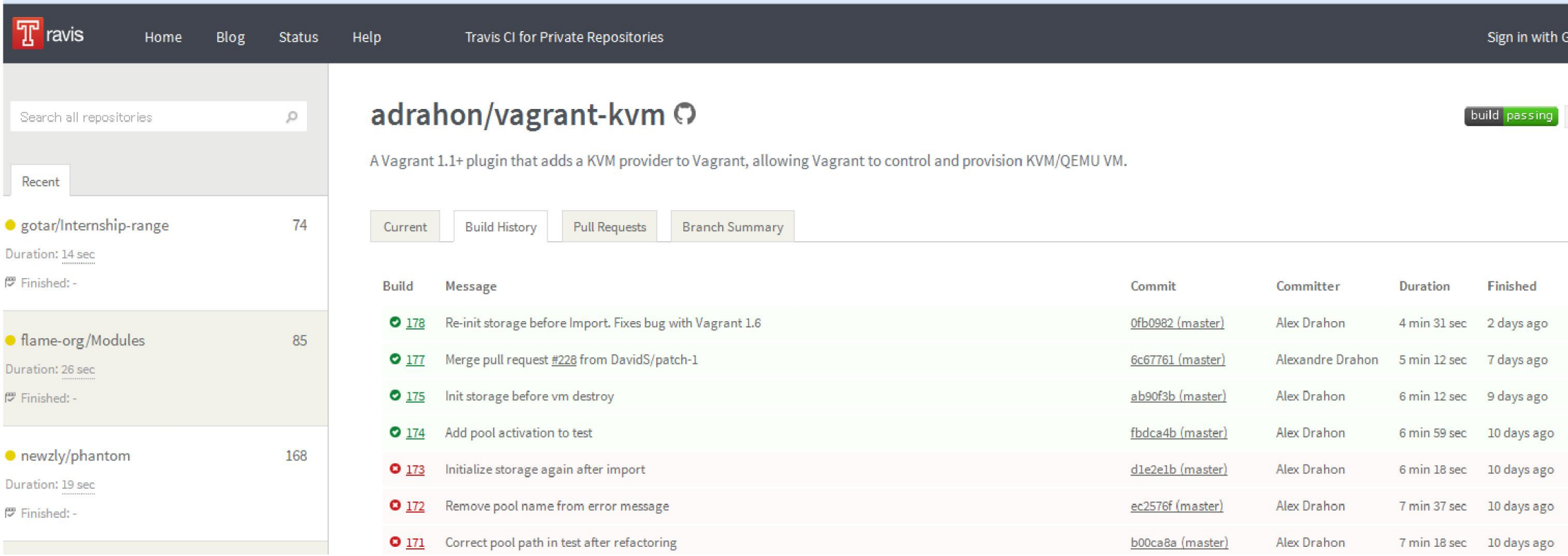


Travis-CI.org: Test history

# Issues fixed

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There are many issues to be fixed in related projects.

| No | Component | Problem | Resolution |
|---|---|---|---|
| 1 | libvirt | security treatment for plan9 file share | Dynamic AppArmor policy update |
| | | | External SELinux label control work around |
| | | Dynamic permission control not to restore permission | Lack of restore function in libvirt.<br>Work around in a plugin. |
| 2 | Ruby-libvirt | Not updated 2 yrs. Unsupported new API | Push developer to update.<br>Release 0.5.x in Dec. 2013 |
| 3 | Linux kernel | Fail to configure AppArmor rule | Wait kernel update |
| 4 | CentOS6 | Unsupported plan9fs (not configured in kernel) | Provide special VM image. |

# Vagrant-kvm: Future plan

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- **Support full features of Vagrant**
- **Multiple architecture(ARM)**
- **Linux kernel debug support**


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# Change the way:infrastructure

# New trend on DevOps

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- **Infrastructure development is Changing**

- **New technology comes on Infrastructure Engineering / development**

# Blue Green Deployment

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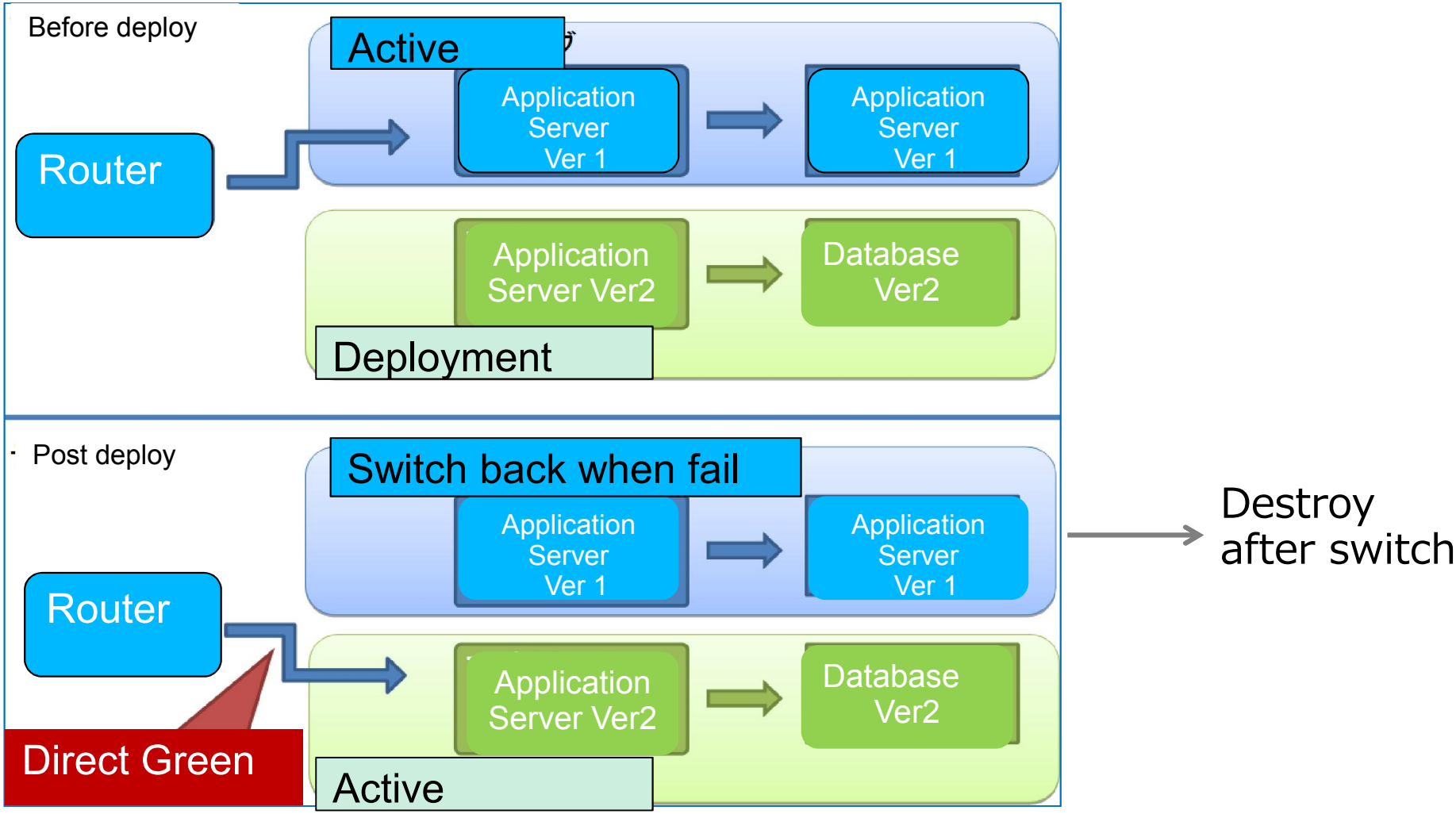
- No change to production environment
- New/Change for environment => create new instance and switch it




http://www.nttdata.com/jp/ja/insights/trend_keyword/2013122601.html

# Packaging for deploy

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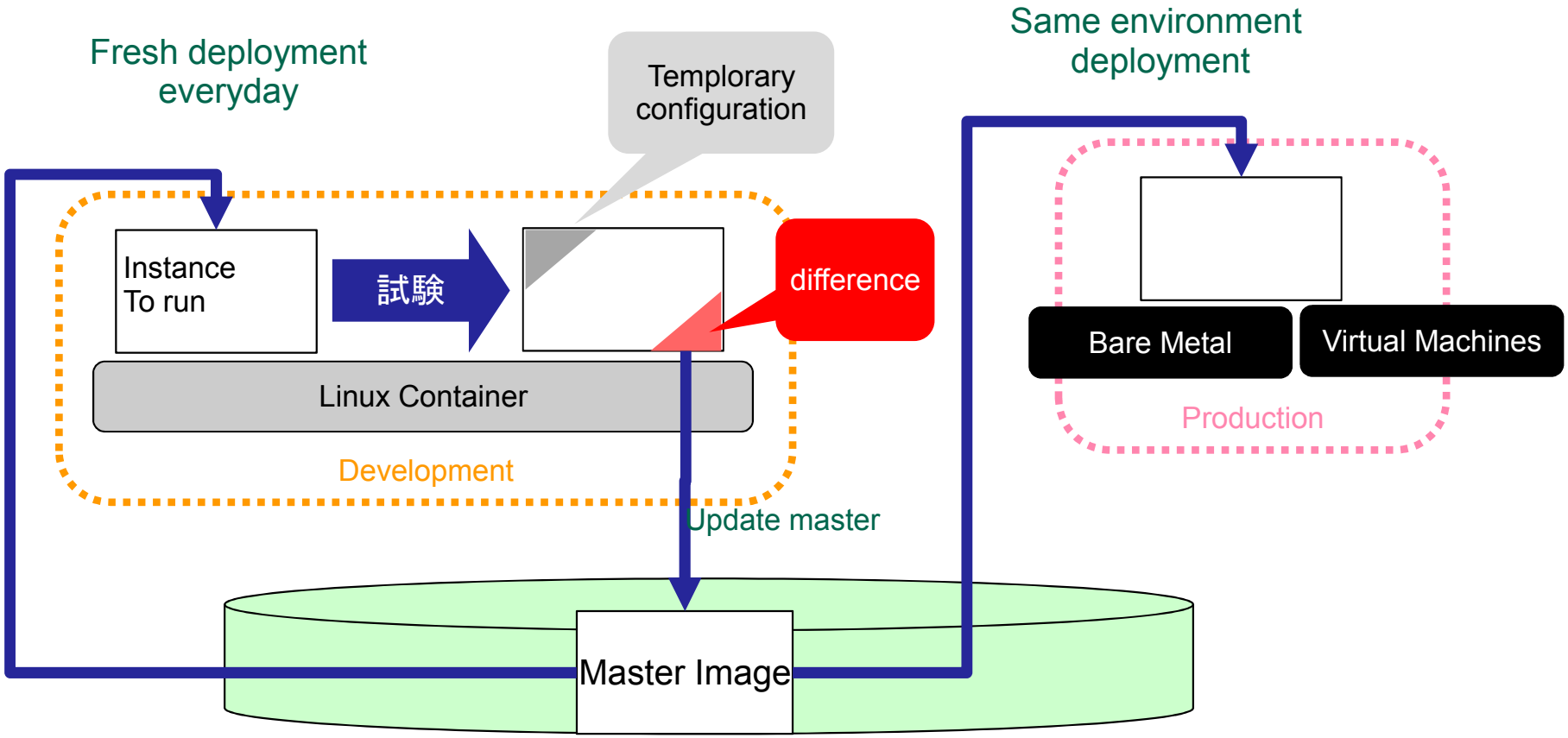
- **Application container help agile deployment of Application**




**Application container(Packer) technology**

# Packer

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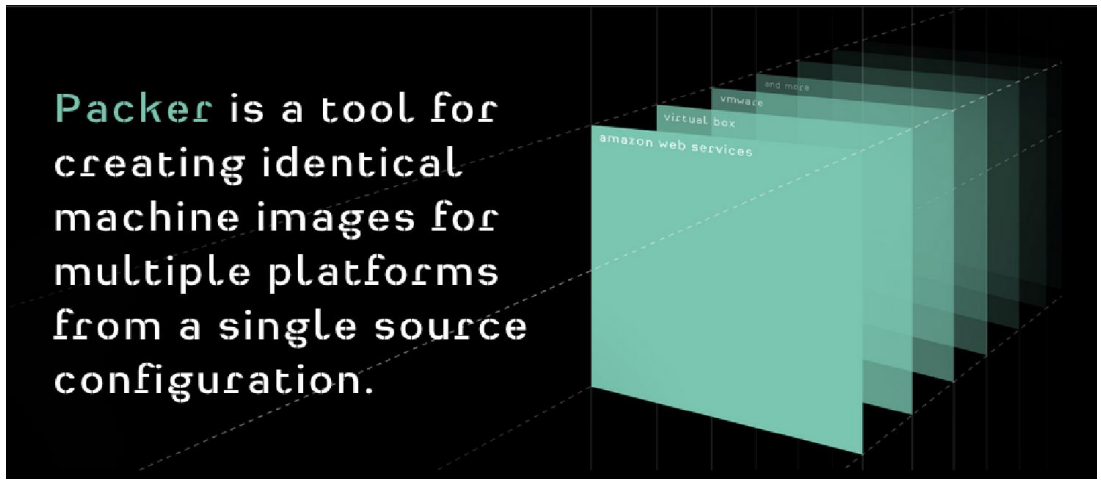
- http://www.packer.io/
- **Create virtual machine image for several kind of cloud / virtulization  infrastructures.**
- **Use JSON as profile description language.**
- **Infra can be managed as same as source code.**



# Packer

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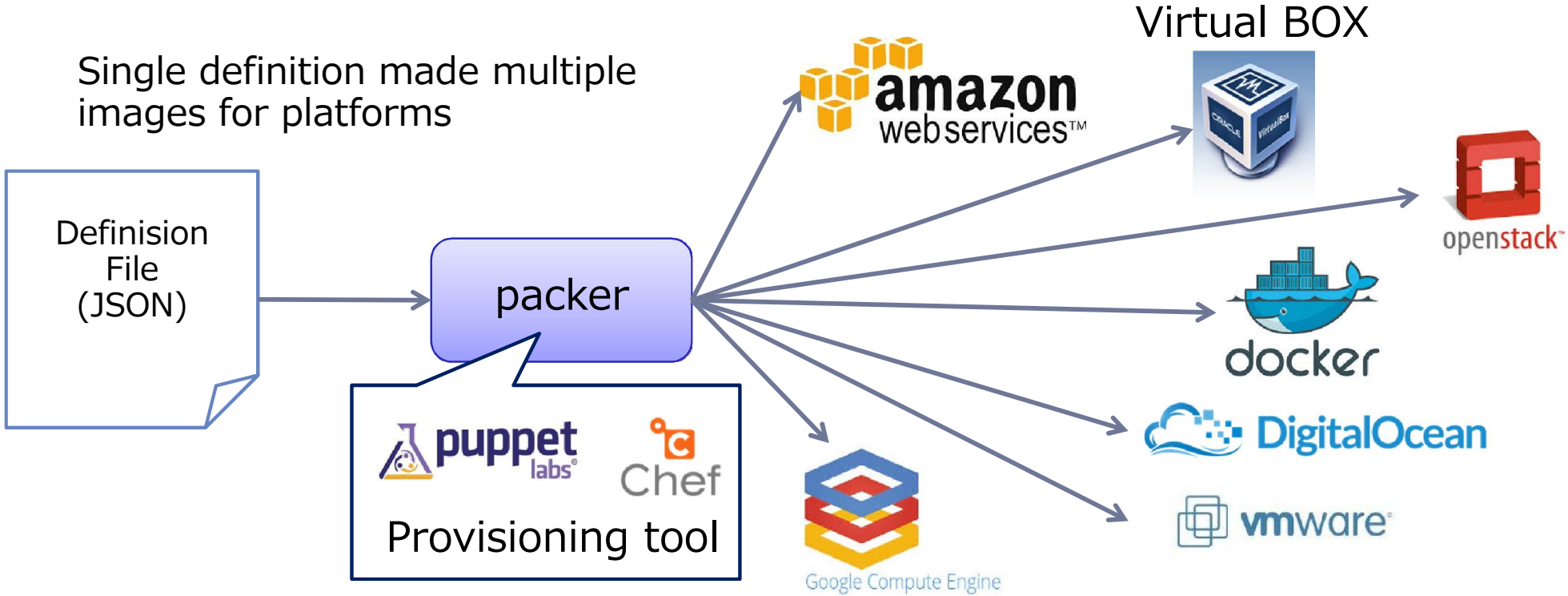
| | |
|---|---|
| Usage | Multi platform VM image build tool |
| Origin | HashiCorp |
| License | Mozilla Public License Version 2.0 |
| Language | Go |

Single definition made multiple images for platforms



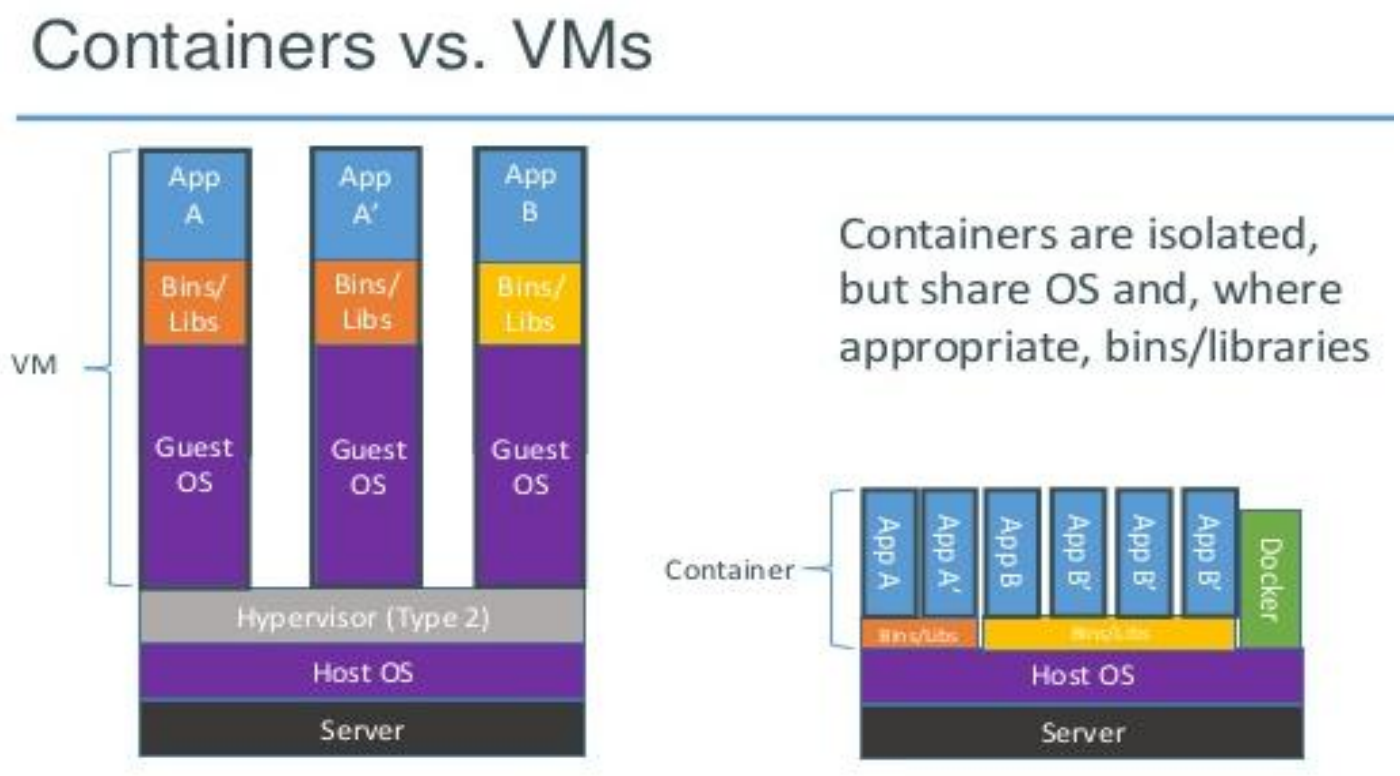
# Docker

- **Portable container for Application**

Agility:
Low overhead and quick setup

Portability:

dependency packed into container image.




https://www.docker.io/

# Vagrant and Docker

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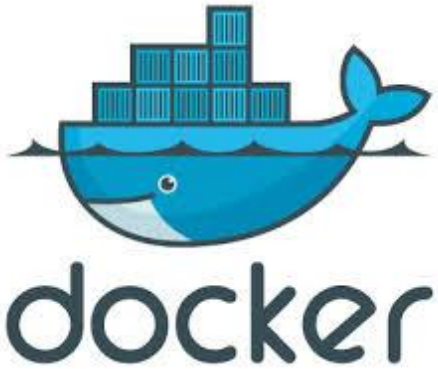
- **Prepare Docker environment on Vagrant**
  - **Auto detect guest OS and install proper packages.**
  - **Start Docker environment only one line command.**

Vagrant 1.5+ Provisioner

Vagrant 1.6+ Provisioner/Provider



# Stack of DevOps infrastructure

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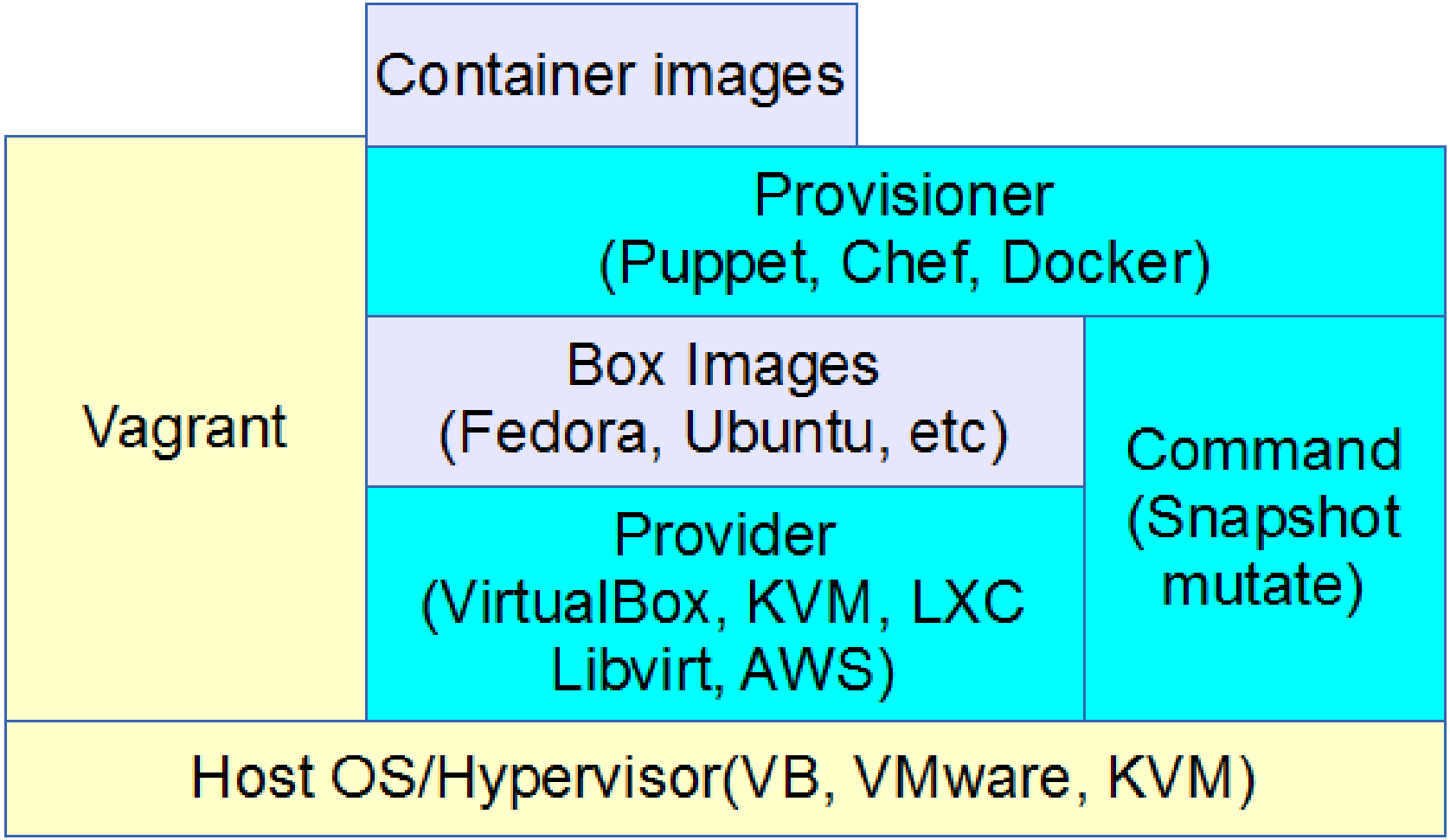
Vagrant enables control over infrastructure tool sets



# Work flow example(1/2)

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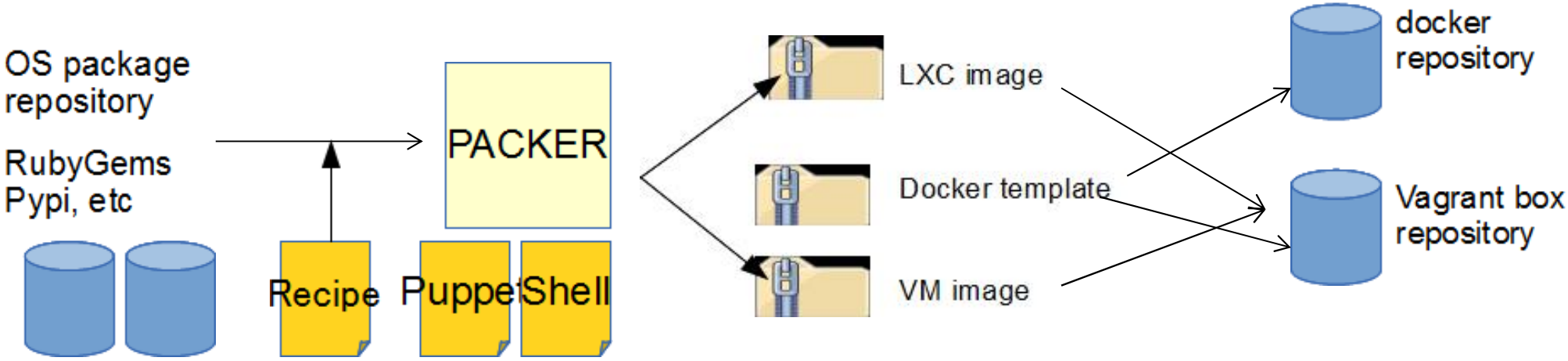
## Creation of Guest Images



# Work flow example(2/2)

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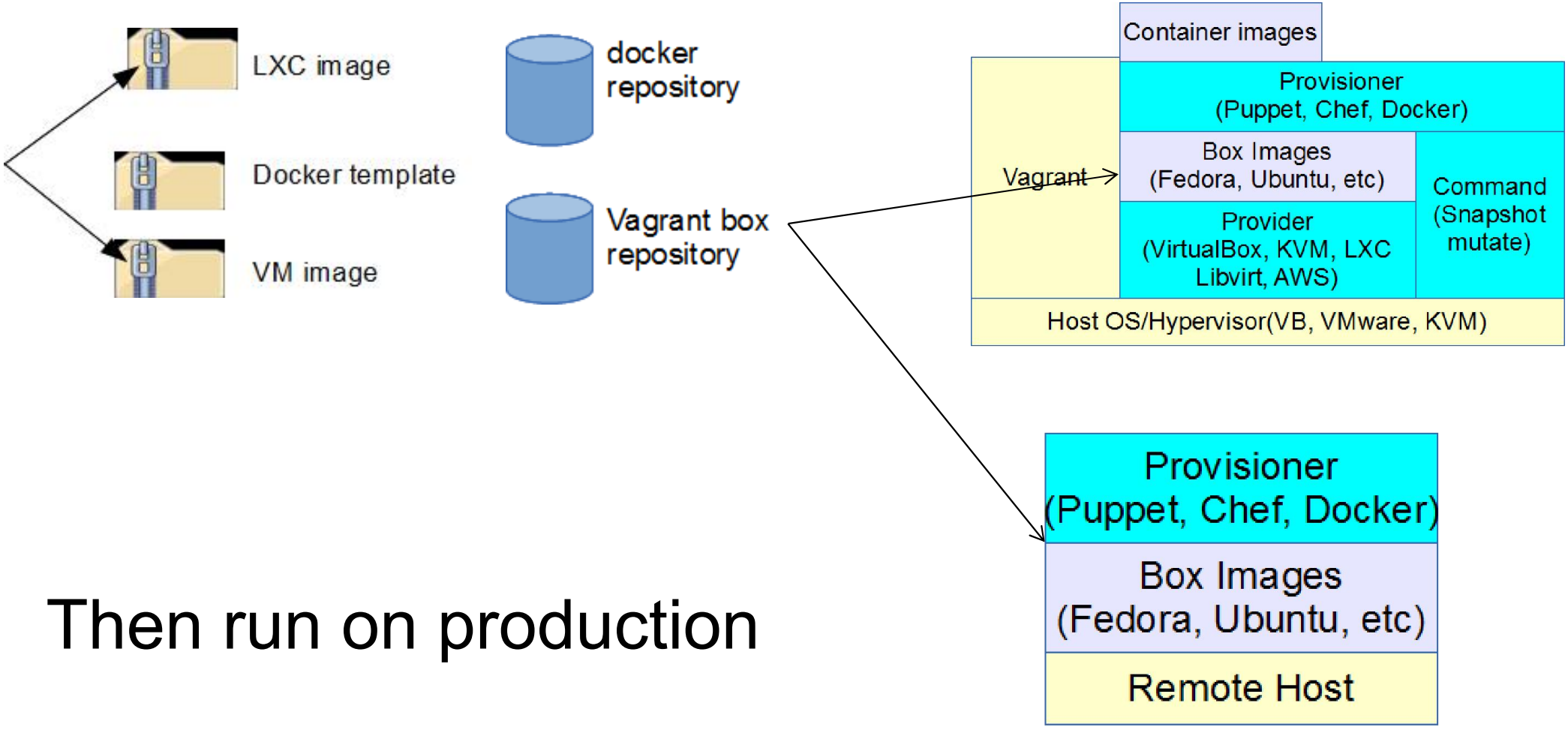
## Test on local Virtual Machines




## Then run on production

# Future

# Future of Vagrant/vagrant-kvm

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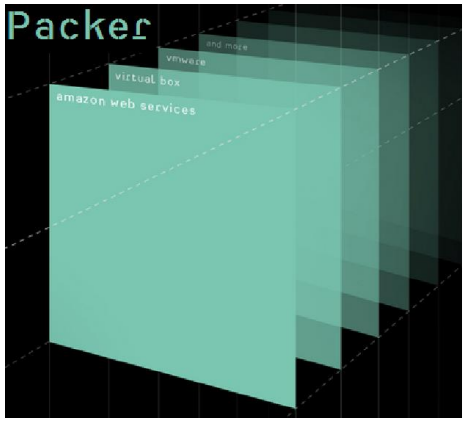
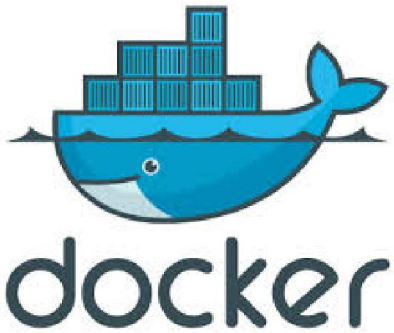
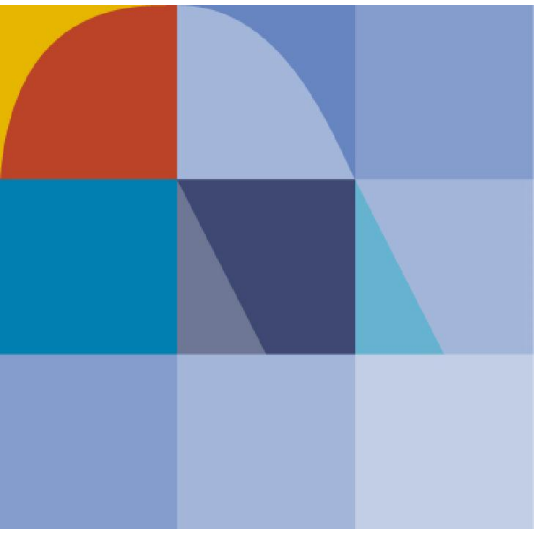
- **Embedded development with ARM support**
- **Various cloud and private platform support**
- **Packer/Docker integration**
- **Test automation**



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