A Survey of Cloud Infrastructure Automation

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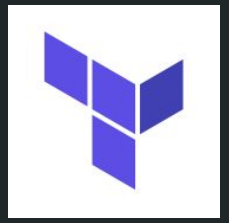
- Dale Lakes
- USMA ‘17
- 1LT U.S. Army Cyber Protection Brigade
  - Focus on threat hunting & data science
  - Splunk, Powershell, Python, etc.
- Been hacking since 2012
  - Android development / tinkering
  - Reverse engineering, web exploitation, forensics (stego, disk, memory), binary exploitation
  - OSCP
  - Bro (now Zeek)
- Currently working on startup - Kvasir Labs

Outline

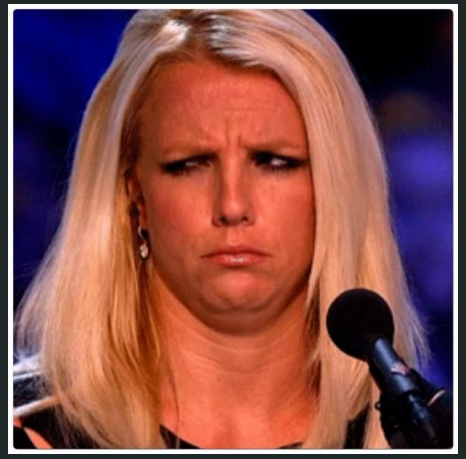
Vagrant

Packer



Terraform

Ansible

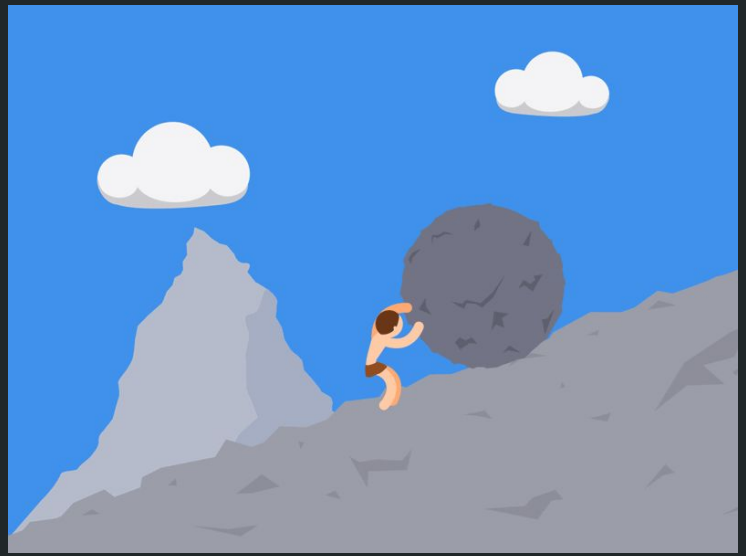


I will talk about these tools and then provide example workflows

Goal of Talk

If you are trying to accomplishing a task that is dependent on provisioning cloud infrastructure, you will have the foundational knowledge of the tools at your disposal to accomplish that task

Once you learn the tools, you can accomplish that task repeatedly without spending a majority of your time manually ~~fighting~~ infrastructure.
building



What is Infrastructure Automation?

Infrastructure automation also goes by other names:

- Configuration management
- IT management
- Provisioning
- Scripted infrastructures
- System configuration management

You are describing your infrastructure and its configuration as a script or set of scripts so that environments can be replicated in a much less error-prone manner.

Vagrant

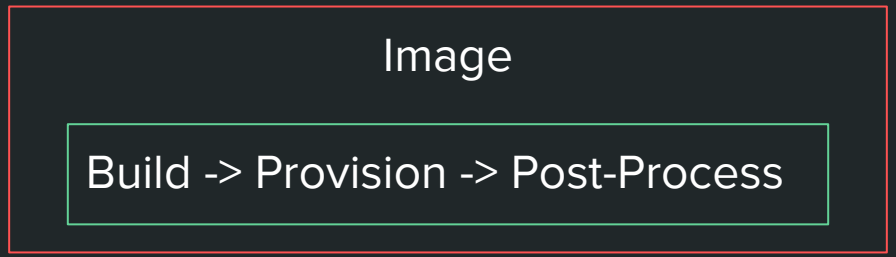
- Automate the creation of development environments
- Providers
  - Virtualbox, VMware, Docker, Hyper-V, and libvirtd
- Provisioners
  - Ansible, Chef, Puppet, Salt, etc.
- Multi-Machine (like Docker Compose)

config.vm
config.ssh / config.winrm

config.vagrant

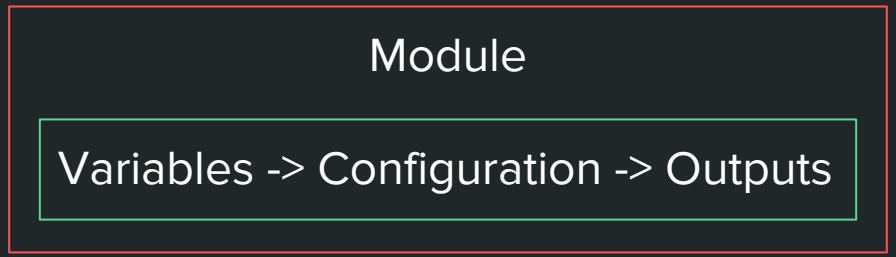
Packer

- Automated machine images
- Templates (like Docker)
- Lots of image formats
  - AWS, Azure, DigitalOcean, Docker, GCP, Virtualbox, VMware
- Lots of provisioners
  - Ansible, Chef, PowerShell, Puppet, Salt



Terraform

- Infrastructure as code via modules
- Maintains state (.tfstate files)
- Many, many providers (Azure, K8s, GCE, AWS, etc.)
- Plugins
- Their GitHub repositories (@HashiCorp) are super helpful
- Terraform Registry



Ansible

- Provision w/ a “push” workflow
  - SSH into boxes
  - Check that everything is good
  - Make changes if necessary
- Agentless
- No special “master” server required
- Deploy and configure at the same time
  - Can do most of what Terraform does wrt deploying infrastructure
- Ansible Tower
  - Enterprise only 😳

Puppet

- Provision w/ a “pull” workflow
  - Agents on machines
  - Send info to master
  - Master verifies info is right, sends changes to agent if necessary
- Agents on provisioned machines that talk to Master server
- Can only configure
  - Machine must already exist w/ Puppet Agent on it, configured to talk to Puppet Master
- Free/OS + Enterprise options 🤍
- Best option for Windows provisioning
  - Desired state configurations are the future

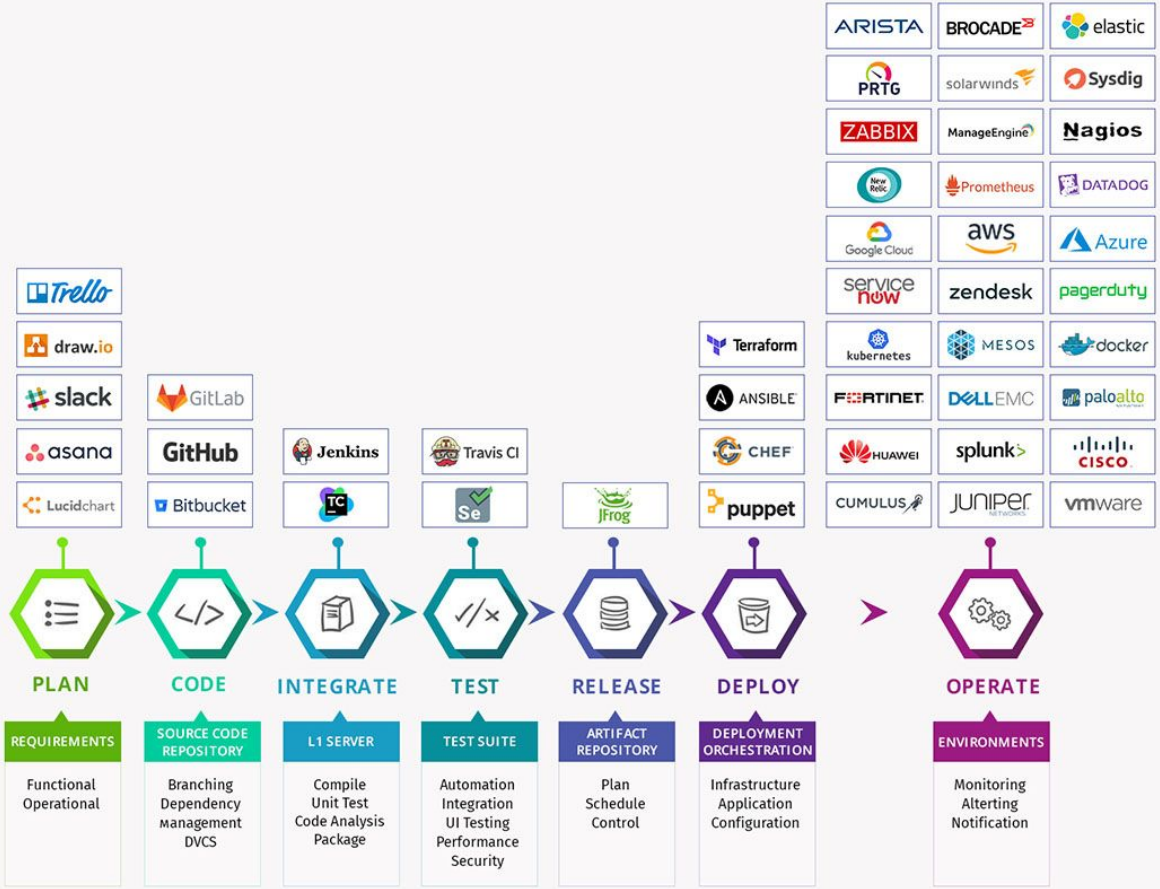
Puppet vs. Ansible

- Push vs Pull workflow
- Agent vs agentless
- Dependency graphs
  - Puppet is smarter and builds this
- Language Extensibility
  - Puppet = Ruby
  - Ansible = Python
- Syntax
  - Puppet DSL
  - Ansible is just YAML
- Community
  - Puppet Forge
  - Ansible Galaxy

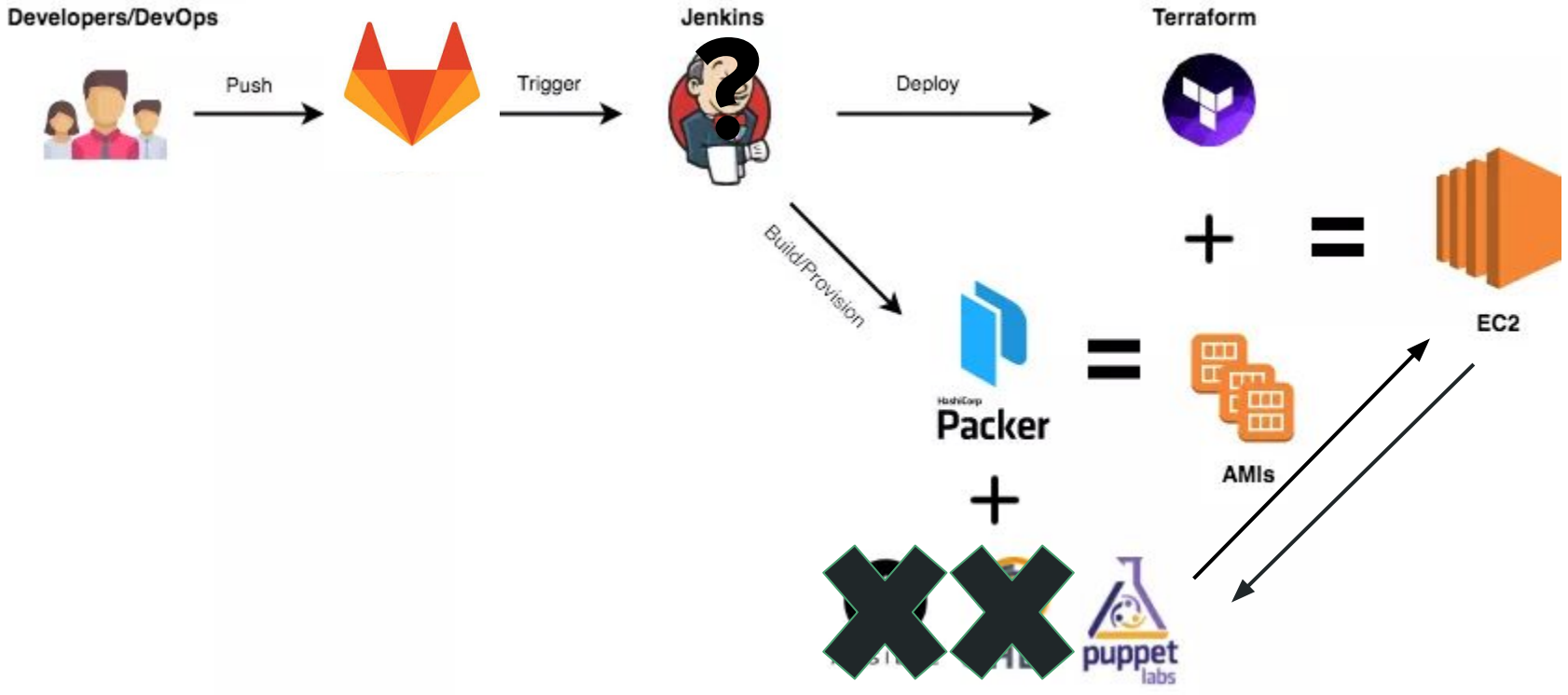
The Others

Many more tools exist, but I lack the experience understanding to discuss them

- Chef (competitor to Puppet & Ansible)
- CloudFormation (AWS)
- Salt (OpenStack)


Trello
draw.io
slack
asana
Lucidchart
GitLab
GitHub
Bitbucket
Jenkins
TC
Travis CI
Se
JFrog
Terraform
ANSIBLE
CHEF
puppet
ARISTA
BROCADE
elastic
PRTG
solarwinds
Sysdig
ZABBIX
ManageEngine
Nagios
New Relic
Prometheus
DATADOG
Google Cloud
aws
Azure
service now
zendesk
pagerduty
kubernetes
MESOS
docker
FORTINET
DELL EMC
paloalto
HUAWEI
splunk>
CISCO
CUMULUS
JUNIPER
vmware
PLAN
CODE
INTEGRATE
TEST
RELEASE
DEPLOY
OPERATE
REQUIREMENTS
Functional
Operational
SOURCE CODE REPOSITORY
Branching
Dependency management
DVCS
L1 SERVER
Compile
Unit Test
Code Analysis
Package
TEST SUITE
Automation Integration
UI Testing
Performance
Security
ARTIFACT REPOSITORY
Plan
Schedule
Control
DEPLOYMENT ORCHESTRATION
Infrastructure
Application
Configuration
ENVIRONMENTS
Monitoring
Alterting
Notification

My Workflow


Developers/DevOps
Push
Trigger
Jenkins
Deploy
Terraform
Build/Provision
Packer
AMIs
EC2
puppet
labs

Examples

github.com/spitfire55/infrastructure-automation

https://github.com/hashicorp

https://forge.puppet.com/modules

Questions / Comments

@spitfyre___

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