



Overview of DevOps

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Dec 1, 2016



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Overview of DevOps

02

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03

Overview of NetDevOps

04

Summary

Who am I?

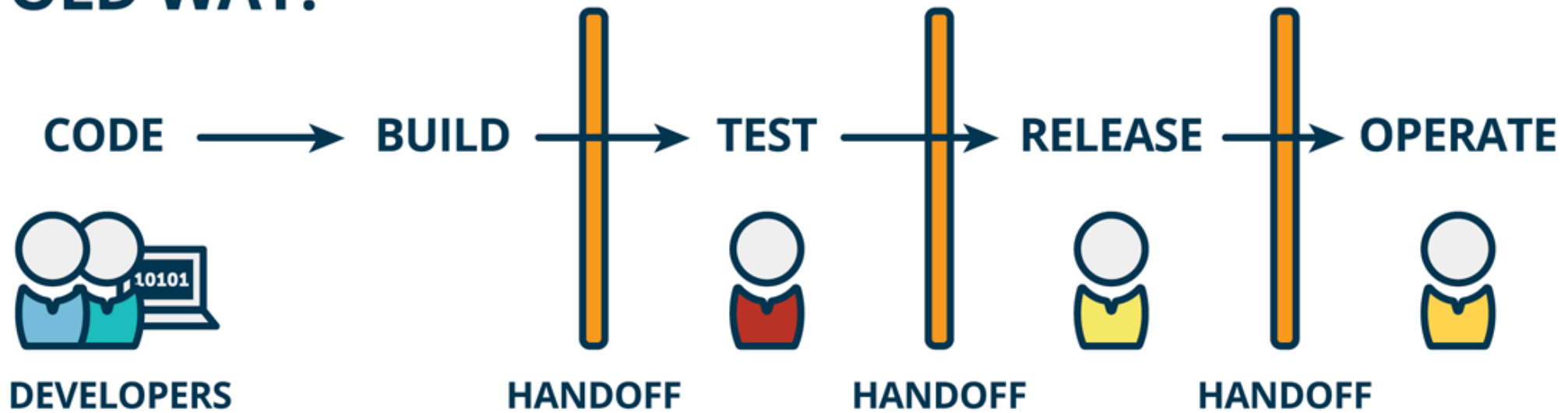
- Phil Huang
 - Edgecore SDN Solution Engineer
 - ONF Ambassador Steering Team
 - Familiar with
 - Open Source / DevOps / NetDevOps
 - SDN Open Source Committer
 - ONOS / Mininet / ONIE
 - Project
 - Global ONOS SDN-IP Deployment, Taiwan
 - GitHub
 - pichuang



General Product Team



OLD WAY:



You

QA/QC

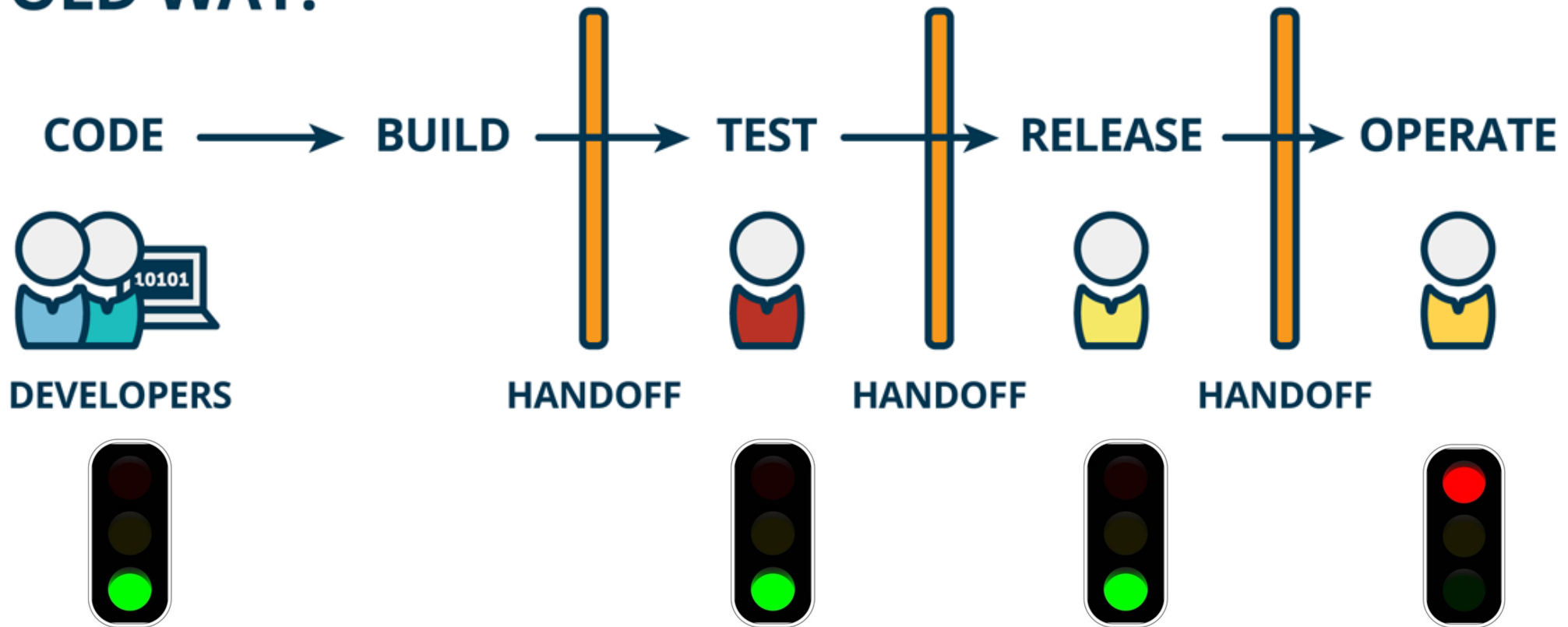
PM

Operator

Ref: <http://www.mindtheproduct.com/2016/02/what-the-hell-are-ci-cd-and-devops-a-cheatsheet-for-the-rest-of-us/>

Problem1: What's wrong?

OLD WAY:



Ref: <http://www.mindtheproduct.com/2016/02/what-the-hell-are-ci-cd-and-devops-a-cheatsheet-for-the-rest-of-us/>

Operator got...



```
VMware ESXi 6.0.0 [Releasebuild-3620759 x86_64]
Machine Check Exception: Fatal (unrecoverable) MCE on PCPU5 in world 33103:nemMap-5
System has encountered a Hardware Error - Please contact the hardware vendor
cr0=0x8001003d cr2=0x3c3f8cc cr3=0x171c000 cr4=0x216c
frame=0x438040055f40 ip=0x418010b0247a err=18 rflags=0x202
rax=0x0 rbx=0x418041400000 rcx=0x0
rdx=0x0 rbp=0x0 rsi=0x17fdcf3e2a24
rdi=0x43004d131390 r8=0x17fdcf3e4dd1 r9=0x0
r10=0x0 r11=0x418041501ec0 r12=0x418041400200
r13=0x0 r14=0x40 r15=0x0
*PCPU5:33103/nemMap-5
PCPU 0: SSHUSISSHSSHSUSUSSSSSSSSSSSH
Code start: 0x418010800000 VMK uptime: 0:03:03:11.632
0x4390ca79b430:[0x418010b0247a]Power_HaltPCPU@vmkernel#nover+0x1f2 stack: 0x417fd0a82ea0
0x4390ca79b480:[0x418010a0fa88]CpuSchedIdleLoopInt@vmkernel#nover+0x2f8 stack: 0x17fdcf3e4dd0
0x4390ca79b500:[0x418010a131dd]CpuSchedDispatch@vmkernel#nover+0x16b5 stack: 0x439248ea7100
0x4390ca79b620:[0x418010a13da4]CpuSchedWait@vmkernel#nover+0x240 stack: 0x0
0x4390ca79b6a0:[0x418010a140e5]CpuSchedTimedWaitInt@vmkernel#nover+0xc9 stack: 0x2001
0x4390ca79b720:[0x418010a141b6]CpuSched_TimedWait@vmkernel#nover+0x36 stack: 0x430352544080
0x4390ca79b740:[0x418010818f88]PageCacheAdjustSize@vmkernel#nover+0x344 stack: 0x0
0x4390ca79bfd0:[0x418010a14a3e]CpuSched_StartWorld@vmkernel#nover+0xa2 stack: 0x0
base fs=0x0 gs=0x418041400000 Kgs=0x0
2016-11-13T09:16:33.522Z cpu5:33103)MC:PCPU5 B:4 S:0xba00000081000402 M:0x0 A:0x0 5

2016-11-13T09:16:33.522Z cpu5:33103)MC:PCPU5 B:4 S:0xba00000081000402 M:0x0 A:0x0 5

Coredump to disk. Slot 1 of 1.
Finalized dump header (13/13) DiskDump: Successful.
No port for remote debugger.
```

Ref: VMWare ESX Host Purple Diagnostic Screen

PM & QA think...

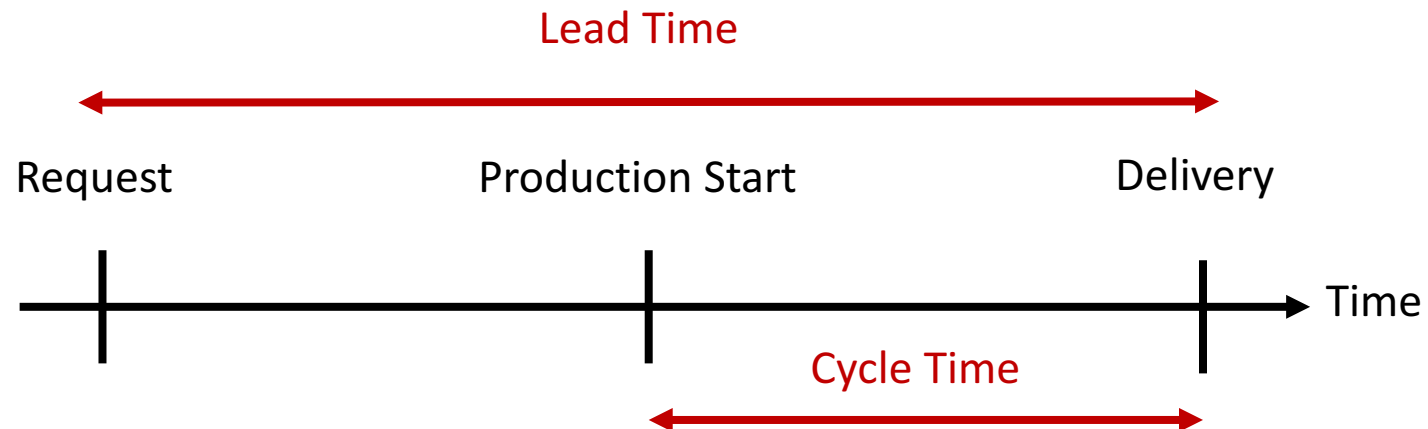


You think...



Problem 2: Lead time Too Long

- Lead Time
 - Time between request to delivery
 - This is what customer sees
- Cycle Time (or Process Time)
 - Time between production start to completion
 - Not visible to customer



Ref: <http://www.slideshare.net/Managewell/lean-and-kanbanbased-software-development>

No Value, No Revenue



Problem 3: Schedule Visibility



You

Problem 4: Human Error Race

- 80% of outages impacting mission-critical services will be caused by people and process issue
- 20% of those outages will be caused by change/configuration/release integration and hand-off issues

Ref: <http://www.slideshare.net/giganati/is-orchestration-the-next-big-thing-in-devops>

Problem 5: What happened in your system?

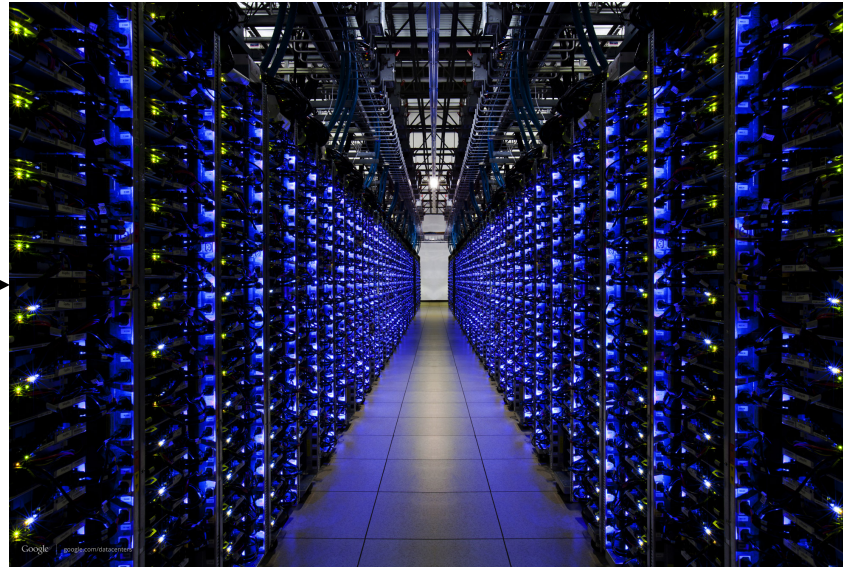
Administrator control
via GUI and CLI

Crontab from system

Force majeure

...

Input



Output



Why DevOps?

- Collaboration
 - Developer + Operator
 - Reduce challenges related to Ops and Dev collaboration
- Deployment
 - Minimize deployment related downtime
 - Minimize roll-backs of deployed application
- Defect resolution
 - Minimize MTTR
 - Increase the ability to **reproduce** and fix defects

MTTR = Mean Time To Resolution

DevOps is about CALMS

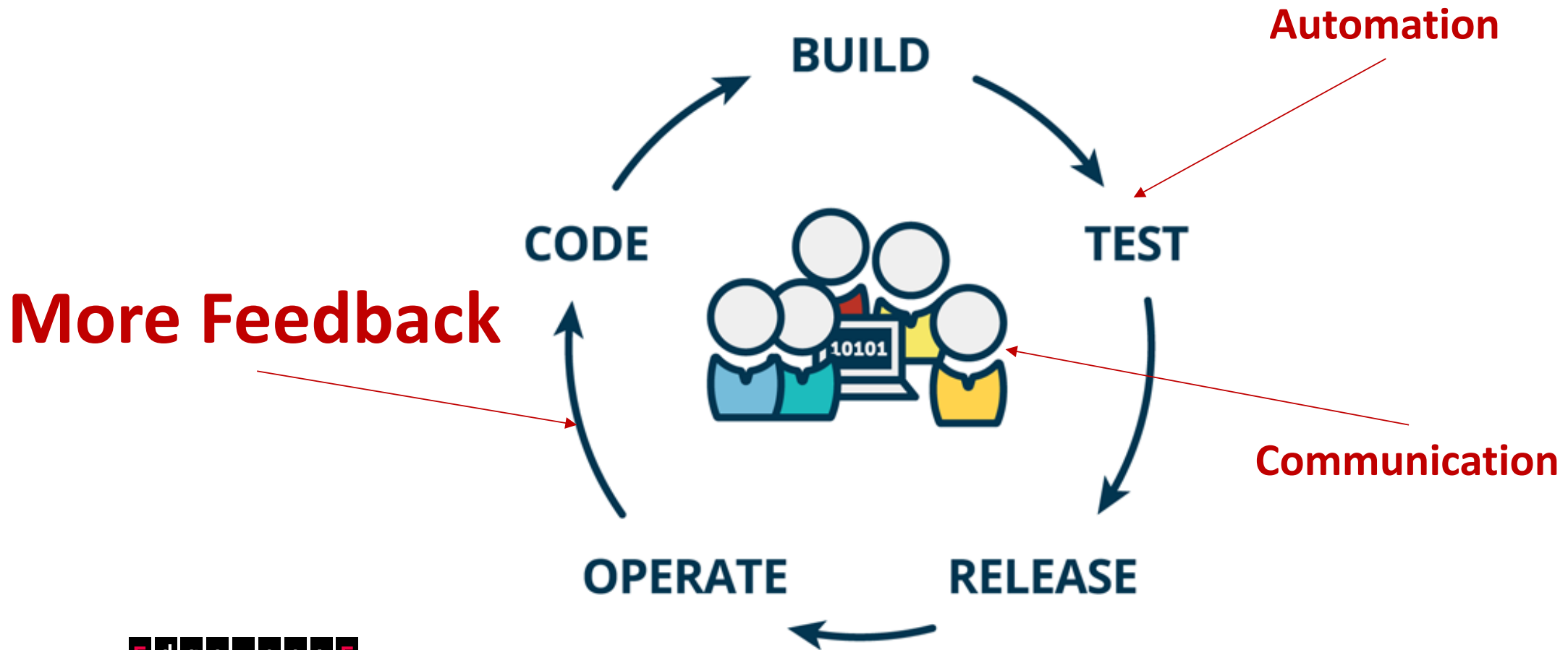
- **Culture**
 - More communication with team member
- **Automation**
 - The idea that you should program everything
- **Lean**
 - Keeping everything to a minimum
- **Measurement**
 - Try to have visibility into everything
- **Sharing**
 - Regular exchanging of ideas across team



Culture



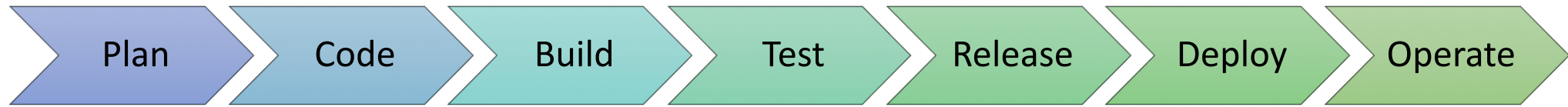
NEW WAY:



Culture

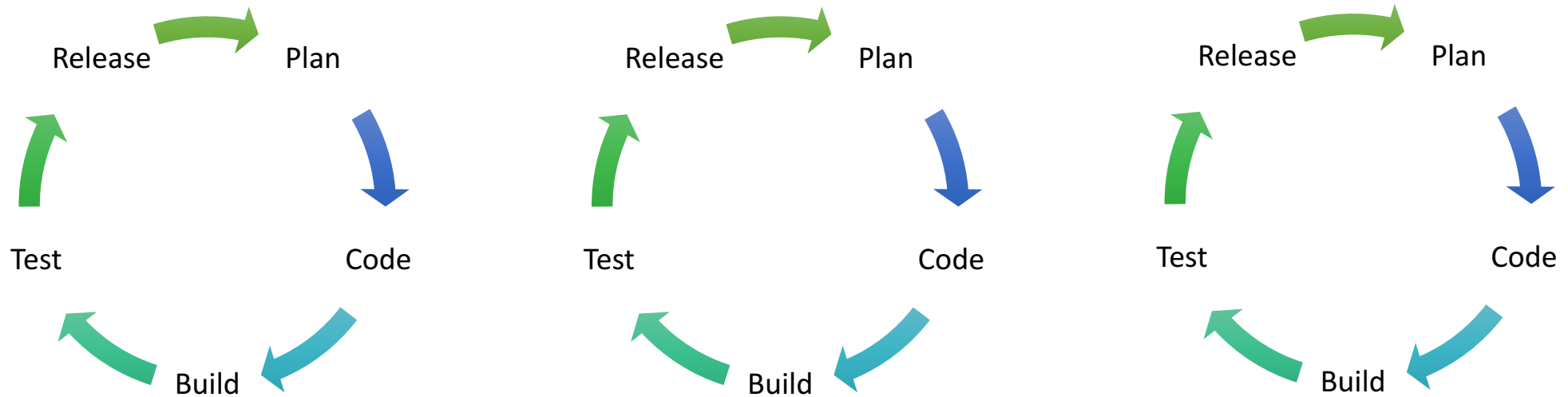


Waterfall



Time

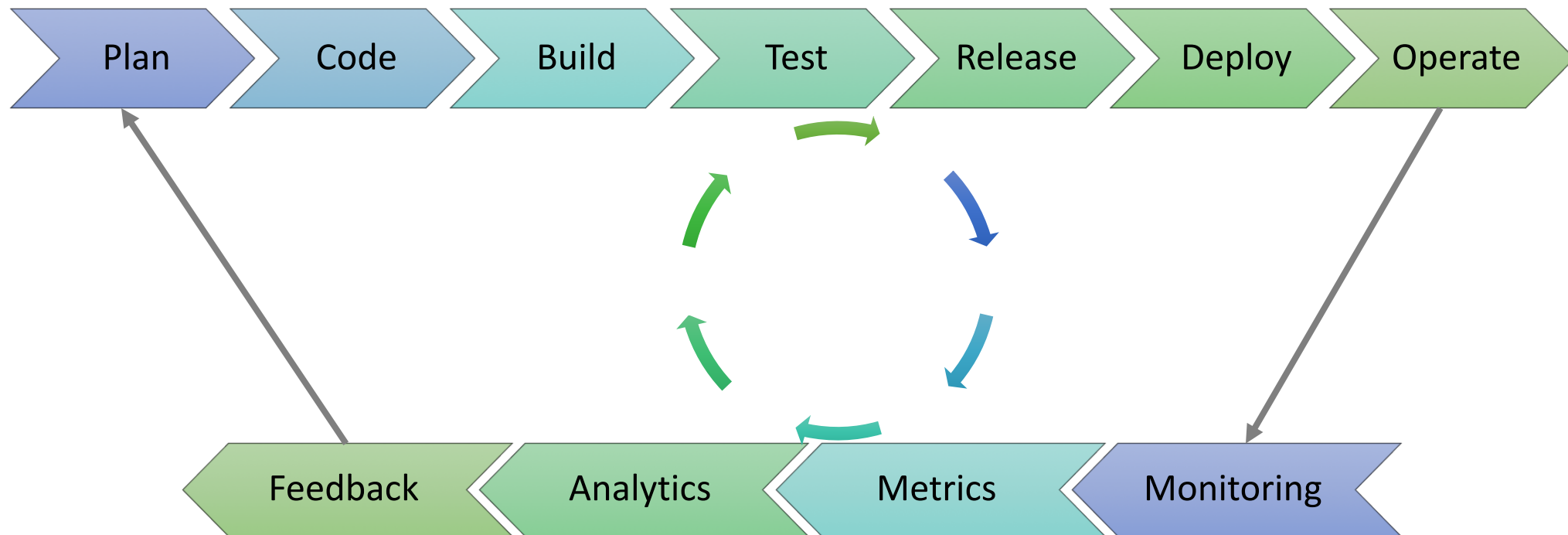
Agile



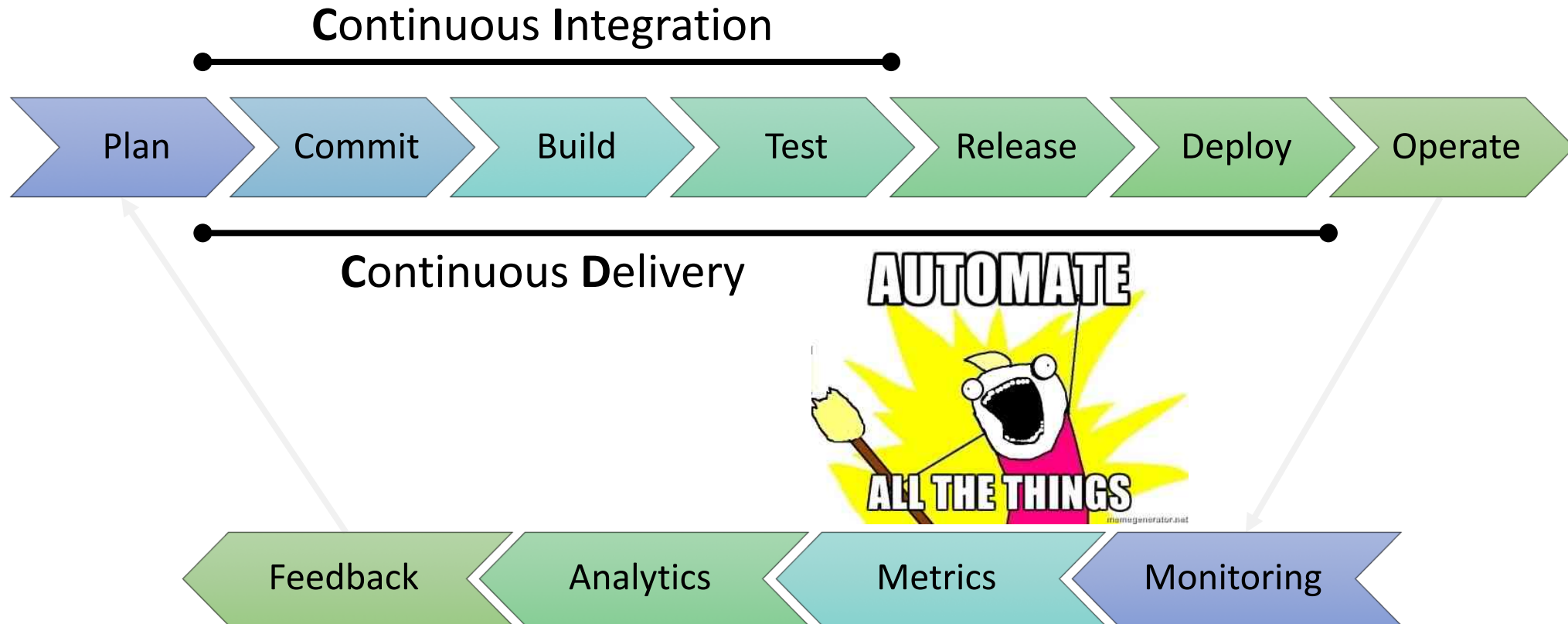
Automation



■ DevOps Lifecycle



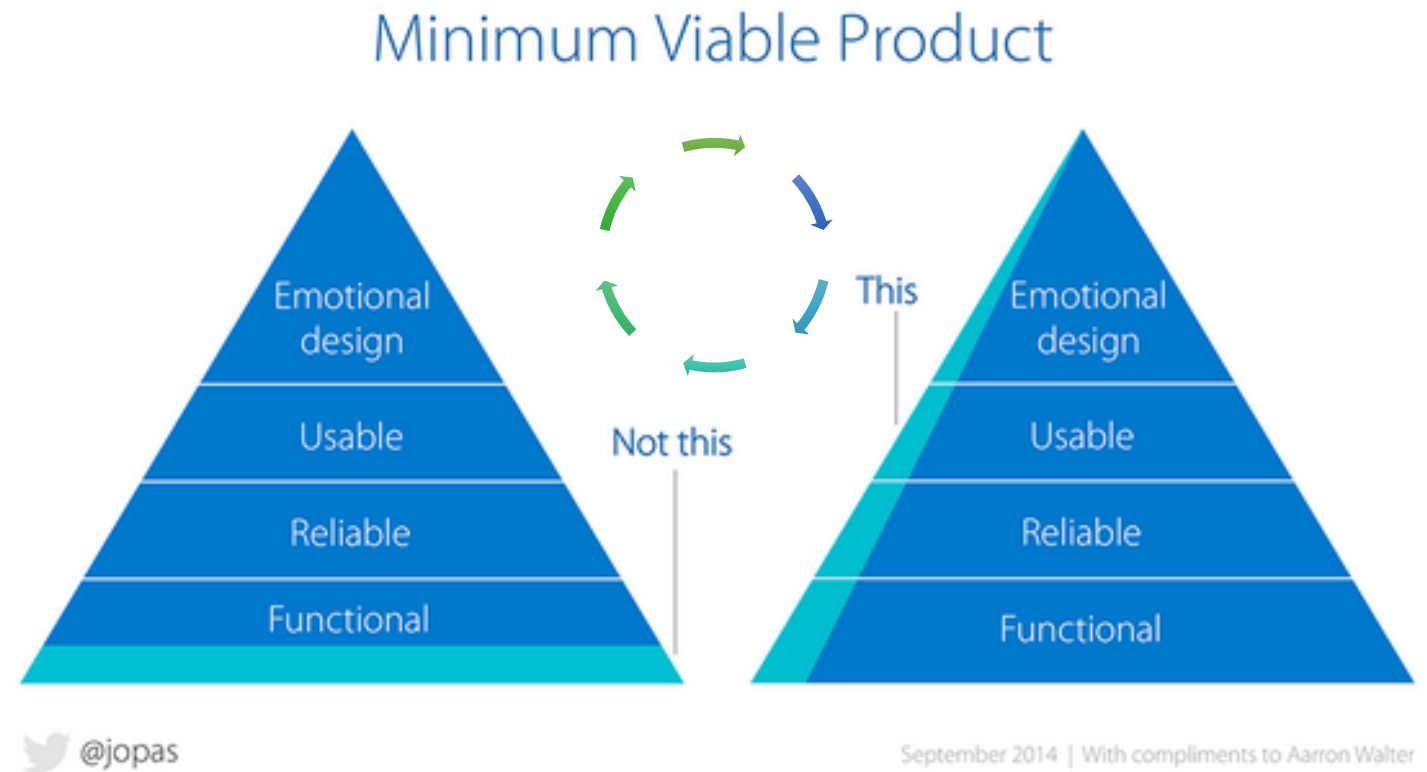
Automation



Lean

■ MVP (Minimal Viable Product)

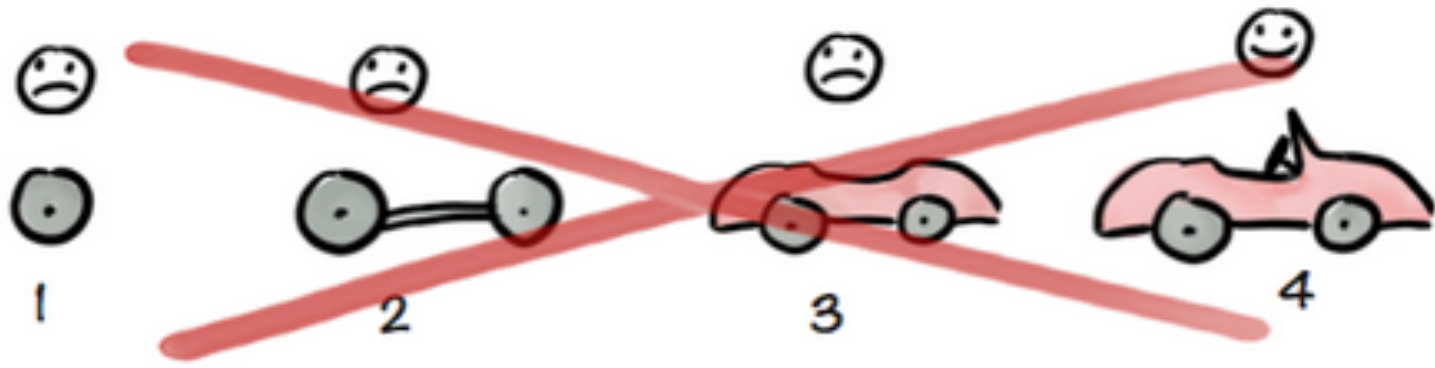
- Set a goal
- Minimum cost
 - **Time**, Money...etc
- Feedback from customer
- Continual Improvement



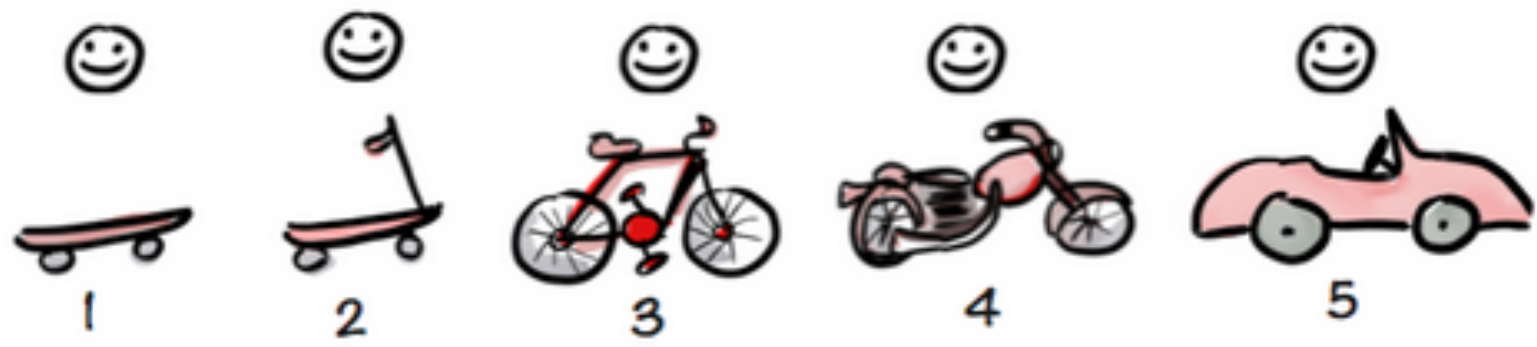
Ref: <http://justinmcgill.net/product-idea-validation-dont-build-mvp/>

Lean

Not like this....



Like this!



Ref: <https://blog.engineyard.com/2015/actually-mvp>

Measurement

- Data collection
 - Syslog, performance data
- Definition of measurement
- Data visualization
 - *A picture is worth a thousand words*
- Data analysis
 - Find business value



Sharing

- Focus on communication
- Any experiences for team
- Focus on people

2016 State of DevOps Report

High-performing IT organizations report experiencing:



200x more frequent deployments



24x faster recovery from failures



3x lower change failure rate



2,555x shorter lead times

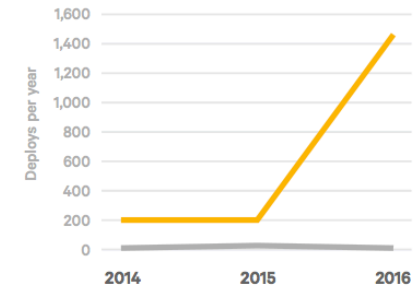
High performers spend



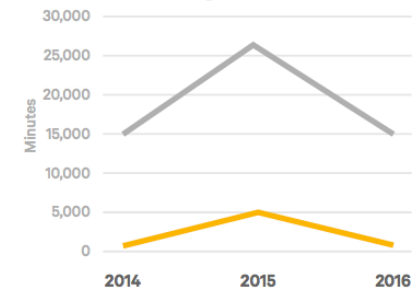
22%

less time on unplanned work and rework

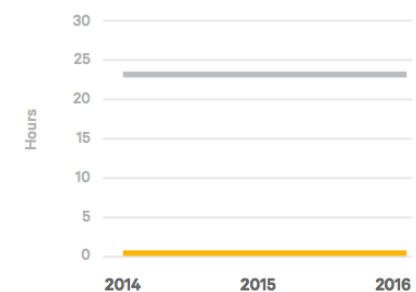
Deploy Frequency



Change Lead Time



Mean Time to Recover



Ref: <https://puppet.com/resources/white-paper/2016-state-devops-report/>

Periodic Table of DevOps Tools

PERIODIC TABLE OF DEVOPS TOOLS (V2) [EMBED](#) [DOWNLOAD](#) [ADD](#)

1 Fm Gh Github																2 Fm Aws AmazonWeb Services						
3 Os Gt Git	4 Pd Dm DBmaestro																5 En Ch Chef	6 En Pu Puppet	7 Os An Ansible	8 En Sl Salt	9 Os Dk Docker	10 Pd Az Azure
11 Fm Bb Bitbucket	12 Os Lb Liquibase																13 Os Ot Otto	14 En Bl BladeLogic	15 Os Va Vagrant	16 Fr Tf Terraform	17 Os Rk rkt	18 En Gc Google Cloud Platform
19 Os Gl GitLab	20 En Rg Redgate	21 Os Mv Maven	22 Os Gr Gradle	23 Os At ANT	24 Os Fn FitNesse	25 Fr Se Selenium	26 Os Ga Gatling	27 Fr Dh Docker Hub	28 Os Jn Jenkins	29 Pd Ba Bamboo	30 Os Tr Travis CI	31 Pd Gd Deployment Manager	32 Os Sf SmartFrog	33 Os Cn Consul	34 Os Bc Bcfg2	35 Os Mo Mesos	36 En Rs Rackspace					
37 Os Sv Subversion	38 En Dt Datical	39 Os Gt Grunt	40 Os Gp Gulp	41 Os Br Broccoli	42 Fr Cu Cucumber	43 Os Cj Cucumberjs	44 Fr Qu Qunit	45 Os Npm npm	46 Fm Cs Codeship	47 Pd Vs Visual Studio	48 Fm Cr CircleCI	49 Fr Cp Capistrano	50 Fr Ju JuJu	51 Os Rd Rundeck	52 Os Cf CFEngine	53 Fr Ds Swarm	54 Os Op OpenStack					
55 Os Hg Mercurial	56 En Dp Delphix	57 Fr Sb sbt	58 Os Mk Make	59 Os Ck CMake	60 Fr Ju JUnit	61 Fr Jm JMeter	62 Fr Tn TestNG	63 Os Ay Artifactory	64 Fm Tc TeamCity	65 Fm Sh Shippable	66 Os Cc CruiseControl	67 En Ry RapidDeploy	68 Fm Cy CodeDeploy	69 En Oc Octopus Deploy	70 En No CA Nolio	71 Os Kb Kubernetes	72 Fm Hr Heroku					
73 En Cw ISPW	74 En Id Idera	75 Os Msb MSBuild	76 Os Rk Rake	77 Fr Pk Packer	78 Os Mc Mocha	79 En Xltv XL TestView	80 Os Jm Jasmine	81 Os Nx Nexus	82 Os Co Continuum	83 Fm Ca Continua CI	84 Pd So Solano CI	85 En Xld XL Deploy	86 En EB ElectricBox	87 Fm Dp Deploybot	88 En Ud UrbanCode Deploy	89 Os Nm Nomad	90 En Os OpenShift					

- Os Open Source
- Fr Free
- Fm Freemium
- Pd Paid
- En Enterprise
- SCM
- CI
- Deployment
- Cloud / IaaS / PaaS
- BI / Monitoring
- Database Mgmt
- Repo Mgmt
- Config / Provisioning
- Release Mgmt
- Logging
- Build
- Testing
- Containerization
- Collaboration
- Security

XebiaLabs
Deliver Faster

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91 En Xlr XL Release	92 En Ur UrbanCode Release	93 En Bm BMC Release Process	94 En Hp HP Codar	95 En Au Automic	96 En Pl Plutora Release	97 En Sr Serena Release	98 Pd Tfs Team Foundation	99 Fm Tr Trello	100 Pd Jr Jira	101 Fm Rf HipChat	102 Fm Sl Slack	103 Fm Fd Flowdock	104 Pd Pv Pivotal Tracker	105 En Sn ServiceNow
106 Os Ki Kibana	107 Fm Nr New Relic	108 Os Ni Nagios	109 Os Zb Zabbix	110 En Dd Datalog	111 Os El Elasticsearch	112 Os Ss StackState	113 En Sp Splunk	114 Fm Le Logentries	115 Fm Sl Sumo Logic	116 Os Ls Logstash	117 Os Gr Graylog	118 Os Sn Snort	119 Os Tr Tripwire	120 En Ff Fortify

Develop workflow

You



- Workflow
1. Launch VM → Choose Hypervisor, CPU, RAM, Disk size, location
 2. Setting environment → Bash, vim, dependency package
 3. Install applications → View INSTALL file
 4. Quick start → View README files
 5. Develop → View Developer's Guide
 6. Compile → View Developer's Guide
 7. Re-install application → View Developer's Guide

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Baby Step 1 – Reduce Routine Manual Job

Manually

```
$ cd $PROJECT_ROOT
$ python setup.py build
$ python setup.py install
$ cd $WORK_ROOT
$ ./service start
```



One-Click

- `$ /usr/bin/rebuild.sh`

```
#!/bin/bash
set -x
cd $PROJECT_ROOT
python setup.py build
python setup.py install
cd $WORK_ROOT/service start
```


Baby Step 2 – Version Control Everything

- `$ /usr/bin/rebuild.sh`

```
#!/bin/bash
set -x
cd $PROJECT_ROOT
echo "Start build"
python setup.py build
echo "Start install"
python setup.py install
cd $WORK_ROOT/service start
```

```
12:13:50 roan@nu11 0 ~/code/rebuild (master*)
$ git lg
* 991f839 - (HEAD -> master) Add action description (2 minutes ago) <Phil Huang>
* ce7af39 - Change permission (2 minutes ago) <Phil Huang>
* 65ff291 - init (3 minutes ago) <Phil Huang>
12:13:51 roan@nu11 0 ~/code/rebuild (master*)
$ git log
commit 991f8394f70b30d19cd774f23774af15944ba6ef
Author: Phil Huang <phil_huang@edge-core.com>
Date: Thu Dec 1 12:12:16 2016 +0800

    Add action description

    Signed-off-by: Phil Huang <phil_huang@edge-core.com>

commit ce7af3916e03f8ab2659f45fc8d7adf06bc37add
Author: Phil Huang <phil_huang@edge-core.com>
Date: Thu Dec 1 12:11:36 2016 +0800

    Change permission

    Signed-off-by: Phil Huang <phil_huang@edge-core.com>

commit 65ff2910a26ff8f50faa2bf3013352cc0d01a941
Author: Phil Huang <phil_huang@edge-core.com>
Date: Thu Dec 1 12:11:04 2016 +0800

    init

    Signed-off-by: Phil Huang <phil_huang@edge-core.com>
```

Develop workflow

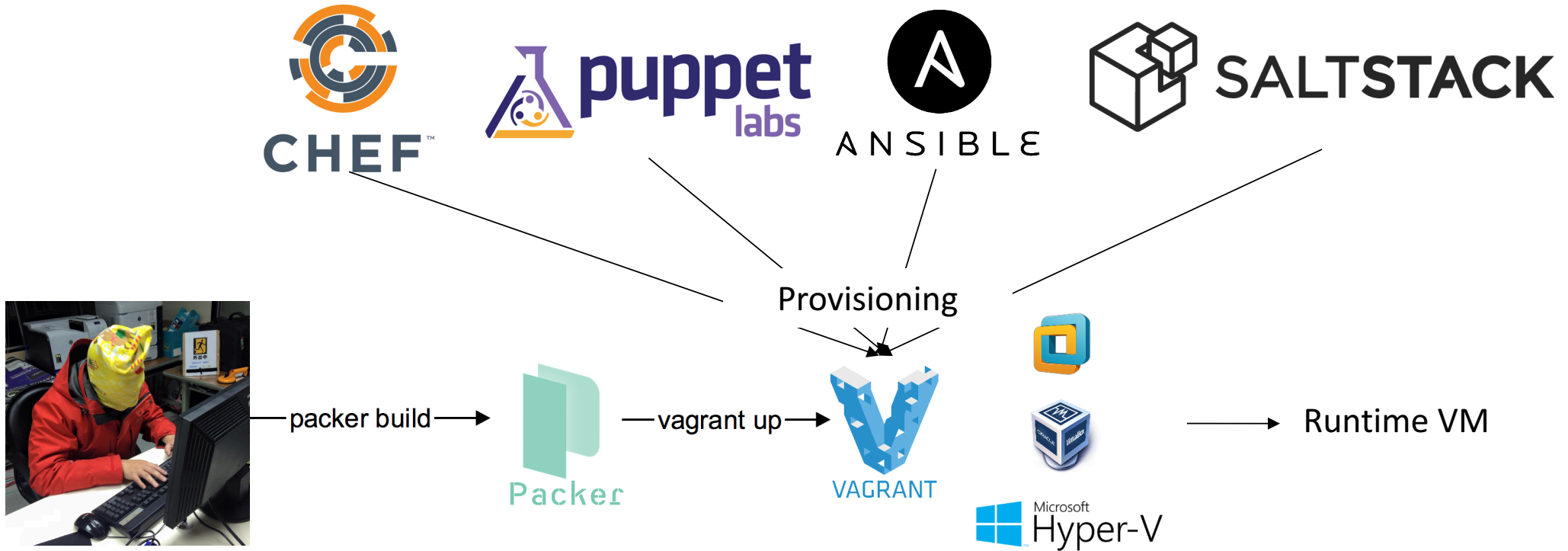


You



- Workflow
1. **Launch VM** → Choose Hypervisor, CPU, RAM, Disk size, location
 2. **Setting environment** → Bash, vim, dependency package
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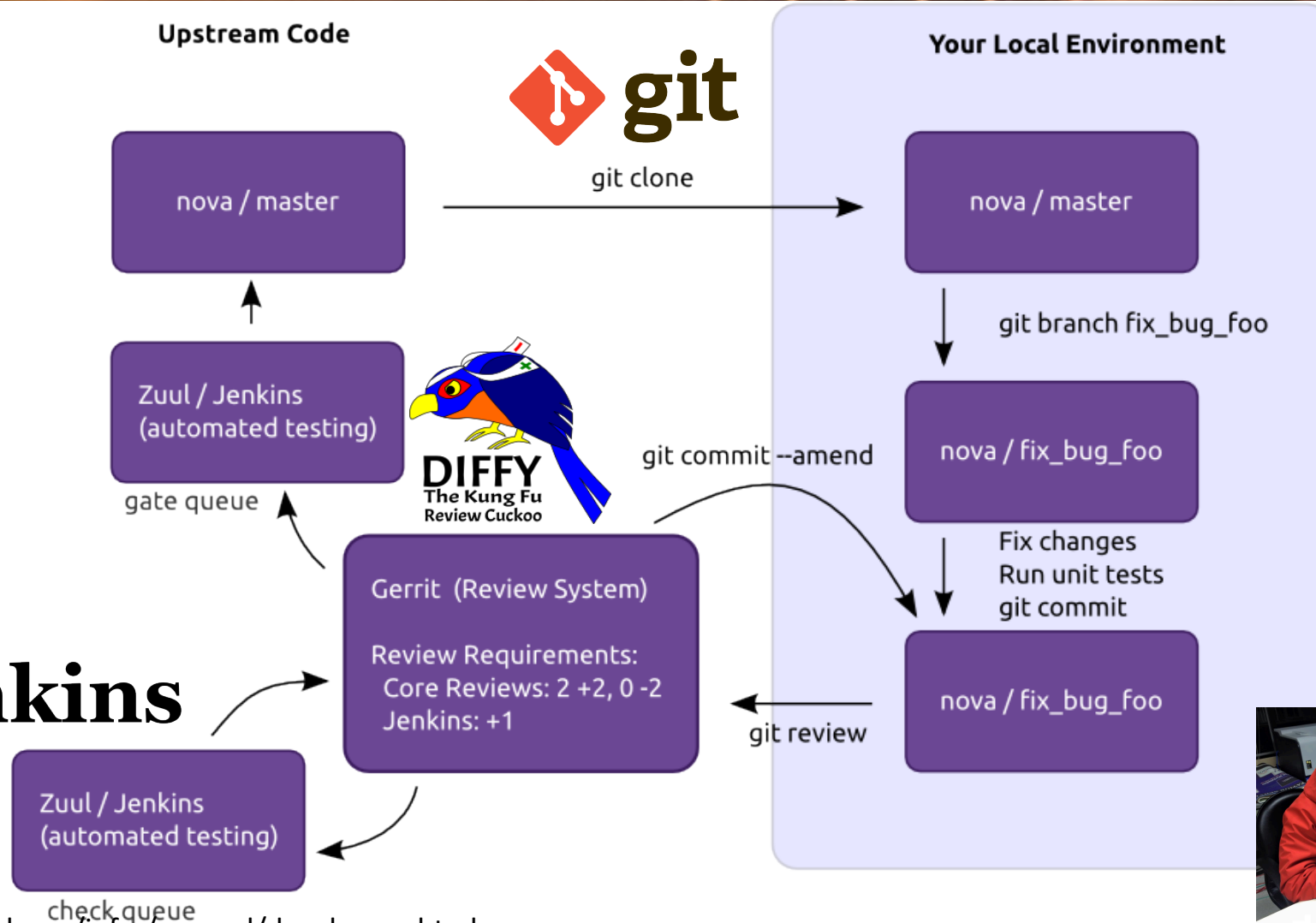
Baby Step 3 – Packer + Vagrant



Case Study - OpenSource Contribution Workflow



Jenkins



Ref: <http://docs.openstack.org/infra/manual/developers.html>

Gerrit Code Review



All My Projects People Documentation
[Open](#) [Merged](#) [Abandoned](#)

status:open

Changes Phil Huang

Search for status:open

Subject	Status	Owner	Project	Branch	Updated	Size	CR	MO	V
★ ONOS-5682 Introduced VIRTUAL_DEVICE_* events.		Claudine Chiu	onos	master (ONOS-5682)	2:53 PM	<div style="width: 10px; height: 10px; background-color: #90EE90;"></div>			
★ ONOS-5639, ONOS-5673 Dynamic Config Service APIs		Sithara Punnassery	onos	master	2:50 PM	<div style="width: 10px; height: 10px; background-color: #FF0000;"></div>			✗
★ [ONOS] Compute path with Explicit path objects		Priyankab-Huawei	onos	master (12022)	1:45 PM	<div style="width: 10px; height: 10px; background-color: #FF0000;"></div>			✗
★ ONOS-5703 OFChannelHandler does not handle error if meter is not supported		Charles Chan	onos	master (onos-5703)	1:39 PM	<div style="width: 10px; height: 10px; background-color: #90EE90;"></div>	+1		✓
★ Restructuring VLAN tag net cfg, fixing ONOS-5613 and making newoptical ...		Konstantinos Kanonakis	onos-app-samples	master (ce-app-vlanCfg)	12:26 PM	<div style="width: 10px; height: 10px; background-color: #FF0000;"></div>			✓
★ Add LISP mapping entry aging mechanism		Jian Li	onos	master (LISP)	12:14 PM	<div style="width: 10px; height: 10px; background-color: #FF0000;"></div>	+1		✓
★ Introducing BandwidthProfileConfigBehaviour to manage policers/markers		Konstantinos Kanonakis	onos	master (BandwidthProfileConfig)	12:00 PM	<div style="width: 10px; height: 10px; background-color: #FF0000;"></div>	+1	+1	✗
★ Bgp and Pcep maintainability		mohamed rahil R	onos	master	11:52 AM	<div style="width: 10px; height: 10px; background-color: #FF0000;"></div>	-1	-1	
★ [ONOS-5465][TE Tunnel SB Provider] Interaction with ONOS core TE subsystems ...		cheng fan	onos	master (tetunnel_sbi)	11:30 AM	<div style="width: 10px; height: 10px; background-color: #FF0000;"></div>			✓
★ [CORD-638] ICMPv6 NDP support		Pier Luigi Ventre	onos	master (ndp-support)	10:07 AM	<div style="width: 10px; height: 10px; background-color: #FF0000;"></div>	-1		✓
★ Implement distributed route store		Charles Chan	onos	master (dist-route-store)	10:06 AM	<div style="width: 10px; height: 10px; background-color: #FFA500;"></div>			✓
★ [CORD-458] Updates ARP handler		Pier Luigi Ventre	onos	master (update-arp-handler)	10:04 AM	<div style="width: 10px; height: 10px; background-color: #FFA500;"></div>	-1		✓
★ [CORD-630] IPv6 filtering rules		Pier Luigi Ventre	onos	master (filt-ipv6)	10:03 AM	<div style="width: 10px; height: 10px; background-color: #FF0000;"></div>	-1		✓
★ CORD-523 Introduce generic routing service in Segment Routing		Charles Chan	onos	master (generic-routing)	9:24 AM	<div style="width: 10px; height: 10px; background-color: #FFA500;"></div>	-1	-1	✓
★ Support LISP SMR message		Yoonseon Han	onos	master (LISP)	8:12 AM	<div style="width: 10px; height: 10px; background-color: #FFFF00;"></div>			✓
★ [newOpenTAM] new Upgraded AFM and FlowStatisticService		SangSik Yoon	onos	master (newOpenTAM)	5:25 AM	<div style="width: 10px; height: 10px; background-color: #FF0000;"></div>			✗
★ YANG model design to define data node for usage in YANG store and YANG runtime		VinodKumarS-Huawei	onos-yang-tools	master (yang-runtime-sketch)	4:00 AM	<div style="width: 10px; height: 10px; background-color: #FF0000;"></div>			✓
★ ONOS-5549 TE Tunnel LSP attributes management	Merge Conflict	qinghui chen	onos	master (tetunnel_impl)	3:01 AM	<div style="width: 10px; height: 10px; background-color: #FF0000;"></div>	+1	+1	✓
★ WIP [ONOS-5310] queryMeters feature in ResourceDeviceListener.		Jordi Ortiz	onos	master (queryMetersFeature)	2:57 AM	<div style="width: 10px; height: 10px; background-color: #90EE90;"></div>	✓	✓	✓
★ [ONOS-5678] MeterIdCodec		Jordi Ortiz	onos	master (queryMetersFeature)	2:56 AM	<div style="width: 10px; height: 10px; background-color: #90EE90;"></div>	+1	+1	✓
★ ONOS-5215 protection behaviour		Yuta HIGUCHI	onos	master (protection)	2:27 AM	<div style="width: 10px; height: 10px; background-color: #FF0000;"></div>	+1	+1	✓
★ WIP:[ONOS-5595] netcfg for protection		Yuta HIGUCHI	onos	master (protection)	2:27 AM	<div style="width: 10px; height: 10px; background-color: #FF0000;"></div>	✓	✓	✓
★ WIP:[ONOS-5604] ProtectionConfig listener		Yuta HIGUCHI	onos	master (protection)	2:23 AM	<div style="width: 10px; height: 10px; background-color: #FFA500;"></div>	✓	✓	✓
★ Fix for ONOS-5032		deepa vaddireddy	onos	onos-1.7 (ONOS-5032)	2:17 AM	<div style="width: 10px; height: 10px; background-color: #90EE90;"></div>			✓

Jenkins

[開啟自動更新頁面](#)

- 使用者
- 建置歷程
- 專案關連
- 檢查檔案指紋

建置佇列 -

佇列中沒有建置作業。

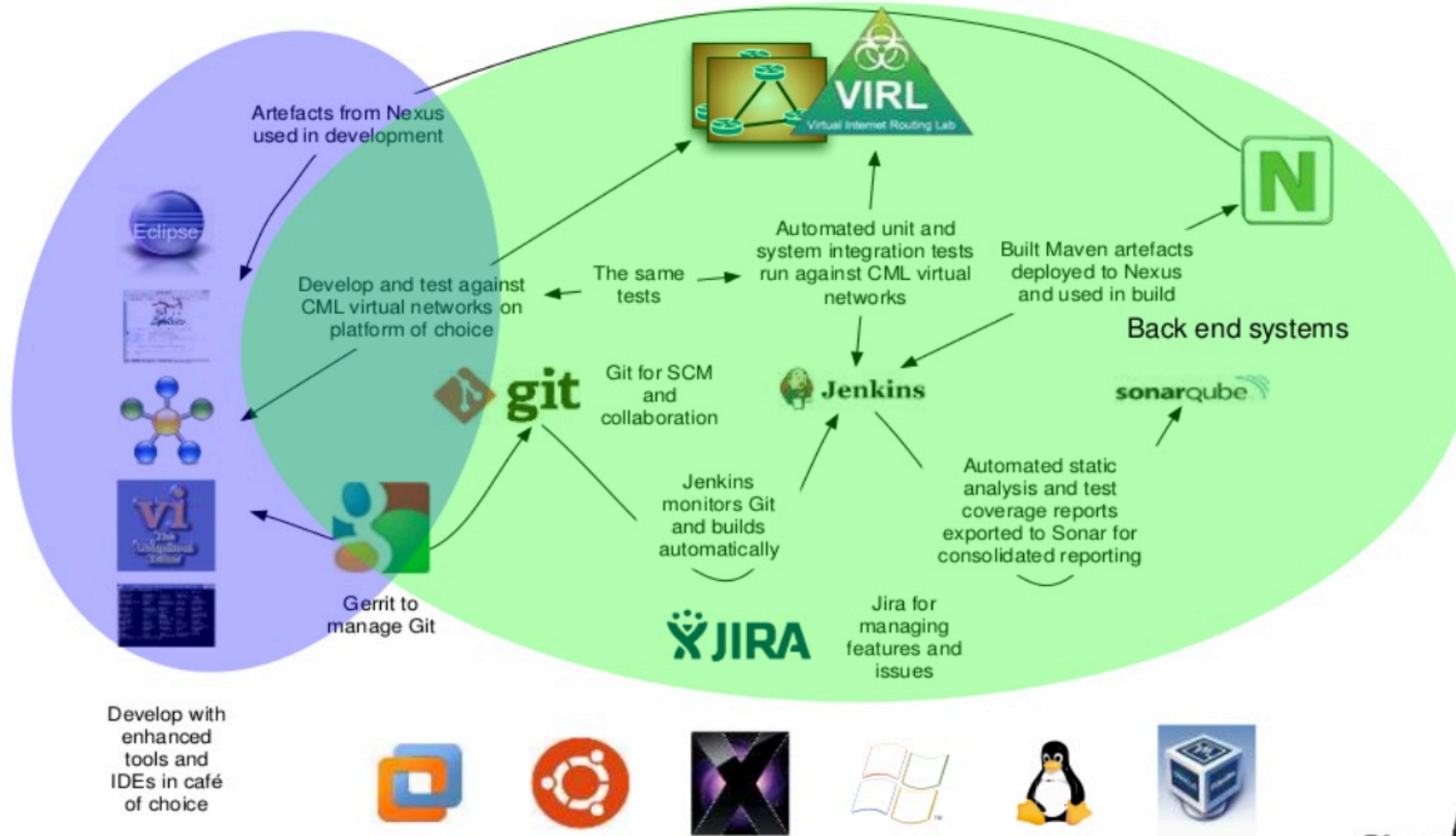
建置執行程式狀態 -

- 1 閒置
- 2 閒置
- 3 閒置
- 4 閒置

S	W	名稱 ↓	上次成功時間	上次失敗時間	上次建置花費時間
		copycat-master	9月12天 - #47	無	40秒
		DEPRECATED-onos-nightly	22天 - #516	22天 - #517	44分
		DEPRECATED-onos-sonar	1月5天 - #636	24天 - #644	54分
		onos-app-samples-gerrit	7天14時 - #2390	12天 - #2389	2分44秒
		onos-buck-nightly	23時 - #45	5天23時 - #40	1分43秒
		onos-gerrit	1天21時 - #15251	1月5天 - #15211	18分
		onos-gerrit-buck	23分 - #7386	1時52分 - #7384	3分33秒
		onos-gerrit-maven	23分 - #1927	32分 - #1926	22分
		onos-master	5時38分 - #245	無	1.2秒
		onos-master-maven	1月20天 - #5372	1月20天 - #5377	41分
		onos-nemo-gerrit	7天22時 - #86	14天 - #82	44秒
		onos-sonar-buck	30分 - #27	無	26分
		onos-ui	23分 - #5787	13天 - #5433	39秒
		onos-yang-tools-gerrit	20時 - #265	7天15時 - #257	1分27秒

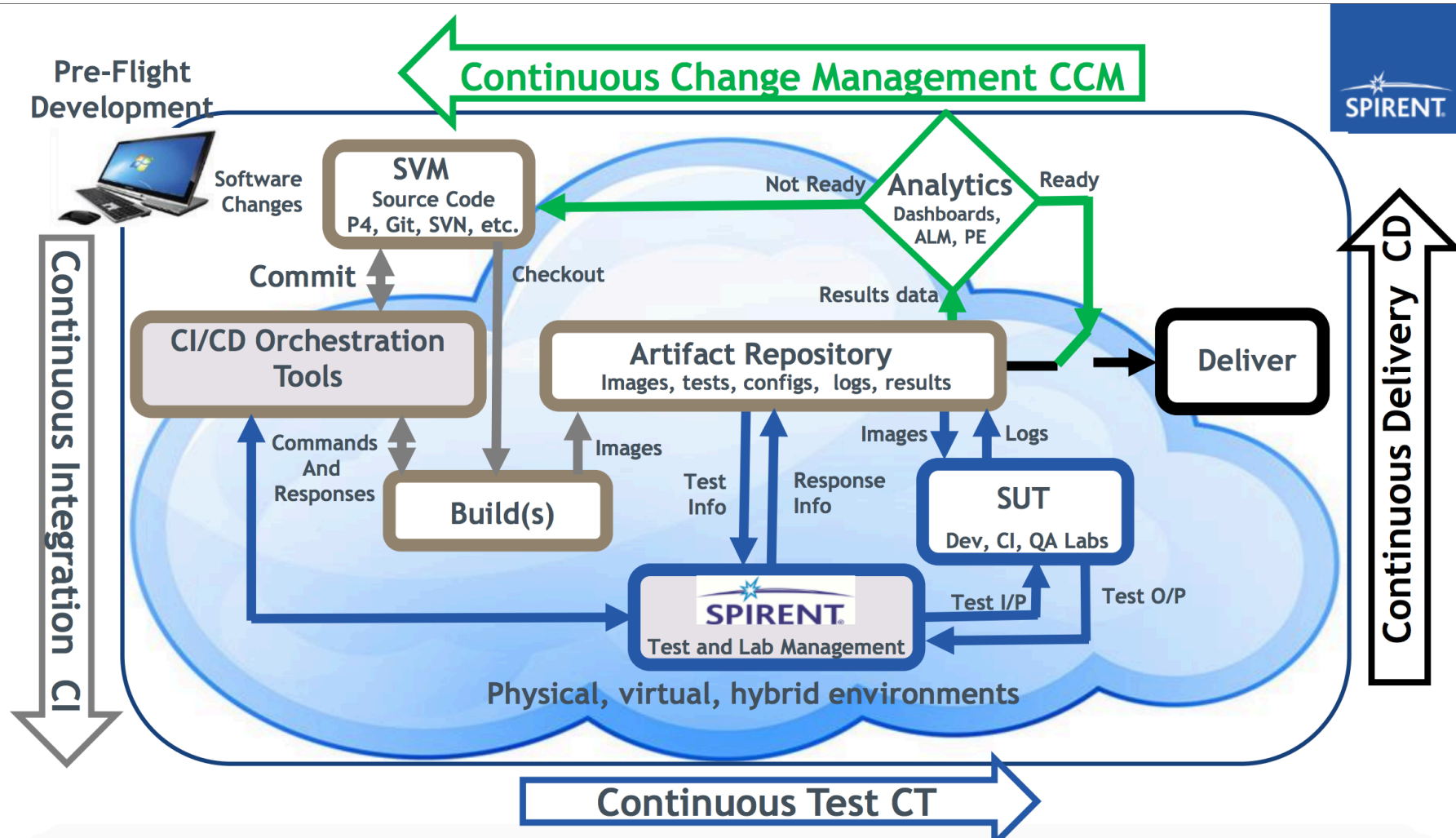
圖示: [S](#) [M](#) [L](#)

Case Study - CISCO



Ref: <http://www.slideshare.net/CiscoDevNet/enabling-devops-in-an-sdn-world>

Case Study - Spirent



Ref: http://dw.connect.sys-con.com/session/2779/Marc_Hornbeek.pdf

Case Study – BigSwitch Chaos Monkey



Chaos Monkey, NSX and Big Cloud Fabric

Demonstrating Overlay/Underlay High Availability With 'Chaos Monkey' Style Stress Testing of NSX-v with Big Cloud Fabric



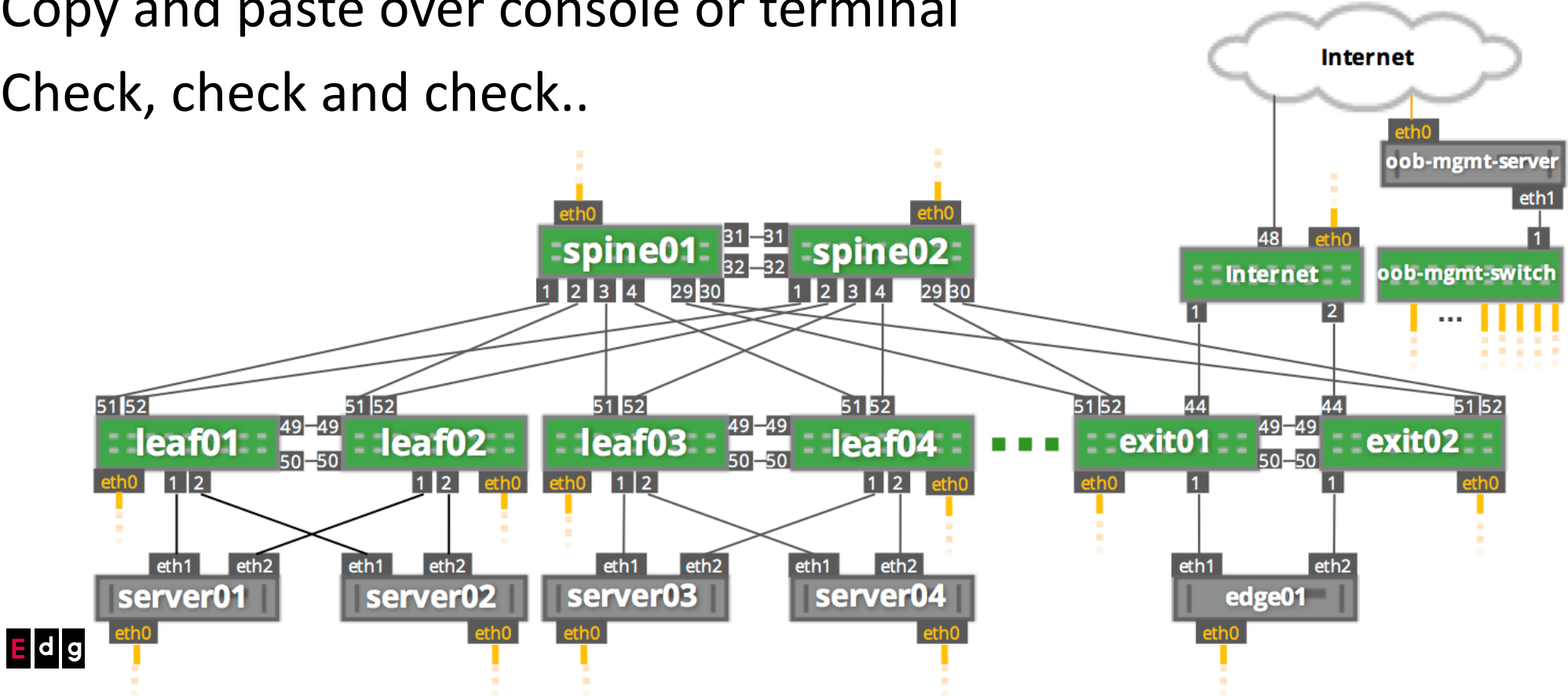
Chaos Monkey testing, a term coined by the Netflix team, involves taking a complex infrastructure and forcing random components to fail while measuring the impact on overall application health.

Applying this in an overlay/underlay context, the team at Big Switch put together a chaos monkey test with a 32 leaf / 6 spine Big Cloud Fabric underlay and NSX overlay outfitted with compute, storage and software to run the Hadoop Terasort benchmark. By using Big Cloud Fabric with NSX together, the design is a) more resilient, b) simpler to troubleshoot, and c) far simpler to configure than a traditional L2 or L3 fabric.

After less than 200 lines of configuration of the fabric, the team added the NSX overlay, then added 48,000 simulated VMs to the underlay. For the next 30 minutes, a set of scripts then forced failures to the Big Cloud Fabric SDN controllers every 70 seconds, failures to random switches every 8 seconds and random links in the fabric every 4 seconds.

Traditional Networking Methodology

- Logging in manually with a password
- Typing commands
- Copy and paste over console or terminal
- Check, check and check..



NetDevOps = Networking + DevOps

- Based on Agile Manifesto and DevOps culture
- It is talking about **Network Automation**
 1. Prevent Fat Fingers
 - “The CLI is Dead, **API is Cool!**” (e.g. Ansible, gRPC, NetConf, RESTful ...etc)
 - “By 2020, **ONLY 30% of network operations teams will use the command line interface (CLI) as their primary interface, down from 85% at YE16.**” from Gartner report
 2. Repetitive Tasks
 - Make reproduce and dispose operations **more reliable and predictable**
 3. Deliver source code
 - Reuse of known-good automation scripts **increases admin confidence** as well as task completion accuracy

Ref: <https://cumulusnetworks.com/blog/netdevops-networking-methods-with-a-devops-mindset/>

Why use Ansible in Networking

- Agentless
 - Don't need any agent on the network devices
- Infrastructure as Code (IaC)
 - Same language and docs between Operating and Networking team
- Community and network OS vendors driven both
 - Based on Open Source and follow GitHub workflow
- Modular framework, easily modified and maintained
 - Simple use and learn



Network Configuration Workflow

Users

Ansible Playbook

Environments

System Team

Collaboration &
Communication

Network Team

```
---  
- name: install and start apache  
  hosts: webservers  
  user: root  
  
  tasks:  
    - name: install httpd  
      yum: name=httpd state=latest  
    - name: start httpd  
      service: name=httpd state=running
```

Playbook

Play

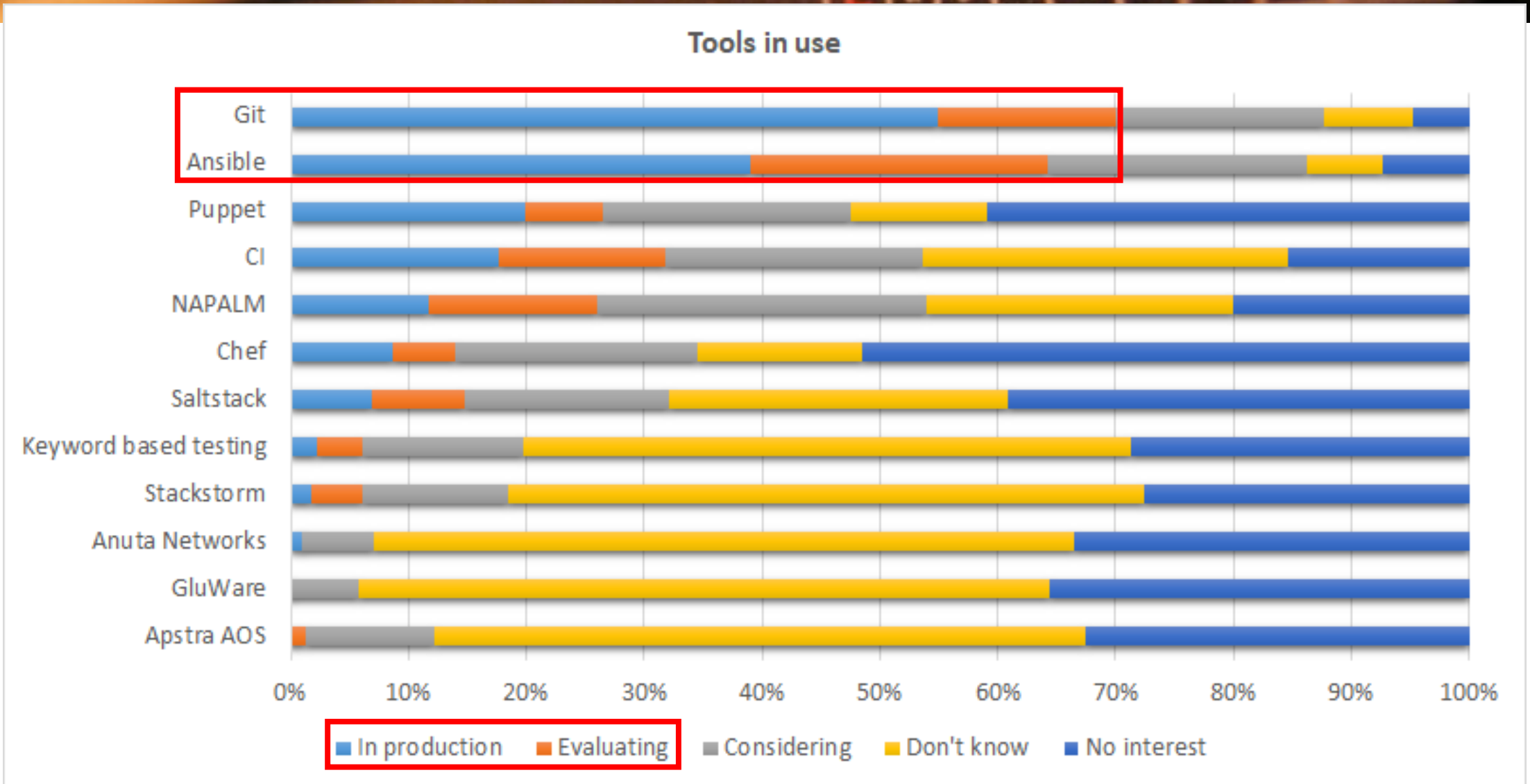
Tasks

Production

Staging

Testing

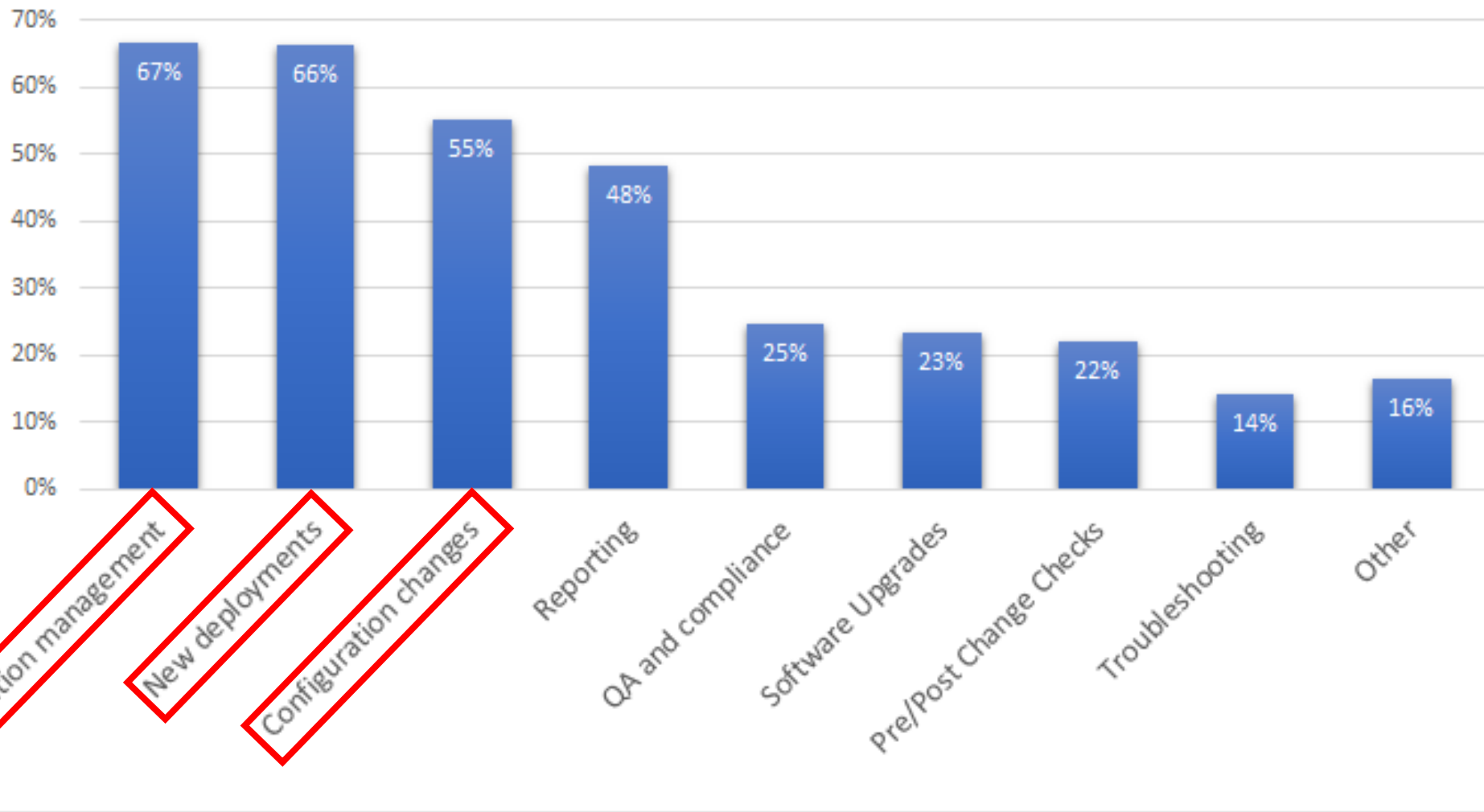
What Tools Should We Look At?



What to Automate First?



Tasks that are automated



Network Integration with Ansible (>2.3)



NOKIA



ARISTA

CITRIX



FORTINET



Ref: <https://www.ansible.com/network-automation>

More than 250+ Ansible Network Modules

10/23/17



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Reuse Playbooks in Multiple Deploy

```
12:24:08 pichuang@pichuang 0 ~/edgecore_core_router (master*)
$ ls
ansible.cfg  deployment.yml  group_vars  init.yml  roles  tdd_testinfra
conf         export.yml      hosts       README   tdd_serverspec  upgrade.yml
12:24:09 pichuang@pichuang 0 ~/edgecore_core_router (master*)
$ ls -la |grep yml
-rw-rw-r-- 1 pichuang pichuang 95 Apr 27 10:02 deployment.yml
-rw-rw-r-- 1 pichuang pichuang 93 Apr 27 13:50 export.yml
-rw-rw-r-- 1 pichuang pichuang 346 Apr 25 15:49 init.yml
-rw-rw-r-- 1 pichuang pichuang 95 Jul 6 11:21 upgrade.yml
```

Ref: https://github.com/pichuang/cumulus_config_backup

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Example: Upgrade Switch

```
12:27:18 pichuang@pichuang 0 ~/edgecore_core_router (master*)
$ cat ./roles/upgrade/tasks/main.yml
---
- name: Test Connection (Before reboot)
  ping:

- name: Upgrade System
  apt:
    upgrade: yes
    update_cache: yes
  become: yes

- name: Reboot
  command: shutdown -r now

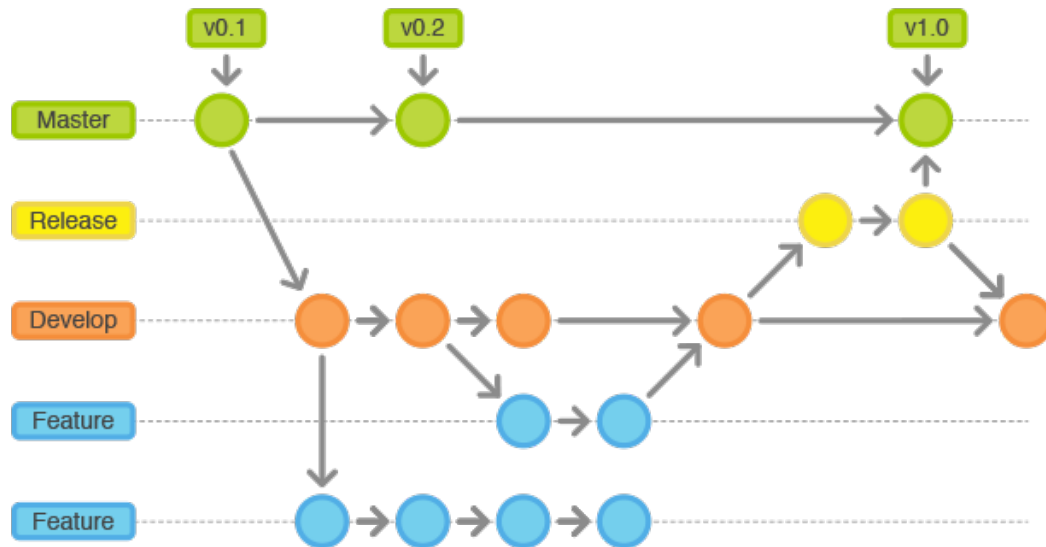
- name: Wait for SSH port down
  local_action: wait_for host={{ inventory_hostname }} port=22 state=stopped

- name: Wait for SSH port up
  wait_for: host={{ inventory_hostname }} port=22 state=started delay=30
  delegate_to: 127.0.0.1

- name: Test Connection (After reboot)
  ping:
```

Version Control – Git

- Configuration file repository
- File change and revision management
- Build for teams to work the same files



Commit Any Change

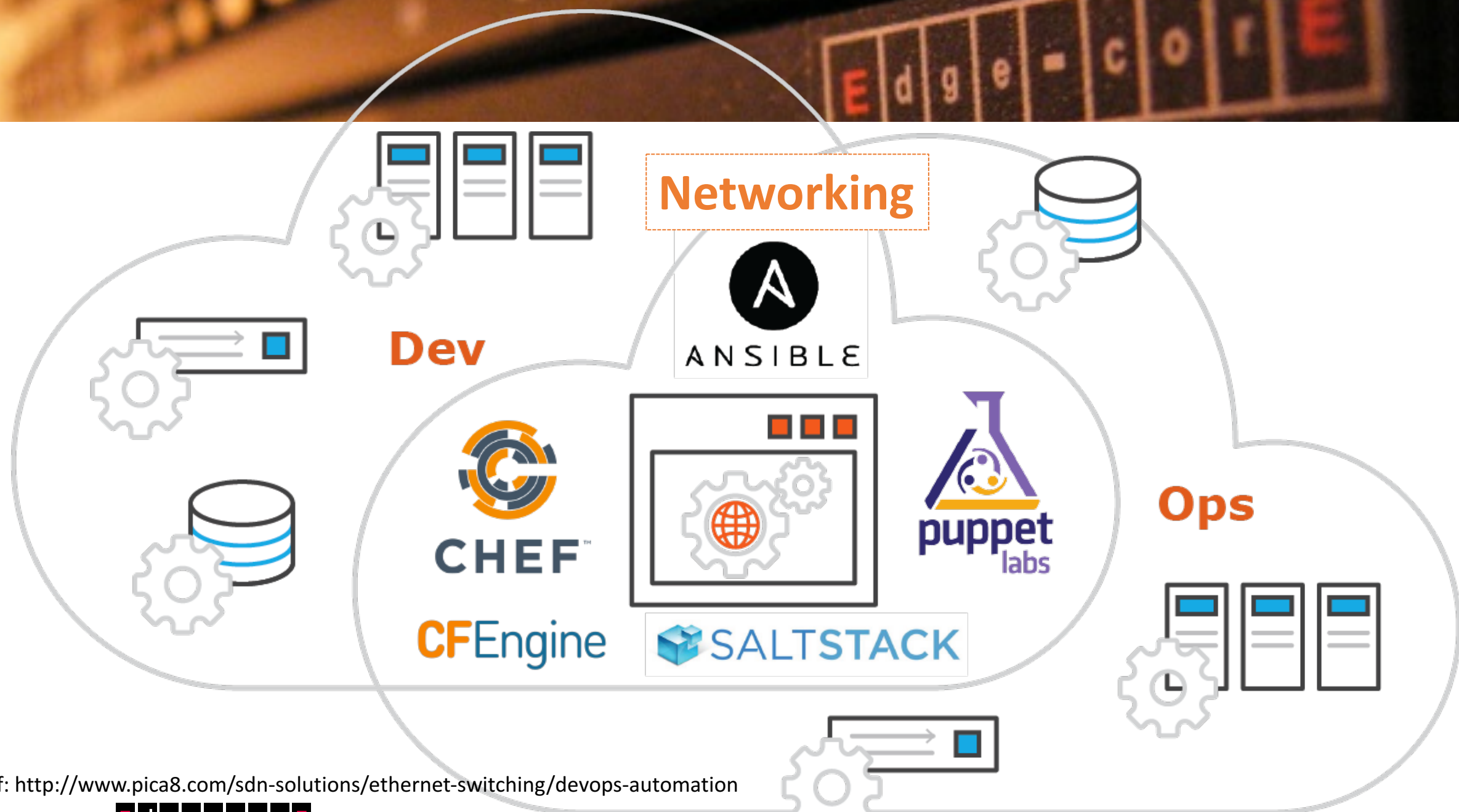
```
$ git add .  
$ git commit -a -s -m "Add new switch configuration"  
[master 8cf8a38] Add new switch configuration 1 file  
changed, 1 insertion(+) create mode 100644  
running.conf  
$ git push -u origin master
```

Blame Someone



```
$ git blame running.conf
```

```
69f5f511 (Phil Huang 2016-11-01 13:59:23 +0800 1) Phil Huang  
69f5f511 (Phil Huang 2016-11-01 13:59:23 +0800 2) is a  
60643262 (Phil Huang 2016-12-01 15:00:51 +0800 3) good  
69f5f511 (Phil Huang 2016-11-01 13:59:23 +0800 4) man
```

Networking

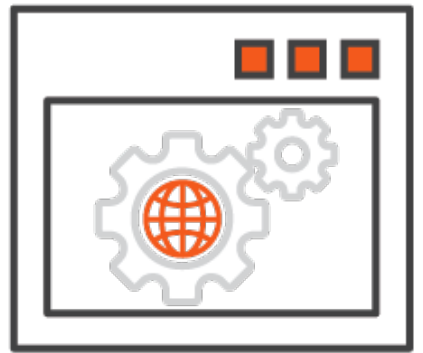
Dev

Ops

ANSIBLE

CHEF

CFEngine



puppet labs

SALTSTACK

Ref: <http://www.pica8.com/sdn-solutions/ethernet-switching/devops-automation>

Use Cases: NTT SIC



- Network Flexibility

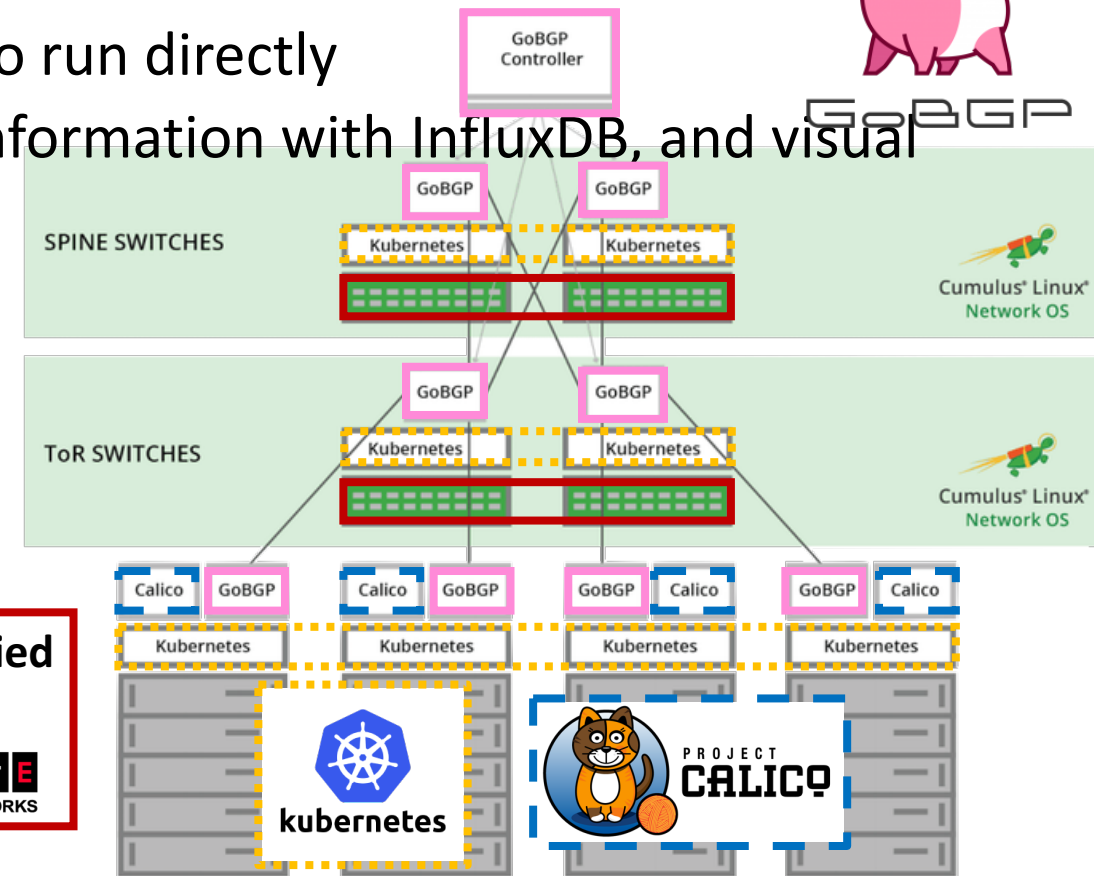
- Leverage **custom applications** like GoBGP to run directly
- Leverage **existing tool** to monitor all BGP information with InfluxDB, and visual report from Grafana

- Network Simplification

- Leveraging ONIE to install NOS allowed NTT SIC to **institute zero touch provisioning (ZTP)**
- Utilized custom REST API to invoke **Ansible** for provisioning



GoBGP



ONIE: Open Network Install Environment

Ref: <https://cumulusnetworks.com/customers/ntt/>

10/23/17



Step 1: Using Git & GitHub

- Configuration file repository
- File change and revision management
- Build for teams to work the same files



Step 2: Commit Your Configuration

```
$ git add .  
$ git commit -a -m "Add new switch configuration" -s  
[master 8cf8a38] Add new switch configuration 1 file  
changed, 1 insertion(+) create mode 100644  
ofswitch.conf  
$ git push -u origin master
```


Show Changes In Action



update all of switch instance

[Browse files](#)

1. update dpid
2. update netcfg

Signed-off-by: Phil Huang <pichuang@cs.nctu.edu.tw>

master

pichuang committed on May 23

1 parent [4f77b48](#) commit [54e40e84e55766db6661cb6f3db0eb68b2d58901](#)

Showing **2 changed files** with **7 additions** and **8 deletions**.

[Unified](#)[Split](#)

1 ansible/hosts

[View](#)

		@@ -21,7 +21,6 @@ nctutest-stream ansible_ssh_host=nctutest-stream ansible_ssh_user=sdn
21	21	nctutest-quagga ansible_ssh_host=nctutest-quagga ansible_ssh_user=sdn
22	22	
23	23	[nuclear]
24		-nuclear-stream ansible_ssh_host=nuclear-stream ansible_ssh_user=sdn
25	24	nuclear-quagga ansible_ssh_host=nuclear-quagga ansible_ssh_user=sdn
26	25	
27	26	[linux:children]

14 netcfg/nctu-sdnip.json

[View](#)

		@@ -1,6 +1,6 @@
...	...	
1	1	{
2	2	"ports" : {
3		"eth1" : {

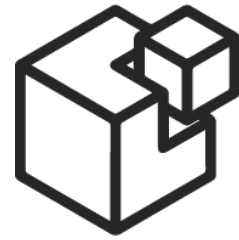
Blame someone



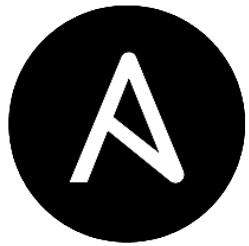
```
$ git blame ofswitch.conf
```

```
69f5f511 (Phil Huang 2016-11-01 13:59:23 +0800 1) Phil Huang  
69f5f511 (Phil Huang 2016-11-01 13:59:23 +0800 2) is a  
60643262 (Phil Huang 2016-12-01 15:00:51 +0800 3) good  
69f5f511 (Phil Huang 2016-11-01 13:59:23 +0800 4) man
```

Step 3: Choose CM



SALTSTACK



ANSIBLE



puppet
labs



CHEFTM

Ansible Network Modules

NETWORK INTEGRATIONS

Ansible includes 175 modules to support a wide variety of network device vendors, including:

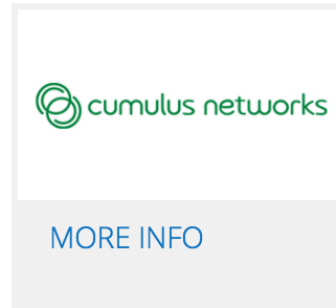


ARISTA

[MORE INFO](#)



[MORE INFO](#)



[MORE INFO](#)

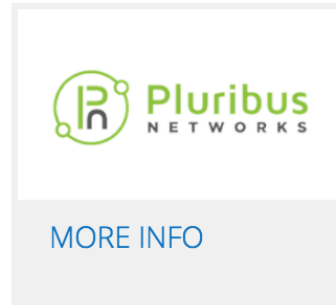


[MORE INFO](#)



JUNIPER
NETWORKS

[MORE INFO](#)

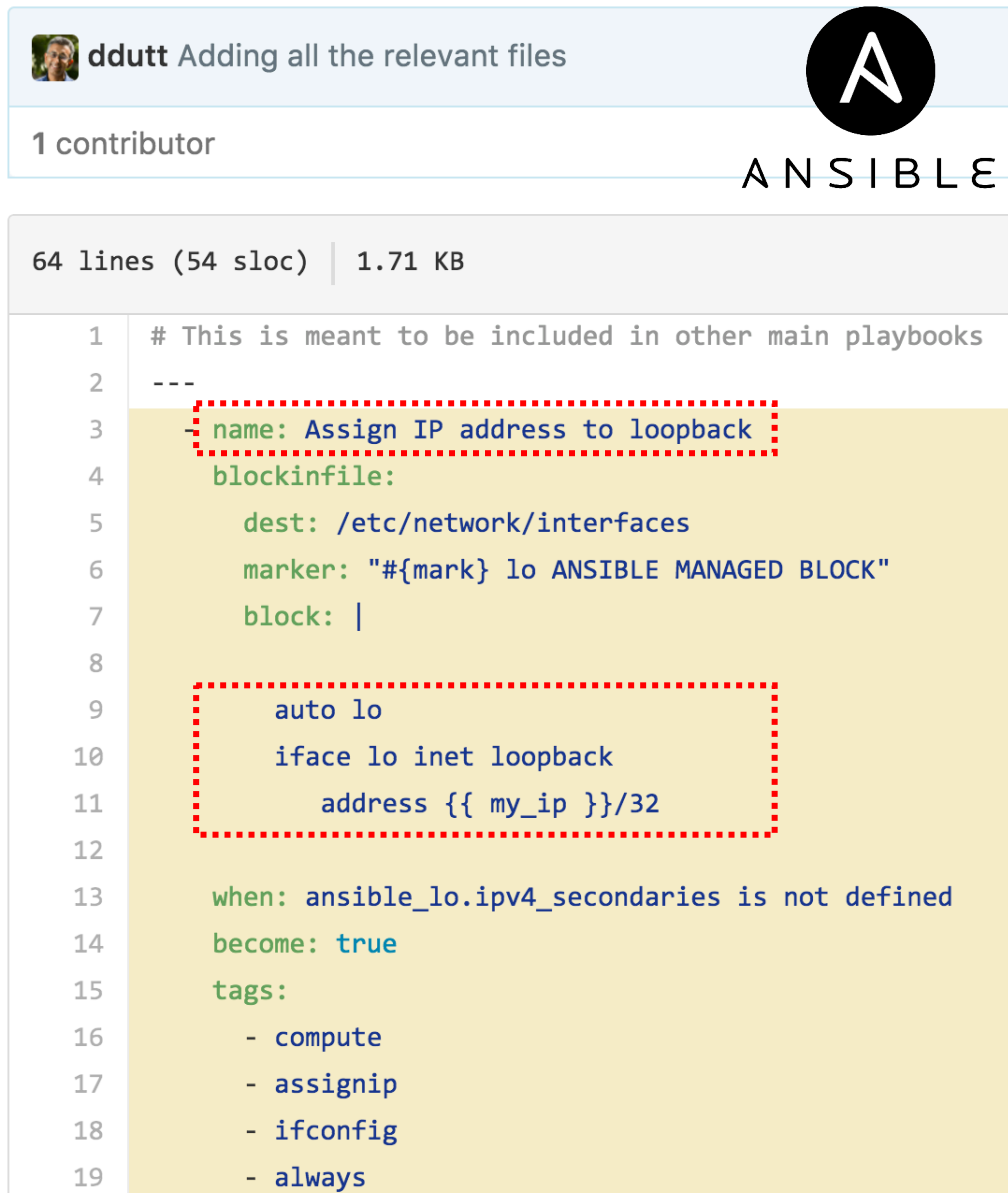


[MORE INFO](#)

Step 4: Templatize Configuration Files

- Let you reuse code snippets
- Avoid human error and typos

Ref: <https://github.com/CumulusNetworks/cldemo-netq-l3>



ddutt Adding all the relevant files

1 contributor

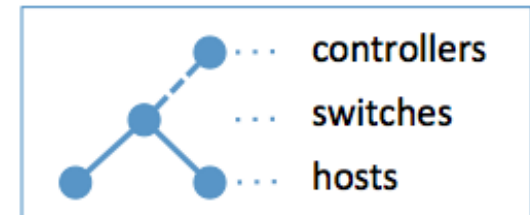
64 lines (54 sloc) | 1.71 KB

```
1 # This is meant to be included in other main playbooks
2 ---
3 - name: Assign IP address to loopback
4   blockinfile:
5     dest: /etc/network/interfaces
6     marker: "#{mark} lo ANSIBLE MANAGED BLOCK"
7     block: |
8
9     auto lo
10    iface lo inet loopback
11    address {{ my_ip }}/32
12
13   when: ansible_lo.ipv4_secondaries is not defined
14   become: true
15   tags:
16     - compute
17     - assignip
18     - ifconfig
19     - always
```

Step 5: Virtualize Copy of Network



> sudo mn →



Step 6: Continuous Integrations System

- Catch error or typos early
- Make sure all of the setting is same as production



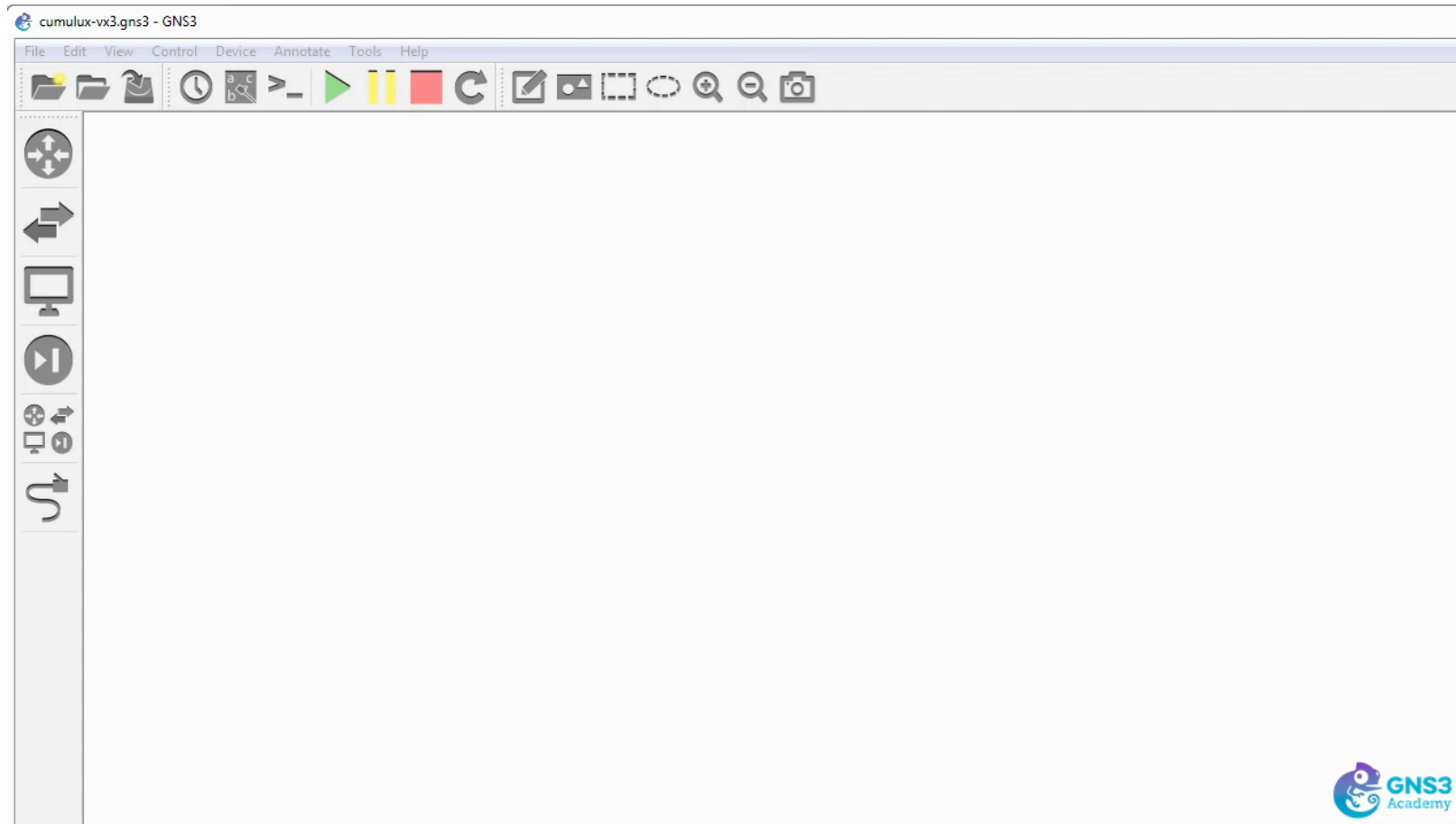
Network Simulator – GNS3

- Used by network engineers worldwide to
 1. Emulate -> Configure -> Test
 2. Troubleshoot **virtual** and **real** networks
- Supports **multi vendor** environments
- Only limitation is your hardware: CPU and memory
- Large and active community (800,000+ members)



Ref: https://docs.gns3.com/1PvtRW5eAb8RJZ11maEYD9_aLY8kkdhgaMB0wPCz8a38/index.html

GNS3 Demonstration



E **d** **g** **e** **-** **c** **o** **r** **e** **E**

Ref: YouTube: [Cumulus Linux: Disaggregated networking - why use proprietary network stacks?](#) - David Bombal

- The concept is based on “*Switch as a Server*”
- Can write **RSpec tests** for checking your devices are configured correctly
- Allows for infrastructure code to be written **using Test Driven Development (TDD) for networking**
- Driven by many of the popular configuration management tools, like **Ansible**, Puppet, CFEngine and Itamae.

TDD for ServerSpec

```
18:04:26 pichuang@pichuang 0 ~/edgecore_core_router/tdd_server
$ rake spec
/home/pichuang/.rvm/rubies/ruby-2.3.3/bin/ruby -I/home/pichuang/
home/pichuang/.rvm/gems/ruby-2.3.3/gems/rspec-core-3.5.4/lib
5.4/exe/rspec --pattern spec/core-1.on.ec/\*_spec.rb
```

```
Port "22"
cumulus@core-1.on.ec's password:
  should be listening with tcp

Interface "eth0"
  should be up
  should have ipv4 address "192.168.17.10/24"

Host "www.edge-core.com"
  should be reachable
  should be resolvable

Finished in 4.72 seconds (files took 0.51537 seconds to load)
5 examples, 0 failures
```

Report

TDD: Test-Driven Development

10/23/17 **Edge-core**
NETWORKS

```
18:05:47 pichuang@pichuang 0 ~/edgecore_core_router/t
$ cat production_spec.rb
require 'spec_helper'
```

```
describe port(22) do
  it { should be_listening.with('tcp') }
end

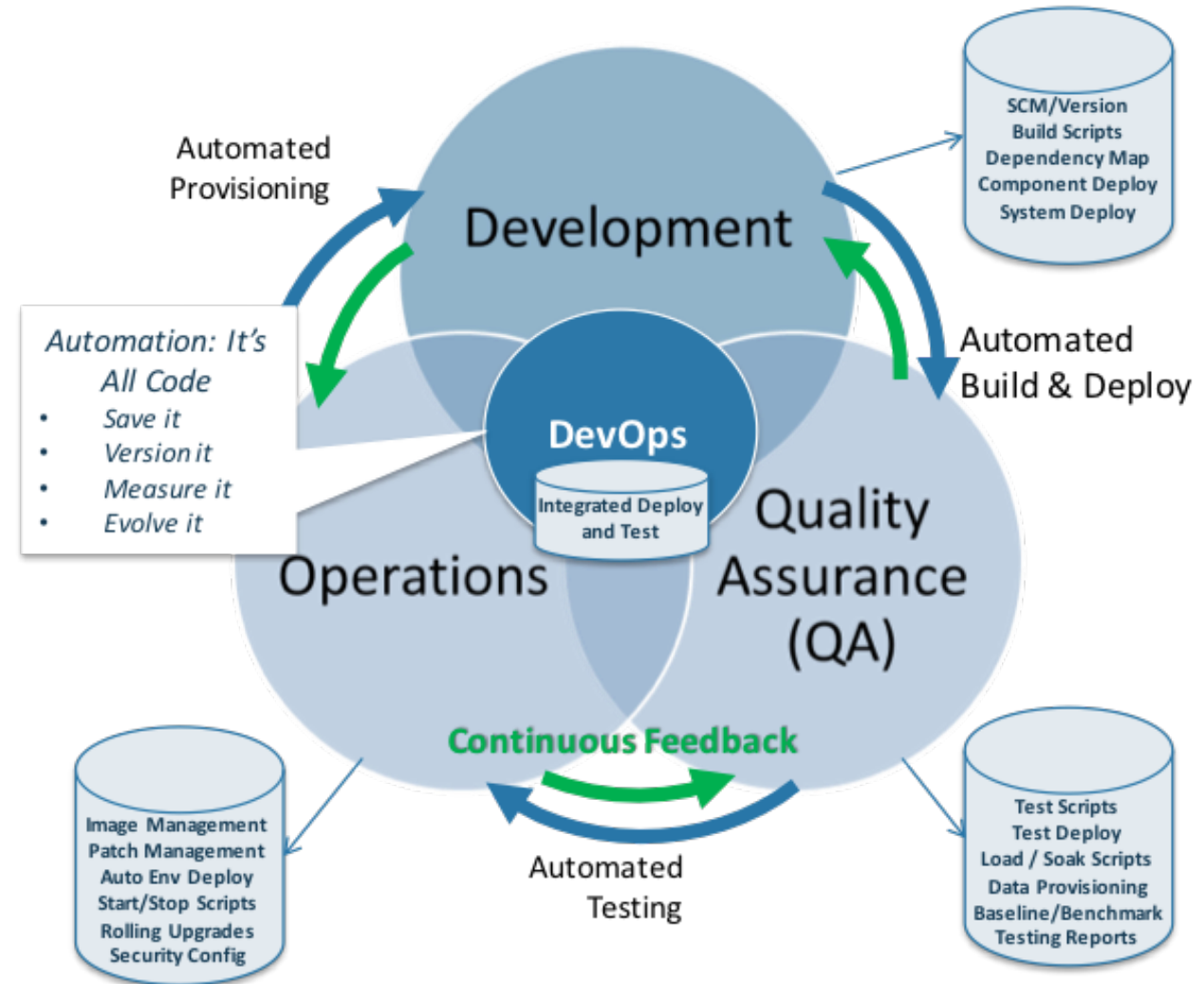
describe interface('eth0') do
  it { should be_up }
  it { should have_ipv4_address("192.168.17.10/24") }
end

describe host('www.edge-core.com') do
  it { should be_reachable }
  it { should be_resolvable }
end
```

Unit Test Case

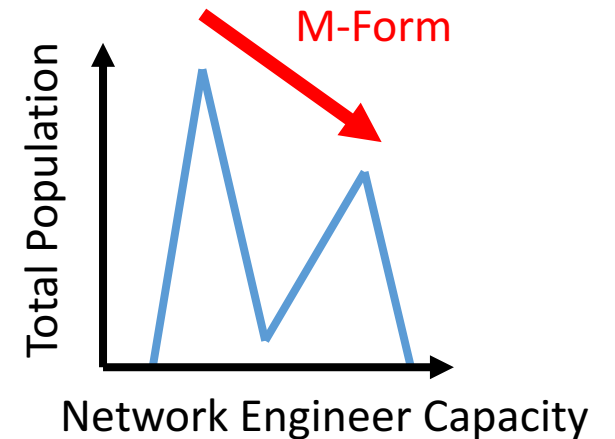
Summary (1/2)

- More communication
 - Get early feedback
- Automate everything
- Version control
- Visibility

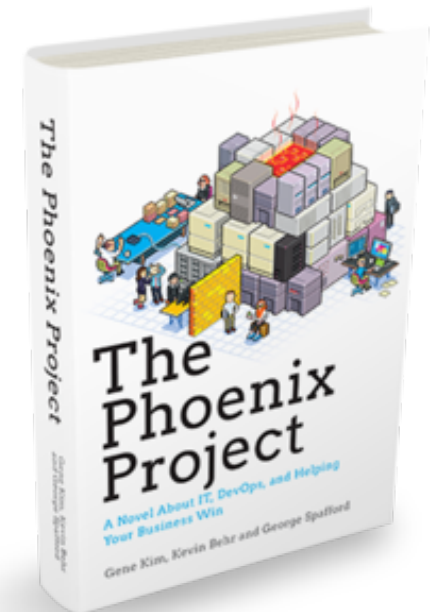
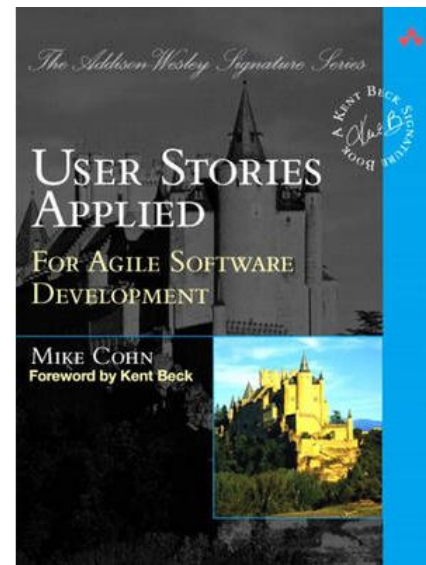
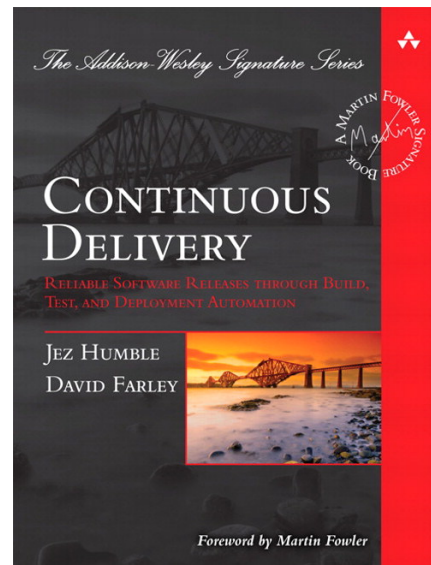
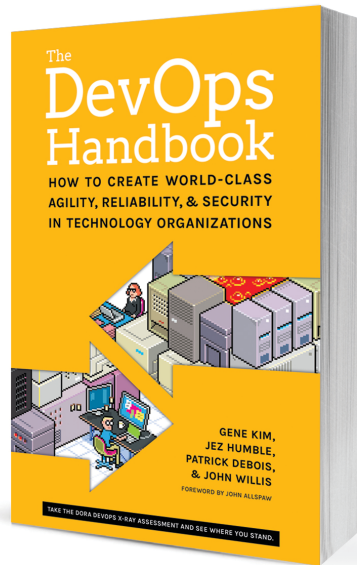


Summary (2/2)

- Emerging trends shaping the data center
 1. **Hardware and Software disaggregation**
 2. **Driving network automation** is the rapid expansion of network infrastructure
 3. Increase strategic workforce, **especially software part**
- Network engineers require skills include
 - **Linux** knowledges
 - Ansible (or others CM tool)
 - Network **programmability** skill
 - **Continued learning and Open Mind**



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Hsinchu

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成員

1,323 位成員 (16 位新成員)

