Interop Las Vegas MAY 2 – 6, 2016 EXPO: MAY 3 – 5

YOUR NETWORK IS YOUR BUSINESS

Net DevOps and Change Control

Pete Lumbis - @PeteCCDE

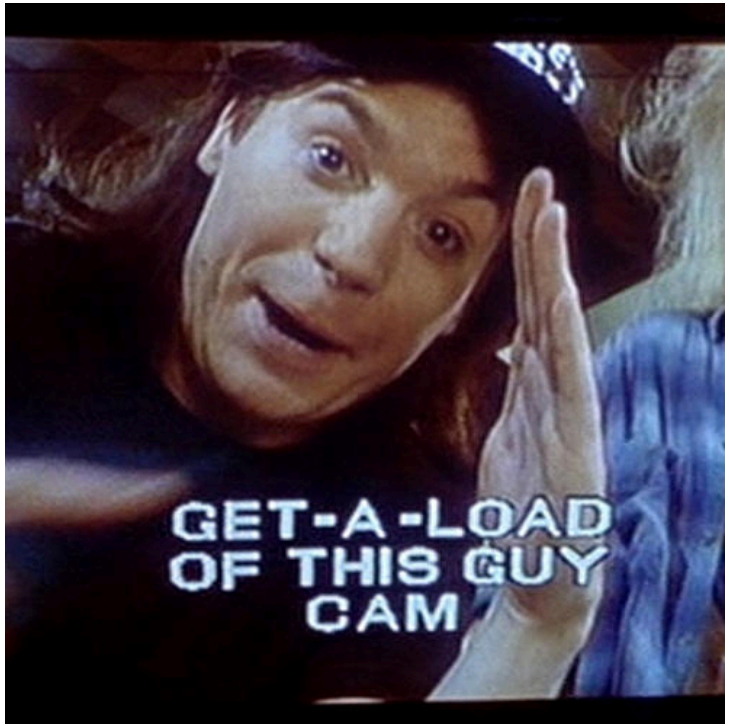
Cumulus Networks Systems Engineer

CCIE #28677, CCDE 2012::3

Agenda

- Change Management Today
- The Problems Today
- NetDevOps Toolkit
- Tying it All Together (vDemo)

Pete Who?



CCIE R&S, CCDE (First in Cisco Support)

Former Cisco TAC Routing Escalation

Current Cumulus Networks SE/Architect

Network Engineer, Not a Programmer

Leading Questions

- Who thinks their change system works well?

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  - I assume your manager is here

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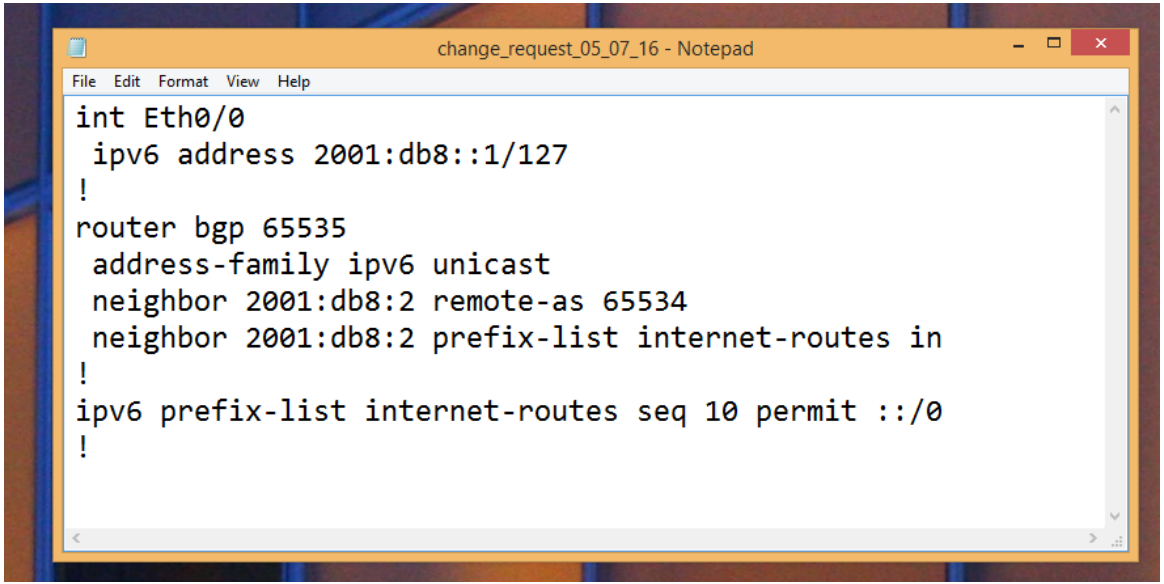
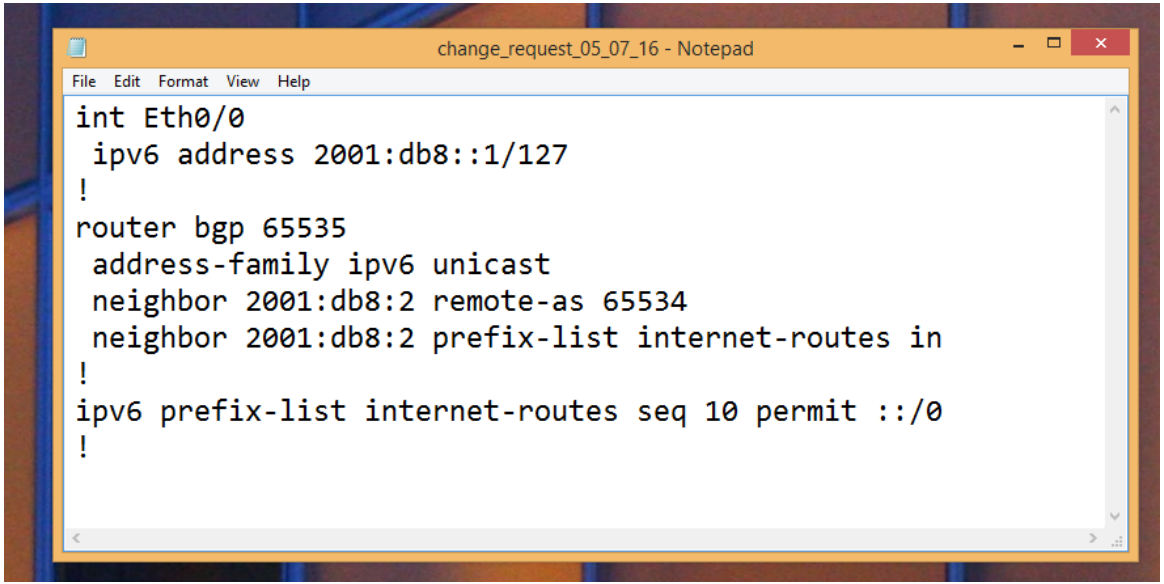
- Who thinks their change system works well?
  - I assume your manager is here
- Who lab tests 100% of changes?
- Who checks servers + apps on changes?
  - Why is it your users?

Change Management Today



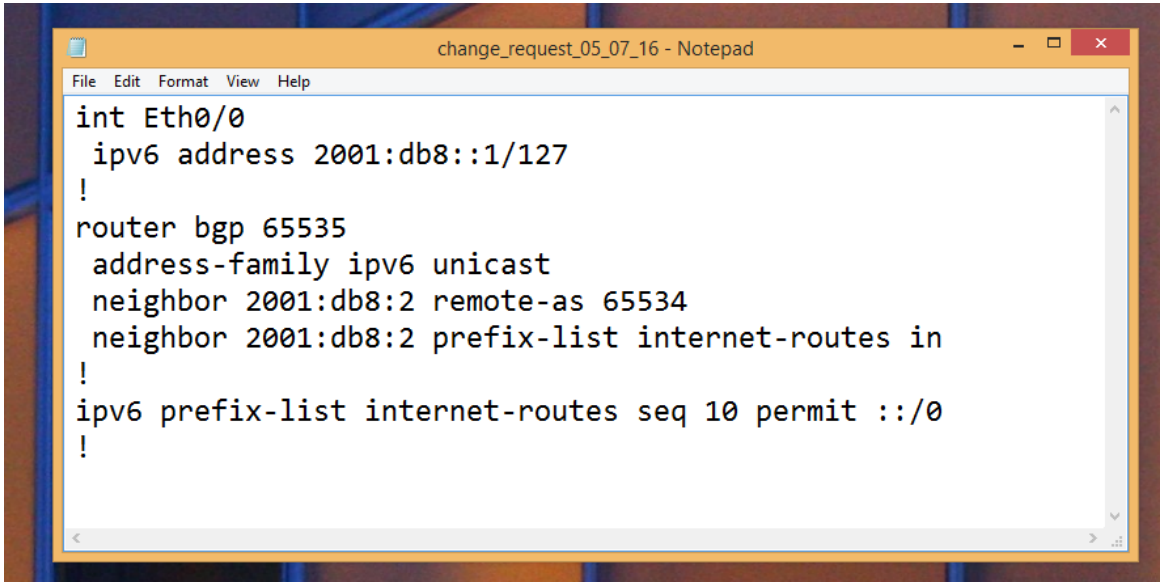
Change Management Today



Monday, 9:30am:

Write Change, Email Team

Change Management Today



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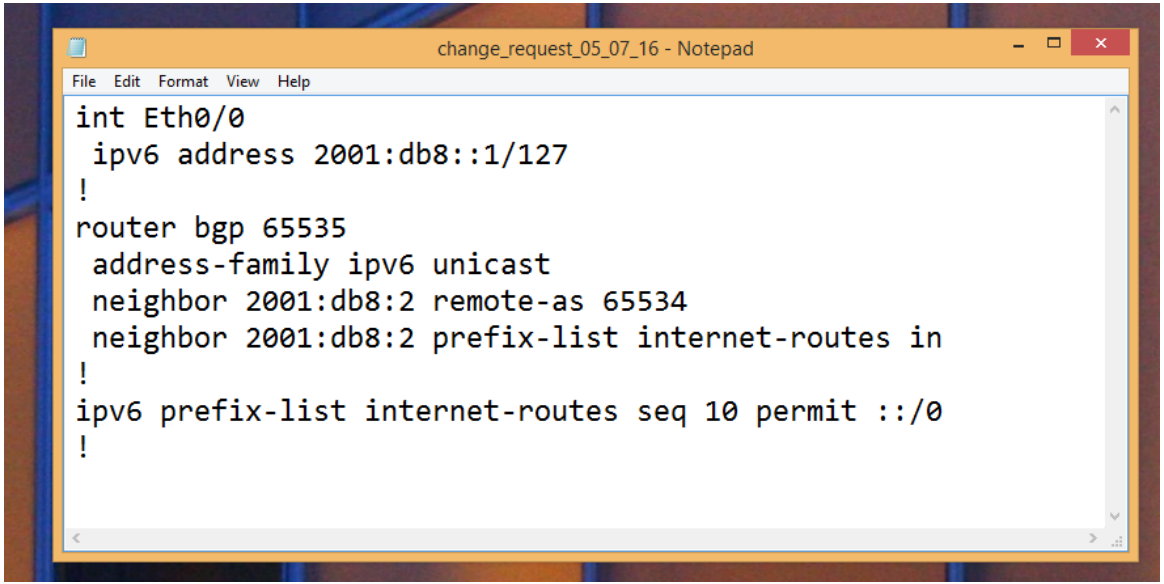

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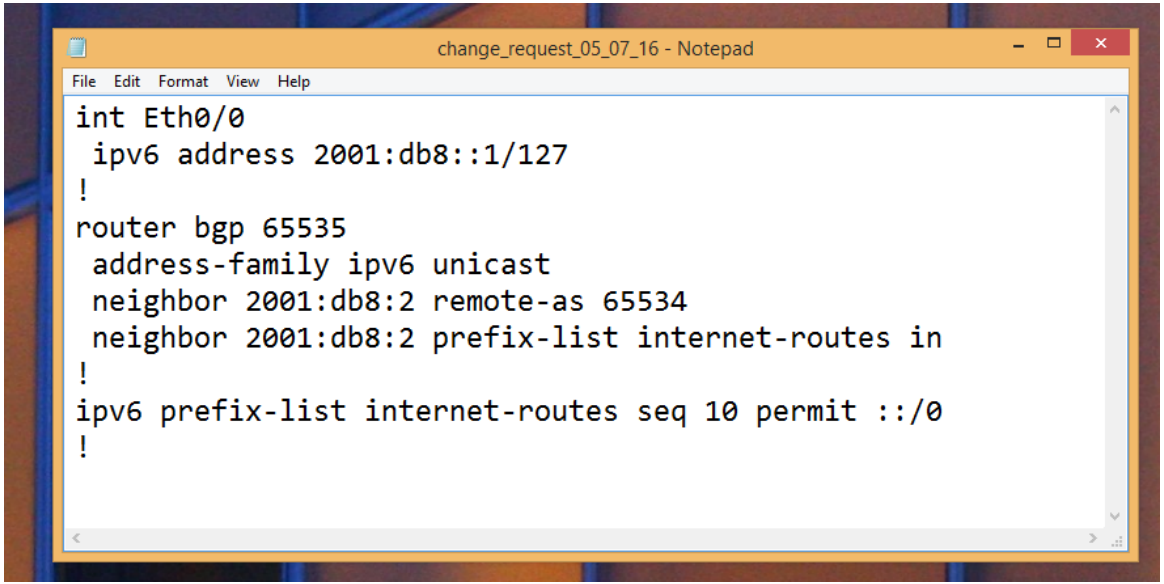
Friday, 11:00am:
Receive “looks good” from lead

Change Management Today



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Saturday, 10:00pm:
Implement Change in 2 hr window

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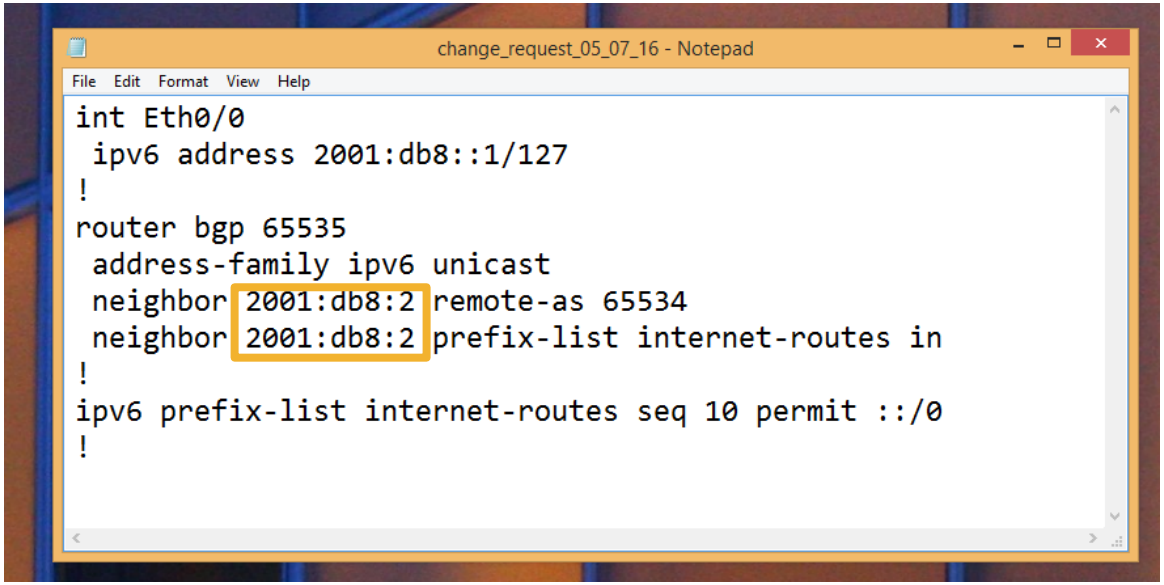

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Ask team if they read email

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Receive “looks good” from lead

Saturday, 10:00pm:
Implement Change in 2 hr window

Sunday, 8:30am:
Notice Typo, Fix. Go home.

Change Validation

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Validation? What Validation?

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Best Case

- 30 person bridge
- Every department signs off

Validation? What Validation?

Best Case

- 30 person bridge
- Every department signs off

Worst Case

- Ping some things
- Watch for tickets

Validation? What Validation?

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Is ping your business application?

Recap: What's Broken?

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- Poor change communication

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Poor change communication

Difficult to test outside of production

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Manual validation doesn't scale

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Silos of Excellence

Imagine a World…

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Configs are easily shared

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All changes are automatically tested

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Tests include servers and apps

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Tests must pass to reach approvers

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More drinks with umbrellas

NetDevOps Toolbox

Git

Git – Provides config management and collabration

NetDevOps Toolbox

GitLab – Change management and automated testing

NetDevOps Toolbox

Virtual Box – Hypervisor for lab network + server VMs

Vagrant – Simplifies large Virtual Box environments

NetDevOps Toolbox

Ansible – Applies configuration and manages automation

NetDevOps Toolbox

Behave – English based testing language

NetDevOps Toolbox

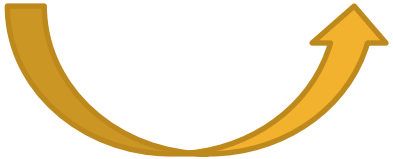
Git

GitLab

Virtual Box

VAGRANT

ANSIBLE



Configuration
Saved to GitLab

NetDevOps Toolbox

GitLab Launches Lab with new configs

NetDevOps Toolbox

Git

GitLab

Virtual Box

VAGRANT

ANSIBLE

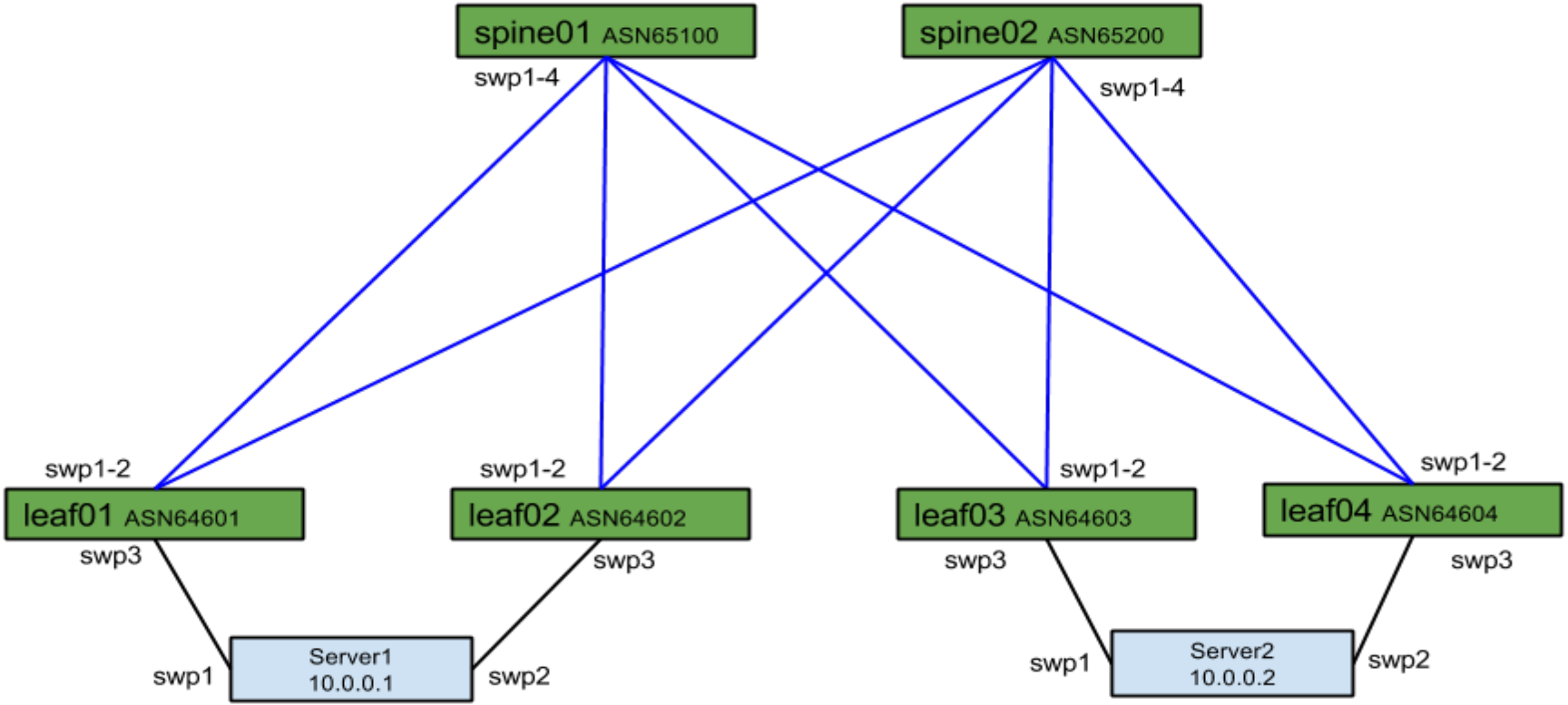
Vagrant configures lab with Ansible

NetDevOps Toolbox

GitLab runs Behave tests
against infrastructure

vDemo

* Sorta



http://gitlab.com/plumbis/interop-2016

Demo Time!

Behave Overview

Behave Overview

```
plumbis:validation plumbis$ behave
Feature: Validate BGP # bgp.feature:1

  Scenario: Check BGP Neighbors      # bgp.feature:3
    Given BGP is enabled             # steps/bgp.py:196 3.697s
    When neighbors are configured    # steps/bgp.py:220 0.001s
    Then the neighbors should be up # steps/bgp.py:317 0.000s

Feature: Validate Interfaces are up and IPs are applied # interfaces.feature:1

  Scenario: Check interfaces are up  # interfaces.feature:3
    Given an interface is configured # steps/interfaces.py:138 0.952s
    Then the interfaces should be up # steps/interfaces.py:162 0.002s

Feature: Validate the webservers can be reached. # website.feature:1
  This will validate each server has apache2 configured and running.
  Then each server will try to reach every other server and fetch the index page
  Scenario: Validate Web Server Access     # website.feature:5
    Given a webserver is configured        # steps/website.py:124 0.232s
    When apache is running                 # steps/website.py:136 0.163s
    Then the website should be accessable # steps/website.py:144 0.916s

3 features passed, 0 failed, 0 skipped
3 scenarios passed, 0 failed, 0 skipped
8 steps passed, 0 failed, 0 skipped, 0 undefined
Took 0m5.962s
```

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plumbis:validation plumbis$ behave
Feature: Validate BGP # bgp.feature:1

  Scenario: Check BGP Neighbors      # bgp.feature:3
    Given BGP is enabled             # steps/bgp.py:196 0.579s
    When neighbors are configured    # steps/bgp.py:220 0.001s
    Then the neighbors should be up # steps/bgp.py:317 0.000s
      Assertion Failed: spine1 peer swp1 not Established. Current state: Idle


Feature: Validate Interfaces are up and IPs are applied # interfaces.feature:1

  Scenario: Check interfaces are up  # interfaces.feature:3
    Given an interface is configured # steps/interfaces.py:138 0.759s
    Then the interfaces should be up # steps/interfaces.py:162 0.000s
      Assertion Failed: Interface swp1 on spine1 is in state ADMDN


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  Scenario: Validate Web Server Access     # website.feature:5
    Given a webserver is configured        # steps/website.py:124 0.233s
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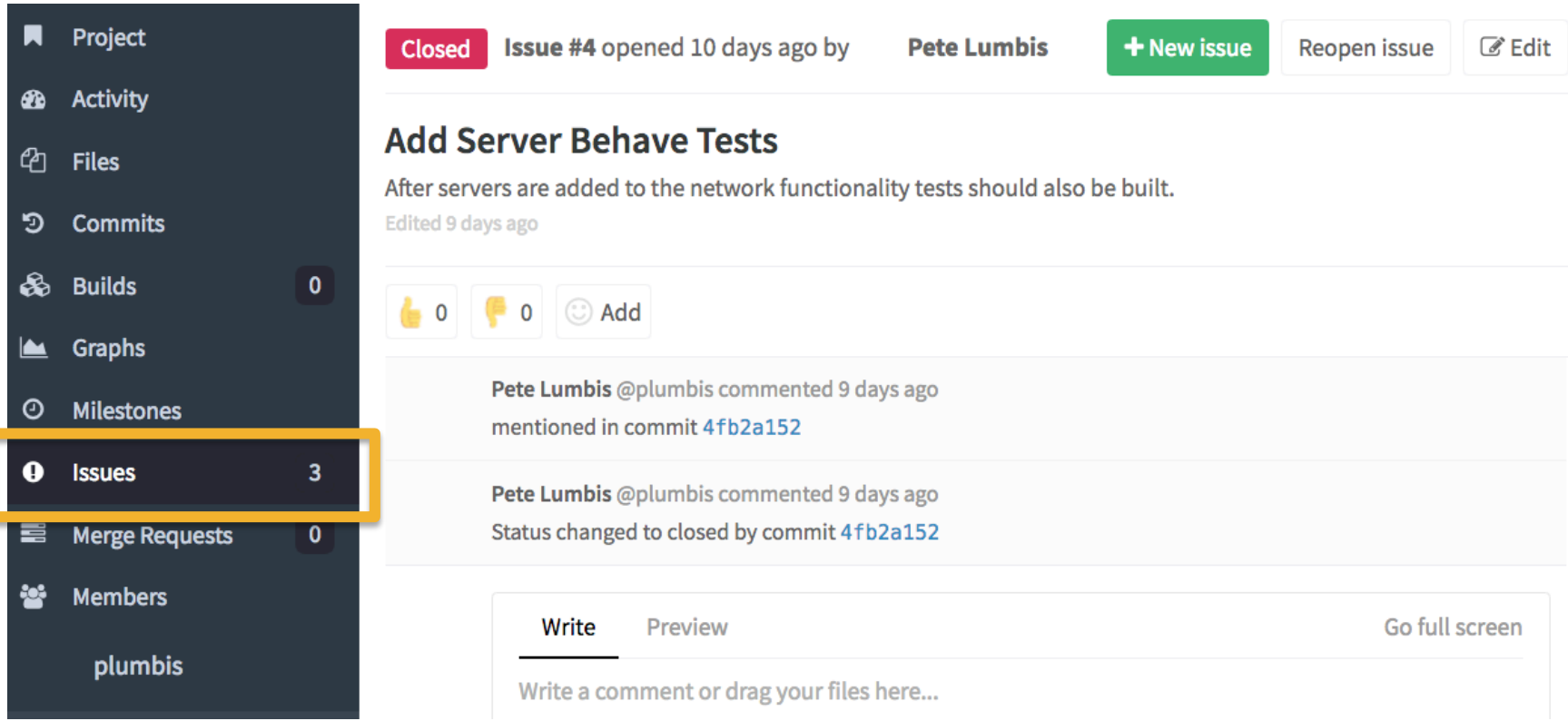
    Then the website should be accessable # steps/website.py:144 0.895s


Failing scenarios:
  bgp.feature:3  Check BGP Neighbors
  interfaces.feature:3  Check interfaces are up

1 feature passed, 2 failed, 0 skipped
1 scenario passed, 2 failed, 0 skipped
6 steps passed, 2 failed, 0 skipped, 0 undefined
Took 0m2.632s
```

GitLab Ticketing



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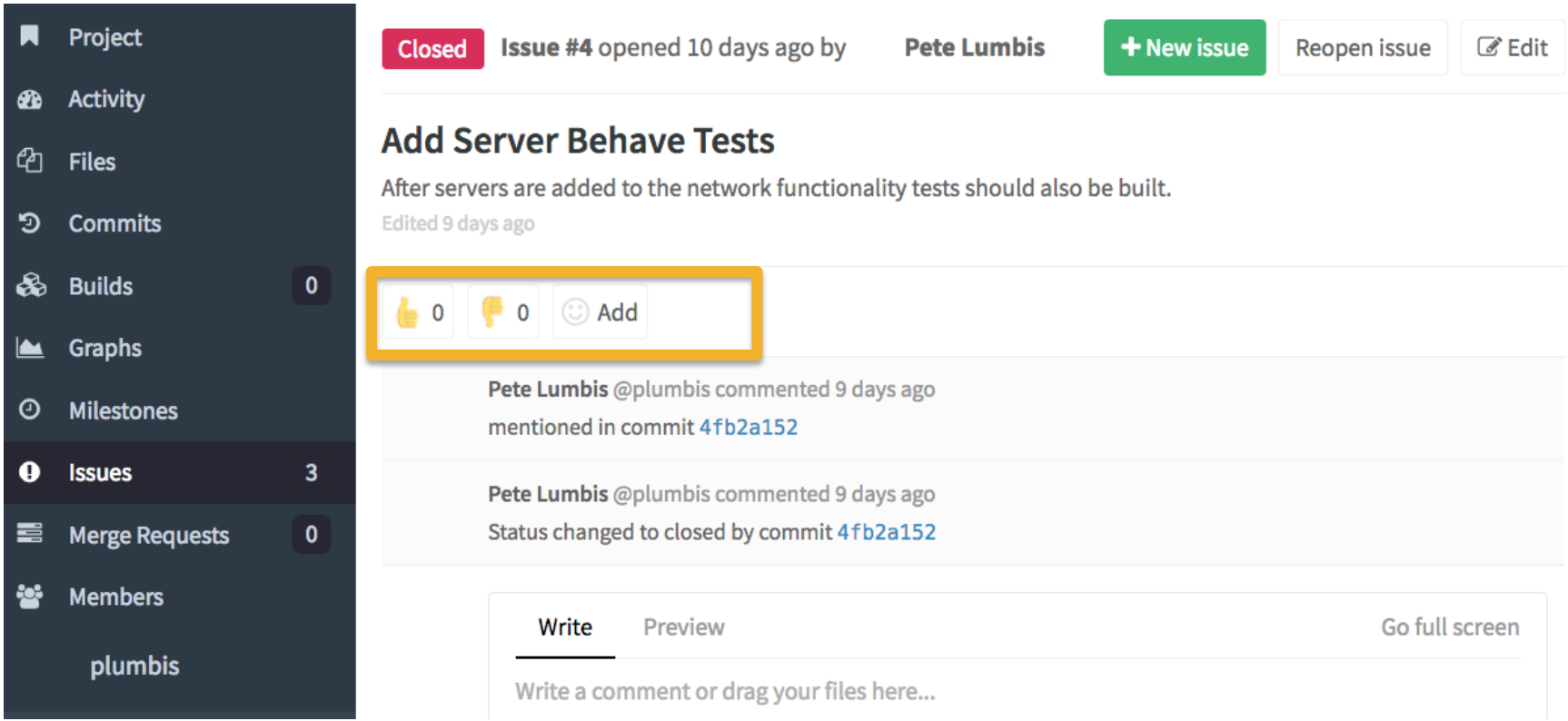

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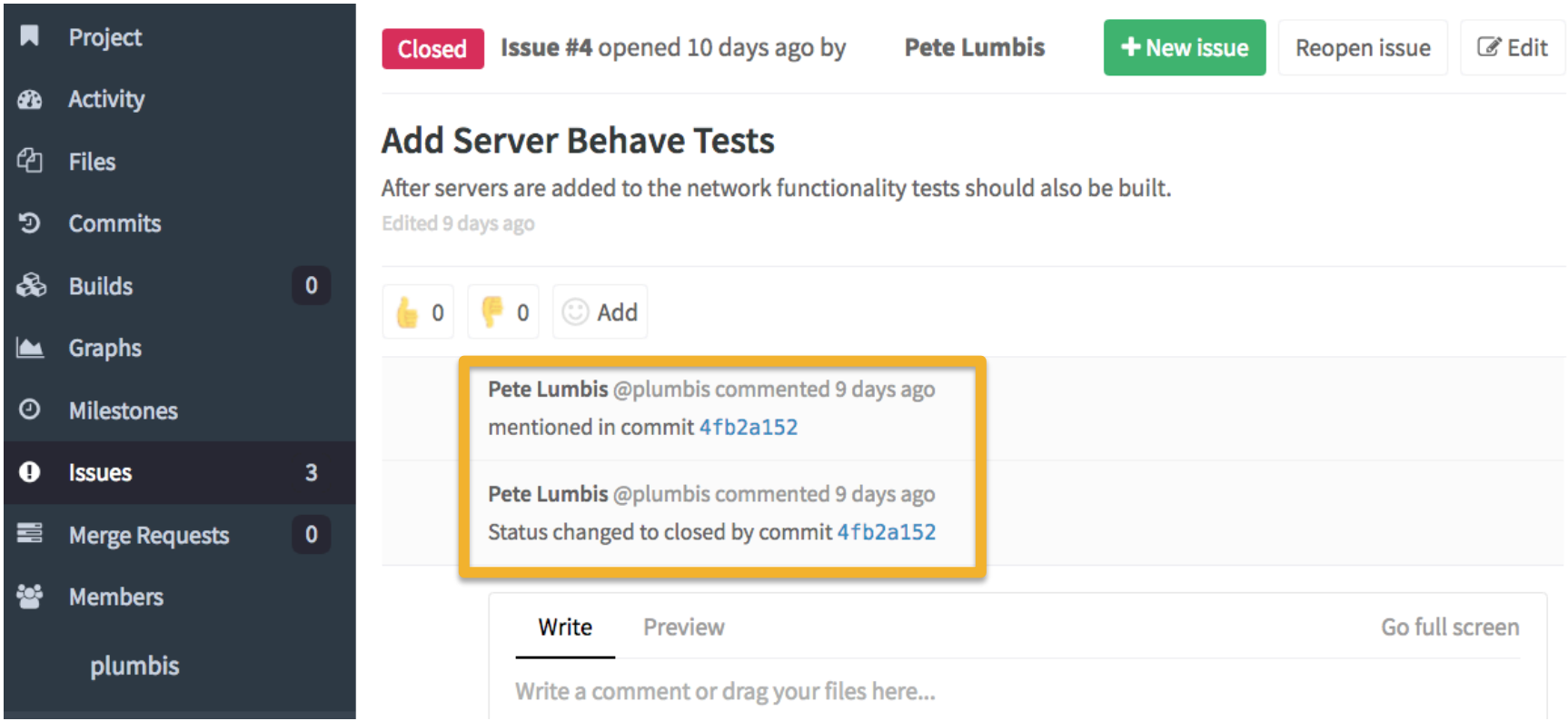

GitLab Changes

Authored by **Pete Lumbis** 9 days ago

1 parent 5567fe3c

master

build: passed

Added Behave Tests for Apache2/Webservers. Resolves #4

Changes 5 Builds 3

Showing **5 changed files** with **362 additions** and **17 deletions**

Inline Side-by-side

roles/servers/tasks/main.yml View file @4fb2a15

```
...  ...  @@ -23,3 +23,9 @@
23   23   - name: Copy Quagga Configuration
24   24     template: src=Quagga.conf.j2 dest=/etc/quagga/Quagga.conf
25   25     notify: reload quagga
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Wrap Up

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Infrastructure as code

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Infrastructure as code
Automate all the things

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Testing **must** include applications

Wrap Up

There's a better way!
Infrastructure as code
Automate all the things
Testing **must** include applications
Push your vendor. Vote with $$

Questions?

Thank You!

@PeteCCDE
http://gitlab.com/plumbis/interop-2016

NetDevOps Toolbox Alternatives

Git

Atlassian Bitbucket

GitLab

NetDevOps Toolbox Alternatives

GitLab

Jenkins

Travis CI

NetDevOps Toolbox Alternatives

NetDevOps Toolbox Alternatives

NetDevOps Toolbox Alternatives

Beaker

puppet labs

Matt Oswalt's ToDD

KitchenCI

Automation Tools - Ansible

- Configuration Management Software
- Manages SSH connections
- Large collection of libraries for common tasks
- Human Readable

Automation Tools - Ansible

```
- name: Disable AAAA DNS lookups
  replace:
    dest=/etc/gai.conf
    regexp="#precedence ::ffff:0:0/96  10"
    replace="precedence ::ffff:0:0/96  100”

- name: Install Apache
  apt: name=apache2 update_cache=yes
  notify: restart apache

- name: Copy /etc/network/interfaces
  template: src=interfaces.j2 dest=/etc/network/interfaces
  notify: reload networking
```

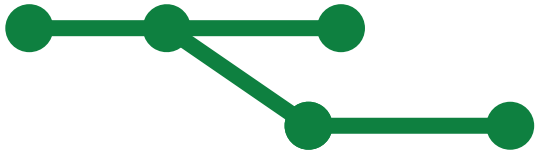
Automation Tools - Git

- ~~Source Code~~ text file repository
- Automatic file revision/change management
- Built for teams to work on the same files
- Easy to get started, lots of knobs for advanced users

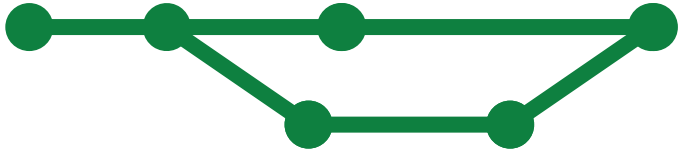
Automation Tools - Git Cont'd

Remote Repository – Central Server hosting files

Local Repository – Your local copy of the remote. Where you change things



Branch – Isolated copy for new features, risky changes

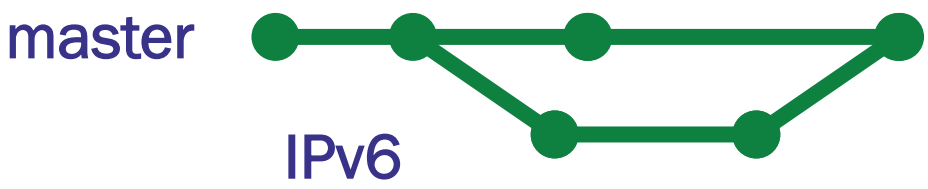


Merge – Apply branch changes to master repository copy (see also: "Pull Request")

Automation Tools - Git Cont'd

Create Changes in Branches

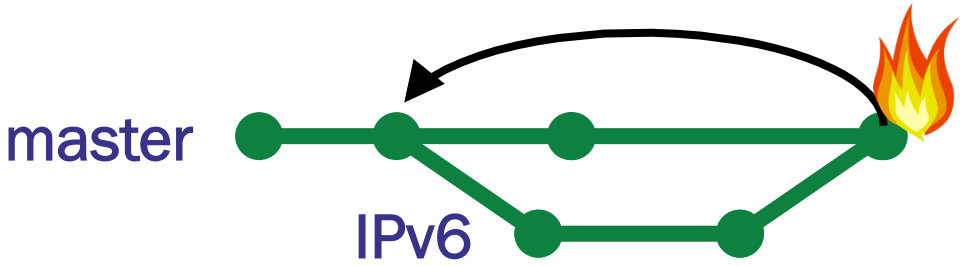
Merge and Review Changes



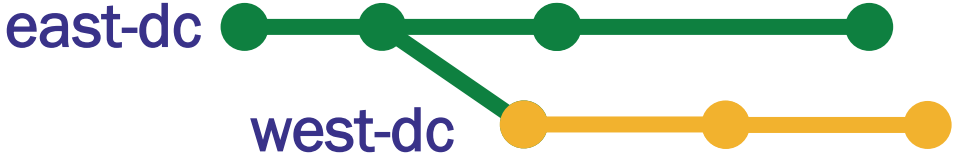
Use merge/pull request as an opportunity to review impact of changes

Automation Tools – Git Cont'd

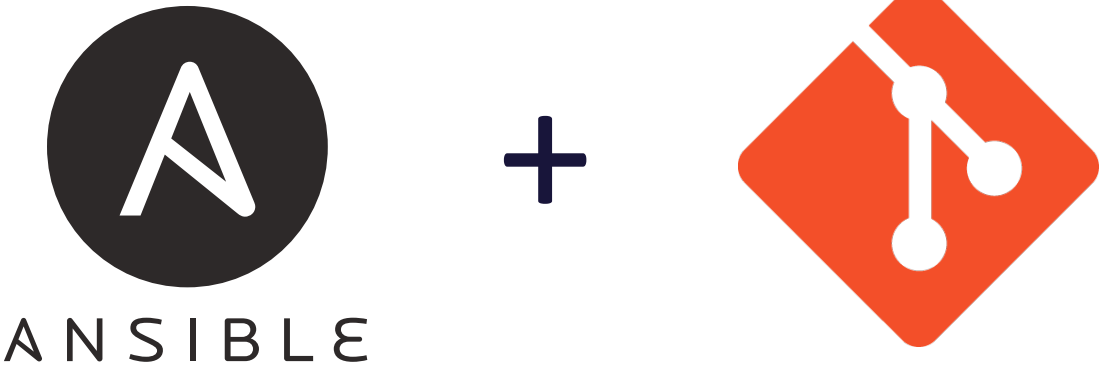
Rollback failures after merge



For for new project/datacenter/office



Infrastructure as Code



- Use software practices for device configurations
- All configuration changes tracked and shared
- Easy to replace and spin up devices

IaC - Vagrant + VirtualBox

- Free hypervisor
- Windows/Mac/Linux support

- Orchestrates VirtualBox
- Define full datacenter of VMs
- One click spin up / spin down

Continuous Integration / Continuous Development

- CI/CD
- CI – Make lots of production changes
  - Probably not good for networks
- CD – Make lots of small config changes
  - Test Early, Test Often

CI/CD Pipeline

- Tools designed to automate tests
- Hook into Git(hub)
- Very flexible, highly customizable

GitLab

Bamboo

Travis CI

Jenkins

Network DevOps

- DevOps is about culture
  - Developers and Operators working together
- Where are the network engineers?
- Death to the silo!
- Network + Dev + Ops
  - Unique skills, collaboration is key!