What is NetDevOps? Why?

Leslie Carr
SRECon16
Who Is Leslie?

Operations Engineer

- @lesliegeek
- Google
- Craigslist
- Twitter
- Wikimedia Foundation (Wikipedia)
- Cumulus Networks
Who Are You?

Are you a network engineer?
- Are you automation curious?
- Is your network running in the traditional model?

Are you a systems engineer?
- Do you love your network engineers?
- Do you want to help them automate?
What Will You Learn? Why Should You Listen?

Legacy Networks -> Modern Techniques

http://www.trefor.net/2015/06/29/network-automation/
What Is DevOps?

https://www.safaribooksonline.com/library/view/effective-devops/9781491926291/
What Is DevOps?

WORKED FINE IN DEV

OPS PROBLEM NOW
Infrastructure == Code

https://www.thoughtworks.com/insights/blog/infrastructure-code-reason-smile
What Do We Look Like Now?
Traditional Networking Methodology

- Logging in manually with a password
- Typing in commands
- Cutting and pasting over console
- Some vendors have rollback
- RANCID is the only decent tool to save configurations or state
- Typos can bring down your whole network
Why is Traditional Networking like this?
Automation is for you!

https://www.youtube.com/watch?v=ArqvSGRzUBw
Working Together
Common Complaints about Automation

- It’s a fad
- It’s hard
- This will steal my job
- One wrong move will take everything down
- My gear doesn’t support it
- I don’t know where to start
Trust the Computers

Friend?
Vendors and Automation!
Here's How to Start

I am a tiny potato
And I believe in you

YOU CAN DO THE THING
No Way! You can do this on any equipment!
Step 1 - Start using 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

https://rogerdudler.github.io/git-guide/
Step 1 - Start using Git!

https://try.github.io

http://www.xkcd.com/1597/
Git Glossary

**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”)
Step 2 - Check in Your Configuration

Check in ALL THE CONFIGS!

```
lcarr@Lappy:~/puppet-presentation (master)$ git add *
lcarr@Lappy:~/puppet-presentation (master)$ git commit -a -m "New router configs"
[master 3dd394a] New router configs
  3 files changed, 0 insertions(+), 0 deletions(-)
  create mode 100644 router1.conf
  create mode 100644 router2.conf
  create mode 100644 router3.conf
lcarr@Lappy:~/puppet-presentation (master)$ git push
Counting objects: 3, done.
Delta compression using up to 4 threads.
Compressing objects: 100% (2/2), done.
Writing objects: 100% (3/3), 377 bytes | 0 bytes/s, done.
Total 3 (delta 0), reused 1 (delta 0)
To git@github.com:LeslieCarr/puppet-presentation.git
  546f0fa..3dd394a  master -> master
lcarr@Lappy:~/puppet-presentation (master)$
```
Showing 1 changed file with 3 additions and 7 deletions.

```
leaf1/Quagga.conf

@@ -31,20 +31,16 @@ router bgp 1

31 31
32 32
33 33
neighbor 10.1.1.2 remote-as 11

34 34
- neighbor 10.1.1.2 prefix-list route-filter in
+ network 10.1.1.0/24
+ network 10.2.1.0/24

36 36
- neighbor 10.2.1.2 prefix-list route-filter in
+ neighbor 10.2.1.2 remote-as 22

37 37
! address-family ipv6

39 39
- network 2001:db8::1/128
+ network 2001:db8::1/128
+ network 2001:db8:1:1::/64
+ network 2001:db8:2:1::/64

42 37
neighbor 10.1.1.2 activate
neighbor 10.2.1.2 activate

39 39
+ network 2001:db8::1/128
+ network 2001:db8:1:1::/64
+ network 2001:db8:2:1:1::/64

44 42
exit-address-family
```
Step 3

Templatize configuration files

- Templates let you reuse code snippets
- Computers never forget... or make typos

https://docs.puppetlabs.com/puppet/latest/reference/lang_template.erb.html
**Template Example**

### site.pp:

```hcl
node 'network.server' {
  switch::config {
    'leaf1':
      loopback      => '10.0.0.1/32',
      webservers =>
        { interfaces => 'swp1 swp2 swp5',
          vlan       => '3' },
    storage =>
        { interfaces => 'swp6',
          vlan       => '10' },

  }
}
```

### config.pp

```hcl
define switch::config
( $switch = $title, $loopback, $webservers, $storage )
{
  file { "/home/switch_configs/${switch}.conf":
    ensure => present,
    content => template('switch/interfaces.erb')
  }
}
```
interfaces.erb:

auto eth0
iface eth0 inet dhcp

auto lo
iface lo inet loopback
    address <%= @loopback %>

# webserver vlan
auto br_webserver_<%= webservers['vlan'] %>
iface br_webserver_<%= webservers['vlan'] %>
    bridge-ports <%= webservers['interfaces'] %>
    bridge-stp on

# storage vlan
auto br_storage_<%= storage['vlan'] %>
iface br_storage_<%= storage['vlan'] %>
    bridge-ports <%= storage['interfaces'] %>
    bridge-stp on
auto eth0  
iface eth0 inet dhcp

auto lo  
iface lo inet loopback  
    address 10.0.0.1/32

# webserver vlan  
auto br_webserver_3  
iface br_webserver_3  
    bridge-ports swp1 swp2 swp5  
    bridge-stp on

#storage vlan  
auto br_storage_10  
iface br_storage_10  
    bridge-ports swp6  
    bridge-stp on
Your Infrastructure has transformed into Code
Team Separation is a Problem
Git Branches to the Rescue!

- **Create changes in branches**
  
  master
  
  vlan

- **Merge and review**

  master
  
  vlan

Use merge/pull request as an opportunity to review impact of changes
Git Branches to the Rescue!

LeslieCarr / puppet-presentation

Configuration and code for puppet demonstration at PuppetConf 2014 — Edit

7 commits   2 branches   0 releases   1 contributor

Your recently pushed branches:

new_vlan (less than a minute ago)

Branch: new_vlan puppet-presentation / +
Start a Pull Request on Github
Approve or Deny the Request!

Adding webserver1 to vlan 50 #1

LeslieCarr wants to merge 1 commit into master from new_vlan

Conversation 0, Commits 1, Files changed 1

LeslieCarr commented just now

No description provided.

Adding webserver1 to vlan 50

e9326dd

Labels
None yet

Milestone
No milestone

Assignee
No one—assign yourself

This branch is up-to-date with the base branch
Merging can be performed automatically.

Merge pull request
You can also open this in GitHub Desktop or view command line instructions.
Adding webserver1 to vlan 50 #1

Merged LeslieCarr merged 1 commit into master from new_vlan just now

No description provided.

Pull request successfully merged and closed
You're all set—the new_vlan branch can be safely deleted.
All of the Teams are Working Together
Advanced Topics for Extra Credit
Continuous Integration Systems

- Catch tpyos!
- Use spell checking
- Probably already have one
Virtualize a Copy of Your Network

VIRTUALIZE

ALL THE THINGS

GNS3
Add in an Agent or Pushes
So Happy!
Oops! I mistyped my loopback!

site.pp:

node 'network.server' {
    switch::config {'leaf1':
        loopback => '10.0.0.1/3',
        webservers =>
            { interfaces => 'swp1 swp2 swp5',
             vlan => '3' },
        storage =>
            { interfaces => 'swp6',
             vlan => '10' },
    }
}
Pushing a Broken Change
Where was that change?
git revert!

- Revert failures after merge

master

IPv6
leslie@mogwai:~$ git revert -m 1 HEAD~0
[master 4df89bb] Revert "Merge pull request #1 from LeslieCarr/new_vlan"
  1 file changed, 1 deletion(-)
leslie@MacBook-Pro:~/github/puppet-presentation (master)$ git push
To git@github.com:LeslieCarr/puppet-presentation.git
  546f0fa..4df89bb  master -> master
All Better

Whew- that was a close call--
No Post Mortem == Wishing For Success
Post Mortems are Your Friend!

- Opportunity, not a chore!
- Blameless
- Ruthlessly accurate
- Fix!
Failure is Okay
Before Automation
After Automation
Step 1 - Git!

https://try.github.io
Advanced Topics
Teamwork
Questions?

@lesliegeek