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Building Security Into Your Workflow with InSpec

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HI!

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EVERY business is a software business

> We’re going to be a software company with airplanes.
>
> – CIO, Alaska Airlines

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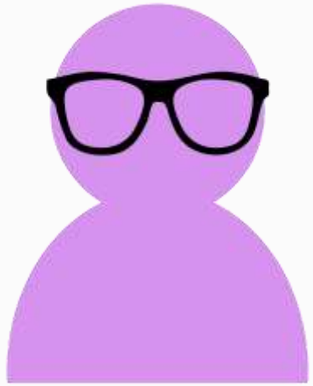
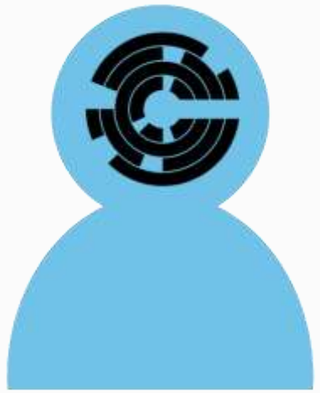
What We Have Here Is A Communications Problem



Compliance

Security



DevOps

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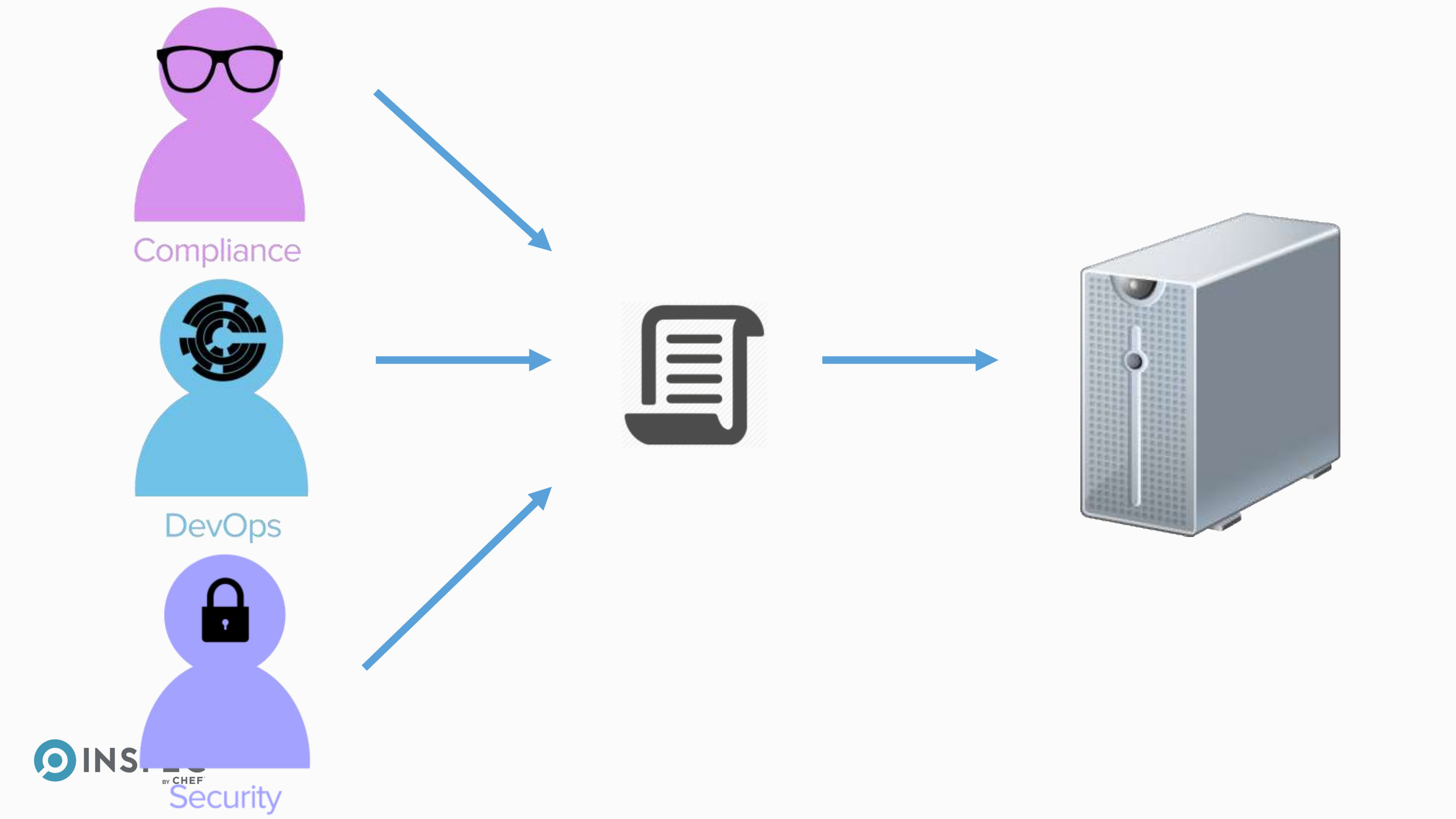
Compliance
DevOps
Security
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What Is InSpec

InSpec

- Human-readable specification language for tests related to security and compliance
- Includes facilities for creating, sharing, and reusing profiles
- Extensible language so you can build your own rules for your applications and systems
- Command-line tools for plugging into your existing workflows / build servers
- Integrates with Test Kitchen for fast-feedback local testing by developers

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SSH Example

- If your security team sends you a directive:

  SSH supports two different protocol versions. The original version, SSHv1, was subject to a number of security issues. All systems must use SSHv2 instead to avoid these issues.

How Do You Go About Fixing It?

- Identify the file and file location to check your systems
- Figure out some sort of incantation
  - Do we check it first or just push a new one everywhere?
- What's the plan for the currently used images?
  - Rebuild?
  - Remediate at instantiation?
- Maybe you're using a configuration management solution for these types of changes? Did your change get tested before it goes to all your systems?

Lifecycle

- When you get a mandate from security, how often is it checked?
- Single big scan, report mailed out with a “due date”?
- Yearly or twice-yearly massive scans with remediation firedrills?

Using InSpec

User: chef
Pass: devseccon2017

User: velocity
Pass: London2017

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Find It!

- http://inspec.io/
- Open Source!
- The “spec” is a hint
- It comes installed as part of the Chef Developer’s Kit, ChefDK, or on its own
- https://downloads.chef.io/chefdk

  curl -o chefdk.rpm https://packages.chef.io/files/stable/chefdk/2.3.4/el/7/chefdk-2.3.4-1.el7.x86_64.rpm

  sudo rpm -Uhv chefdk.rpm

Check that sshd_config

```
describe sshd_config do
  impact 1.0

  title 'SSH Version 2'

  desc <<-EOF
    SSH supports two different protocol versions. The original version, SSHv1, was subject to a number of security issues. Please use SSHv2 instead to avoid these.
  EOF

  its('Protocol') { should cmp 2 }
end
```

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Resources

- InSpec includes built-in resources for common services, system files, and configurations

  See http://inspec.io/docs/reference/resources/ for the current list!
- Built-in resources work on several platforms of Linux. There are also Windows-specifics
- A resource has characteristics that can be verified for your requirements, and Matchers that work with those characteristics

- Resources take the “grep for x” out of the testing phase
- Parsers included in the InSpec software do the work for you
- It’s built off the premises of rSpec, and meant to be human readable

its.... should...

- it { should exist }
- it { should be_installed }
- it { should be_enabled }
- its('max_log_file') { should cmp 6 }
- its('exit_status') { should eq 0 }
- its('gid') { should eq 0 }

Run It

- InSpec is command line
  - Installs on your workstation as a ruby gem or as part of the ChefDK
- Can be run locally, test the machine it is executing on
- Or remotely
  - InSpec will log into the target and run the tests for you
- Also a REPL
  - https://www.inspec.io/docs/reference/shell/

Create a Basic Test – test.rb

- Let’s write a basic test to make sure /tmp is a directory
- It also should be owned by root
- And its mode should be 01777 – open to all (plus sticky bit!)
- Let’s check out the docs for the “file” resource for InSpec:w

File Resources in InSpec

- https://www.inspec.io/docs/reference/resources/file/
- We want:
  - Directory
  - Owner
  - Mode

```
describe file(‘path’) do
  it { should MATCHER ‘value’ }
end
```

test.rb

```
describe file("/tmp") do
  it { should exist }
  it { should be_directory }
  it { should be_owned_by 'root' }
  its('mode') { should cmp '01777' }
end
```

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Test Any Target

```
inspec exec test.rb
```

```
inspec exec test.rb -i ~/.aws/mandi_eu.pem -t ssh://ec2-user@54.152.7.203
```

```
inspec exec test.rb -t winrm://Admin@192.168.1.2 --password super
```

```
inspec exec test.rb -t docker://3dda08e75838
```

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Execute InSpec

```
[chef@ip-172-31-38-151 ~]$ inspec exec ./test.rb
Profile: tests from ./test.rb
Version: (not specified)
Target:  local://

  File /tmp
     ✓  should exist
     ✓  should be directory
     ✓  should be owned by "root"
     ✓  mode should cmp == "01777"

Test Summary: 4 successful, 0 failures, 0 skipped
```

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Failures

- InSpec runs with failed tests return a non-zero return code

```
Profile Summary: 0 successful, 1 failures, 0 skipped
[chef@ip-172-31-29-25 ~]$ echo $?
1
[chef@ip-172-31-29-25 ~]$
```

- Passing tests have 0 return code

```
Profile Summary: 1 successful, 0 failures, 0 skipped
[chef@ip-172-31-29-25 ~]$ echo $?
0
[chef@ip-172-31-29-25 ~]$
```

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Profiles

- InSpec profiles allow you to package and share sets of InSpec tests for your organization or for a specific application set
- Each profile can have multiple test files included
- The test files generally test for one required outcome, but can look at different objects to meet requirements
- Flexible!

  Create your own profiles for specific software you use

Hardening with InSpec

- Centos 7 host
- *os-hardening* cookbook from https://supermarket.chef.io
- */dev-sec/linux-baseline* InSpec profile from https://github.com/dev-sec/linux-baseline

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What's in the *linux-baseline* Profile

```
control 'os-02' do
  impact 1.0
  title 'Check owner and permissions for /etc/shadow'
  desc 'Check periodically the owner and permissions for /etc/shadow'
  describe file('/etc/shadow') do
    it { should exist }
    it { should be_file }
    it { should be_owned_by 'root' }
    its('group') { should eq shadow_group }
    it { should_not be_executable }
    it { should be_writable.by('owner') }
...
```

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Use the Profile

```
$ git clone https://github.com/dev-sec/linux-baseline
...

$ sudo inspec exec linux-baseline
Profile Summary: 23 successful controls, 28 control failures, 2 controls skipped
Test Summary: 60 successful, 60 failures, 2 skipped
$
```

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What's in the os-hardening Cookbook

Branch: master ▾ **chef-os-hardening / recipes /** Create new file | Find file | History

artem-sidorenko Set the suid_dumpable to the safe value of 2 ··· Latest commit `09054ee` on Mar 28

..		
apt.rb	Remove dependenies to apt and yum cookbooks.	3 months ago
default.rb	PP-174 OS hardening	a year ago
limits.rb	PP-174 OS hardening	a year ago
login_defs.rb	Add attribute to control login.defs PASS_WARN_AGE	4 months ago
minimize_access.rb	PP-174 OS hardening	a year ago
packages.rb	Remove packages with known issues on debian/ubuntu	2 years ago
pam.rb	[pam-attr-namespace-fix]	a year ago
profile.rb	PP-174 OS hardening	a year ago
securetty.rb	PP-174 OS hardening	a year ago
suid_sgid.rb	Making rubocop and foodcritic happy	3 months ago
sysctl.rb	Set the suid_dumpable to the safe value of 2	2 months ago
yum.rb	Remove dependenies to apt and yum cookbooks.	3 months ago

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Use Chef to Repair the Findings

```
$ chef generate cookbook harden
```

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Edit harden/metadata.rb

```
name 'harden'
maintainer 'The Authors'
maintainer_email 'you@example.com'
license 'All Rights Reserved'
description 'Installs/Configures harden'
...
...
depends 'os-hardening'
```

Create a Cookbooks Package

```
$ cd harden
$ berks install
$ berks package
$ cd ..
$ tar –xzvf harden/cookbooks-VERSION.tar.gz
```

Run chef-client to remediate failed tests

```
$ sudo chef-client -r "recipe[os-hardening]" --local-mode
```

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Rerun the Tests

```
$ inspec exec linux-baseline/
...
Profile Summary: 50 successful controls, 2 control failures, 1
control skipped
Test Summary: 103 successful, 19 failures, 1 skipped
```

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What’s Still Failing?

- Find the controls that aren’t passing
- Decide if you want to fix them or forget them
- Let’s fix one and forget the others

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Fix rngd

```
$ cat harden/recipes/default.rb

package 'rng-tools'

service 'rngd' do
  action [:start, :enable]
end
```

Berks Update

```
$ berks package
```

Install new cookbooks and run chef-client

```
$ cd ~
$ tar -xzvf harden/cookbooks-VERSION.tar.gz
$ sudo chef-client -r “recipe[harden],recipe[os-hardening]”
--local-mode
```

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Building New Profiles

```
inspec init profile my_hardening
```

Including Profiles

```
$ cat my_hardening/inspec.yml
name: my_hardening
title: InSpec Profile
...
version: 0.1.0
depends:
  - name: linux-baseline
    path: ../linux-baseline
```

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Skipping Individual Controls

```
$ cat my_hardening/controls/my.rb
include_controls 'linux-baseline' do
  skip_control 'os-10’
  skip_control 'os-08’
  skip_control ‘package-08'
  skip_control 'sysctl-14'
end
```

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Rerun the InSpec Profile

```
$ inspec exec my_hardening/
...

Profile Summary: 51 successful controls, 0 control failures, 1
control skipped
Test Summary: 104 successful, 0 failures, 1 skipped
```

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Other Stuff – Test Kitchen

- InSpec also runs as a test suite in Test Kitchen
- Test Kitchen is a tool for your team to create fast-feedback loops for development
- Add InSpec tests to TK so that any change can also be certified with the security profile before it is pushed to source code repository
- More info at http://kitchen.ci/

Resources

- https://inspec.io
- https://github.com/chef-training/workshops/
- http://www.anniehedgie.com/inspec-basics-1
- http://blog.johnray.io/chef-inspec-and-dirty-cow
- https://blog.chef.io/2017/05/23/inspec-launches-support-cloud-platform-assessments/
- https://github.com/lnxchk/inspec_fivemins

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