Faster Feedback with Unit Testing

PROBLEM

Slower Feedback Cycle

The slower the feedback loop the less value it provides to you while developing your cookbooks. You are less inclined to run the test suite. Which means you will likely miss issues as they happen.

Objectives

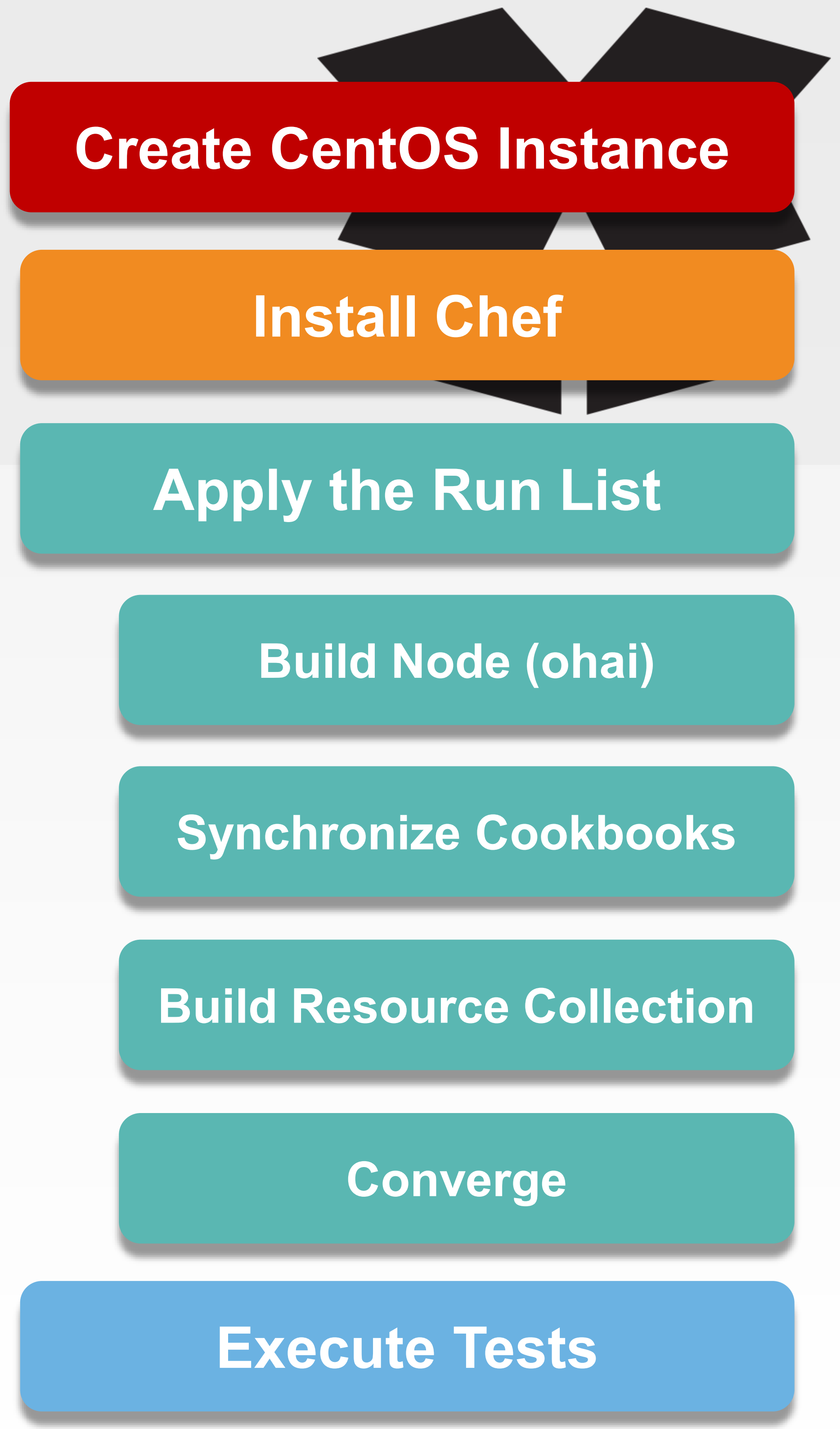
After completing this module, you should be able to:

- Explain the importance and limitations of unit testing
- Write and execute a unit test

CONCEPT

External Dependencies

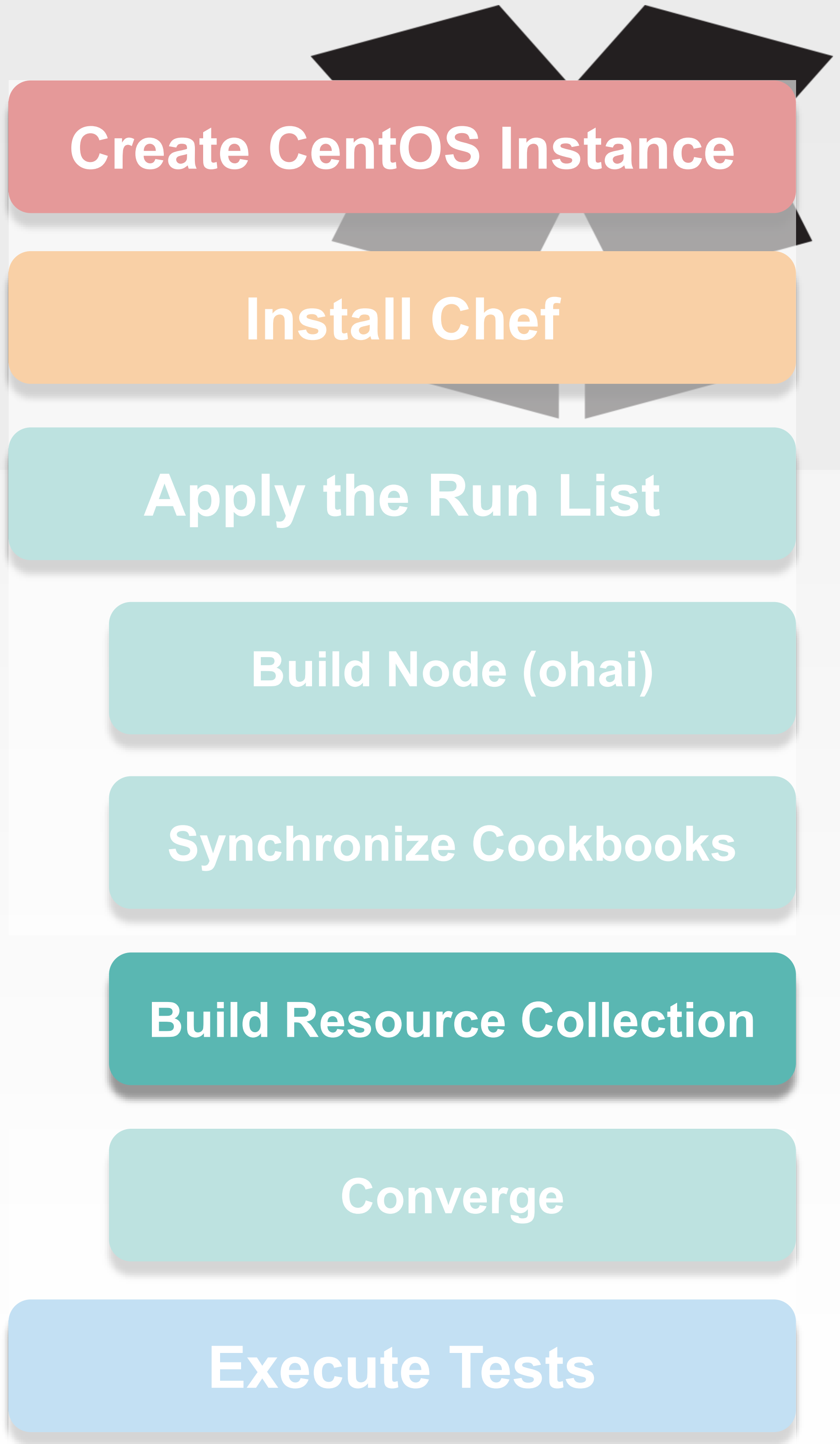
The speed of the test suite is affected by the external dependency on the creation of the test instance, installing chef, and applying the run list.



CONCEPT

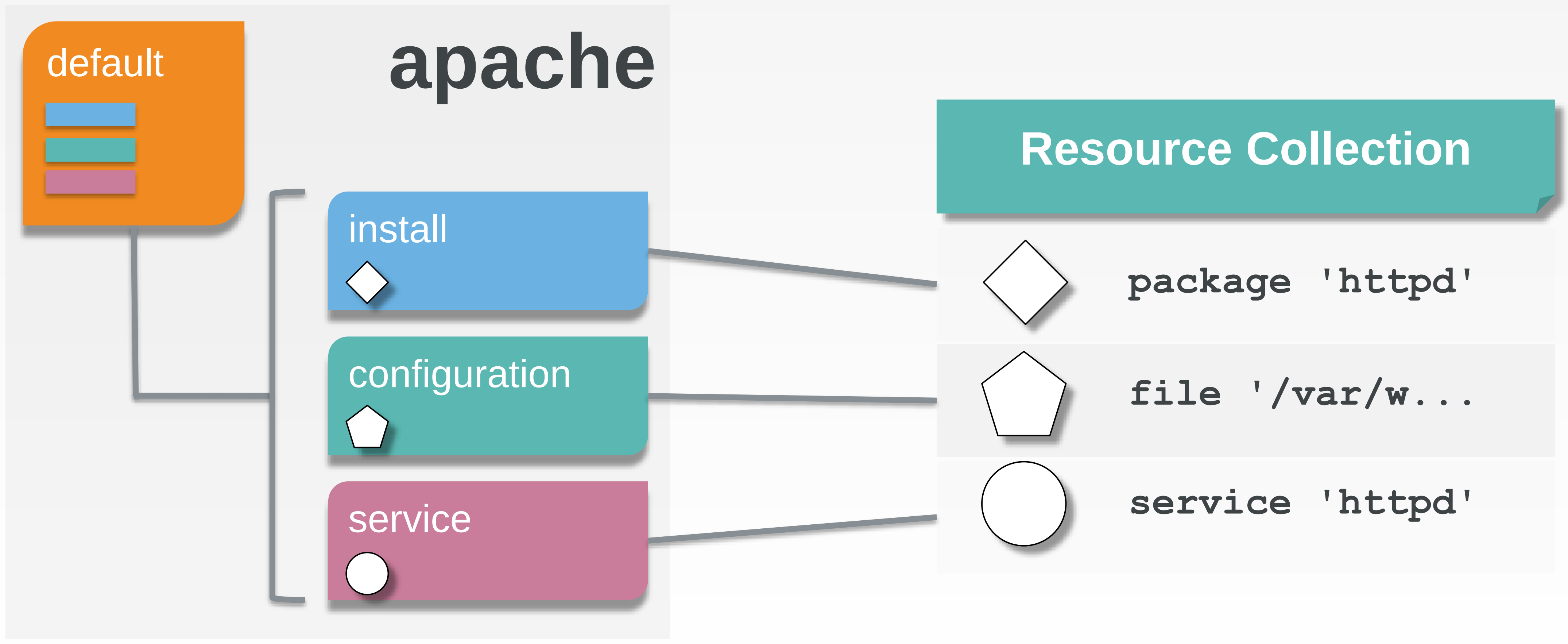
Build Resource Collection

The resource collection is a list of all the resources and recipes loaded across all the recipes within the run list.



CONCEPT

Resource Collection

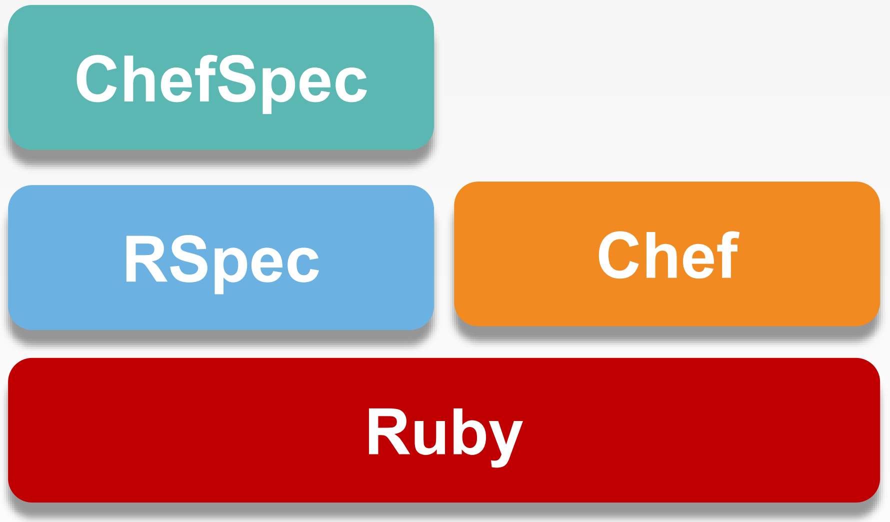


CONCEPT

RSpec and ChefSpec

RSpec is a Domain Specific Language (DSL) that allows you to express and execute expectations. These expectations are expressed in examples that are asserted in different example groups.

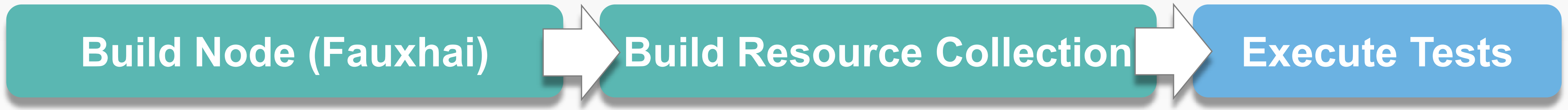
ChefSpec provides helpers and tools that allow you to express expectations about the state of **resource collection**.



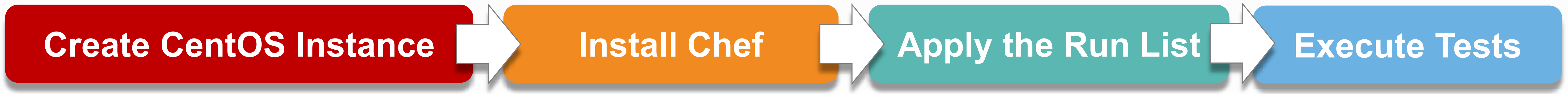
CONCEPT

Test Kitchen versus ChefSpec

ChefSpec



Test Kitchen using InSpec



EXERCISE

Faster Feedback While Developing Cookbooks

The faster the feedback from our tests, the more likely we are to run them.
The more likely we are to run them means they will catch more issues.

Objective:

- ❑ Review and run the existing tests
- ❑ Identify the tests that we need to write
- ❑ Write and execute the tests to identify the failure
- ❑ Fix the code and execute the tests to see success

CHEF

View the Spec Directory

```
> tree spec
```

```
spec
├── spec_helper.rb
└── unit
    └── recipes
        ├── configuration_spec.rb
        ├── default_spec.rb
        ├── install_spec.rb
        └── service_spec.rb
2 directories, 6 files
```

View the Test for the Default Recipe

~/apache/spec/unit/recipes/default_spec.rb

```
require 'spec_helper'

describe 'apache::default' do
  context 'When all attributes are default, on an Ubuntu 16.04' do
    let(:chef_run) do
      runner = ChefSpec::ServerRunner.new(platform: ubuntu',version: '16.04 ')
      runner.converge(described_recipe)
    end

    it 'converges successfully' do
      expect { chef_run }.to_not raise_error
    end
  end
end
```

View the Test for the Default Recipe

~/apache/spec/unit/recipes/default_spec.rb

```
require 'spec_helper'

describe 'apache::default' do
  context 'When all attributes are default, on an Ubuntu 16.04' do
    let(:chef_run) do
      runner = ChefSpec::ServerRunner.new(platform: ubuntu',version: '16.04' )
      runner.converge(described_recipe)
    end

    it 'converges successfully' do
      expect { chef_run }.to_not raise_error
    end
  end
end
```

example groups

cookbook name::recipe name

View the Test for the Default Recipe

~/apache/spec/unit/recipes/default_spec.rb

```
require 'spec_helper'

describe 'apache::default' do
  context 'When all attributes are default, on an Ubuntu 16.04' do
    let(:chef_run) do
      runner = ChefSpec::ServerRunner.new(platform: ubuntu',version: '16.04 ')
      runner.converge(described_recipe)
    end

    it 'converges successfully' do
      expect { chef_run }.to_not raise_error
    end
  end
end
```

example

expectation

View the Test for the Default Recipe

~/apache/spec/unit/recipes/default_spec.rb

```
require 'spec_helper'

describe 'apache::default' do
  context 'When all attributes are default, on an Ubuntu 16.04' do
    let(:chef_run) do
      runner = ChefSpec::ServerRunner.new(platform: ubuntu',version: '16.04 ')
      runner.converge(described_recipe)
    end

    it 'converges successfully' do
      expect { chef_run }.to_not raise_error
    end
```

described recipe

Ruby Class

chef_run helper

Execute the Test for the Default Recipe

```
> chef exec rspec spec/unit/recipes/default_spec.rb
```

```
.


Finished in 0.44592 seconds (files took 4.35 seconds to load)
1 example, 0 failures
```

passing example

EXERCISE

Faster Feedback While Developing Cookbooks

The faster the feedback from our tests, the more likely we are to run them. The more likely we are to run them means they will catch more issues.

Objective:

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- ❑ Identify the tests that we need to write
- ❑ Write and execute the tests to identify the failure
- ❑ Fix the code and execute the tests to see success

These are the Three Things to Test

~/apache/recipes/default.rb

```
#
# Cookbook Name:: apache
# Recipe:: default
#
# Copyright (c) 2017 The Authors, All Rights Reserved.
# include_recipe 'apache::install'
include_recipe 'apache::configuration'
include_recipe 'apache::service'
```

Update the ChefSpec Platform

~/apache/spec/unit/recipes/default_spec.rb

```
require 'spec_helper'

describe 'apache::default' do
  context 'When all attributes are default, on an CentOS 6.9' do              +
    let(:chef_run) do
      runner = ChefSpec::ServerRunner.new(platform: 'centos', version: '6.9')+
      runner.converge(described_recipe)
    end

    it 'converges successfully' do
      expect { chef_run }.to_not raise_error
    end
  end
end
```

Create a Pending Test

~/apache/spec/unit/recipes/default_spec.rb

```
    # ... START OF THE SPEC FILE ...
    it 'converges successfully' do
      expect { chef_run }.to_not raise_error
    end

    it 'includes the install recipe'

  end
end
```

Execute the Tests to See the Pending Tests

```
> chef exec rspec spec/unit/recipes/default_spec.rb
```

```
.*

Pending: (Failures listed here are expected and do not affect your
suite's status)

  1) apache::default When all attributes are default, on an CentOS
6.9 includes the install recipe
     # Not yet implemented
     # ./spec/unit/recipes/default_spec.rb:20

  # ... OUTPUT CONTINUES ON NEXT SLIDE ...
```

pending example

Execute the Tests to See the Pending Tests

```
> chef exec rspec spec/unit/recipes/default_spec.rb
```

```
.*


Pending: (Failures listed here are expected and do not affect your
suite's status)


  1) apache::default When all attributes are default, on an CentOS
6.9 includes the install recipe
     # Not yet implemented
     # ./spec/unit/recipes/default_spec.rb:20


  # ... OUTPUT CONTINUES ON NEXT SLIDE ...
```

summary

spec file : line number

View the Results to See the Pending Tests

```
> chef exec rspec spec/unit/recipes/default_spec.rb
```

```
  # ... OUTPUT CONTINUED FROM PREVIOUS SLIDE ...


Finished in 0.46457 seconds (files took 4.39 seconds to load)
2 examples, 0 failures, 1 pending
```

EXERCISE

Faster Feedback While Developing Cookbooks

The faster the feedback from our tests, the more likely we are to run them. The more likely we are to run them means they will catch more issues.

Objective:

- ✓ Review and run the existing tests
- ✓ Identify the tests that we need to write
- ❑ Write and execute the tests to identify the failure
- ❑ Fix the code and execute the tests to see success

CHEF

REFERENCE

ChefSpec Documentation

Find within the documentation examples of testing for `include_recipe`.

- Search the README
- Search through the 'examples' directory

https://github.com/chefspec/chefspec

CHEF™

Write the Test that Verifies the Include Recipe

~/apache/spec/unit/recipes/default_spec.rb

```
# ... START OF THE SPEC FILE ...
    it 'converges successfully' do
      expect { chef_run }.to_not raise_error
    end

    it 'includes the install recipe' do
      expect(chef_run).to include_recipe('apache::install')
    end

  end
end
```

Execute the Tests to See the Failure

```
> chef exec rspec spec/unit/recipes/default_spec.rb
```

```
.F

Failures:

  1) apache::default When all attributes are default, on an CentOS
6.9 includes the install recipe
     Failure/Error: expect(chef_run).to
include_recipe('apache::install')
       expected ["apache::default"] to include "apache::install"
     # ./spec/unit/recipes/default_spec.rb:21:in `block (3 levels)
in <top (required)>'
```

failing example

EXERCISE

Faster Feedback While Developing Cookbooks

The faster the feedback from our tests, the more likely we are to run them. The more likely we are to run them means they will catch more issues.

Objective:

- ✓ Review and run the existing tests
- ✓ Identify the tests that we need to write
- ✓ Write and execute the tests to identify the failure
- ❑ Fix the code and execute the tests to see success

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Uncomment the Include Recipe

~/apache/recipes/default.rb

```
#
# Cookbook Name:: apache
# Recipe:: default
#
# Copyright (c) 2017 The Authors, All Rights Reserved.
include_recipe 'apache::install'                                        +
include_recipe 'apache::configuration'
include_recipe 'apache::service'
```

Execute the Tests to See it Pass

```
> chef exec rspec spec/unit/recipes/default_spec.rb
```

```
..

Finished in 0.67714 seconds (files took 4.26 seconds to load)
2 examples, 0 failures
```

EXERCISE

Faster Feedback While Developing Cookbooks

The faster the feedback from our tests, the more likely we are to run them. The more likely we are to run them means they will catch more issues.

Objective:

- ✓ Review and run the existing tests
- ✓ Identify the tests that we need to write
- ✓ Write and execute the tests to identify the failure
- ✓ Fix the code and execute the tests to see success

CHEF

LAB

Continue with Mutation Testing

- ❑ Comment out the next line in the apache cookbook's default recipe
- ❑ Write the example with expectation that will generate a failure
- ❑ Verify that one example generates a failure
- ❑ Restore the code in the recipe
- ❑ Verify that all examples pass

❖ **Repeat this series of steps for each line within the default recipe**

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Comment the Include Recipe

~/apache/recipes/default.rb

```
#
# Cookbook Name:: apache
# Recipe:: default
#
# Copyright (c) 2017 The Authors, All Rights Reserved.
include_recipe 'apache::install'
# include_recipe 'apache::configuration'
include_recipe 'apache::service'
```

Write the Test that Verifies the Include Recipe

~/apache/spec/unit/recipes/default_spec.rb

```
# ... START OF THE SPEC FILE ...

    it 'includes the install recipe' do
      expect(chef_run).to include_recipe('apache::install')
    end

    it 'includes the configuration recipe' do
      expect(chef_run).to include_recipe('apache::configuration')
    end

  end
end
```

Execute the Tests to See it Fail

```
> chef exec rspec spec/unit/recipes/default_spec.rb
```

```
..F

Failures:

  1) apache::default When all attributes are default, on an Centos
6.9 includes the configuration recipe
     Failure/Error: expect(chef_run).to
include_recipe('apache::configuration')
       expected ["apache::default", "apache::install",
"apache::service"] to include "apache::configuration"
     # ./spec/unit/recipes/default_spec.rb:27:in `block (3 levels)
```

Uncomment the Include Recipe

~/apache/recipes/default.rb

```
#
# Cookbook Name:: apache
# Recipe:: default
#
# Copyright (c) 2017 The Authors, All Rights Reserved.
include_recipe 'apache::install'
include_recipe 'apache::configuration'
include_recipe 'apache::service'
```

Execute the Tests to See it Pass

```
> chef exec rspec spec/unit/recipes/default_spec.rb
```

```
...

Finished in 0.97252 seconds (files took 4.33 seconds to load)
3 examples, 0 failures
```

Comment the Include Recipe

~/apache/recipes/default.rb

```
#
# Cookbook Name:: apache
# Recipe:: default
#
# Copyright (c) 2017 The Authors, All Rights Reserved.
include_recipe 'apache::install'
include_recipe 'apache::configuration'
include_recipe 'apache::service'
```

Write the Test that Verifies the Include Recipe

~/apache/spec/unit/recipes/default_spec.rb

```
 # ... START OF THE SPEC FILE ...

 it 'includes the install recipe' do
      expect(chef_run).to include_recipe('apache::install')
    end

    it 'includes the configuration recipe' do
      expect(chef_run).to include_recipe('apache::configuration')
    end

    it 'includes the service recipe' do
      expect(chef_run).to include_recipe('apache::service')
    end
  end
end
```

Execute the Tests to See it Fail

```
> chef exec rspec spec/unit/recipes/default_spec.rb
```

```
...F

Failures:

  1) apache::default When all attributes are default, on an Centos
6.9 includes the service recipe
     Failure/Error: expect(chef_run).to
include_recipe('apache::service')
       expected ["apache::default", "apache::install",
"apache::configuration"] to include "apache::service"
     # ./spec/unit/recipes/default_spec.rb:31:in `block (3 levels)
```

Uncomment the Include Recipe

~/apache/recipes/default.rb

```
#
# Cookbook Name:: apache
# Recipe:: default
#
# Copyright (c) 2017 The Authors, All Rights Reserved.
include_recipe 'apache::install'
include_recipe 'apache::configuration'
include_recipe 'apache::service'
```

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Execute the Tests to See it Pass

```
> chef exec rspec spec/unit/recipes/default_spec.rb
```

```
....

Finished in 1.38 seconds (files took 4.16 seconds to load)
4 examples, 0 failures
```

LAB

Continue with Mutation Testing

- ✓ Comment out the next line in the apache cookbook's default recipe
- ✓ Write the example with expectation that will generate a failure
- ✓ Verify that one example generates a failure
- ✓ Restore the code in the recipe
- ✓ Verify that all examples pass

❖ **Repeat this series of steps for each line within the default recipe**

Discussion

What functionality did you test in the integration tests?

What functionality did you test in these unit tests?

What do you see as the scope of unit testing versus integration testing?

What are the differences between a ChefSpec test and a InSpec test?

DISCUSSION

Q&A

What questions can we answer for you?

Morning

Introduction

Why Write Tests? Why is that Hard?

Writing a Test First

Refactoring Cookbooks with Tests

Afternoon

Faster Feedback with Unit Testing

Testing Resources in Recipes

Refactoring to Attributes

Refactoring to Multiple Platforms

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