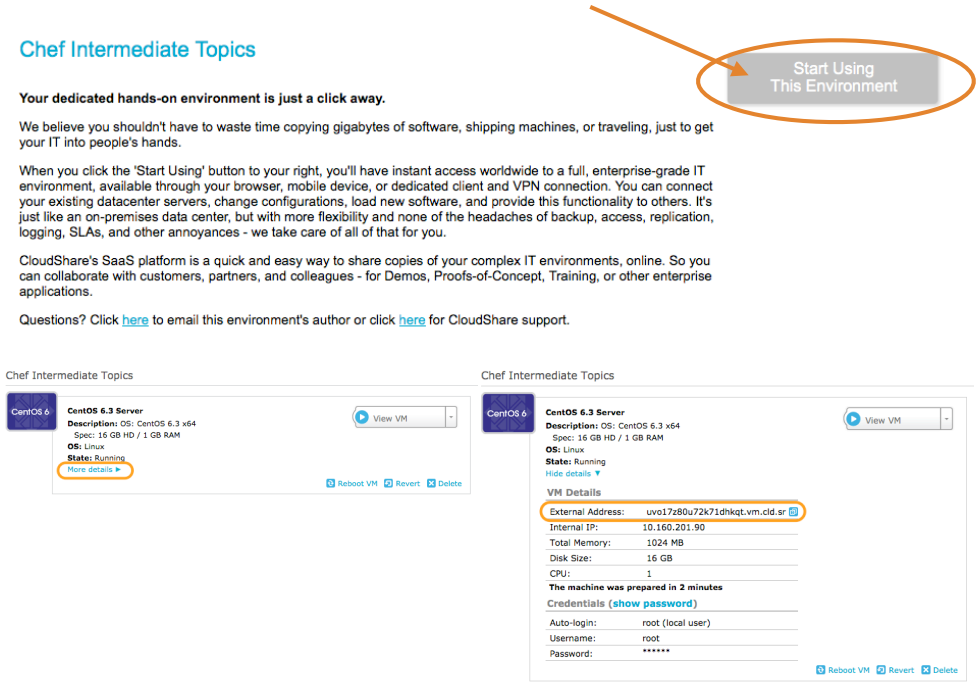
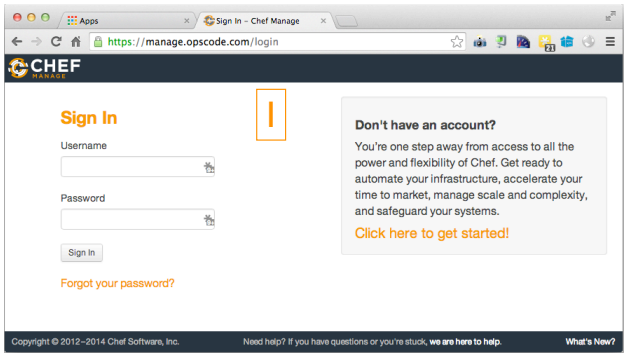
Training Environment

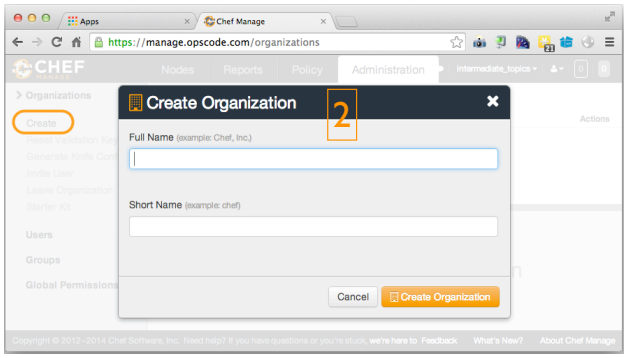


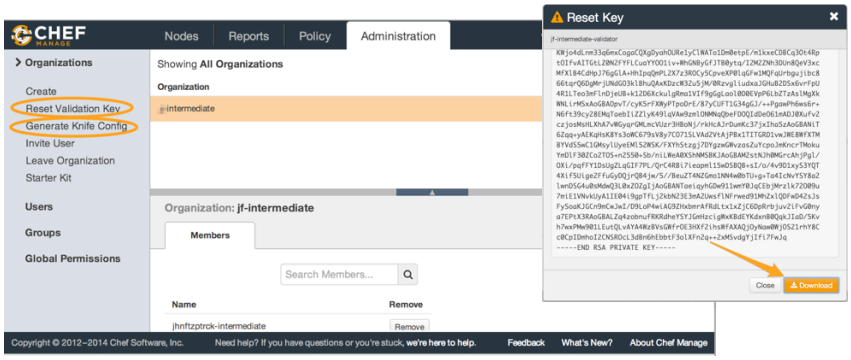

```
$ ssh chef@<EXTERNAL_ADDRESS>
```

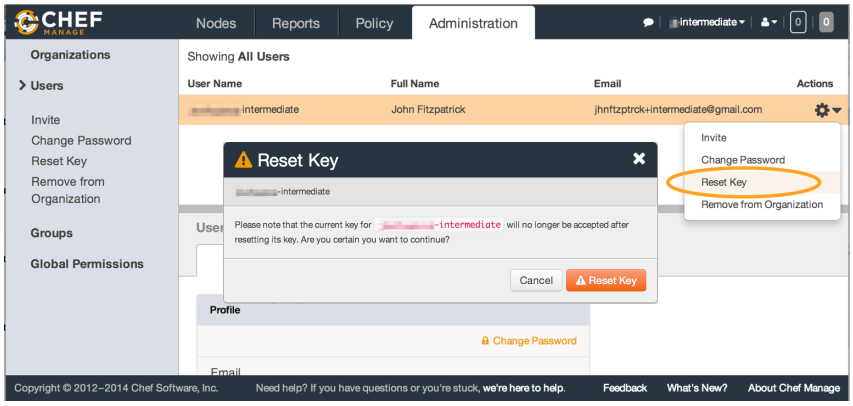
Chef Fundamentals Refresher

Create a new Org

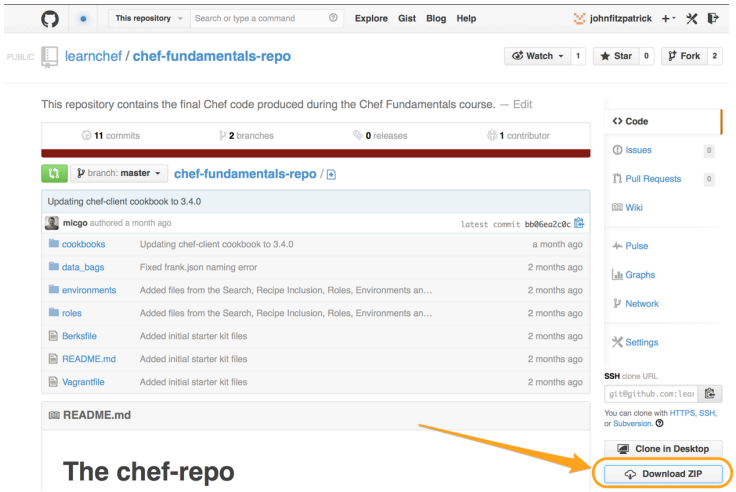




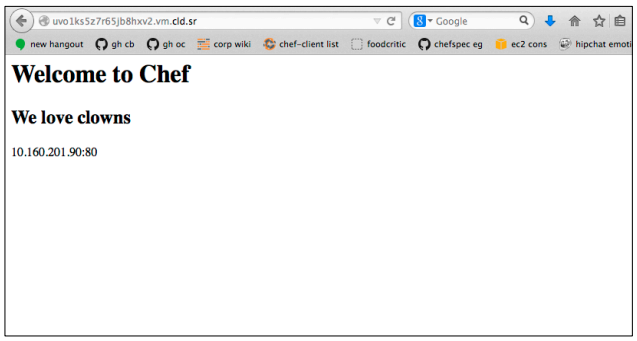


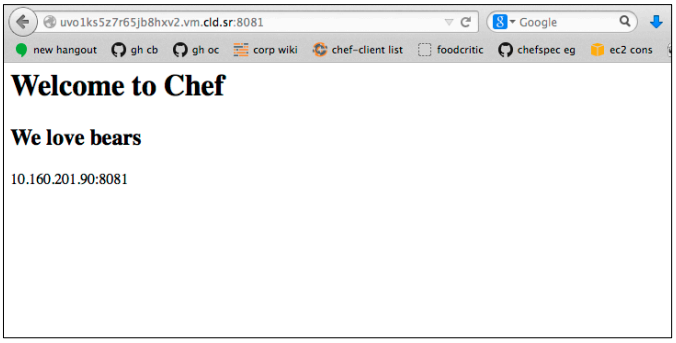


https://github.com/learnchef/chef-fundamentals-repo




```
$ cp ~/Downloads/chef-fundamentals-repo-master.zip .
$ unzip chef-fundamentals-repo-master.zip
$ cd chef-fundamentals-repo-master
$ ls -a
$ mkdir .chef
$ cp ~/Downloads/<yourname>.pem .chef
$ cp ~/Downloads/<your-org>-validator.pem .chef
$ cp ~/Downloads/knife.rb .chef
$ knife client list
$ knife cookbook upload -a
$ knife upload data_bags
$ knife role from file base.rb starter.rb webserver.rb
$ knife environment from file dev.rb production.rb
$ knife bootstrap <EXTERNAL_ADDRESS> --sudo -x chef -P chef -N
"node1" --bootstrap-version 11.12.8
$ ssh chef@<EXTERNAL_ADDRESS>
chef@node1:~$ ls /etc/chef
chef@node1:~$ which chef-client
chef@node1:~$ chef-client -v
$ knife node run_list add node1 'role[webserver]'
chef@node1$ sudo chef-client
chef@node1$ ps awux | grep chef-client
```


uvo1ks5z7r65jb8hxv2.vm.cld.sr
Google
new hangout
gh cb
gh oc
corp wiki
chef-client list
foodcritic
chefspec eg
ec2 cons
hipchat emoti
Welcome to Chef
We love clowns
10.160.201.90:80


uvo1ks5z7r65jb8hxv2.vm.cld.sr:8081
Google
new hangout
gh cb
gh oc
corp wiki
chef-client list
foodcritic
chefspec eg
ec2 cons
Welcome to Chef
We love bears
10.160.201.90:8081

Configuring Chef Clients

```
$ knife node show node1
cookbooks/chef-client/recipes/config.rb

roles/base.rb
name "base"
description "Base Server Role"
run_list "recipe[chef-client::delete_validation]",
"recipe[chef-client::config]", "recipe[chef-client]",
"recipe[ntp]", "recipe[motd]", "recipe[users]"
default_attributes(
  "chef_client" => {
    "config" => {
      "ssl_verify_mode" => ":verify_peer"
    }
  }
)

$ knife role from file base.rb
chef@node1$ sudo chef-client
chef@node1$ sudo cat /etc/chef/client.rb
$ knife ssl fetch
```

Building Custom Resources

cookbooks/apache/metadata.rb

```
maintainer       "apache"
maintainer_email "YOUR_EMAIL"
license          "All rights reserved"
description      "Installs/Configures apache"
long_description IO.read(File.join(File.dirname(__FILE__),
'README.md'))
version          "0.3.0"
```

cookbooks/apache/recipes/default.rb

cookbooks/apache/resources/vhost.rb

```
actions :create, :remove
```

cookbooks/apache/providers/vhost.rb

```
action :create do
  puts "My name is #{new_resource.name}"
end
```

cookbooks/apache/recipes/default.rb

```
...
# Enable an Apache Virtualhost
apache_vhost "lions" do
  action :create
end

$ knife cookbook upload apache
chef@node1$ sudo chef-client
```

cookbooks/apache/providers/vhost.rb

```
use_inline_resources
action :create do
     log "My name is #{new_resource.name}"
end
```

```
$ knife cookbook upload apache
chef@node1$ sudo chef-client
```

cookbooks/apache/resources/vhost.rb

```
actions :create, :remove
attribute :site_name, :name_attribute => true, :kind_of =>
String
attribute :site_port, :default => 80, :kind_of => Fixnum
```

cookbooks/apache/providers/vhost.rb

```
use_inline_resources

action :create do
  # Set the document root
  document_root = "/srv/apache/#{new_resource.site_name}"

 # Add a template for Apache virtual host configuration
  template "/etc/httpd/conf.d/#{new_resource.site_name}.conf"
do
    source "custom.erb"
    mode "0644"
    variables(
      :document_root => document_root,
      :port => new_resource.site_port
    )
  end

    directory document_root do
    mode "0755"
    recursive true
  end

  # Add a template resource for the virtual host's index.html
  template "#{document_root}/index.html" do
    source "index.html.erb"
    mode "0644"
    variables(
      :site_name => new_resource.site_name,
      :port => new_resource.site_port
    )
  end
end
```

(Gist: http://bit.ly/1o4X8Qi)

cookbooks/apache/recipes/default.rb

```
# Enable an Apache Virtualhost
apache_vhost "lions" do
  site_port 8080
  action :create
  notifies :restart, "service[httpd]"
end
```

```
$ knife cookbook upload apache
chef@node1$ sudo chef-client
```


```
$ knife data_bag create apache_sites
$ mkdir -p data_bags/apache_sites
```

data_bags/apache_sites/clowns.json

```
{
  "id": "clowns",
  "port": 80
}
```

```
$ knife data_bag from file apache_sites clowns.json
```

data_bags/apache_sites/bears.json

```
{
  "id": "bears",
  "port": 81
}
```

```
$ knife data_bag from file apache_sites bears.json
```

data_bags/apache_sites/lions.json

```
{
  "id": "lions",
  "port": 8080
}
```

```
$ knife data_bag from file apache_sites lions.json
```

cookbooks/apache/recipes/default.rb

```
...
# Iterate over the apache sites
search("apache_sites", "*:*").each do |site|
  # Enable an Apache Virtualhost
  apache_vhost site['id'] do
    site_port site['port']
    action :create
    notifies :restart, "service[httpd]"
  end
end
```

(Gist: http://bit.ly/1o4ZSNH)

```
$ knife cookbook upload apache
chef@node1$ sudo chef-client
```

cookbooks/apache/providers/vhost.rb

```
...
action :remove do
  file "/etc/httpd/conf.d/#{new_resource.site_name}.conf" do
    action :delete
  end
end
```

cookbooks/apache/recipes/default.rb

```
# Disable the default virtual host
apache_vhost "welcome" do
  action :remove
  notifies :restart, "service[httpd]"
end
...

$ knife cookbook upload apache
chef@node1$ sudo chef-client
```

chef-shell - The Chef Debugger

```
chef@node1$ sudo chef-shell -z
chef > help
chef > help(:nodes)
chef > node['fqdn']

chef > attributes_mode
chef:attributes > node.normal["interactive"] = "is cool"
chef:attributes > node["interactive"]

$ knife node show node1 -a interactive

chef:attributes > node.save

$ knife node show node1 -a interactive
$ knife node show node1 -Fj -l |more

chef:attributes > recipe_mode
chef:recipe > package "tree"
chef:recipe > run_chef
chef:recipe > resources
chef:recipe > resources("user[frank]")
chef:recipe > puts resources("user[frank]").to_text
chef:recipe > exit

chef > reset
chef > nodes.list
chef > nodes.all {|n| "#{n.name}:#{n.chef_environment}"}
chef > nodes.transform(:all) {|n| n.chef_environment("dev")}
chef > nodes.all {|n| "#{n.name}:#{n.chef_environment}"}

$ knife exec -E 'nodes.transform(:all) {|n|
n.chef_environment("production")}'

$ knife search node "*:*" -a chef_environment

chef > nodes.all {|n| "#{n.name}:#{n.chef_environment}"}
```

```
$ knife node environment set node1 _default
$ knife raw
https://api.opscode.com/organizations/yourorg/nodes/node1 |
grep chef_environment
```

Writing Ohai Plugins

```
chef@node1:~$ ohai
chef@node1:~$ ohai -v
chef@node1:~$ apachectl -t -D DUMP_MODULES

$ knife cookbook site download ohai 2.0.0
$ tar -zxvf ohai-2.0.0.tar.gz -C cookbooks/
$ knife cookbook upload ohai

cookbooks/ohai/attributes/default.rb

cookbooks/apache/metadata.rb
name             'apache'
maintainer       'Your Name'
maintainer_email 'your_email@example.com'
license          'All rights reserved'
description      'Installs/Configures apache'
long_description IO.read(File.join(File.dirname(__FILE__),
'README.md'))
version          '0.4.0'
depends 'ohai'


apache/files/default/plugins/modules.rb
Ohai.plugin(:Apache) do
  require 'mixlib/shellout'
  provides "apache/modules"

  collect_data(:default) do
    modules = Mixlib::ShellOut.new("apachectl -t -D DUMP_MODULES")
    modules.run_command
    apache Mash.new
    apache[:modules] = modules.stdout
  end
end
```

cookbooks/apache/recipes/ohai_plugin.rb

```
ohai 'reload_apache' do
  plugin 'apache'
  action :nothing
end

cookbook_file "#{node['ohai']['plugin_path']}/modules.rb" do
  source 'plugins/modules.rb'
  owner  'root'
  group  'root'
  mode   '0755'
  notifies :reload, 'ohai[reload_apache]', :immediately
end
include_recipe 'ohai::default'

$ knife cookbook upload apache
$ knife node run_list set node1
'recipe[apache::ohai_plugin]','role[base]','recipe[apache]'
chef@node1:~$ sudo chef-client
$ knife node show node1 -a apache
chef@node1:~$ cat /etc/chef/ohai_plugins/modules.rb
```

apache/files/default/plugins/modules.rb

```
Ohai.plugin(:Apache) do
  provides "apache/modules"

  collect_data(:default) do
    apache Mash.new
    apache[:modules] = {:static => [], :shared => []}
      modules = shell_out("apachectl -t -D DUMP_MODULES")
      modules.stdout.each_line do |line|
      fullkey, value = line.split(/\(/, 2).map {|i| i.strip}
      apache_mod = fullkey.gsub(/_module/,"")
      dso_type = value.to_s.chomp("\)")
      if dso_type.match(/shared/)
        apache[:modules][:shared] << apache_mod
      elsif dso_type.match(/static/)
        apache[:modules][:static] << apache_mod
      end
    end
  end
end
```

(Gist: http://bit.ly/1jGAsmB)

```
$ knife cookbook upload apache
chef@node1:~$ sudo chef-client

$ knife node show node1 -a apache.modules

chef@node1$ /opt/chef/bin/chef-shell

chef > Ohai::Config['plugin_path'] << "/etc/chef/ohai_plugins"

chef > o = Ohai::System.new
chef > o.all_plugins

chef > o.refresh_plugins(attribute_filter='apache/modules')

$ knife node show node1 -a etc.passwd
```

roles/base.rb

```
name "base"
description "Base Server Role"
run_list "recipe[chef-client::delete_validation]",
"recipe[chef-client::config]", "recipe[chef-client]",
"recipe[ntp]", "recipe[motd]", "recipe[users]"
default_attributes(
  "chef_client" => {
    "config" => {
      "ssl_verify_mode" => ":verify_peer"
    }
  },
  "ohai" => {
    "disabled_plugins" => [":Passwd"]
  }
)
```

```
$ knife role from file base.rb
chef@node1:~$ sudo chef-client

$ knife node show node1 -a etc.passwd
chef@node1:~$ sudo cat /etc/chef/client.rb
```

Chef Client Run Internals

apache/recipes/default.rb

```
...
ruby_block "randomly_choose_language" do
  block do
    if Random.rand > 0.5
      node.run_state['scripting_language'] = 'php'
    else
      node.run_state['scripting_language'] = 'perl'
    end
  end
end

package "scripting_language" do
  package_name lazy { node.run_state['scripting_language'] }
  action :install
end
...

$ knife cookbook upload apache
chef@node1$ sudo chef-client
```

Implementing Chef Handlers

```
$ knife cookbook site download chef_handler 1.1.6
$ tar -zxvf chef_handler-1.1.6.tar.gz -C cookbooks/
$ knife cookbook upload chef_handler

$ knife cookbook create email_handler
```

cookbooks/email_handler/recipes/default.rb

```
chef_gem "pony" do
  action :install
end
include_recipe "chef_handler"
```

cookbooks/email_handler/recipes/default.rb

```
cookbook_file
"#{node['chef_handler']['handler_path']}/email_handler.rb" do
  source "handlers/email_handler.rb"
  owner "root"
  group "root"
  mode "0755"
end

chef_handler "MyCompany::EmailMe" do
  source "#{node['chef_handler']['handler_path']}/email_handler.rb"
  arguments [node['email_handler']['from_address'],
             node['email_handler']['to_address']]
  action :enable
end
```

(Gist: http://bit.ly/T22uzb)

cookbooks/email_handler/attributes/default.rb

```
default['email_handler']['from_address'] = "chef@localhost"
default['email_handler']['to_address'] = "chef@localhost"
```

../email_handler/files/default/handlers/email_handler.rb

```
require 'rubygems'
require 'pony'

module MyCompany
  class EmailMe < Chef::Handler
     def initialize(from_address, to_address)
       @from_address = from_address
       @to_address = to_address
     end

         def report
       status = success? ? "Successful" : "Failed"
       subject = "#{status} Chef run report from #{node.name}"
       report_string = ""

             # report on changed resources
       if ! run_status.updated_resources.empty?
         # get some info about all the changed resources!
         run_status.updated_resources.each do |r|
           report_string += "The resource #{r.name} was changed in
cookbook #{r.cookbook_name} at #{r.source_line}\n"
         end
       else
         report_string += "No resources changed by chef-client\n"
       end

             Pony.mail(:to => @to_address,
                 :from => @from_address,
                 :subject => subject,
                 :body => report_string)
     end
  end
end
```

(Gist http://bit.ly/T25AD2)

$ knife cookbook site download postfix 3.1.8

```
$ tar -zxvf postfix-3.1.8.tar.gz -C cookbooks/
$ knife cookbook upload postfix

$ knife cookbook create mailx
```

cookbooks/mailx/attributes/default.rb

```
case node['platform_family']
when "debian"
  default['mailutils']['mailx-package'] = "mailutils"
when "rhel"
  default['mailutils']['mailx-package'] = "mailx"
end
```

cookbooks/mailx/recipes/default.rb

```
package node['mailutils']['mailx-package'] do
  action :install
end
```

cookbooks/email_handler/recipes/default.rb

```
chef_gem "pony" do
  action :install
end

include_recipe "chef_handler"
include_recipe "postfix"
include_recipe "mailx"
```

cookbooks/email_handler/metadata.rb

```
name             "email_handler"
maintainer       "You"
maintainer_email "you@somewhere.com"
license          "Apache 2.0"
description      "Email me on every Chef run"
long_description IO.read(File.join(File.dirname(__FILE__),
'README.md'))
version          "0.1.0"
depends "chef_handler"
depends "postfix"
depends "mailx"
```

```
$ knife cookbook upload email_handler postfix mailx
```

roles/base.rb

```
name "base"
description "Base Server Role"
run_list "recipe[email_handler]",
"recipe[chef-client::delete_validation]",
"recipe[chef-client::config]", "recipe[chef-client]",
"recipe[ntp]", "recipe[motd]", "recipe[users]"
```

```
$ knife role from file base.rb
chef@node1$ sudo chef-client
chef@node1$ mail
```

Cookbook Style & Correctness

```
$ gem install foodcritic --no-ri --no-rdoc -v 3.0.3
$ foodcritic cookbooks/apache
$ foodcritic cookbooks/apache -t ~FC003 -t ~FC009

$ gem install rubocop --no-ri --no-rdoc -v 0.18.1
$ rubocop cookbooks
$ rubocop cookbooks/apache
$ rubocop cookbooks/apache --auto-gen-config
$ echo "inherit_from: rubocop-todo.yml" >> .rubocop.yml
```

cookbooks/apache/.rubocop.yml

```
AlignParameters:
  Enabled: false

Encoding:
  Enabled: false

LineLength:
  Max: 200

SingleSpaceBeforeFirstArg:
  Enabled: false

$ rubocop cookbooks/apache
```

apache/files/default/plugins/modules.rb

```
...
modules.stdout.each_line do |line|
  fullkey, value = line.split(/\(/, 2).map { |i| i.strip }
  apache_mod = fullkey.gsub(/_module/,"")
...

$ rubocop cookbooks/apache
```

An Introduction to ChefSpec

```
$ gem install chefspec  -v 4.0.1
```

cookbooks/motd/spec/spec_helper.rb

```
require 'chefspec'
at_exit { ChefSpec::Coverage.report! }
```

```
$ mkdir cookbooks/motd/spec
$ mkdir cookbooks/motd/spec/unit
```

cookbooks/motd/spec/unit/default_spec.rb

```
require_relative '../spec_helper.rb'

describe 'motd::default' do
  let(:chef_run) { ChefSpec::Runner.new.converge(described_recipe) }

  it 'does something' do
    pending 'need to write this test'
  end
end
```

```
$ rspec cookbooks/motd
```

cookbooks/motd/spec/unit/default_spec.rb

```
require_relative '../spec_helper.rb'

describe 'motd::default' do
  let(:chef_run) { ChefSpec::Runner.new.converge(described_recipe) }

  it 'creates an motd correctly' do
    expect(chef_run).to create_template('/etc/motd').with(
      :user => 'root',
      :group => 'root',
      :mode => '0644'
    )
  end
end
```

```
$ rspec cookbooks/motd
```

cookbooks/motd/recipes/default.rb

```
...
template "/etc/motd" do
  source "motd.erb"
  mode "0644"
  owner "root"
  group "root"
end
```

```
$ rspec cookbooks/motd
$ knife cookbook upload apache motd
```

cookbooks/mailx/spec/spec_helper.rb

```
require 'chefspec'
at_exit { ChefSpec::Coverage.report! }
```

cookbooks/mailx/spec/unit/default_spec.rb

```
require 'spec_helper'

describe 'mailx::default' do
     context 'on Debian' do
          let(:chef_run) { ChefSpec::Runner.new({:platform =>
'ubuntu', :version => '14.04'}).converge(described_recipe) }

          it 'should install the correct packages' do
               expect(chef_run).to install_package 'mailutils'
          end
     end
     context 'on CentOS' do
          let(:chef_run) { ChefSpec::Runner.new({:platform =>
     'centos', :version =>
     '6.5'}).converge(described_recipe) }

          it 'should install the correct packages' do
               expect(chef_run).to install_package 'mailx'
          end
     end
end
```

(Gist http://bit.ly/1tJiSRl)

```
$ rspec cookbooks/mailx
```