

Implementing Chef Testing Framework with Test Kitchen and InSpec

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Description

Chef's **Test Kitchen** and **InSpec** are used to test and verify cookbooks in isolated environments, helping ensure that code functions as intended before it's deployed in production. **Test Kitchen** manages testing environments and runs configurations, while **InSpec** is used to write tests that validate infrastructure settings.

Problem Statement

Testing Chef cookbooks in real environments can be time-consuming and error-prone. With Test Kitchen and InSpec, you can:

- **Isolate tests** in separate environments.
- **Automate verification** of expected configurations and services.
- **Ensure code consistency** across multiple systems.

Prerequisites

Software Required

- **Chef Workstation:** To create, test, and manage cookbooks.
- **Virtualization Software:** Vagrant or Docker for local testing (recommended).

Hardware Requirement

- **Chef Workstation:** 2 GB RAM, 2 CPU cores

Implementation Steps

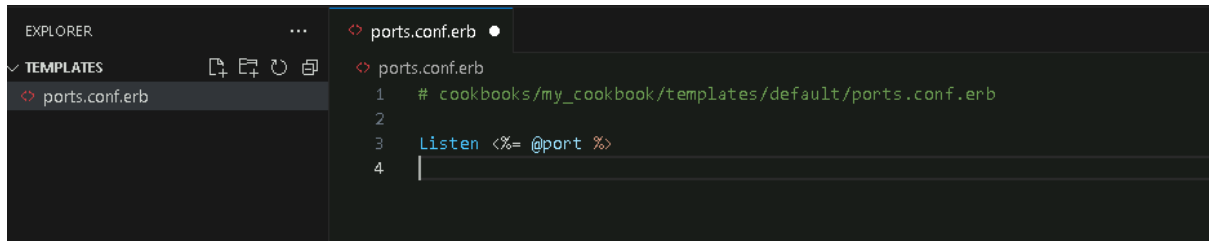
Step-1: Install Test Kitchen and InSpec

1. Ensure Chef Workstation is Installed

2. Verify Installation:

- Check that Test Kitchen and InSpec are available by running:

```
kitchen --version
inspec version
```

A screenshot of a code editor with a dark theme. On the left, the 'EXPLORER' sidebar shows a file named 'ports.conf.erb' under a 'TEMPLATES' folder. The main editor area displays the content of 'ports.conf.erb', which includes a comment and a 'Listen' directive.

```
ports.conf.erb
ports.conf.erb
1 # cookbooks/my_cookbook/templates/default/ports.conf.erb
2
3 Listen <%= @port %>
4
```

```
C:\Users\Administrator\Downloads\chef-starter\chef-repo>kitchen --version
Test Kitchen version 3.6.0

C:\Users\Administrator\Downloads\chef-starter\chef-repo>_
```

Step-2: Configure Test Kitchen

1. Initialize Test Kitchen:

- Navigate to your cookbook directory and initialize Test Kitchen with:

```
kitchen init
```

```
C:\Users\Administrator\Downloads\chef-starter\chef-repo\cookbooks\my_webserver>kitchen init
  conflict  kitchen.yml
xchef-repo/cookbooks/my_webserver/kitchen.yml? (enter "h" for help) [Ynaqdhm] Y
  force    kitchen.yml
  identical cheignore

C:\Users\Administrator\Downloads\chef-starter\chef-repo\cookbooks\my_webserver>_
```

- This command creates a **.kitchen.yml** file in your cookbook directory, which defines how Test Kitchen will set up and test your environment.

2. Edit **.kitchen.yml**:

- Open the **.kitchen.yml** file and configure it to use the appropriate driver and platform.
- For example, to use Docker as a test platform:

```
driver:
  name: vagrant

platforms:
  - name: ubuntu-20.04

suites:
  - name: default
    run_list:
      - recipe[my_webserver::default]
    verifier:
      name: inspec
    attributes:
```



```
! kitchen.yml M x
my_webserver > ! kitchen.yml
1  ---
2  driver:
3    name: vagrant
4
5  platforms:
6    - name: ubuntu-20.04
7
8  suites:
9    - name: default
10      run_list:
11        - recipe[my_webserver::default]
12      verifier:
13        name: inspec
14      attributes:
```

- Here, we set **vagrant** as the driver and **Ubuntu 20.04** as the testing platform, applying the **my_webserver::default** recipe.

Step-3: Write InSpec Tests for the Cookbook

1. Create InSpec Test Directory:

- Inside the **test/integration/default** folder of your cookbook, create a test file named **default_test.rb**.

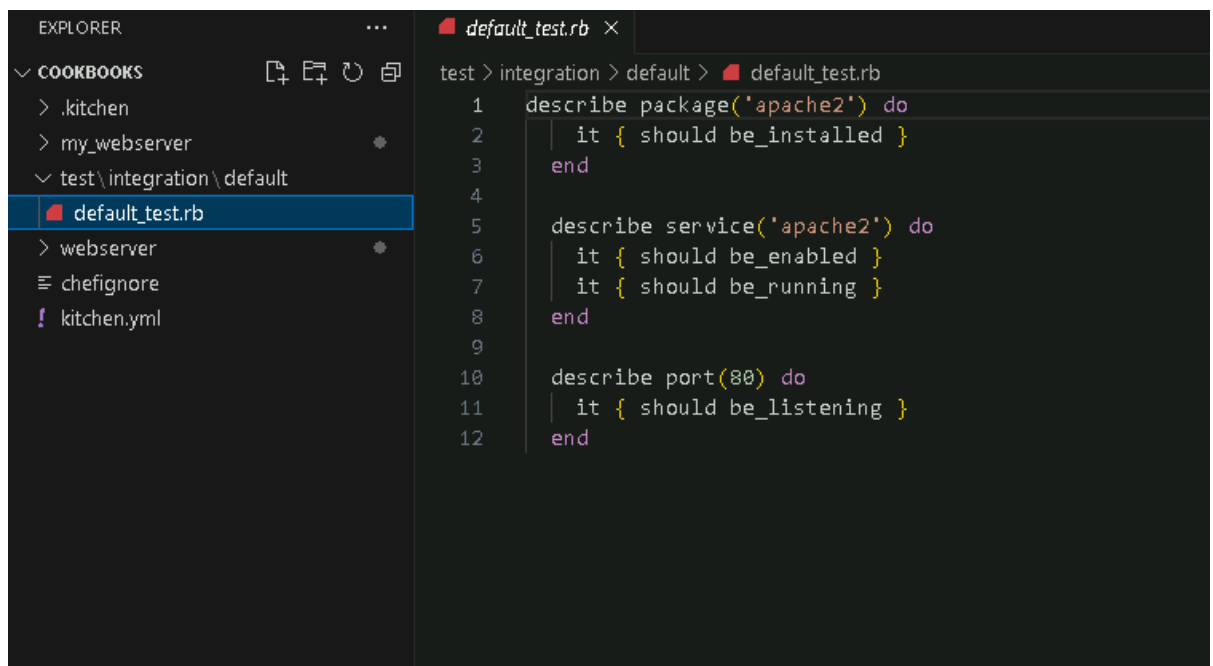
2. Write InSpec Tests:

- Open **default_test.rb** and write tests to validate your configurations. For example, if your cookbook installs Apache, you could check for the Apache package and its running status:

```
describe package('apache2') do
  it { should be_installed }
end

describe service('apache2') do
  it { should be_enabled }
  it { should be_running }
end

describe port(80) do
  it { should be_listening }
end
```



- These tests check if **Apache** is installed, enabled, and running, and if **port 80** is open.

Step-4: Run Tests with Test Kitchen

1. Run Test Kitchen Commands:

- **Create the Test Instance:**

```
kitchen create
```

```
C:\Users\Administrator\Downloads\chef-starter\chef-repo\cookbooks\my_webserver>kitchen create
-----> Starting Test Kitchen (v3.6.0)
-----> Creating <default-ubuntu-2004>...
  Bringing machine 'default' up with 'virtualbox' provider...
  ==> default: Importing base box 'bento/ubuntu-20.04'...
  ==> default: Matching MAC address for NAT networking...
  ==> default: Checking if box 'bento/ubuntu-20.04' version '202407.23.0' is up to date...
  ==> default: Setting the name of the VM: kitchen-my_webserver-default-ubuntu-2004-2af67fe1-0c2c-4707-a7e0-808344506882
  ==> default: Clearing any previously set network interfaces...
  ==> default: Preparing network interfaces based on configuration...
  default: Adapter 1: nat
  ==> default: Forwarding ports...
  default: 22 (guest) => 2222 (host) (adapter 1)
  ==> default: Running 'pre-boot' VM customizations...
  ==> default: Booting VM...
  ==> default: Waiting for machine to boot. This may take a few minutes...
  default: SSH address: 127.0.0.1:2222
  default: SSH username: vagrant
  default: SSH auth method: private key
  default: Warning: Connection reset. Retrying...
  default: Warning: Connection aborted. Retrying...
  default:
  default: Vagrant insecure key detected. Vagrant will automatically replace
  default: this with a newly generated keypair for better security.
  default:
  default: Inserting generated public key within guest...
  default: Removing insecure key from the guest if it's present...
  default: Key inserted! Disconnecting and reconnecting using new SSH key...
  ==> default: Machine booted and ready!
  ==> default: Checking for guest additions in VM...
  ==> default: Setting hostname...
  ==> default: Mounting shared folders...
  default: C:/Users/Administrator/.kitchen/cache => /tmp/omnibus/cache
  ==> default: Machine not provisioned because '--no-provision' is specified.
  [SSH] Established
  Vagrant instance <default-ubuntu-2004> created.
  Finished creating <default-ubuntu-2004> (2m16.25s).
-----> Test Kitchen is finished. (2m21.66s)

C:\Users\Administrator\Downloads\chef-starter\chef-repo\cookbooks\my_webserver>
```

- This command starts the container or virtual machine based on your `.kitchen.yml` configuration.

2. Apply the Cookbook and Run Tests:

- **Converge** the cookbook to apply its configurations:

kitchen converge

```
C:\Users\Administrator\Downloads\chef-starter\chef-repo\cookbooks\my_webserver>kitchen converge
-----> Starting Test Kitchen (v3.6.0)
-----> Converging <default-ubuntu-2004>...
  Preparing files for transfer
  Policy lock file doesn't exist, running 'C:\opscode\chef-workstation\bin\chef-cli.BAT install' for Policyfile C:/Users/Administrator/Downloads/chef-starter/chef-repo/cookbooks/my_webserver/Policyfile.rb...
  Building policy my_webserver
  Expanded run list: recipe[my_webserver::default]
  Caching Cookbooks...
  Installing my_webserver >= 0.0.0 from path
  Lockfile written to C:/Users/Administrator/Downloads/chef-starter/chef-repo/cookbooks/my_webserver/Policyfile.lock.json
  Policy revision id: 59356be96436bc2b83f361b4efbe5237870a520d83398bfec17d02be17b89c6
  Updating policy lock using 'C:\opscode\chef-workstation\bin\chef-cli.BAT update'
  Building policy my_webserver
  Expanded run list: recipe[my_webserver::default]
  Caching Cookbooks...
  Installing my_webserver >= 0.0.0 from path
  Lockfile written to C:/Users/Administrator/Downloads/chef-starter/chef-repo/cookbooks/my_webserver/Policyfile.lock.json
  Policy revision id: 796f1f638380e343c529216a1714104d3d24aa4fc0288e647ae7232399f2779
  Preparing dna.json
  Exporting cookbook dependencies from Policyfile C:/Users/ADMINI~1/AppData/Local/Temp/default-ubuntu-2004-sandbox-20241112-4816-e2j4on using 'C:\opscode\chef-workstation\bin\chef-cli.BAT export'...
  Exported policy 'my_webserver' to C:/Users/ADMINI~1/AppData/Local/Temp/default-ubuntu-2004-sandbox-20241112-4816-e2j4on
  To converge this system with the exported policy, run:
  cd C:/Users/ADMINI~1/AppData/Local/Temp/default-ubuntu-2004-sandbox-20241112-4816-e2j4on
  chef-client -z
  Removing non-cookbook files before transfer
  Preparing validation.pem
  Preparing client.rb
  -----> Installing Chef install only if missing package
  Downloading https://omnitruck.chef.io/install.sh to file /tmp/install.sh
  Trying wget...
  Download complete.
  ubuntu 20.04 x86_64
  Getting information for chef stable for ubuntu...
  downloading https://omnitruck.chef.io/stable/chef/metadata?v=&p=ubuntu&pv=20.04&m=x86_64
  to file /tmp/install.sh.i2649/metadata.txt
  trying wget...
  sha1 b27b98228f3fd5c0e9a09b04b069cb96d478f22b
  sha256 b582d489f8d35f560d7b1015d967f478d88e085229c386310h13f5b5b2749777d3
```

```
-  
-  
-  
-      </div>  
-    </div>  
-    <div class="validator">  
-      </div>  
-    </body>  
-</html>  
-  
+<h1>Welcome to Labguide-05: Creating and Using Chef Cookbooks for Complex Configurations!</h1>  
  
Running handlers:  
Running handlers complete  
Infra Phase complete, 3/5 resources updated in 59 seconds  
Downloading files from <default-ubuntu-2004>  
Finished converging <default-ubuntu-2004> (2m40.30s).  
----- Test Kitchen is finished. (2m45.77s)  
  
C:\Users\Administrator\Downloads\chef-starter\chef-repo\cookbooks\my_webserver>
```

- **Verify** the cookbook by running the tests:

kitchen verify

```
C:\Users\Administrator\Downloads\chef-starter\chef-repo\cookbooks\my_webserver>kitchen verify
----> Starting Test Kitchen (v3.6.0)
----- Verifying (default-ubuntu-2004)...
    Loaded tests from {:path=>"C:\Users\Administrator\Downloads\chef-starter\chef-repo\cookbooks\my_webserver\test\integration\default"}

Profile: tests from {:path=>"C:\Users\Administrator\Downloads\chef-starter\chef-repo\cookbooks\my_webserver\test\integration\default"} (tests from {:path=>"C:\Users\Administrator\Downloads\chef-starter\chef-repo\cookbooks\my_webserver\test\integration\default"})
Version: (not specified)
Target: ssh://vagrant@127.0.0.1:2222
Target ID: 4f3f3e7d-b197-50e7-bf6d-48e0c0829a7a

  System Package apache2
    [PASS] is expected to be installed
  Service apache2
    [PASS] is expected to be enabled
    [PASS] is expected to be running

Test Summary: 3 successful, 0 failures, 0 skipped
  Finished verifying (default-ubuntu-2004) (0m12.45s).
----- Test Kitchen is finished. (0m10.25s)

C:\Users\Administrator\Downloads\chef-starter\chef-repo\cookbooks\my_webserver>
```

- This command runs the InSpec tests you wrote in `default_test.rb`. If successful, you'll see output indicating that the tests passed.

References

- Chef Test Kitchen Documentation: https://docs.chef.io/test_kitchen/
- Chef InSpec Documentation: <https://docs.chef.io/inspec/>
- Testing Infrastructure with Chef: <https://learn.chef.io/>