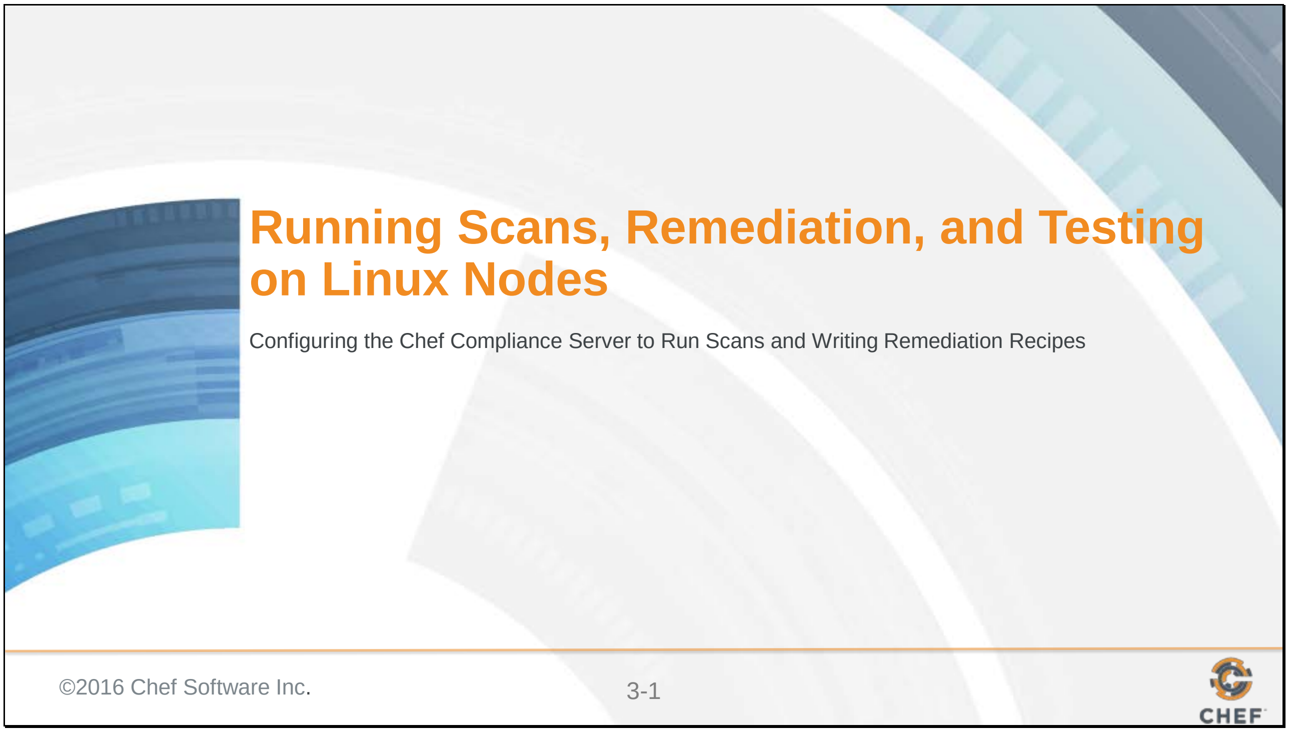
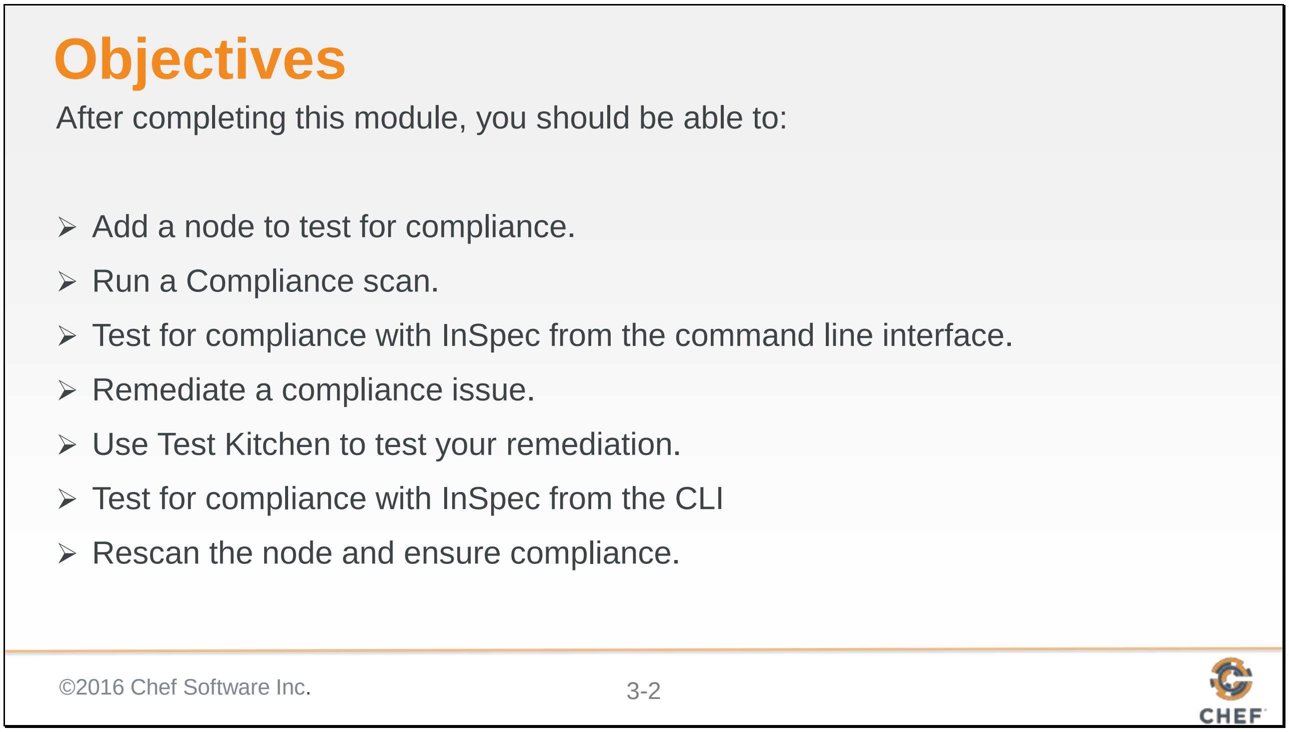
3: Running Scans, Remediation, and Testing on Linux Nodes



Running Scans, Remediation, and Testing on Linux Nodes

Configuring the Chef Compliance Server to Run Scans and Writing Remediation Recipes

Slide 2

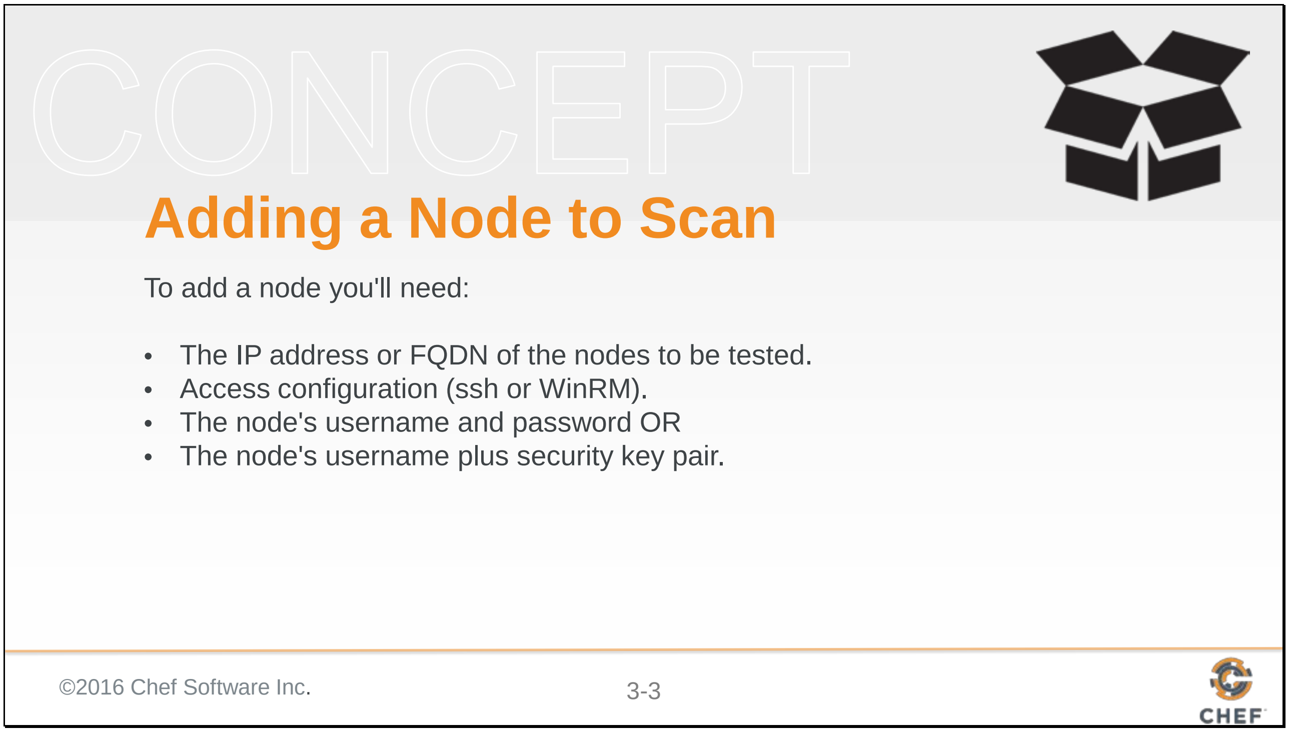


Objectives

After completing this module, you should be able to:

- ➢ Add a node to test for compliance.
- ➢ Run a Compliance scan.
- ➢ Test for compliance with InSpec from the command line interface.
- ➢ Remediate a compliance issue.
- ➢ Use Test Kitchen to test your remediation.
- ➢ Test for compliance with InSpec from the CLI
- ➢ Rescan the node and ensure compliance.

Slide 3



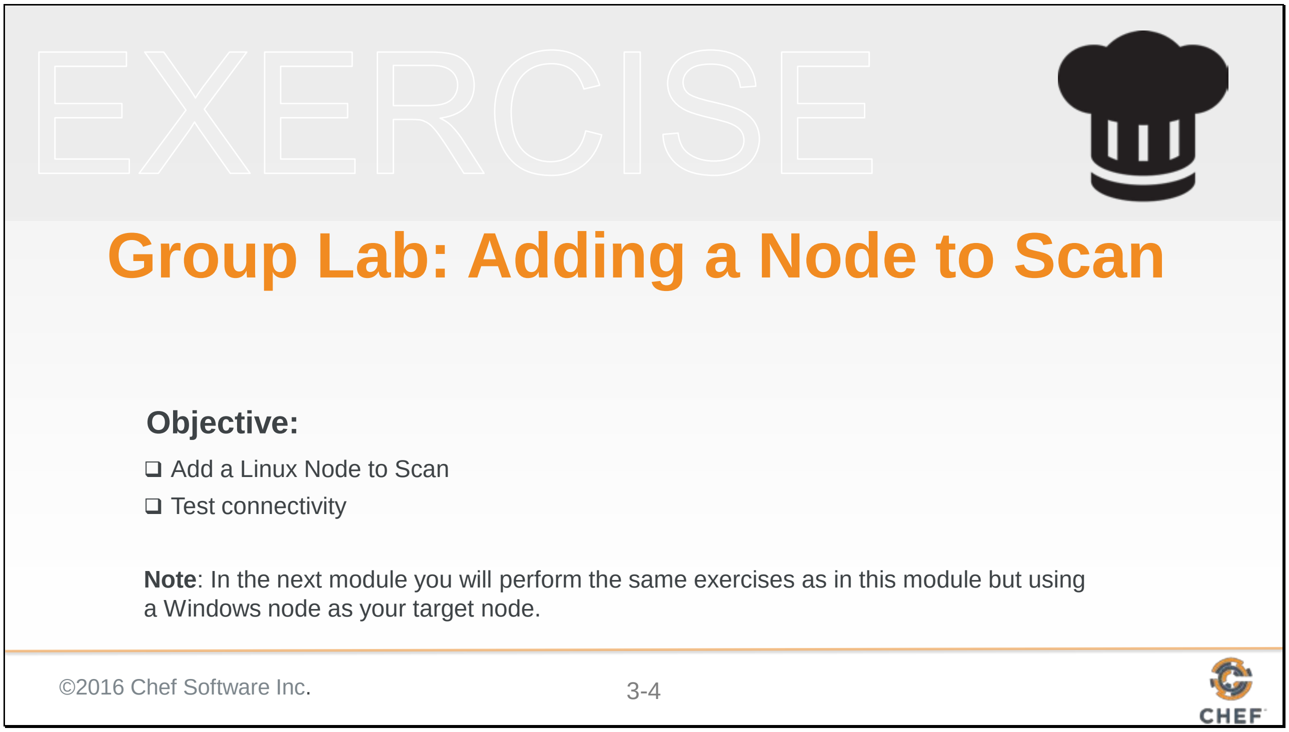
CONCEPT

Adding a Node to Scan

To add a node you'll need:

- The IP address or FQDN of the nodes to be tested.
- Access configuration (ssh or WinRM).
- The node's username and password OR
- The node's username plus security key pair.

Slide 4



EXERCISE

Group Lab: Adding a Node to Scan

Objective:

□ Add a Linux Node to Scan

□ Test connectivity

Note: In the next module you will perform the same exercises as in this module but using a Windows node as your target node.

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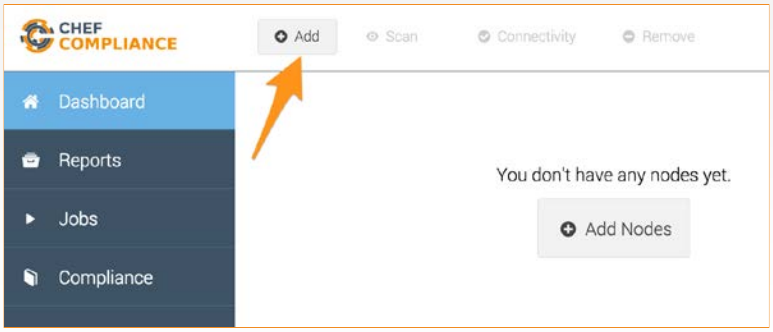
Slide 5

GL: Adding a Node to Scan

1. From your Chef Compliance Dashboard, click Add Node.

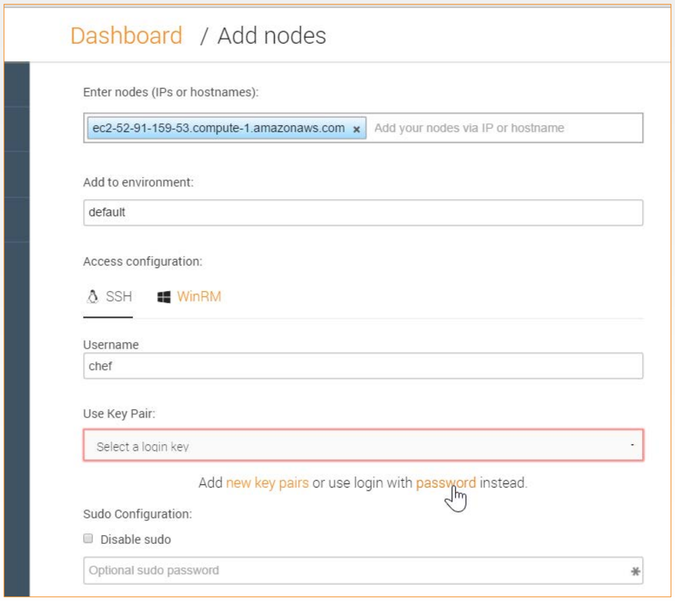


You don't have any nodes yet.

Slide 6

GL: Adding a Node

2. From the resulting page, enter the node's FQDN or IP address.
3. Leave environment blank. A ‘default’ environment will be used
4. Accept the default **SSH** Access configuration
5. Type **chef** in the **username** field.
6. Click the **password** link as shown in this illustration.



Dashboard / Add nodes

Enter nodes (IPs or hostnames): ec2-52-91-159-53.compute-1.amazonaws.com ×

Add to environment: default

Access configuration:

Username: chef

Use Key Pair: Select a login key

Add new key pairs or use login with password instead.

Sudo Configuration:

□ Disable sudo

Be sure you are using the hostname of the target node that you noted previously in class.

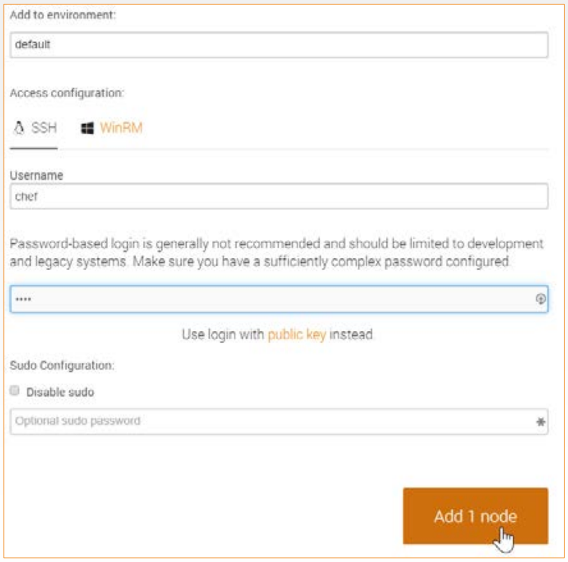
In the workplace, the target node's username and password will likely be different than shown in this example.

We'll discuss using key pair access later in the module.

Slide 7

GL: Adding a Node to Scan

7. Type the password (**chef**) in the password field.
8. Click the **Add 1 node** button as shown in this illustration.



Add to environment:

default

Access configuration:

SSH WinRM

Username

chef

Password-based login is generally not recommended and should be limited to development and legacy systems. Make sure you have a sufficiently complex password configured.

••••

Use login with public key instead

Sudo Configuration:

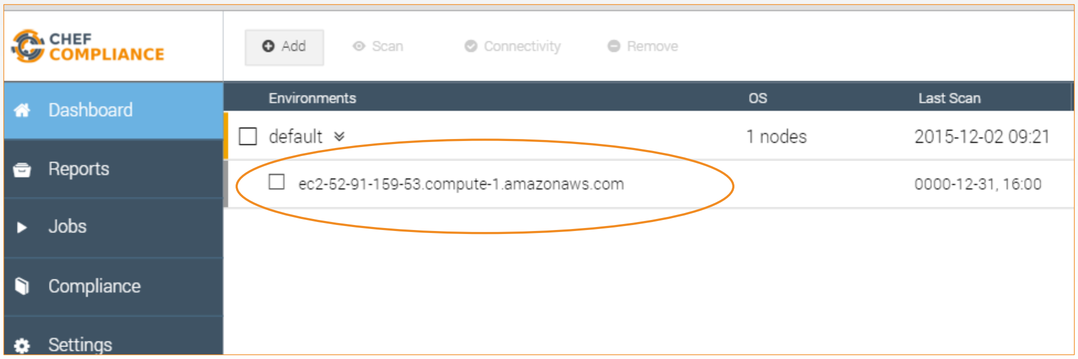
□ Disable sudo

Optional sudo password

Slide 8

GL: Adding a Node to Scan

At this point your Compliance Dashboard should list the node you just added.

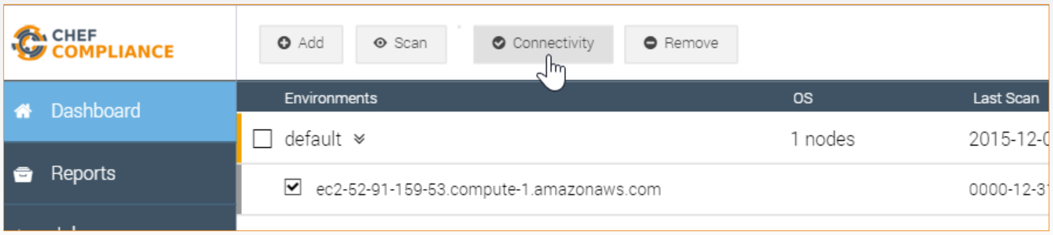


Environments	OS	Last Scan
□ default »	1 nodes	2015-12-02 09:21
□ ec2-52-91-159-53.compute-1.amazonaws.com		0000-12-31, 16:00

Slide 9

GL: Testing Connectivity to Your Node

1. Click the **check box** next to your node and then click the **Connectivity** button.

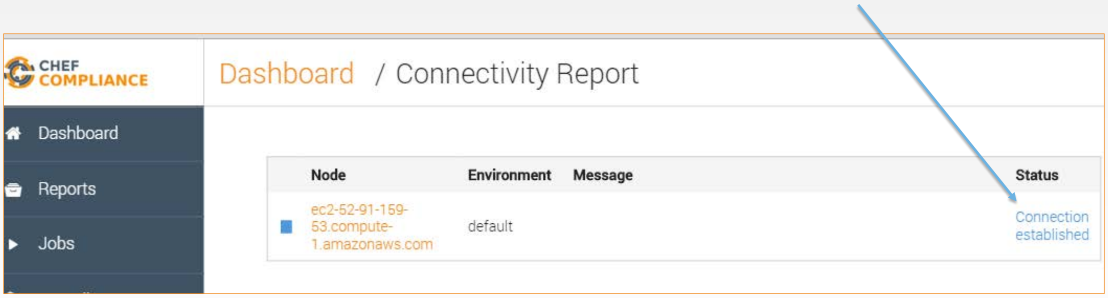


Environments	OS	Last Scan
□ default	1 nodes	2015-12-0
☑ ec2-52-91-159-53.compute-1.amazonaws.com		0000-12-3

Slide 10

GL: Testing Connectivity to Your Node

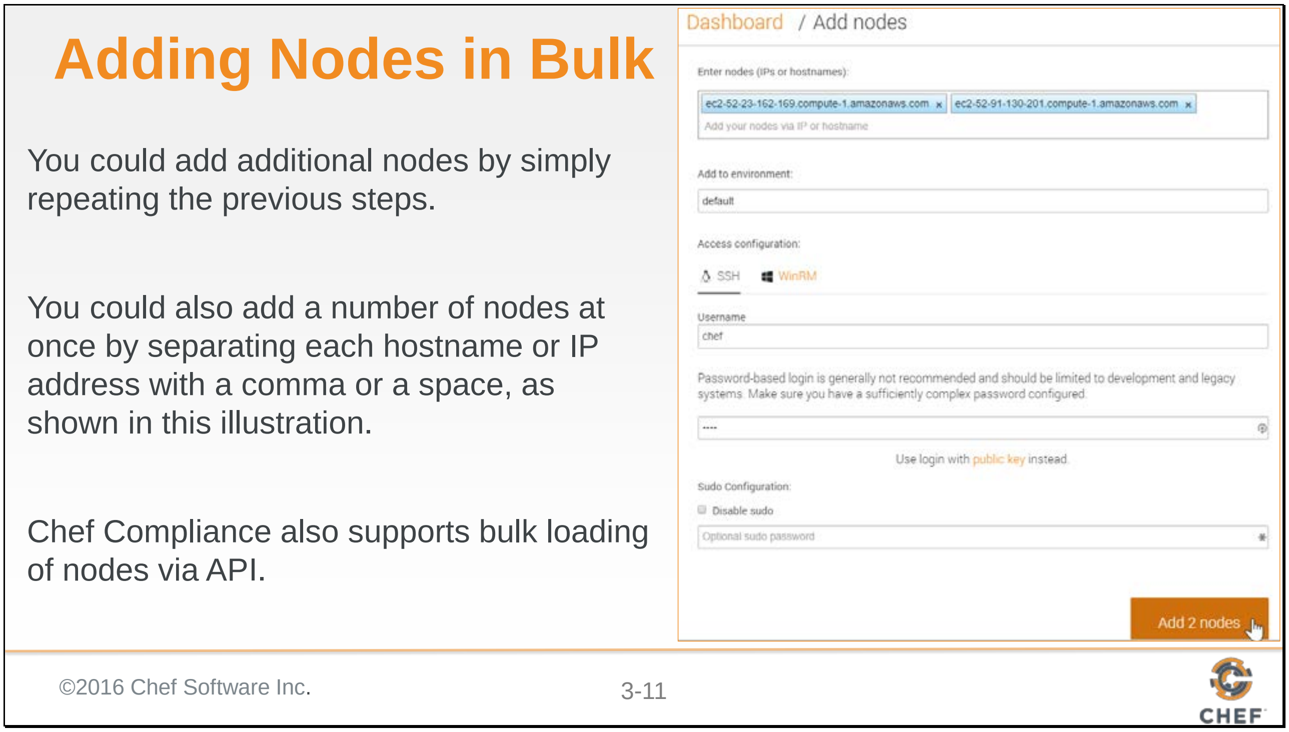
The Status column of you node should now indicate **Connection established**.



Node	Environment	Message	Status
ec2-52-91-159-53.compute-1.amazonaws.com	default		Connection established

If your Status column does not indicate `**Connection established**`, please notify the instructor.

Slide 11



Adding Nodes in Bulk

You could add additional nodes by simply repeating the previous steps.

You could also add a number of nodes at once by separating each hostname or IP address with a comma or a space, as shown in this illustration.

Chef Compliance also supports bulk loading of nodes via API.

Dashboard / Add nodes

Enter nodes (IPs or hostnames):

ec2-52-23-162-169.compute-1.amazonaws.com × ec2-52-91-130-201.compute-1.amazonaws.com ×

Add your nodes via IP or hostname

Add to environment:

default

Access configuration:

Username

chef

Password-based login is generally not recommended and should be limited to development and legacy systems. Make sure you have a sufficiently complex password configured.

Use login with public key instead.

Sudo Configuration:

□ Disable sudo

Optional sudo password

As you may have noticed, you could add additional nodes by simply repeating the previous steps.

You could also add a number of nodes at once by separating each hostname or IP address with a comma or a space, as shown in this illustration.

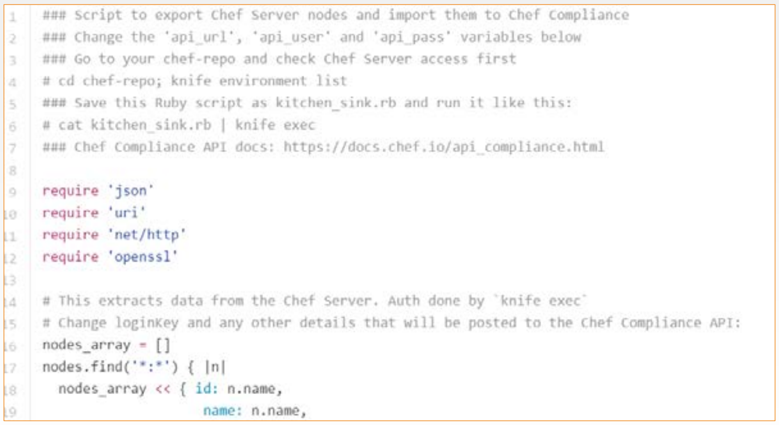
Chef Compliance also supports bulk loading of nodes via API.

Slide 12

Adding Nodes in Bulk via API

After class you can go to the following link.

The resulting kitchen_sink.rb will step you through how to upload nodes in bulk.



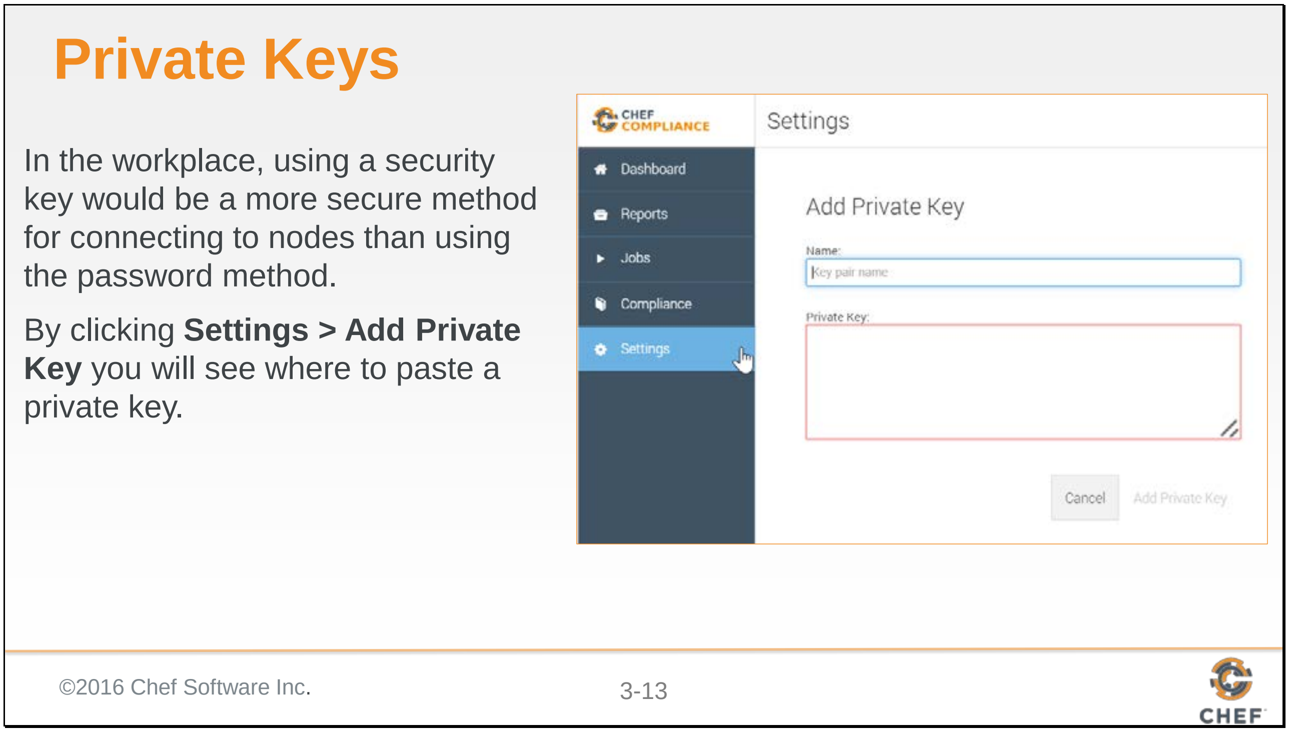
```
### Script to export Chef Server nodes and import them to Chef Compliance
### Change the 'api_url', 'api_user' and 'api_pass' variables below
### Go to your chef-repo and check Chef Server access first
# cd chef-repo; knife environment list
### Save this Ruby script as kitchen_sink.rb and run it like this:
# cat kitchen_sink.rb | knife exec
### Chef Compliance API docs: https://docs.chef.io/api_compliance.html

require 'json'
require 'uri'
require 'net/http'
require 'openssl'

# This extracts data from the Chef Server. Auth done by `knife exec`
# Change loginKey and any other details that will be posted to the Chef Compliance API:
nodes_array = []
nodes.find('*:*') { |n|
  nodes_array << { id: n.name,
                   name: n.name,
```

https://gist.github.com/alexpop/01b0bba8d259adeee320

Slide 13



Private Keys

In the workplace, using a security key would be a more secure method for connecting to nodes than using the password method.

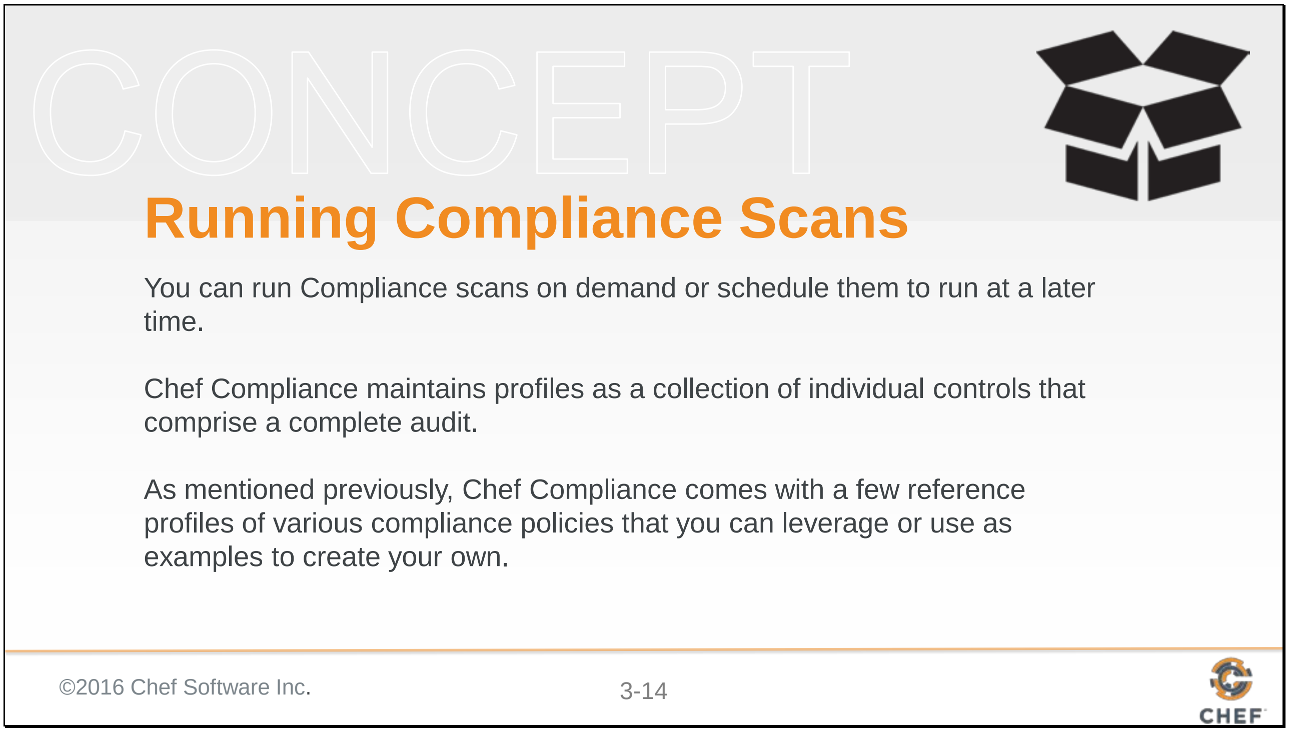
By clicking **Settings > Add Private Key** you will see where to paste a private key.

3-13

In the workplace, using security key pairs would be a more secure method for connecting to nodes than using the password method we are using in class.

By clicking `**Settings > Add Private Key**` you will see where to paste your private key.

Slide 14



CONCEPT

Running Compliance Scans

You can run Compliance scans on demand or schedule them to run at a later time.

Chef Compliance maintains profiles as a collection of individual controls that comprise a complete audit.

As mentioned previously, Chef Compliance comes with a few reference profiles of various compliance policies that you can leverage or use as examples to create your own.

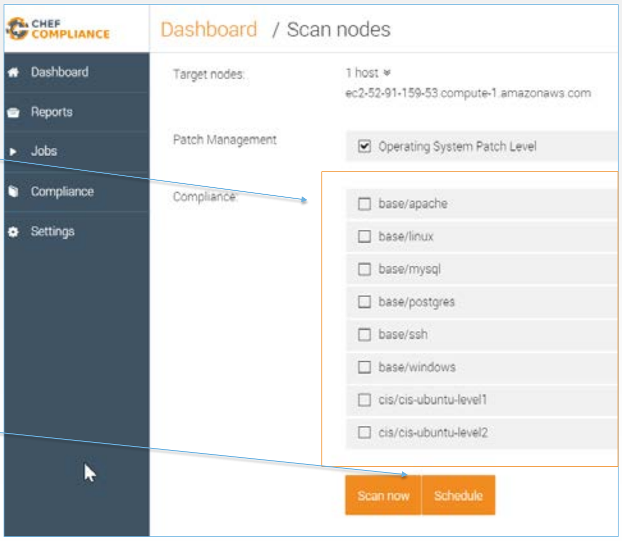
Slide 15

Compliance Profiles Used in Scans

This image shows the default Compliance Profiles as accessed from the Scan Nodes page.

You should be thoughtful with which profiles choose.

Notice how you can also choose to run a scan on demand or schedule a scan.



Target nodes: 1 host
ec2-52-91-159-53.compute-1.amazonaws.com

Patch Management: ☑ Operating System Patch Level

Compliance:
- □ base/apache
- □ base/linux
- □ base/mysql
- □ base/postgres
- □ base/ssh
- □ base/windows
- □ cis/cis-ubuntu-level1
- □ cis/cis-ubuntu-level2

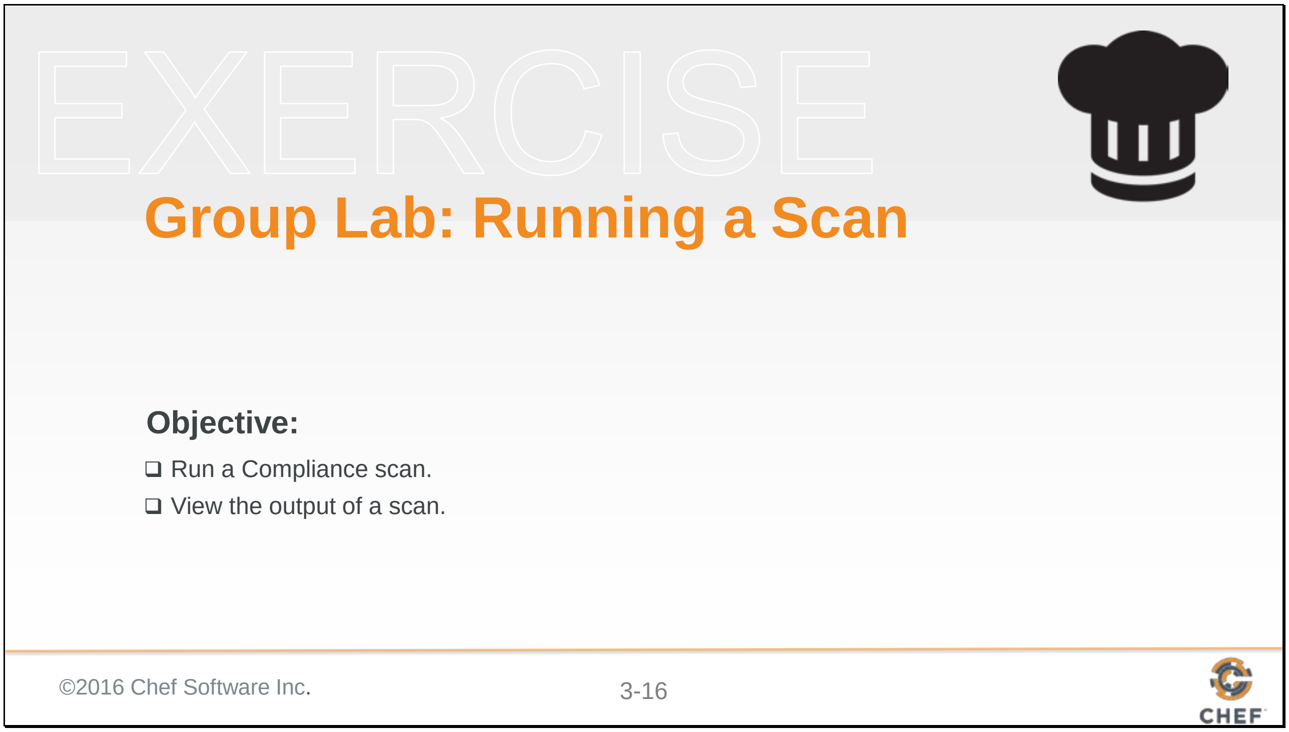
This image shows the default Compliance Profiles as accessed from the Scan Nodes page. This page displays when you select nodes to scan and then click the Scan button.

You'll access the profiles in a moment. These profiles determine what will be scanned on your nodes.

You should be thoughtful with which profiles choose since the more you choose to run, the longer it will take to execute the scan.

Notice how you can also choose to run a scan on demand (Scan now) or schedule a scan to run at a later time.

Slide 16



EXERCISE

Group Lab: Running a Scan

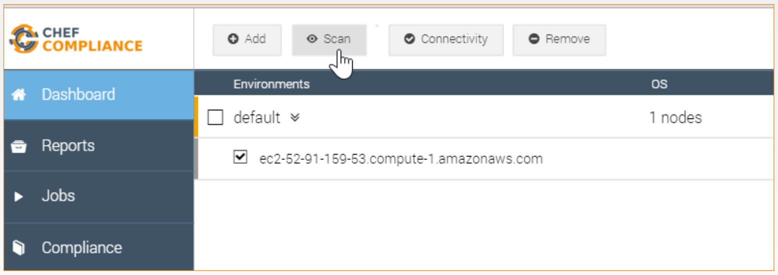
Objective:

- ❑ Run a Compliance scan.
- ❑ View the output of a scan.

Slide 17

GL: Running a Scan

1. Click the **check box** next to your node and then click the **Scan** button.



□ default 1 nodes

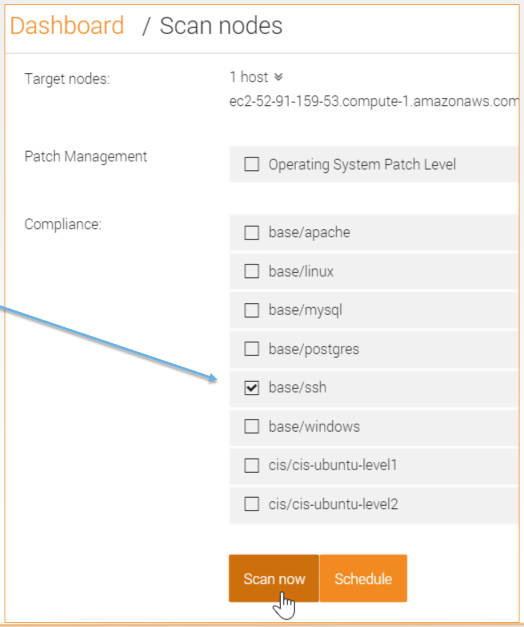
☑ ec2-52-91-159-53.compute-1.amazonaws.com

Slide 18

GL: Running a Scan

2. From the resulting page, check the **base/ssh** profile and uncheck any other check boxes.

3. Click the **Scan now** button.



Dashboard / Scan nodes

Target nodes: 1 host
ec2-52-91-159-53.compute-1.amazonaws.com

Patch Management: □ Operating System Patch Level

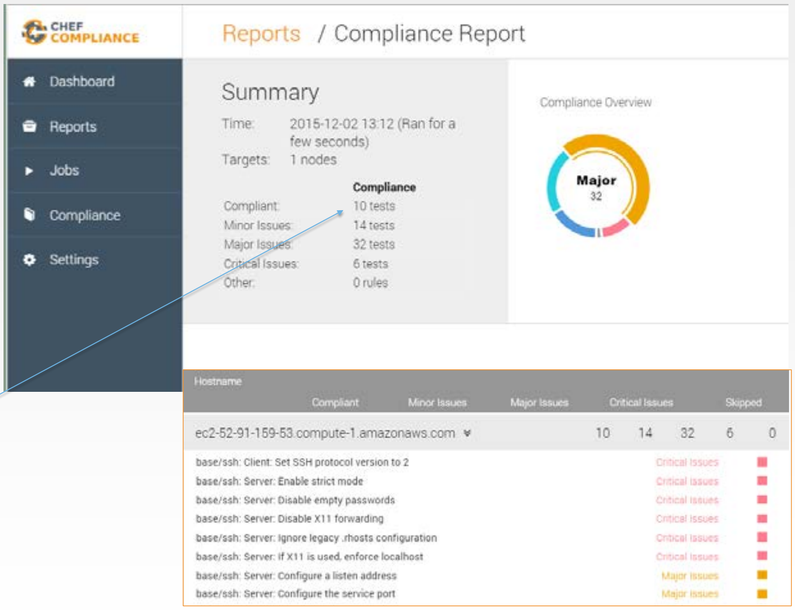
Compliance:
□ base/apache
□ base/linux
□ base/mysql
□ base/postgres
☑ base/ssh
□ base/windows
□ cis/cis-ubuntu-level1
□ cis/cis-ubuntu-level2

Slide 19

Scan Results

A Compliance Report should now display and your scan results should be similar to that shown here.

Notice how in the upper Summary section in this example, 10 tests were compliant and 6 tests show critical issues with ssh.



Reports / Compliance Report

Summary

Time: 2015-12-02 13:12 (Ran for a few seconds)

Targets: 1 nodes

	Compliance
Compliant:	10 tests
Minor Issues:	14 tests
Major Issues:	32 tests
Critical Issues:	6 tests
Other:	0 rules

Hostname	Compliant	Minor Issues	Major Issues	Critical Issues	Skipped
ec2-52-91-159-53.compute-1.amazonaws.com	10	14	32	6	0

base/ssh: Client: Set SSH protocol version to 2	Critical Issues	🟥
base/ssh: Server: Enable strict mode	Critical Issues	🟥
base/ssh: Server: Disable empty passwords	Critical Issues	🟥
base/ssh: Server: Disable X11 forwarding	Critical Issues	🟥
base/ssh: Server: Ignore legacy .rhosts configuration	Critical Issues	🟥
base/ssh: Server: If X11 is used, enforce localhost	Critical Issues	🟥
base/ssh: Server: Configure a listen address	Major Issues	🟧
base/ssh: Server: Configure the service port	Major Issues	🟧

There are also 6 critical issues related to ssh on the target node. Your results may be slightly different than this example.

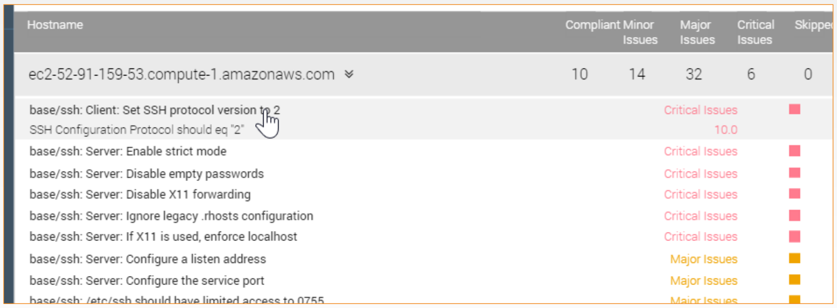
Slide 20

Scan Results

The bottom half of the Compliance Report shown here has a table of details of test results.

These are sorted by severity.

If you click an issue as shown here, a bit more information about the issue displays.



Hostname	Compliant	Minor Issues	Major Issues	Critical Issues	Skippe
ec2-52-91-159-53.compute-1.amazonaws.com ⌄	10	14	32	6	0
base/ssh: Client: Set SSH protocol version to 2				Critical Issues	🟥
SSH Configuration Protocol should eq "2"				10.0	
base/ssh: Server: Enable strict mode				Critical Issues	🟥
base/ssh: Server: Disable empty passwords				Critical Issues	🟥
base/ssh: Server: Disable X11 forwarding				Critical Issues	🟥
base/ssh: Server: Ignore legacy .rhosts configuration				Critical Issues	🟥
base/ssh: Server: If X11 is used, enforce localhost				Critical Issues	🟥
base/ssh: Server: Configure a listen address				Major Issues	🟧
base/ssh: Server: Configure the service port				Major Issues	🟧
base/ssh: /etc/ssh should have limited access to 0755				Major Issues	🟧

The bottom half of the Compliance Report has a table of details of test results.

These are sorted by severity so the critical issues are listed at the top and the compliant items are at the bottom of the list.

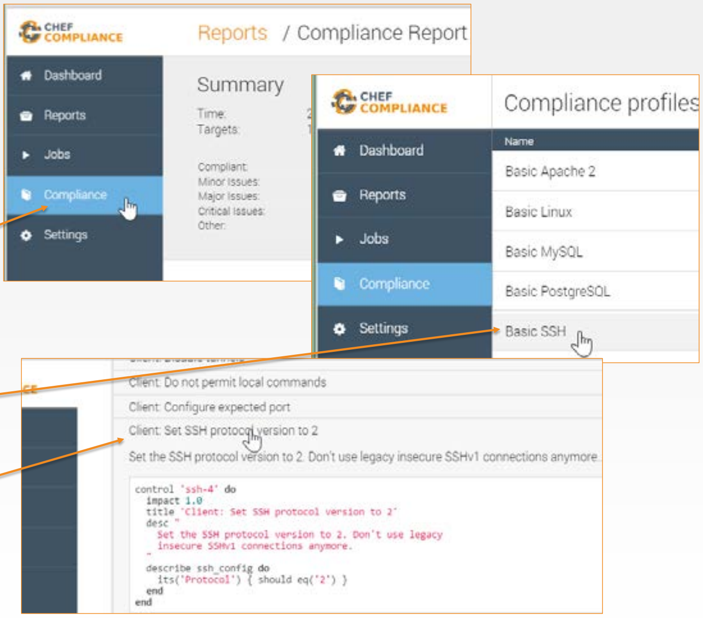
If you click an issue as shown here, a bit more information about the issue displays, but that's not really telling us much.

Slide 21

GL: Profile

To view the InSpec code that comprises this profile, do the following:

1. Click the **Compliance** button.
2. Click the relevant profile (**Basic SSH**).
3. Scroll down and click the `**Set SSH protocol version to 2**` profile.



Basic Apache 2
Basic Linux
Basic MySQL
Basic PostgreSQL
Basic SSH

Client: Do not permit local commands
Client: Configure expected port
Client: Set SSH protocol version to 2
Set the SSH protocol version to 2. Don't use legacy insecure SSHv1 connections anymore.

```
control 'ssh-4' do
  impact 1.0
  title 'Client: Set SSH protocol version to 2'
  desc "
    Set the SSH protocol version to 2. Don't use legacy
    insecure SSHv1 connections anymore.
  "
  describe ssh_config do
    its('Protocol') { should eq('2') }
  end
end
```

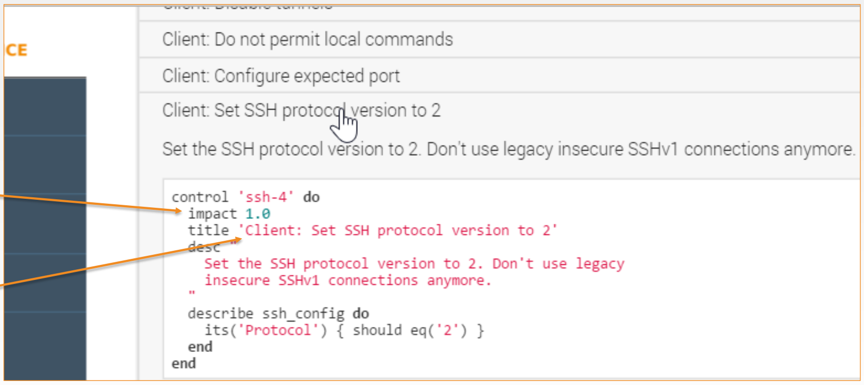
Slide 22

Discussion: InSpec Profile Code

Let's discuss what this profile is doing.

The `impact` of 1.0 indicates this is a Critical issue.

The `title` is what populates the Compliance Report issue title.



Client: Disable tunnels

Client: Do not permit local commands

Client: Configure expected port

Client: Set SSH protocol version to 2

Set the SSH protocol version to 2. Don't use legacy insecure SSHv1 connections anymore.

```
control 'ssh-4' do
  impact 1.0
  title 'Client: Set SSH protocol version to 2'
  desc "
    Set the SSH protocol version to 2. Don't use legacy
    insecure SSHv1 connections anymore.
  "
  describe ssh_config do
    its('Protocol') { should eq('2') }
  end
end
```

Let's discuss what this profile is doing.

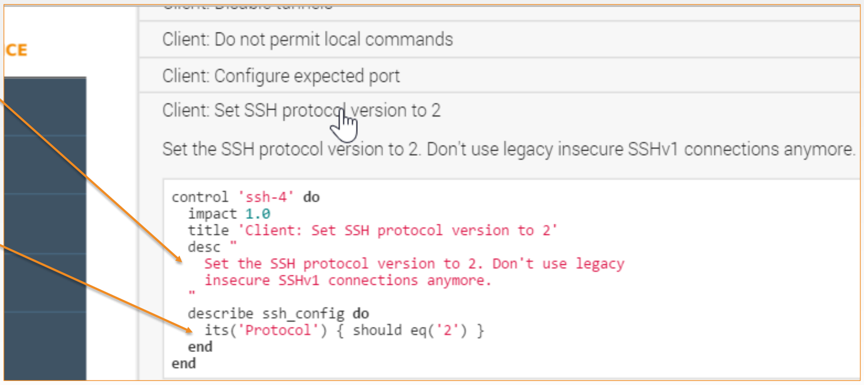
The impact of 1.0 indicates this is a critical issue if it the scanned node violates what is in this code. We'll discuss severity mapping in a moment.

Slide 23

Discussion: InSpec Profile Code

The **desc** is typically human-readable description sourced from the CIS or source doc.

The `**describe**` section is the actual test that is executed.



Client: Disable tunnels

Client: Do not permit local commands

Client: Configure expected port

Client: Set SSH protocol version to 2

Set the SSH protocol version to 2. Don't use legacy insecure SSHv1 connections anymore.

```
control 'ssh-4' do
  impact 1.0
  title 'Client: Set SSH protocol version to 2'
  desc "
    Set the SSH protocol version to 2. Don't use legacy
    insecure SSHv1 connections anymore.
  "
  describe ssh_config do
    its('Protocol') { should eq('2') }
  end
end
```

The **desc** is typically human-readable description sourced from the CIS or source doc.

The describe value is the actual test. In this case, this is saying the protocol for `ssh_config` Protocol should be `2`. If the actual value from the node is not Protocol 2, the Critical issue is reported as in this case.

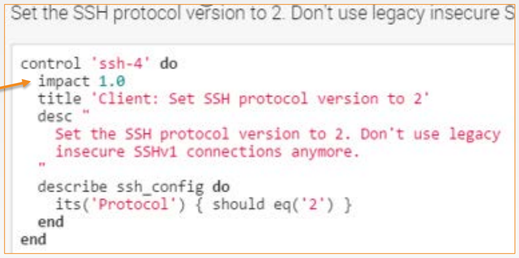
So when you run a scan, the Compliance Server connects to the node using the configuration we specified, in this case ssh, and then it will run this set of code, this InSpec control, on that node. The Compliance Server translates the InSpec code into ssh commands when it transmits across the wire.

No agent or client is required to be running on the target node for this work.

Slide 24

Compliance Profile Severity Mapping

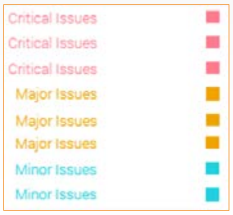
The table below shows the current mapping of Compliance Profile **impact** numbering to severity.



Set the SSH protocol version to 2. Don't use legacy insecure S

```
control 'ssh-4' do
  impact 1.0
  title 'Client: Set SSH protocol version to 2'
  desc "
    Set the SSH protocol version to 2. Don't use legacy
    insecure SSHv1 connections anymore.
  "
  describe ssh_config do
    its('Protocol') { should eq('2') }
  end
end
```

Impact Numbering	Severity Designation
0.7 - 1.0	Critical Issues
0.4 - <0.7	Major Issues
0 - <0.4	Minor Issues



Critical Issues 🟥
Critical Issues 🟥
Critical Issues 🟥
Major Issues 🟧
Major Issues 🟧
Major Issues 🟧
Minor Issues 🟦
Minor Issues 🟦

https://nvd.nist.gov/cvss.cfm

Here is the current mapping of Compliance Profile **impact** numbering to severity.

The image at the top-right shows a Compliance Profile's impact numbering.

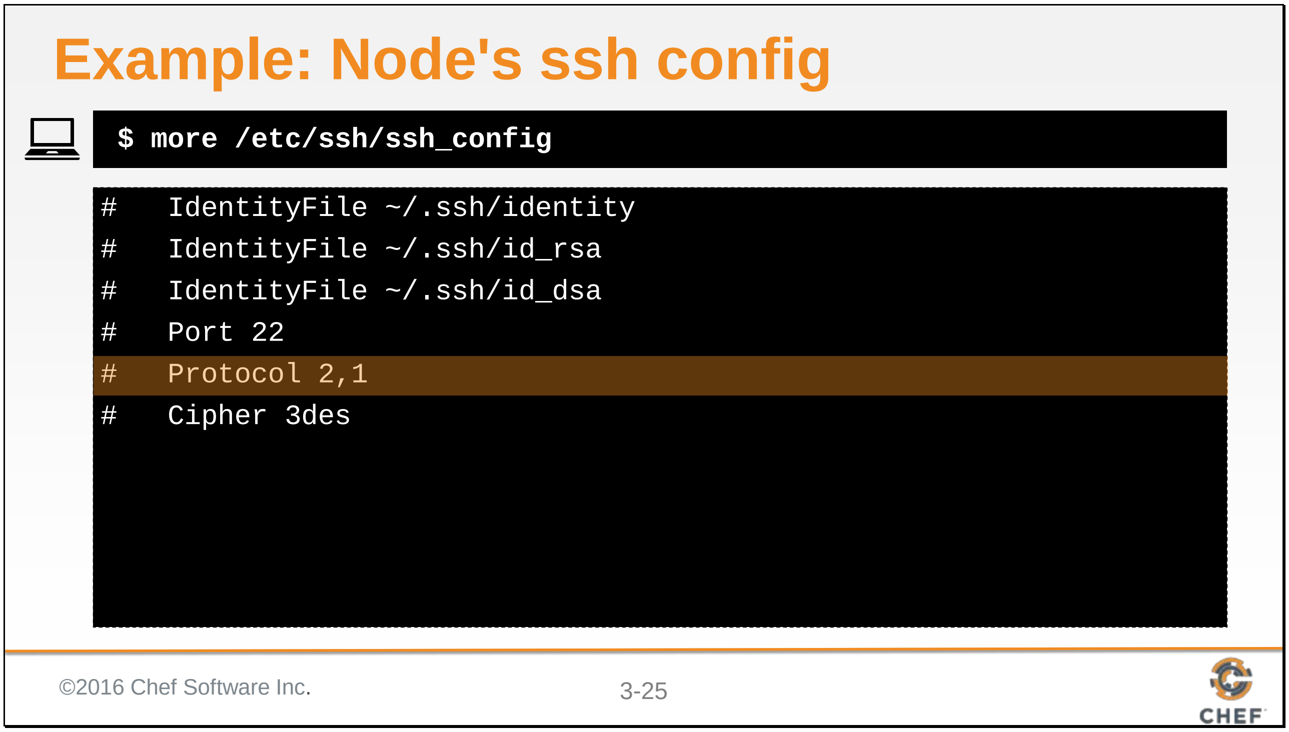
The table at the bottom-left shows the current mapping of Compliance Profile impact numbering
to severity.

The image at the bottom-right is an example of the severities listed in the reports in the Compliance web UI.

The mapping is currently analogous to the Common Vulnerability Scoring System (CVSS) framework, which can be viewed via the link at the bottom of this slide.

This mapping will be made configurable in the future.

Slide 25

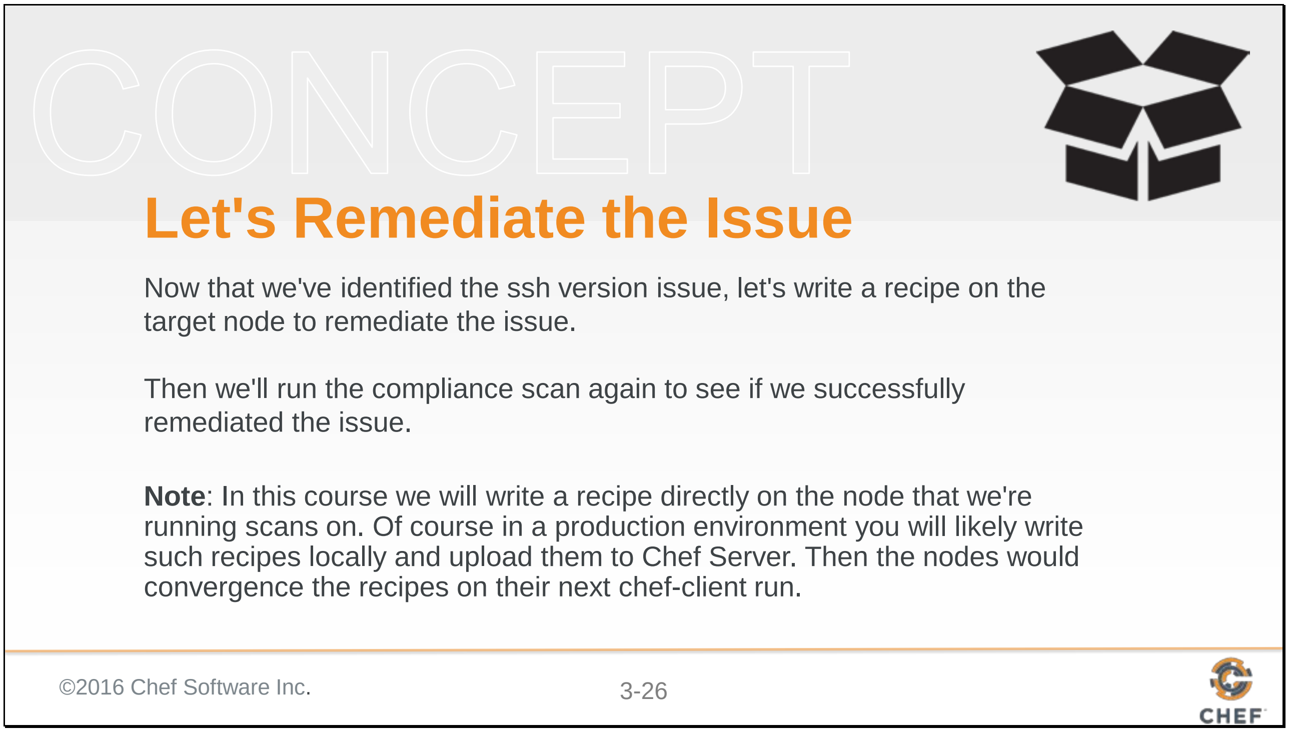


Example: Node's ssh config

```
$ more /etc/ssh/ssh_config
```

```
#   IdentityFile ~/.ssh/identity
#   IdentityFile ~/.ssh/id_rsa
#   IdentityFile ~/.ssh/id_dsa
#   Port 22
#   Protocol 2,1
#   Cipher 3des
```

Slide 26



CONCEPT

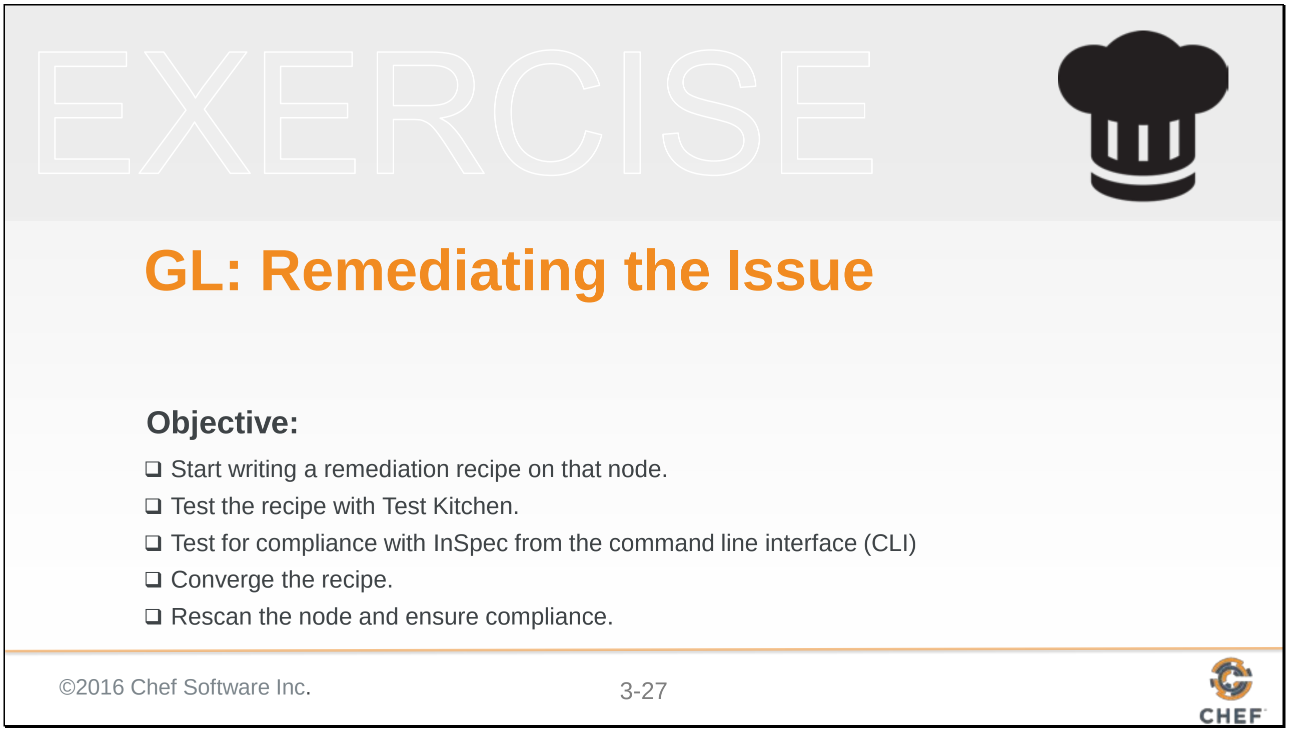
Let's Remediate the Issue

Now that we've identified the ssh version issue, let's write a recipe on the target node to remediate the issue.

Then we'll run the compliance scan again to see if we successfully remediated the issue.

Note: In this course we will write a recipe directly on the node that we're running scans on. Of course in a production environment you will likely write such recipes locally and upload them to Chef Server. Then the nodes would convergence the recipes on their next chef-client run.

Slide 27



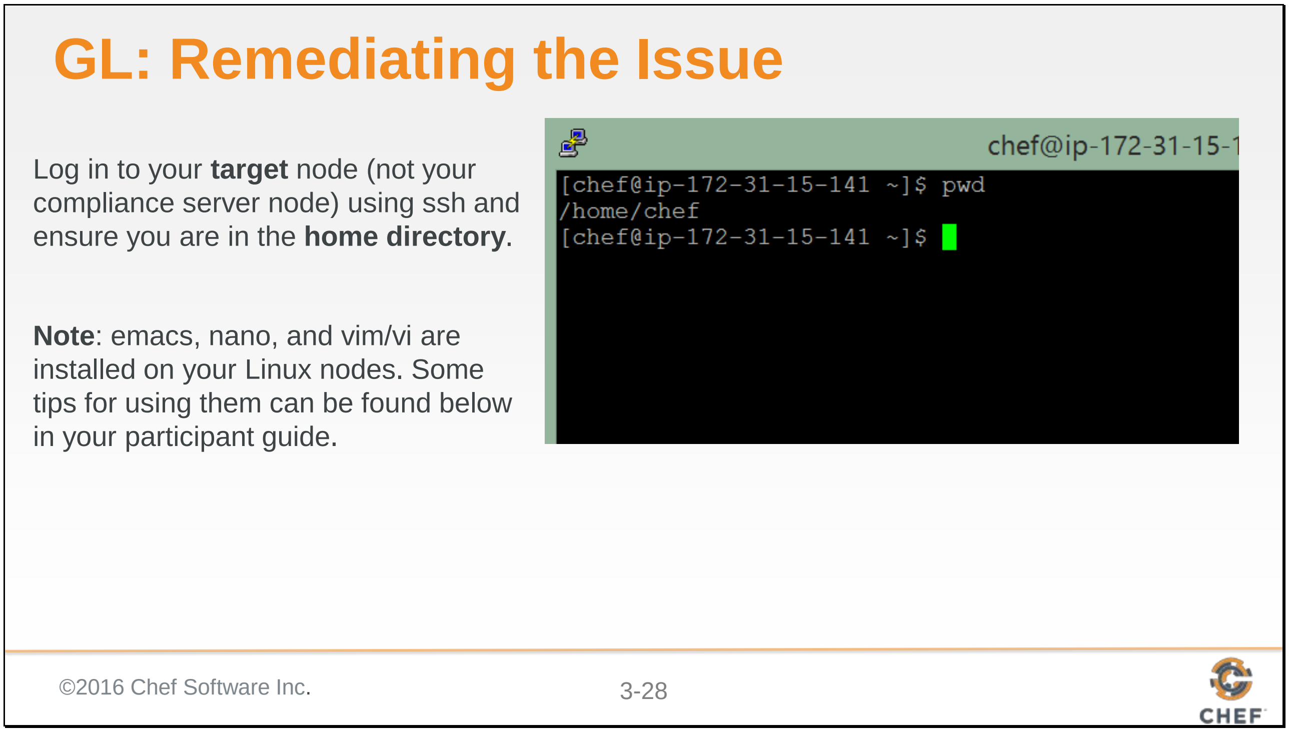
EXERCISE

GL: Remediating the Issue

Objective:

- ❑ Start writing a remediation recipe on that node.
- ❑ Test the recipe with Test Kitchen.
- ❑ Test for compliance with InSpec from the command line interface (CLI)
- ❑ Converge the recipe.
- ❑ Rescan the node and ensure compliance.

Slide 28



GL: Remediating the Issue

Log in to your **target** node (not your compliance server node) using ssh and ensure you are in the **home directory**.

Note: emacs, nano, and vim/vi are installed on your Linux nodes. Some tips for using them can be found below in your participant guide.

```
[chef@ip-172-31-15-141 ~]$ pwd
/home/chef
[chef@ip-172-31-15-141 ~]$
```

Emacs: (Emacs is fairly straightforward for editing files.)

OPEN FILE $ emacs FILENAME
WRITE FILE ctrl+x, ctrl+w
EXIT ctrl+x, ctrl+c

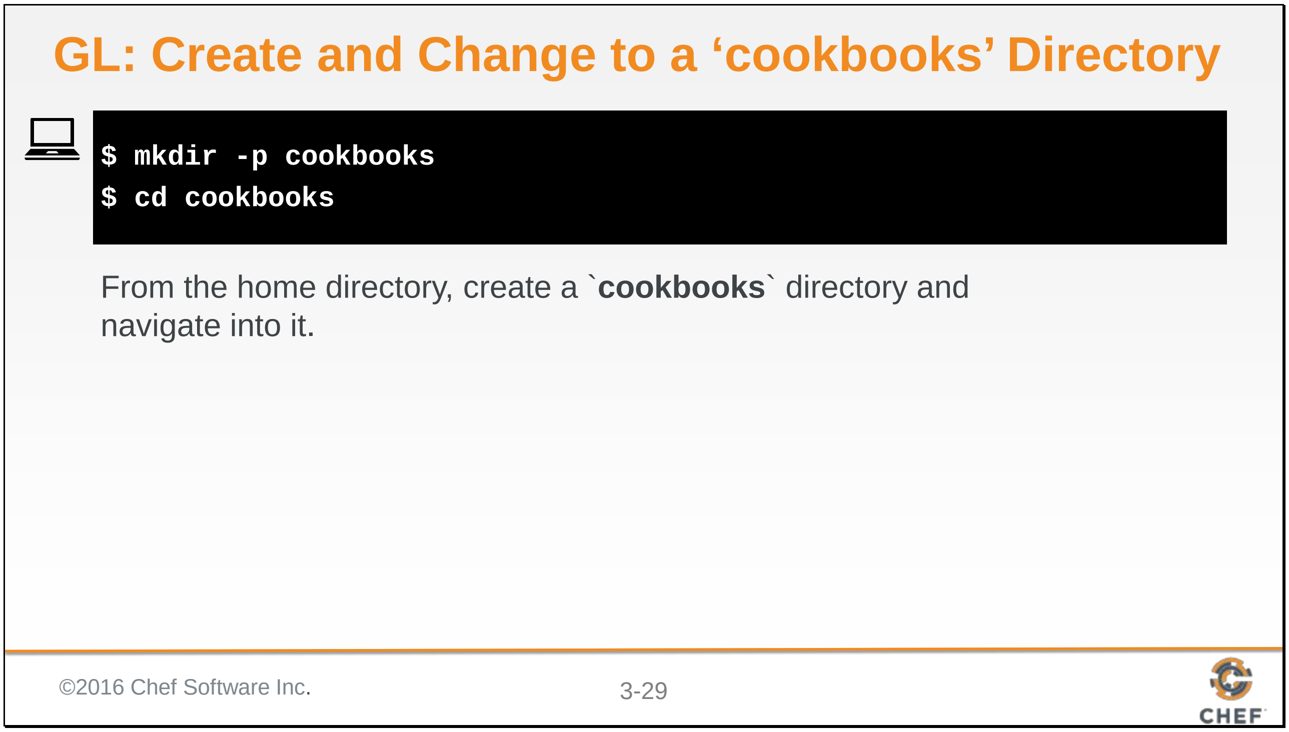
Nano: (Nano is usually touted as the easiest editor to get started with editing through the command-line.)

OPEN FILE $ nano FILENAME
WRITE (When exiting) ctrl+x, y, ENTER
EXIT ctrl+x

VIM: (Vim, like vi, is more complex because of its different modes.)

OPEN FILE $ vim FILENAME
START EDITING i
WRITE FILE ESC, :w
EXIT ESC, :q
EXIT (don't write) ESC, :q!

Slide 29

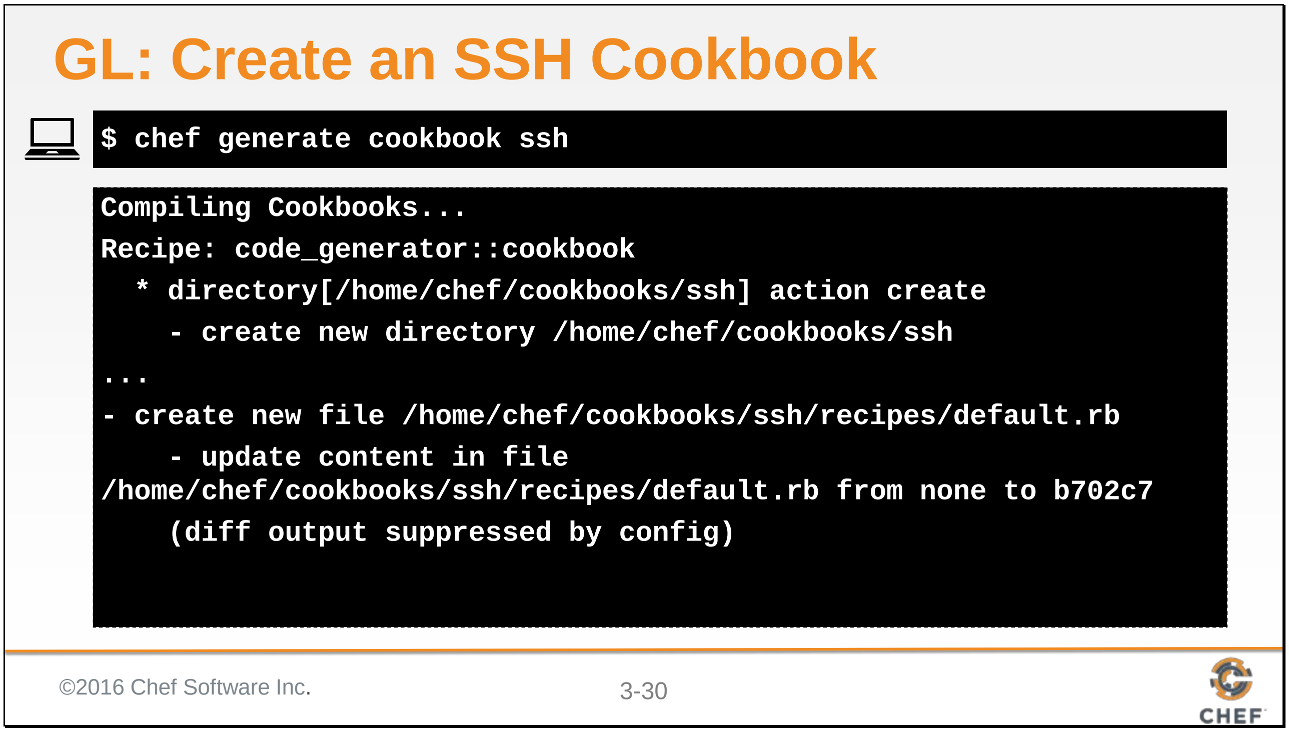


GL: Create and Change to a ‘cookbooks’ Directory

```
$ mkdir -p cookbooks
$ cd cookbooks
```

From the home directory, create a `**cookbooks**` directory and navigate into it.

Slide 30

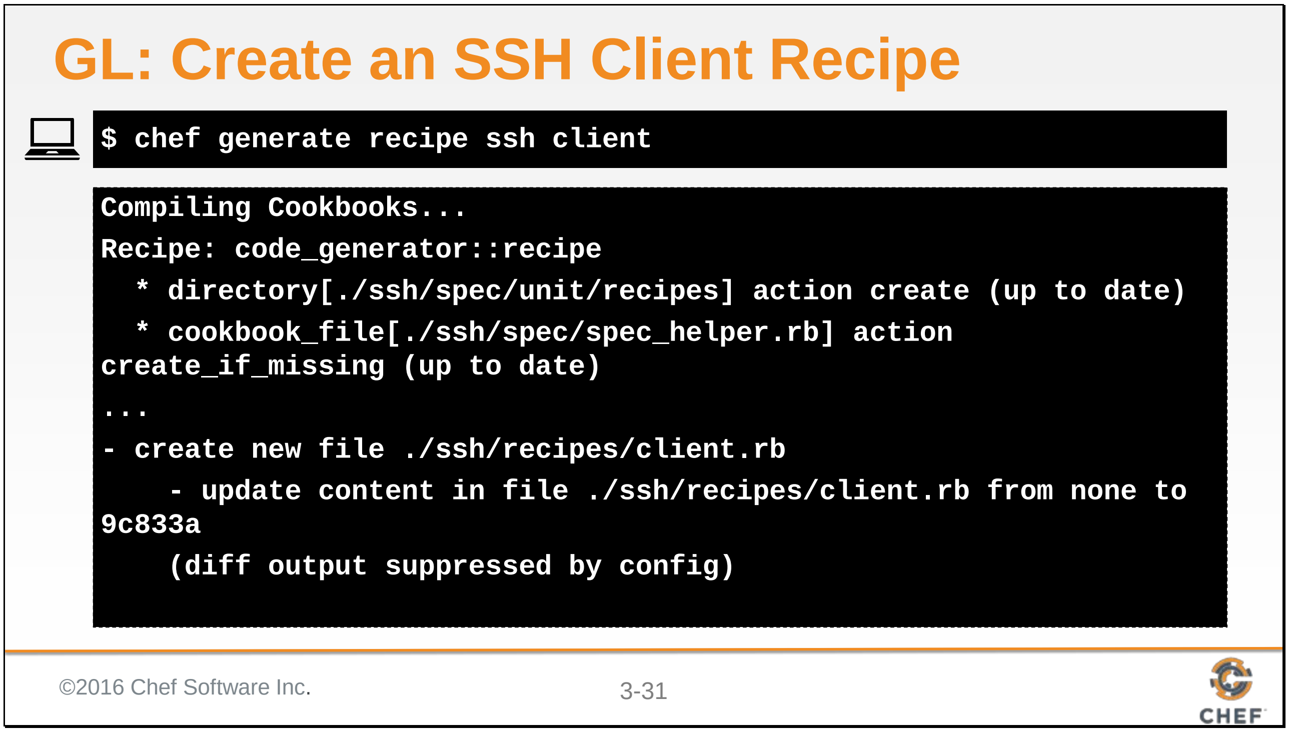


GL: Create an SSH Cookbook

```
$ chef generate cookbook ssh
```

```
Compiling Cookbooks...
Recipe: code_generator::cookbook
  * directory[/home/chef/cookbooks/ssh] action create
    - create new directory /home/chef/cookbooks/ssh
...
- create new file /home/chef/cookbooks/ssh/recipes/default.rb
    - update content in file
/home/chef/cookbooks/ssh/recipes/default.rb from none to b702c7
    (diff output suppressed by config)
```

Slide 31



GL: Create an SSH Client Recipe

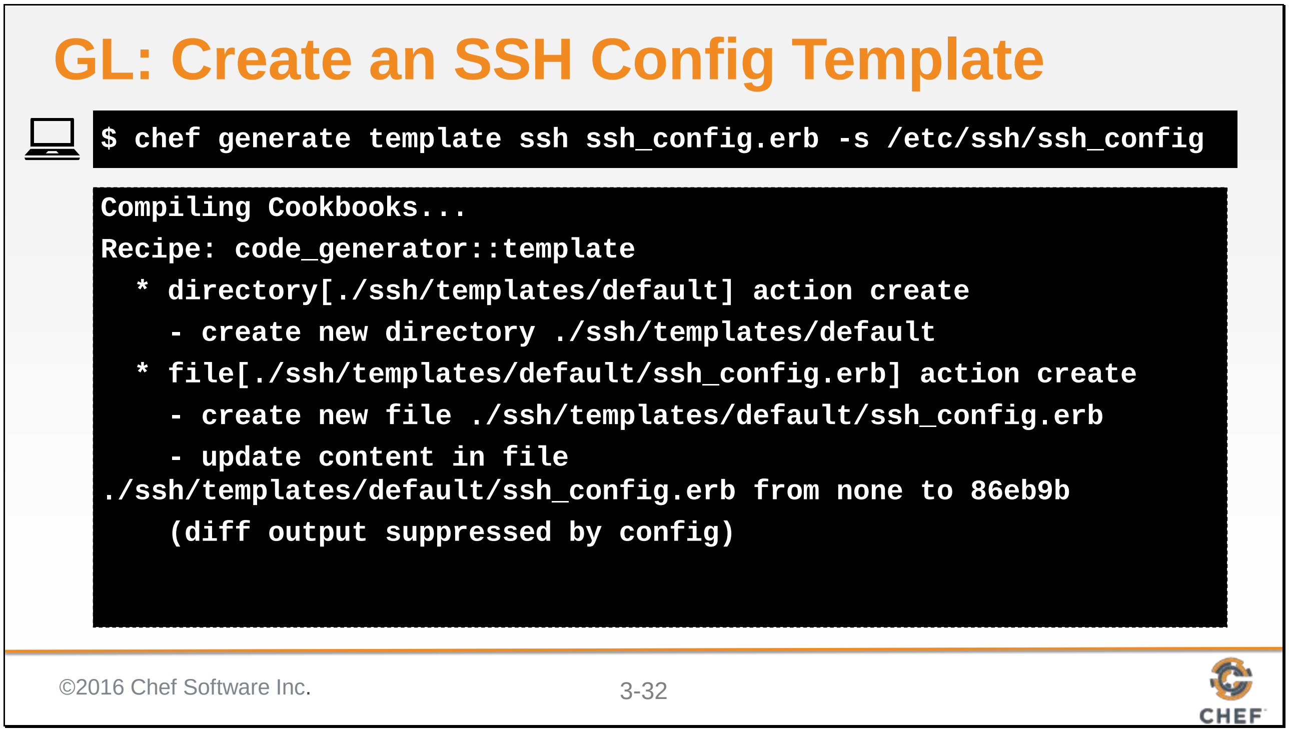
```
$ chef generate recipe ssh client
```

```
Compiling Cookbooks...
Recipe: code_generator::recipe
  * directory[./ssh/spec/unit/recipes] action create (up to date)
  * cookbook_file[./ssh/spec/spec_helper.rb] action
create_if_missing (up to date)
...
- create new file ./ssh/recipes/client.rb
    - update content in file ./ssh/recipes/client.rb from none to
9c833a
    (diff output suppressed by config)
```

In this step, instead of modifying the default recipe, we will create a new `**ssh client**` recipe.

This is because a default ssh cookbook probably affects an ssh server config and ssh client config and we only want to affect an ssh client.

Slide 32



GL: Create an SSH Config Template

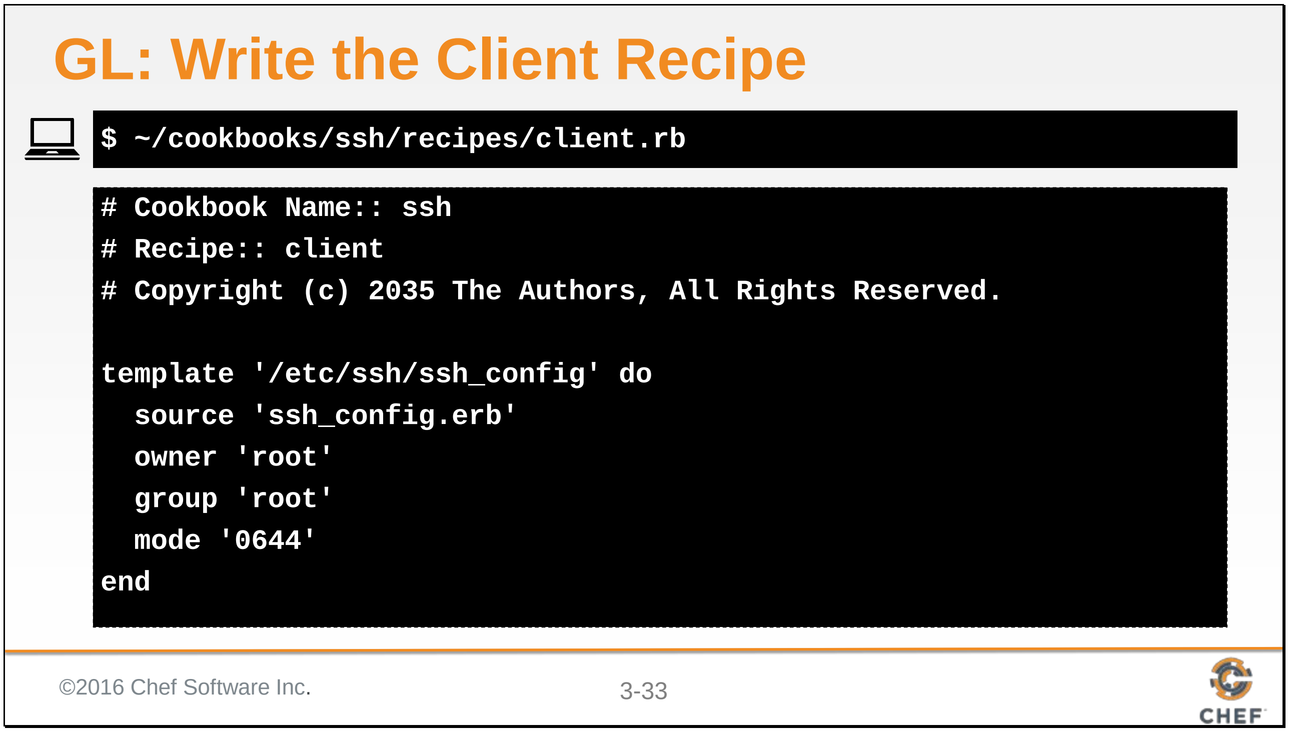
```
$ chef generate template ssh ssh_config.erb -s /etc/ssh/ssh_config
```

```
Compiling Cookbooks...
Recipe: code_generator::template
  * directory[./ssh/templates/default] action create
    - create new directory ./ssh/templates/default
  * file[./ssh/templates/default/ssh_config.erb] action create
    - create new file ./ssh/templates/default/ssh_config.erb
    - update content in file
./ssh/templates/default/ssh_config.erb from none to 86eb9b
    (diff output suppressed by config)
```

In this step, we want to create a template file to manage our `ssh_config` file.

The `-s` option in this command takes the contents of the current `**/etc/ssh/ssh_config**` file and places it in the `**ssh_config.erb**` file.

Slide 33



GL: Write the Client Recipe

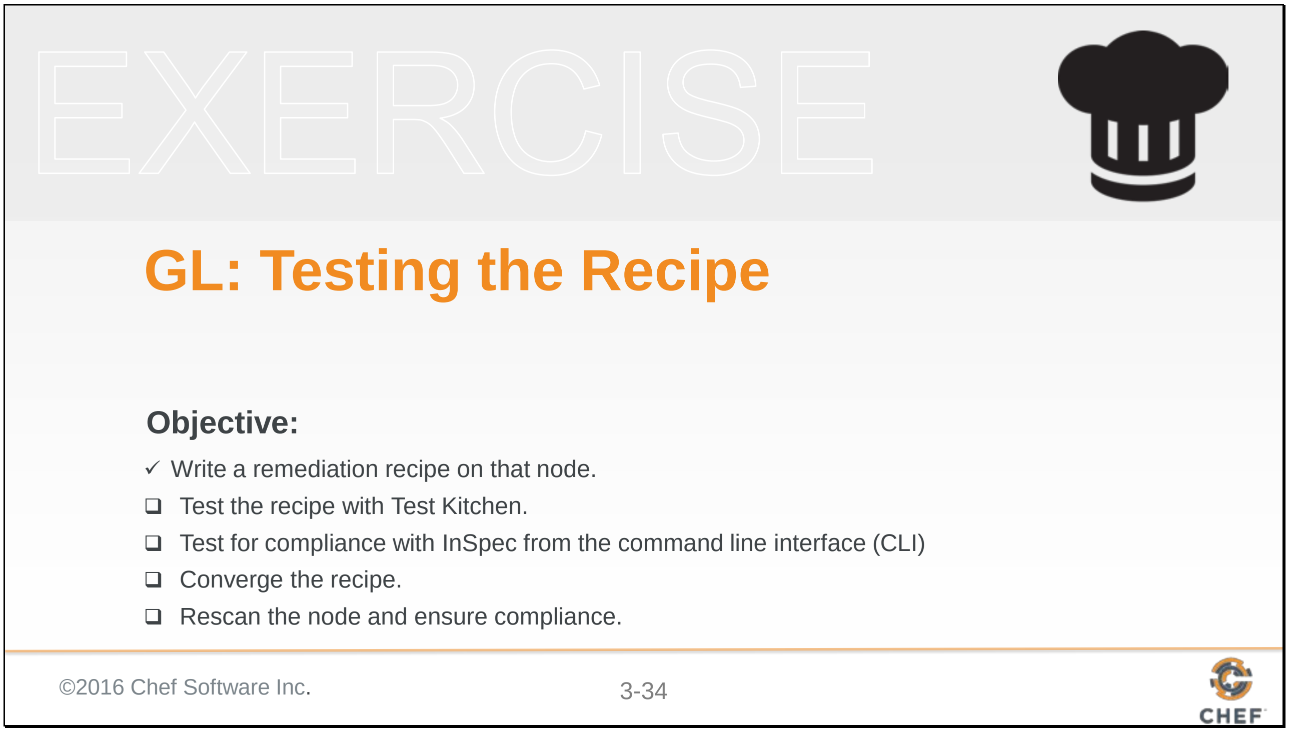
```
$ ~/cookbooks/ssh/recipes/client.rb
```

```
# Cookbook Name:: ssh
# Recipe:: client
# Copyright (c) 2035 The Authors, All Rights Reserved.

template '/etc/ssh/ssh_config' do
  source 'ssh_config.erb'
  owner 'root'
  group 'root'
  mode '0644'
end
```

Edit the `**~/cookbooks/ssh/recipes/client.rb**` file and add the contents shown here.

Slide 34



EXERCISE

GL: Testing the Recipe

Objective:

✓ Write a remediation recipe on that node.

❑ Test the recipe with Test Kitchen.

❑ Test for compliance with InSpec from the command line interface (CLI)

❑ Converge the recipe.

❑ Rescan the node and ensure compliance.

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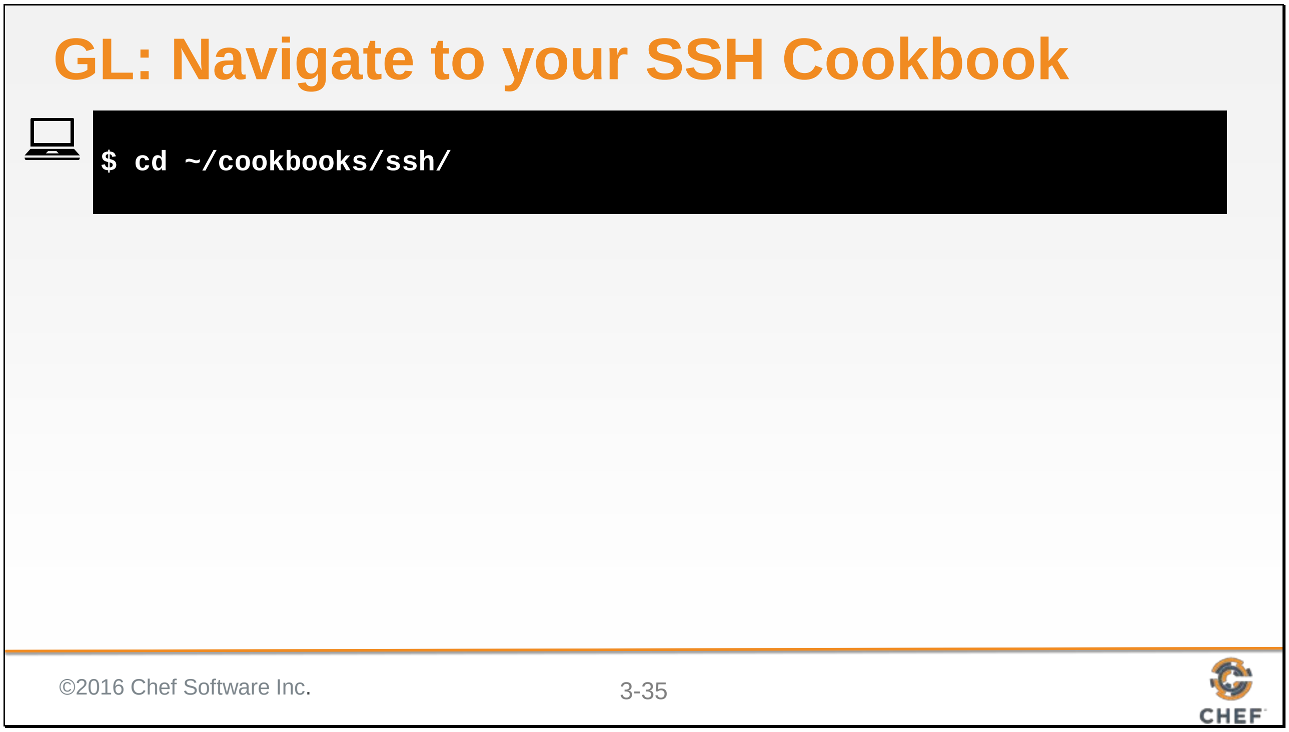
CHEF

Slide 35

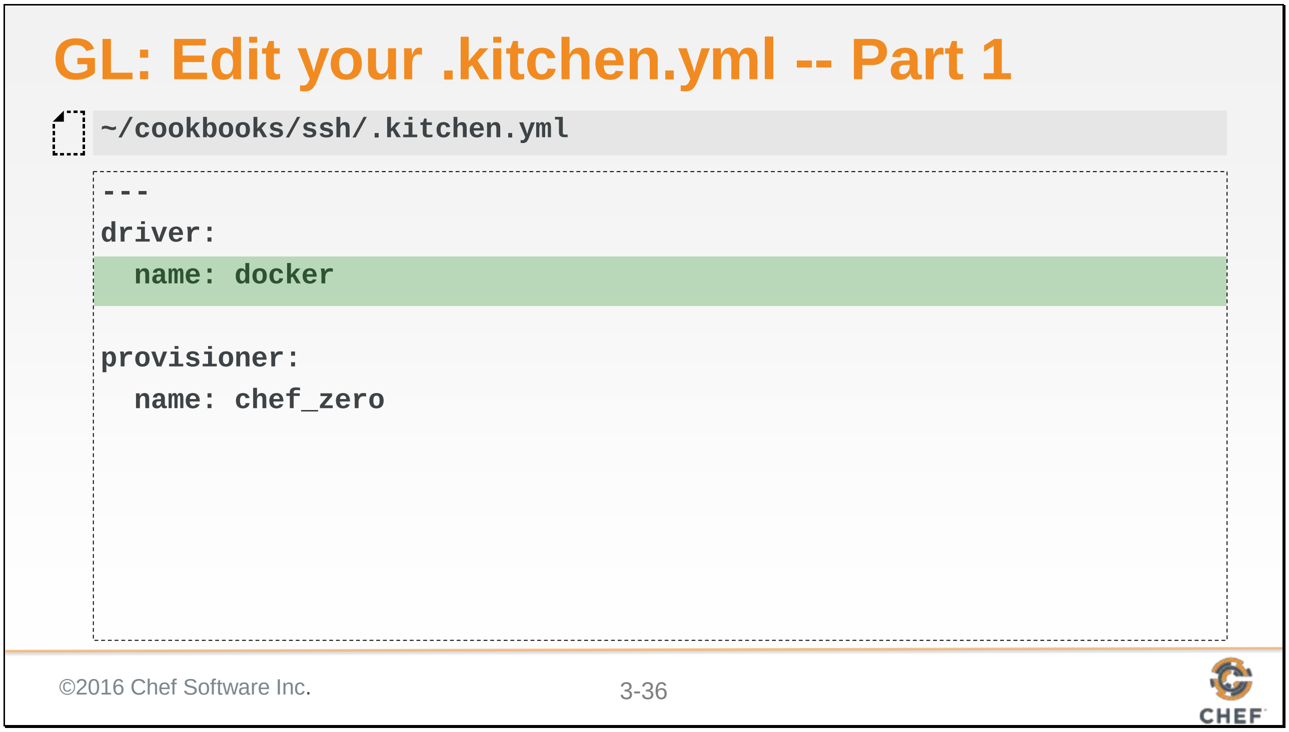


GL: Navigate to your SSH Cookbook

```
$ cd ~/cookbooks/ssh/
```

To test your recipe, first navigate to where the recipe lives.

Slide 36



GL: Edit your .kitchen.yml -- Part 1

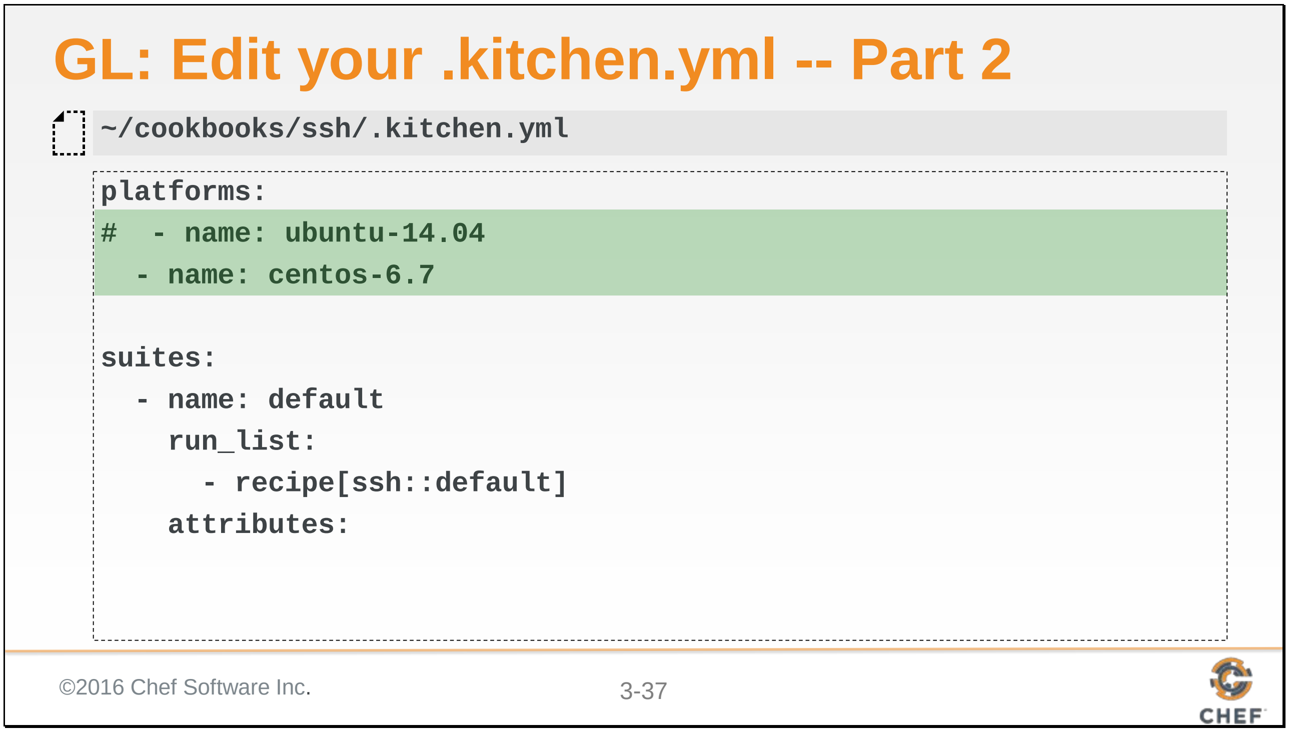
~/cookbooks/ssh/.kitchen.yml

```
---
driver:
  name: docker

provisioner:
  name: chef_zero
```

Edit your `.kitchen.yml` as shown here and on the following slide.

Because our node is an EC2 AWS instance, we need to change the driver from vagrant to docker. docker should already be installed on the EC2 AWS training instances.

Slide 37



GL: Edit your .kitchen.yml -- Part 2

~/cookbooks/ssh/.kitchen.yml

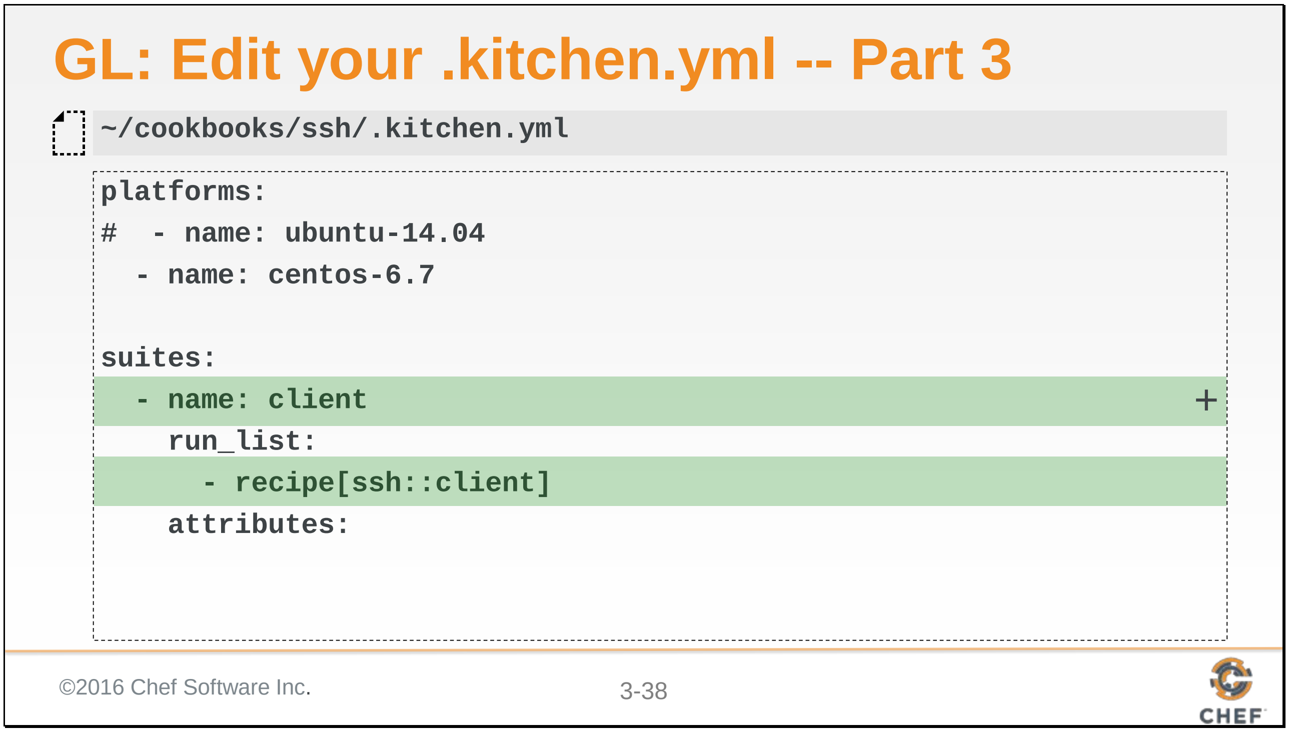
```
platforms:
#   - name: ubuntu-14.04
  - name: centos-6.7

suites:
  - name: default
    run_list:
      - recipe[ssh::default]
    attributes:
```

Also comment the ubuntu platform line and change the centos platform to `centos-6.7', which should be the version running on the training instance.

To confirm the centos release, you could execute `more /etc/*-release`

```
::::::::::::::
/etc/centos-release
::::::::::::::
CentOS release 6.7 (Final)
```

Slide 38



GL: Edit your .kitchen.yml -- Part 3

~/cookbooks/ssh/.kitchen.yml

```
platforms:
#   - name: ubuntu-14.04
  - name: centos-6.7

suites:
  - name: client
    run_list:
      - recipe[ssh::client]
    attributes:
```

Finally, change the suites name to `client' and the run_list recipe name to `ssh:client`.
run_list:
      - recipe[ssh::client]

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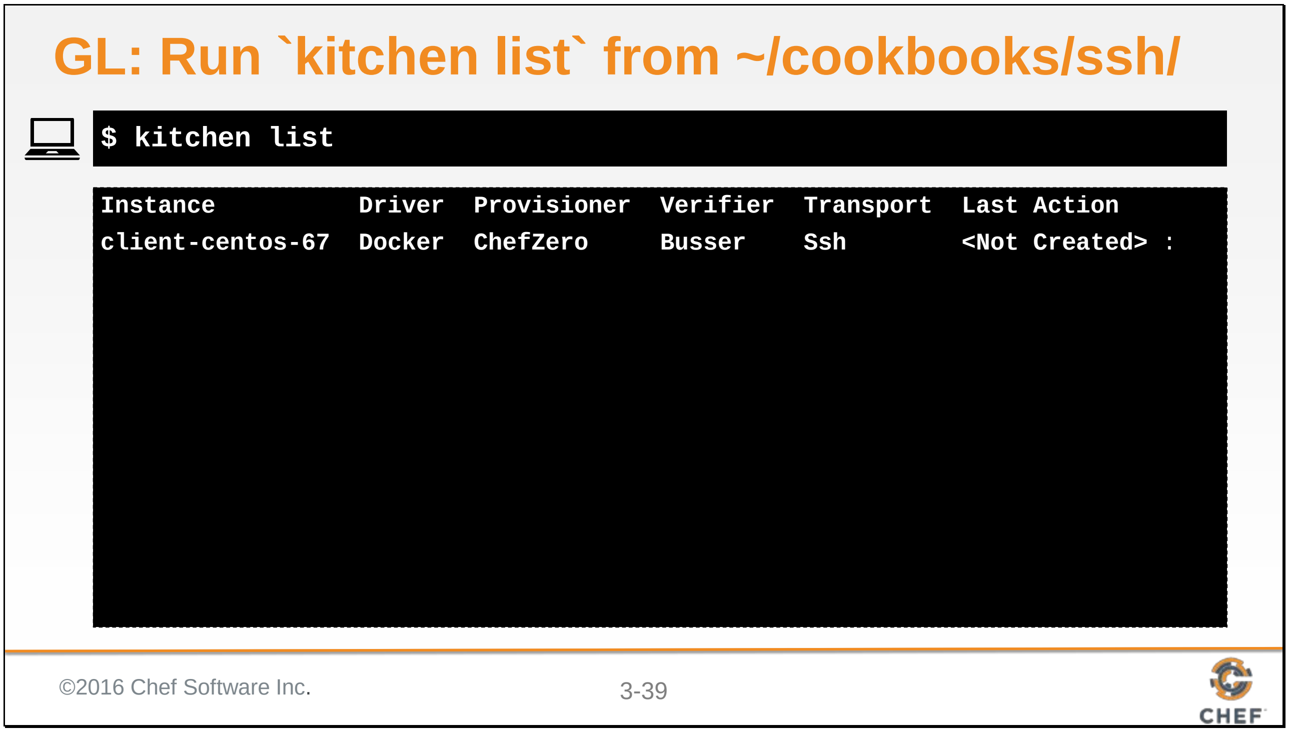


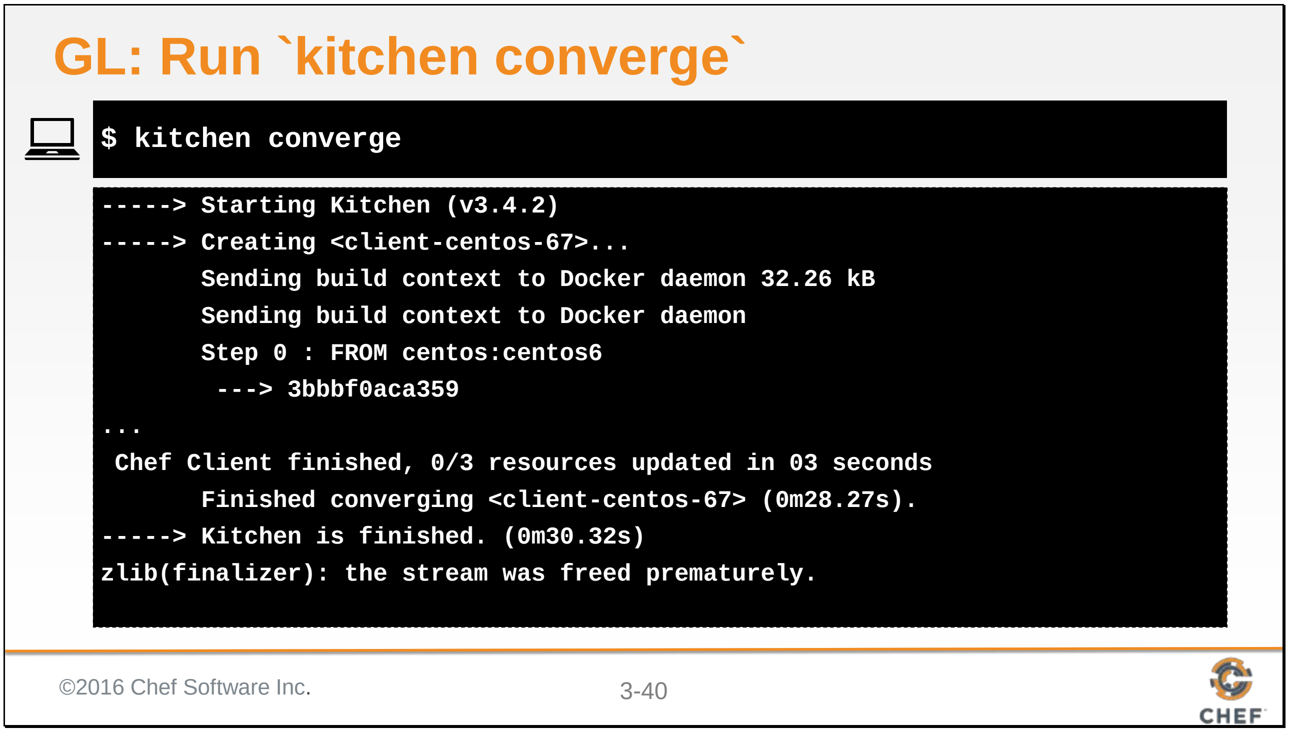
GL: Run `kitchen list` from ~/cookbooks/ssh/

```
$ kitchen list
```

```
Instance          Driver  Provisioner  Verifier  Transport  Last Action
client-centos-67  Docker  ChefZero     Busser    Ssh        <Not Created> :
```

Now run `kitchen list` from the ~/cookbooks/ssh directory. This command will tell you if you have a typo in your `.kitchen.yml`.

Slide 40



GL: Run `kitchen converge`

```
$ kitchen converge
```

```
-----> Starting Kitchen (v3.4.2)
-----> Creating <client-centos-67>...
       Sending build context to Docker daemon 32.26 kB
       Sending build context to Docker daemon
       Step 0 : FROM centos:centos6
        ---> 3bbbf0aca359
...
 Chef Client finished, 0/3 resources updated in 03 seconds
       Finished converging <client-centos-67> (0m28.27s).
-----> Kitchen is finished. (0m30.32s)
zlib(finalizer): the stream was freed prematurely.
```

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3-40

Now run `kitchen converge` from the ~/cookbooks/ssh directory.

`kitchen converge` will:

- Launch a docker container.
- Place the cookbook into the docker container.
- Install chef-client in the docker container.
- Run chef zero (i.e., chef-client in local mode) across the client recipe.

The end result will be that it should write out the ssh_conf to the appropriate location (i.e., /etc/ssh/ssh_config).

It could take a couple minutes or so for this command to complete.

Slide 41

CONCEPT

What We've Done So Far

In the preceding exercises, we began writing a remediation recipe on our target node.

We also tested the recipe with Test Kitchen.

But have we even addressed the "Set the SSH protocol version to 2" issue?

3-41

CHEF

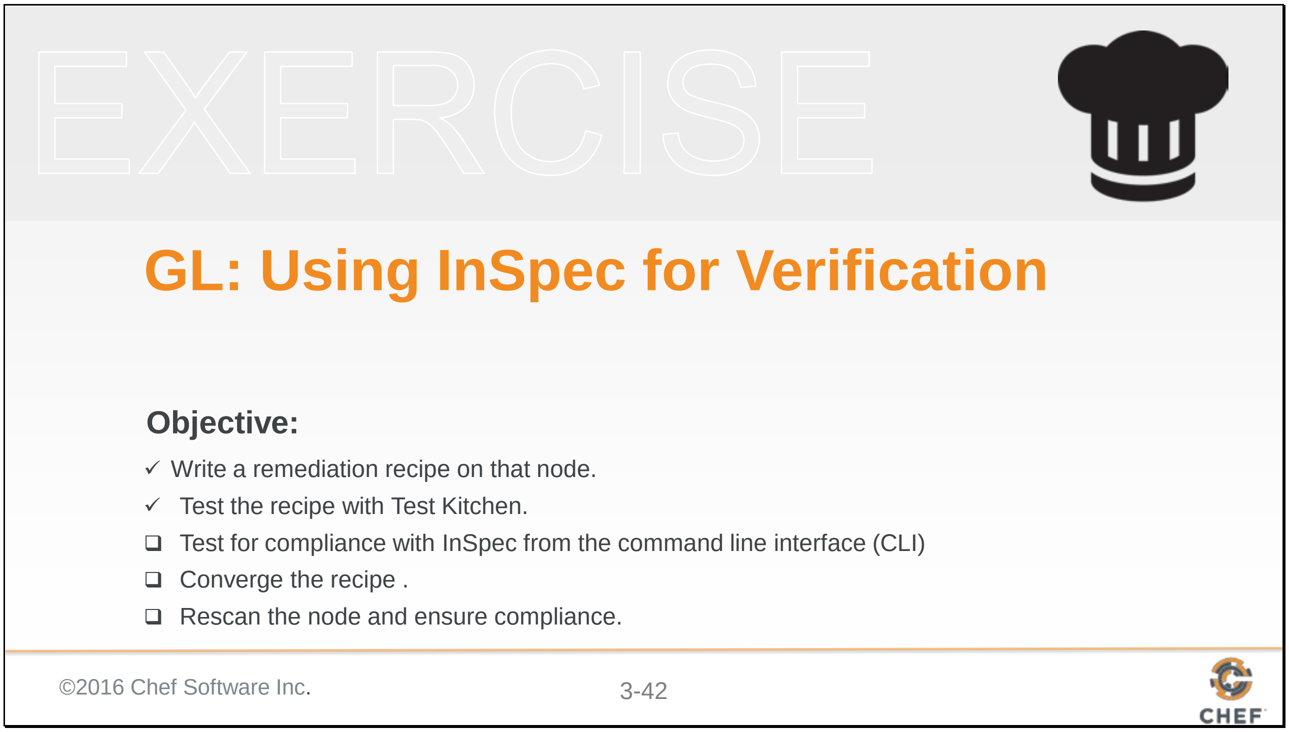
In the preceding exercises we began writing a remediation recipe on our target node.

We also tested the recipe with Test Kitchen.

But have we even addressed the "Set the SSH protocol version to 2" issue?

If you answered "no", you are correct. In a little while we will modify our recipe to address the "Set the SSH protocol version to 2" issue.

Slide 42



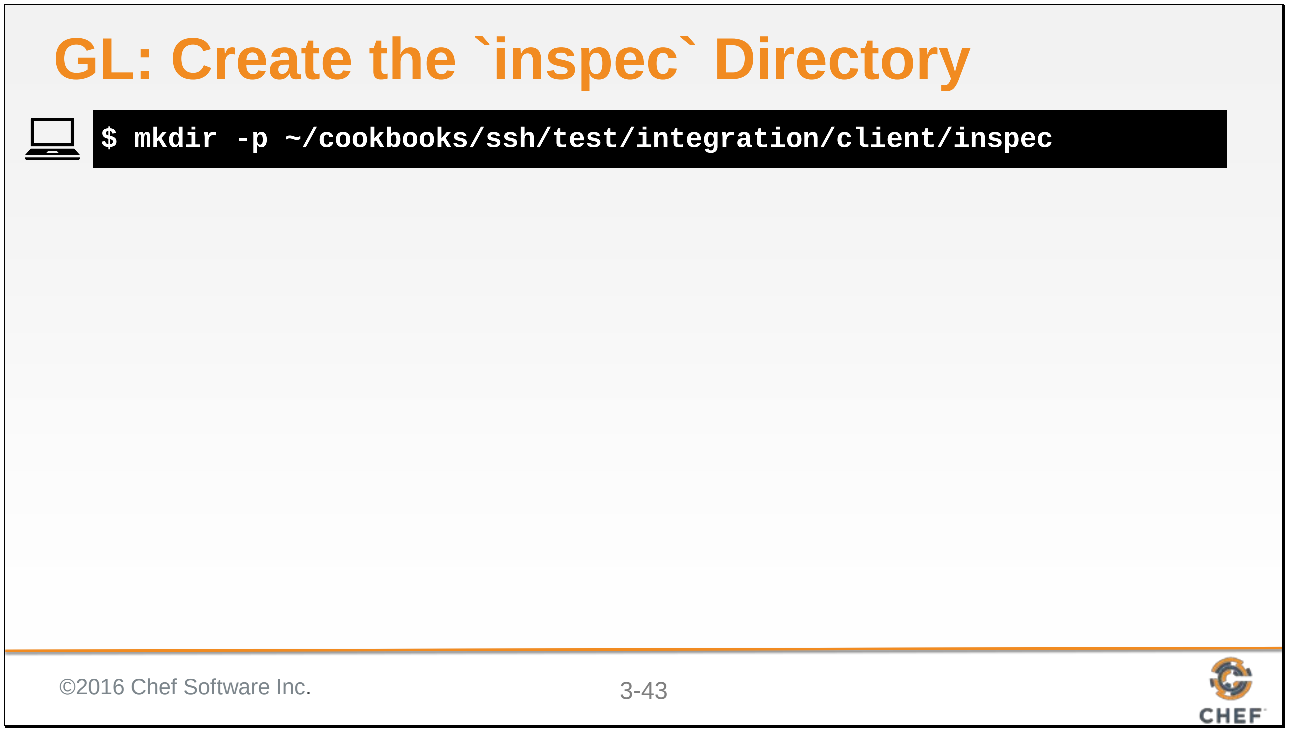
EXERCISE

GL: Using InSpec for Verification

Objective:

- ✓ Write a remediation recipe on that node.
- ✓ Test the recipe with Test Kitchen.
- ❑ Test for compliance with InSpec from the command line interface (CLI)
- ❑ Converge the recipe .
- ❑ Rescan the node and ensure compliance.

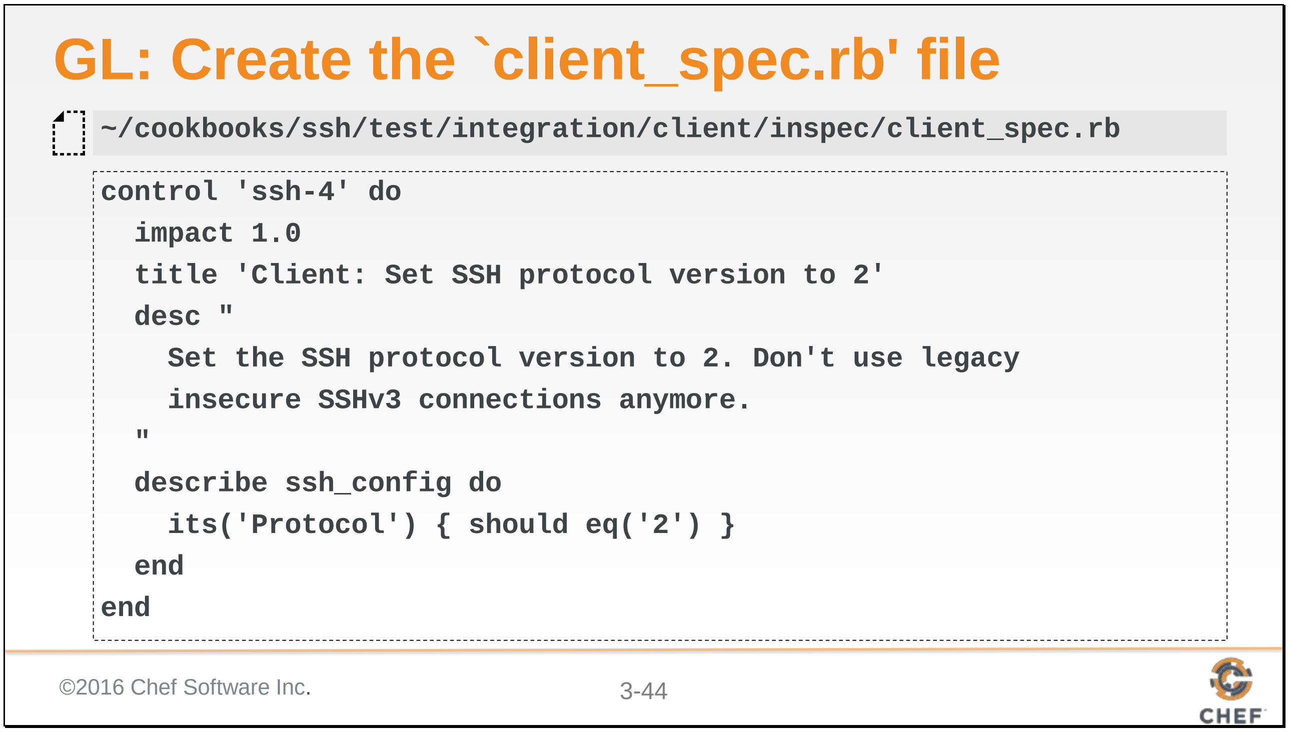
Slide 43



GL: Create the `inspec` Directory

```
$ mkdir -p ~/cookbooks/ssh/test/integration/client/inspec
```

Slide 44



GL: Create the `client_spec.rb' file

~/cookbooks/ssh/test/integration/client/inspec/client_spec.rb

```
control 'ssh-4' do
  impact 1.0
  title 'Client: Set SSH protocol version to 2'
  desc "
    Set the SSH protocol version to 2. Don't use legacy
    insecure SSHv3 connections anymore.
  "
  describe ssh_config do
    its('Protocol') { should eq('2') }
  end
end
```

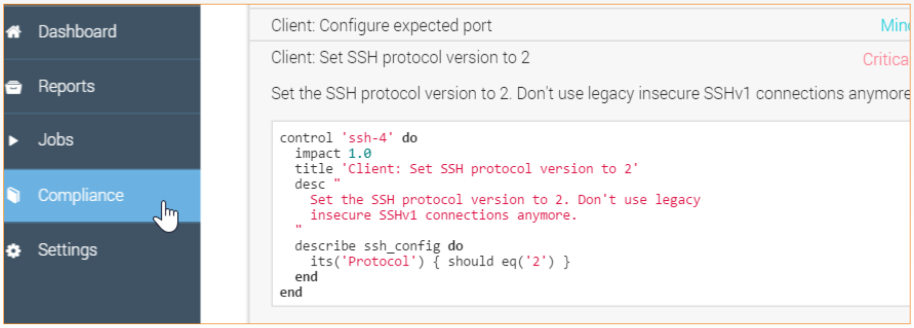
See the following slide for an example of a handy way to populate this file.

Slide 45

Example of Creating the `client_spec.rb' file

One handy way to populate the preceding `client_spec.rb' is to use the Compliance Web UI and copy the InSpec code found in the relevant Compliance profile:

Compliance > Base SSH > Set the SSH protocol version to 2



Client: Configure expected port

Client: Set SSH protocol version to 2

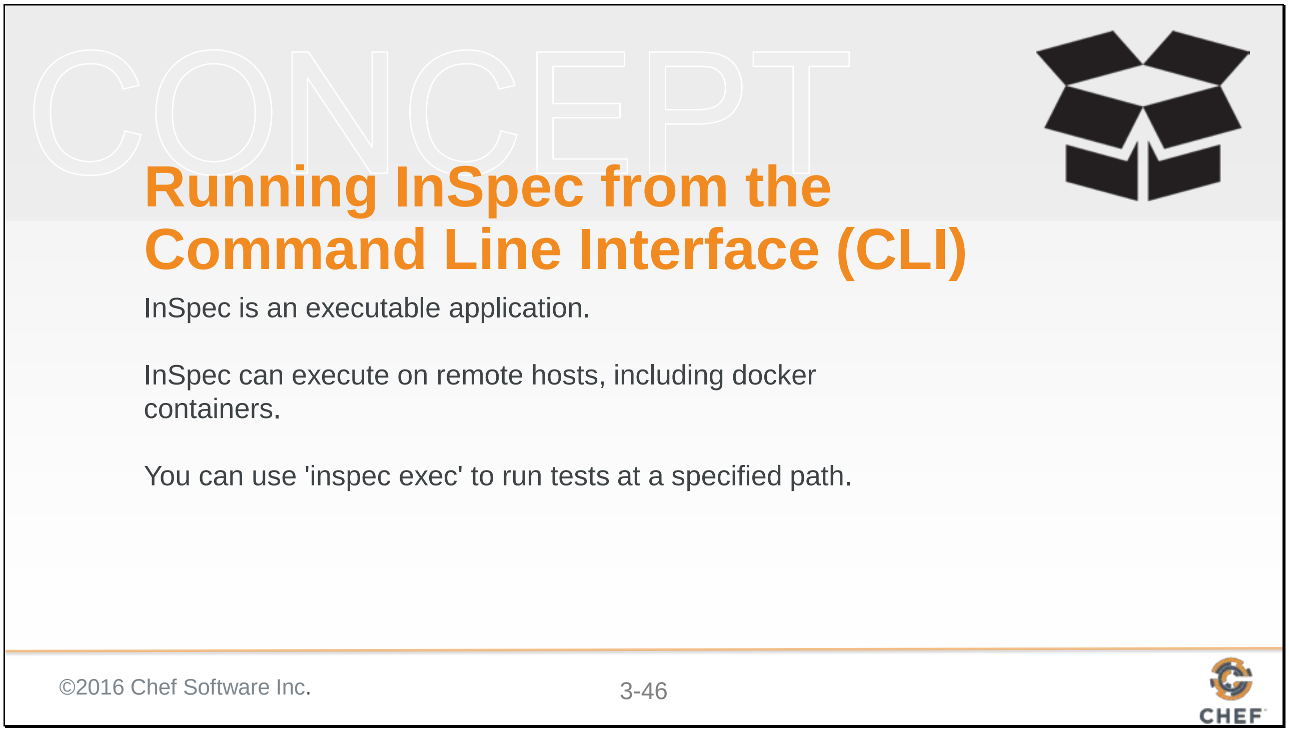
Set the SSH protocol version to 2. Don't use legacy insecure SSHv1 connections anymore

```
control 'ssh-4' do
  impact 1.0
  title 'Client: Set SSH protocol version to 2'
  desc "
    Set the SSH protocol version to 2. Don't use legacy
    insecure SSHv1 connections anymore.
  "
  describe ssh_config do
    its('Protocol') { should eq('2') }
  end
end
```

One handy way to populate the preceding `client_spec.rb' is to use the Compliance Web UI and copy the InSpec control code found in the relevant Compliance profile.

Then you can paste it into the `client_spec.rb' file to save yourself some typing.

Slide 46


CONCEPT

Running InSpec from the Command Line Interface (CLI)

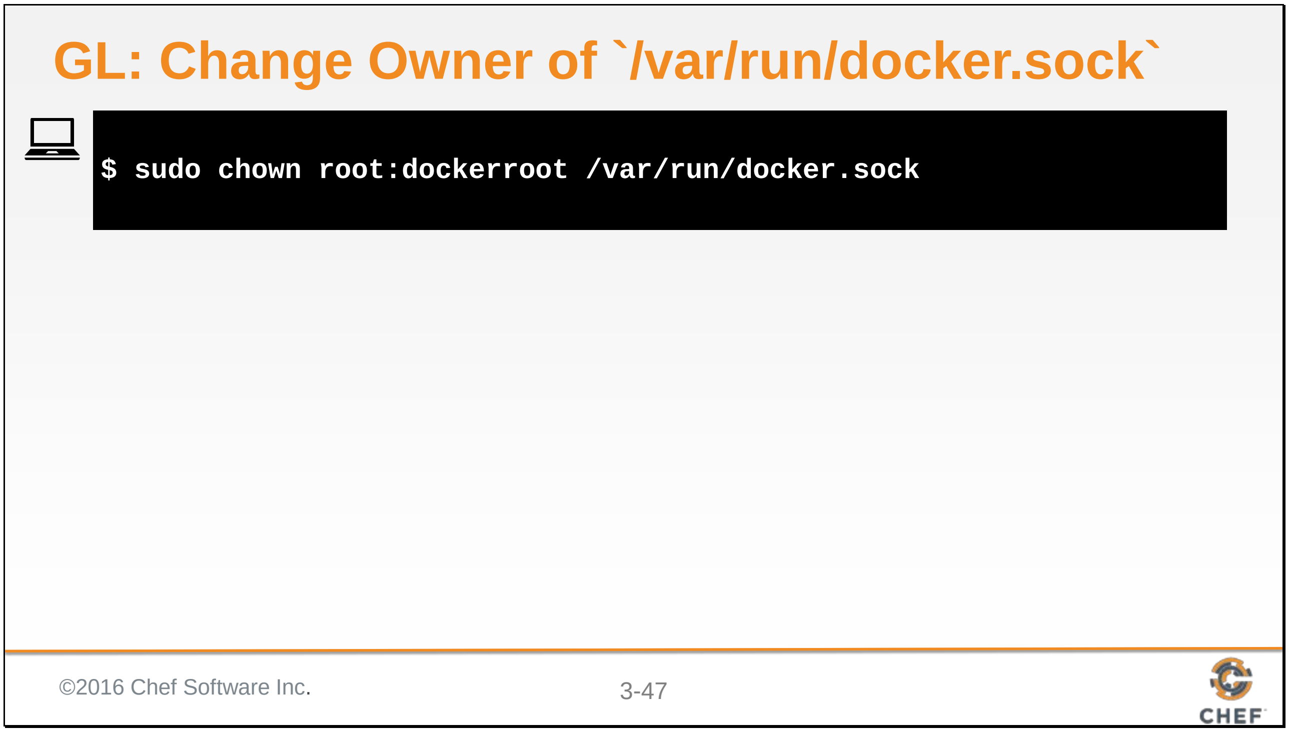
InSpec is an executable application.

InSpec can execute on remote hosts, including docker containers.

You can use 'inspec exec' to run tests at a specified path.

CHEF

Slide 47



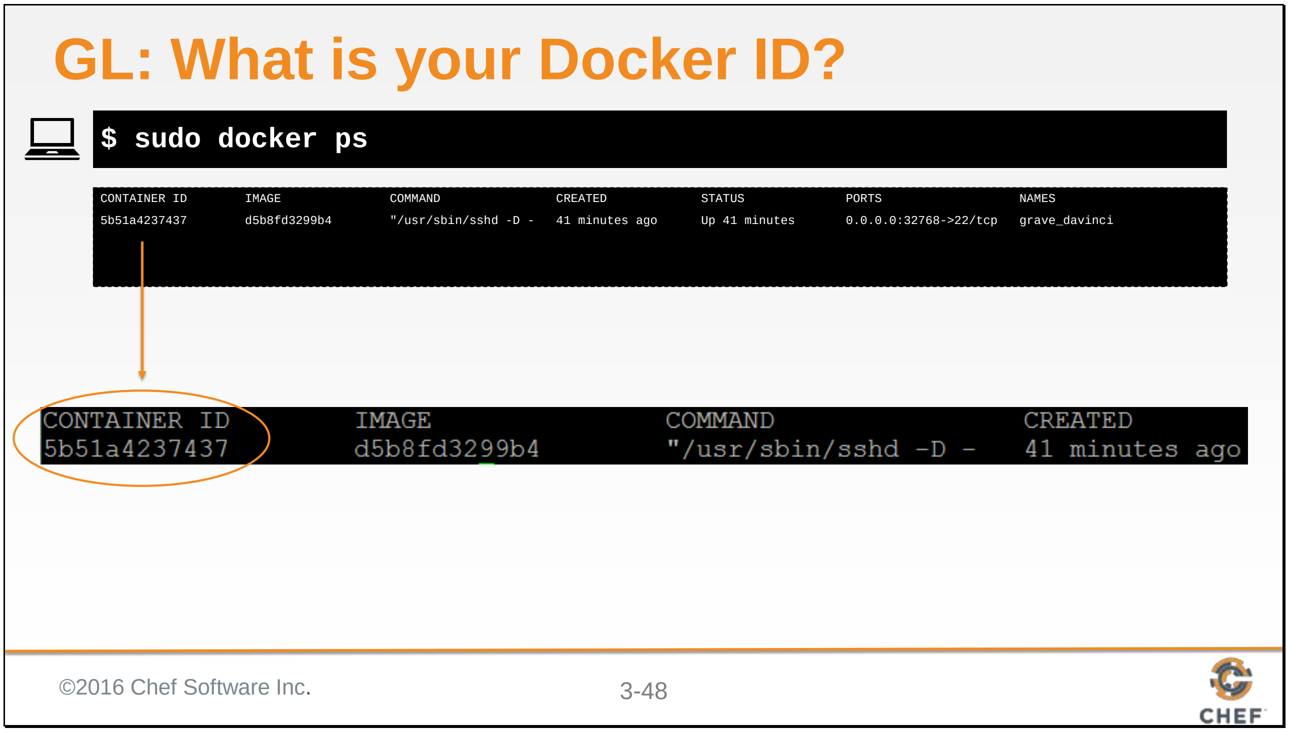
GL: Change Owner of `/var/run/docker.sock`

```
$ sudo chown root:dockerroot /var/run/docker.sock
```

First, we need to run this command because we are using Docker solely for testing and placing it in this configuration is not secure. We are doing it here because it is necessary if we do not want to prefix `sudo` in front of the commands we execute.

So it’s done here namely for speed and ease of training so you can focus on Compliance. On your local system you may use vagrant, ec2, or the azure driver and those will not have the same concern that we are experiencing here.

Slide 48



GL: What is your Docker ID?

```
$ sudo docker ps
```

```
CONTAINER ID        IMAGE               COMMAND                  CREATED             STATUS              PORTS                    NAMES
5b51a4237437        d5b8fd3299b4        "/usr/sbin/sshd -D -     41 minutes ago      Up 41 minutes       0.0.0.0:32768->22/tcp    grave_davinci
```

```
CONTAINER ID        IMAGE               COMMAND                  CREATED
5b51a4237437        d5b8fd3299b4        "/usr/sbin/sshd -D -     41 minutes ago
```

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Below is an example of the details of the `sudo docker ps` command. This shows one docker container running.

You should only have only one docker container running too.

You'll need the Container ID for the next step so copy your Container ID, which is the first value that is not a header.

```
CONTAINER ID       IMAGE            COMMAND               CREATED            STATUS
PORTS                  NAMES
5b51a4237437       d5b8fd3299b4       "/usr/sbin/sshd -D -   41 minutes ago      Up 41
minutes       0.0.0.0:32768->22/tcp   grave_davinci
```

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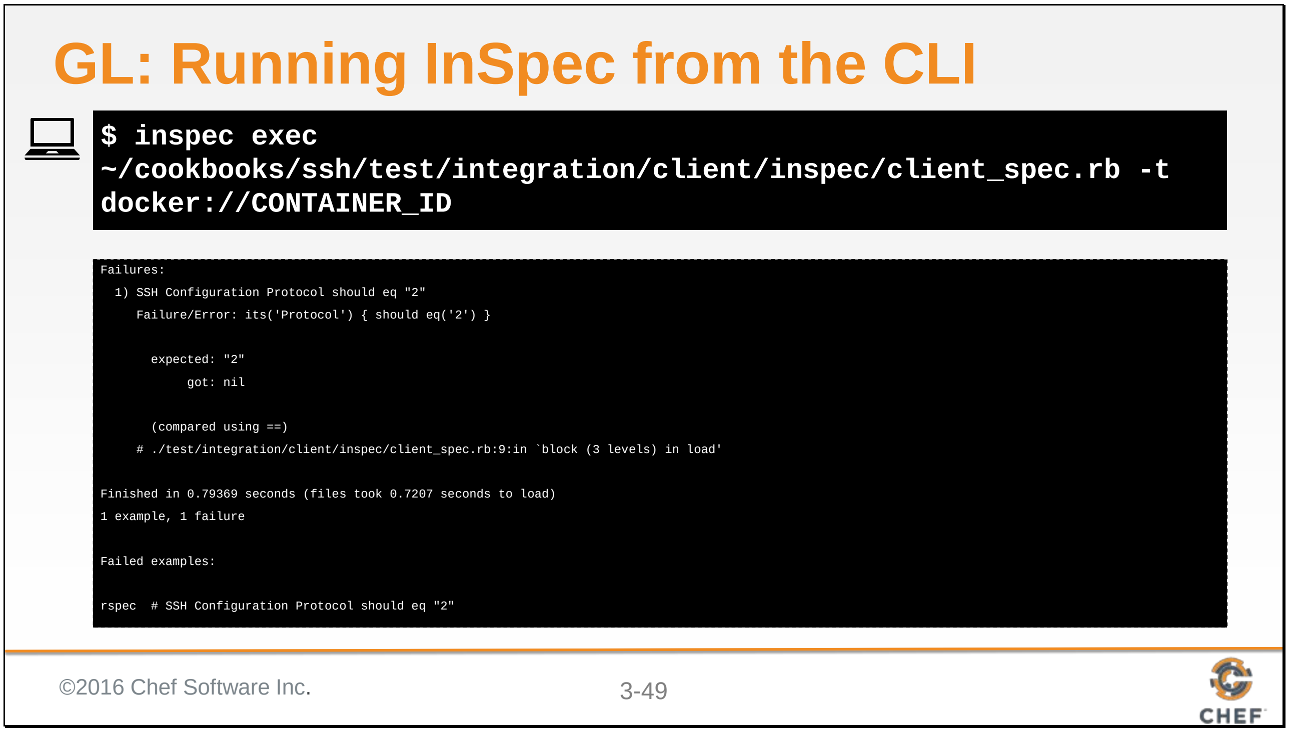


GL: Running InSpec from the CLI

```
$ inspec exec
~/cookbooks/ssh/test/integration/client/inspec/client_spec.rb -t
docker://CONTAINER_ID
```

```
Failures:
  1) SSH Configuration Protocol should eq "2"
     Failure/Error: its('Protocol') { should eq('2') }

       expected: "2"
            got: nil

       (compared using ==)
     # ./test/integration/client/inspec/client_spec.rb:9:in `block (3 levels) in load'

Finished in 0.79369 seconds (files took 0.7207 seconds to load)
1 example, 1 failure

Failed examples:

rspec  # SSH Configuration Protocol should eq "2"
```

Run this inspec command using the container ID you just copied, replacing CONTAINER_ID in the example.
`inspec exec ~/cookbooks/ssh/test/integration/client/inspec/client_spec.rb -t docker://CONTAINER_ID`

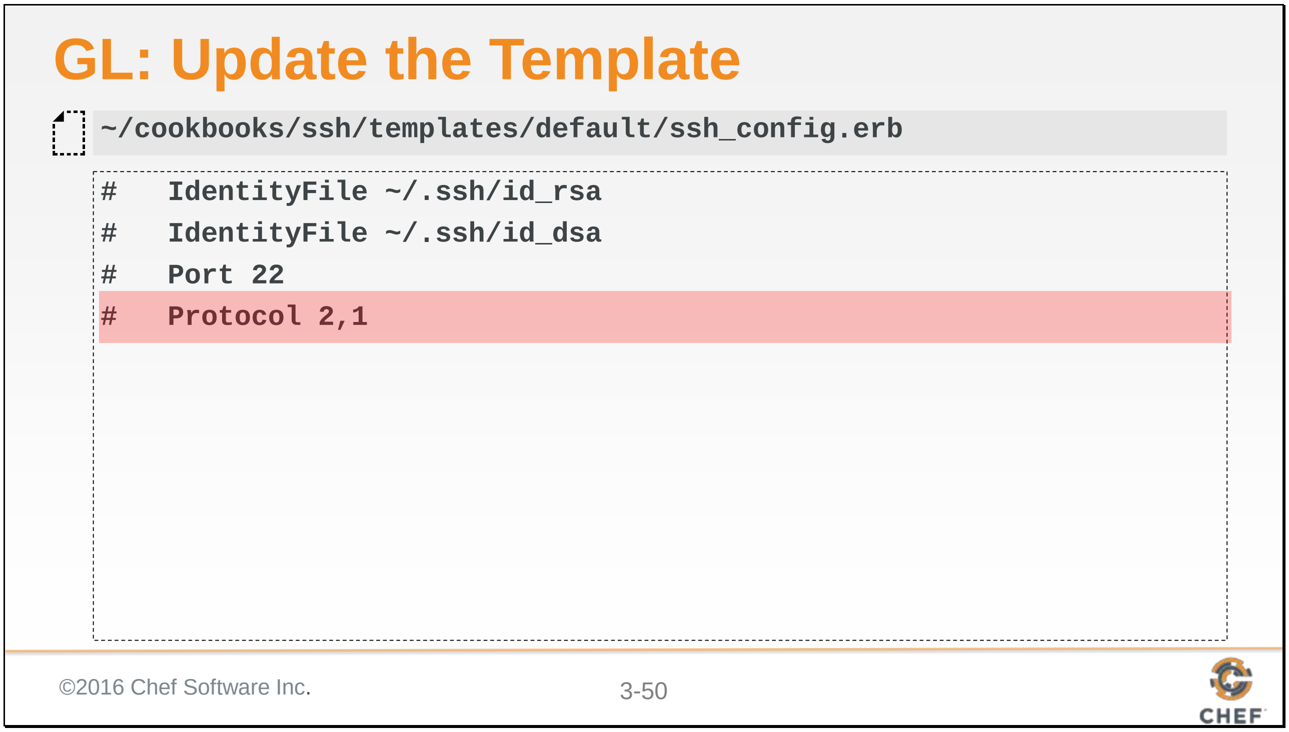
Running InSpec in this way can uncover more complex issues than the basic issue we are remediating in this module.

While the image of the output may be hard to see, key parts of the output is also pasted below. Notice how inspec from the command line also found the "SSH Configuration Protocol should eq "2" non compliance issue.

Key parts of the output is here:
Failures:

```
  1) SSH Configuration Protocol should eq "2"
     Failure/Error: its('Protocol') { should eq('2') }
expected: "2"
            got: nil
...
Failed examples:
rspec  # SSH Configuration Protocol should eq "2"
```

Slide 50



GL: Update the Template

~/cookbooks/ssh/templates/default/ssh_config.erb

```
#   IdentityFile ~/.ssh/id_rsa
#   IdentityFile ~/.ssh/id_dsa
#   Port 22
#   Protocol 2,1
```

- Edit the ~/cookbooks/ssh/templates/default/ssh_config.erb file.
- Uncomment the `#   Protocol 2,1` line.
- Change the protocol version to `2` only.

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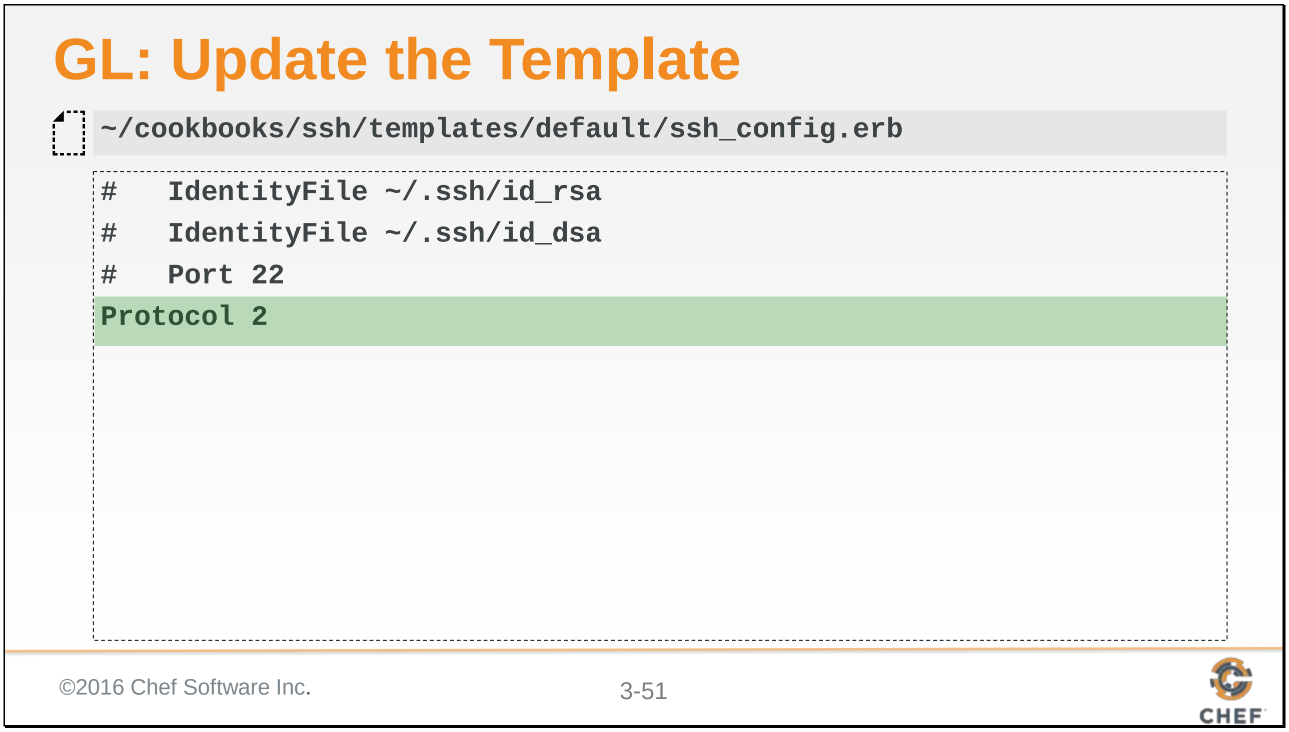


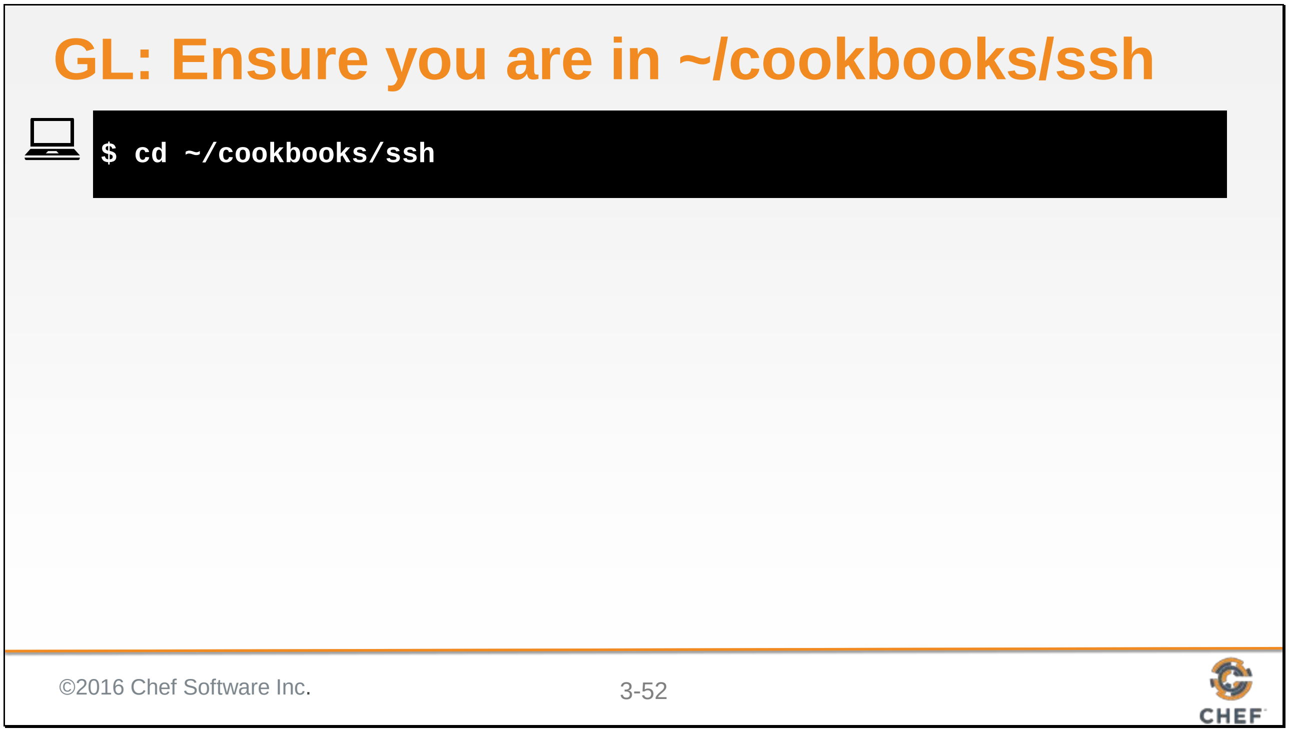
GL: Update the Template

~/cookbooks/ssh/templates/default/ssh_config.erb

```
#   IdentityFile ~/.ssh/id_rsa
#   IdentityFile ~/.ssh/id_dsa
#   Port 22
Protocol 2
```

Results: Your ~/cookbooks/ssh/templates/default/ssh_config.erb file's Protocol line should now look like this example.

Slide 52

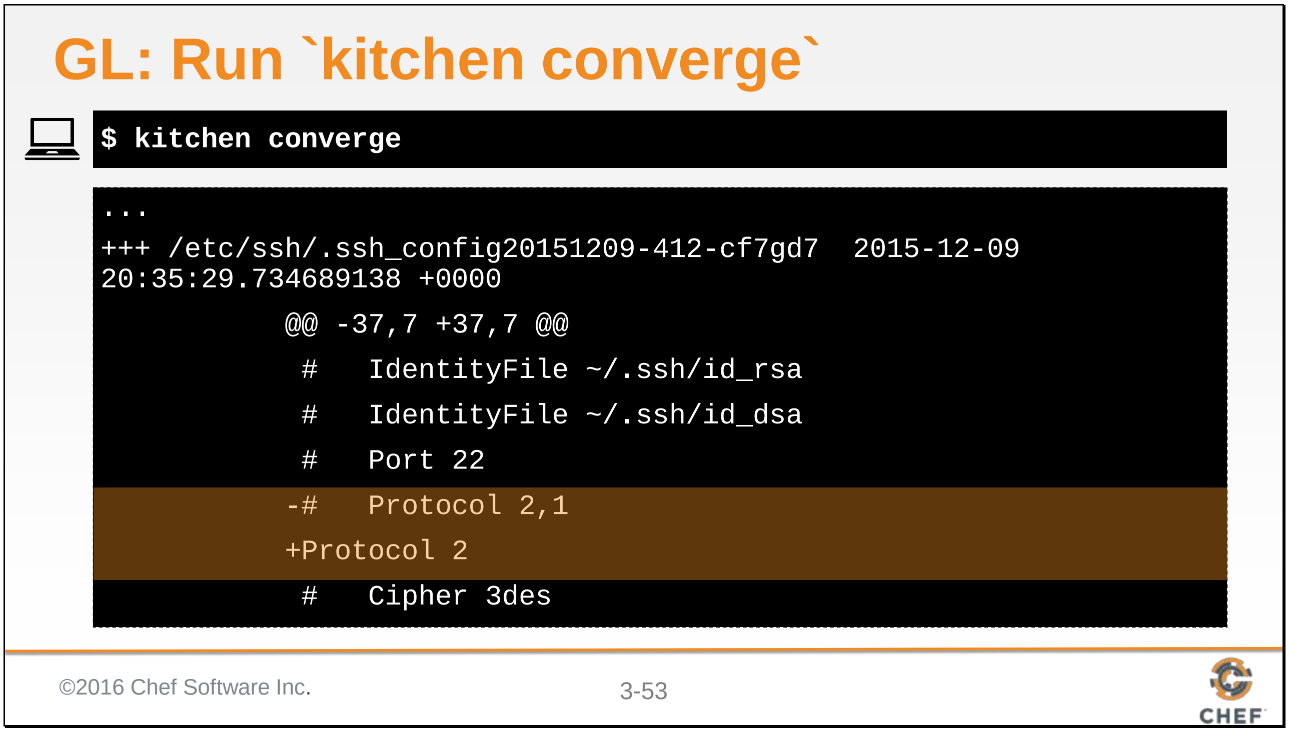


GL: Ensure you are in ~/cookbooks/ssh

```
$ cd ~/cookbooks/ssh
```

Change to ~/cookbooks/ssh if not there already.

Slide 53



GL: Run `kitchen converge`

```
$ kitchen converge
```

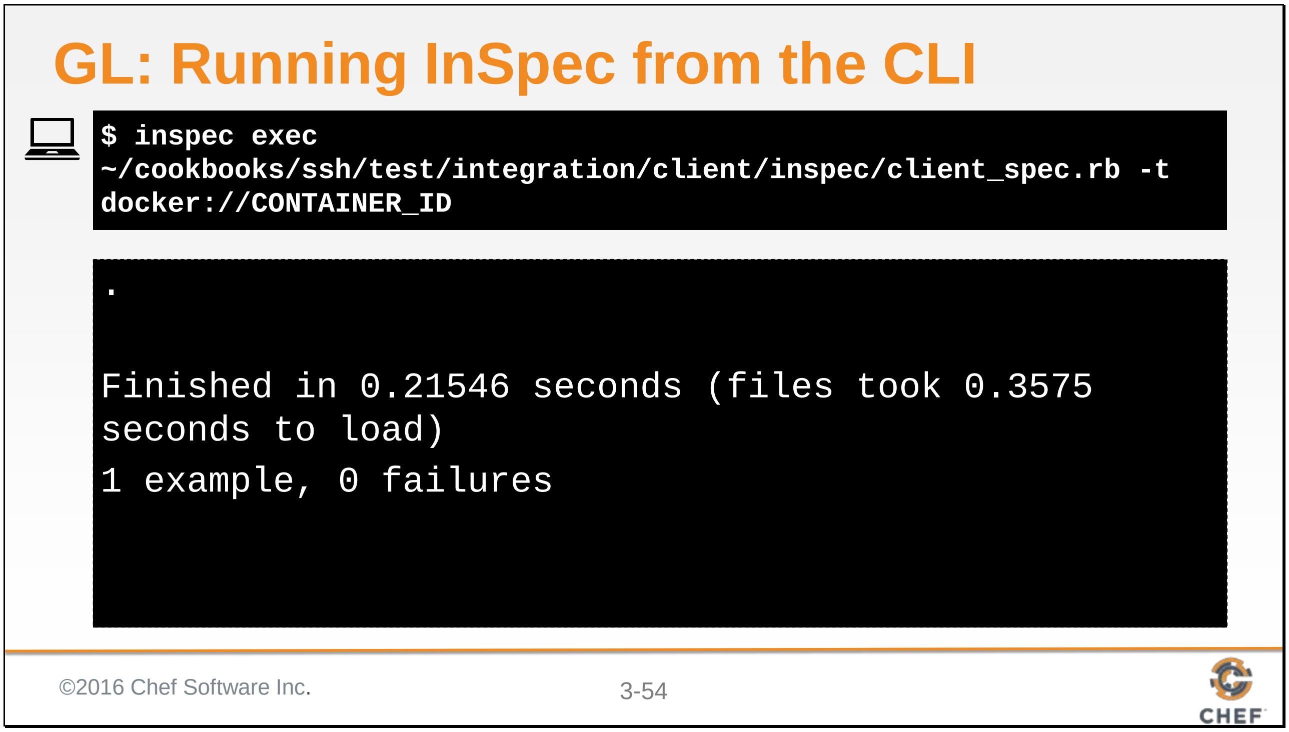
```
...
+++ /etc/ssh/.ssh_config20151209-412-cf7gd7  2015-12-09
20:35:29.734689138 +0000
           @@ -37,7 +37,7 @@
            #   IdentityFile ~/.ssh/id_rsa
            #   IdentityFile ~/.ssh/id_dsa
            #   Port 22
           -#   Protocol 2,1
           +Protocol 2
            #   Cipher 3des
```

3-53

You should now see that only Protocol version 2 is currently set in test kitchen.

```
 - update content in file /etc/ssh/ssh_config from 86eb9b to 065f90
        --- /etc/ssh/ssh_config      2015-08-13 09:58:26.000000000 +0000
        +++ /etc/ssh/.ssh_config20151209-412-cf7gd7  2015-12-09 20:35:29.734689138
+0000
        @@ -37,7 +37,7 @@
         #   IdentityFile ~/.ssh/id_rsa
         #   IdentityFile ~/.ssh/id_dsa
         #   Port 22
        -#   Protocol 2,1
        +Protocol 2
         #   Cipher 3des
         #   Ciphers aes128-ctr,aes192-ctr,aes256-ctr,arcfour256,arcfour128,aes128-
cbc,3des-cbc

     Running handlers:

     Chef Client finished, 3/3 resources updated in 03 seconds
     Finished converging <client-centos-67> (0m8.22s).
```

Slide 54



GL: Running InSpec from the CLI

```
$ inspec exec
~/cookbooks/ssh/test/integration/client/inspec/client_spec.rb -t
docker://CONTAINER_ID
```

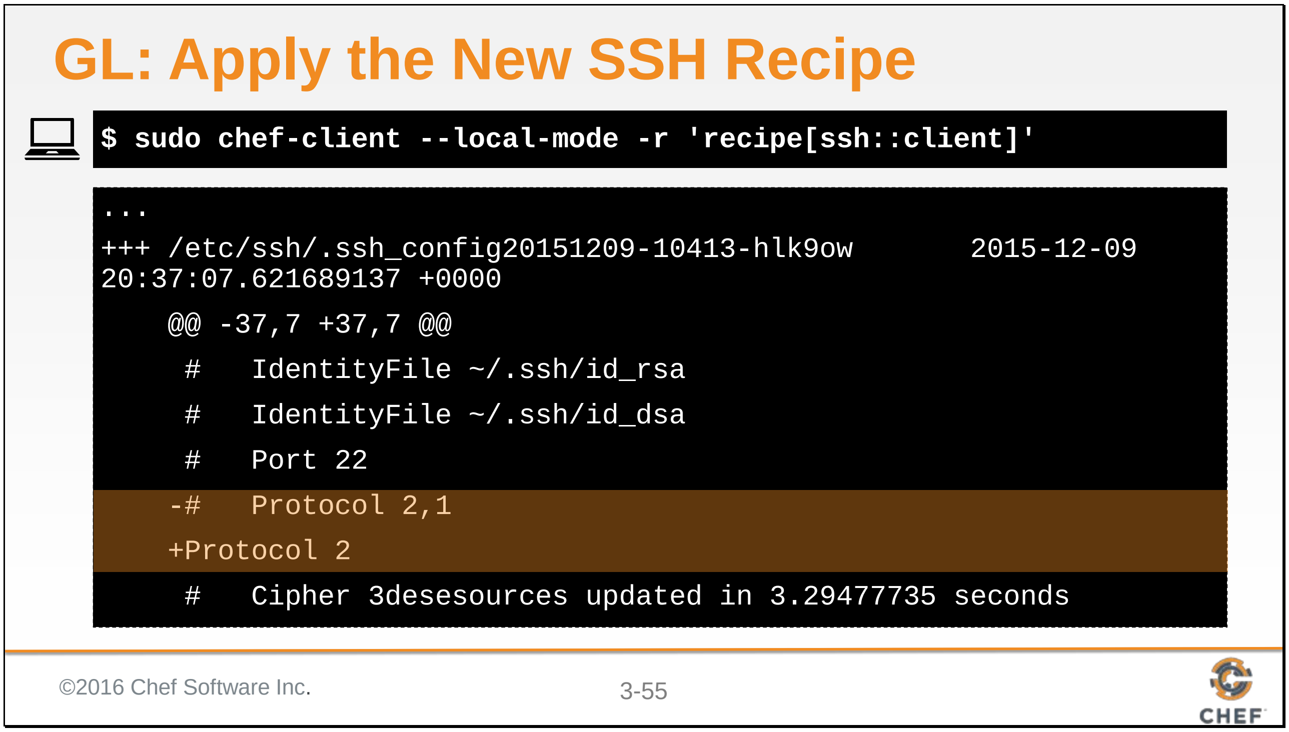
```
.

Finished in 0.21546 seconds (files took 0.3575
seconds to load)
1 example, 0 failures
```

Run this inspec command again using the container ID you copied previously, replacing CONTAINER_ID in the example.

`inspec exec ~/cookbooks/ssh/test/integration/client/inspec/client_spec.rb -t docker://CONTAINER_ID`

You should now see that the test has passed. In addition to the output text that says there were 0 failures, the single dot at the top-left of the output means there was one test made and that it passed.

Slide 55



GL: Apply the New SSH Recipe

```
$ sudo chef-client --local-mode -r 'recipe[ssh::client]'
```

```
...
+++ /etc/ssh/.ssh_config20151209-10413-hlk9ow       2015-12-09
20:37:07.621689137 +0000
    @@ -37,7 +37,7 @@
     #   IdentityFile ~/.ssh/id_rsa
     #   IdentityFile ~/.ssh/id_dsa
     #   Port 22
    -#   Protocol 2,1
    +Protocol 2
     #   Cipher 3desesources updated in 3.29477735 seconds
```

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Now we need to actually apply the change to the node. We'll do this using chef-client in local mode. You should then see that only Protocol version 2 is currently set on the node.

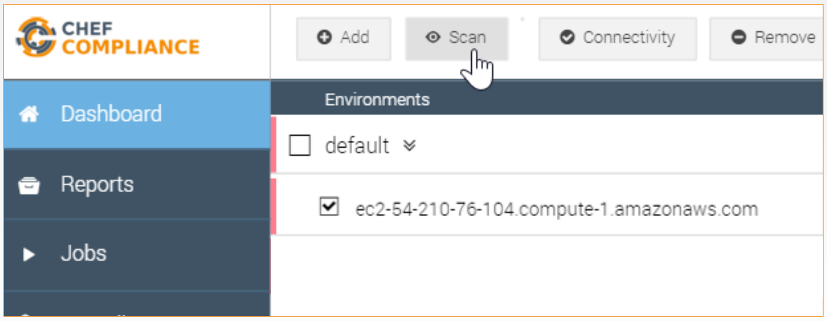
Of course in a production environment chef-client would most likely be set to run automatically to download and converge these changes from Chef Server.

Slide 56

GL: Re-run the Compliance Scan

Return to the Compliance Web UI and re-run the scan on your target node.

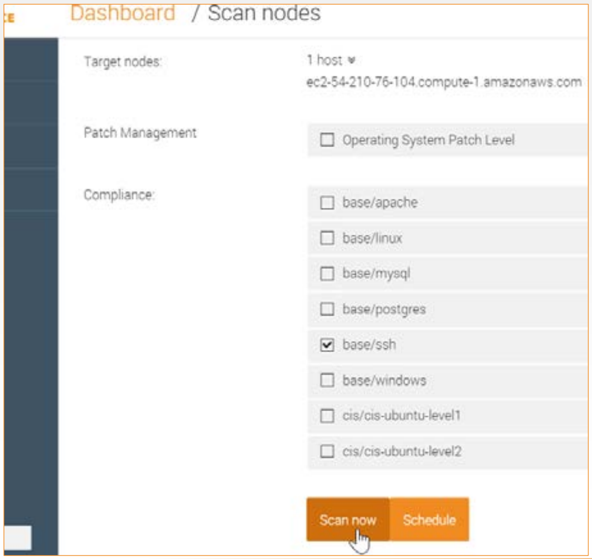
Be sure to run only the base/ssh scan as shown on the next slide.



Slide 57

GL: Re-run the Compliance Scan

Run only the base/ssh scan.



Dashboard / Scan nodes

Target nodes: 1 host
ec2-54-210-76-104.compute-1.amazonaws.com

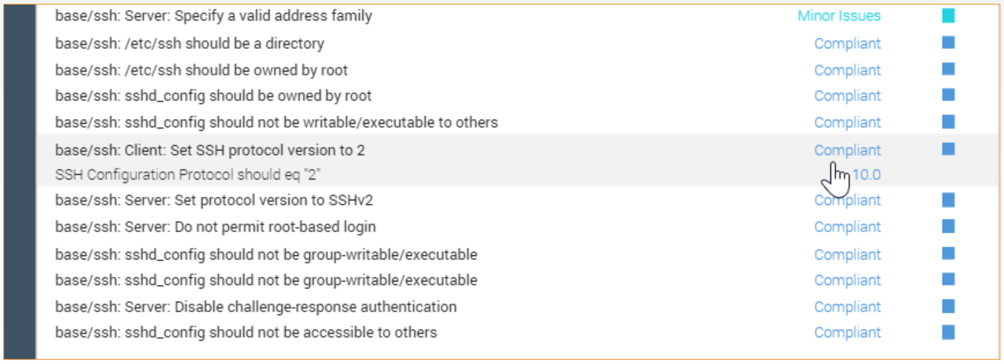
Patch Management
□ Operating System Patch Level

Compliance:
□ base/apache
□ base/linux
□ base/mysql
□ base/postgres
☑ base/ssh
□ base/windows
□ cis/cis-ubuntu-level1
□ cis/cis-ubuntu-level2

Slide 58

GL: Results of this Exercise

Your scan should show that the ssh protocol issue is now complaint.



base/ssh: Server: Specify a valid address family	Minor Issues	🟦
base/ssh: /etc/ssh should be a directory	Compliant	🟦
base/ssh: /etc/ssh should be owned by root	Compliant	🟦
base/ssh: sshd_config should be owned by root	Compliant	🟦
base/ssh: sshd_config should not be writable/executable to others	Compliant	🟦
base/ssh: Client: Set SSH protocol version to 2	Compliant	🟦
SSH Configuration Protocol should eq "2"	10.0	
base/ssh: Server: Set protocol version to SSHv2	Compliant	🟦
base/ssh: Server: Do not permit root-based login	Compliant	🟦
base/ssh: sshd_config should not be group-writable/executable	Compliant	🟦
base/ssh: sshd_config should not be group-writable/executable	Compliant	🟦
base/ssh: Server: Disable challenge-response authentication	Compliant	🟦
base/ssh: sshd_config should not be accessible to others	Compliant	🟦

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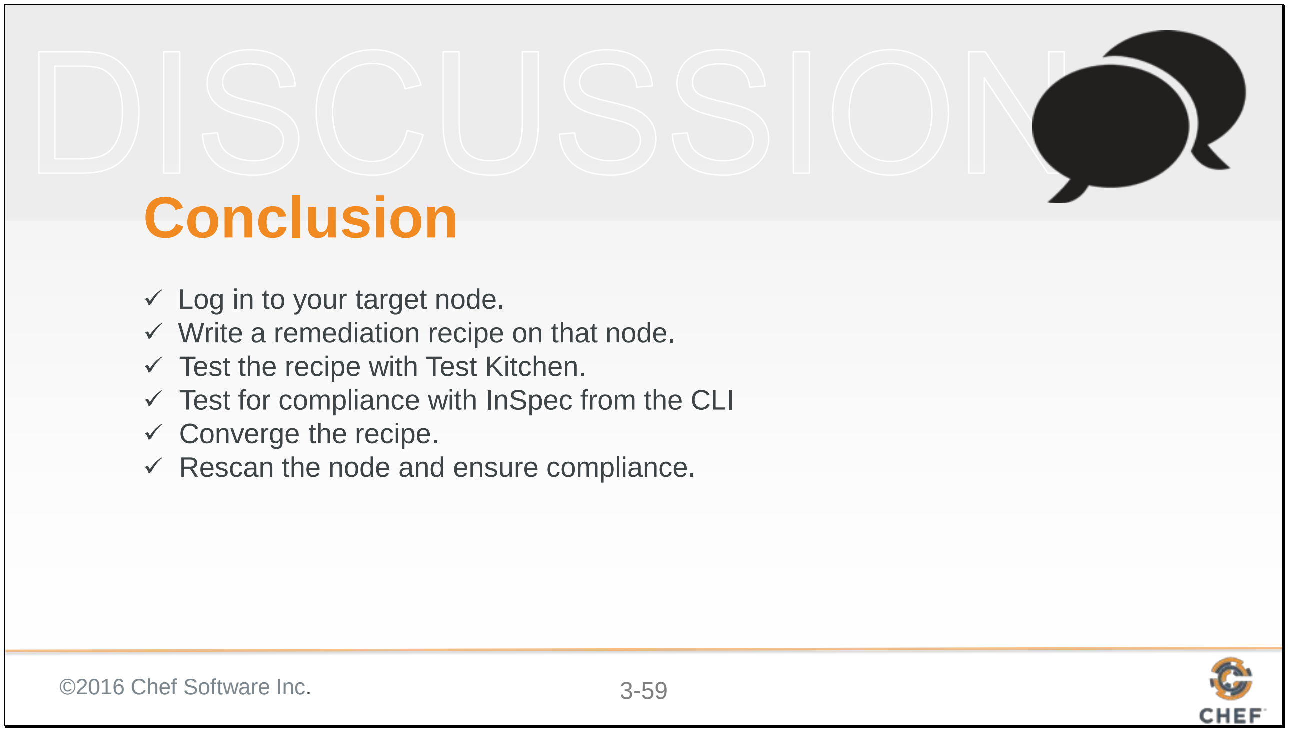


DISCUSSION

Conclusion

- ✓ Log in to your target node.
- ✓ Write a remediation recipe on that node.
- ✓ Test the recipe with Test Kitchen.
- ✓ Test for compliance with InSpec from the CLI
- ✓ Converge the recipe.
- ✓ Rescan the node and ensure compliance.

In this module we scanned a node for compliance issues. We identified an issue and then wrote a remediation recipe directly on the node scanned. We also tested our recipe with test kitchen.

As mentioned previously, in a production environment, you will likely write such recipes locally, add them to the node's run list, and then upload them to Chef Server.

Then the nodes would download the recipes from Chef Server on their next chef-client run and also convergence the recipes.

Slide 60

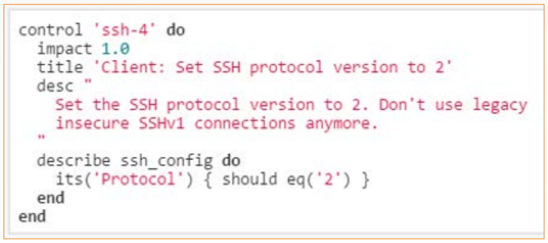
Review Questions

1. When adding a node to the Compliance server's dashboard, should you use the node's FQDN or just its IP address?

2. What can `inspec exec` be used for?

3. How are compliance severities defined?

4. Using the image on the right, what section is the actual test?



```
control 'ssh-4' do
  impact 1.0
  title 'Client: Set SSH protocol version to 2'
  desc "
    Set the SSH protocol version to 2. Don't use legacy
    insecure SSHv1 connections anymore.
  "
  describe ssh_config do
    its('Protocol') { should eq('2') }
  end
end
```

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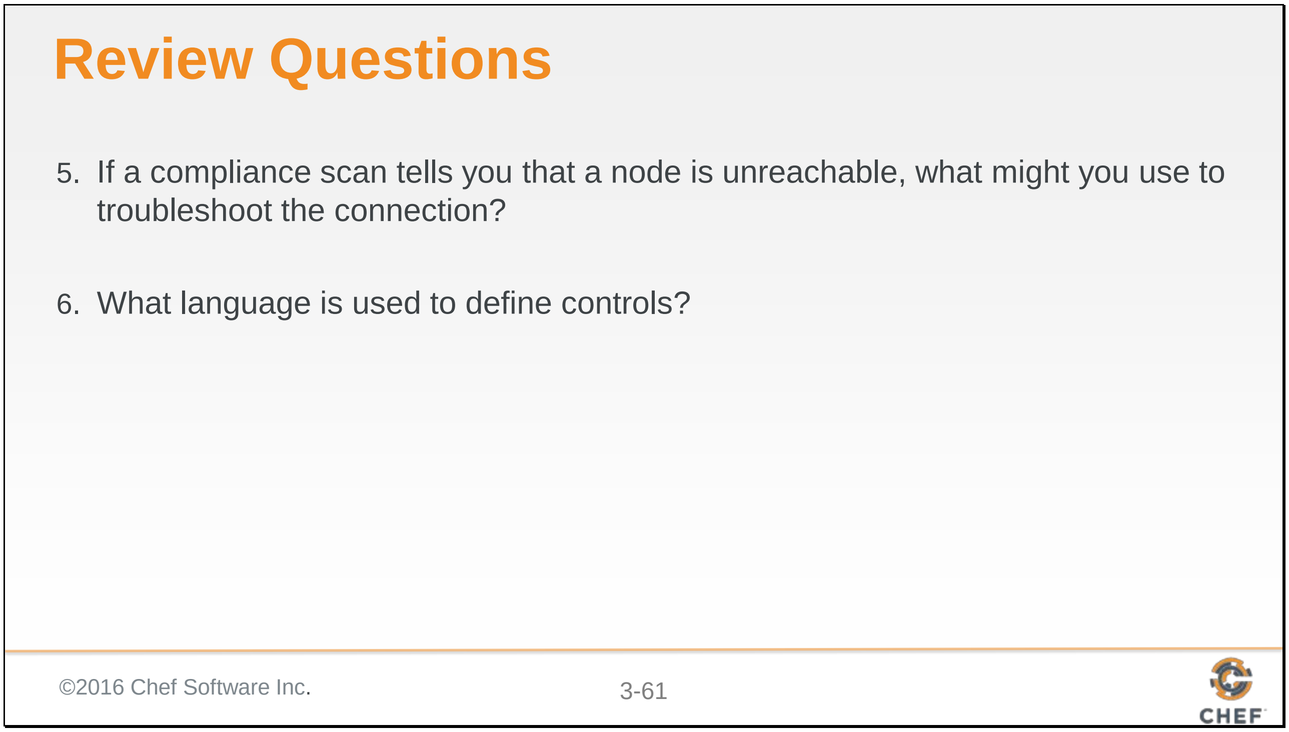

Review Questions

5. If a compliance scan tells you that a node is unreachable, what might you use to troubleshoot the connection?

6. What language is used to define controls?

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