Chef

Agenda

Topics

- Overview of Chef
- Workstation Setup
- Node Setup
- Chef Resources and Recipes
- Working with the Node object
- Common configuration with Data Bags
- Roles and Environments
- Community Cookbooks and Further Resources

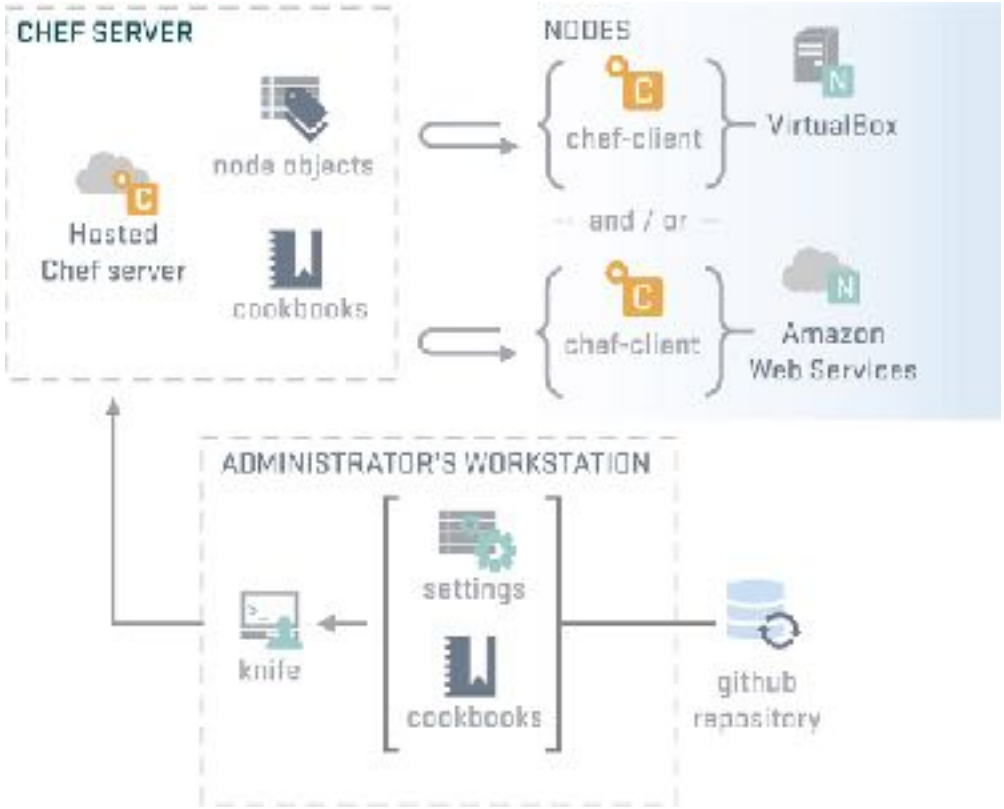
Node Setup

Setup a Node to manage

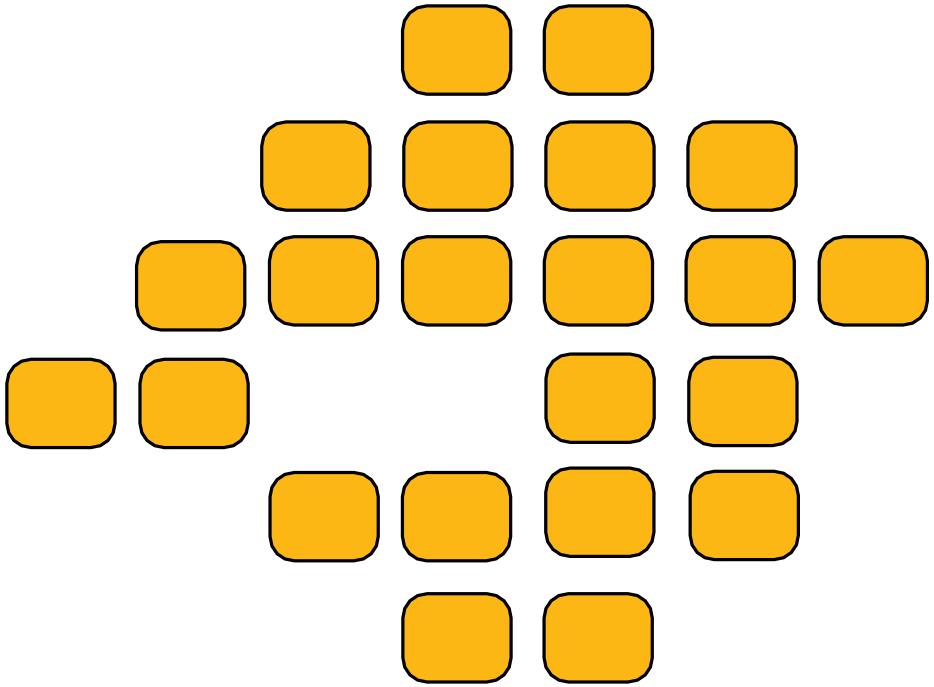
Lesson Objectives

- After completing the lesson, you will be able to
  - Login to the node in your Chef Training Lab
  - Install Chef nodes using "knife bootstrap"
  - Explain how knife bootstrap configures a node to use the Organization created in the previous section
  - Explain the basic configuration needed to run chef-client

Chef Infrastructure



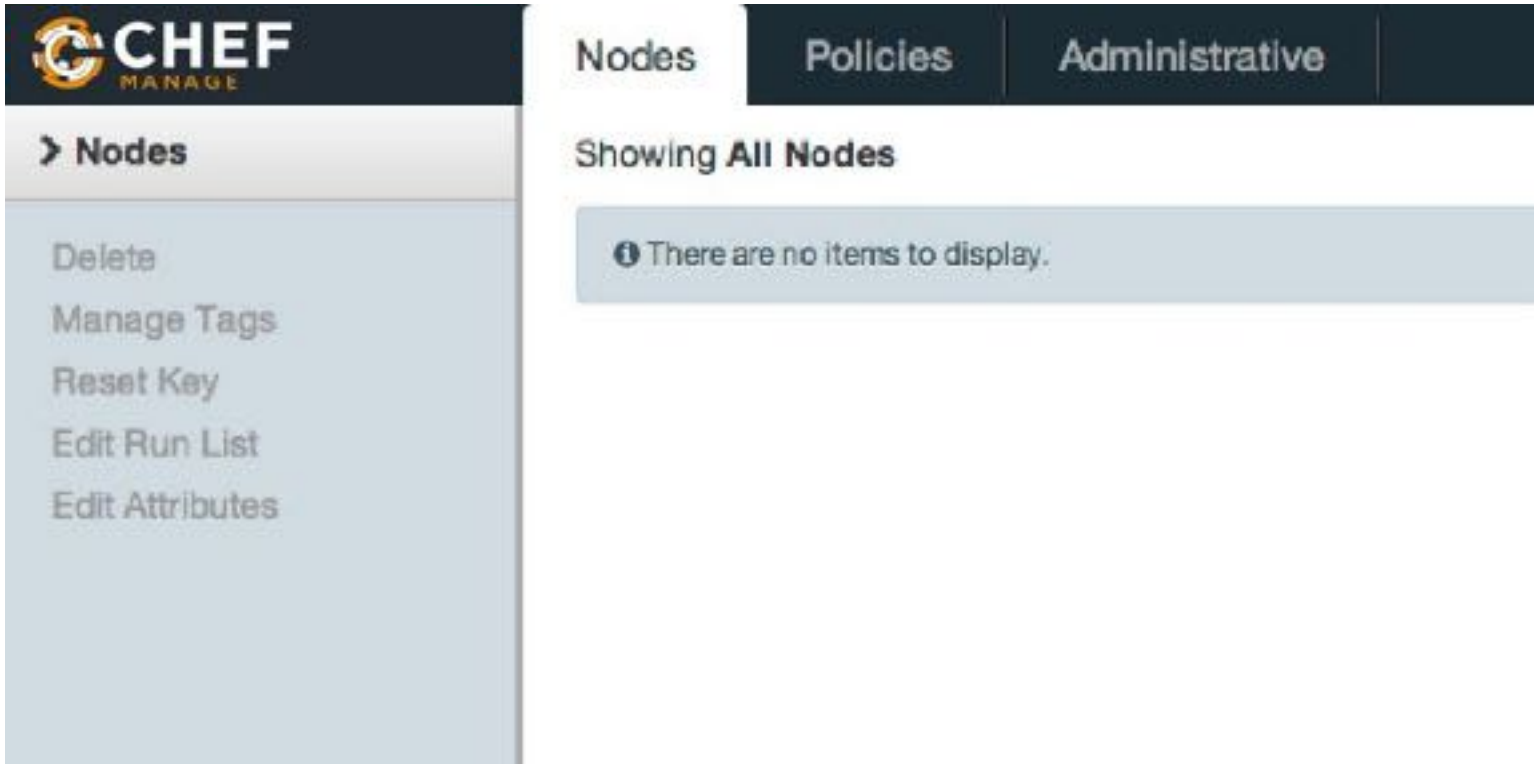
Nodes



Nodes

- Nodes represent the servers in your infrastructure these may be
  - Physical or virtual servers
  - Hardware that you own
  - Compute instances in a public or private cloud

We Have No Nodes Yet



Lab - Login

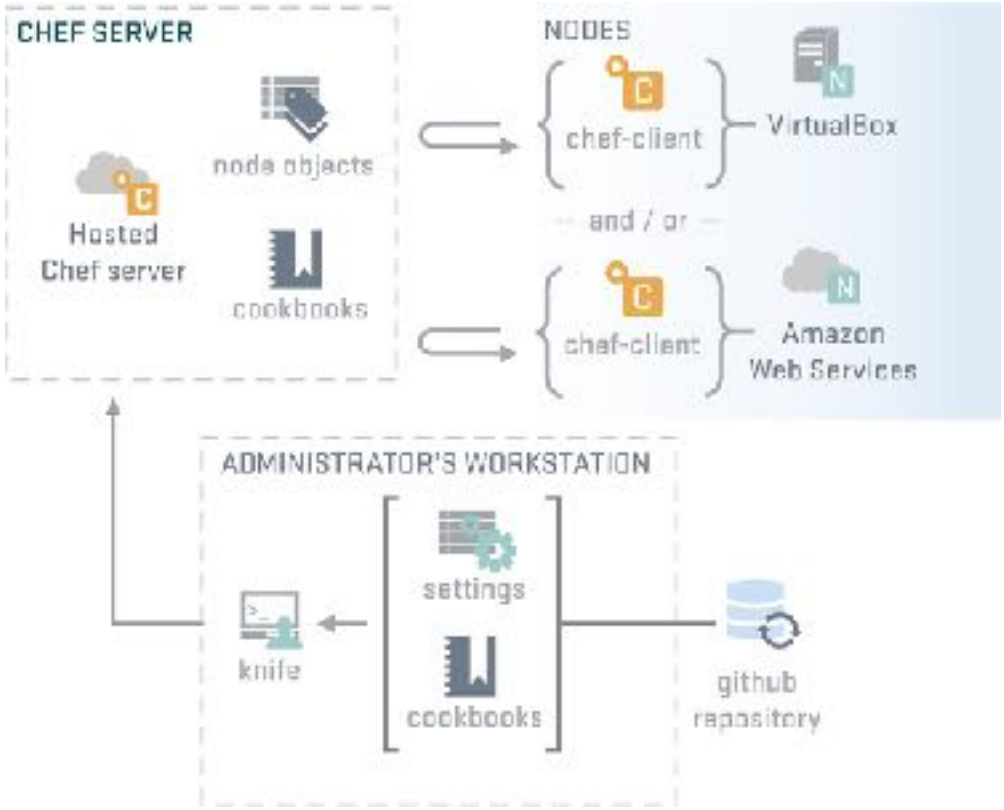
```
$ ssh root@<EXTERNAL_ADDRESS>
```

```
The authenticity of host
'uvo1qrwls0jdgs3blvt.vm.cld.sr  (69.195.232.110)'
can't be established.
RSA key fingerprint is
d9:95:a3:b9:02:27:e9:cd:
74:e4:a2:34:23:f5:a6:8b.
Are you sure you want to continue connecting (yes/no)?
yes  Warning: Permanently added
'uvo1qrwls0jdgs3blvt.vm.cld.sr,  69.195.232.110' (RSA) to
the list of known hosts.
chef@uvo1qrwls0jdgs3blvt.vm.cld.sr's password:
Last login: Mon Jan  6 16:26:24 2014 from
host86-145-117-53.range86-145.btcentralplus.com
[chef@CentOS63 ~]$
```

Checkpoint

- At this point you should have
  - One virtual machine (VM) or server that you'll use for the lab exercises
  - The IP address or public hostname
  - An application for establishing an ssh connection
  - 'sudo' or 'root' permissions on the VM

Chef Infrastructure



"Bootstrap" the Target Instance

```
$ knife bootstrap <EXTERNAL_ADDRESS> -x chef -P chef -N "module2"
```

```
Bootstrapping Chef on uvo1qrwls0jdgs3blvt.vm.cld.sr
...
...
uvo1qrwls0jdgs3blvt.vm.cld.sr Creating a new client identity for
module2 using the validator key.
uvo1qrwls0jdgs3blvt.vm.cld.sr  resolving cookbooks for run list:  []
uvo1qrwls0jdgs3blvt.vm.cld.sr  Synchronizing Cookbooks:
uvo1qrwls0jdgs3blvt.vm.cld.sr  Compiling Cookbooks...
uvo1qrwls0jdgs3blvt.vm.cld.sr  [2014-01-28T11:03:14-05:00] WARN:  Node
node2 has an empty run list.
uvo1qrwls0jdgs3blvt.vm.cld.sr  Converging 0 resources
uvo1qrwls0jdgs3blvt.vm.cld.sr  Chef Client finished, 0 resources  updated
```

knife bootstrap

Workstation

Nod
e

knife bootstrap

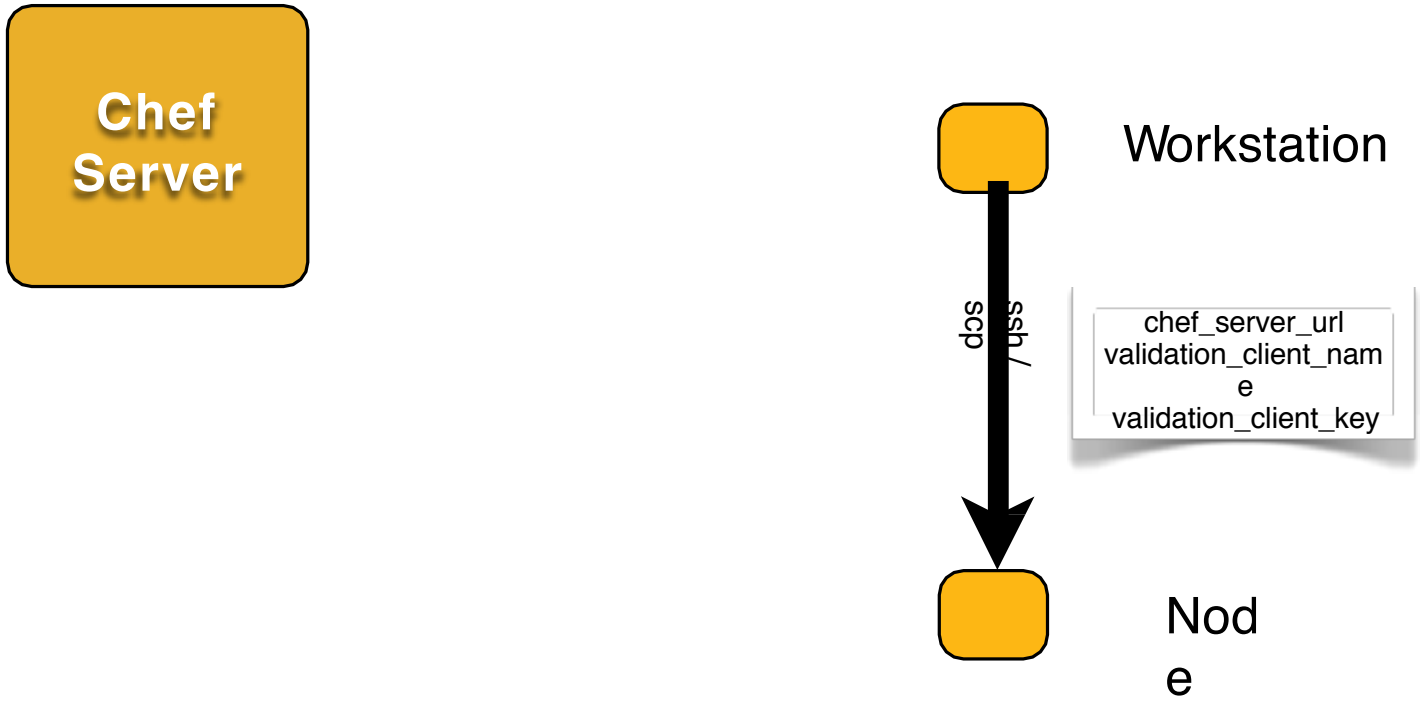
```
knife bootstrap HOSTNAME -x root -P PASSWORD -N module2
```

Workstation

Nod
e

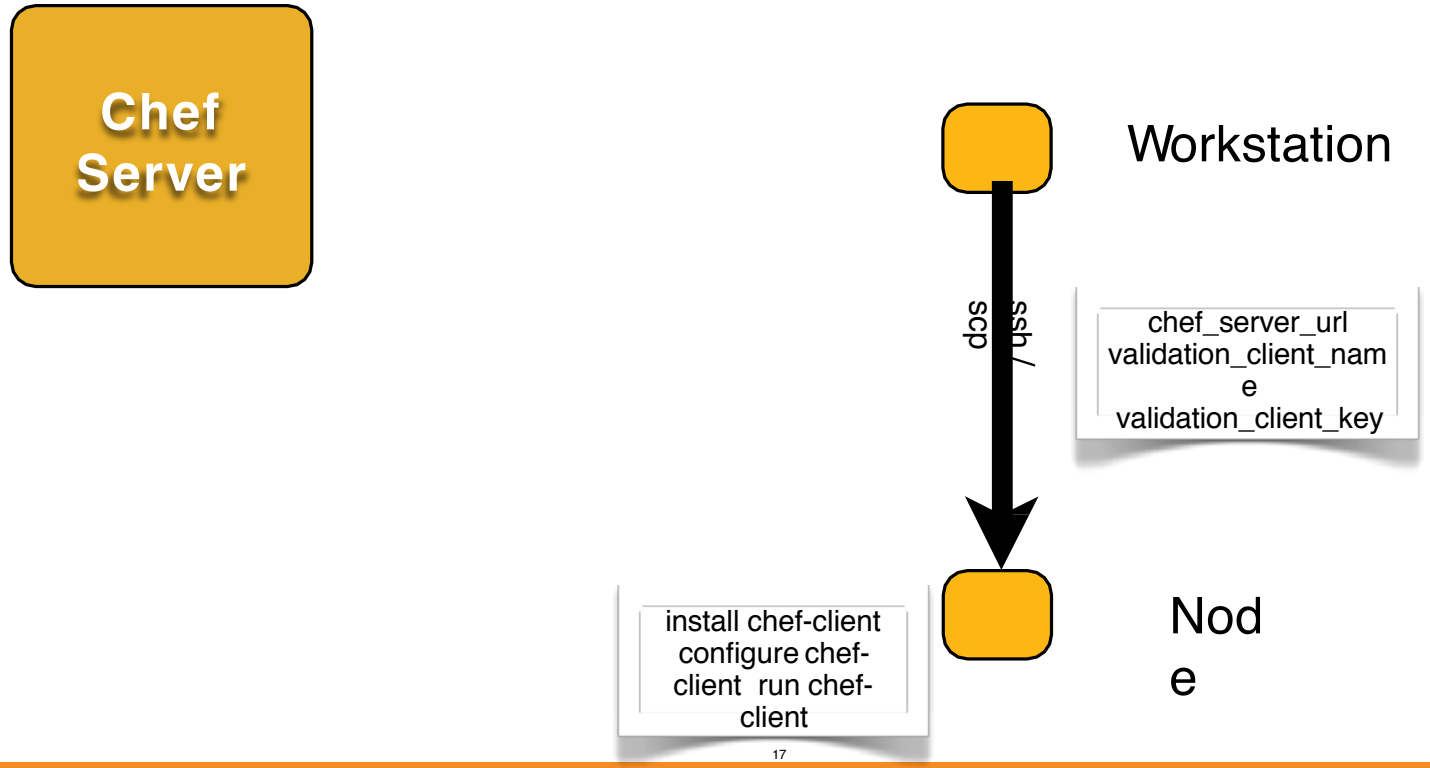
knife bootstrap

```
knife bootstrap HOSTNAME -x root -P PASSWORD -N module2
```



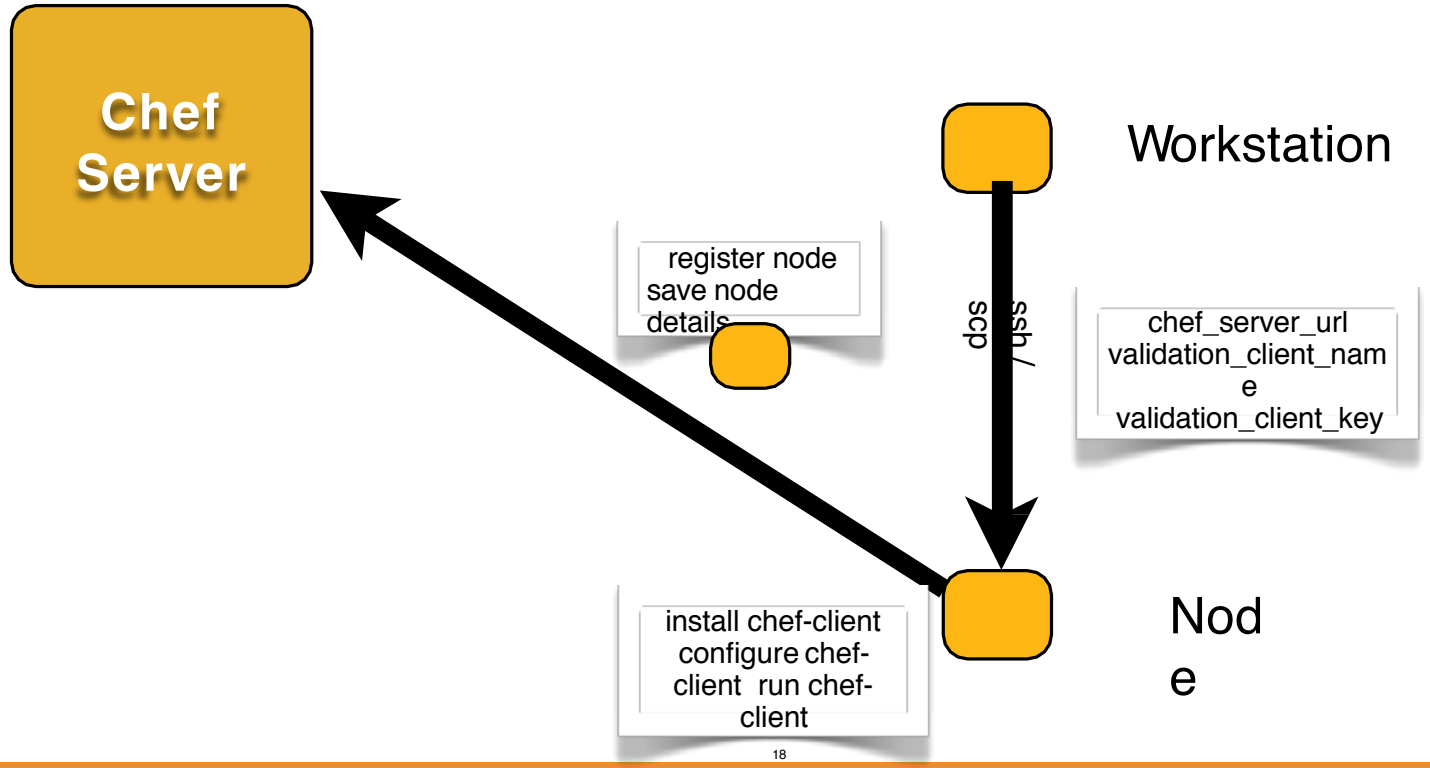
knife bootstrap

```
knife bootstrap HOSTNAME -x root -P PASSWORD -N module2
```



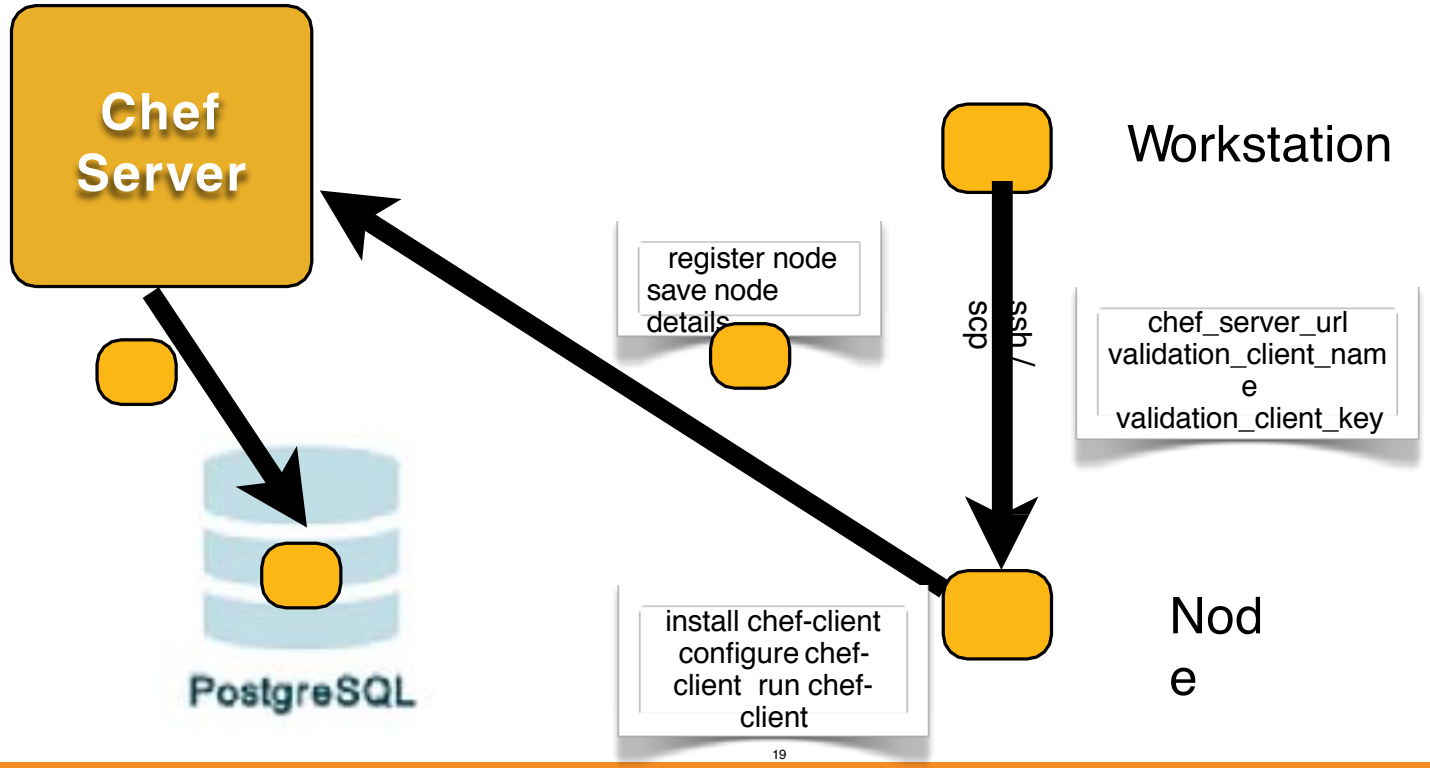
knife bootstrap

```
knife bootstrap HOSTNAME -x root -P PASSWORD -N module2
```



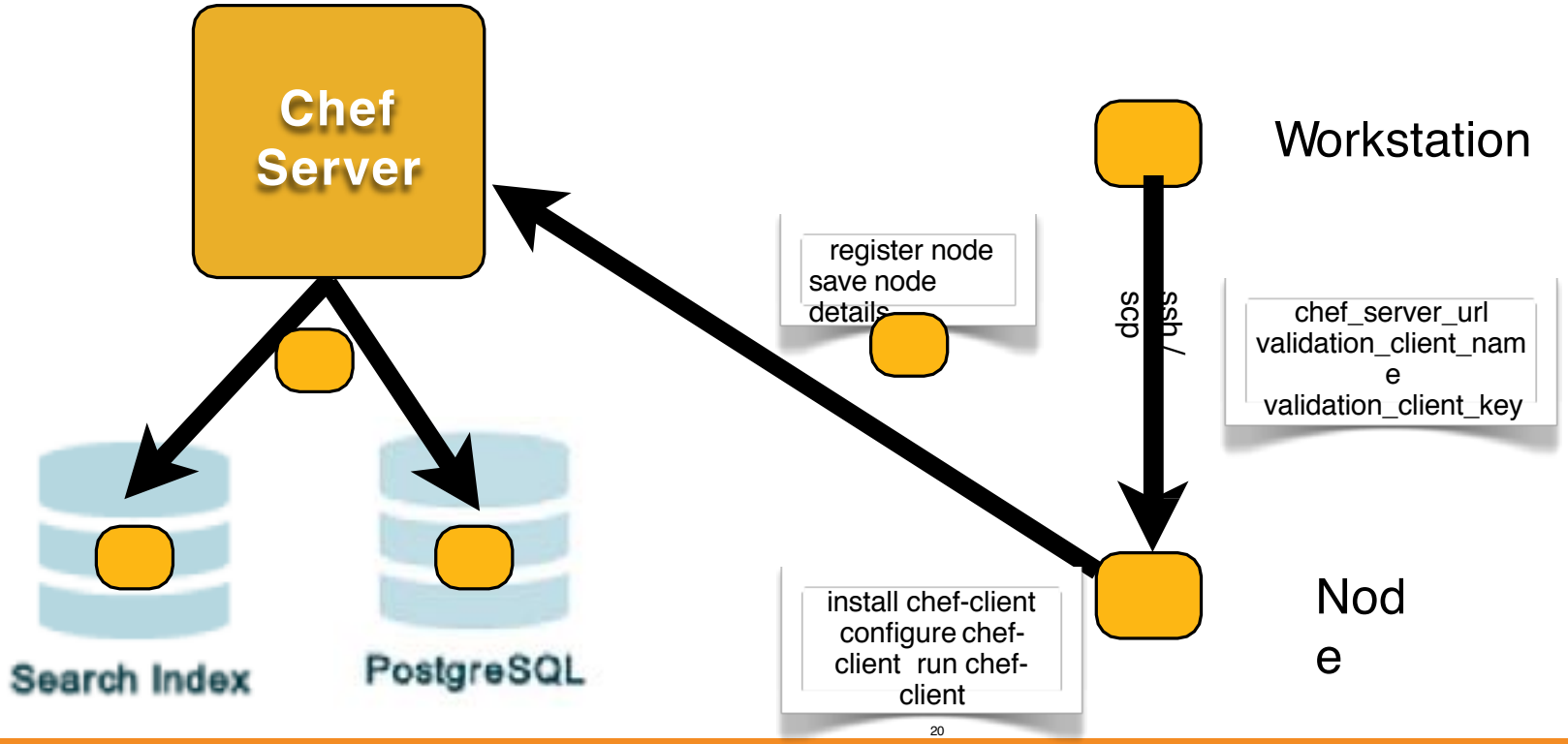
knife bootstrap

```
knife bootstrap HOSTNAME -x root -P PASSWORD -N module2
```



knife bootstrap

```
knife bootstrap HOSTNAME -x root -P PASSWORD -N module2
```

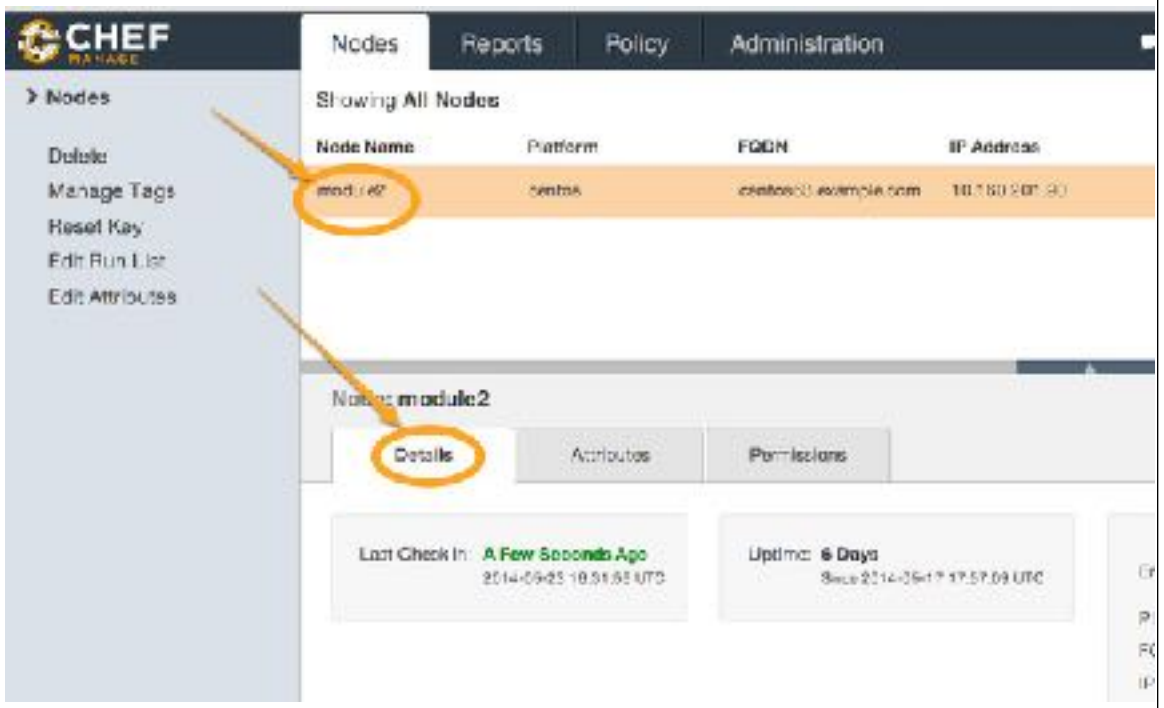


Verify Your Target Instance's Chef-Client is Configured Properly

```
$ ssh root@<EXTERNAL_ADDRESS>

root@CentOS63:~$ ls /etc/chef

client.pem  client.rb  first-boot.json validation.pem

root@CentOS63:~$ which chef-client
/usr/bin/chef-client
```

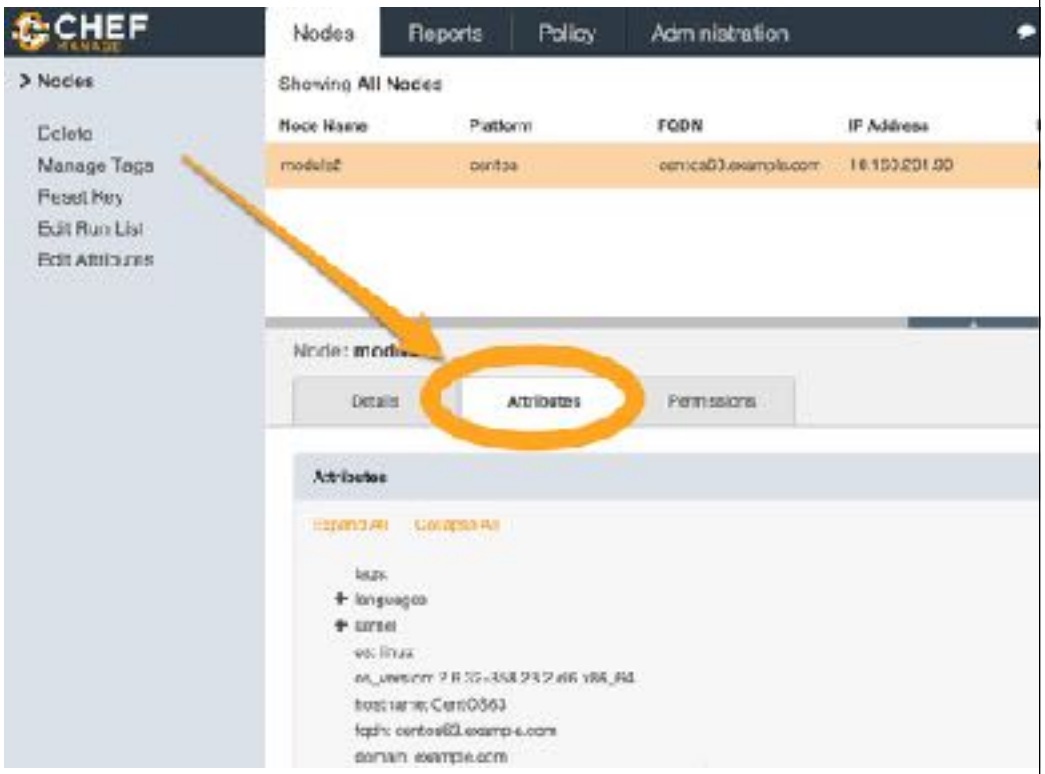
View Node on Chef Server

- Click the 'Details' tab



View Node on Chef Server

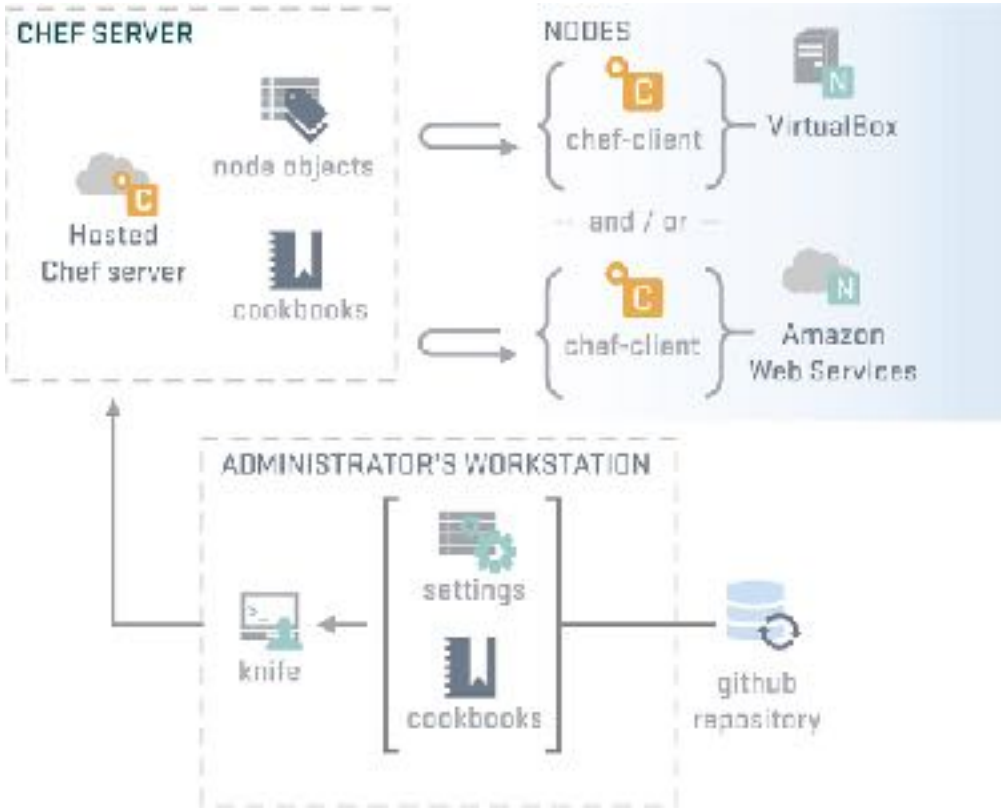
- Click the 'Attributes' tab



Node

- The node is registered with Chef Server
- The Chef Server displays information about the node
- This information comes from Ohai - we'll see Ohai later.....

Checkpoint


CHEF SERVER
node objects
Hosted
Chef server
cookbooks
NODES
chef-client
VirtualBox
and / or
chef-client
Amazon
Web Services
ADMINISTRATOR'S WORKSTATION
settings
knife
cookbooks
github
repository

Chef Resources and Recipes

Writing an Apache cookbook

Lesson Objectives

- After completing the lesson, you will be able to
  - Describe in detail what a **cookbook** is
  - Create a new cookbook
  - Explain what a **recipe** is
  - Describe how to use the **package**, **service**, and **template** resources
  - **Upload a cookbook** to the Chef Server
  - Explain what a **run list** is, and how to set it for a node via knife
  - Explain the output of a chef-client run

What is a cookbook?

- A cookbook is like a “package” for Chef recipes.
  - It contains all the recipes, files, templates, libraries, etc. required to configure a portion of your infrastructure
- Typically they map 1:1 to a piece of software or functionality.

The Problem and the Success Criteria

- **The Problem:** We need a web server configured to serve up our home page.
- **Success Criteria:** We can see the homepage in a web browser.

Desired state: our policy

- Apache web server should be installed
- Apache should be running and configured to start when the machine boots
- Our home page should be displayed

- Please note in this course we're teaching Chef primitives, not web server management
- This is probably not the Apache HTTP server configuration you would use in production

Exercise: Create a new Cookbook

```
$ knife cookbook create apache
```

```
** Creating cookbook apache
** Creating README for cookbook: apache
** Creating CHANGELOG for cookbook: apache
** Creating metadata for cookbook: apache
```

Exercise: Explore the cookbook

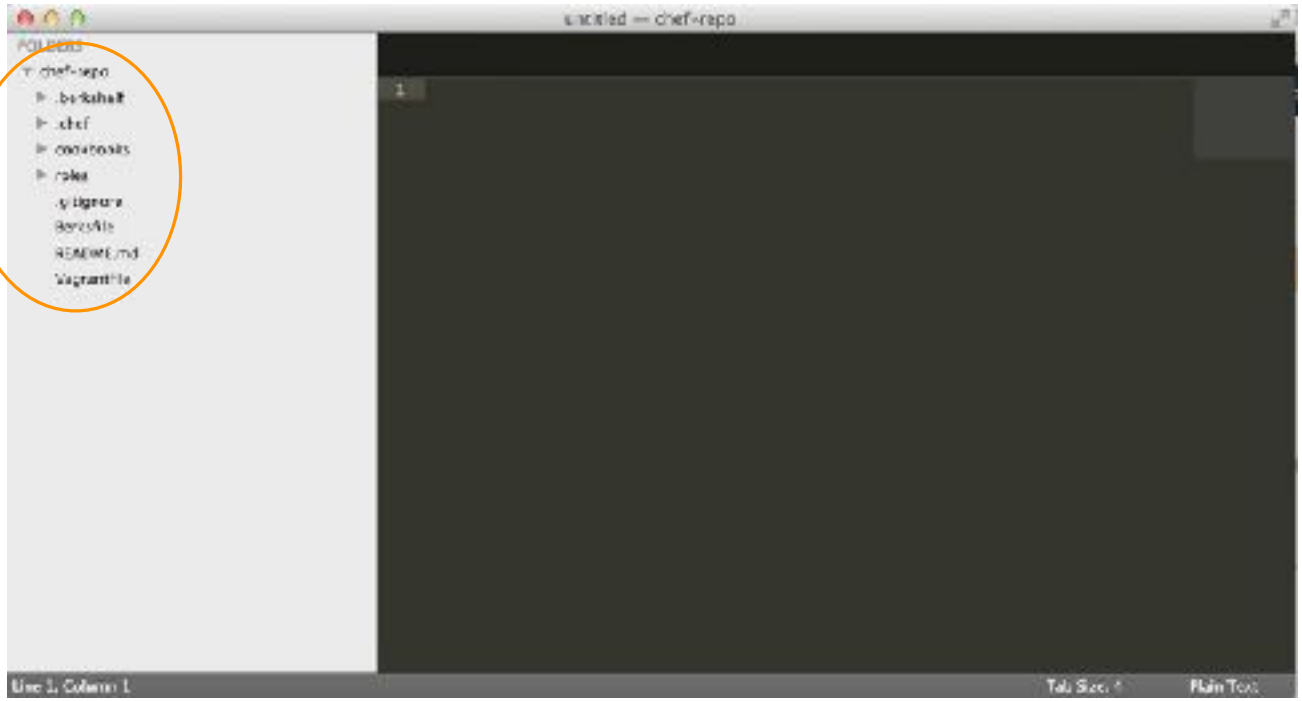
```
$ ls -la cookbooks/apache
```

```
total 24
drwxr-xr-x    13 opscode   opscode    442 Jan 24 21:25 .
drwxr-xr-x     5 opscode   opscode    170 Jan 24 21:25 ..
-rw-r--r--     1 opscode   opscode    412 Jan 24 21:25 CHANGELOG.md
-rw-r--r--     1 opscode   opscode   1447 Jan 24 21:25 README.md
drwxr-xr-x     2 opscode   opscode     68 Jan 24 21:25 attributes
drwxr-xr-x     2 opscode   opscode     68 Jan 24 21:25 definitions
drwxr-xr-x     3 opscode   opscode    102 Jan 24 21:25 files
drwxr-xr-x     2 opscode   opscode     68 Jan 24 21:25 libraries
-rw-r--r--     1 opscode   opscode    276 Jan 24 21:25 metadata.rb
drwxr-xr-x     2 opscode   opscode     68 Jan 24 21:25 providers
drwxr-xr-x     3 opscode   opscode    102 Jan 24 21:25 recipes
drwxr-xr-x     2 opscode   opscode     68 Jan 24 21:25 resources
drwxr-xr-x     3 opscode   opscode    102 Jan 24 21:25 templates
```

Exercise: Open a project drawer if you're using Sublime Text

- If you're using Sublime, then File>Open the chef-repo directory you created earlier

Access the cookbook files from the left menu



Exercise: Edit the default recipe

OPEN IN EDITOR: cookbooks/apache/recipes/default.rb

```
#
# Cookbook Name:: apache
# Recipe:: default
#
# Copyright 2013, YOUR_COMPANY_NAME
#
# All rights reserved - Do Not Redistribute
#
```

Exercise: Add a package resource to install Apache to the default recipe

OPEN IN EDITOR: cookbooks/apache/recipes/default.rb

```
#
# Cookbook Name:: apache
# Recipe:: default
#
# Copyright 2013, YOUR_COMPANY_NAME
#
# All rights reserved - Do Not Redistribute
#


package "httpd" do
  action :install
end
```

SAVE FILE!

So the resource we just wrote...

```
package "httpd" do
  action :install
end
```

So the resource we just wrote...

- Is a **package** resource

```
package "httpd" do
  action :install
end
```

So the resource we just wrote...

- Is a package resource
- Whose **name** is *httpd*

```
package "httpd" do
  action :install
end
```

So the resource we just wrote...

- Is a package resource
- Whose name is *httpd*
- With an install **action**

```
package "httpd" do
  action :install
end
```

Notice we didn't say how to install the package

- Resources are **declarative** - that means we say *what* we want to have happen, rather than *how*
- Resources take action through **Providers** - providers perform the how
- Chef uses the **platform** the node is running to determine the correct **provider** for a resource

Package Resource

package "git"

yum install git
apt-get install git pacman

sync git pkg_add -r git

Providers are determined by node's platform

Exercise: Add a service resource to ensure the service is started and enabled at boot

OPEN IN EDITOR: cookbooks/apache/recipes/default.rb

```
...
# All rights reserved - Do Not Redistribute
#

package "httpd" do
  action :install
end

service "httpd" do
  action [ :enable, :start ]
end
```

SAVE FILE!

So the resource we just wrote...

```
service "httpd" do
  action [ :enable, :start ]
end
```

So the resource we just wrote...

- Is a **service** resource

```
service "httpd" do
  action [ :enable, :start ]
end
```

So the resource we just wrote...

- Is a service resource
- Whose **name** is *httpd*

```
service "httpd" do
  action [ :enable, :start ]
end
```

So the resource we just wrote...

- Is a service resource
- Whose **name** is *httpd*
- With two **actions**:
  - enable
  - start

```
service "httpd" do
  action [ :enable, :start ]
end
```

Order Matters

- Resources are executed in order


```
package "haproxy" do
  action :install
end

template "/etc/haproxy/haproxy.cfg" do
  source "haproxy.cfg.erb"
  owner "root"
  group "root"
  mode "0644"
  notifies :restart, "service[haproxy]"
end

service "haproxy" do
  supports :restart => :true
  action [:enable, :start]
end
```

Exercise: Add a cookbook_file resource to copy the home page in place

OPEN IN EDITOR: cookbooks/apache/recipes/default.rb

```
...

service "httpd" do
  action [ :enable, :start ]
end

template "/var/www/html/index.html" do
  source "index.html.erb"
  mode "0644"
end
```

SAVE FILE!

So the resource we just wrote...

```
template "/var/www/html/index.html" do
  source "index.html.erb"
  mode "0644"
end
```

So the resource we just wrote...

- Is a **template** resource

```
template "/var/www/html/index.html" do
  source "index.html.erb"
  mode "0644"
end
```

So the resource we just wrote...

- Is a template resource
- Whose **name** is:
  /var/www/html/index.html

```
template "/var/www/html/index.html" do
  source "index.html.erb"
  mode "0644"
end
```

So the resource we just wrote...

- Is a template resource
- Whose **name** is: */var/www/html/index.html*
- With two **parameters**:
  - **source** of *index.html.erb*
  - **mode** of *“0644”*

```
template "/var/www/html/index.html" do
  source "index.html.erb"
  mode "0644"
end
```

Full contents of the apache recipe

```
#
# Cookbook Name:: apache
# Recipe:: default
#
# Copyright 2013, YOUR_COMPANY_NAME
#
# All rights reserved - Do Not Redistribute
#

package "httpd" do
  action :install
end

service "httpd" do
  action [ :enable, :start ]
end

template "/var/www/html/index.html" do
  source "index.html.erb"
  mode "0644"
end
```

Exercise: Add index.html to your cookbook's files/default directory

OPEN IN EDITOR: cookbooks/apache/templates/default/index.html.erb

```
<h1>Hello, world!</h1>
```

SAVE FILE!

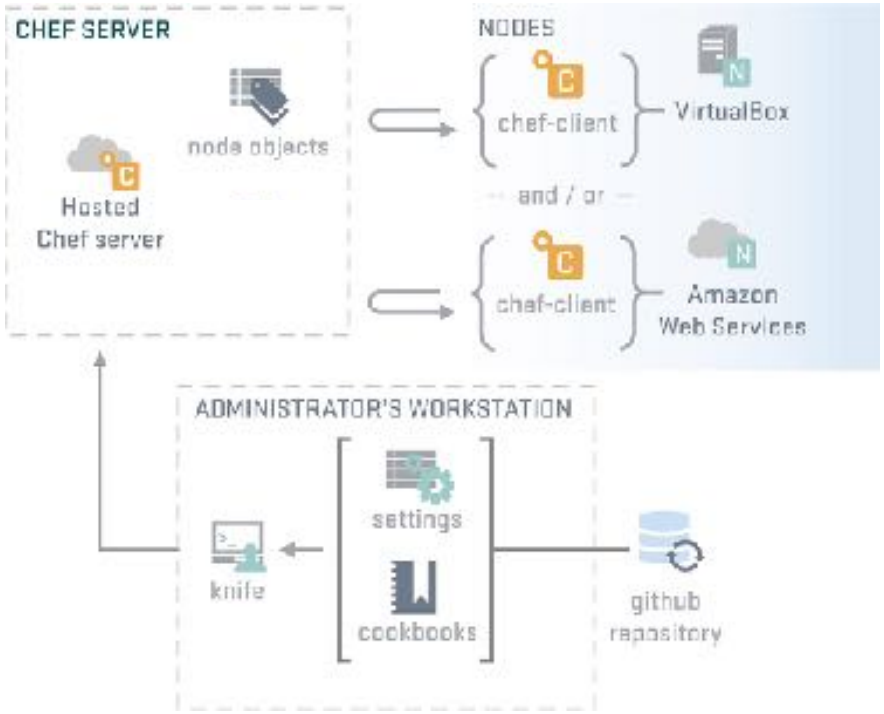
Exercise: Upload the cookbook

```
$ knife cookbook upload apache
```

```
Uploading apache                [0.1.0]
Uploaded 1 cookbook.
```

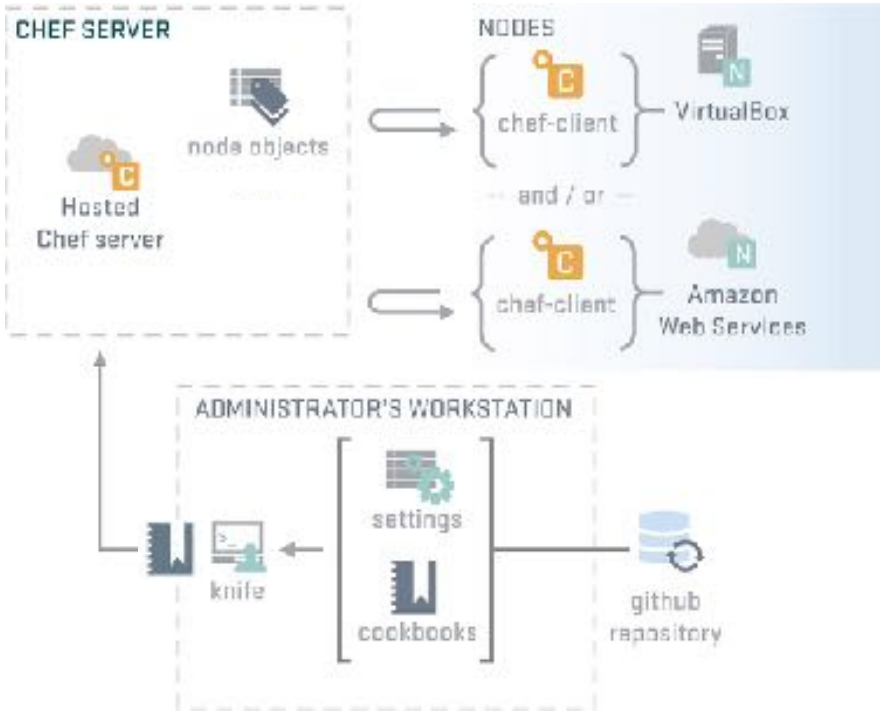
Upload a cookbook

```
knife cookbook upload apache
```



Upload a cookbook

```
knife cookbook upload apache
```



Upload a cookbook

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knife cookbook upload apache
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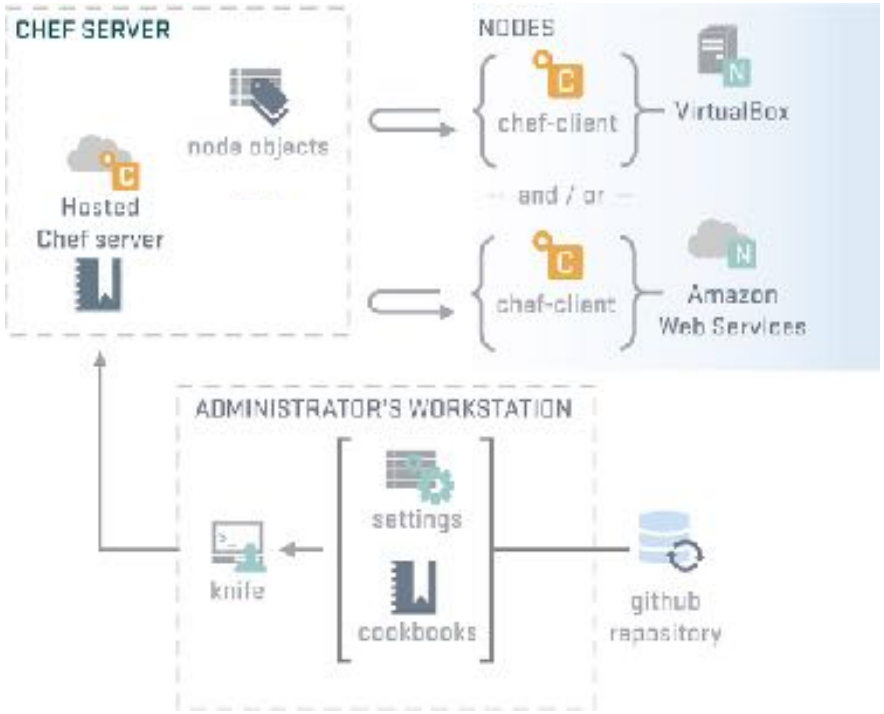
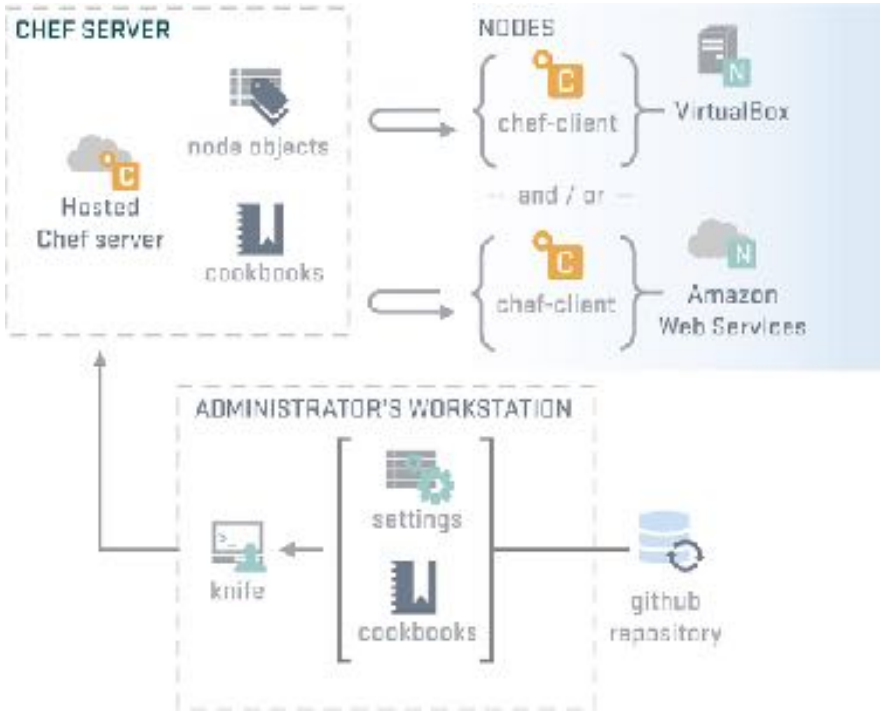


Upload a cookbook

```
knife cookbook upload apache
```



The Run List

- The Run List is the ordered set of recipes and roles that the Chef Client will execute on a node
  - Recipes are specified by "**recipe[*name*]**"

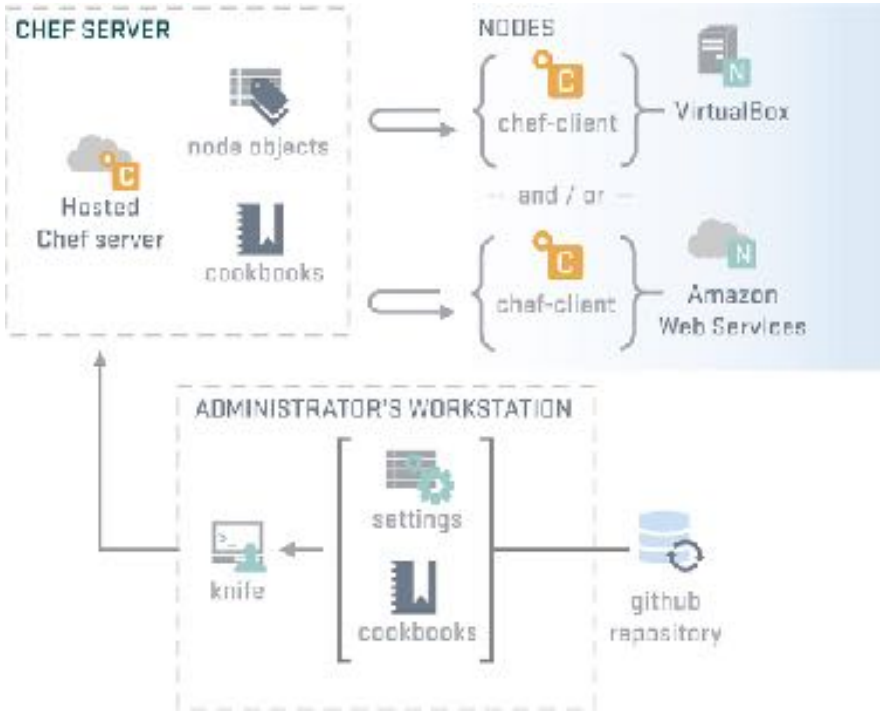
Exercise: Add apache recipe to test node's run list

```
$ knife node run_list add module2 "recipe[apache]"
```

```
module2:
  run_list: recipe[apache]
```

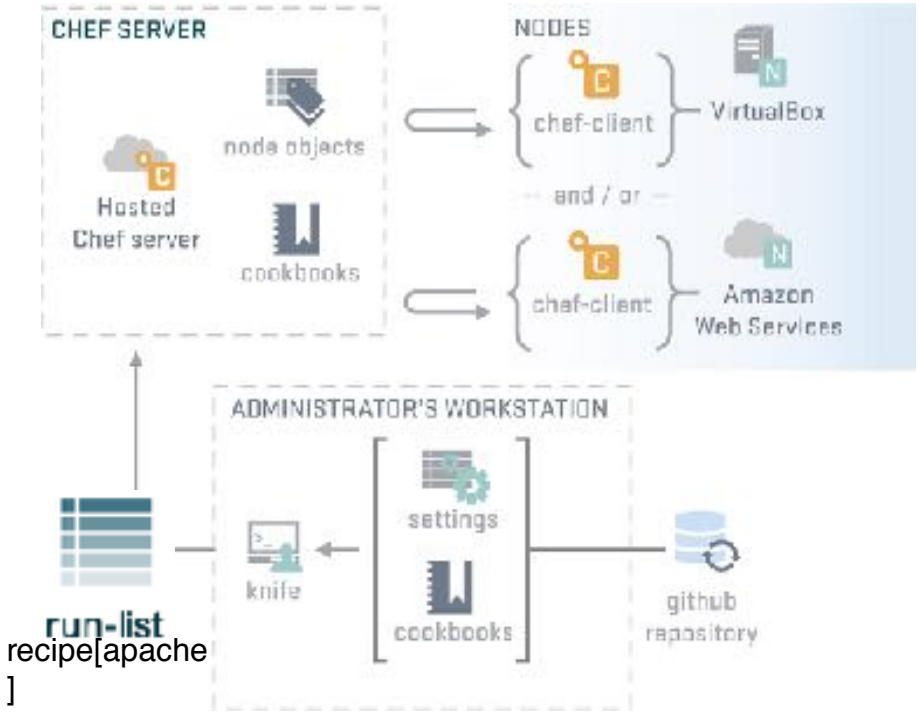
Upload a cookbook

```
knife node run_list add module2 “recipe[apache]”
```



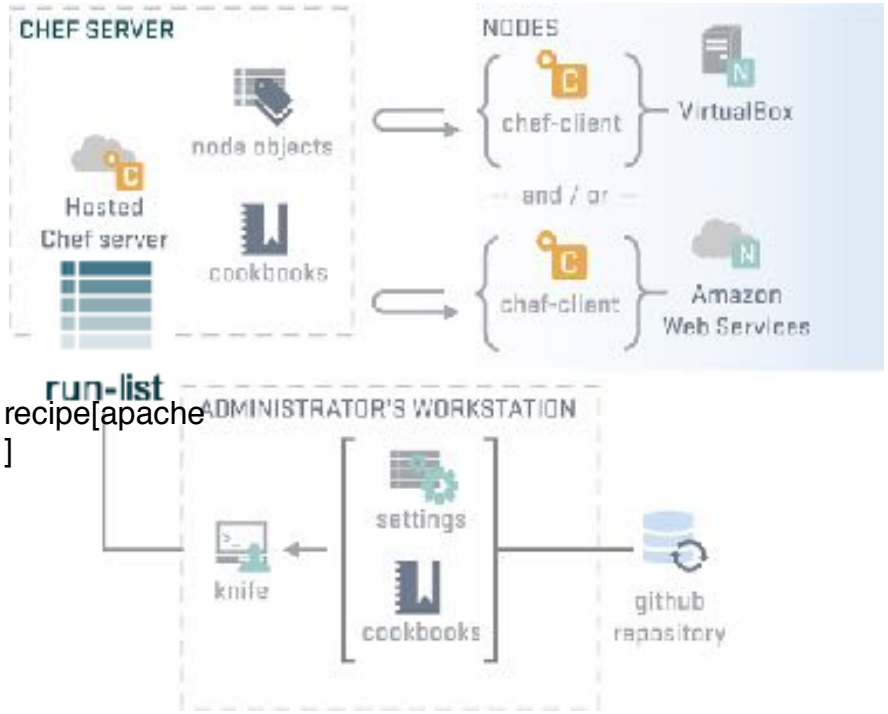
Upload a cookbook

```
knife node run_list add module2 “recipe[apache]”
```



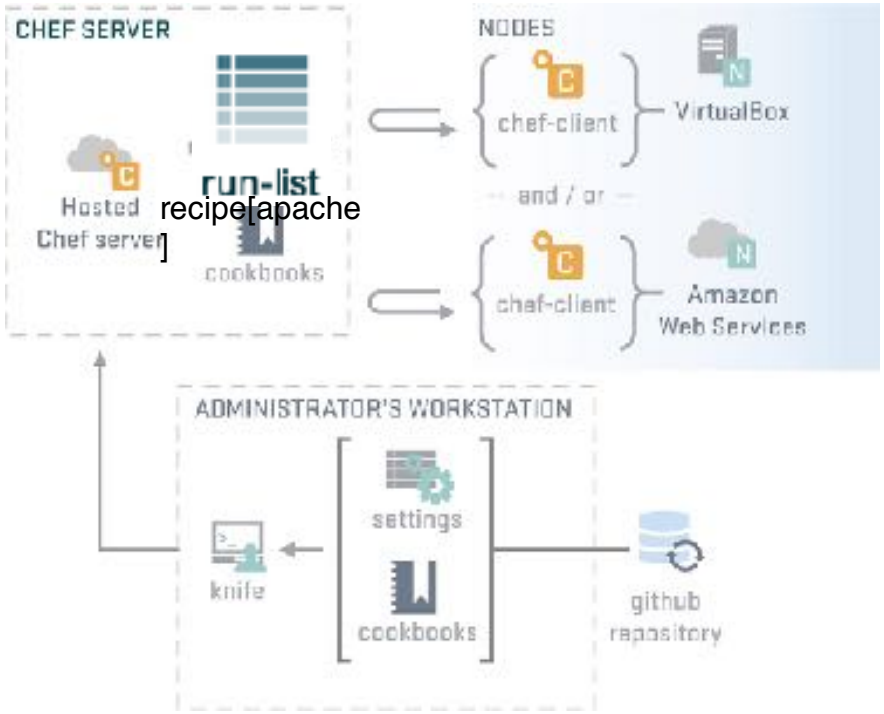
Upload a cookbook

```
knife node run_list add module2 “recipe[apache]”
```



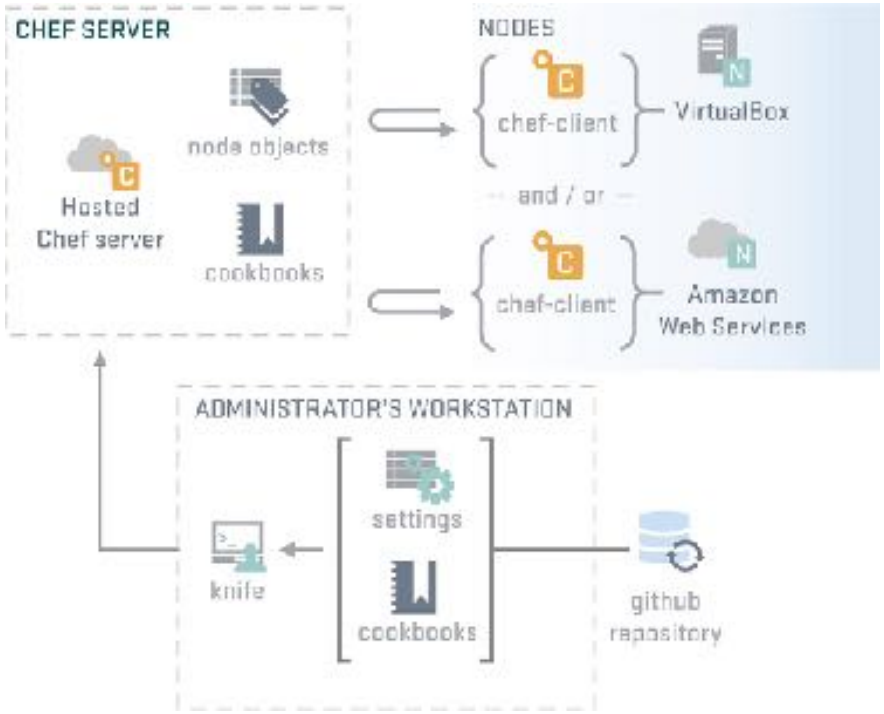
Upload a cookbook

```
knife node run_list add module2 “recipe[apache]”
```



Upload a cookbook

```
knife node run_list add module2 “recipe[apache]”
```



Exercise: Run Chef Client

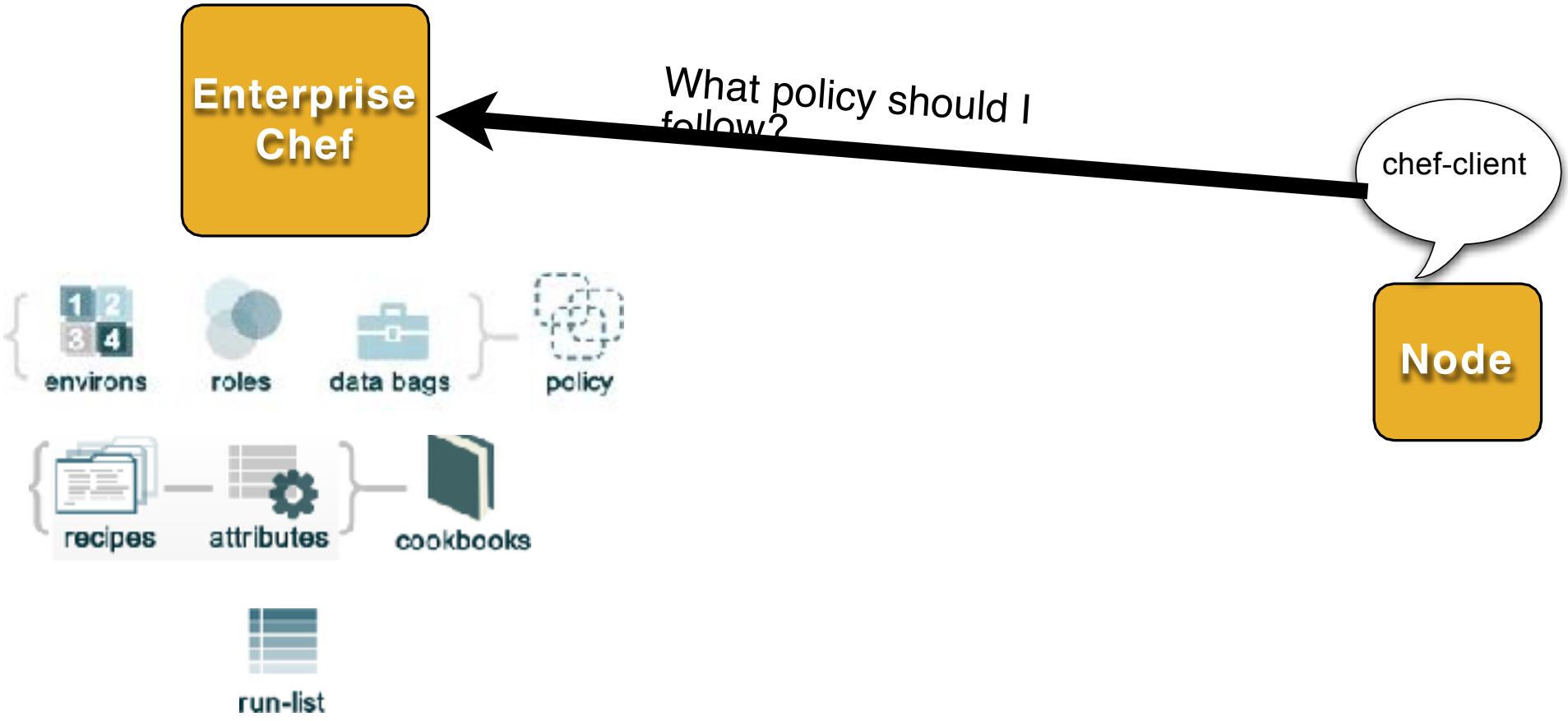
```
root@CentOS63:~$ sudo chef-client
```

```
Starting Chef Client, version 11.10.4
resolving cookbooks for run list: ["apache"]
Synchronizing Cookbooks:
  - apache
Compiling Cookbooks...
Converging 3 resources
Recipe: apache::default
  * package[httpd] action install

    - install version 2.2.15-29.el6.centos of package httpd

  * service[httpd] action enable
    - enable service service[httpd]

  * service[httpd] action start
    - start service service[httpd]

  * template[/var/www/html/index.html] action create
    - create new file /var/www/html/index.html
    - update content in file /var/www/html/index.html from none to 17d291
```

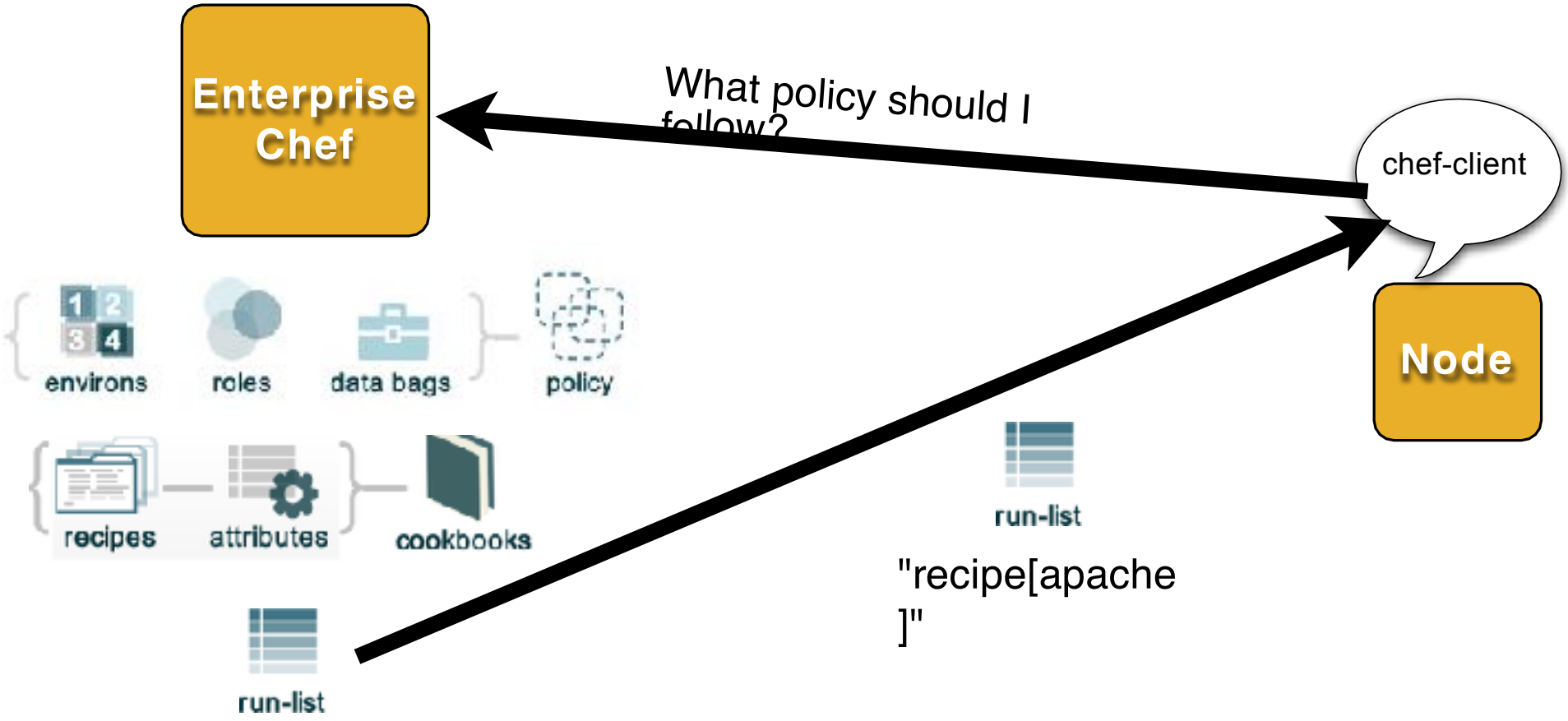
Exercise: Verify that the home page works

- Open a web browser
- Type in the the URL for your test node

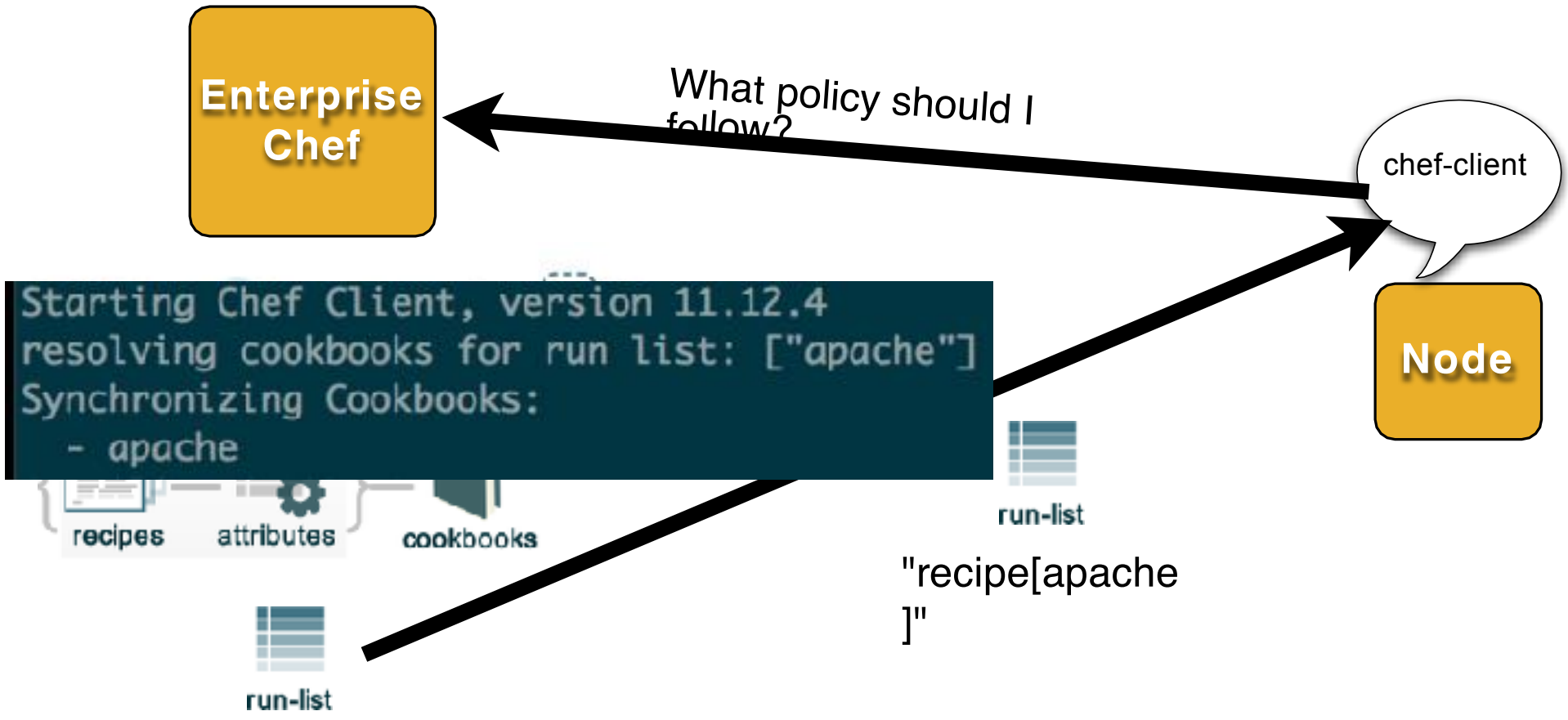
Run List


Enterprise Chef
What policy should I follow?
chef-client
Node
environs
roles
data bags
policy
recipes
attributes
cookbooks
run-list

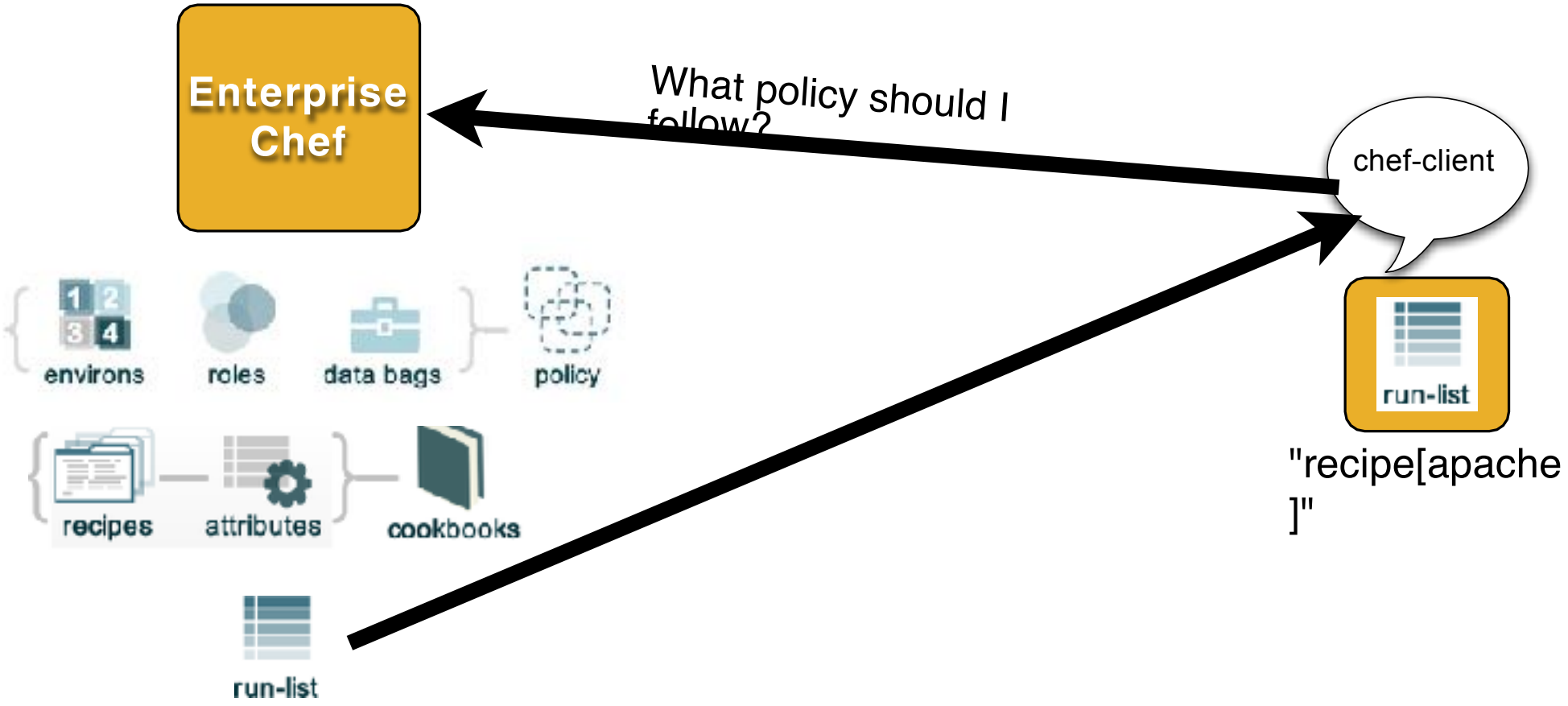
Run List


Enterprise Chef
What policy should I follow?
chef-client
Node
environs
roles
data bags
policy
recipes
attributes
cookbooks
run-list
"recipe[apache]"
run-list

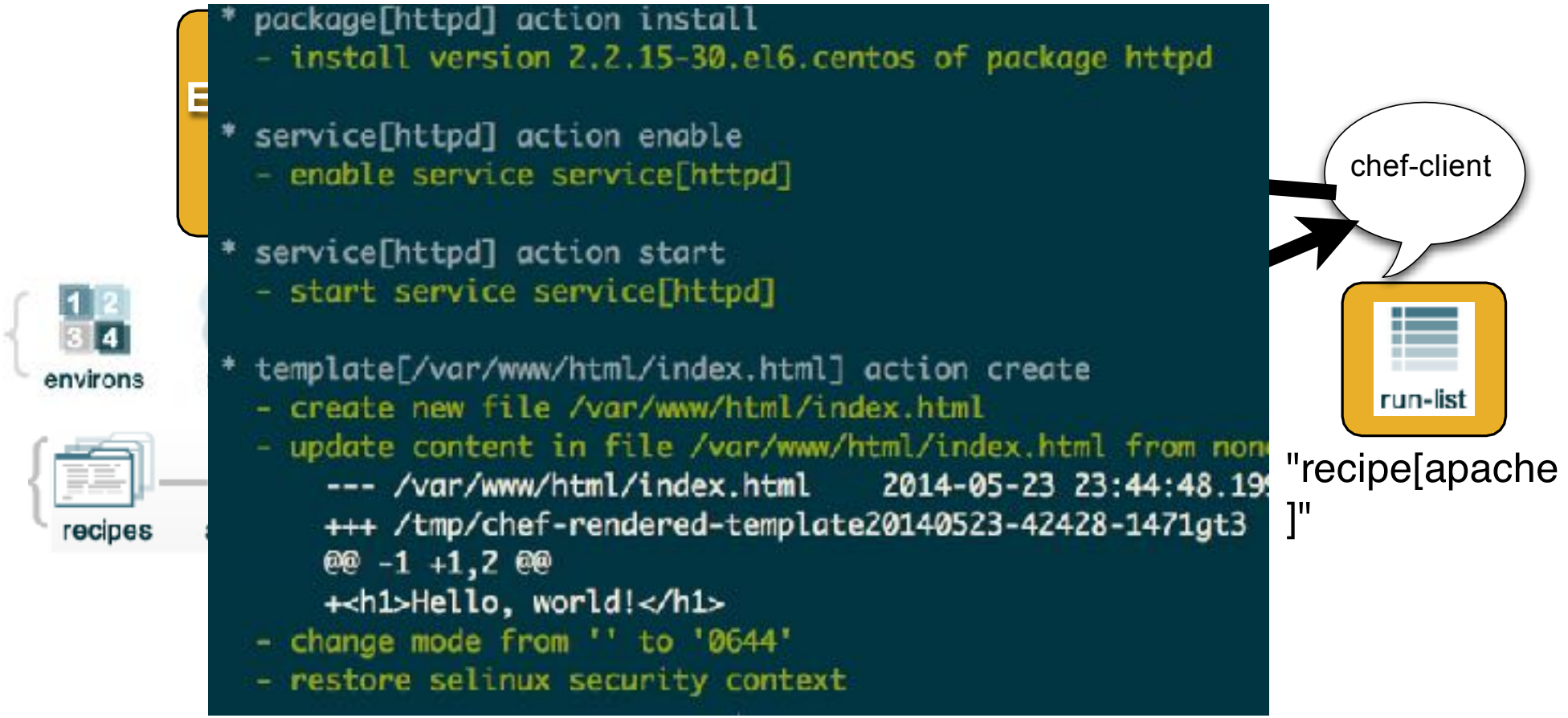
Run List


Enterprise Chef
What policy should I follow?
chef-client
Node
Starting Chef Client, version 11.12.4
resolving cookbooks for run list: ["apache"]
Synchronizing Cookbooks:
- apache
recipes
attributes
cookbooks
run-list
"recipe[apache]"
run-list

Run List


Enterprise Chef
What policy should I follow?
chef-client
environs
roles
data bags
policy
run-list
"recipe[apache]"
recipes
attributes
cookbooks
run-list

Run List


* package[httpd] action install
- install version 2.2.15-30.el6.centos of package httpd
* service[httpd] action enable
- enable service service[httpd]
* service[httpd] action start
- start service service[httpd]
* template[/var/www/html/index.html] action create
- create new file /var/www/html/index.html
- update content in file /var/www/html/index.html from non
--- /var/www/html/index.html 2014-05-23 23:44:48.19
+++ /tmp/chef-rendered-template20140523-42428-1471gt3
@@ -1 +1,2 @@
+<h1>Hello, world!</h1>
- change mode from '' to '0644'
- restore selinux security context
chef-client
run-list
"recipe[apache
]"
environs
recipes

Additional Resources

- Chef Fundamentals Webinar Series
- https://www.youtube.com/watch?v=S5lHUpzoCYo&list=PL11cZfNdwNyPnZA9D1MbVqldGuOWqbumZ

- Discussion group for webinar participants
- https://groups.google.com/d/forum/learnchef-fundamentals-webinar

Additional Resources

- Learn Chef
- http://learnchef.com

- Documentation
- http://docs.opscode.com