

CHEF IN THE CLOUD AND ON THE GROUND

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Relevance

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[@mtnygard](#)

Infrastructure As Code

Infrastructure As Code

Chef

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Development Models

Infrastructure As Code

Chef

Development Models

Deployment Models

Infrastructure As Code

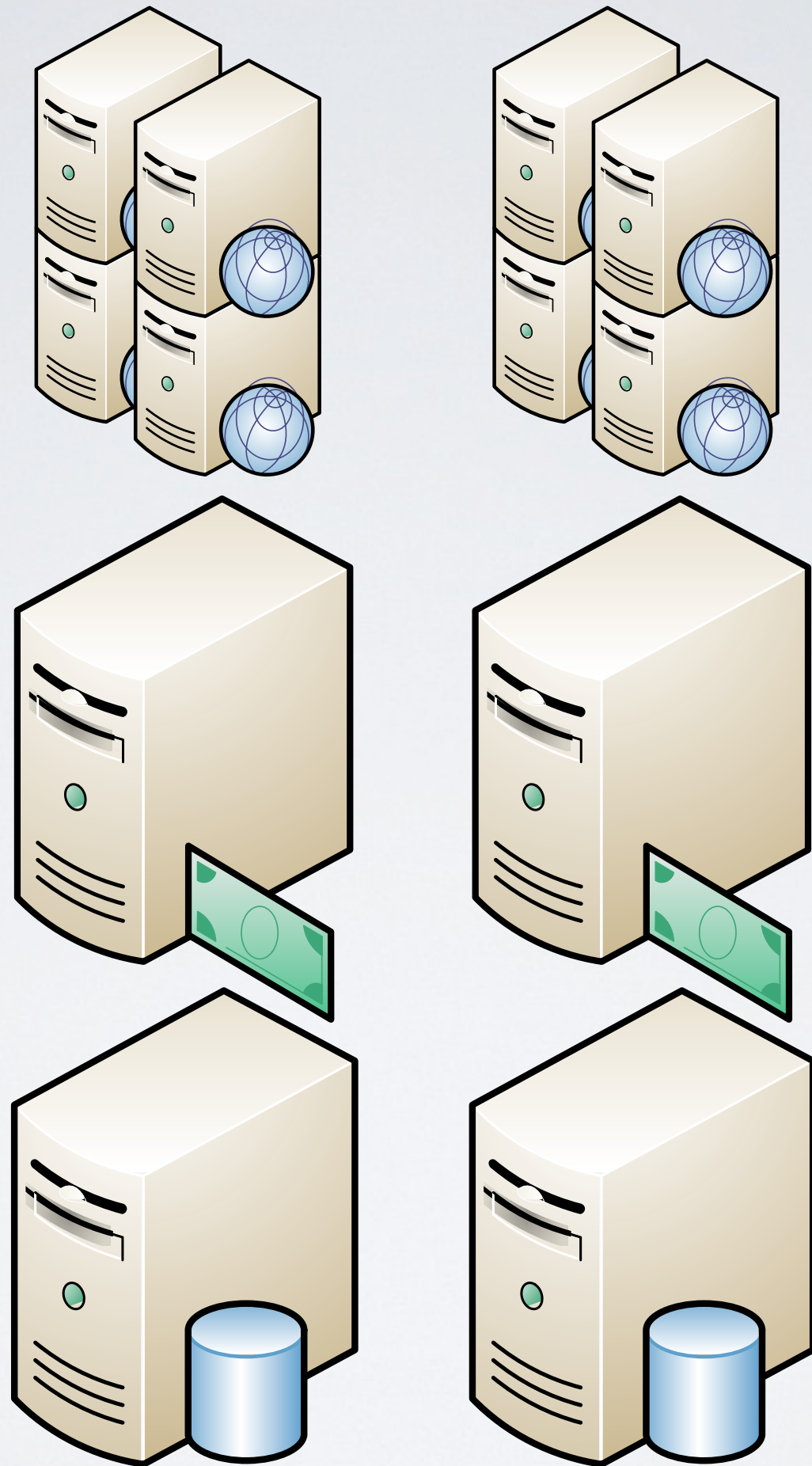
Infrastructure As Code

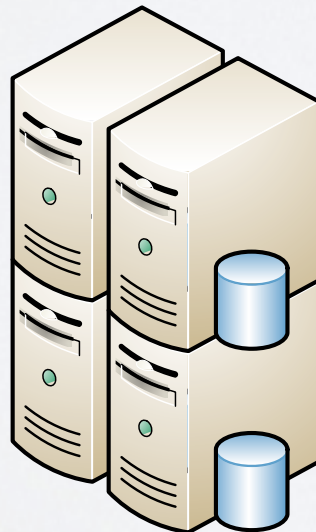
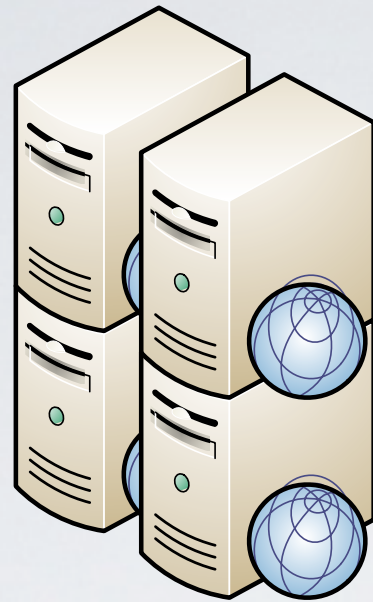
Problems beget solutions.
Solutions become the next problems.

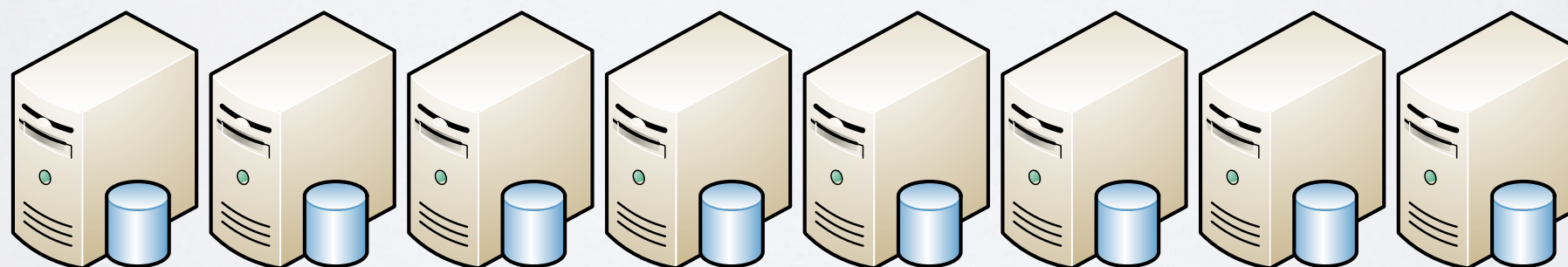
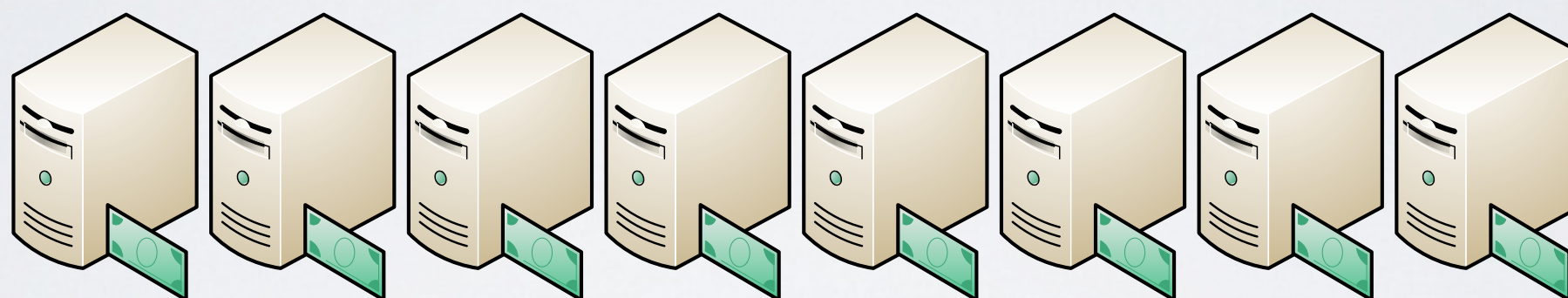
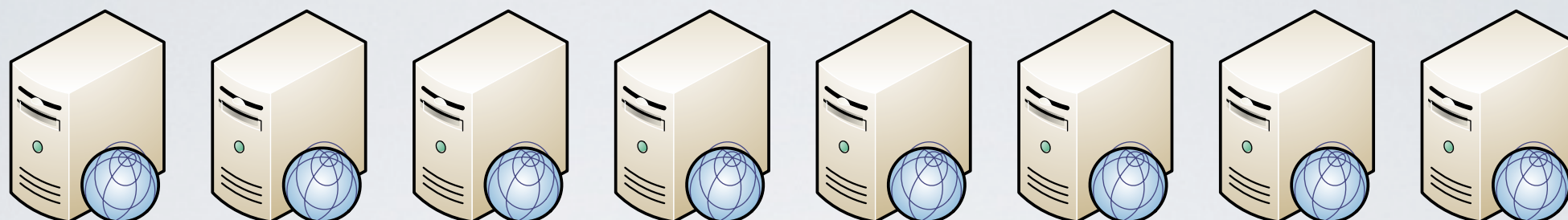












What if we could version control
our servers and network, the
way we do with code ?

Infrastructure as Code

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- Desired state

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- Desired state
- Transformations to achieve it

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- Desired state
- Transformations to achieve it
- As text files

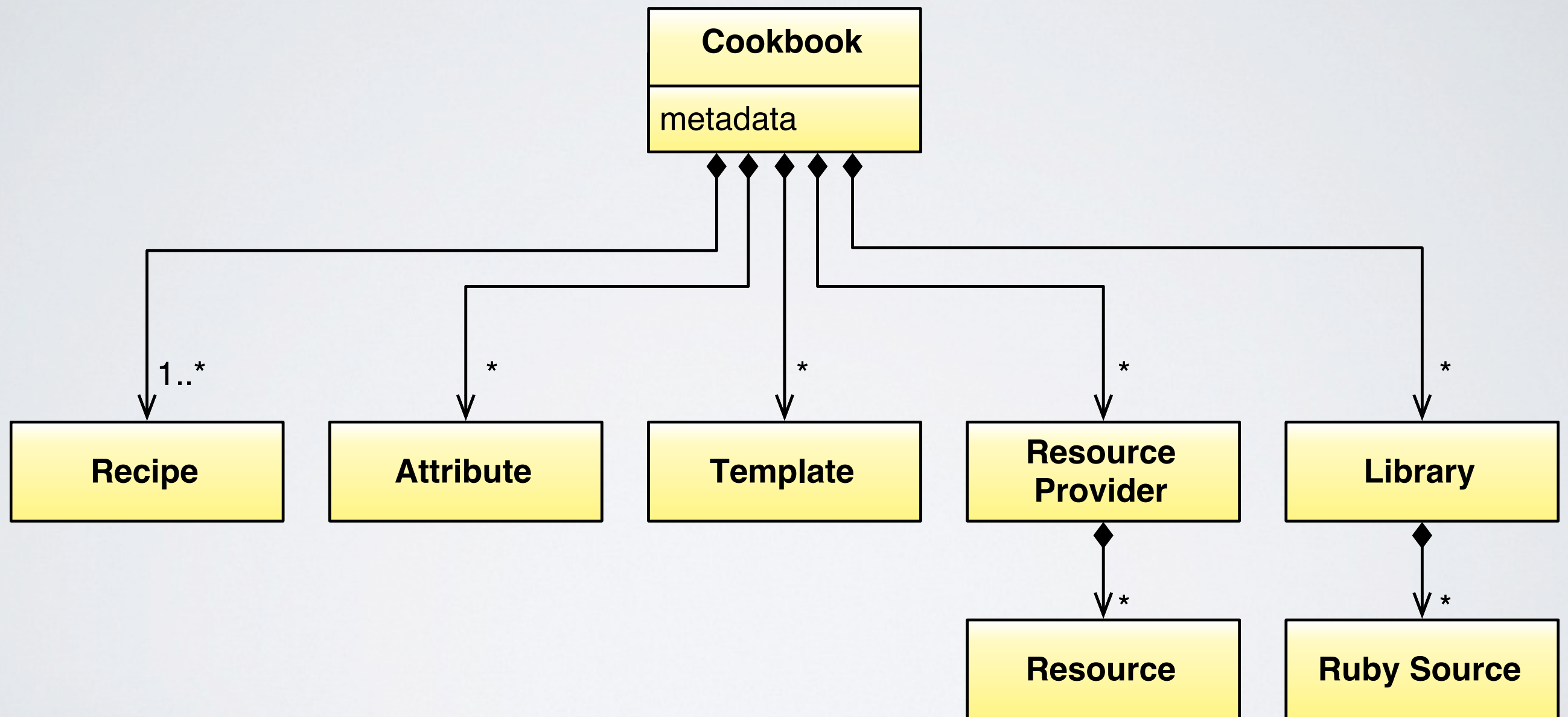
Infrastructure as Code

- Desired state
- Transformations to achieve it
- As text files
- In version control

Infrastructure as Code

- Desired state
- Transformations to achieve it
- As text files
- In version control
- Testable and reproducible

Chef Basics



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Library	Extra Ruby code, can create classes, resources, implement actions, etc.
Resource Provider	Lightweight Ruby DSL for creating new resources.

Cookbook: Git



git



metadata.json



metadata.rb



README.rdoc



recipes



default.rb



server.rb



templates



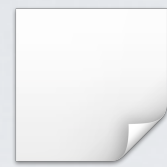
default



sv-git-daemon-log-run.erb



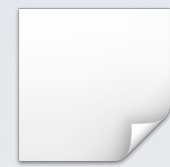
sv-git-daemon-run.erb



metadata.rb

```
maintainer      "Opscode, Inc."
maintainer_email "cookbooks@opscode.com"
license         "Apache 2.0"
description     "Installs git and/or set..."
long_description IO.read(File.join(
  File.dirname(__FILE__),
  'README.rdoc'))
version         "0.9.0"
recipe          "git", "Installs git"
recipe          "git::server",
  "Sets up a runit_service for git daemon"
```

cont...

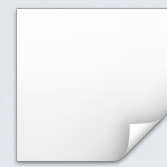


metadata.rb

...

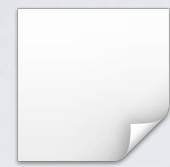
```
%w{ ubuntu debian arch }.each do |os|  
  supports os  
end
```

```
%w{ runit }.each do |cb|  
  depends cb  
end
```



recipes/default.rb

```
case node[:platform]
when "debian", "ubuntu"
  package "git-core"
else
  package "git"
end
```

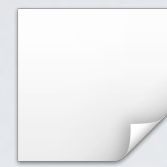


recipes/server.rb

```
include_recipe "git"

directory "/srv/git" do
  owner "root"
  group "root"
  mode 0755
end
```

cont...

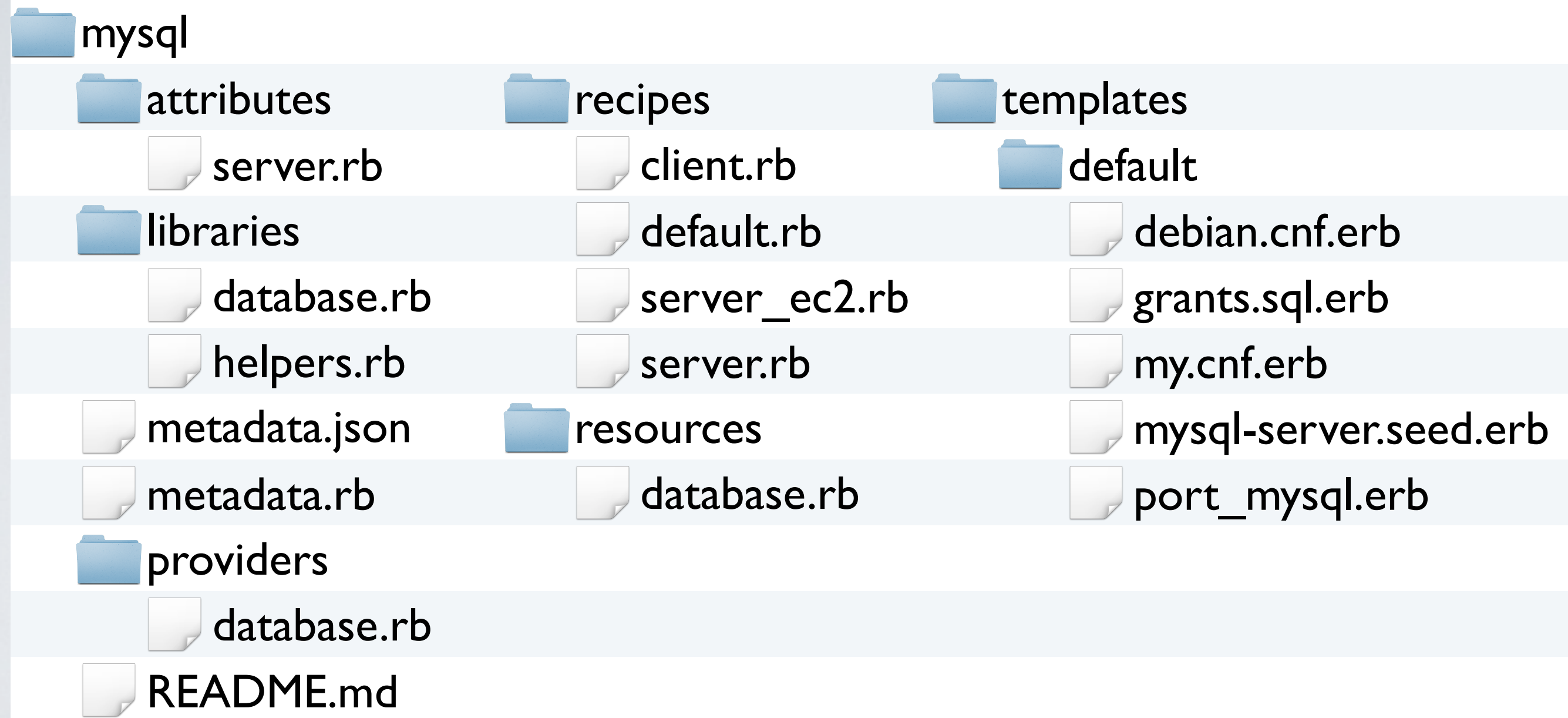


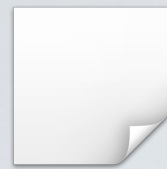
recipes/server.rb

...

```
case node[:platform]
when "debian", "ubuntu"
  include_recipe "runit"
  runit_service "git-daemon"
else
  log "Platform requires setting up ..."
  log "Hint: /usr/bin/git daemon --export..."
end
```

Cookbook: MySQL





templates/default/debian.cnf.erb

```
[client]
host      = localhost
user      = debian-sys-maint
password  = <%= node['mysql']['server_debian_password'] %>
socket    = <%= node['mysql']['socket'] %>
```

```
[mysql_upgrade]
host      = localhost
user      = debian-sys-maint
password  = <%= node['mysql']['server_debian_password'] %>
socket    = <%= node['mysql']['socket'] %>
basedir   = /usr
```



resources/database.rb

```
actions :flush_tables_with_read_lock,  
        :unflush_tables, :create_db, :query
```

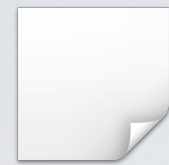
```
attribute :host, :kind_of => String  
attribute :username, :kind_of => String  
attribute :password, :kind_of => String  
attribute :database, :kind_of => String  
attribute :sql, :kind_of => String  
attribute :exists, :default => false
```

Using the Custom Resource

```
# In cookbooks/stratego/recipes/default.rb

include_recipe "mysql::client"

mysql_database "reporting database" do
  host "db01prod"
  username "root"
  password node[:mysql][:server_root_password]
  database "reporting_production"
  action :create_db
end
```



providers/database.rb

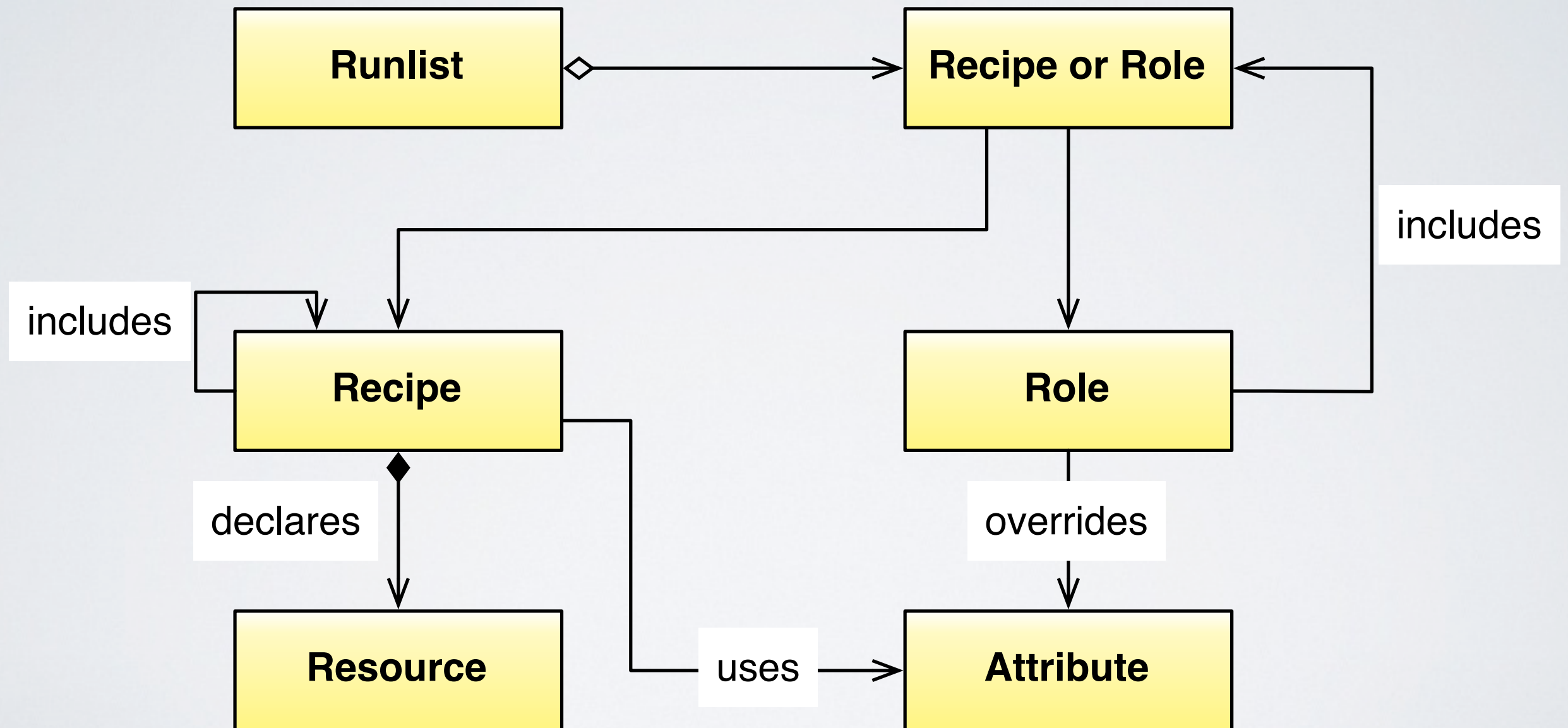
```
include Opscode::Mysql::Database

action :create_db do
  unless exists?
    begin
      Chef::Log.info "mysql_database: Creating databa..."
      db.query("create database #{new_resource.database}")
      new_resource.updated_by_last_action(true)
    ensure
      db.close
    end
  end
end
```

How do cookbooks get
applied to servers



Runlist Executes On Node



Example Runlist (from a role file)

```
name "dev_env_bamboo"  
description "Continuous Integration server"  
  
run_list "recipe[aws]", "recipe[xfs]",  
        "recipe[bamboo]",  
        "recipe[bamboo::crowd_authentication]",  
        "recipe[bamboo::ebs_volume]",  
        "recipe[build_dependencies]",  
        "recipe[maven]", "recipe[maven3]",  
        "recipe[bamboo::post_maven_bamboo]",  
        "recipe[bamboo::start]",  
        "recipe[iptables::ci_instance]"
```

Bamboo has a one time, setup wizard
in the admin GUI.
How do you automate that ?

Recreate the results, not the process.

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I. Install once by hand, stop before setup wizard.

Recreate the results, not the process.

1. Install once by hand, stop before setup wizard.
2. Make a tarball.

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Recreate the results, not the process.

1. Install once by hand, stop before setup wizard.
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3. Go through setup wizard.
4. Compare resulting files with snapshot.
5. Build a template to replicate the outcome.

Where do you keep installation
binaries



Control, integrity, efficiency

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I. Your VCS may hate binaries.

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1. Your VCS may hate binaries.
2. S3 worked for us. Private maven repo also works well.

Control, integrity, efficiency

1. Your VCS may hate binaries.
2. S3 worked for us. Private maven repo also works well.
3. Vendor download might also work, but beware slipstreaming.

Remote file resource

```
remote_file "crowd" do
  path "/tmp/crowd.tar.gz"
  source "http://downloads.atlassian.com/.../
atlassian-crowd-2.3.3.tar.gz"
  checksum "dcc486625e96925..."
end
```

Have a sandbox!

Where do I find cookbooks



Many available on github
cookbooks.opscode.com

Download at the Shell

```
$ knife cookbook site download postgresql
Downloading postgresql from the cookbooks site ...
Cookbook saved: /Users/mtnygard/cookbooks/postgresql...
$ tar xvzf postgresql-0.11.1.tar.gz
x postgresql/
x postgresql/attributes/
x postgresql/metadata.json
x postgresql/metadata.rb
x postgresql/README.rdoc
x postgresql/recipes/
x postgresql/templates/
x postgresql/templates/default/
x postgresql/templates/default/debian.pg_hba.conf.erb
...
```

One other cool knife trick

```
$ gem install knife-ec2
Fetching: excon-0.6.6.gem (100%)
...
Successfully installed knife-ec2-0.5.10
6 gems installed
$ knife ec2 server create 'role[webserver]' \
  -I ami-7000f019 -f m1.small
Instance ID: i-9e7ef1fe
Flavor: m1.small
Image: ami-7000f019
Region: us-east-1
Availability Zone: us-east-1c
Security Groups: default
SSH Key: relevance_aws

Waiting for server...
```

Throughout Development Cycle

Local Development

Throughout Development Cycle

Local Development

Single App (solo)

Throughout Development Cycle

Local Development

Single App (solo)

Server Based Rollout

Local Development



Vagrant

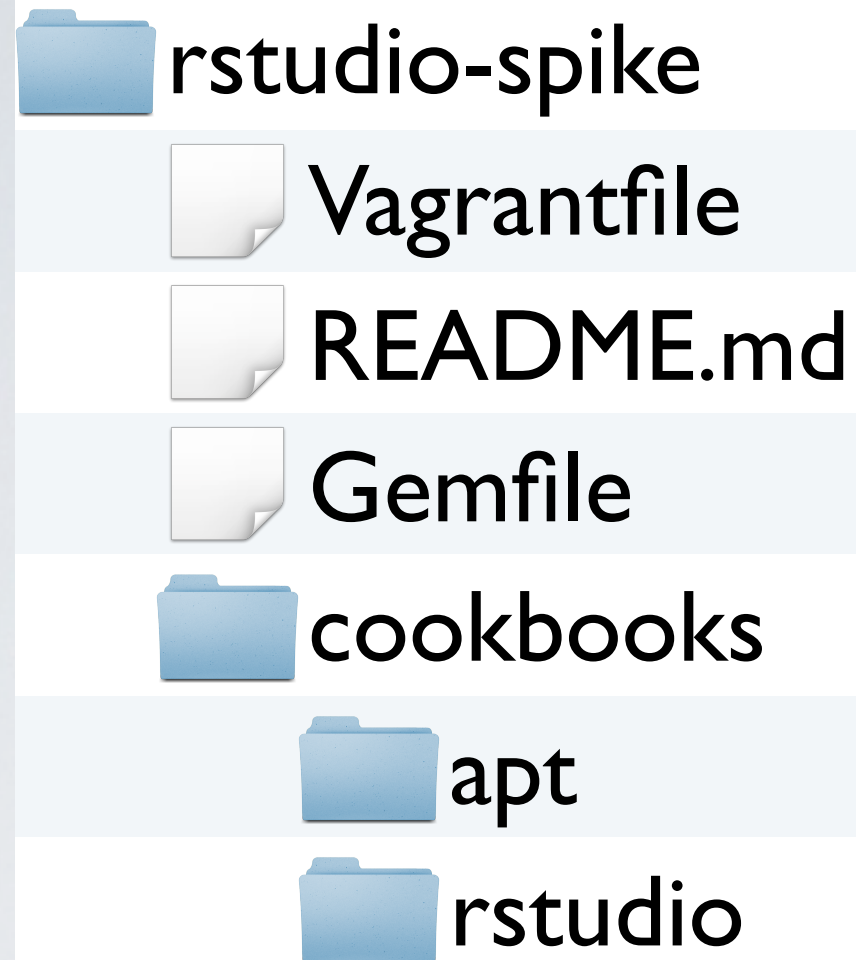


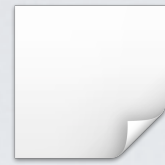
Vagrant



Builds virtual machines from a text file and some Chef cookbooks.

Vagrant Project

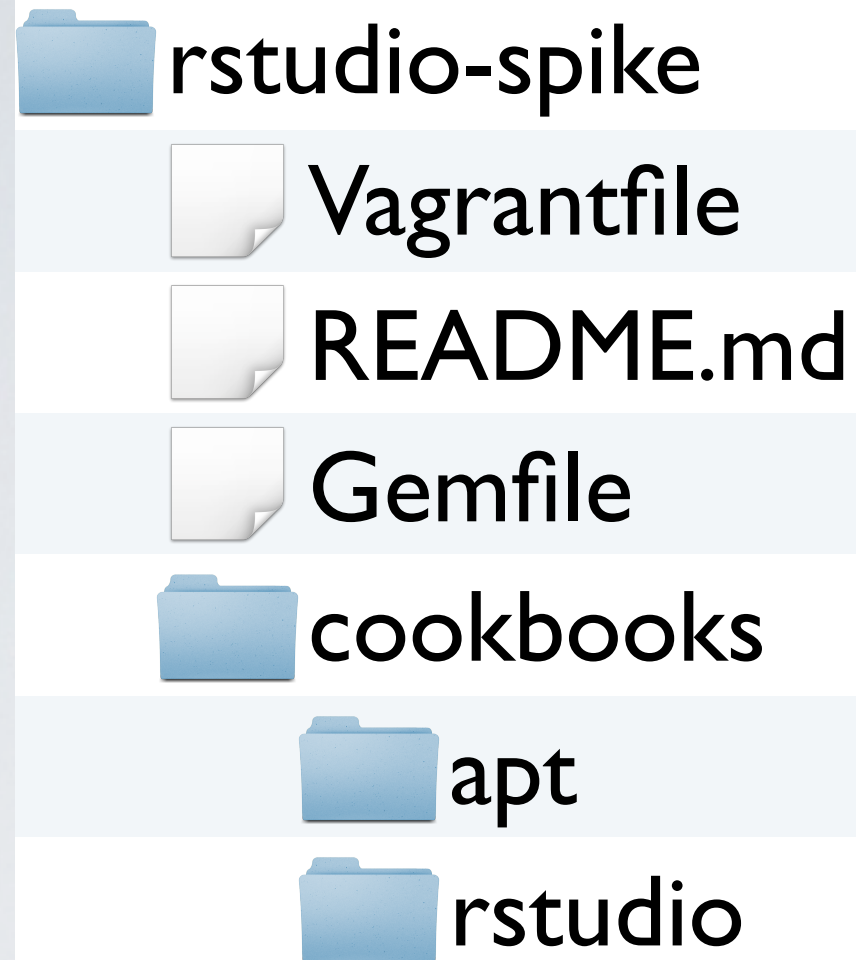




Vagrantfile

```
Vagrant::Config.run do |config|  
  config.vm.box = "lucid64"  
  config.vm.box_url =  
    "http://files.vagrantup.com/lucid64.box"  
  
  config.vm.forward_port "http", 8787, 8787  
  
  config.vm.provision :chef_solo do |chef|  
    chef.cookbooks_path = "cookbooks"  
    chef.add_recipe "rstudio"  
    chef.add_recipe "mysql::server"  
  
    chef.json.merge!({ :mysql =>  
      { :server_root_password => "foo" }  
    })  
  end  
end
```

Vagrant Project



Benefits

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Version control dev environment

Benefits

Version control dev environment

Share configs across team

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Version control dev environment

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Recreate project or client setup

Benefits

Version control dev environment

Share configs across team

Recreate project or client setup

Keep host environment clean

“Base Box”

“Base Box”

OS Image

+ Vagrant configs

Download Base Boxes

Vagrantbox.es

Vagrant is an amazing tool for managing virtual machines via a simple to use command line interface. With a simple **vagrant up** you can be working in a clean environment based on a standard template.

These standard templates are called **base boxes**, and this website is simply a list of boxes people have been nice enough to make publicly available.

Suggest a Box

Do you know of another high quality base box? [Let us know about it](#) and, once we've checked it out, we'll add it to the list below.

Available Boxes

Search

Search

ubuntu 11.04 server i386	http://dl.dropbox.com/u/7490647/talifun-ubuntu-11.04-server-i386.box
ubuntu 11.04 server	http://dl.dropbox.com/u/7490647/talifun-ubuntu-11.04-server-amd64.box

Make Base Boxes

 **github**
SOCIAL CODING

 **mtnygard** | [Dashboard](#) | [Inbox](#)

[Explore GitHub](#) [Gist](#) [Blog](#)

 **jedi4ever** / **veewee**

Source

Commits

Network

Pull Requests (2)

Issues (34)

Wiki (2)

Graphs

Switch Branches (3) ▾ Switch Tags (32) ▾ Branch List

Easing the building of vagrant boxes — [Read more](#)

HTTP

Git Read-Only

`https://github.com/jedi4ever/veewee.git`

 **Read-Only** access

Merge pull request **#115** from dcarley/vbox_sataportcount_1 [+ ...](#)

 **jedi4ever** authored 2 days ago

veewee /

Some Recommendations

Know your image;
build your own base boxes.

Avoid multiple Chef and Vagrant
copies.

Use RVM with `.rvmrc` in your
Vagrant directory.

Reuse cookbooks between vagrant
boxes and real deployments.

Share the project directory with the
VM.



Solo Deployment

Chef Solo



Chef Solo

Runs cookbooks,
with attributes,
on a node.

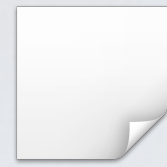
chef-solo

```
$ sudo chef-solo -c solo.rb -j node.json
... INFO: *** Chef 0.10.4 ***
... INFO: Setting the run_list to ["recipe[rstudio]"] from JSON
... INFO: Run List is [recipe[rstudio]]
... INFO: Run List expands to [rstudio]
... INFO: Starting Chef Run for lucid64.hsd1.ca.comcast.net.
...
... INFO: Processing package[r-base] action install
(rstudio::default line 18)
          -- many lines of output --
... INFO: Processing dpkg_package[rstudio-server] action install
(rstudio::default line 46)
... INFO: dpkg_package[rstudio-server] installed version 0.94.84
... INFO: Chef Run complete in 238.033898 seconds
... INFO: Running report handlers
... INFO: Report handlers complete
```



solo.rb

```
file_cache_path "/var/chef-solo"  
cookbook_path ["/var/chef/cookbooks",  
               "/var/chef/site-cookbooks"]
```



node.json

```
{  
  "mysql": {  
    "server_root_password": "foo"  
  },  
  "run_list": ["recipe[rstudio]"]  
}
```

Benefits

Benefits

Self-contained bundle

Benefits

Self-contained bundle

Can run from tarball at URL

Benefits

Self-contained bundle

Can run from tarball at URL

Easy setup; no extra infrastructure

Some Recommendations

Rubyists: deliver cookbooks with
capistrano, use chef-solo to execute.

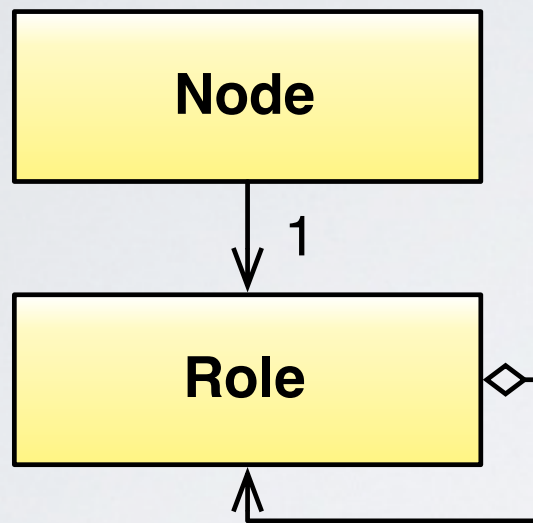
Everyone: start with chef-solo before
you deal with chef server.

Make a shared repository for
cookbooks.

Use attributes to factor out
environment and tuning.

Use roles to set parameters for an environment.

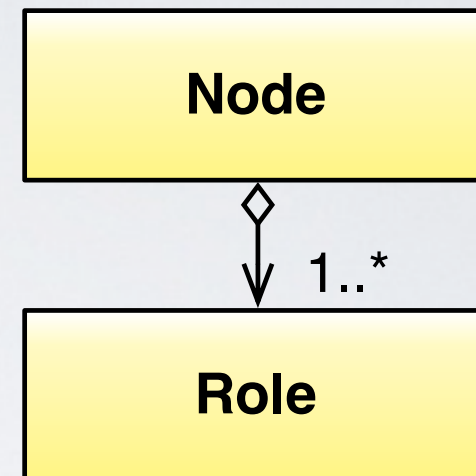
Factoring Roles



Compose Role

Runlist for role includes
other roles

Use for applications



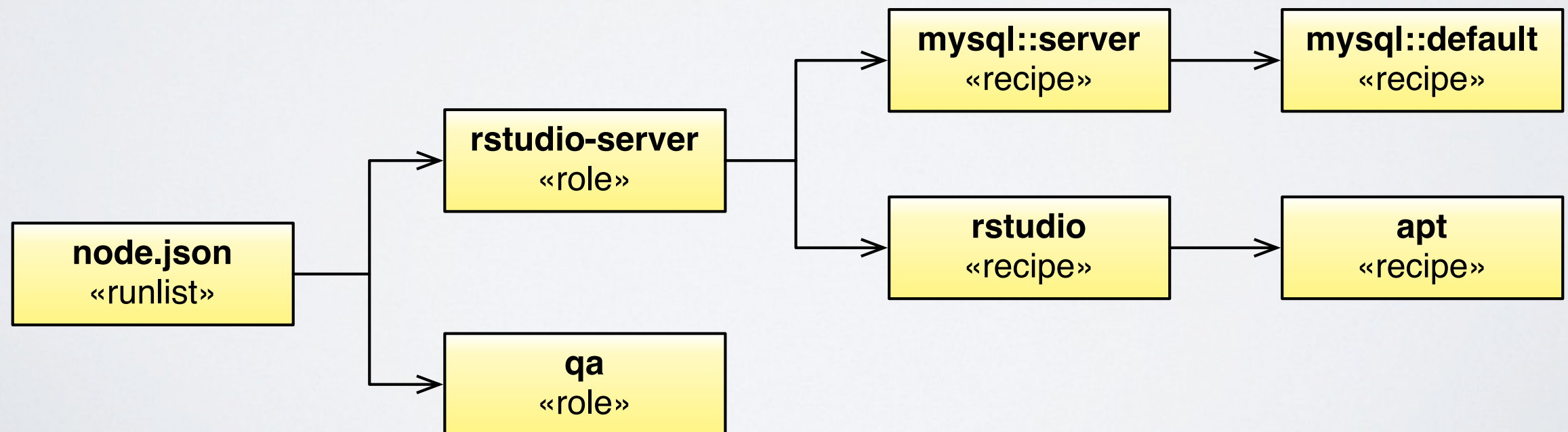
Mix in Role

Runlist for role includes
other roles

Use for environments

Example: Factoring Roles

```
{  
  "run_list": ["role[rstudio-server]",  
               "role[qa]"]  
}
```



Separate off-the-shelf cookbooks
from locally maintained cookbooks

Example: Isolating Local Cookbooks

project-root

 **README.md**

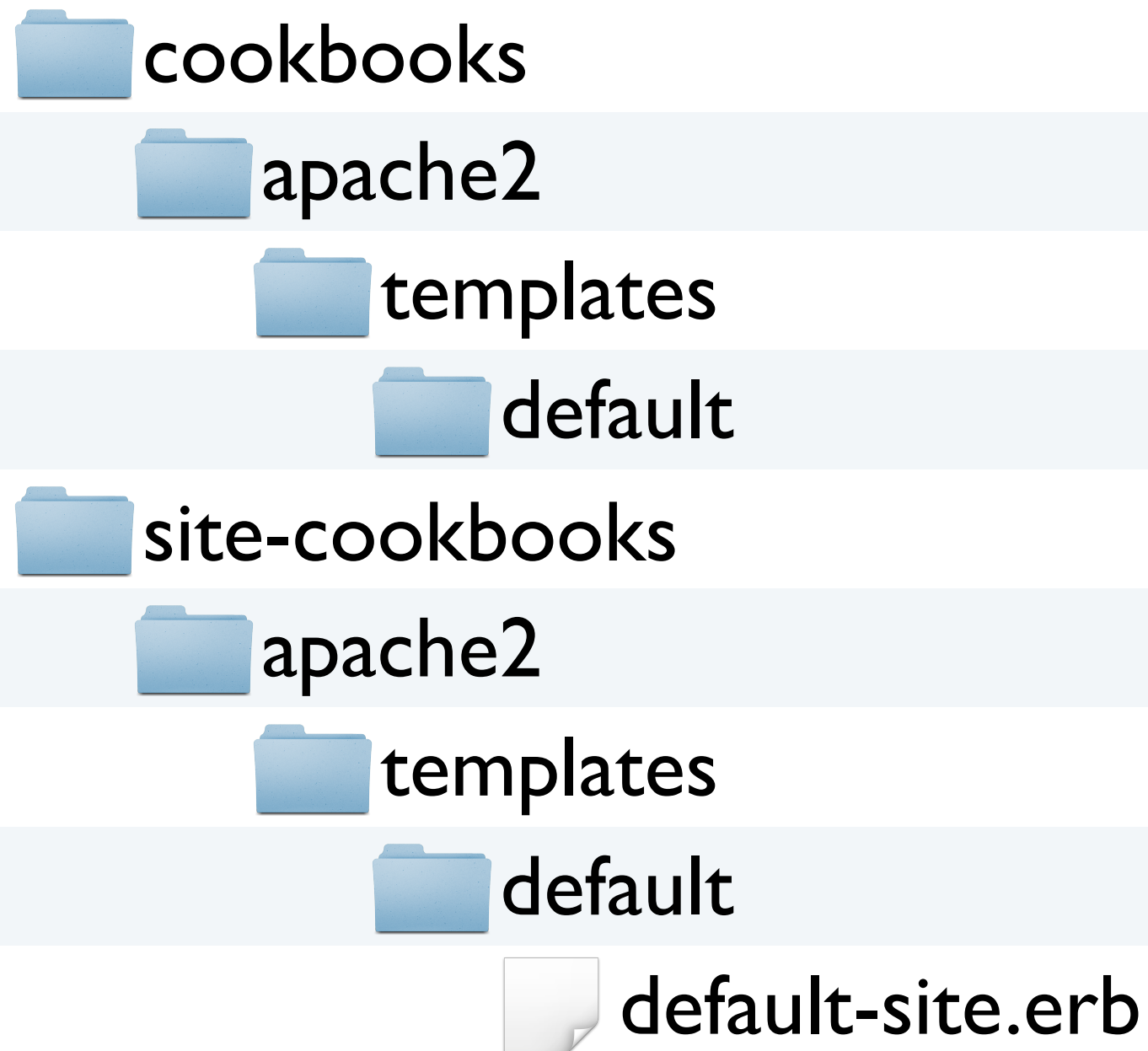
 **cookbooks**

 **site-cookbooks**

 **vagrant**

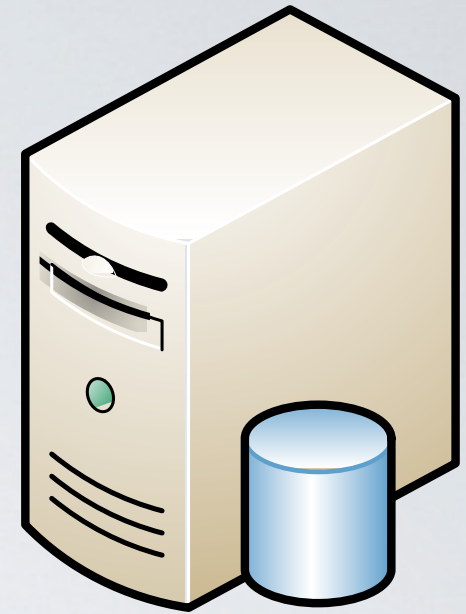
 **Vagrantfile**

Example: Local Cookbooks With Overrides

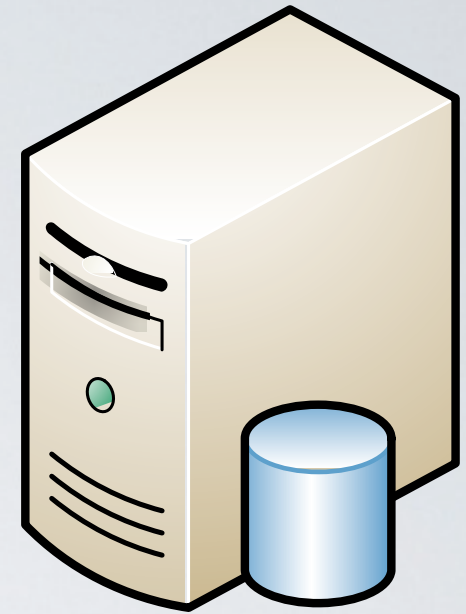


Use overrides sparingly.
It's implementation inheritance.

Server-Based Deployment



Chef Server



Chef Server

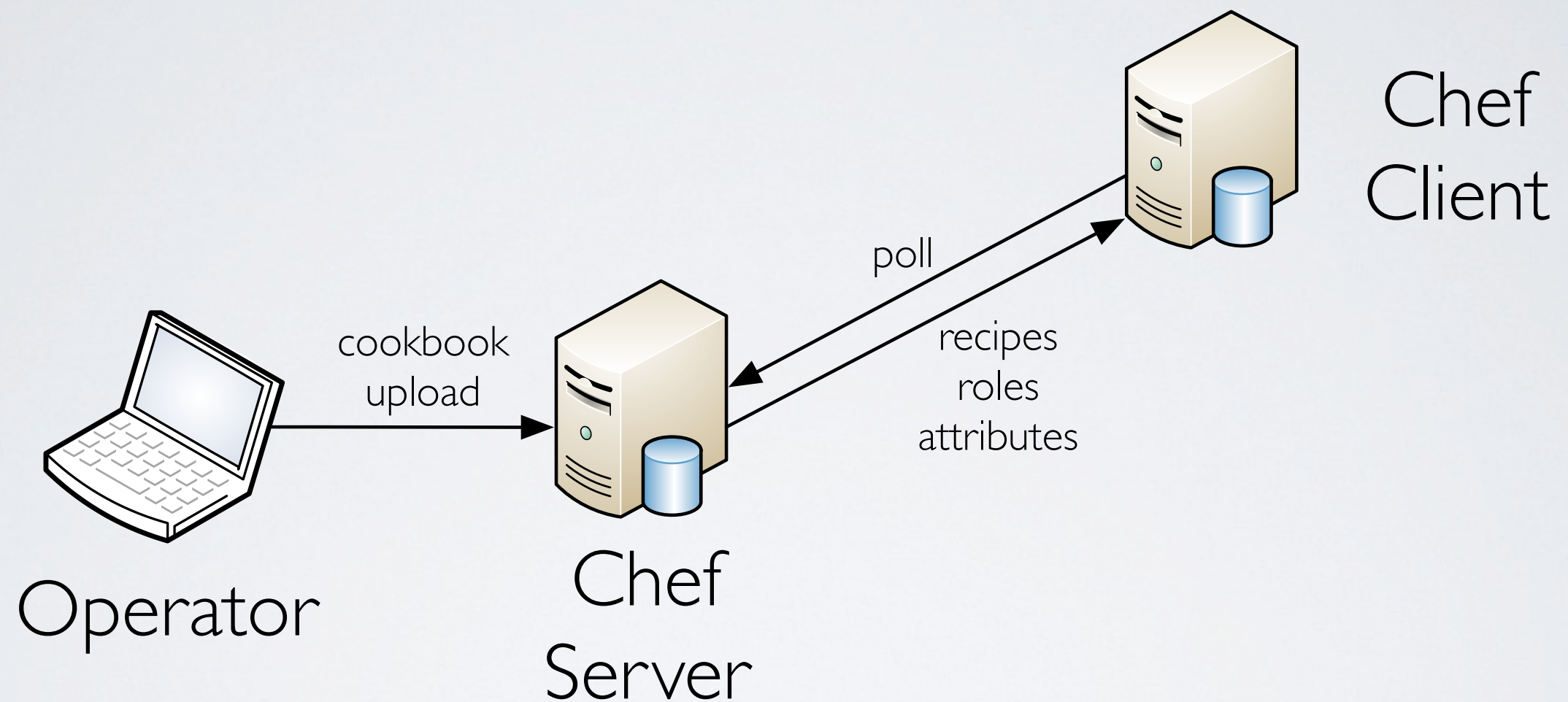
Client-server polling

Searchable via API

Authenticated and encrypted

Centralized management

Chef Server



Server Based Search

API access to Lucene search

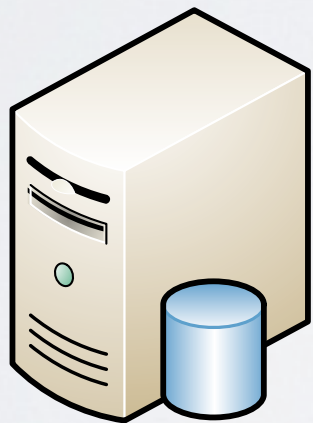
Nodes, roles, or data bags

Can be used from recipes on clients

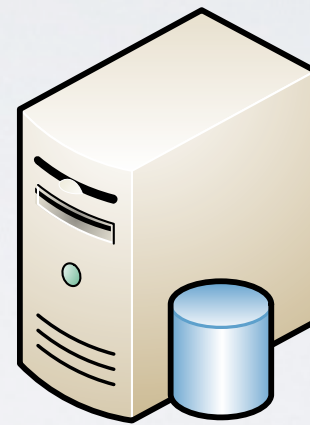
Example: Automatic Nagios Config

1. Search for nodes in the environment
2. Generate Nagios config files with information about nodes.

Step 1: Chef Server Assigns Recipe “nagios::server”

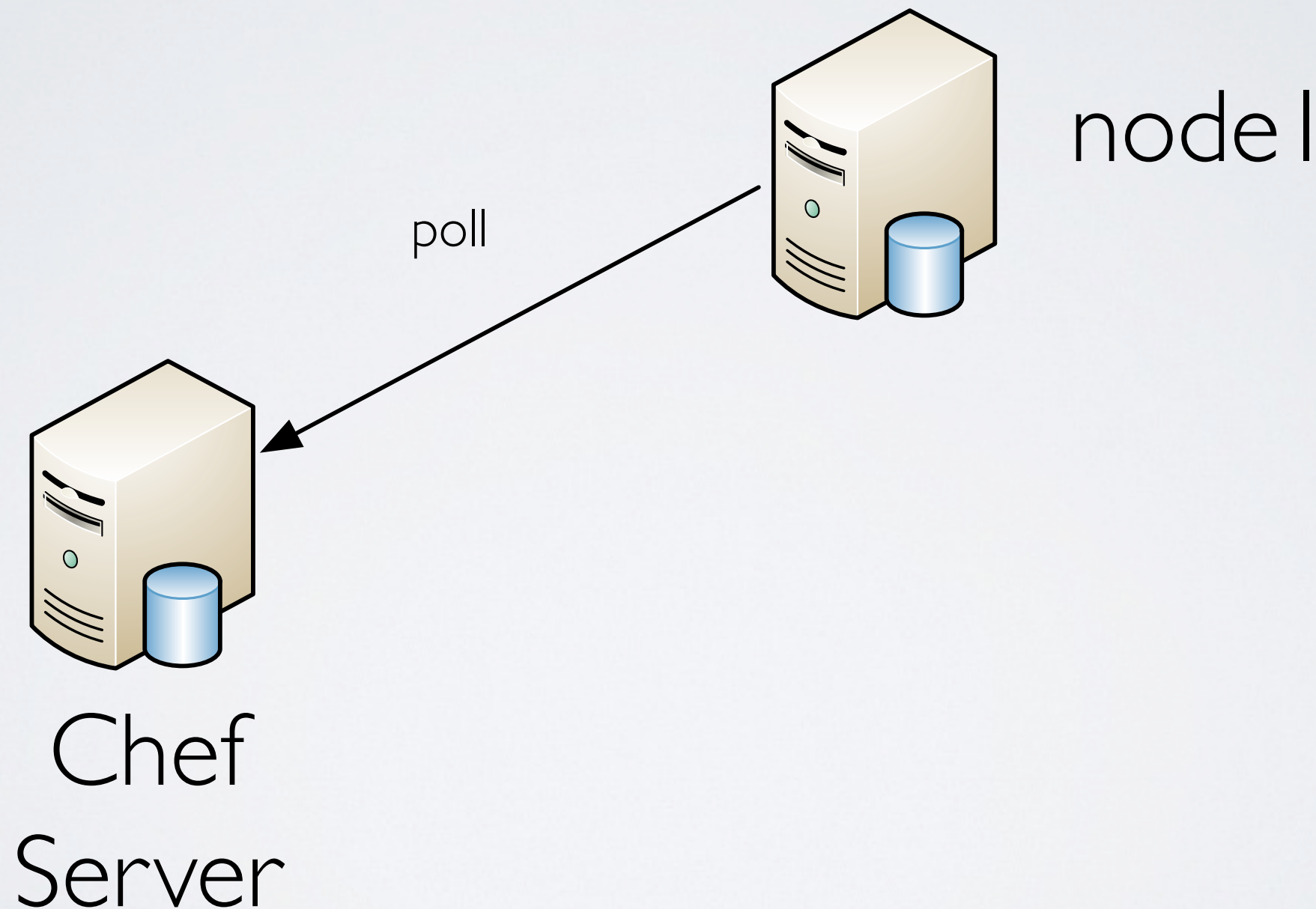


Chef
Server

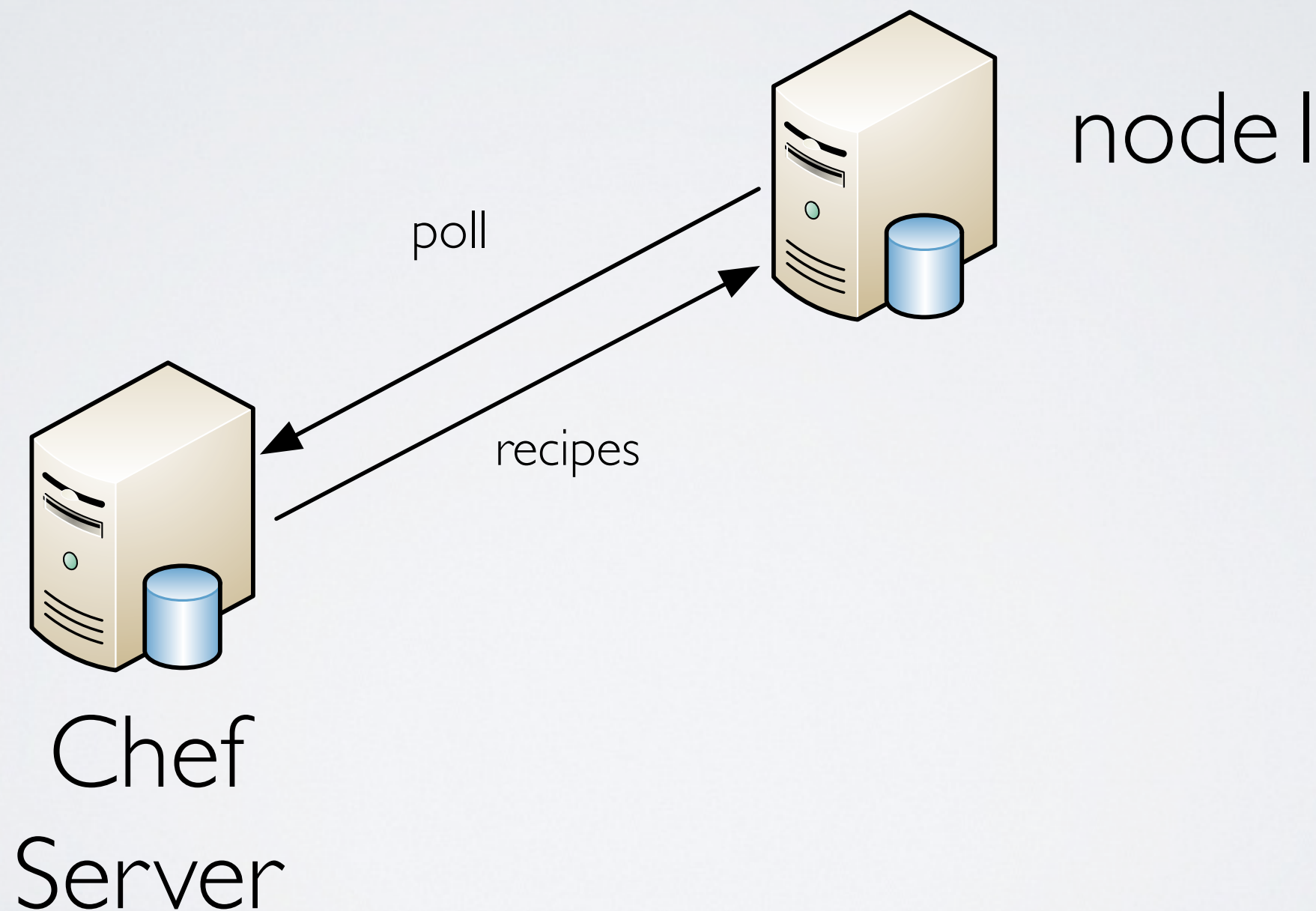


node1

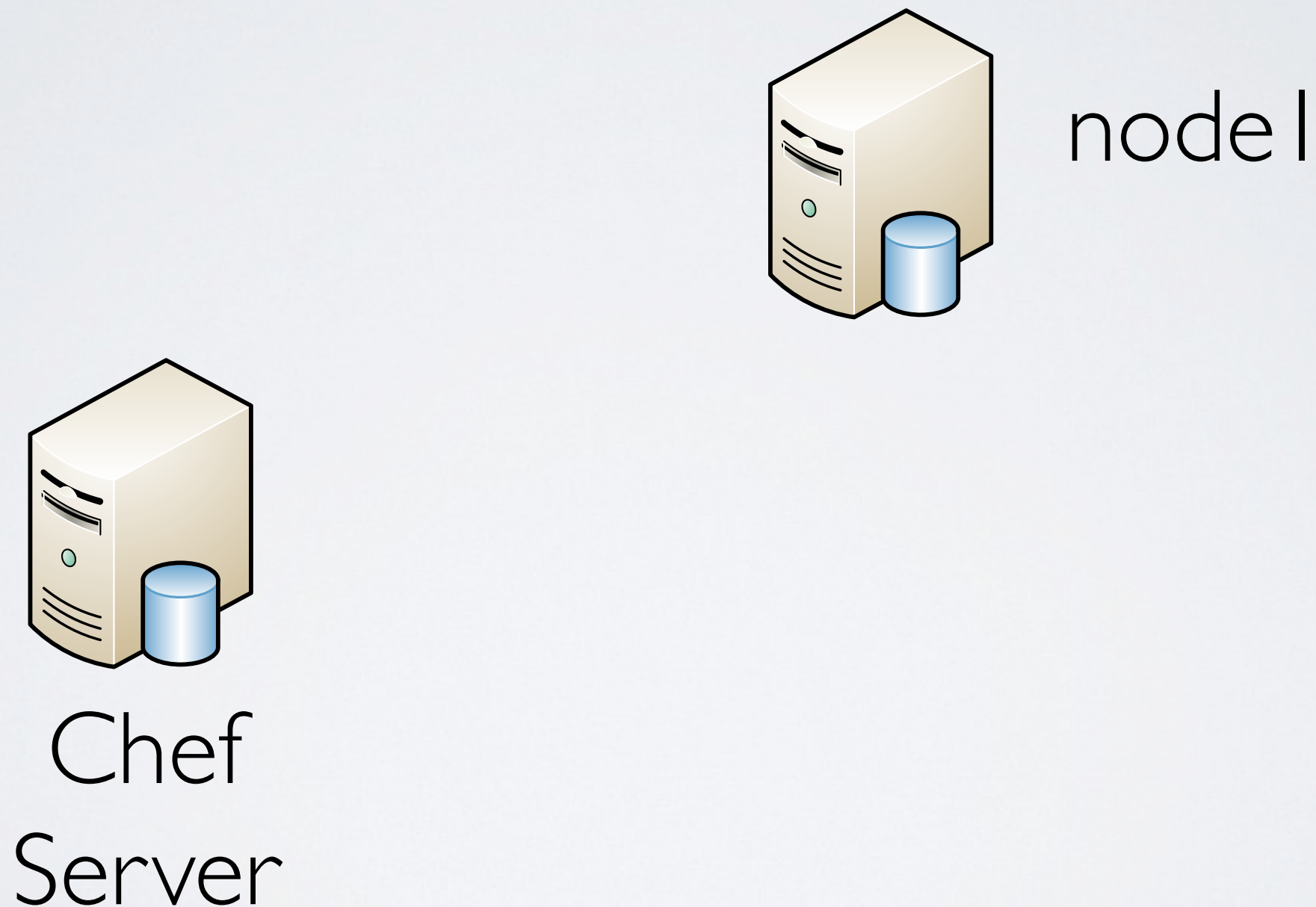
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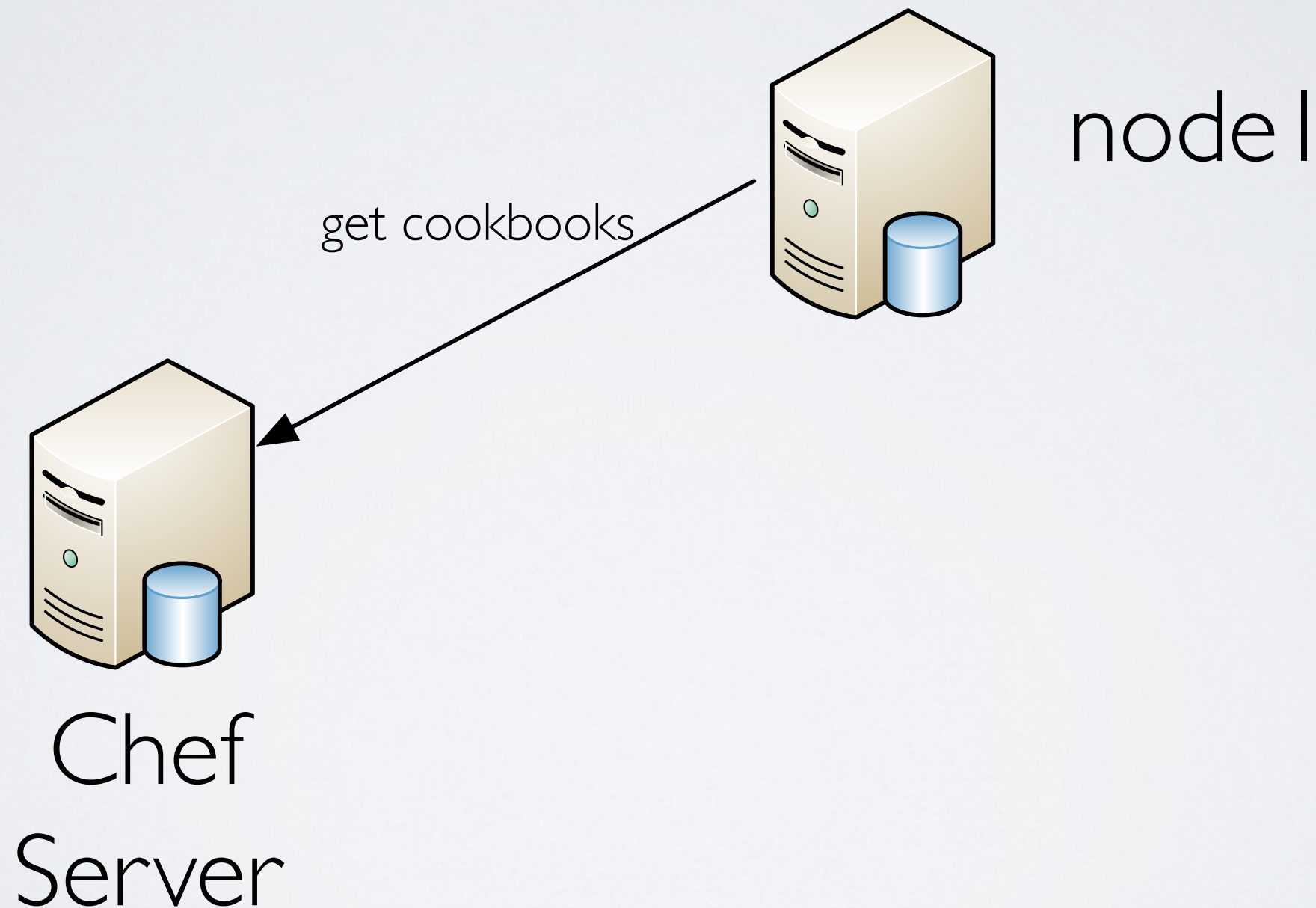
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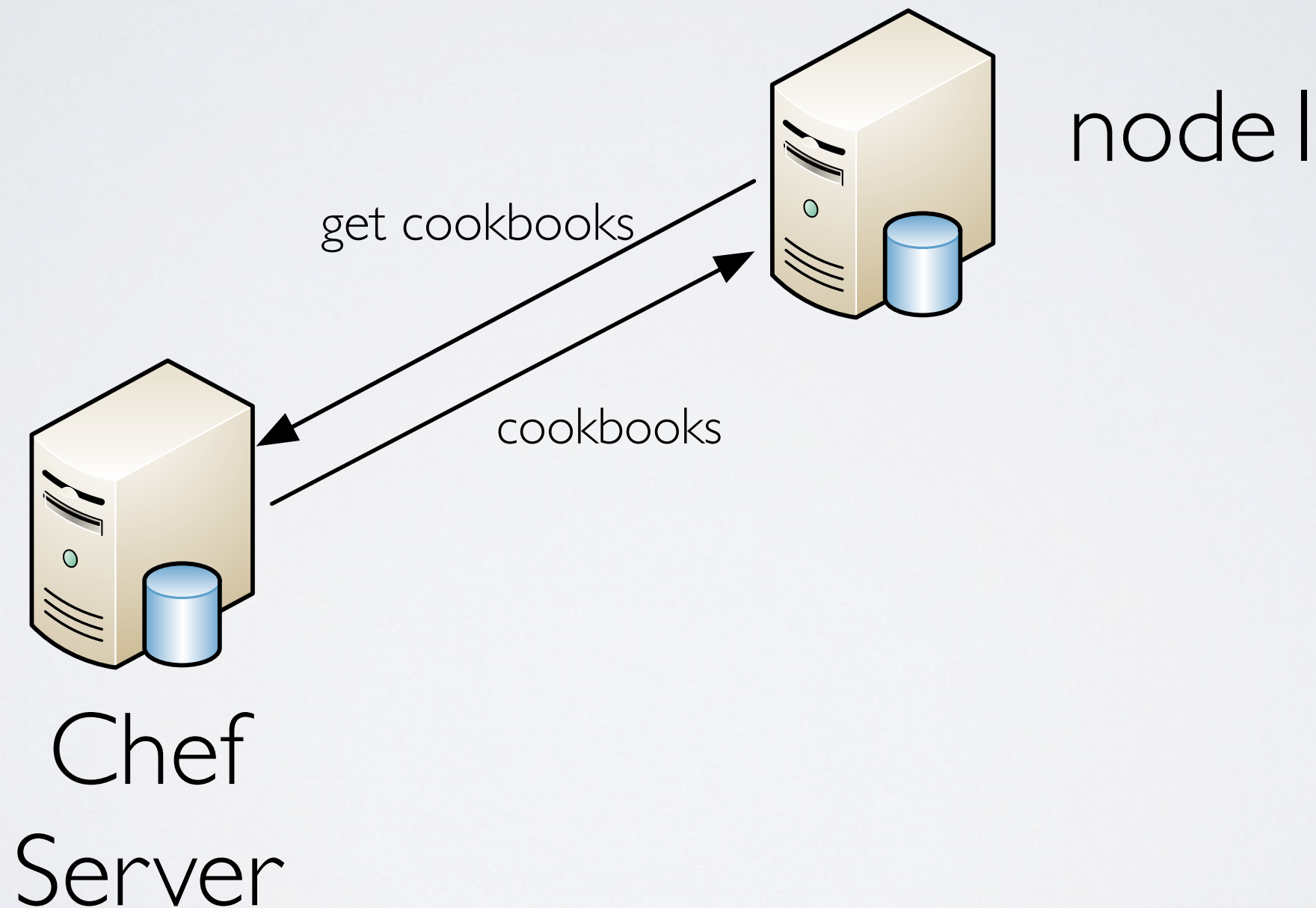
Step 2: Client Downloads Cookbooks



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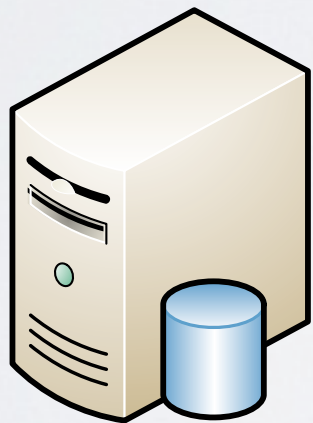


Step 3: Client Executes Recipe

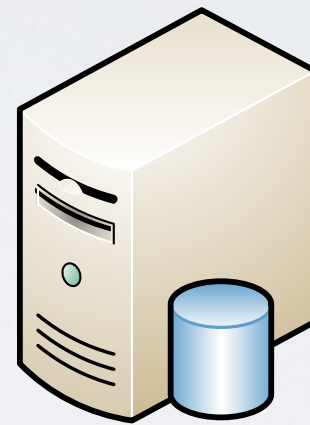
```
sysadmins = search(:users, 'groups:sysadmin')
nodes = search(:node,
  "hostname:[* T0 *] AND role:#{node[:app_environment]}")

members = Array.new
sysadmins.each do |s|
  members << s['id']
end
```

Step 3a: Client Searches Nodes

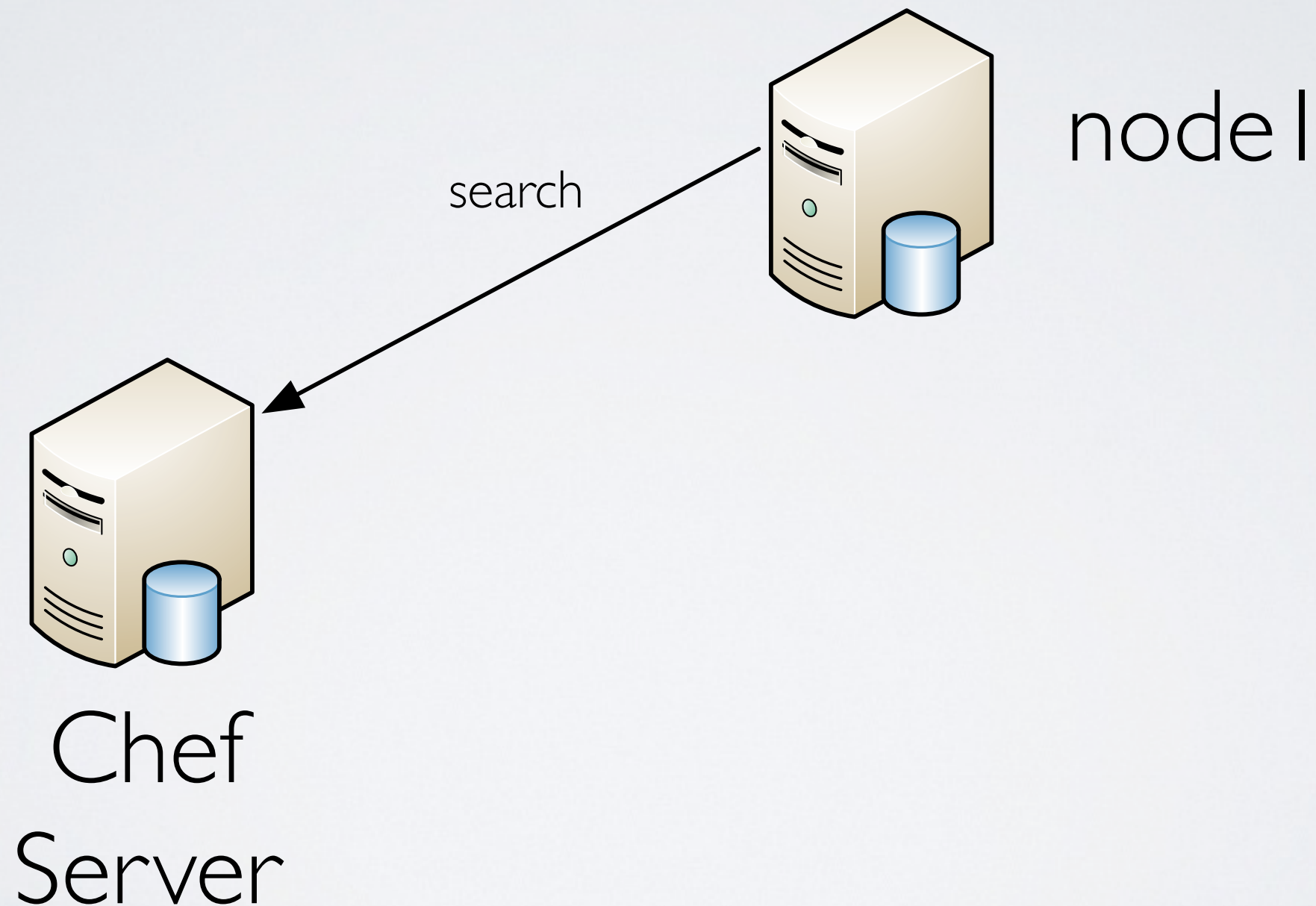


Chef
Server

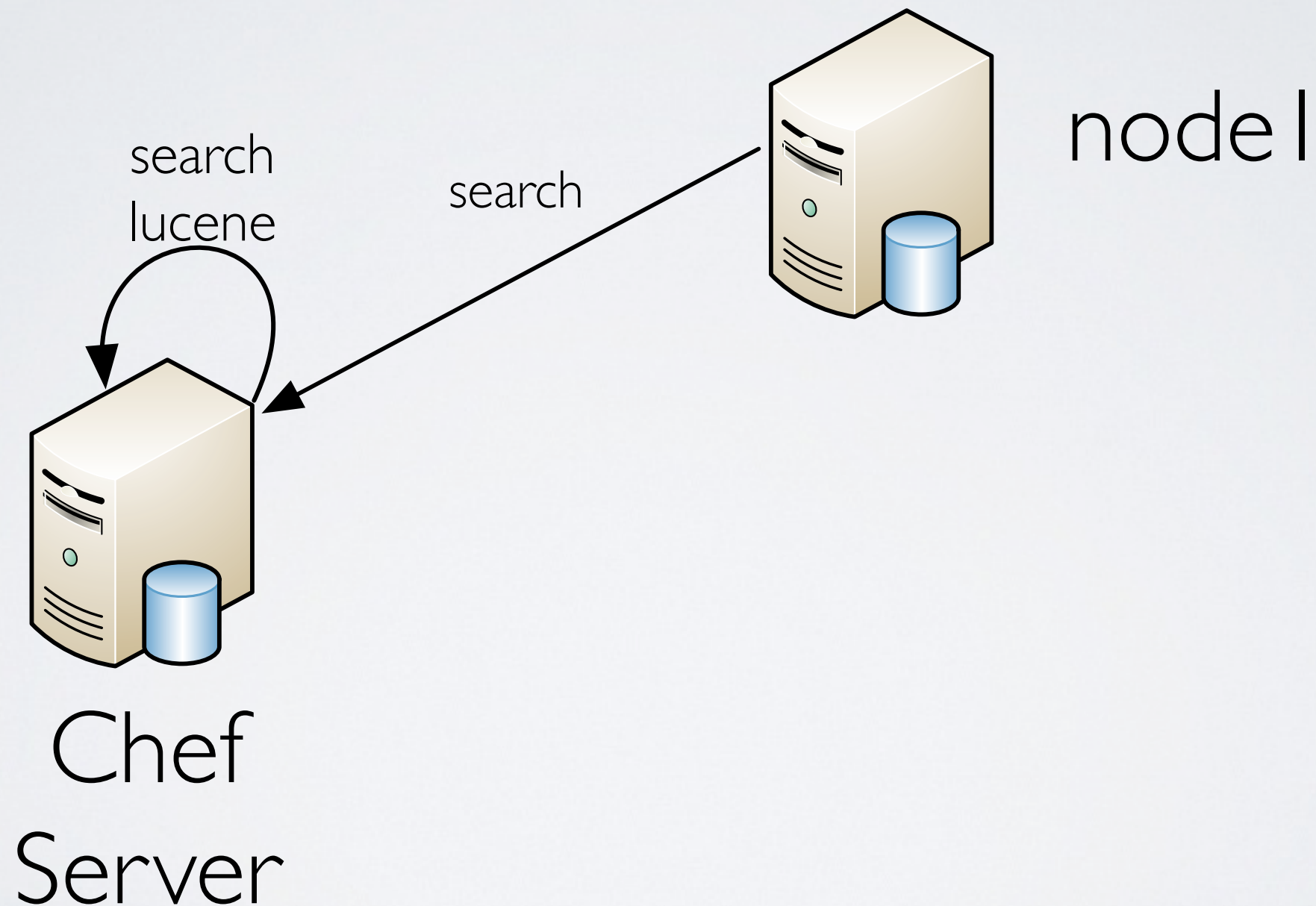


node1

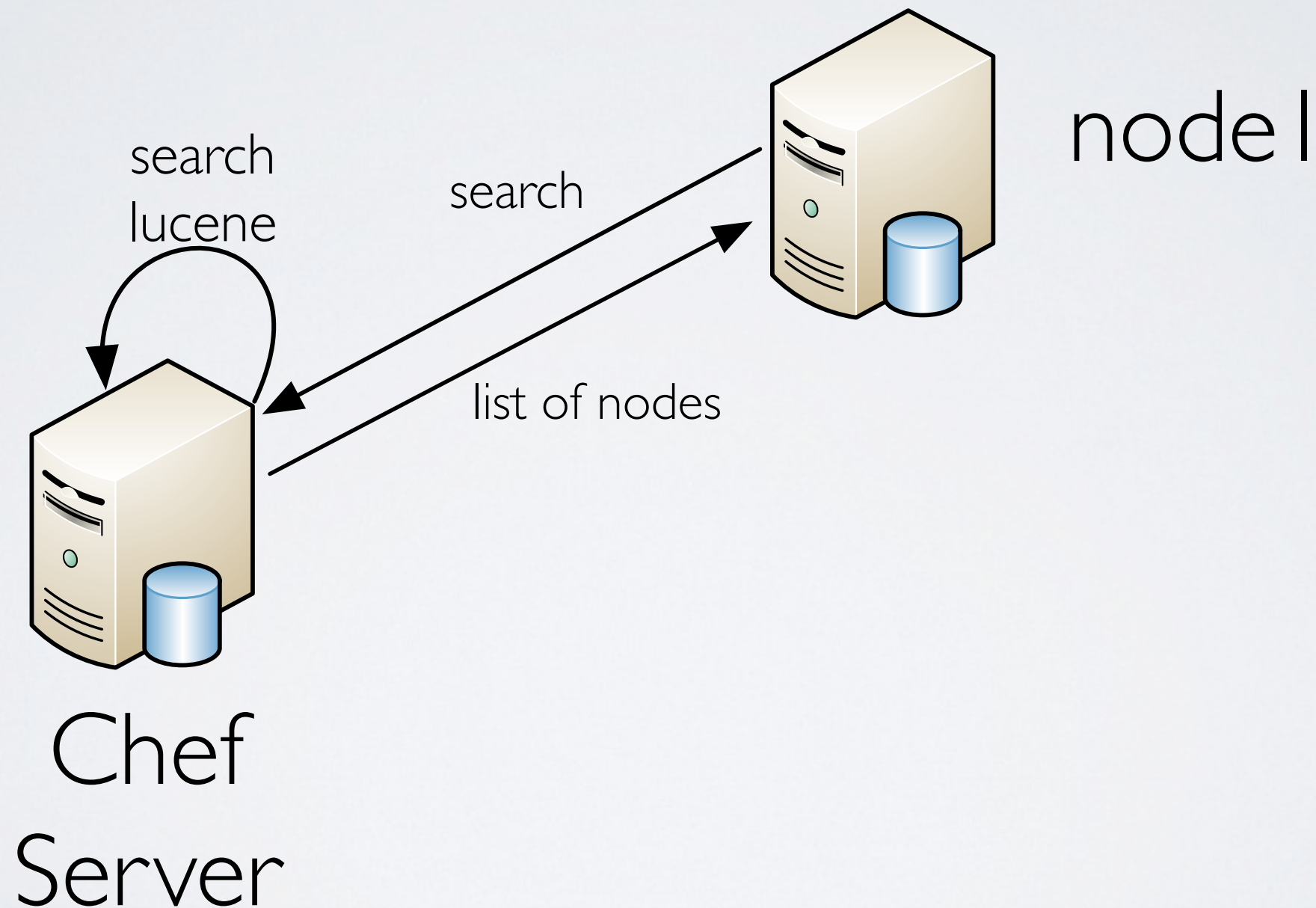
Step 3a: Client Searches Nodes



Step 3a: Client Searches Nodes



Step 3a: Client Searches Nodes



Step 3b: Client Applies Templates

```
nagios_conf "hosts" do
  variables :nodes => nodes
end
```

Step 3b: Client Applies Templates

```
<% @nodes.each do |n| -%>
define host {
  use server
  address <%= n['ipaddress'] %>
  host_name <%= n['hostname'] %>
  hostgroups <%= n.run_list.roles.to_a.join(",")
%>
}

<% end -%>
```

Data Bags

JSON data

Held on server

Access via API

Example: Database Credentials

```
begin
  bamboo_app = Chef::DataBagItem.load(:apps, :bamboo)
  Chef::Log.info("Loaded... apps[#{bamboo_app['id']}]")
rescue
  Chef::Log.fatal("Could not find #{:bamboo}... ")
  raise
end
```

Search & data bags require Chef Server.

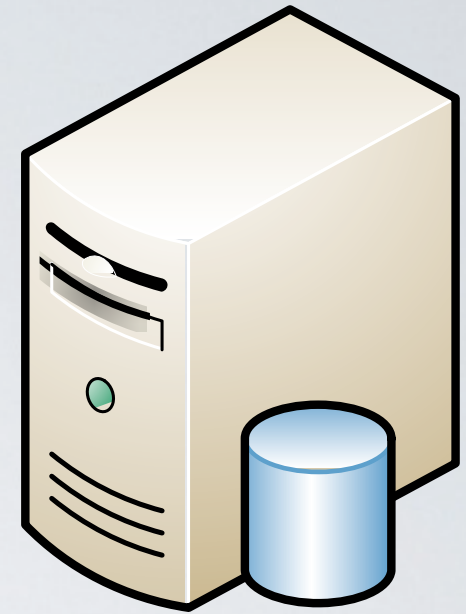
Breaks Vagrant and Chef Solo.



Encrypted Data Bags

<https://jtimberman.posterous.com/64227128>

Chef Server in EC2



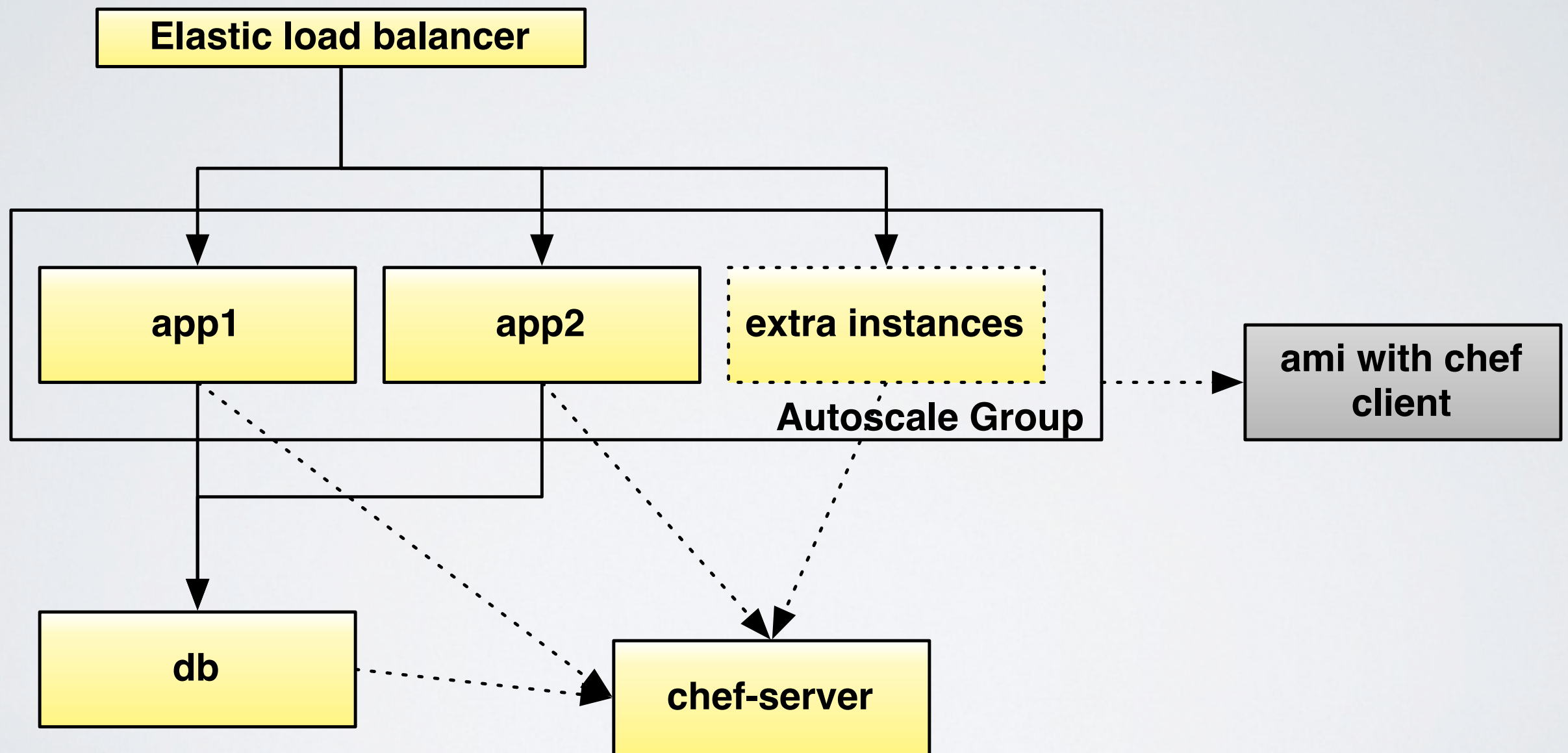
Challenges

No long-lived identity

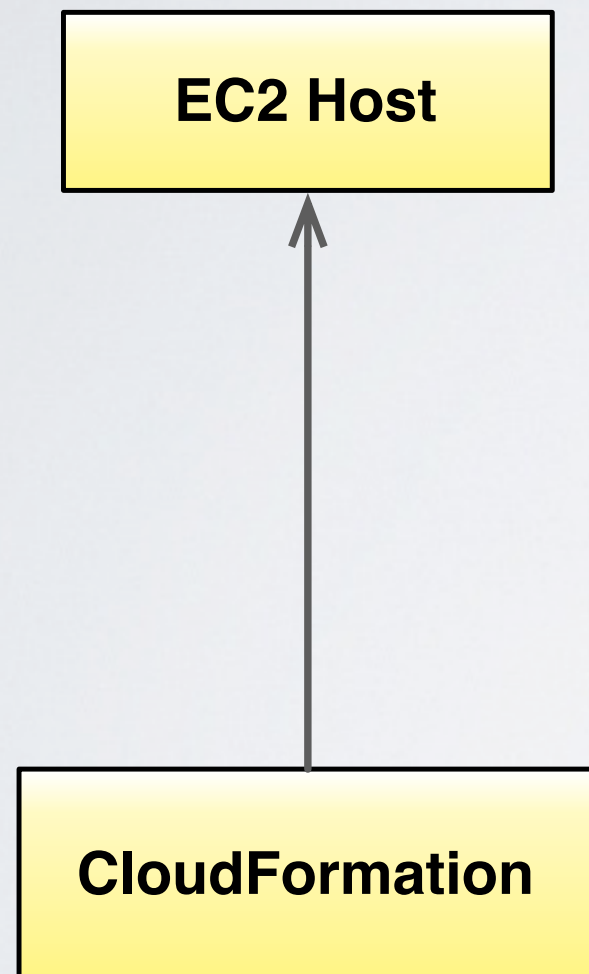
Must use EBS for server

Authentication of new nodes

Example: EC2 + ELB + AS

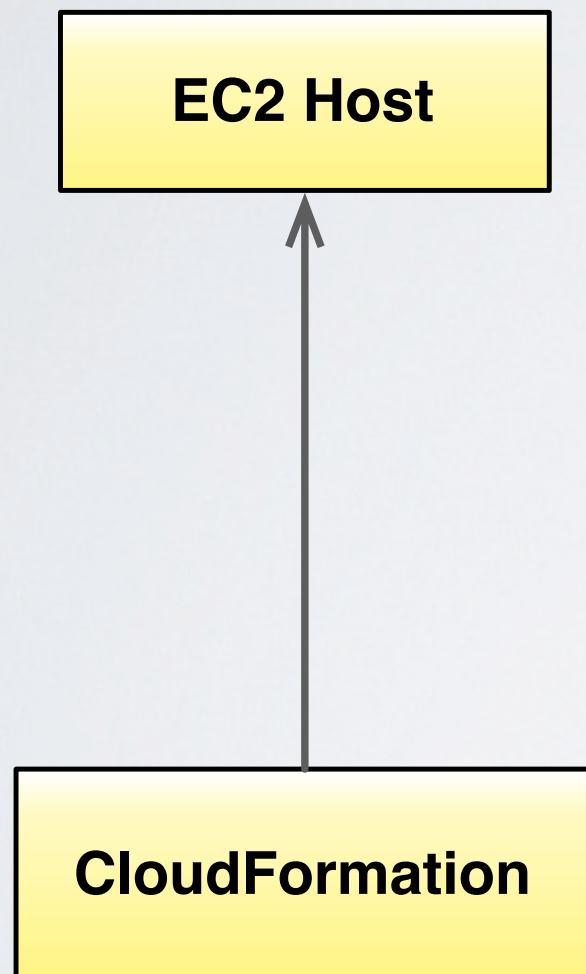


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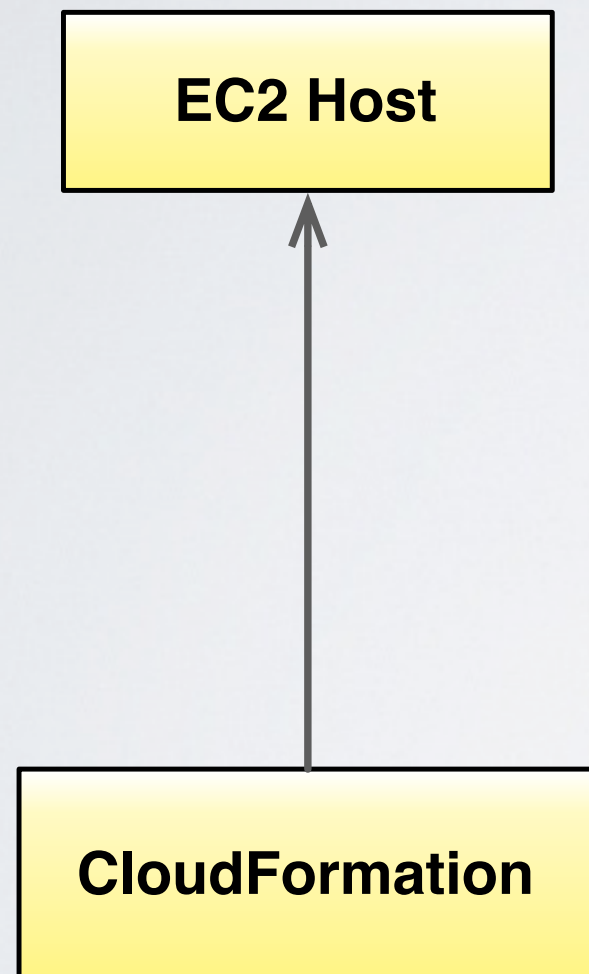


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1. create virtual machine

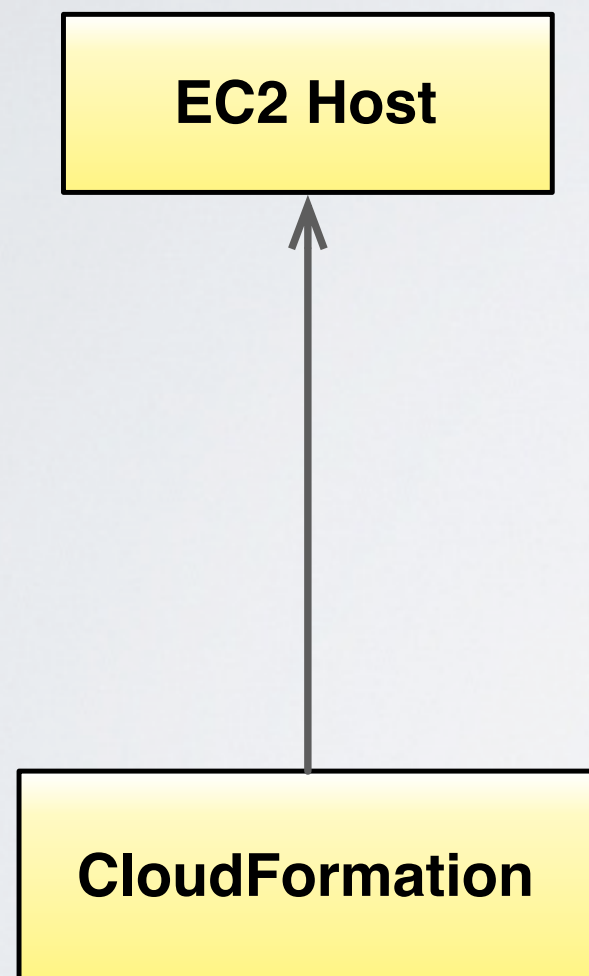


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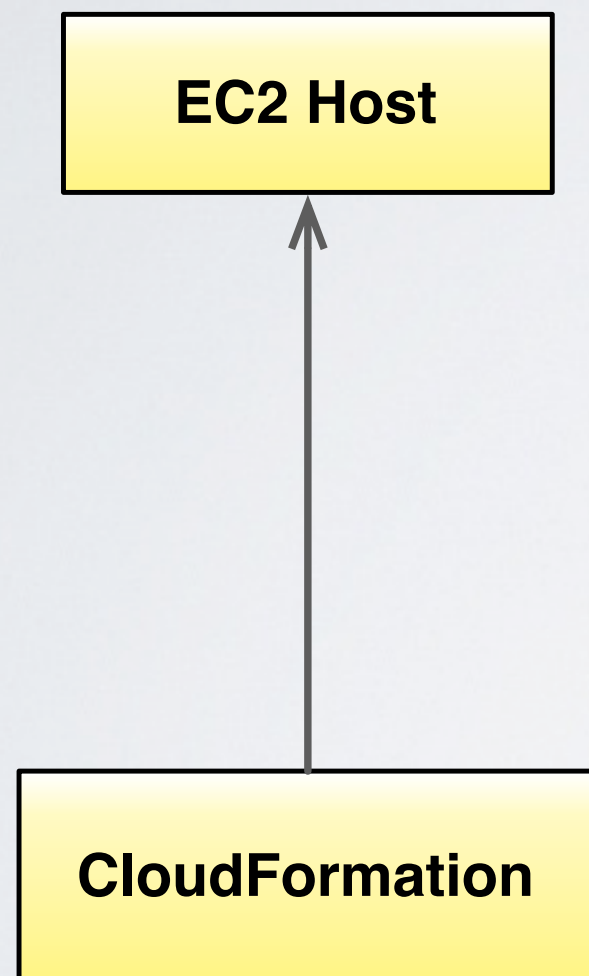
1. create virtual machine
2. `yum install gcc, ruby, rubygems`
`gem install chef`

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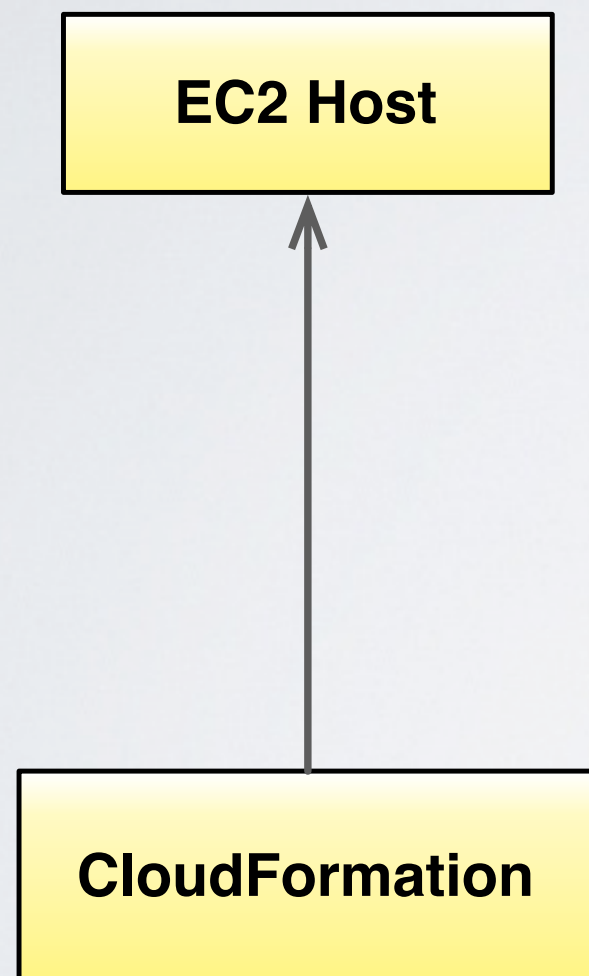
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4. run `chef-solo` with a URL target

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1. create virtual machine
2. `yum install gcc, ruby, rubygems`
`gem install chef`
3. deposit `solo.rb` & `node.json` files
4. run `chef-solo` with a URL target
5. `chef-solo` fetches cookbooks & executes recipes

Chef in Private Clouds



Chef + OpenStack: Automation 2 Ways

1. Build the platform itself
2. Build nodes in the platform

Other Options

Hosted Chef: Chef Server as a Service

www.opscode.com

Other Options

Hosted Chef: Chef Server as a Service

Private Chef: Like Hosted Chef, as an appliance
behind your firewall

www.opscode.com

Resources

Chef

<http://wiki.opscode.com>

Vagrant

<http://www.vagrantup.com/>

CloudFormation

<http://bit.ly/mPFFJG>

CHEF IN THE CLOUD AND ON THE GROUND

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