Chef

Agenda

Topics

- Overview of Chef
- Workstation Setup
- Node Setup
- Chef Resources and Recipes
- Introducing the Node object
- Setting Node attributes
- Roles
- Community Cookbooks

Lesson Objectives

- After completing the lesson, you will be able to
  - Describe how Chef thinks about Infrastructure Automation
  - Define the following terms:
    - Resource
    - Recipe
    - Node
    - Run List
    - Search

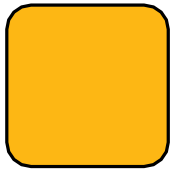
Complexity

http://www.flickr.com/photo1o1s/michaelheiss/3090102907/

Items of Manipulation (Resources)

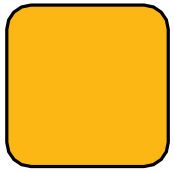
- Networking
- Files
- Directories
- Symlinks
- Mounts
- Registry Keys
- Powershell Scripts
- Users
- Groups
- Packages
- Services
- Filesystems

A tale of growth...

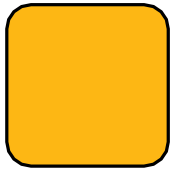


Applicatio
n

Add a database

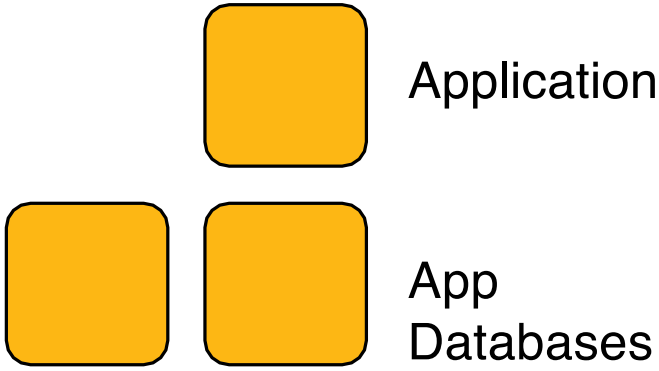


Application

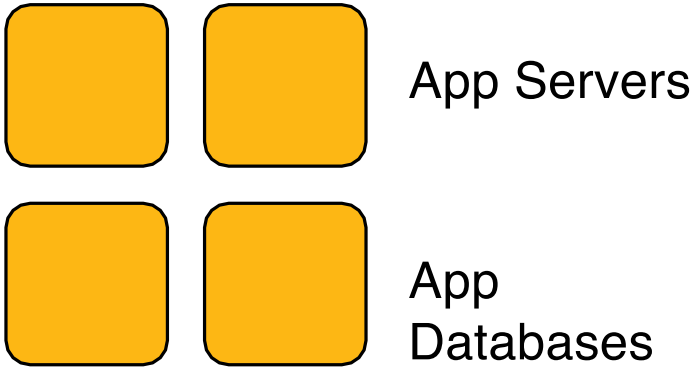


Application
Database

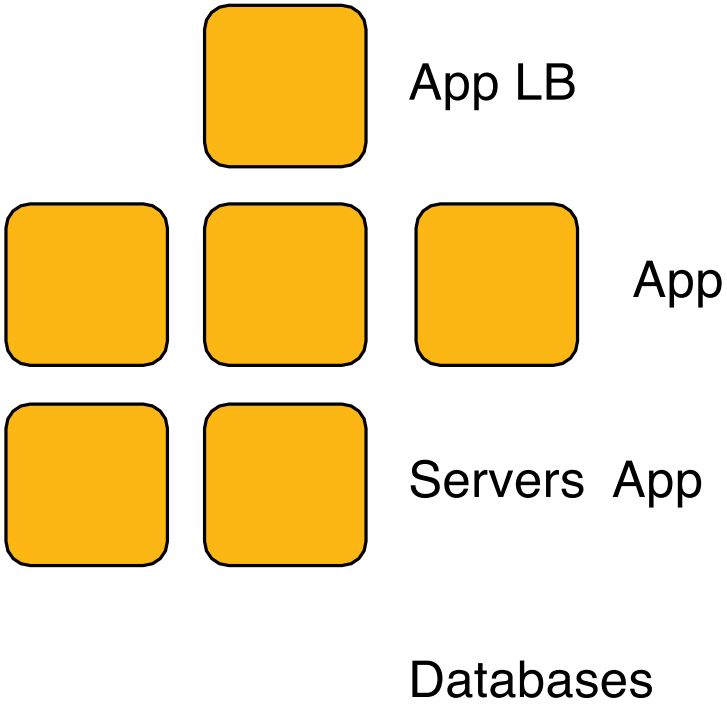
Make database redundant



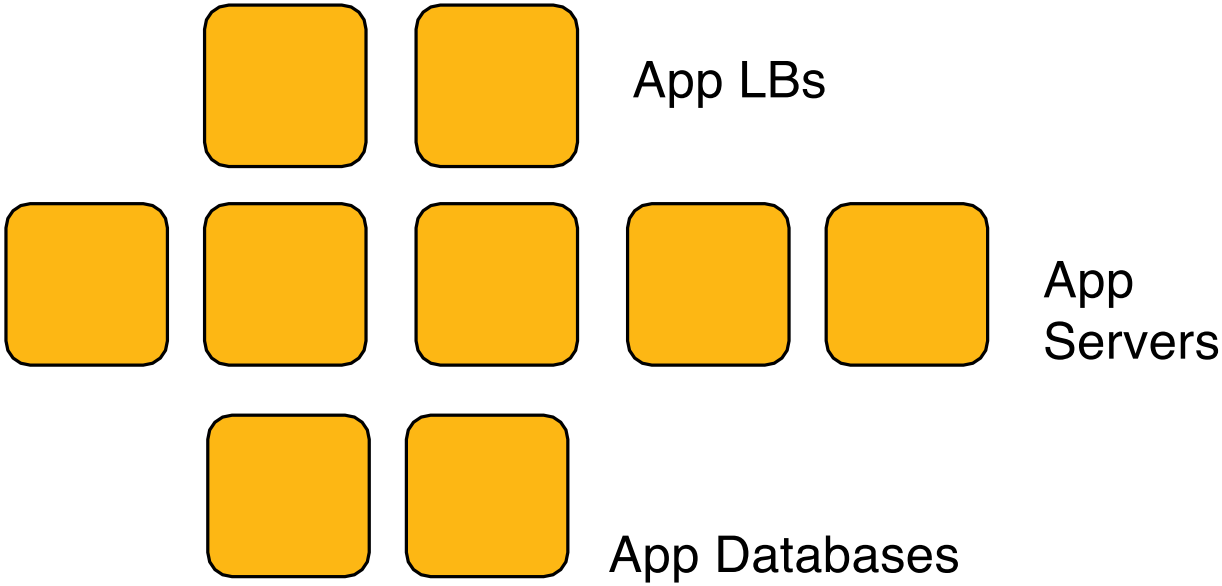
Application server redundancy



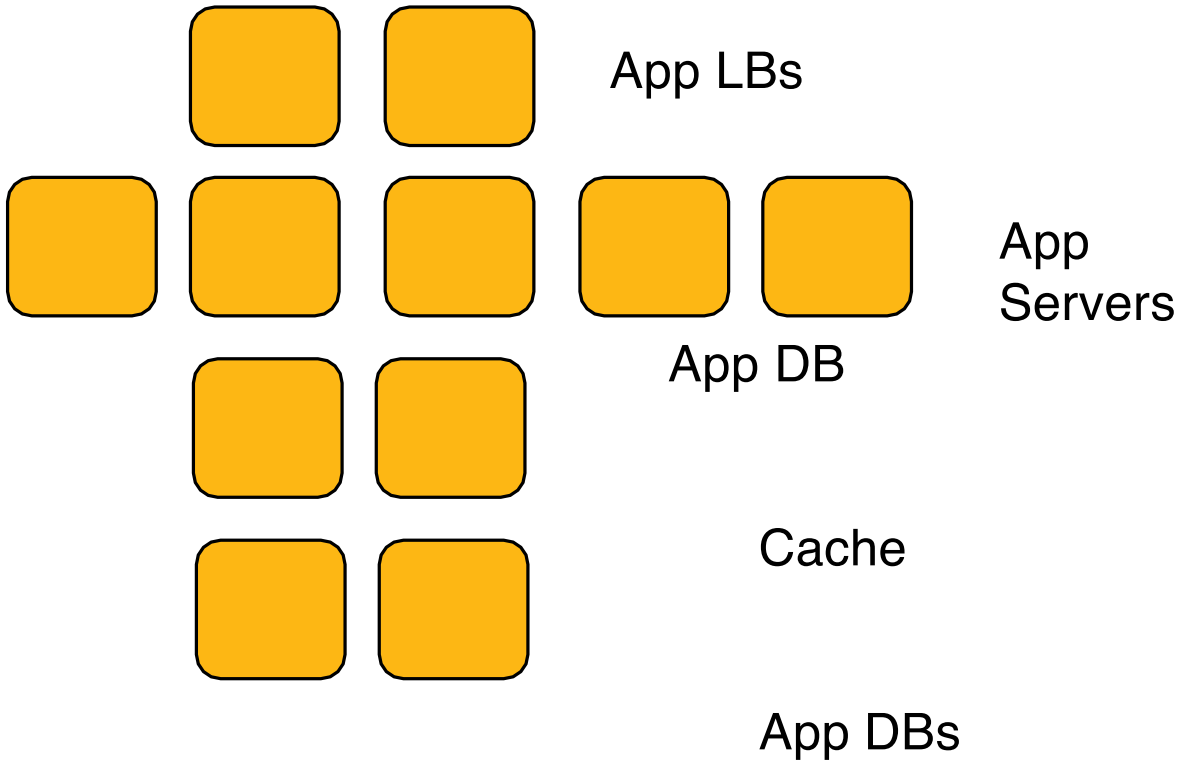
Add a load balancer



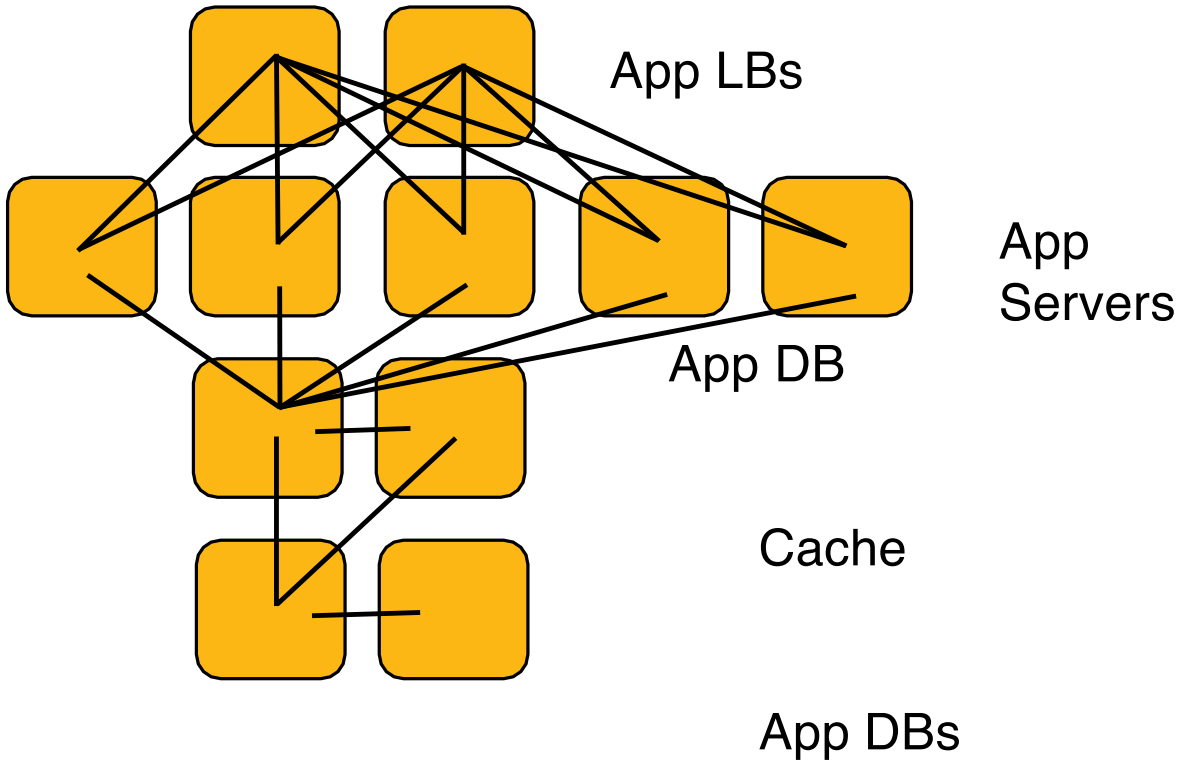
Webscale!



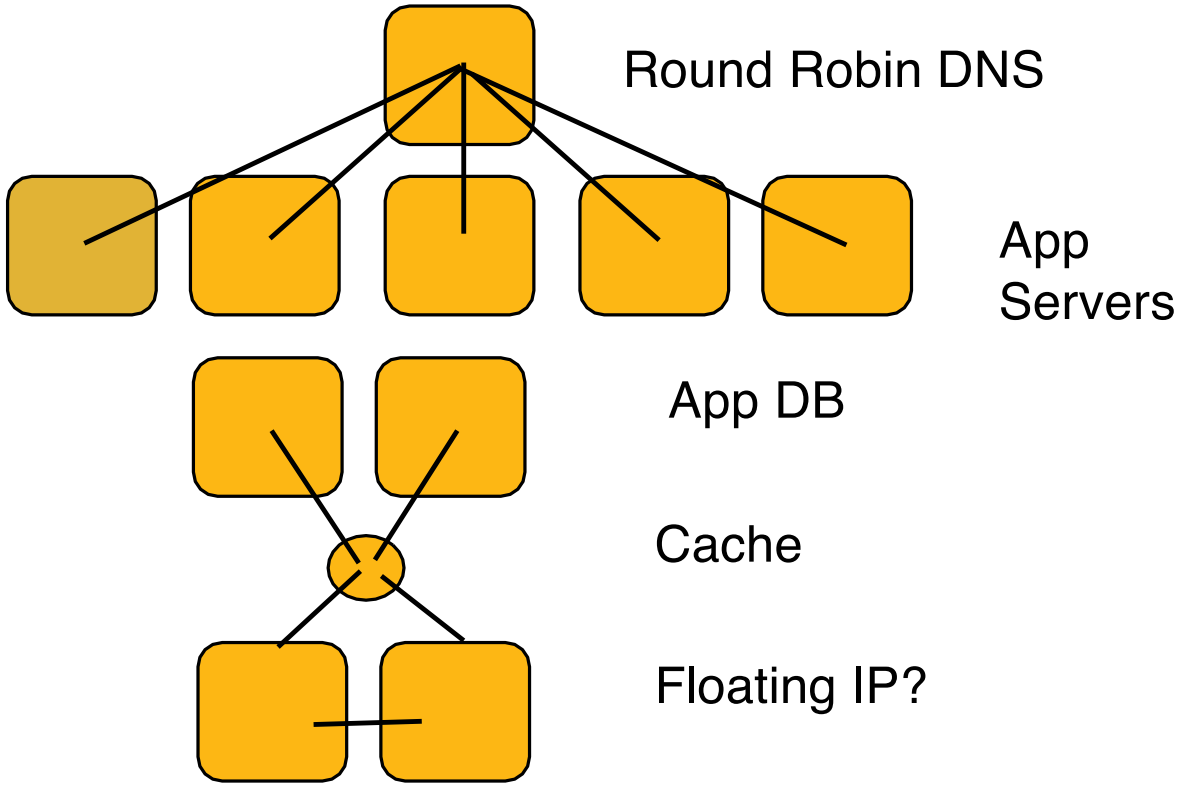
Now we need a caching layer



Infrastructure has a Topology

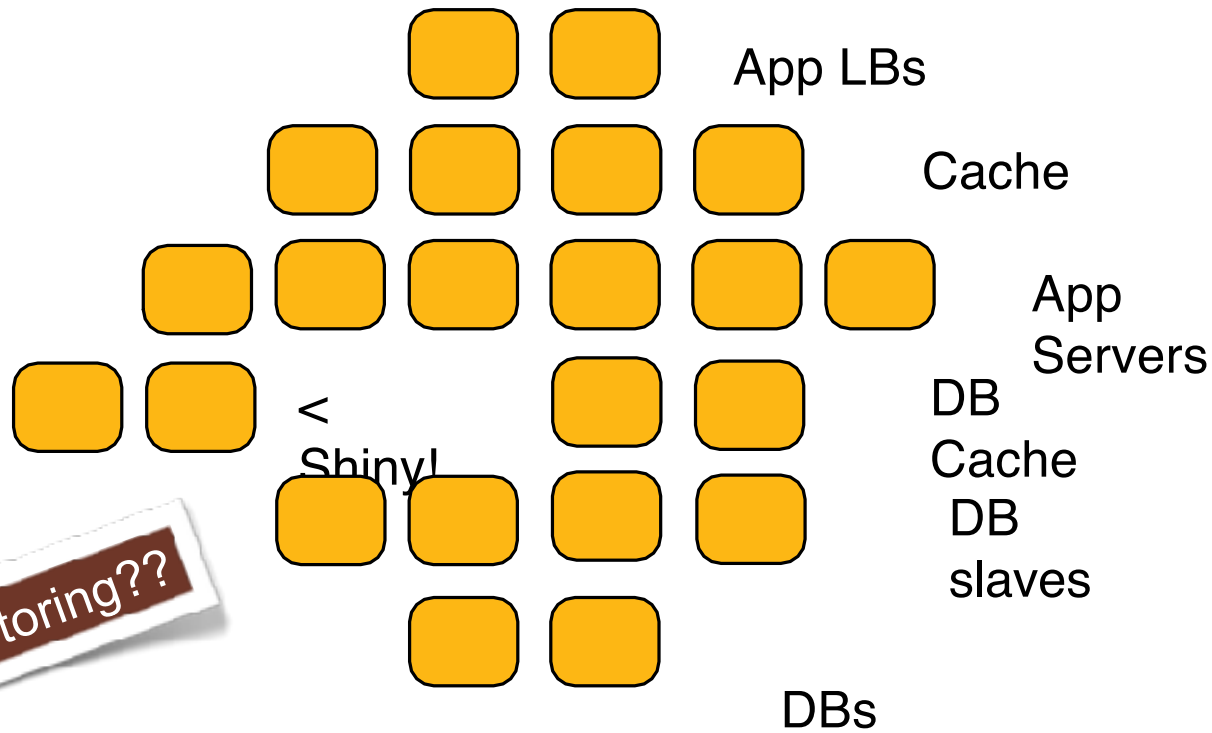


Your Infrastructure is a Snowflake



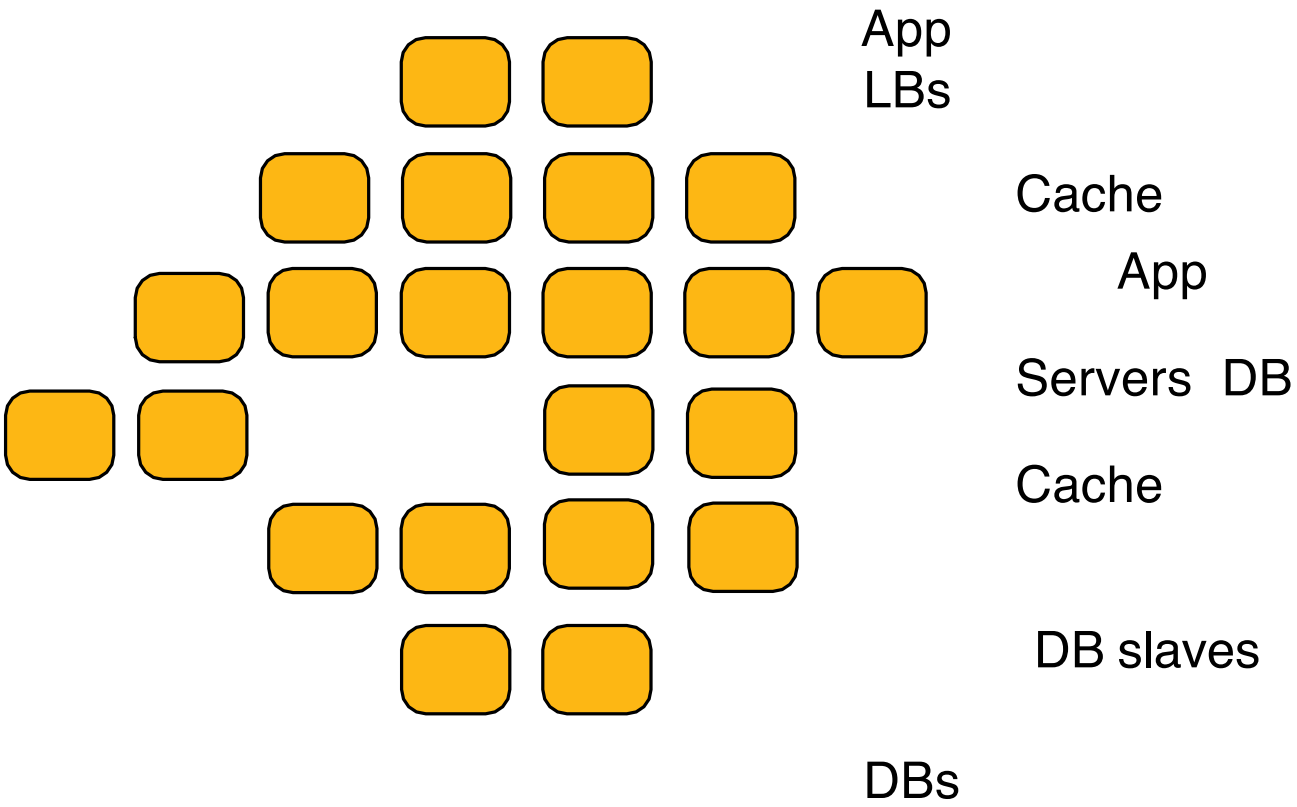
App DBs

Complexity Increases Quickly



Are we monitoring??

...and change happens!



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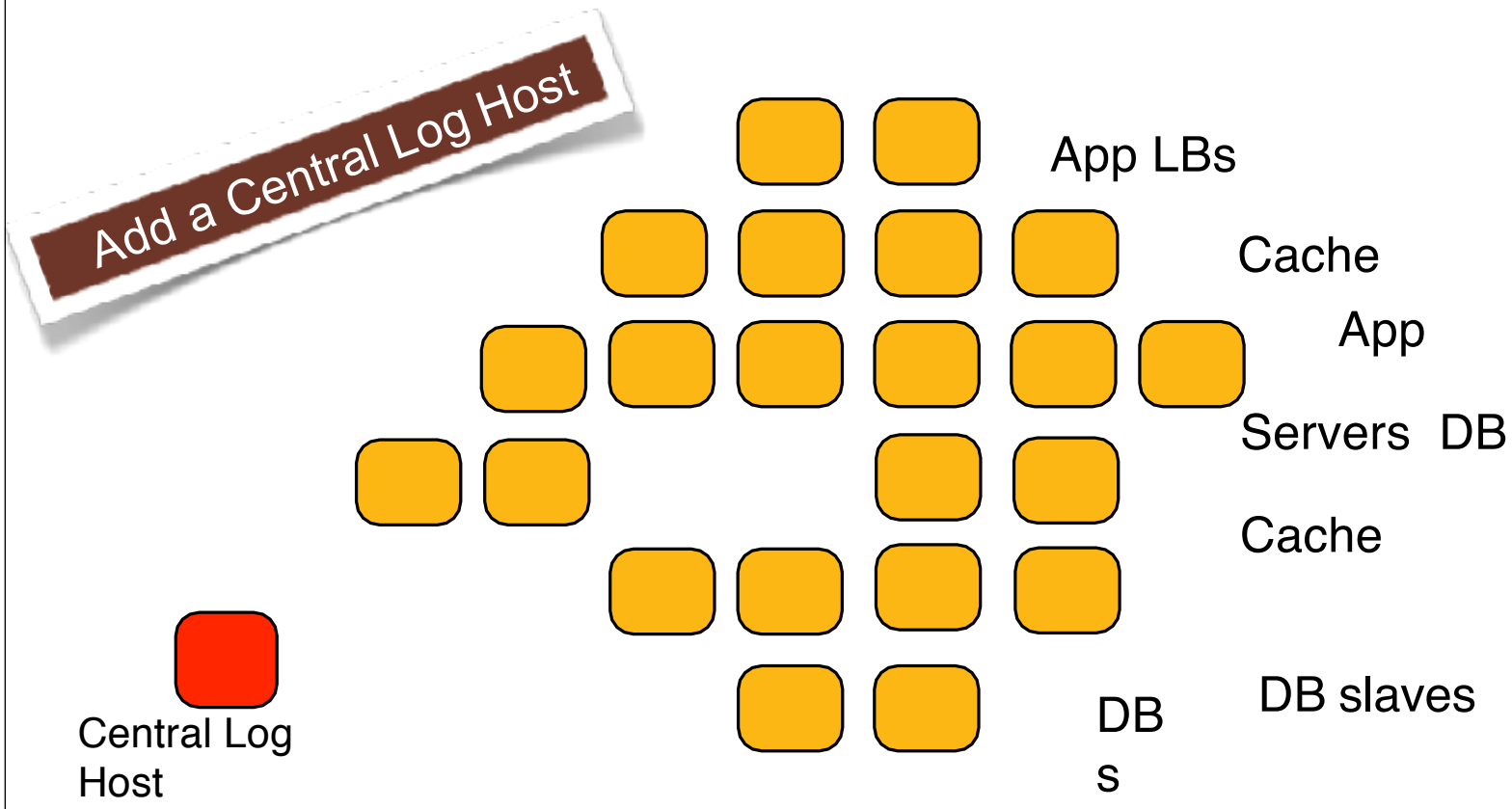
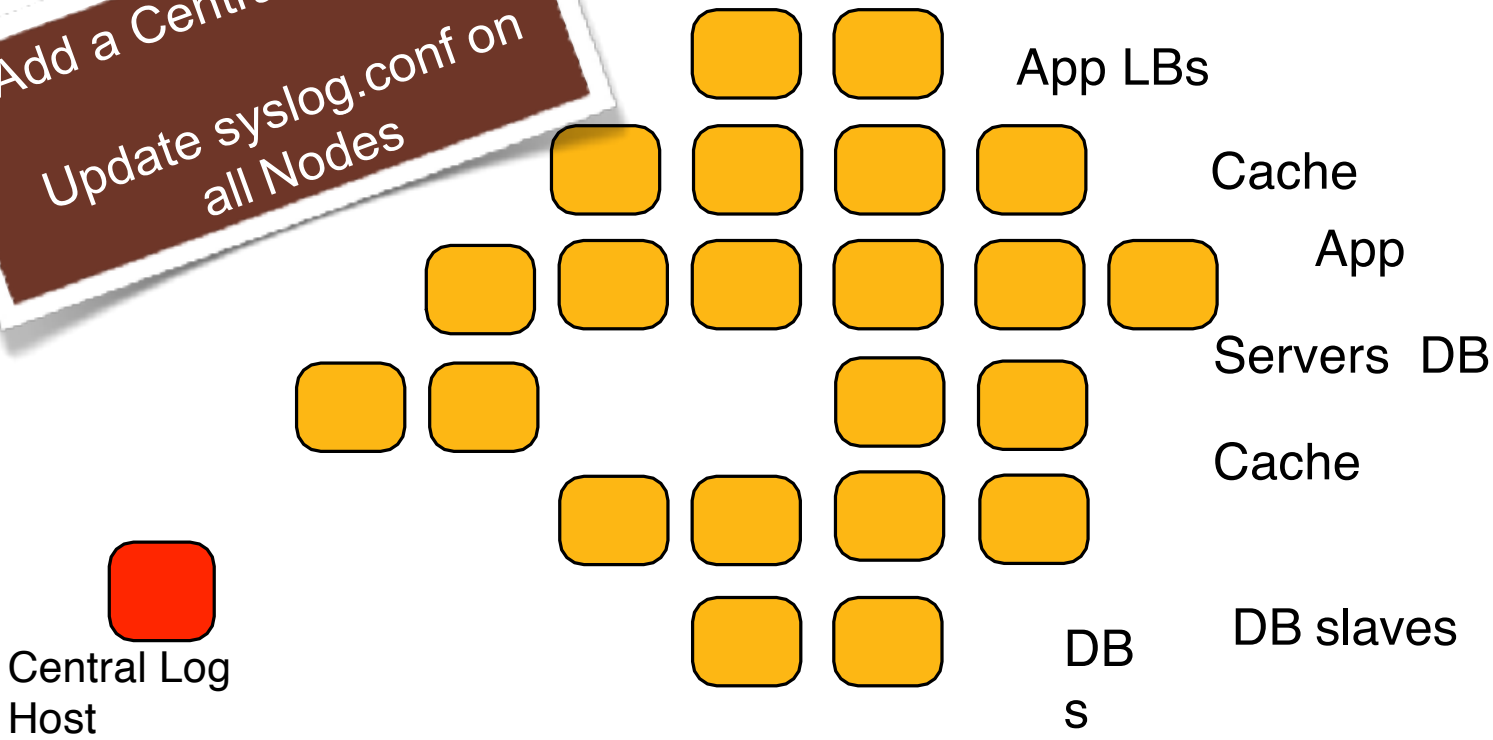


...and change happens!

Add a Central Log Host

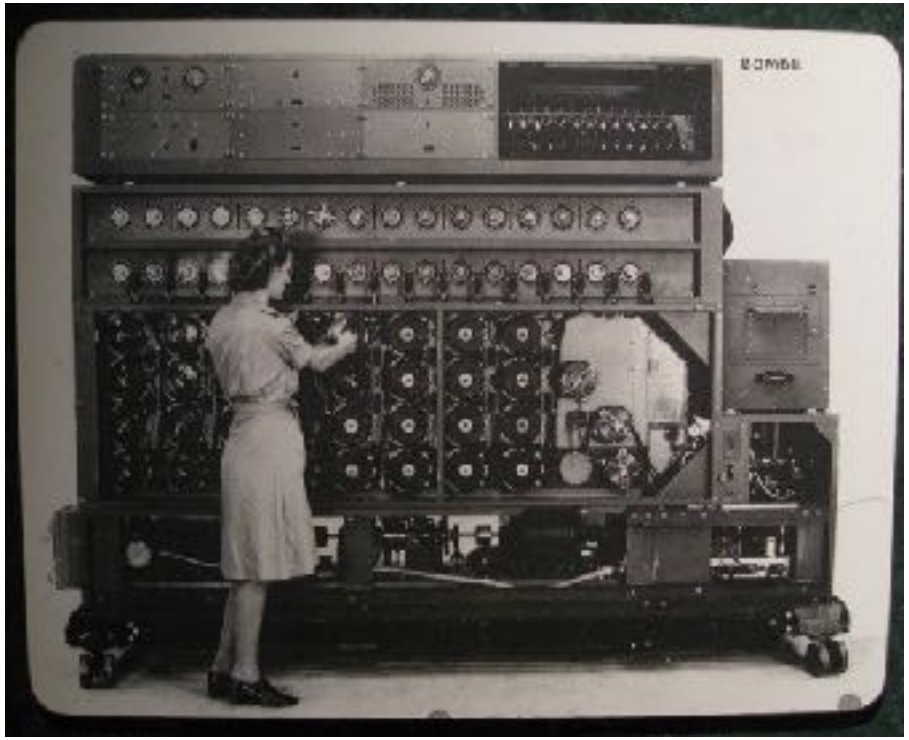
Update syslog.conf on all Nodes



Chef Solves This Problem

- But you already guessed that, didn't you?

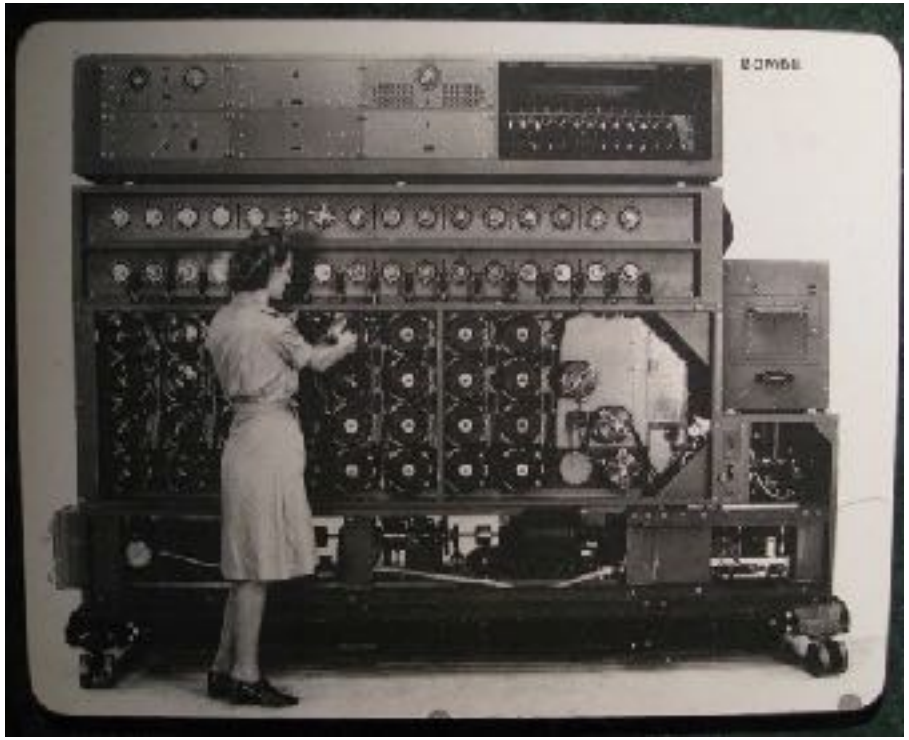
Chef is Infrastructure as Code



http://www.flickr.com/photos/louisb/4555295187/

- Programmatically provision and configure components

Chef is Infrastructure as Code



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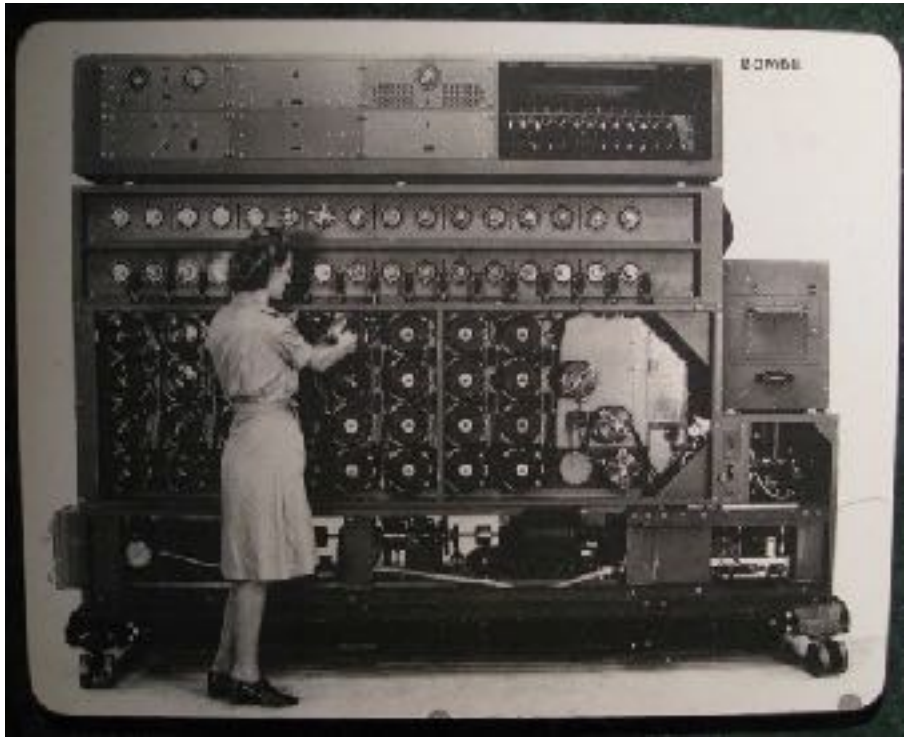
- Treat like any other code base

Chef is Infrastructure as Code



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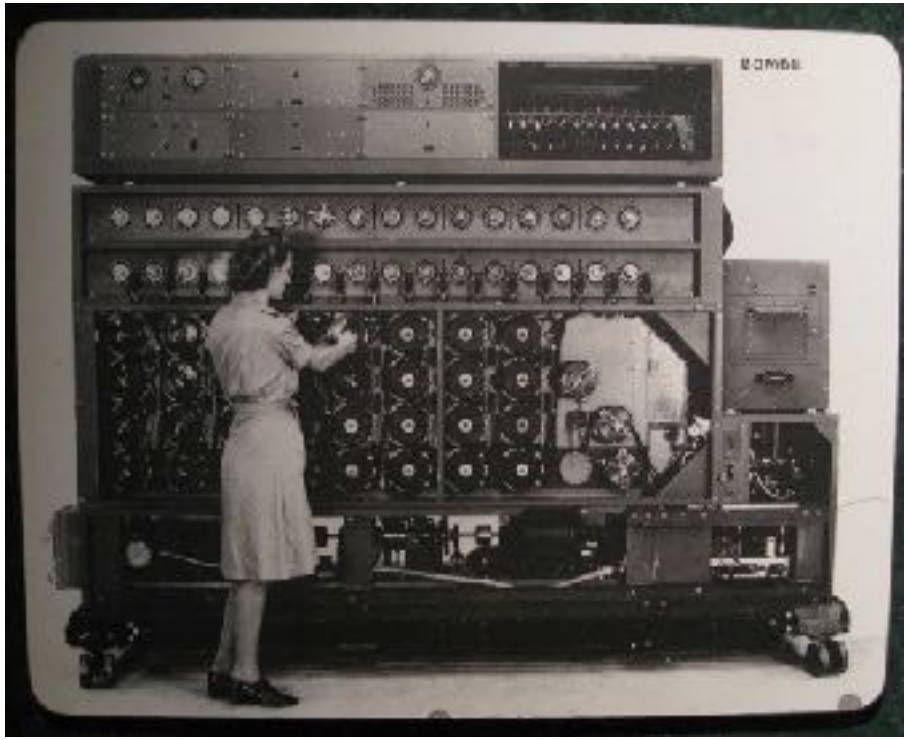
- Reconstruct business from **code repository**, **data backup**, and **compute resources**

Chef is Infrastructure as Code



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- Programmatically provision and configure components
- Treat like any other code base
- Reconstruct business from **code repository**, **data backup**, and **compute resources**

Configuration Code

- Chef ensures each Node complies with the policy
- Policy is determined by the configurations in each Node's run list
- Reduce management complexity through abstraction
- Store the configuration of your infrastructure in version control

Declarative Interface to Resources

- You define the policy in your Chef configuration
- Your policy states what state each resource should be in, but not how to get there
- Chef-client will pull the policy from the Chef Server and enforce the policy on the Node

Managing Complexity

- Resources
- Recipes
- Nodes
- Search

Resources

- A Resource represents a piece of the system and its desired state
  - A package that should be installed
  - A service that should be running
  - A file that should be generated
  - A cron job that should be configured
  - A user that should be managed
  - and more

Resources in Recipes

- Resources are the fundamental building blocks of Chef configuration
- Resources are gathered into Recipes
- Recipes ensure the system is in the desired state

Recipes

- Configuration files that describe resources and their desired state
- Recipes can:
  - Install and configure software components
  - Manage files
  - Deploy applications
  - Execute other recipes
  - and more

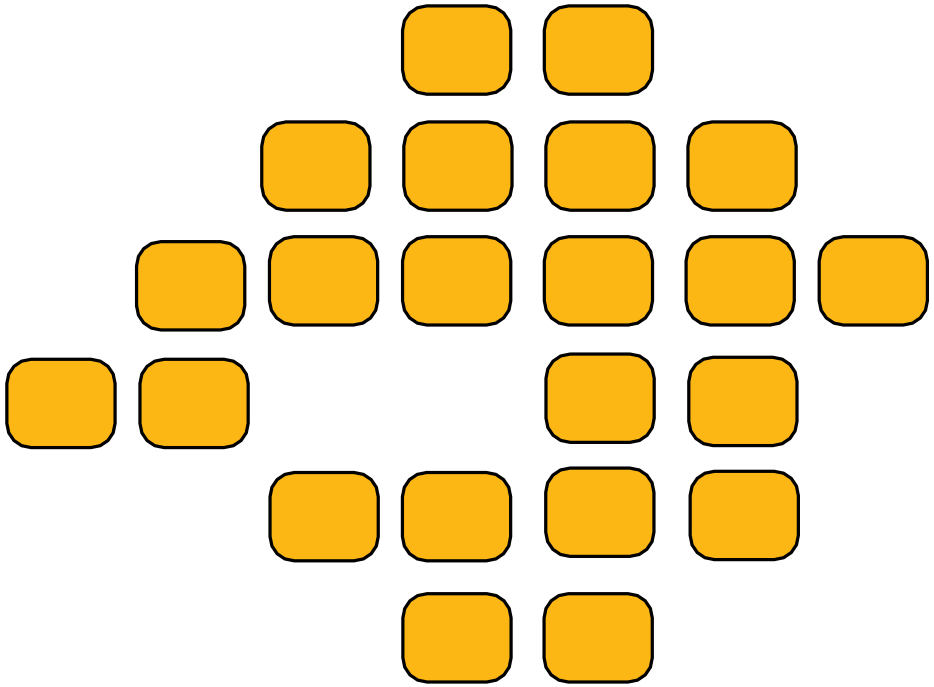
Example Recipe

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

```
template "/etc/httpd/conf/httpd.conf" do
  source "httpd.conf.erb"
  owner "root"
  group "root"
  mode "0644"
  variables(:allow_override => "All")
  notifies :reload, "service[httpd]"
end
```

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

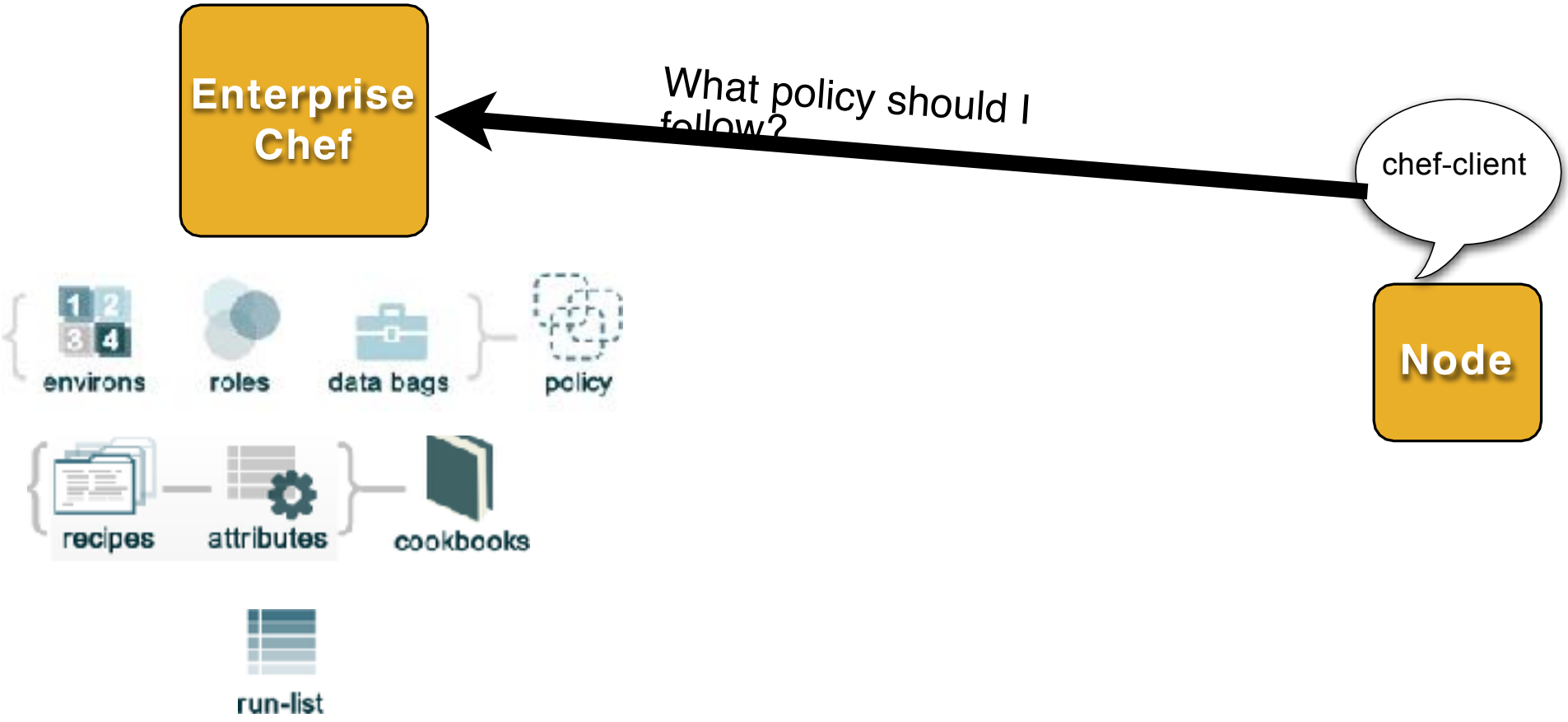
Nodes



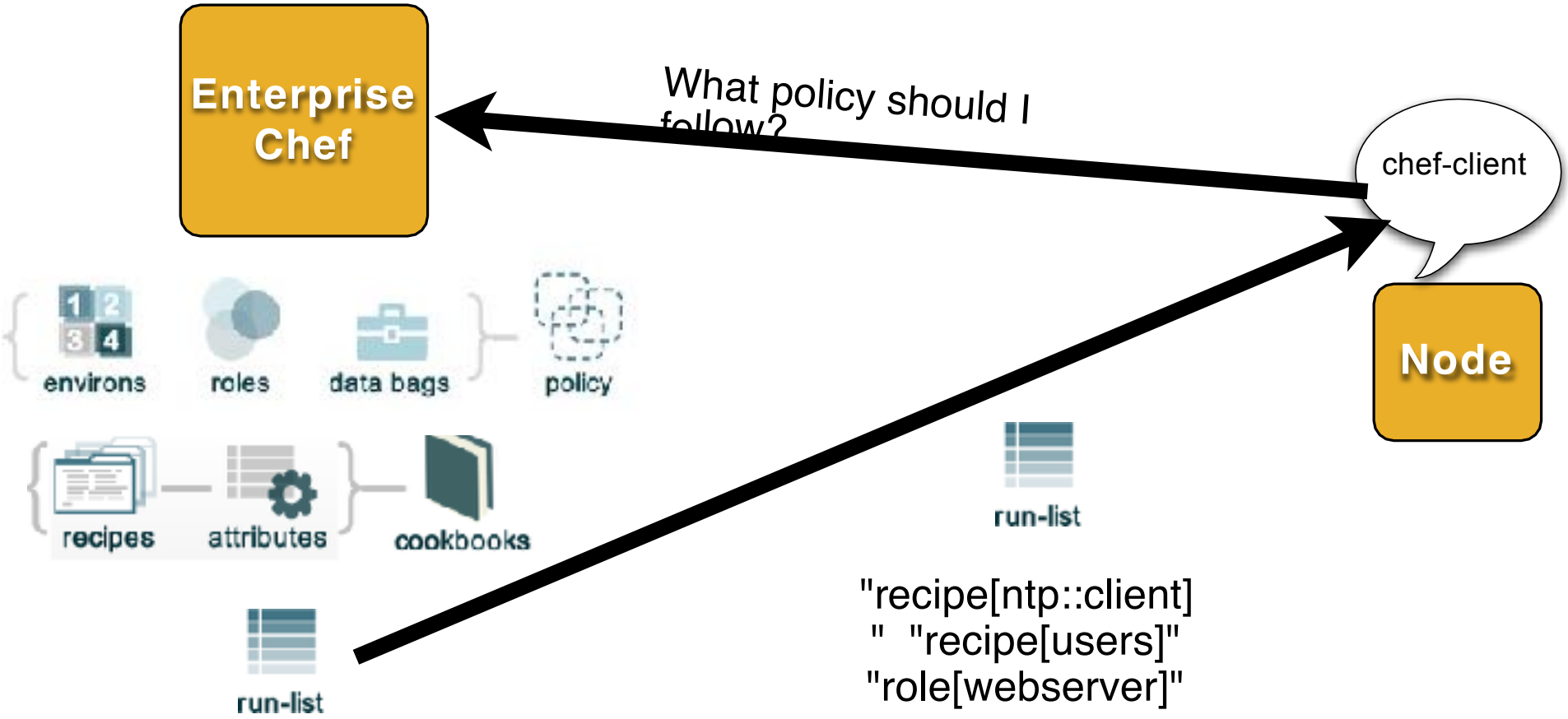
Nodes Adhere to Policy

- The chef-client application runs on each node, which
  - Gathers the current system configuration of the node
  - Downloads the desired system configuration policies from the Chef server for that node
  - Configures the node such that it adheres to those policies

Run List


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

Run List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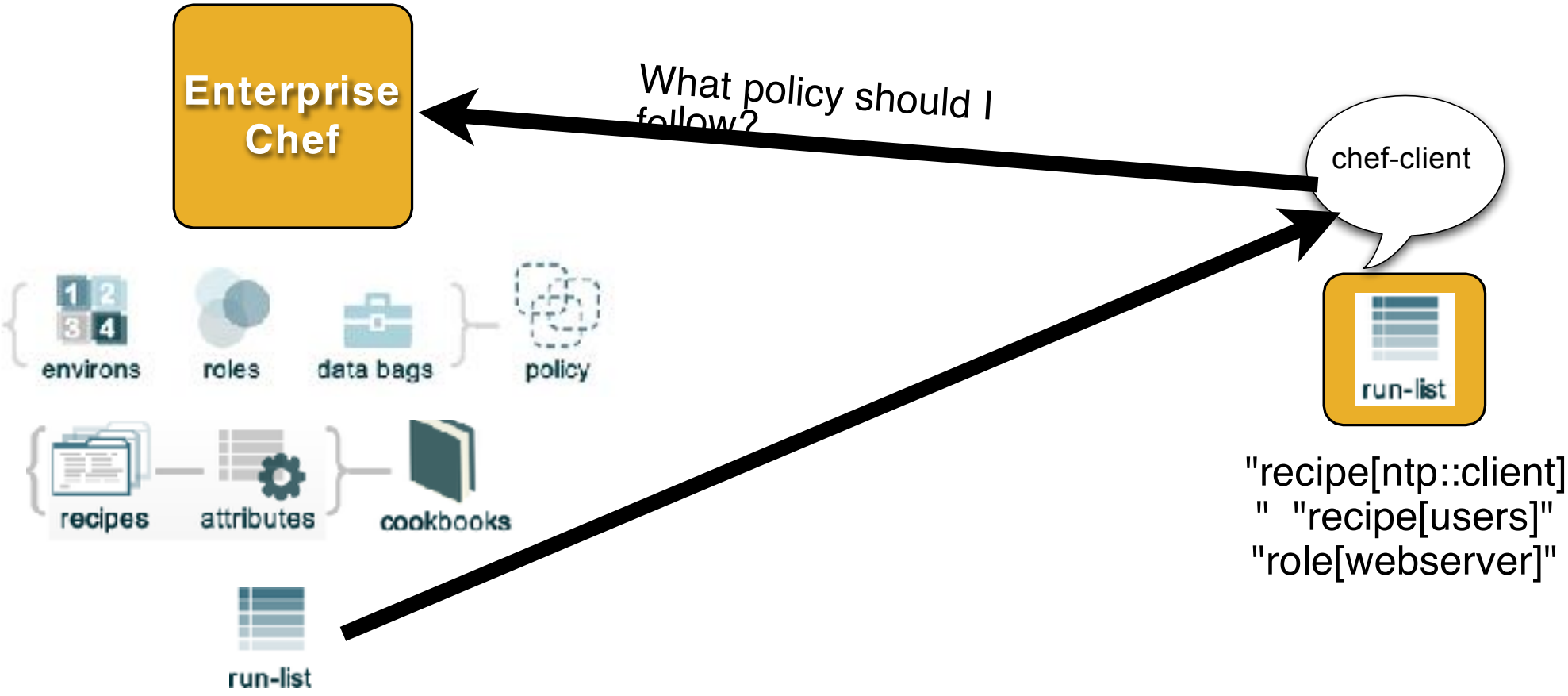
Run List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Run List Specifies Policy

- The Run List is an ordered collection of policies that the Node should follow
- Chef-client obtains the Run List from the Chef Server
- Chef-client ensures the Node complies with the policy in the Run List

Search

- Search for nodes with Roles
- Find Topology Data

- IP addresses
- Hostnames
- FQDNs

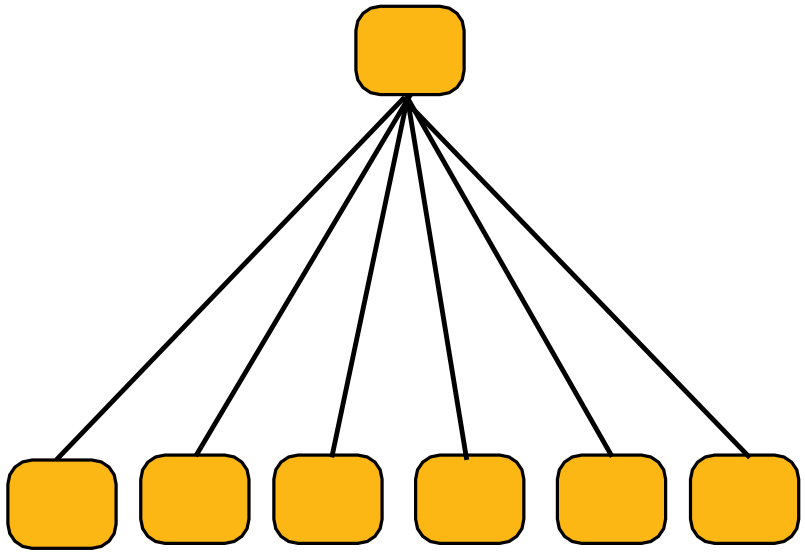
http://www.flickr.com/photos/kathycsus/2686772625

Search for Nodes

```
pool_members = search("node","role:webserver")

template "/etc/haproxy/haproxy.cfg" do
  source "haproxy-app_lb.cfg.erb"
  owner "root"
  group "root"
  mode 0644
  variables :pool_members => pool_members.uniq
  notifies :restart, "service[haproxy]"
end
```

HAProxy Configuration



HAProxy Load Balancer

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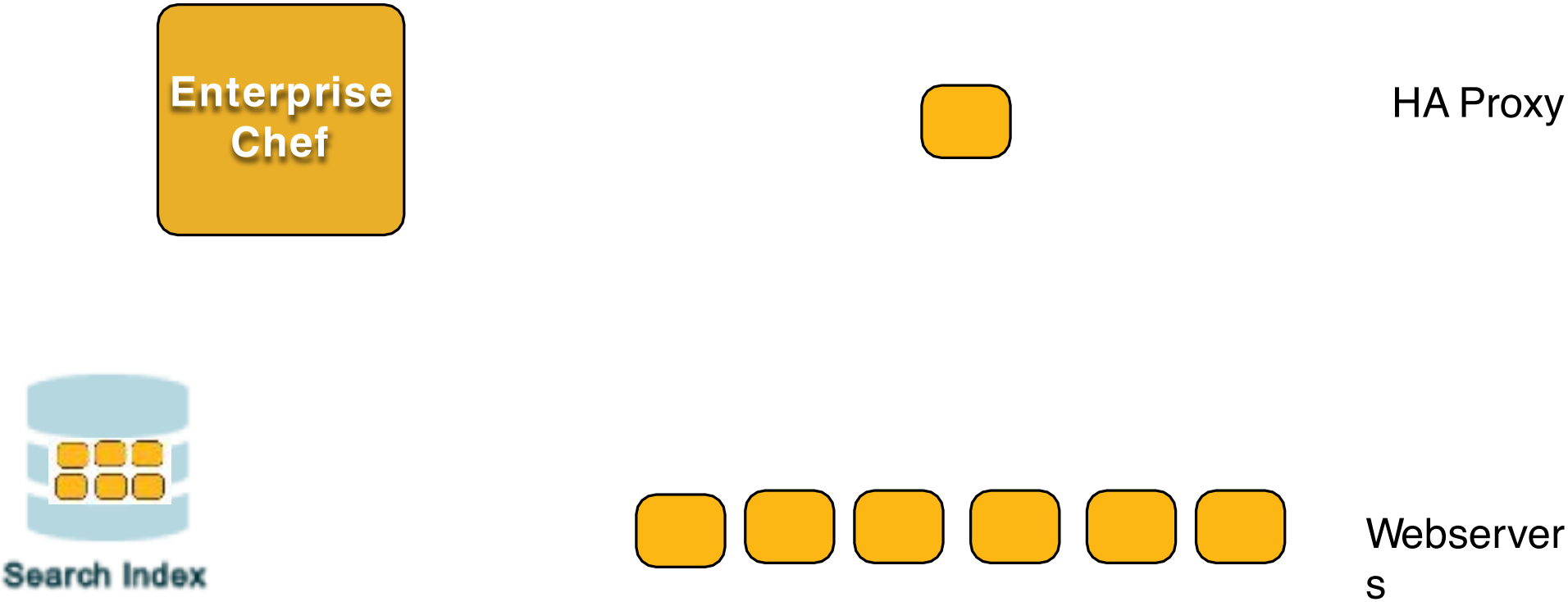

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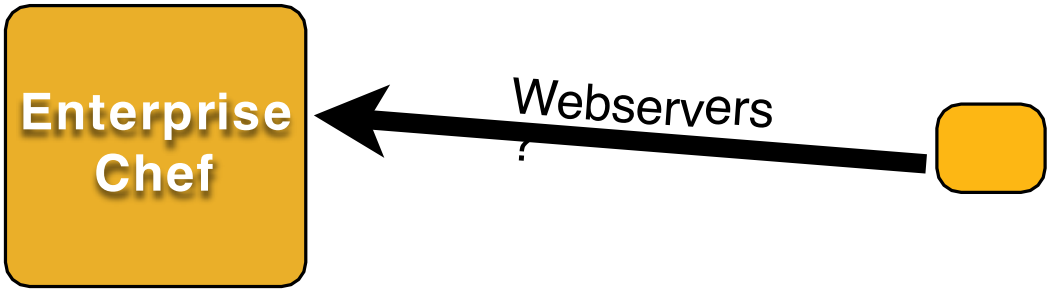
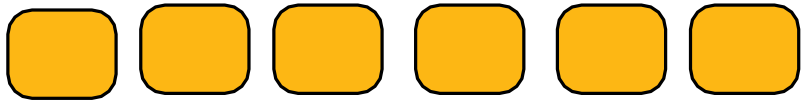


HA Proxy



Webservers

HAProxy Load Balancer

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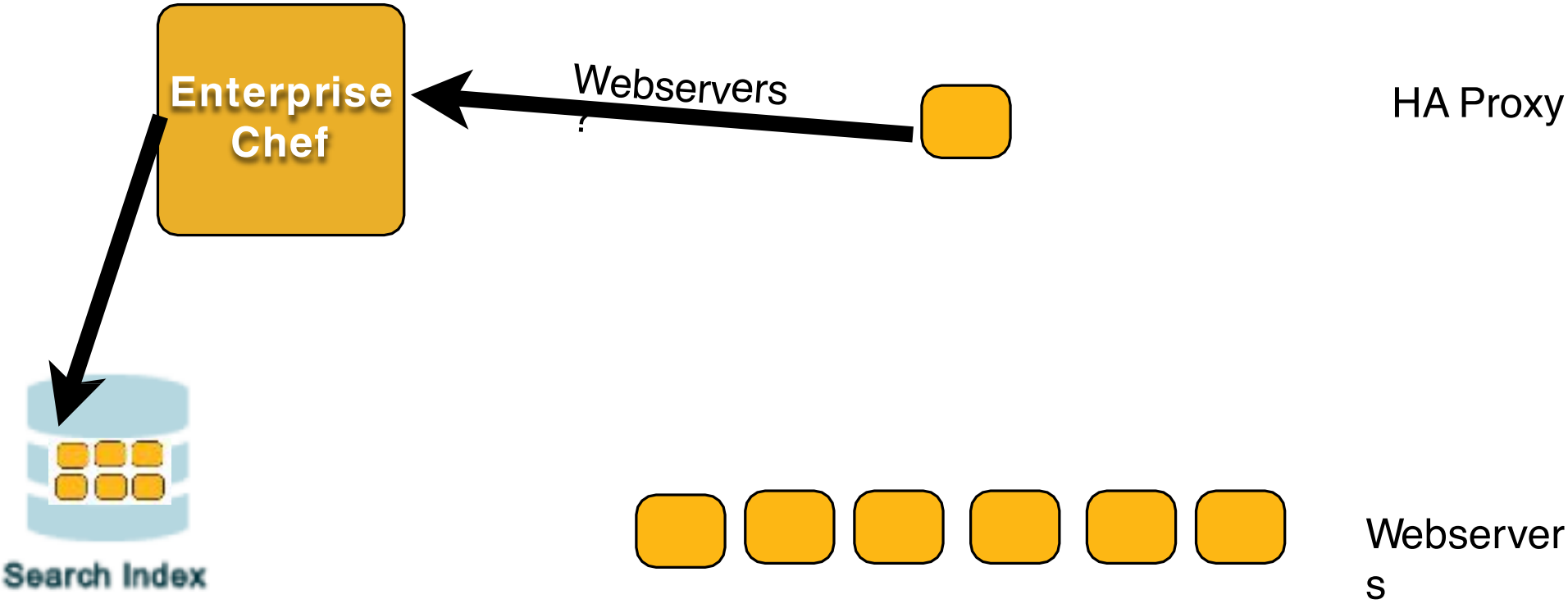

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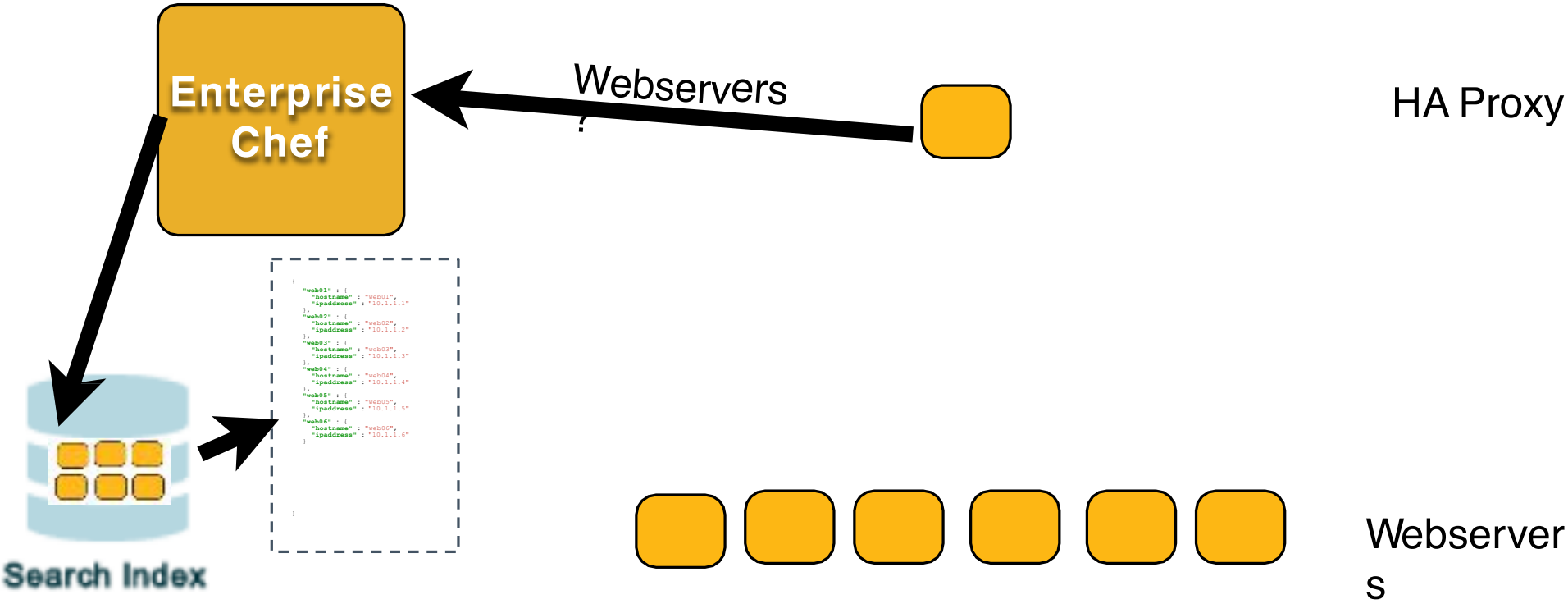

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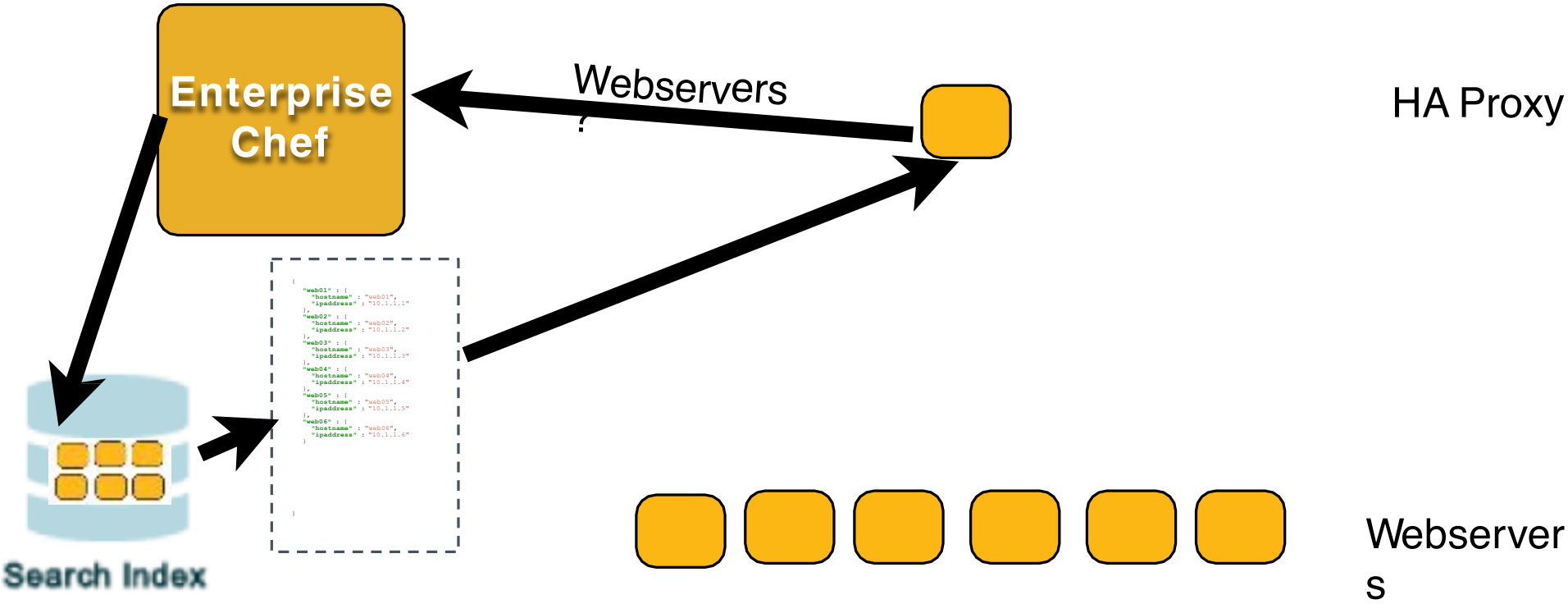

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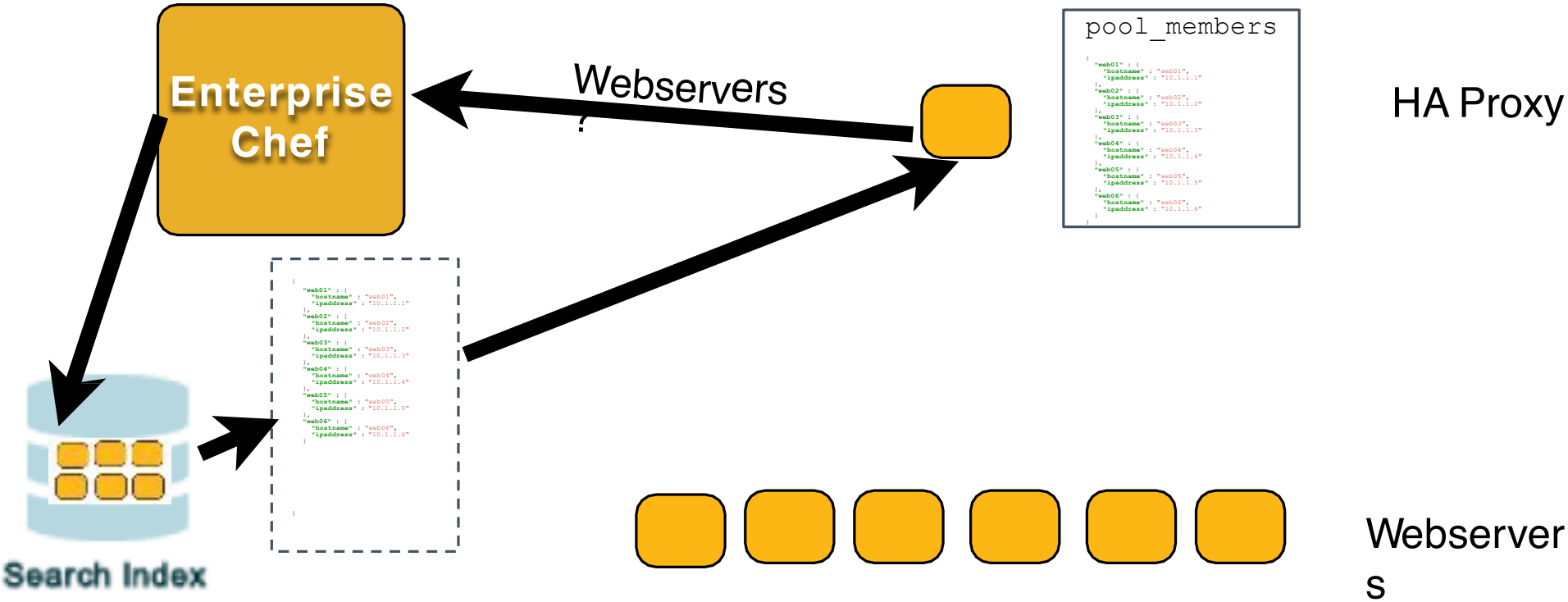

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  source "haproxy-app_lb.cfg.erb"
  owner "root"
  group "root"
  mode 0644
  variables :pool_members => pool_members.uniq

  notifies :restart, "service[haproxy]"
end
```

Pass results into Templates

```
 # Set up application listeners here.
listen application 0.0.0.0:80
  balance roundrobin
  <% @pool_members.each do |member| -%>

  server <%= member[:hostname] %> <%= member[:ipaddress] %>:>
weight 1 maxconn 1 check
  <% end -%>
<% if node["haproxy"]["enable_admin"] -%>
listen admin 0.0.0.0:22002
  mode http
  stats uri /
<% end -%>
```

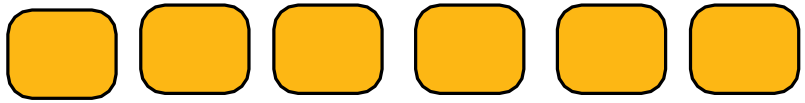
HAProxy Configuration

```
<% @pool_members.each do |member| -%>
server <%= member[:hostname] %> <%= member[:ipaddress] %>:> weight 1 maxconn 1 check
<% end -%>
```

pool_members


```
{
  "web01" : {
    "hostname" : "web01",
    "ipaddress" : "10.1.1.1"
  },
  "web02" : {
    "hostname" : "web02",
    "ipaddress" : "10.1.1.2"
  },
  "web03" : {
    "hostname" : "web03",
    "ipaddress" : "10.1.1.3"
  },
  "web04" : {
    "hostname" : "web04",
    "ipaddress" : "10.1.1.4"
  },
  "web05" : {
    "hostname" : "web05",
    "ipaddress" : "10.1.1.5"
  },
  "web06" : {
    "hostname" : "web06",
    "ipaddress" : "10.1.1.6"
  }
}
```


HA Proxy



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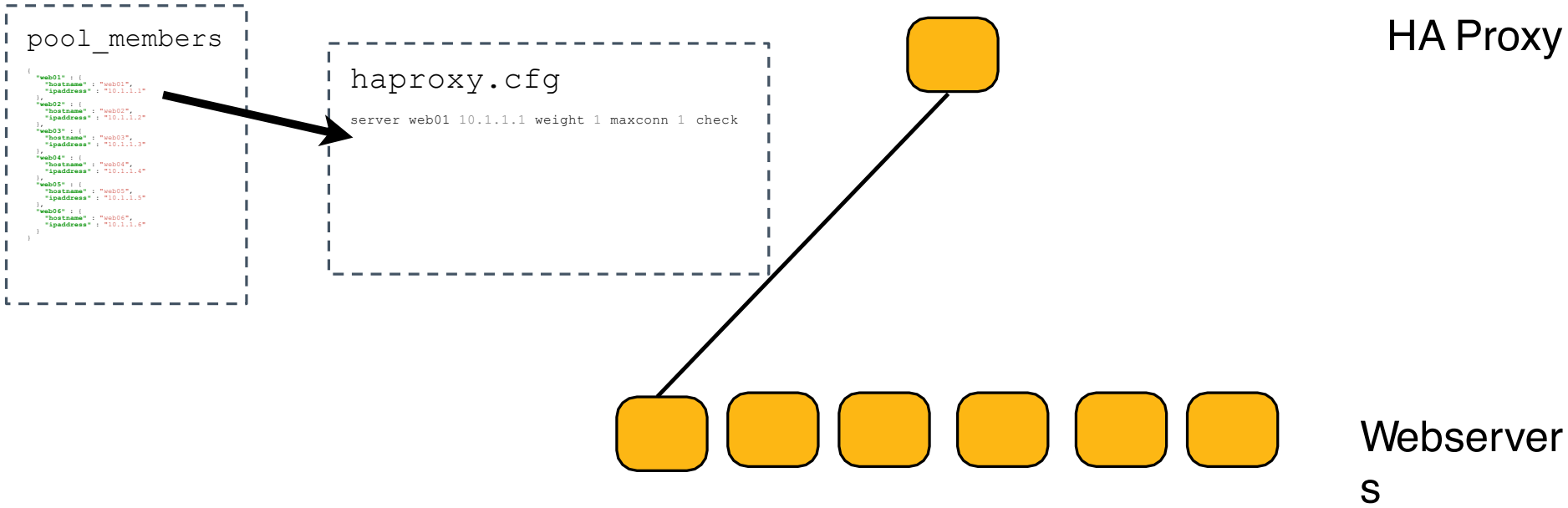

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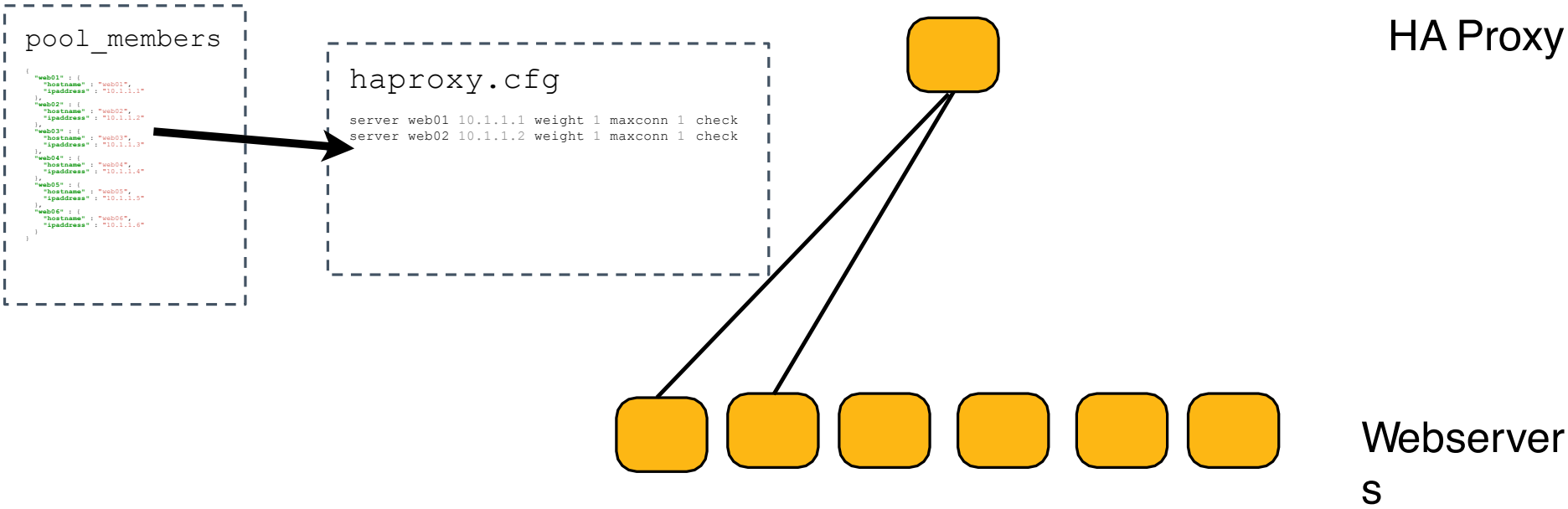

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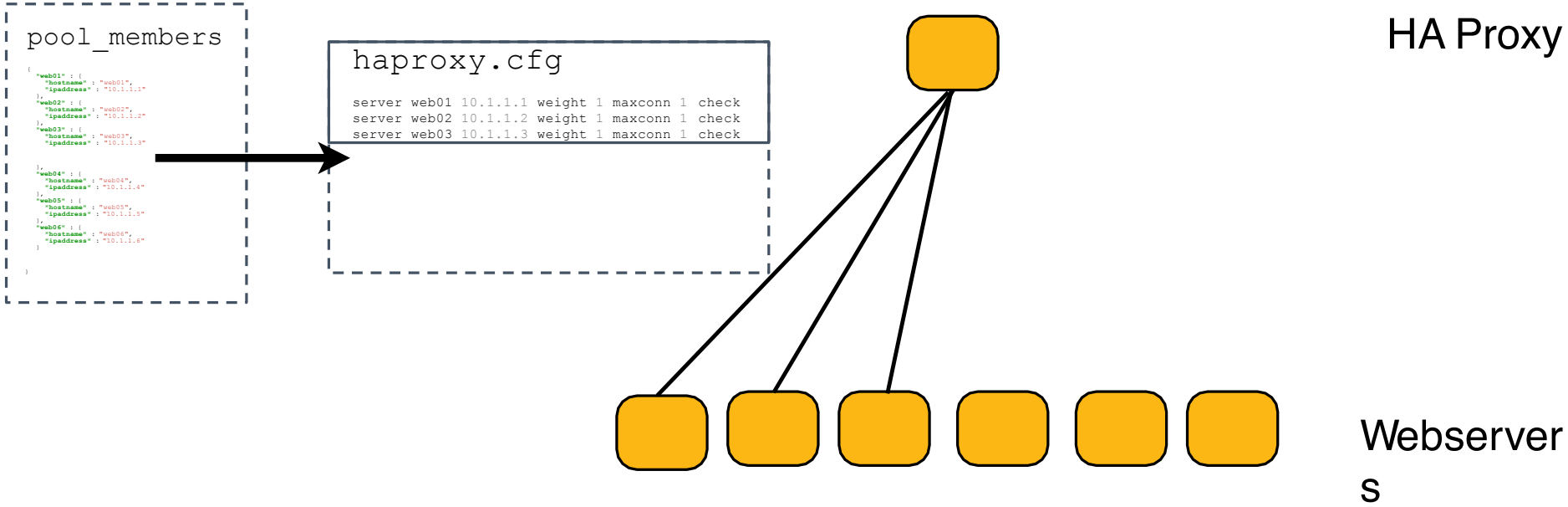

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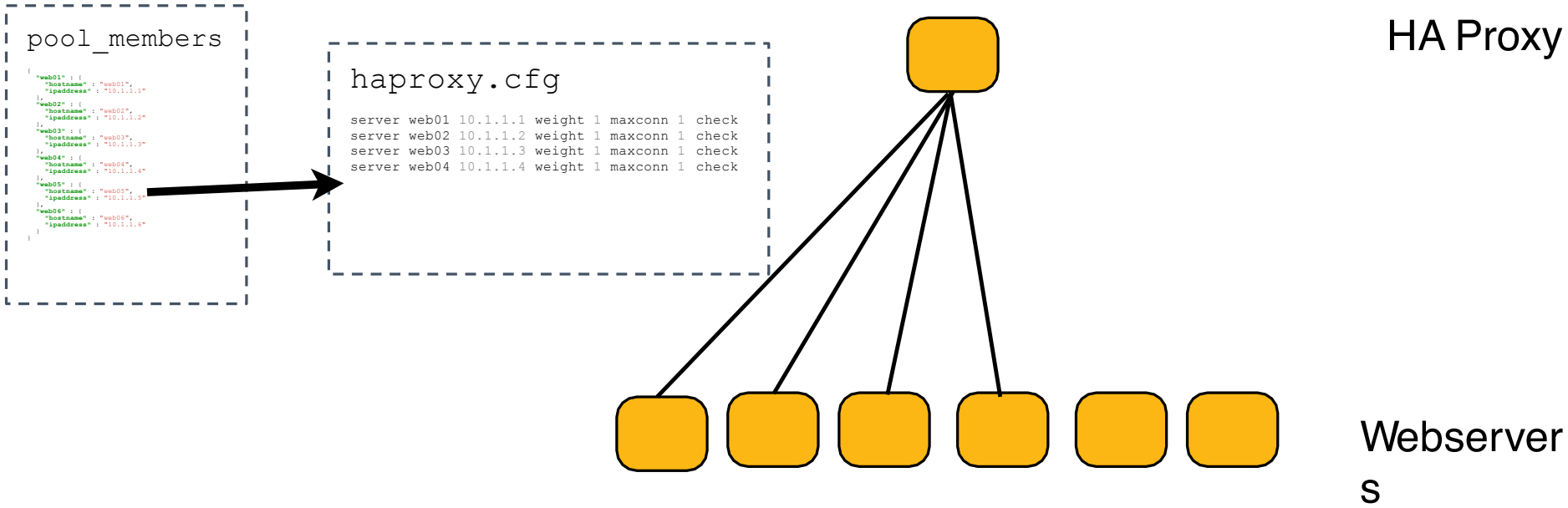

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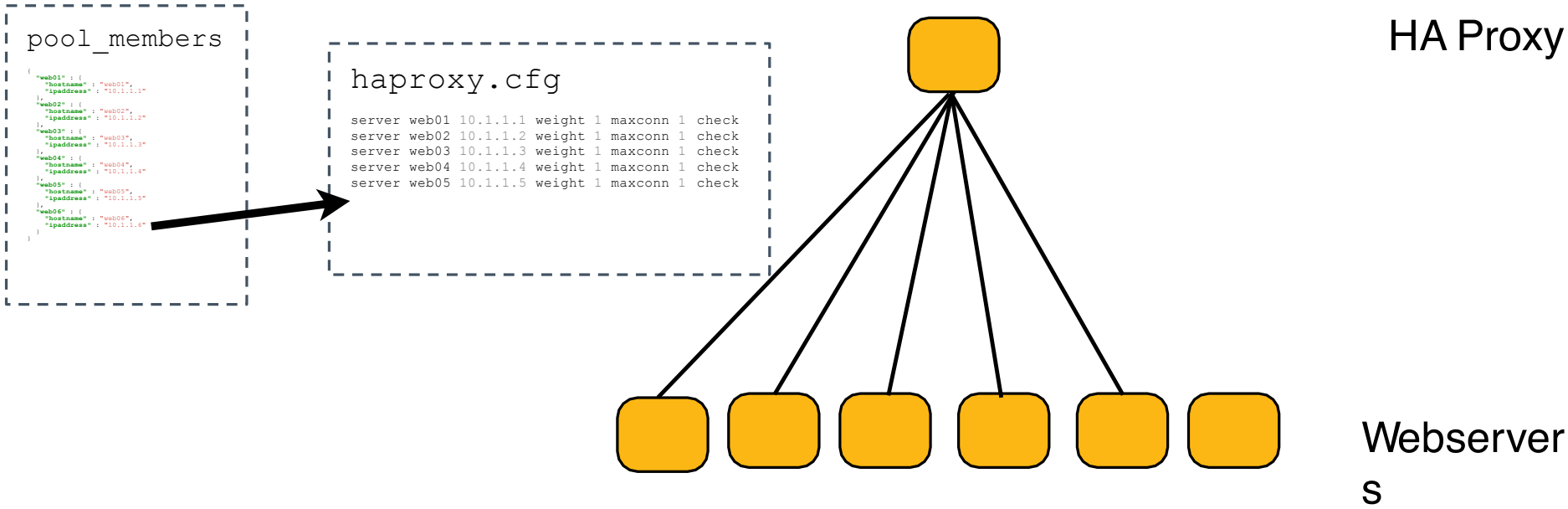

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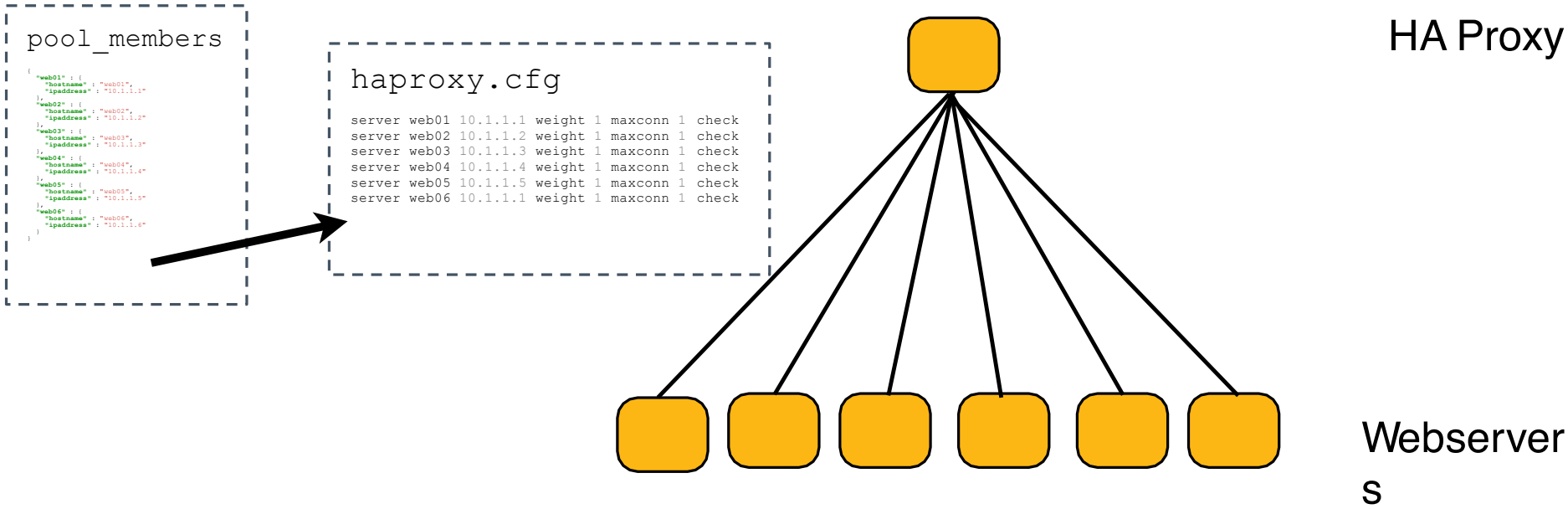
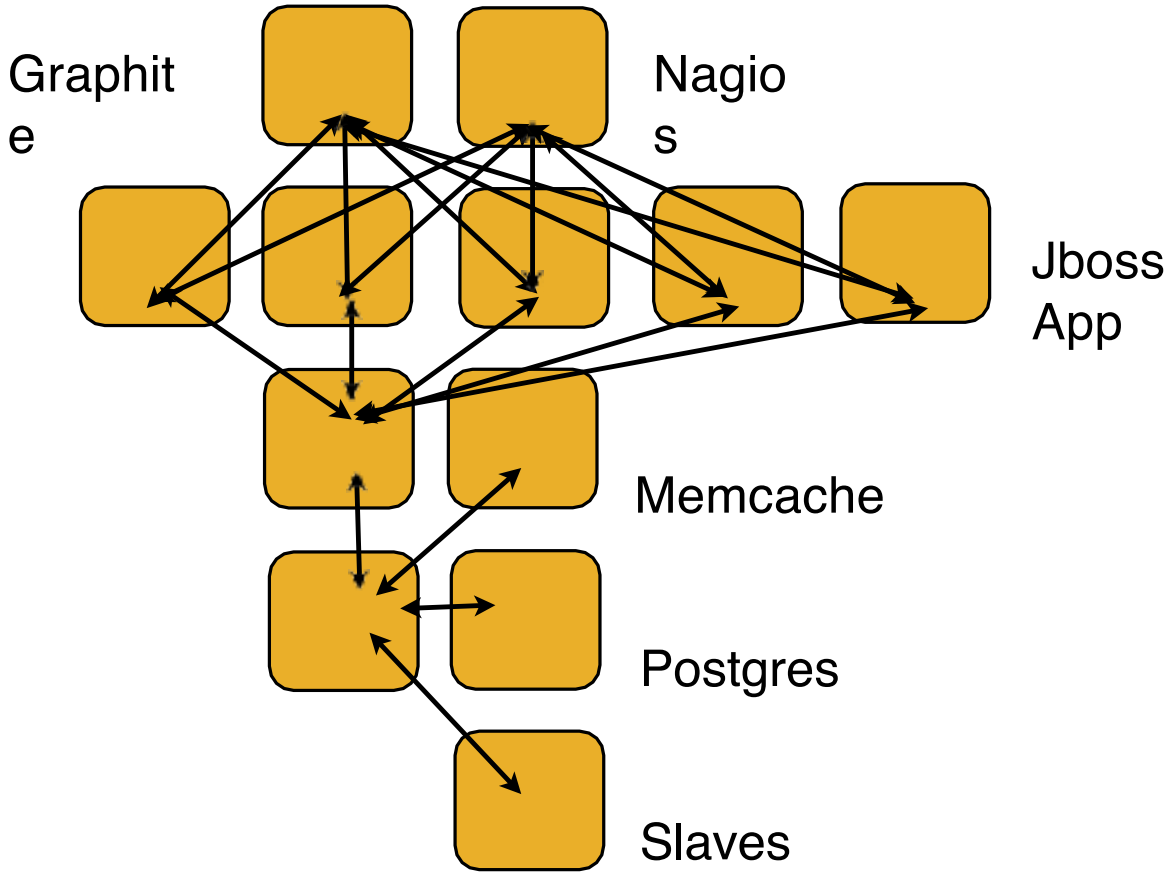
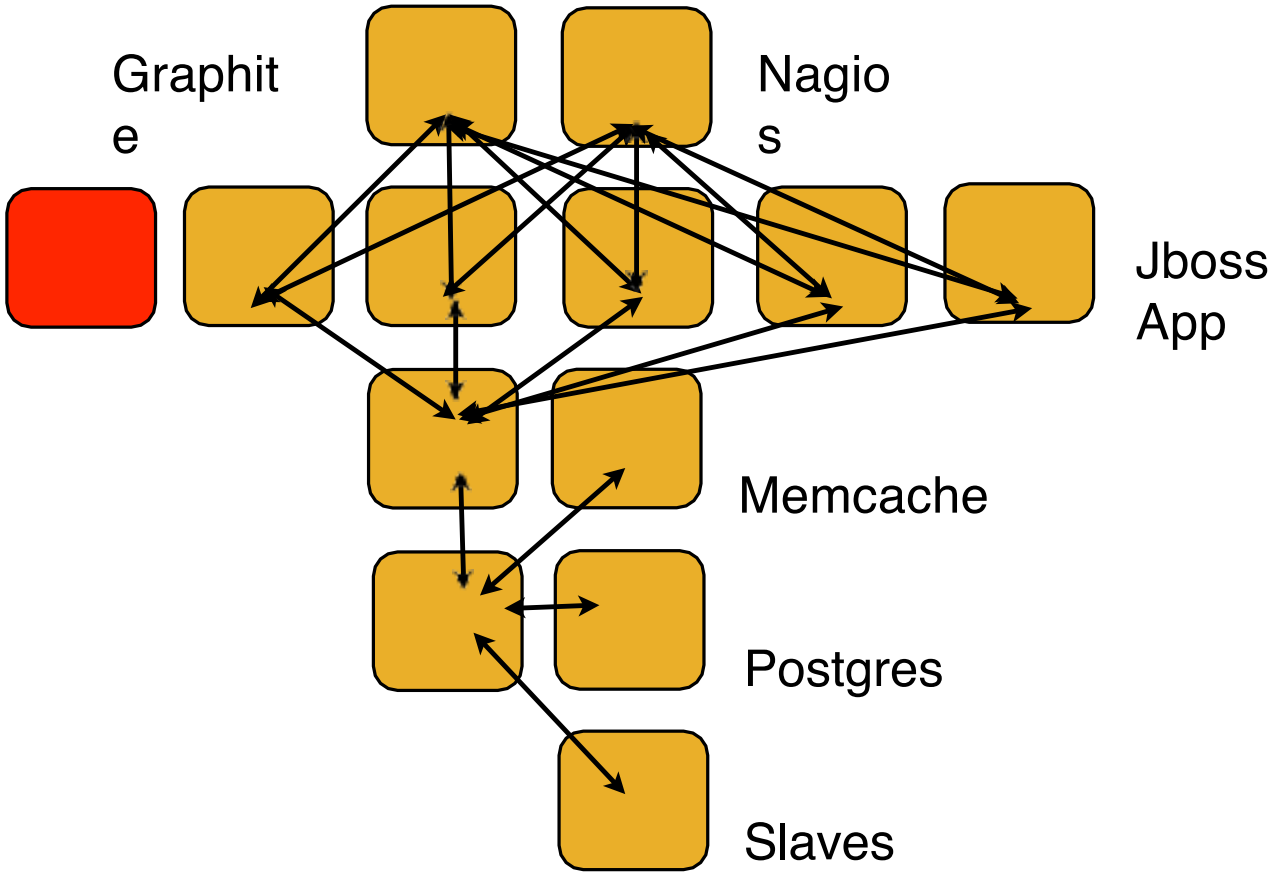


So when this...



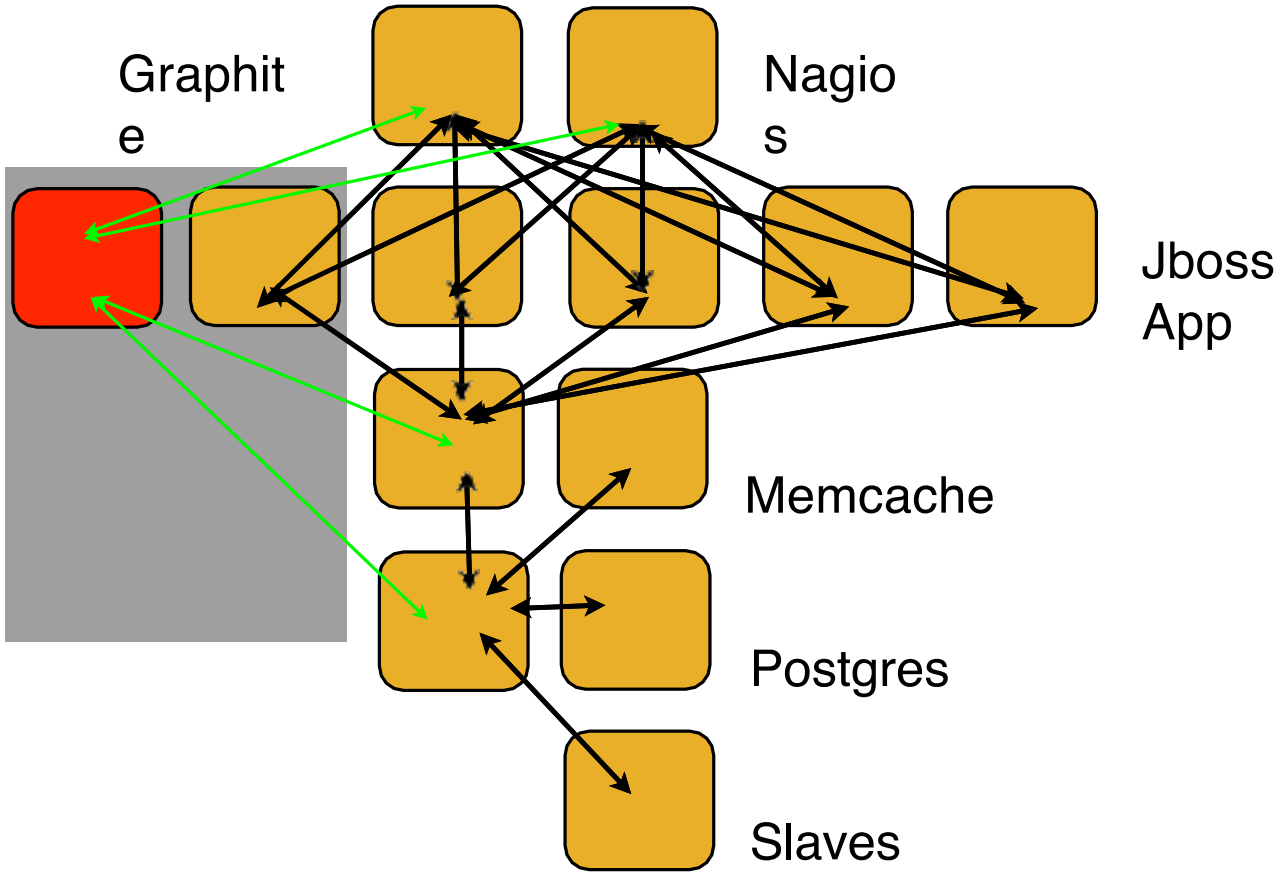
Postgres Master

...becomes this



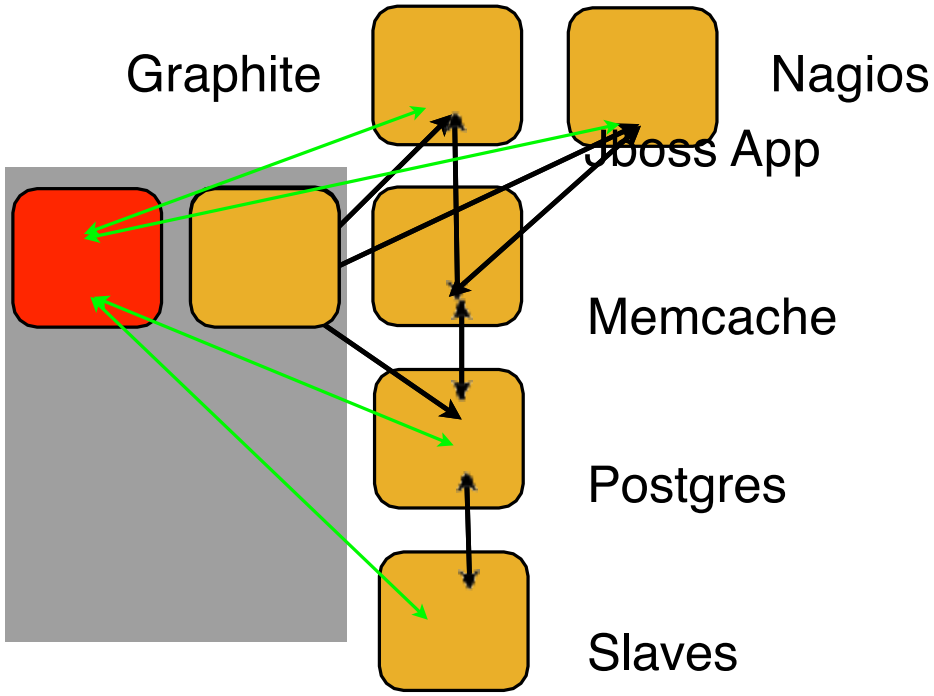
Postgres Master

...this can happen automatically



Postgres Master

Count the Resources



- Load balancer config
- Nagios host ping
- Nagios host ssh
- Nagios host HTTP
- Nagios host app health
- Graphite CPU
- Graphite Memory
- Graphite Disk
- Graphite SNMP
- Memcache firewall
- Postgres firewall
- Postgres authZ config

Manage Complexity

- Determine the desired state of your infrastructure
- Identify the Resources required to meet that state
- Gather the Resources into Recipes
- Compose a Run List from Recipes
- Apply a Run List to each Node in your environment
- Your infrastructure adheres to the policy modeled in Chef

Configuration Drift

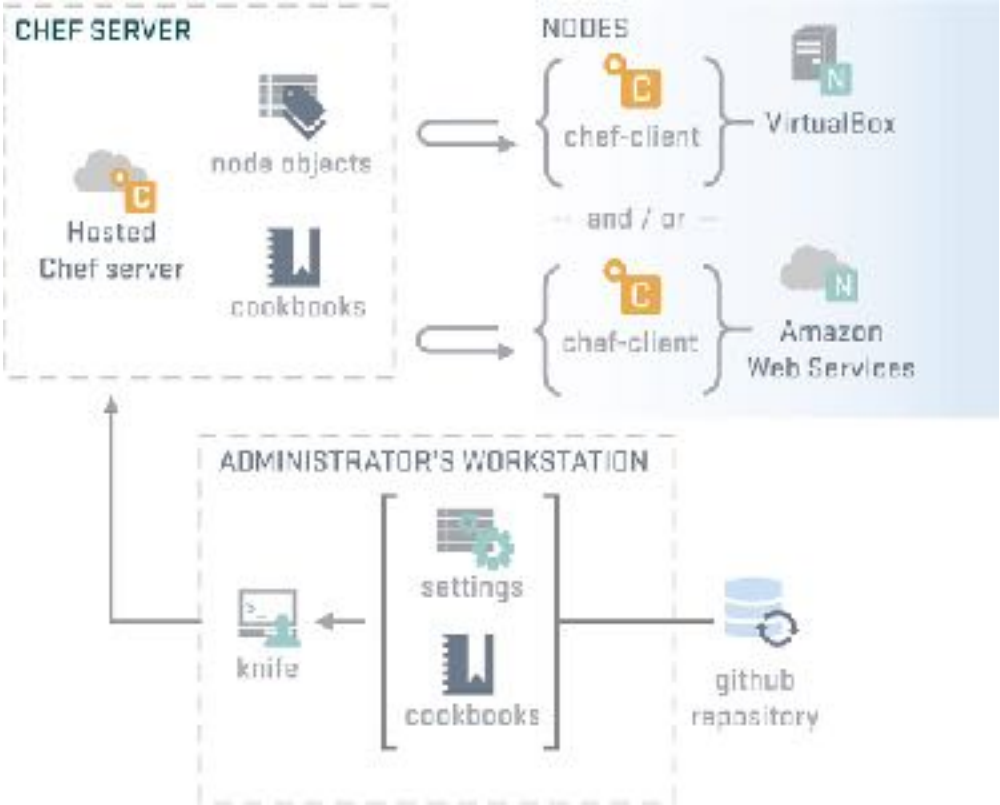
- Configuration Drift happens when:
  - Your infrastructure requirements change
  - The configuration of a server falls out of policy

- Chef makes it easy to manage
  - Model the new requirements in your Chef configuration files
  - Run the chef-client to enforce your policies

Recap

- In this section, we have
  - Described how Chef thinks about Infrastructure Automation
  - Defined the following terms:
    - Resource
    - Recipe
    - Node
    - Run List
    - Search

Chef Infrastructure

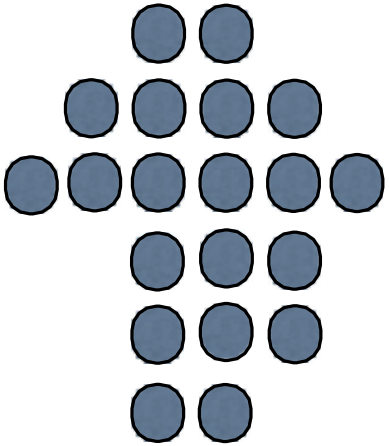


Sign-up for Hosted Chef

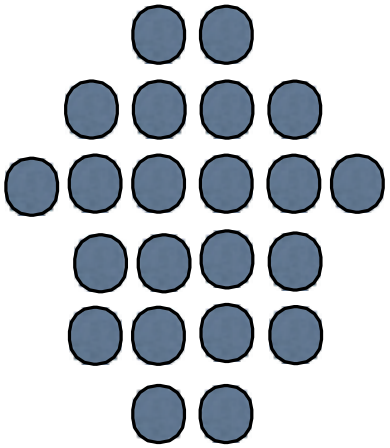
- http://getchef.com
- Click “Get Chef”
- Select “Hosted Chef”
- Complete the registration form
- Create an Organization

Organizations

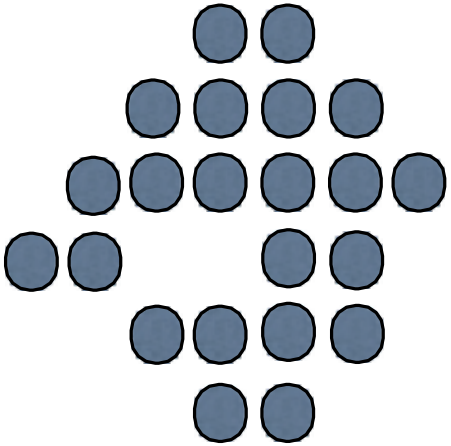
My Infrastructure



Your Infrastructure



Their Infrastructure



Organizations

- Provide multi-tenancy in Enterprise Chef
- Nothing is shared between Organizations - they're completely independent
- May represent different
  - Companies
  - Business Units
  - Departments

Configure Workstation

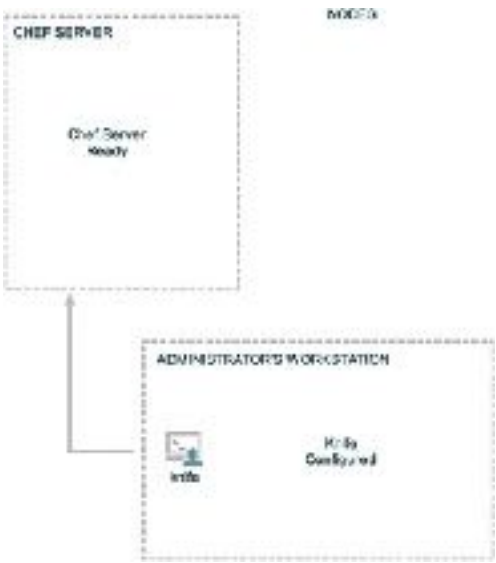
- Download and extract Chef starter kit
- Install chef-client
  - http://getchef.com/chef/install

Verify Knife

```
$ knife --version
 Chef: 11.12.4
```

- Your version may be different, that's ok!

```
$ knife client list
 ORGNAME-validator
```



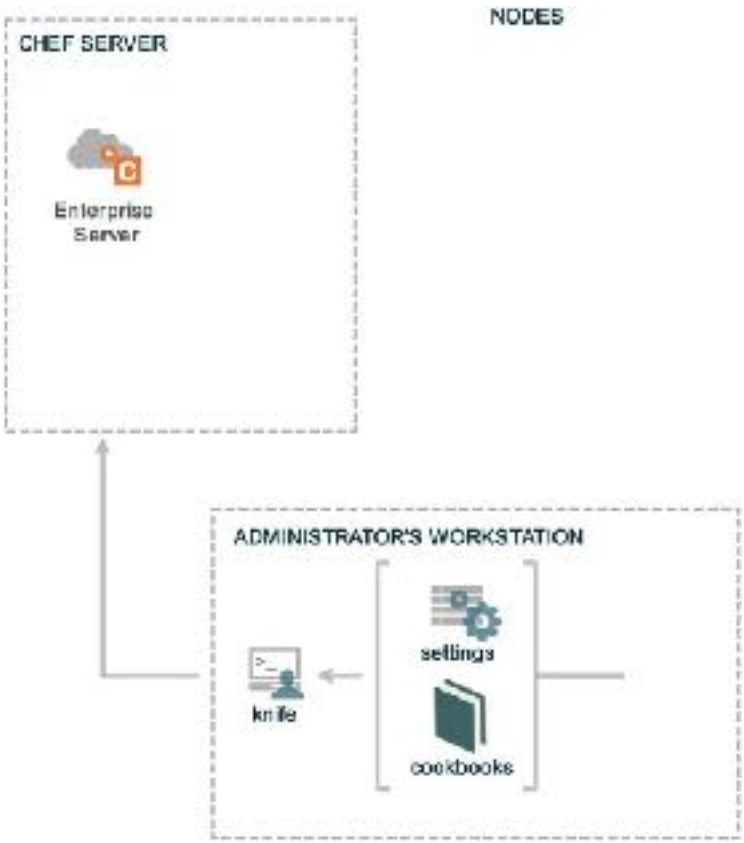
knife.rb

OPEN IN EDITOR: chef-repo/.chef/knife.rb

```
current_dir = File.dirname(__FILE__)
log_level                :info
log_location             STDOUT
node_name                "USERNAME"
client_key               "#{current_dir}/USERNAME.pem"
validation_client_name   "ORGNAME-validator"  "#{current_dir}/
validation_key           ORGNAME-validator.pem"
chef_server_url          "https://api.opscode.com/organizations/ORGNAME"
cache_type               'BasicFile'
cache_options( :path => "#{ENV['HOME']}/.chef/checksums" )
cookbook_path            ["#{current_dir}/../cookbooks"]
```

knife client list

1. Reads the chef_server_url from knife.rb
2. Invokes HTTP GET to #{chef_server_url}/clients
3. Displays the result



Additional Resources

- Chef Fundamentals Webinar Series
- https://www.youtube.com/watch?v=S5IHUpzoCYo&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
- Slides are from chef.com