Chef Fundamentals

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Introductions

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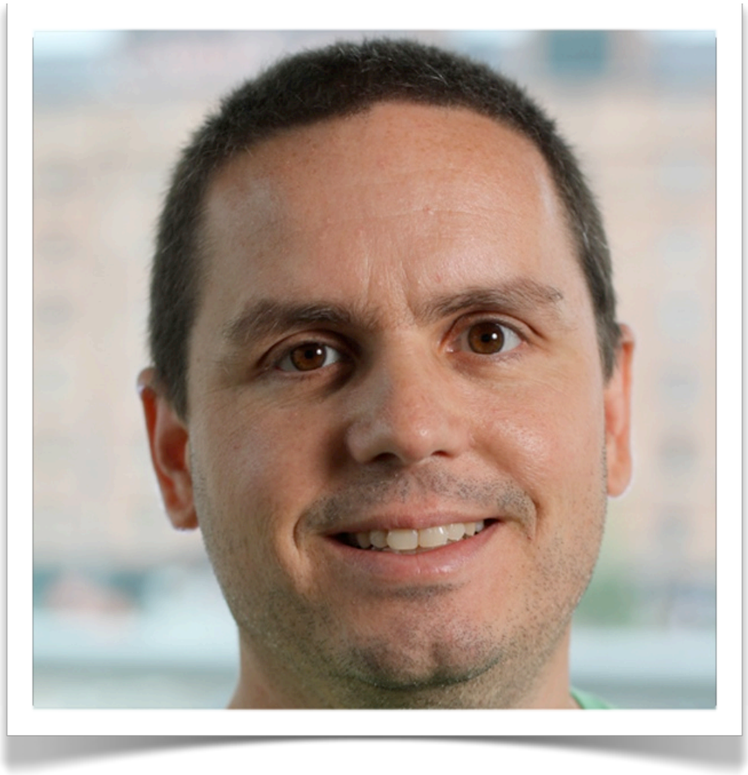
- Co-host of the Food Fight Show Podcast

- @nathenharvey



Webinar Objectives and Style

Multi-week Webinar Series

- After completing of this webinar series you will be able to
  - Automate common infrastructure tasks with Chef
  - Describe Chef’s architecture
  - Describe Chef’s various tools
  - Apply Chef’s primitives to solve your problems

How to learn Chef

- You bring the domain expertise about your business and problems
- Chef provides a framework for solving those problems
- Our job is to work together to teach you how to express solutions to your problems with Chef

Chef is a Language

- Learning Chef is like learning the basics of a language
- 80% fluency will be reached very quickly
- The remaining 20% just takes practice
- The best way to **learn** Chef is to ***use*** Chef

Questions & Answers

- I'll post objectives at the beginning of a section
- Ask questions in the chat window when they come to you
  - We'll answer as many questions as we can at the end of the session
- The webinar will be recorded and you'll be able to watch the recording again.

Agenda

Topics

- Overview of Chef
- Workstation Setup
- Test Node Setup
- Dissecting your first Chef run
- Introducing the Node object
- Writing your first cookbook

Topics

- Setting attributes, cookbook metadata, templates
- Idempotency, notifications, template variables
- Roles
- Using community cookbooks
- Further Resources

Overview of Chef

Lesson Objectives

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

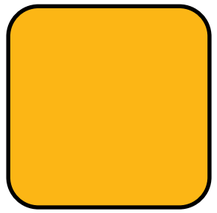
Complexity

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

Items of Manipulation (Resources)

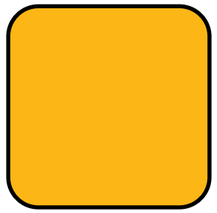
- Nodes
- Networking
- Files
- Directories
- Symlinks
- Mounts
- Routes
- Users
- Groups
- Packages
- Services
- Filesystems

A tale of growth...

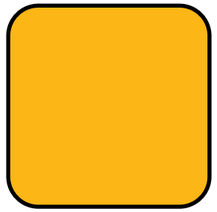


Application

Add a database

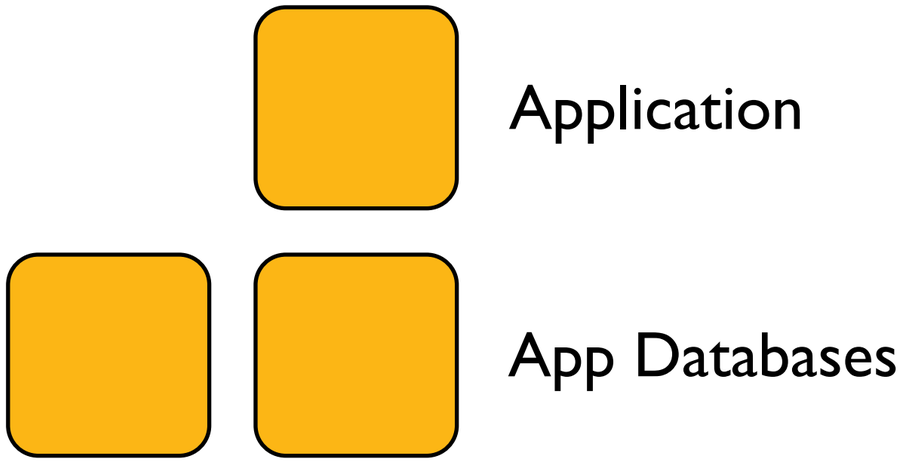


Application

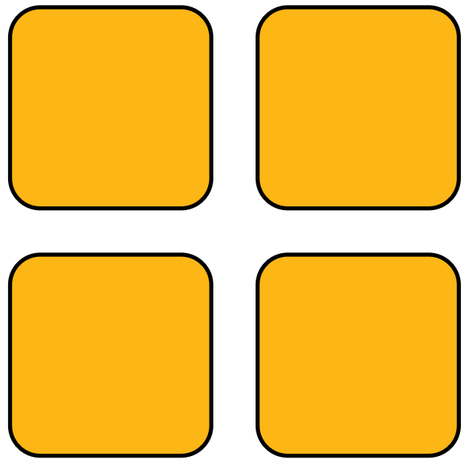


Application Database

Make database redundant



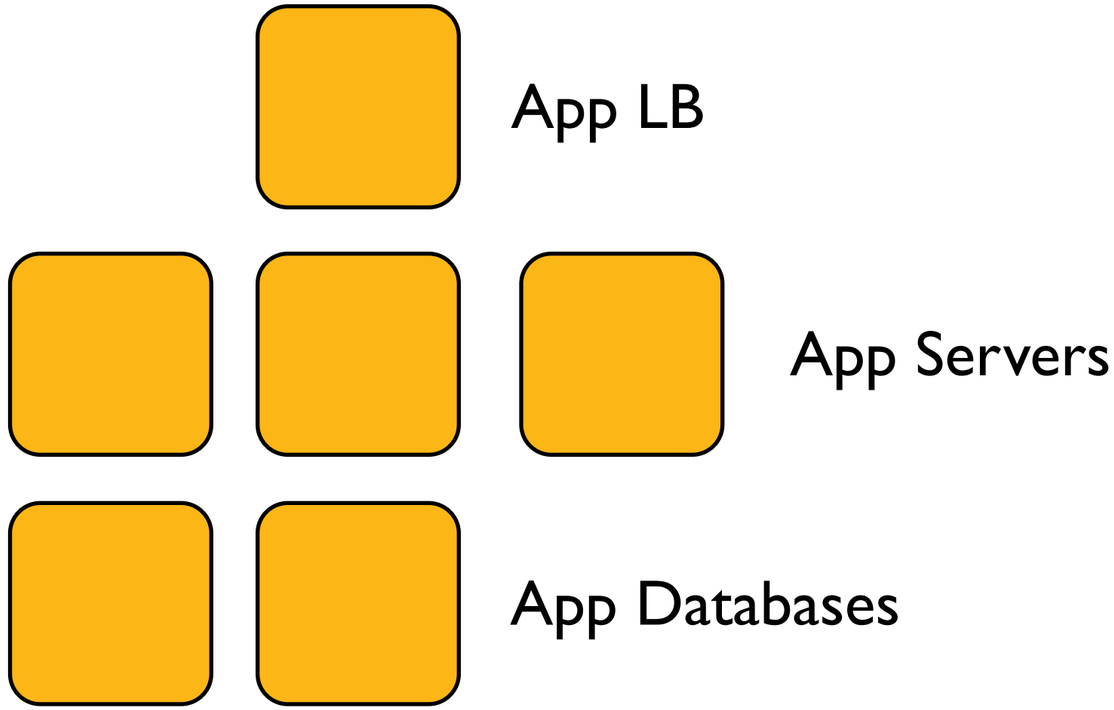
Application server redundancy



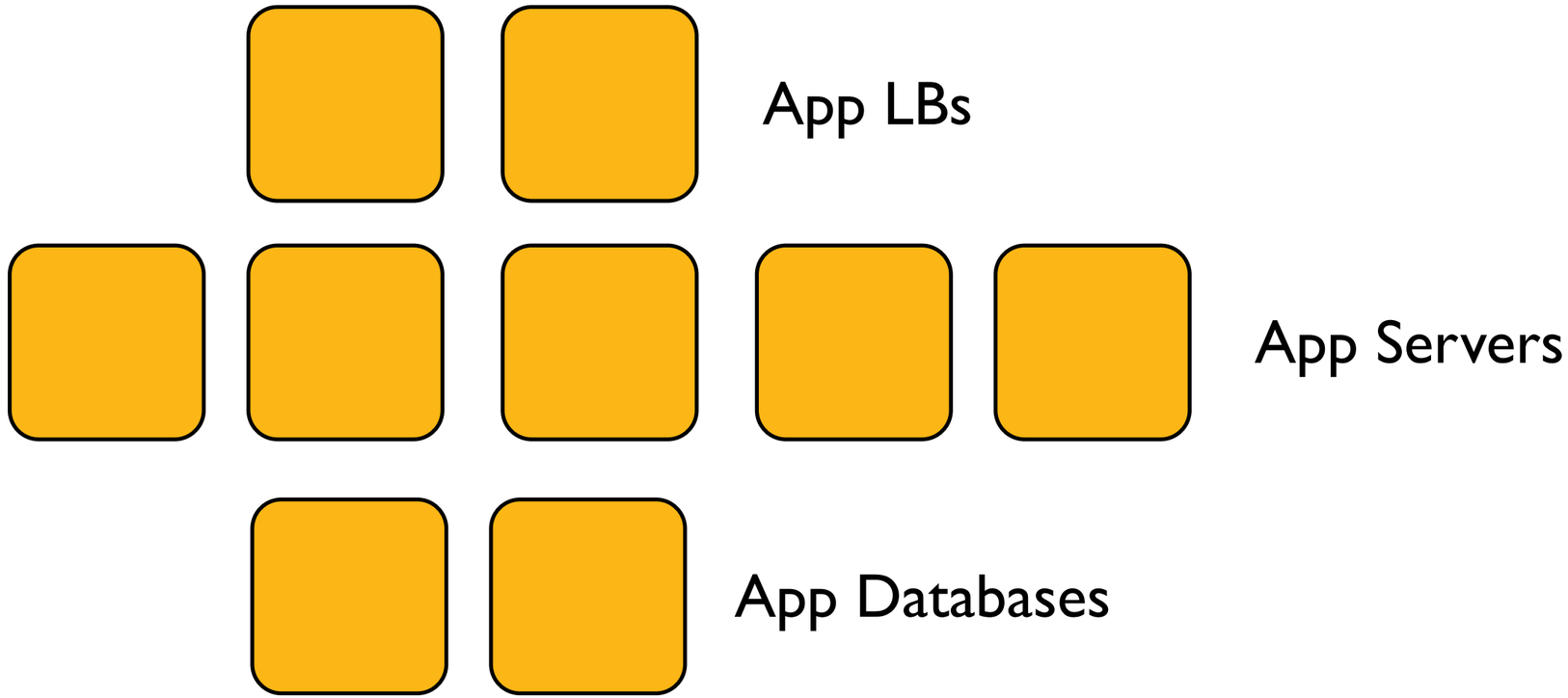
App Servers

App Databases

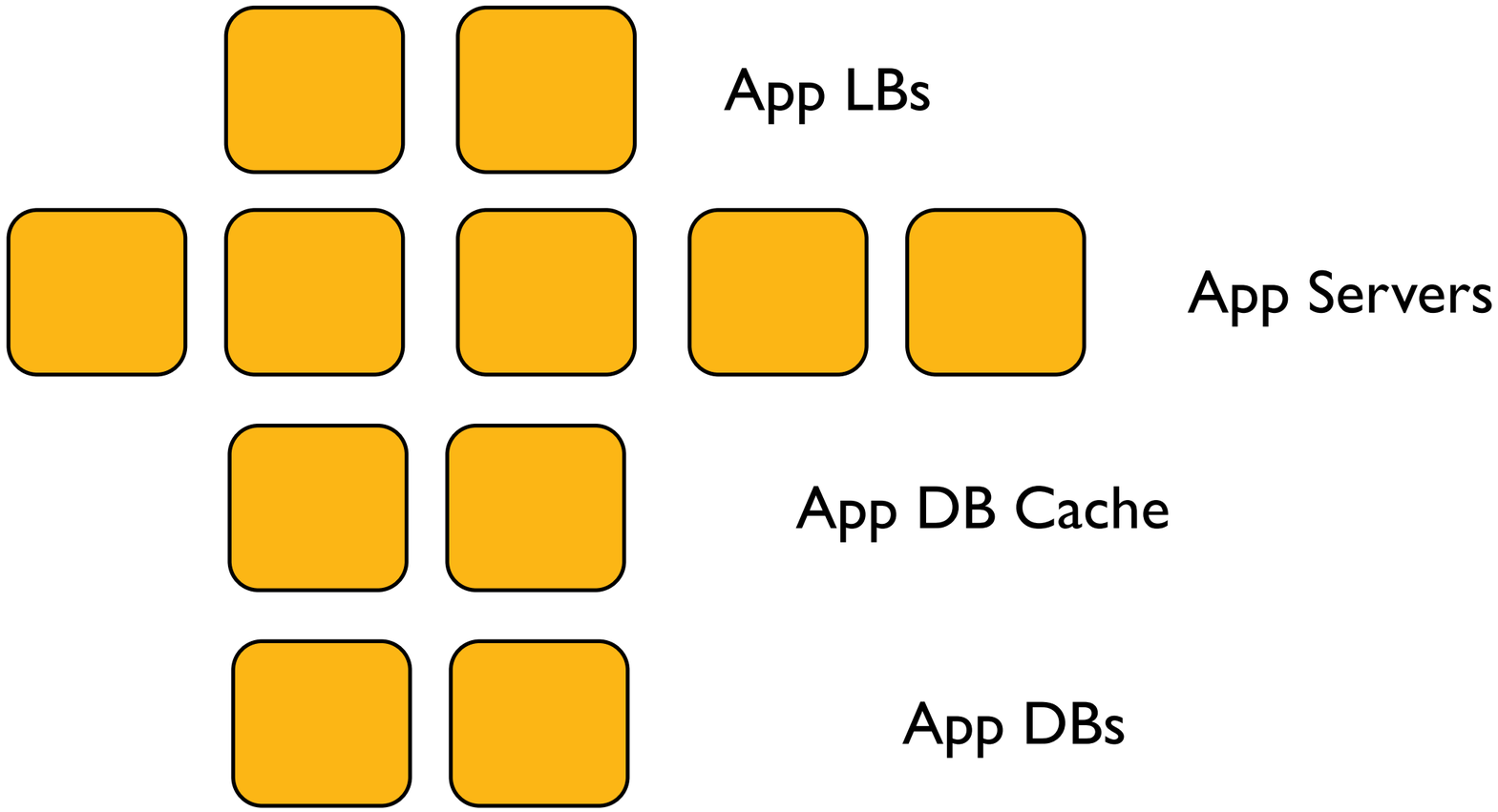
Add a load balancer



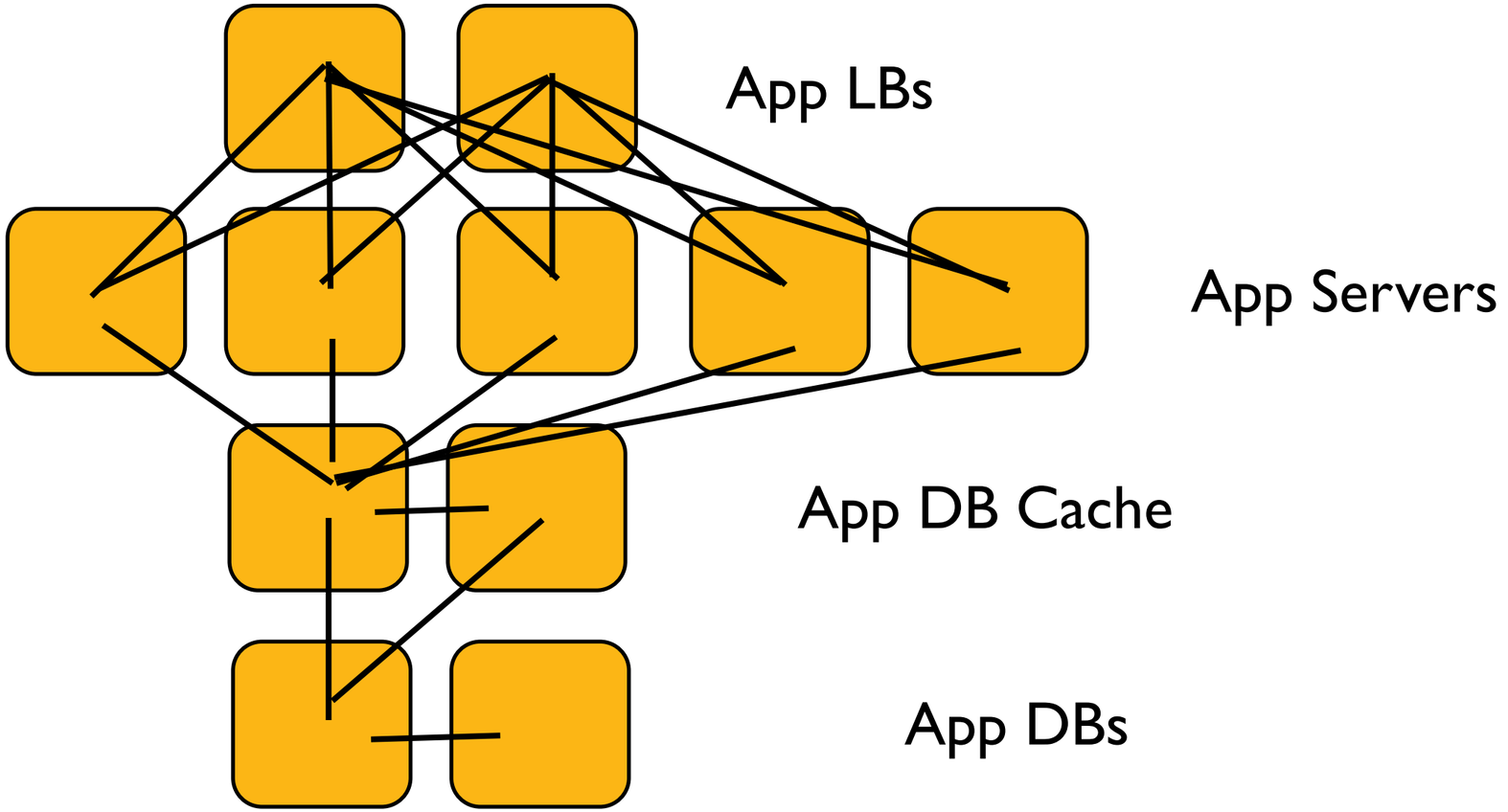
Webscale!



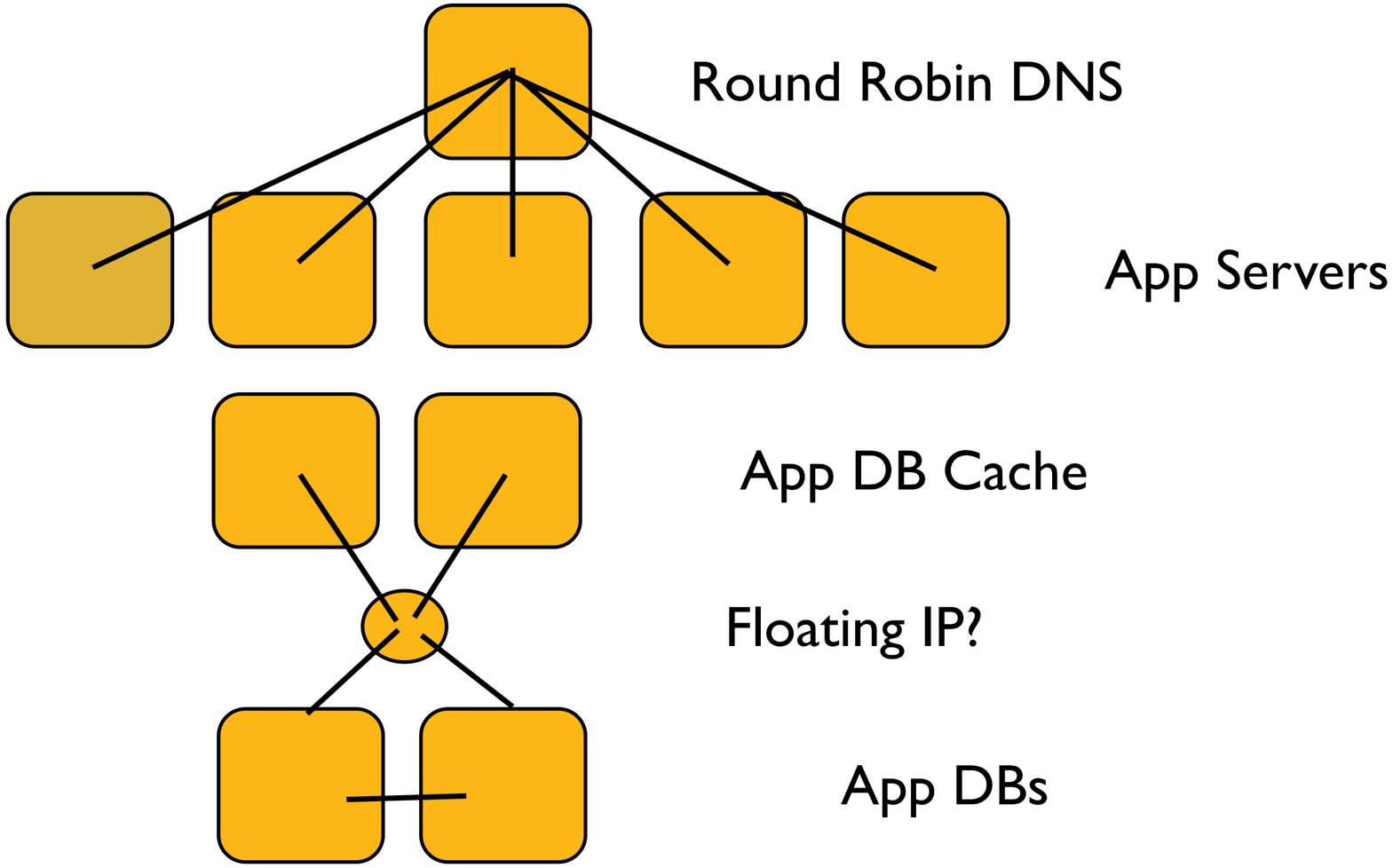
Now we need a caching layer



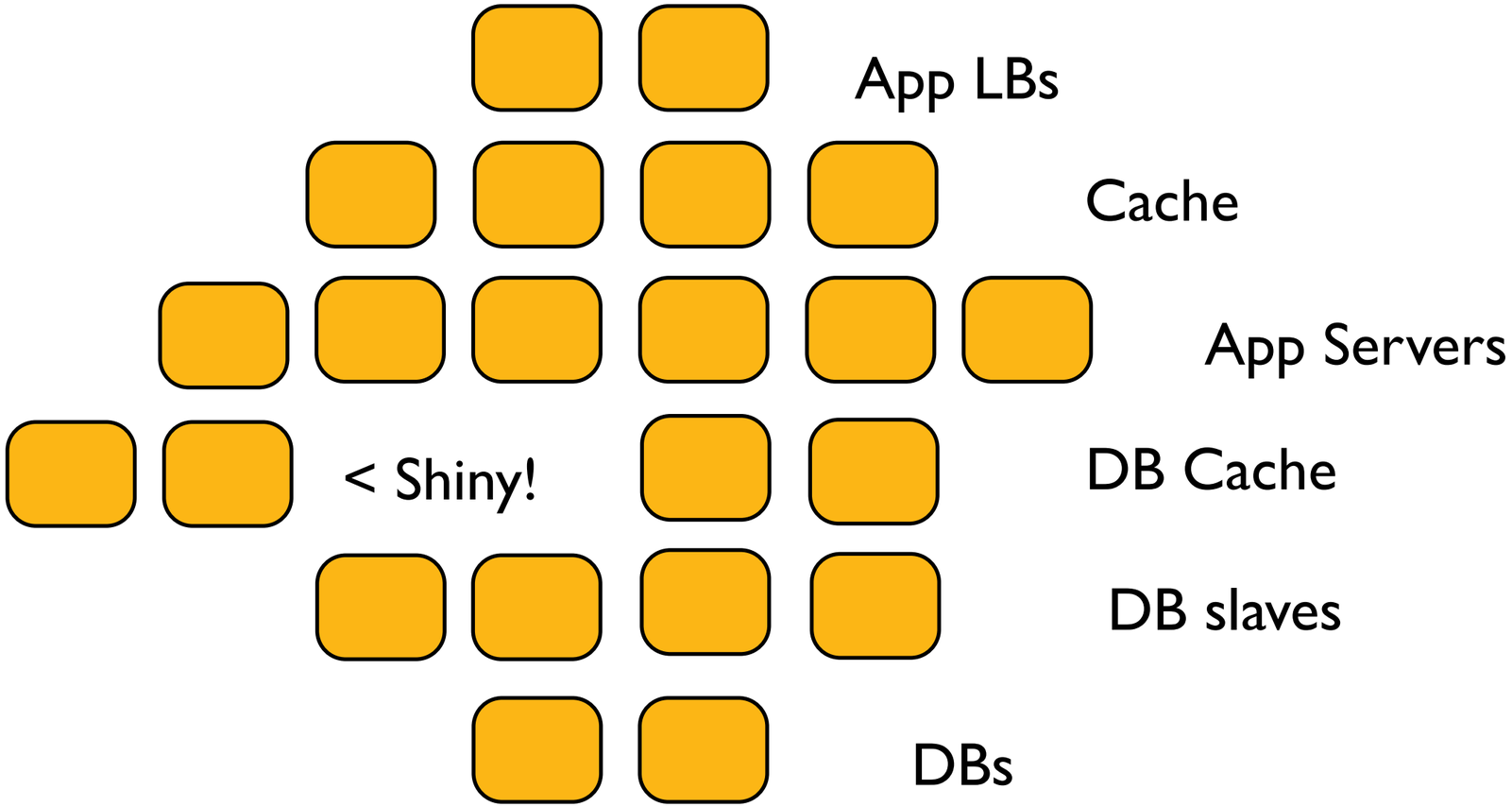
Infrastructure has a Topology



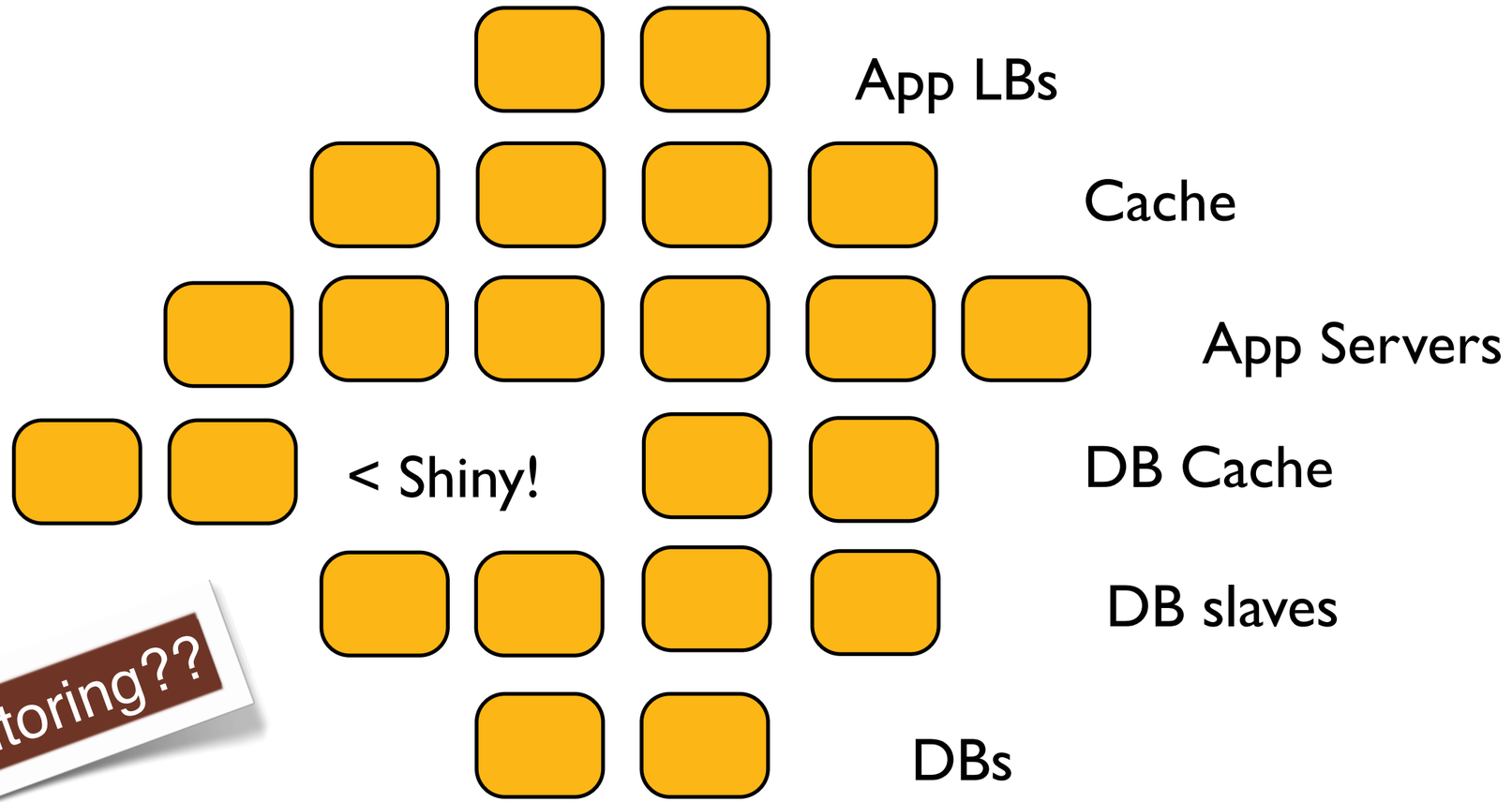
Your Infrastructure is a Snowflake



Complexity Increases Quickly

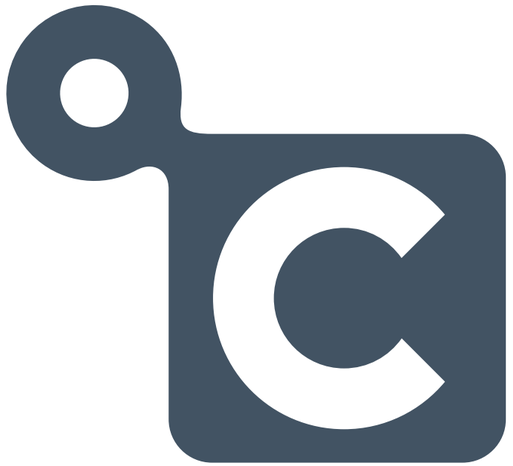


Complexity Increases Quickly



Are we monitoring??

Chef Solves This Problem



Chef™

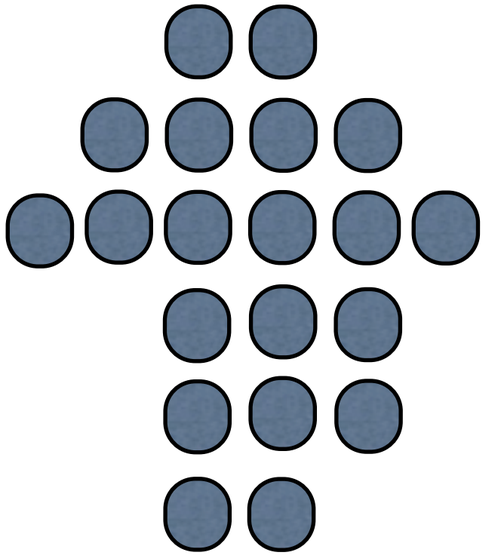
- But you already guessed that, didn't you?

Managing Complexity

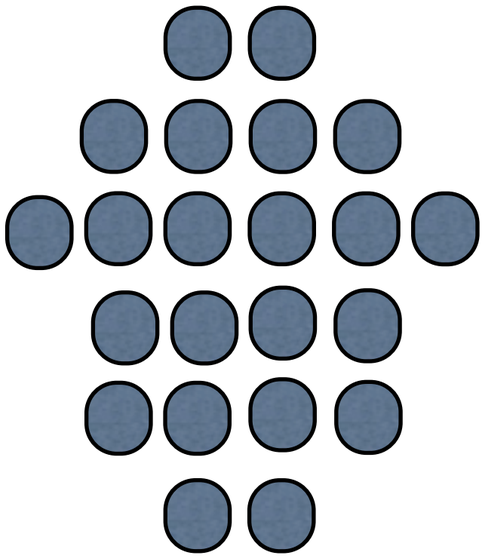
- Organizations
- Environments
- Roles
- Nodes
- Recipes
- Cookbooks
- Search

Organizations

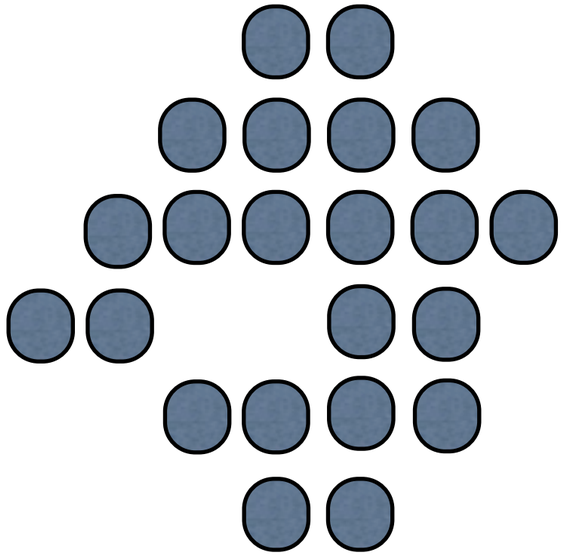
My Infrastructure



Your Infrastructure



Their Infrastructure

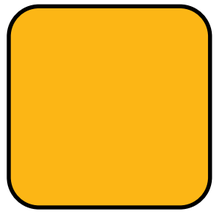


Organizations

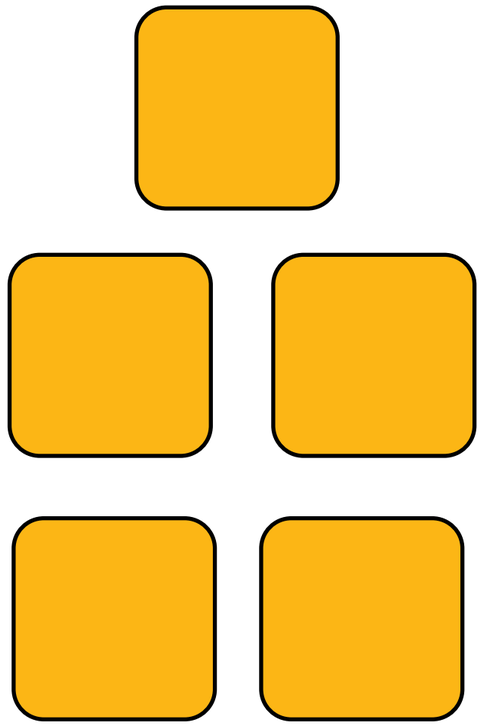
- Completely independent tenants of Enterprise Chef
- Share nothing with other organizations
- May represent different
  - Companies
  - Business Units
  - Departments

Environments

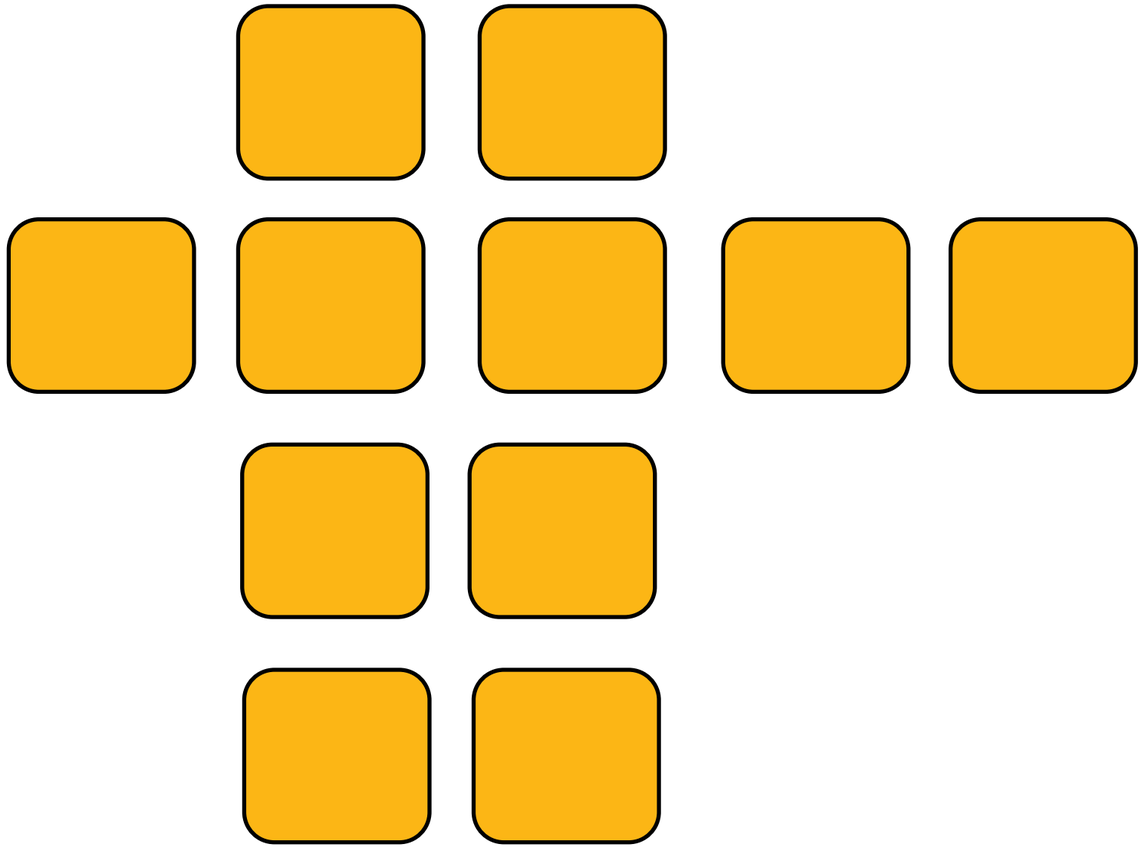
Development



Staging



Production



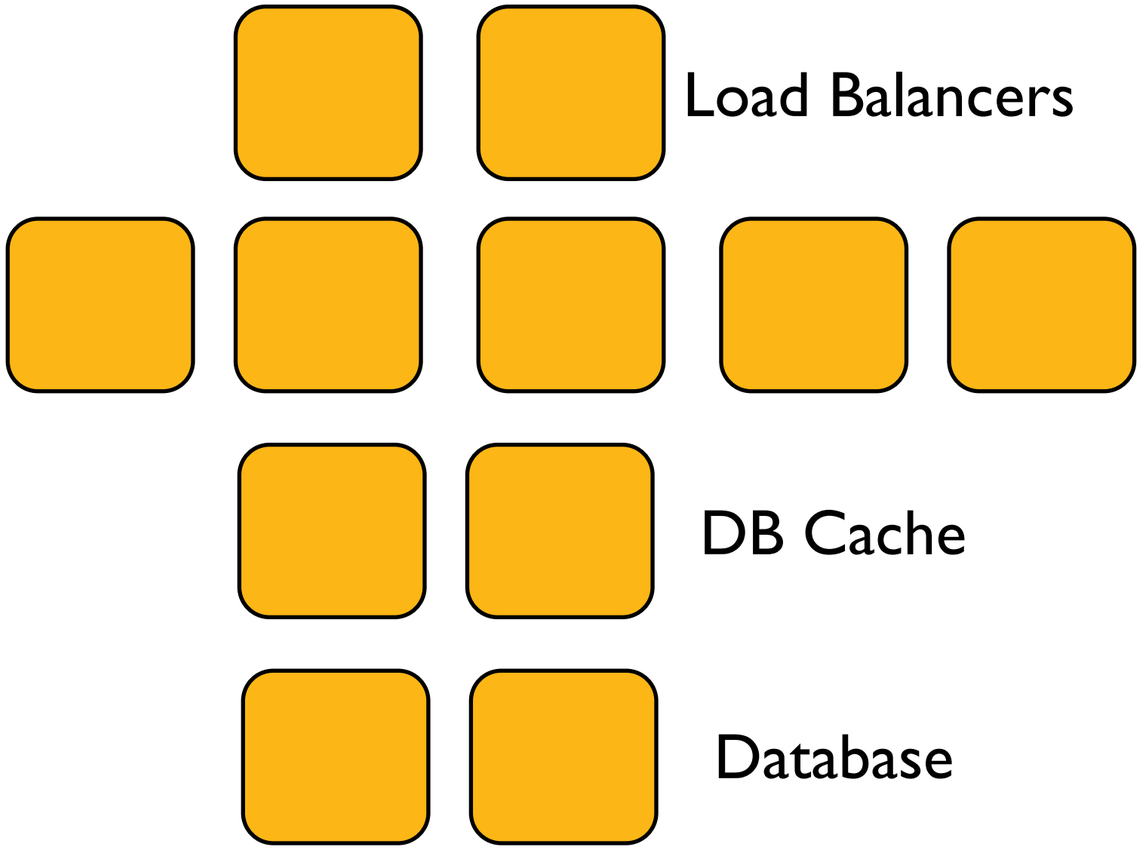
Environments

- Model the life-stages of your applications
- Every Organization starts with a single environment
- Environments to reflect your patterns and workflow
  - Development
  - Test
  - Staging
  - Production
  - etc.

Environments Define Policy

- Environments may include data attributes necessary for configuring your infrastructure
  - The URL of your payment service's API
  - The location of your package repository
  - The version of the Chef configuration files that should be used

Roles



Load Balancers

Application Servers

DB Cache

Database

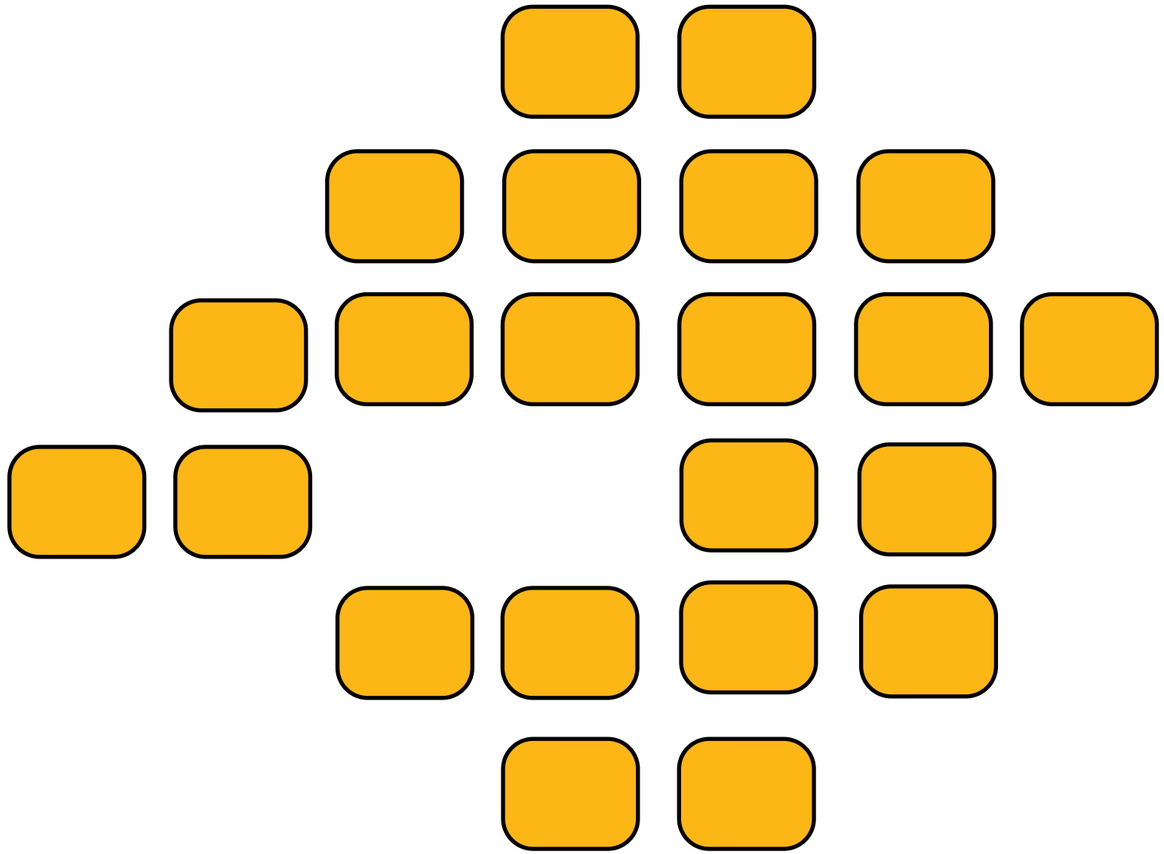
Roles

- Roles represent the types of servers in your infrastructure
  - Load Balancer
  - Application Server
  - Database Cache
  - Database
  - Monitoring

Roles Define Policy

- Roles may include a list of Chef configuration files that should be applied.
  - We call this list a Run List
- Roles may include data attributes necessary for configuring your infrastructure
  - The port that the application server listens on
  - A list of applications that should be deployed

Nodes



Nodes

- Nodes represent the servers in your infrastructure
- Nodes may represent physical servers or virtual servers
- Nodes may represent hardware that you own or may represent compute instances in a public or private cloud

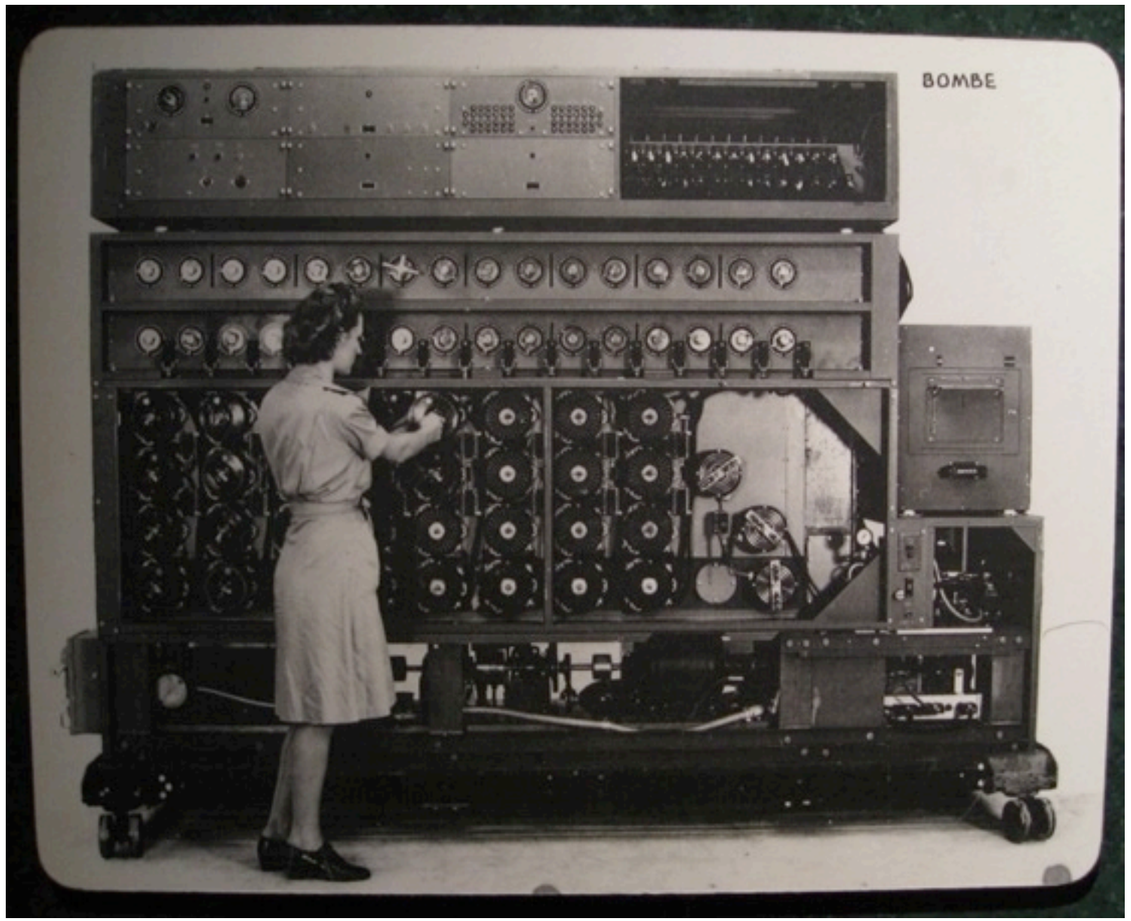
Node

- Each Node will
  - belong to one Organization
  - belong to one Environment
  - have zero or more Roles

Nodes Adhere to Policy

- An application, the chef-client, runs on each node
- chef-client will
  - gather current system configuration
  - download the desired system configuration from the Chef server
  - configure the node such that it adheres to the policy

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 bare metal resources.

Configuration Code

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

Delcaritive 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

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

Recipes

```
package "apache2"
```

```
template "/etc/apache2/apache2.conf" do
  source "apache2.conf.erb"
  owner "root"
  group "root"
  mode "0644"
  variables(:allow_override => "All")
  notifies :reload, "service[apache2]"
end
```

```
service "apache2" do
  action [:enable,:start]
  supports :reload => true
end
```

Cookbooks

- Recipes are stored in Cookbooks
- Cookbooks contain recipes, templates, files, custom resources, etc
- Code re-use and modularity

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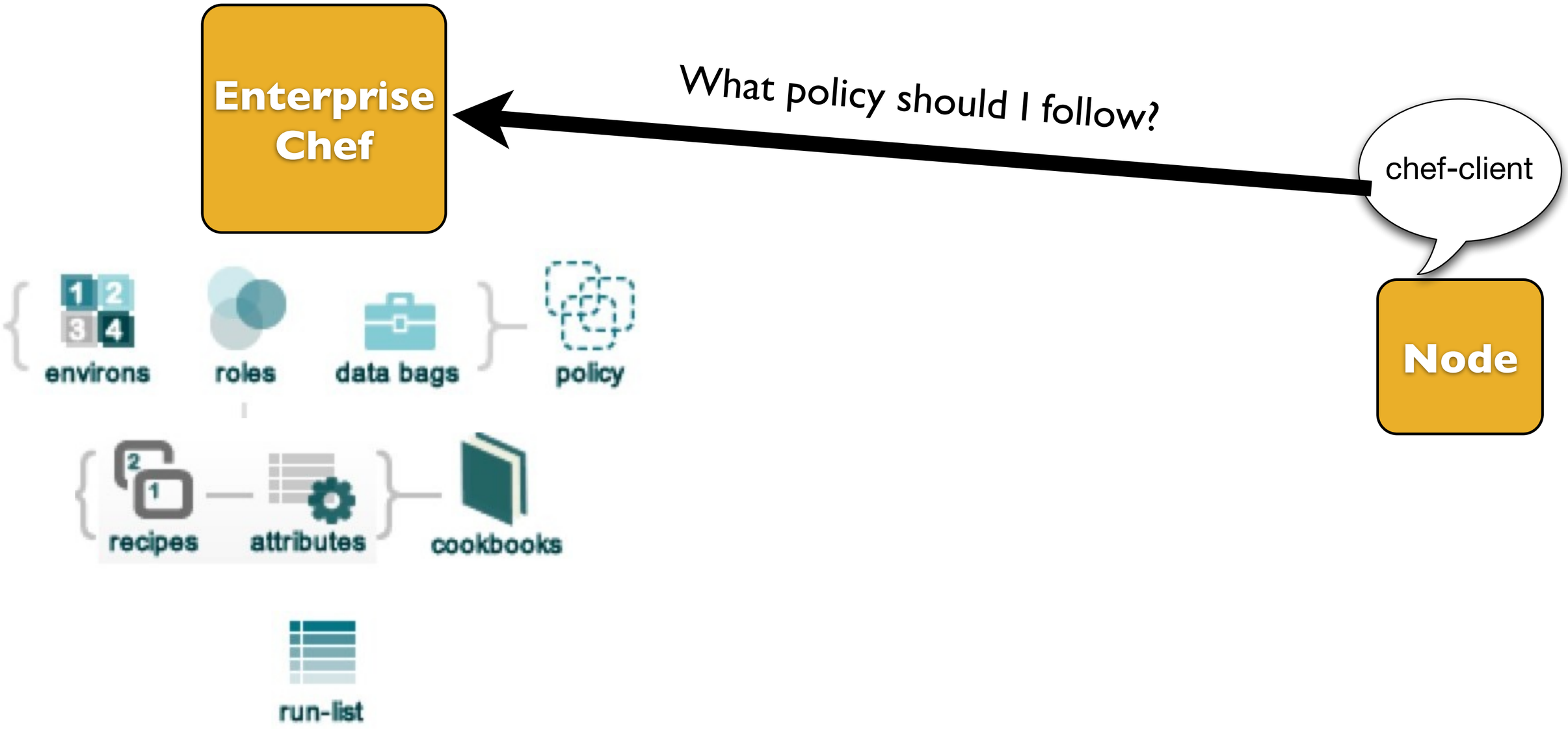
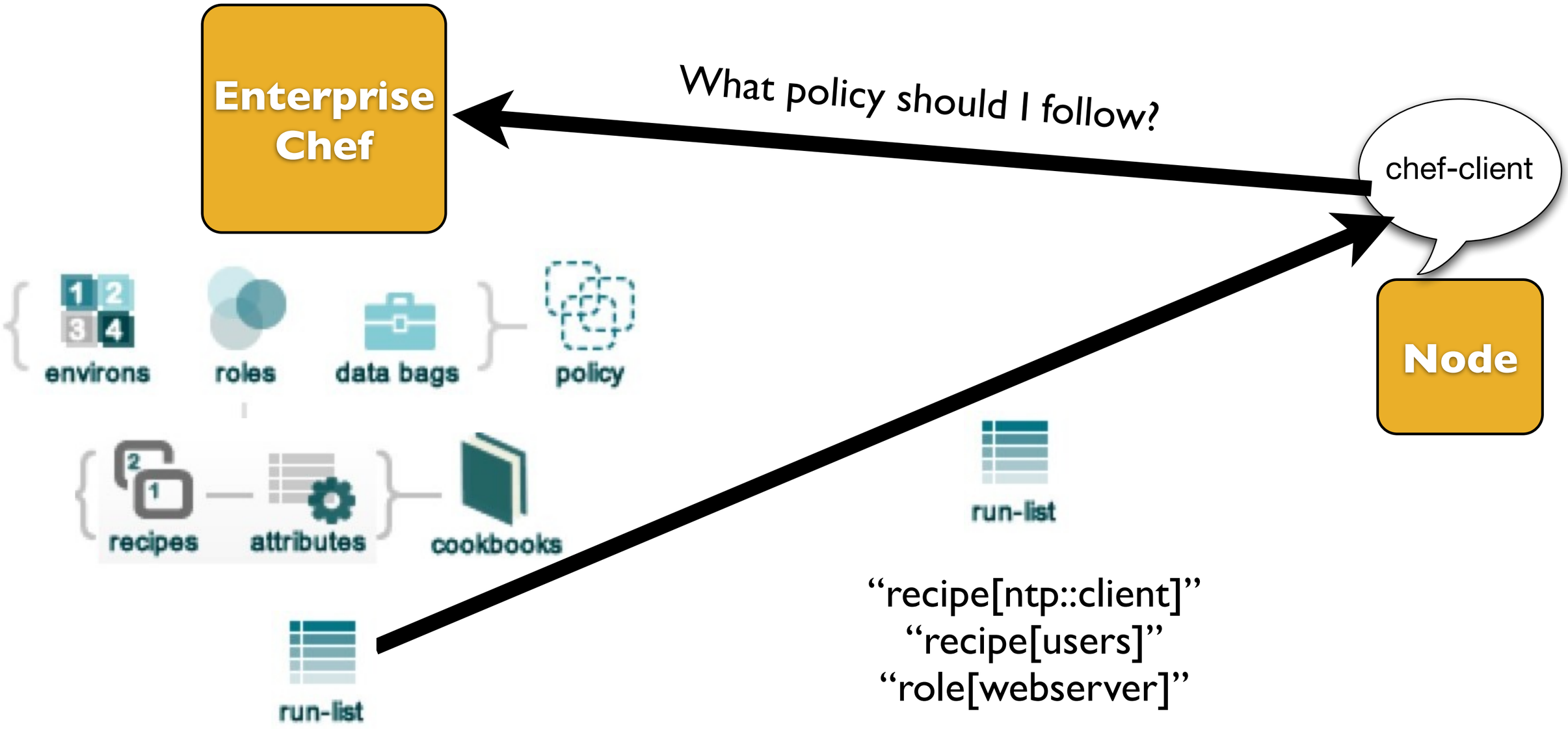
Run List


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

Run List


Enterprise Chef
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chef-client
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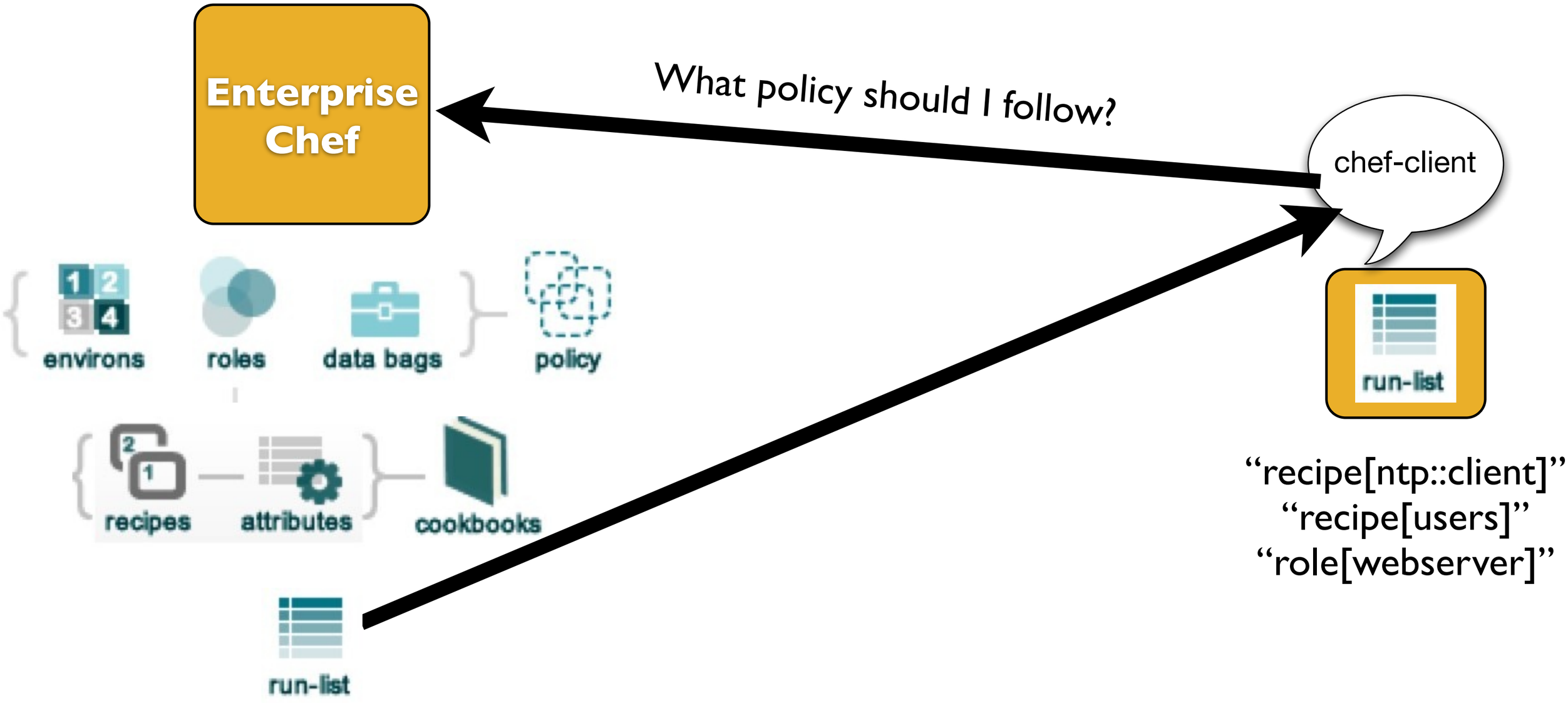
run-list
run-list
“recipe[ntp::client]”
“recipe[users]”
“role[webserver]”

Run List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“recipe[users]”
“role[webserver]”

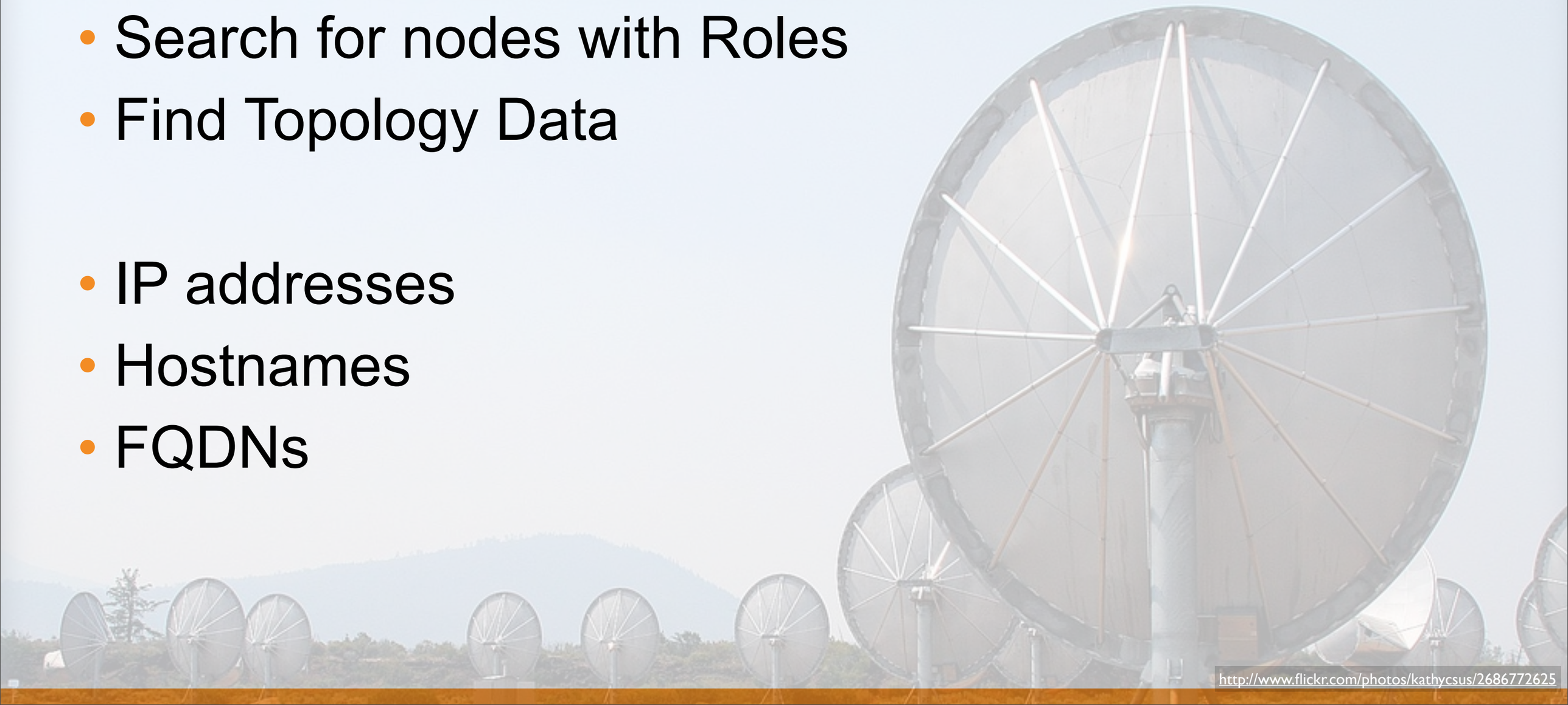
Run Lists Specifies Policy

- The Run List is a 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



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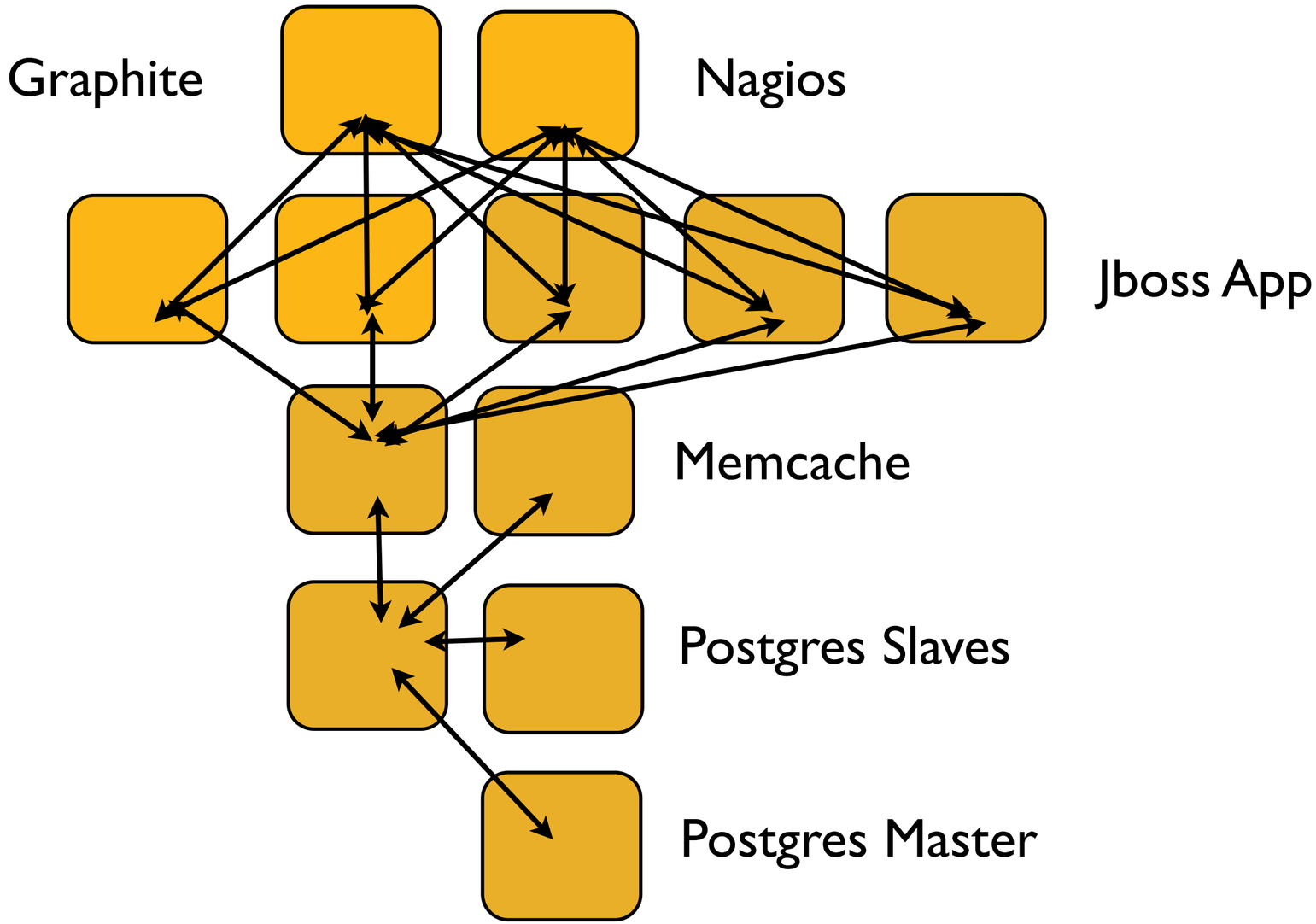
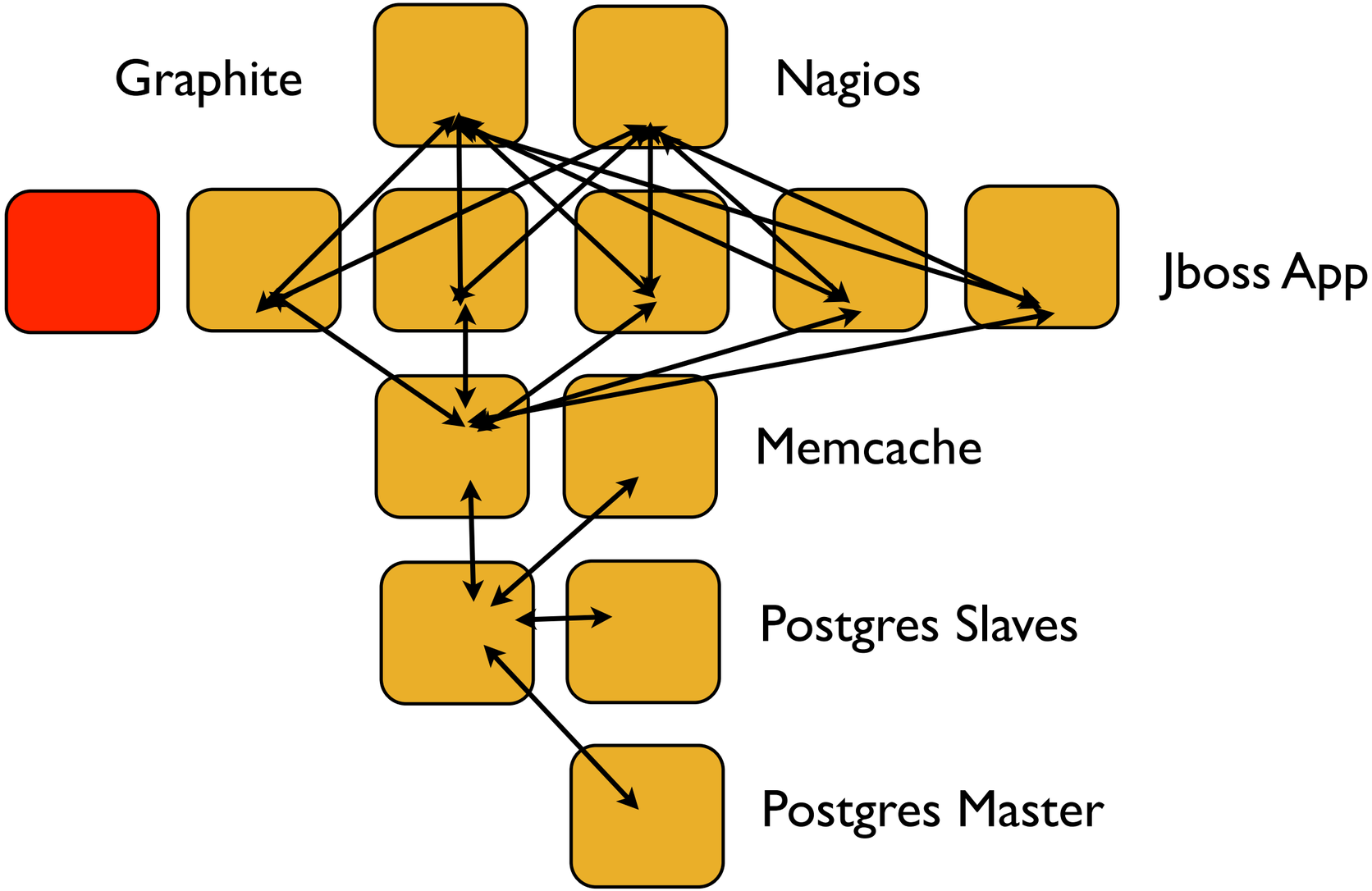
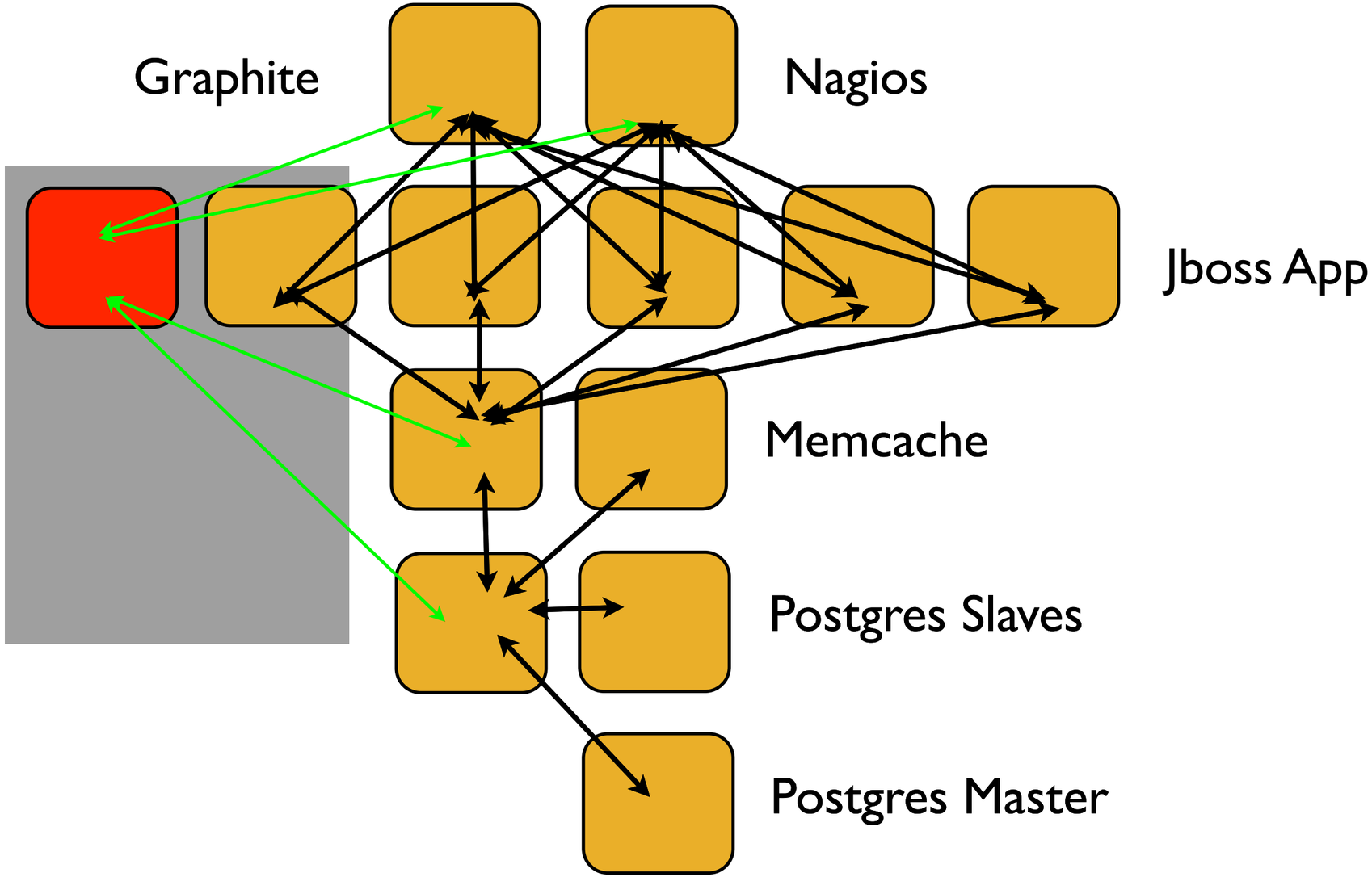
So when this...


Graphite
Nagios
Jboss App
Memcache
Postgres Slaves
Postgres Master

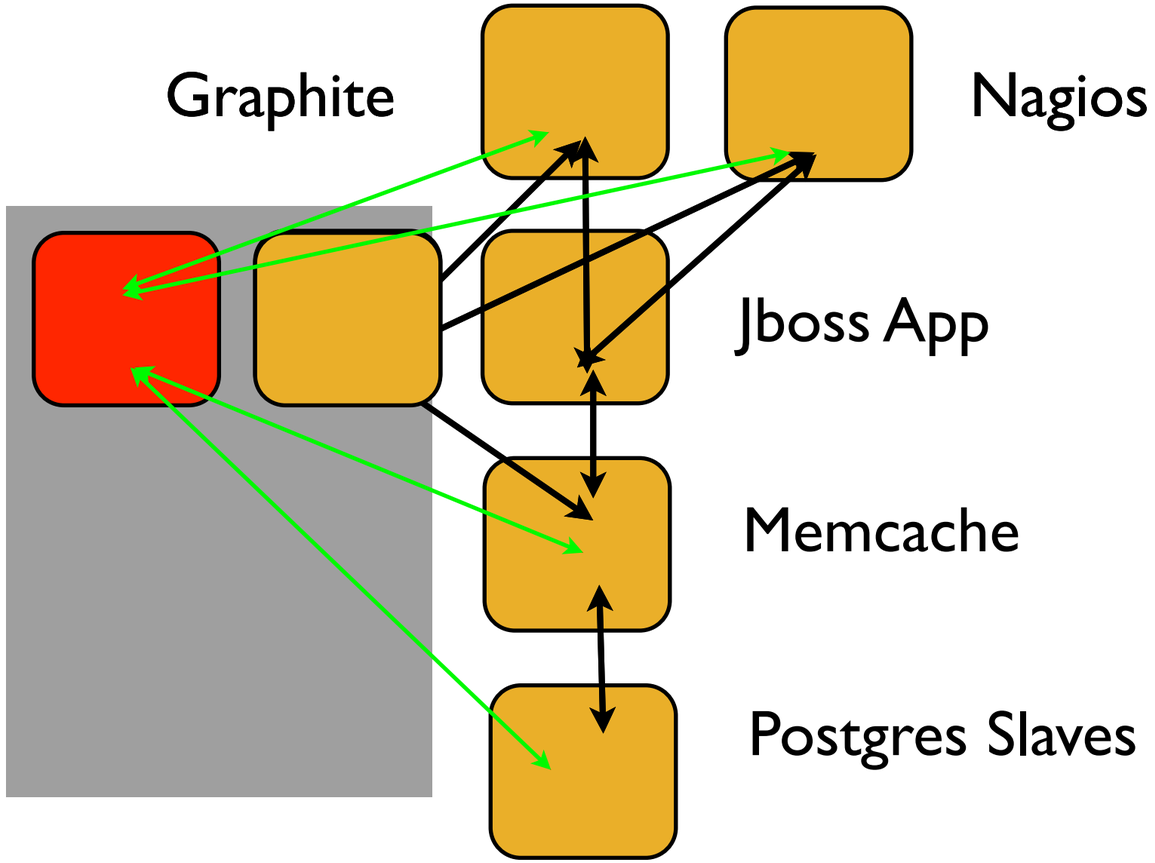
...becomes this



...this can happen automatically



Count the Resources



- 12+ resource changes for 1 node addition

- 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 and Roles
- 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 today's webinar, we have
  - Described how Chef thinks about Infrastructure Automation
  - Defined the following terms:
    - Node
    - Resource
    - Recipe
    - Cookbook
    - Run List
    - Roles
    - Search

What Questions Do You Have?

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