Infrastructure Automation with Chef

Speaker:
Aaron Peterson  Technical Evangelist

Some Content/Mixin Credit to:
John Willis  VP Services
Adam Jacob  CTO
OUR SERVERS WERE ABOUT TO CRASH, SO I WROTE A SUITE OF SCRIPTS TO KEEP THEM RUNNING.

YOUR ACCOMPLISHMENTS ARE SUSPICIOUSLY HARD TO VERIFY.

SO, RECAPPING WHAT WE KNOW FOR SURE, YOU'RE AN INADEQUATE VERIFIER, AND YOU CAN'T RULE OUT THE POSSIBILITY THAT I'M AWESOME.
580 Million Years Ago...

Environmental, developmental, and ecological changes accelerated the rate of evolution by an order of magnitude.
“The rate of evolution of any system is dependent upon the organization of its subsystems”

Herbert Simon, Theory of Hierarchy and componentization.
Cambrian Explosion

“A Period of Combinatorial Innovation”

Hal Varian a Chief Economist for Google

Recall component parts that innovators could combine or recombine to create new inventions: In the 1800s, it was interchangeable parts. In 1920, it was electronics. In the 1970s, it was integrated circuits.
Today

(John Willis) argues we are at the base of an explosion of innovation driven primarily by four factors:

- Abstract and fault tolerant components
- Unlimited infrastructure
- World wide collaboration
- Changes in intellectual property
Abstract and Fault Tolerant Components

- Components are abstract
- Bits, software, virtualized
- Clustered
- Fault tolerant
- Parallelized
Unlimited Infrastructure

- You never run out of them
- So there’s no shortage
- There are no inventory delays
- You can reproduce them
- You can duplicate them, you can spread them around the world
Cambrian Explosion

World Wide Collaboration

- You can have thousands and tens of thousands of innovators combining or recombining the same component parts to create new innovation.
- It’s a situation where the components are available for everyone.
Cambrian Explosion

Changes in Intellectual Property

- Revolution in how we view intellectual property
- Open source
- Google – I can be an expert on anything in a matter of minutes... worst case one day.
¿who am I?
Infrastructure is Hard
Fully Automated Infrastructure is Hard!
Classic infrastructure & operations are major efforts to run.
There has been a recent shift, taking aspects of software development & agile methodology.

Some call this DevOps.
There has been a recent shift, taking aspects of software development & agile methodology. Some call this DevOps.

If you think agile isn't for you...
you may be right!
The rise of exceedingly dynamic businesses and infrastructures to support them created the need for DevOps....

But the sea change in tools, and methodologies that have resulted apply to far more than just those young upstarts startups whippersnappers!
“It is about the collaborative and communicative culture and the tools and process that arise from that culture.”

- John Allspaw (Etsy)

http://www.rationalsurvivability.com/blog/?p=1890
# Cookbook Name:: mysql
# Recipe:: client
#
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distributed under the License is distributed on an "AS IS" BASIS,
WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or
See the License for the specific language governing permissions
and limitations under the License.

p = package "mysql-devel" do
  package_name value_for_platform(
    [ "centos", "redhat", "suse" ] => { "default" => "mysql-devel",
    "default" => 'libmysqlclient15-dev'
  )
  action :nothing
end

p.run_action(:install)

package "mysql-client" do

At a High Level...

- A library for configuration management
- A configuration management system
- A systems integration platform
- An API for your entire Infrastructure
Principles

• Idempotent
• Reasonability
• Sane defaults, easily changed
• Hackability
• TMTOWTDI

It has yet to be proven.

That intelligence has any survival value.

—Arthur C. Clarke

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The world moves pretty fast

- Primitives
- Enable you to solve your problems
- Your **best skill** is knowing your systems

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So you better be ready

- You need a 3rd generation language
- You’re already a programmer

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What is Chef?

Chef is a data-driven systems integration platform

Chef runs infrastructure as a business application
Chef enables Infrastructure as Code

Manage configuration as idempotent Resources. Put them together in Recipes. Track it like source code. Configure your servers.
Infrastructure as Code
Infrastructure as Code is...

A technical domain revolving around building and managing infrastructure programmatically

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Enable the reconstruction of the business from nothing but a source code repository, an application data backup, and bare metal resources.
Theory of Constraints
as it applies to IT Infrastructure

Dr. Eliyahu M. Goldratt
Your Prime Constraint Should Be

The time it takes to restore your application data

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Tale of Two Startups

“Traditional” Operations

Operations - The “Secret Sauce”

This is the secret of Cloud Computing.
Every other virtue stems from here.

Wax Philosophical

- We are craftsmen and artists
- You need great brushes and tools
- But nobody remembers Gaudi’s hammer

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Can only be measured by the final solution

SUCCESS
The ladder of success was not crowded at the top. Did I set it against the right building?

http://www.flickr.com/photos/aloshbennett/619307160/sizes/l/
Hey, that looks a little rough around the edges and pieced-together... BUT IT WORKS

SUCCESS
The ladder of success was not crowded at the top. Did I set it against the right building?

http://www.flickr.com/photos/aloshbennett/619307160/sizes/l/
A Tour of Chef
Some Principles of Chef’s Design...

You specify the desired result and Chef takes action that will place the system in that state.
Chef prefers failure over non-deterministic "success" when something goes wrong.
Managed clients do most of the work and thus can ask useful questions about their surroundings and the rest of the infrastructure for systems integration.
Chef exposes data and behavior through HTTP to enable integration with external tools.
Apache licensed, Chef’s foundation is a growing and vibrant world-class open source community with a culture of quality and reusability.
<table>
<thead>
<tr>
<th>Chef Cookbook Examples</th>
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<tbody>
<tr>
<td>Tomcat6</td>
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<tr>
<td>Glassfish</td>
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<td>Apache2</td>
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<td>Mysql</td>
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<td>Riak</td>
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<td>Postgresql</td>
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Chef Client runs on your systems
They talk to Chef Servers
They can also stand alone - Chef Solo
We call each system you configure a **Node**
Nodes have a **Run List**

What **Roles** or **Recipes** to apply in **Order**
Nodes have a Run List

```json
1 "run_list": [
2   "role[webserver]",
3   "role[database_master]",
4   "role[development]"
5 ]
```
Nodes have Roles
Chef manages Resources on Nodes
A Resource...

- Is of a given type.
- Has a name.
- Has attributes.
- Takes actions to bring the resource to a declared state.

Is a declarative description of the state you desire a part of your node to be in.

```bash
20 package "sudo" do
21   version '1.6.8p12'
22   action :install
23 end

57 service "slapd" do
58   supports [ :restart, :status ]
59   action [:enable, :start]
60 end
```
20 package "sudo" do
21   action :upgrade
22 end
23
24 template "/etc/sudoers" do
25   source "sudoers.erb"
26   mode 0440
27   owner "root"
28   group "root"
29   variables {
30     :sudoers_groups => node[:authorization][:sudo][:groups],
31     :sudoers_users => node[:authorization][:sudo][:users]
32   }
33 end
Resources take *action* through *Providers*
A Provider...

Knows how to actually perform the actions specified by a resource.

Multiple providers per resource type.

Apt, Yum, Rubygems, Portage, Macports, FreeBSD Ports, etc.

Can be overridden with the provider attribute on a resource.
Recipes are lists of Resources
Cookbooks are packages for Recipes
Cookbooks

Attributes

- Node attributes

```
9  default[:nginx][:gzip] = "on"
10 default[:nginx][:gzip_http_version] = "1.0"
11 default[:nginx][:gzip_comp_level] = "2"
12 default[:nginx][:gzip_proxied] = "any"
13
14 default[:nginx][:keepalive] = "on"
15 default[:nginx][:keepalive_timeout] = 65
16
17 default[:nginx][:worker_processes] = cpu[:total]
18 default[:nginx][:worker_connections] = 4096
```
Cookbooks

Metadata

cookbooks/god/metadata.rb

1 maintainer         "Opscode, Inc."
2 maintainer_email  "cookbooks@opscode.com"
3 license           "Apache 2.0"
4 description       "Installs and configures god and provides a define for monitoring"
5 long_description  IO.read(File.join(File.dirname(__FILE__), 'README.rdoc'))
6 version           "0.7"
7
8 %w{debian ubuntu}.each do |os|
9   supports os
10 end
11
12 %w{ ruby runit }.each do |cb|
13   depends cb
14 end
Cookbooks

Other Components

- definitions
- libraries
- resources
- providers
Cookbooks are shareable!

search results for category:"Databases"

- mysql
  - 578 downloads, 14 followers
  - Installs and configures mysql for client or server
  - Platforms: debian, ubuntu

- database
  - 19 downloads, 0 followers
  - Sets up the database master or slave
Add your Cloudy credentials to knife

$ vi ~/.chef/knife.rb

10 knife[:rackspace_api_key] = "SECRET"
11 knife[:rackspace_api_username] = "BOBO"
12 knife[:aws_access_key_id] = "SUPERSEKRET"
13 knife[:aws_secret_access_key] = "EVENMORESEKRET"
14 knife[:aws_ssh_key_id] = "MYSSHKEYBRINGSALLTHEBOYSTOTHEYARD"
Launch a new Rails Server

$ knife rackspace server create 'role[rails]'

$ knife ec2 server create 'role[rails]'

Or just install Chef on your existing servers
Questions?

www.opscode.com

- Twitter: @opscode, #opschef
- irc.freenode.net #chef
- lists.opscode.com