Introduction to Chef for SCALE 10x

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Congratulations!!!

- U has a cloud
- Now what?

http://www.flickr.com/photos/ian_munroe/4758240536/
APIs are awesome

- You can provision **compute** resources in seconds
- You can provision **storage** resources in seconds
- That’s cool.

http://www.flickr.com/photos/jdhancock/3634246981/
Chef can help with that

- knife ec2 server create
- knife rackspace server create
- knife terremark server create
- knife voxel server create
- knife gandi server create
- knife cloudstack server create
- knife vsphere server create
- knife eucalyptus server create
- knife openstack server create
But then what?
You need to configure them
Collection of Resources

• Nodes
• Networking
• Files
• Directories
• Symlinks
• Mounts

• Routes
• Users
• Groups
• Tasks
• Packages
• Software
• Services
• Configurations
• Stuff
Acting in concert
To provide a Service

http://www.flickr.com/photos/28309157@N08/3743455858/
And it evolves
See Nodes Grow

Application

App Databases
See Nodes Grow

App LB

App Servers

App Databases
See Nodes Grow

App LBs

App Servers

App Databases
See Nodes Grow

App LBs
App Servers
App DB Cache
App DBs
Stitched together with configs

- App LBs
- App Servers
- App DB Cache
- App DBs
Your Infrastructure is a snow flake

- App LB
- App Servers
- App DB Cache
- Floating IP?
- App DBs
Complexity increases quickly

App LBs

Cache

App Servers

NoSQL

DB Cache

DB slaves

DBs
Complexity increases very quickly
Configuration Management
Golden Images are not the answer

- Gold is heavy
- Hard to transport
- Hard to mold
- Easy to lose
- Configuration detail

http://www.flickr.com/photos/garysoup/2977173063/
Typical Boring Infrastructure

Graphite

Nagios

Memcache

Postgres Slaves

Postgres Master

Jboss App
New Compliance Mandate

- Move SSH off port 22
- Lets put it on 2022
- edit /etc/ssh/sshd_config
12 Instance Replacements

- Delete, launch
- Repeat
- Typically manually

Graphite

Nagios

Memcache

Postgres Slaves

Postgres Master

Jboss App

12 Instance Replacements

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Done in Maintenance Windows

- Don’t break anything!
- Bob just got fired =(

Graphite  1  2  Nagios
3  4  5  6  7  Jboss App
8  9  Memcache
10  11  Postgres Slaves
12  Postgres Master
Different IP Addresses?

- Jboss App
- Graphite
- Nagios
- Memcache
- Postgres Slaves
- Postgres Master

Invalid configs!

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Configuration Desperation

HELP ME
Chef Solves This Problem

• But you already guessed that, didn’t you?
• Generate configurations directly on nodes
• Reduce management complexity
• Version control the programs

http://www.flickr.com/photos/ssoosay/5126146763/
Declarative Interface to Resources

- Define policy
- Say what, not how
- Pull not Push

http://www.flickr.com/photos/bixentro/2591838509/
Chef is Infrastructure as Code

- Programmatically provision and configure
- Treat like any other code base
- Reconstruct business from code repository, data backup, and bare metal resources.

http://www.flickr.com/photos/louisb/4555295187/
package "ntp" do
  action :install
end

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

template "/etc/ntpd.conf" do
  source "ntpd.conf.erb"
  owner "root"
  group "root"
  mode 0644
  action :create
  variables(:time_server => "time.example.com")
  notifies :restart, "service[ntpd]"
end

service "ntpd" do
  action [:enable,:start]
end
package "net-snmp" do
  action :install
end

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

template "/etc/snmpd.conf" do
  source "snmpd.conf.erb"
  owner "root"
  group "root"
  mode 0644
  action :create
  variables(:community_string => "not_public")
  notifies :restart, "service[snmpd]"
end
"memory": {
  "swap": {
    "cached": "0kB",
    "total": "4128760kB",
    "free": "4128760kB"
  },
  "total": "2055676kB",
  "free": "1646524kB",
  "buffers": "35032kB",
  "cached": "210276kB",
  "active": "125336kB",
  "inactive": "142884kB",
  "dirty": "8kB",
  "writeback": "0kB",
  "anon_pages": "22976kB",
  "mapped": "8416kB",
  "slab": "121512kB",
  "slab_reclaimable": "41148kB",
  "slab_unreclaim": "80364kB",
  "page_tables": "1784kB",
  "nfs_unstable": "0kB",
  "bounce": "0kB",
  "commit_limit": "5156596kB",
  "committed_as": "74980kB",
  "vmalloc_total": "34359738367kB",
  "vmalloc_used": "274512kB",
  "vmalloc_chunk": "34359449936kB"
},
"block_device": {
  "ram0": {
    "size": "32768",
    "removable": "0"
  },
  "ram1": {
    "size": "32768",
    "removable": "0"
  },
  "ram2": {
    "size": "32768",
    "removable": "0"
  }
}
execute "load sysctl" do
  command "#/sbin/sysctl -p"
  action :nothing
end

bytes = node['memory']['total'].split("kB")[0].to_i * 1024 / 3,
pages = node['memory']['total'].split("kB")[0].to_i * 1024 / 3 / 2048

# adjust shared memory and semaphores
template "/etc/sysctl.conf" do
  source "sysctl.conf.erb"
  variables(
    :shmmmax_in_bytes => bytes,
    :shmall_in_pages => pages
  )
  notifies :run, "execute[load sysctl]", :immediately
end
```ruby
size = ((2 * 3) * 4) / 2

99.downto(1) do |i|
  beer_bottle "bottle-#{i}" do
    oz size
    action [:take_down, :pass_around]
  end
end
```
Recipes and Cookbooks

- Recipes are collections of Resources
- Cookbooks contain recipes, templates, files, custom resources, etc
- Code re-use and modularity

http://www.flickr.com/photos/shutterhacks/4474421855/
Run Lists

chef-server

API

chef-client

recipe[ntp::client]

ntp

client.rb

node
Run Lists

chef-server

API

chef-client

ntp::client, openssh::server

node

cmd::client.rb

cmd::server.rb

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“recipe[ntp::client]”, “recipe[openssh::server]”, “recipe[apache]”, “recipe[php]”
name "base"
description "base"
run_list [  "recipe[selinux::disabled]",  "recipe[etchnodes]",  "recipe[yum::epel]",  "recipe[debugtools]"
]
“recipe[ntp::client]”, “recipe[openssh::server]”, “recipe[apache]”, “recipe[php]”
Roles

“role[base]”, “role[webserver]”
Roles

- chef-server
- API
- ntp
- client.rb
- openss
- apache
- php
- default.rb
- mysql
- server.rb

"role[webserver]"

"role[database]"
Search

- Search for nodes with Roles
- Find configuration data
- IP addresses
- Hostnames
- FQDNs

http://www.flickr.com/photos/kathycsus/2686772625
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
# 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 -%>
node.set[:munin][:server] = true
munin_clients = search(:node, "munin_client:true")

cookbook_file "/etc/cron.d/munin" do
  source "munin-cron"
  mode "0644"
  owner "root"
  group "root"
end

template "/etc/munin/munin.conf" do
  source "munin.conf.erb"
  mode 0644
  variables(:munin_clients => munin_clients)
end
node.set[:munin][:client] = true
munin_servers = search(:node, "munin_server:true")

unless munin_servers.empty?
  package "munin-node" do
    action :install
  end

  template "/etc/munin/munin-node.conf" do
    source "munin-node.conf.erb"
    mode 0644
    variables :munin_servers => munin_servers
    notifies :restart, "service[munin-node]"
  end

  service "munin-node" do
    supports :restart => true
    action [ :enable, :start ]
  end
end
So when this
Becomes this

Graphite

Nagios

Memcache

Postgres Slaves

Postgres Master

Jboss App

RULE THE CLOUD
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

12+ resource changes for 1 node addition

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CLONING CANNOT COPE WITH THIS

Chef can.
Build anything

- Simple internal applications
- Complex internal applications
- Workstations
- Hadoop clusters
- IaaS applications
- PaaS applications
- SaaS applications
- Storage systems
- You name it

http://www.flickr.com/photos/hyku/245010680/
And manage it simply

- Automatically reconfigure everything
- Load balancers
- Metrics collection systems
- Monitoring systems
- Whatever
- Cloud migrations become trivial

http://www.flickr.com/photos/helico/404640681/
Questions?

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