Foreman in Your Data Center

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Agenda

• Introduction
  – Provisioning
  – Configuration
  – Monitoring
• History and Technology
• Architecture and Installation
• Demo: Foreman Basics
• Customizing foreman
  – Automating with CLI + API
  – Plugins (Bootdisk, Discovery, Docker, Katello, Chef, Salt, Hooks, Remote Execution)
• Demo: Foreman Plugins
Foreman's Realm

Managing the Lifecycle of your Systems

Installation   Initial configuration   Updates and drift management
Foreman

Provisioning  Configuration  Monitoring
Provisioning

- Provision new machines or containers to (almost) anything
  - Bare metal, oVirt, libvirt, VMware, Docker, EC2, Rackspace, Digital Ocean, OpenStack, etc.

- If we don't support it today, we can via new plugins
Provisioning

- Provisioning types:
  - PXE - via PXELinux and kickstart, preseed, AutoYAST, etc
  - Image-based - cloning, configured over SSH or user data (cloudinit)
- For virtualization provider, we create the VM
- For everything we orchestrate related services through Smart Proxies
  - DNS - DHCP / TFTP
  - FreeIPA Realm - Configuration Management
Configuration

- Puppet
- Via plugins:
  - Chef
  - Salt
  - Ansible
- Automatic registration & setup of clients, including autosigning certs/keys
- Defining:
  - Classes / states
  - Parameters / pillars
- Inventory data:
  - Facts / Grains
  - results of configuration runs
Monitoring

- **Generic Report API** with graphs/trends:
  - System Inventories
  - Reports from runs
  - Generic reports: ABRT, OpenSCAP
- Context sensitive search:
  - Not full-text (SQL level)
  - Keyword completion
  - Works across whole application
Distributed Architecture

- **Smart Proxies** located locally on Foreman itself or independent – (orchestration)

- Large organizations and/or multi-tenancy:
  - Organizations (Divisions)
  - Locations

- **Strong RBAC** model
  - Users / Groups
  - Permissions / Filters

- **LDAP / MS-AD** integration
History

- Project started in July 2009
- Initial set of features: Puppet + PXE provisioning
- 213 unique contributors (winter 2015)
- Core team sponsored by Red Hat (GMT +10 -8)
- Translated to 13 languages
- Healthy and friendly community
- Reported usage: Red Hat, CERN, EMC, Citrix, DHL, BBC, Digg, Good Data, Mozilla, eBay/Paypal (100,000 nodes)
Technology

Foreman itself
- Ruby on Rails application
- Targeted on UNIX platforms, Ruby 1.9+
- Steep learning curve (git clone, bundle install)

• Smart Proxy
- Ruby / Sinatra application
- Minimum dependencies
- Quick start (git clone, bundle install)
- On all Ruby 1.8+ platforms (incl. MS Windows)
Installation

- Repositories for RHEL/Fedora, Debian/Ubuntu
- Puppet-based installer
- Sane defaults for POC deployments
- Able to install, configure and manage:
  - Foreman app
  - Smart-proxies
  - Services: DNS, DHCP, TFTP, Puppet
  - Selected plugins

```
# foreman-installer -h | wc -l
439
```
Demo: Foreman Basics
Customization

• Customize Foreman to support your workflows!
  – Configuration options in UI: Administer → Settings
  – Smart proxy configuration values (features)
  – Automation with API + CLI
  – Foreman Plugins
  – Smart Proxy Plugins
  – Foreman Hooks Plugin
API & CLI

- Full UI coverage
- All of our API is documented
- Documentation DSL generates dynamic Ruby bindings
- Full RESTful API
  - Docs at /apidoc on your Foreman server
  - Also available at http://www.theforeman.org/api/1.9/index.html
Hammer CLI

- On par with UI
- Username/Password authentication
- Easy to use, great for working in shell

hammer salt-key list --smart-proxy=smartproxy.example.com
Plugins

Rich ecosystem of existing plugins

Bootdisk plugin

- Small hybrid ISO downloaded from Host UI page
- Unknown or pre-registered hosts boot chainloads from Foreman without PXE/TFTP
- Generic image
  - iPXE-based, DHCP required
- Host image
  - iPXE-based, DHCP not required
- Full host image
  - SYSLINUX-based, DHCP required, OS specific
Discovery plugin

• Unknown host boots via DHCP/PXE
  – Becomes available in Foreman as a “Discovered Host”
  – Workflow remains the same
  – Discovery image is RHEL7/CentOS7-based

• Provision with as few as **NO** clicks
  – Automatic provisioning via rules on arbitrary facts:
    • cpu_count < 8 → web server host group
    • cpu_count >= 8 → db box host group
Discovery plugin

- Metal as a Service – PXE installation

Status: SUCCESS - awaiting kexec into installer
MAC address: 52:54:00:be:8e:8c
IP address: 192.168.122.47
Discovery server: https://192.168.100.1:8443
Endpoint type: proxy
Latest server response: 200:

Kernel command line:
initrd=initrd0.img
root=live:CDLABEL=fdi
rootfstype=auto

<Resend> <Status> <Facts> <Network> <System log> <SSH> <Reboot>
Discovery plugin

- PXE-less (un)attended workflow (supports EFI)
Docker plugin

- Manage many docker hosts
- Deploy new containers easily & view their status, logs, etc
- Multiple registry support & integration with Katello
- https://github.com/theforeman/foreman-docker
Katello plugin

- Content Lifecycle Management
  - http://www.katello.org/
- Sync RPM, Docker, and Puppet content
- Spin repositories with filters using Content Views
Katello plugin

• Manage through a lifecycle
  – Dev → QA → Production (Environments)

• Patch Management
  – Emergency Patches
  – Errata Reports

• And much more!
Hooks plugin

• Hooks
  – Triggered on actions: on action, do X
    • host create/update/delete, build complete, etc.
    • X could be anything
      – add to nagios
      – send an email
    • Can be shell, python, ruby, etc.
  – More info:
    https://github.com/theforeman/foreman_hooks
Salt plugin

- Bootstrapping nodes
- Full interface to keys/autosign
- Define states, pillars via ext_node and ext_pillar
- Import reports (state.highstate results) and grains into Foreman
- API & CLI
Chef plugin

- Automatic bootstrapping of clients
- Import reports and attributes into Foreman
- Decomission nodes from Chef server when deleted in Foreman
Remote execution plugin

- Arbitrary commands on hosts
- Job Templates
  - Based on Foreman Templating engine
  - Input parameters
- Collected data available (Facts)
- Multiple providers architecture:
  - SSH (via Smart Proxies)
Writing Foreman Plugins

- Foreman:
  - Rails Engine
  - Extra Foreman API (plugin registration)
  - Distributed as a Ruby GEM
  - Template and HOWTO available

- Smart Proxy:
  - Sinatra app (REST API)
  - Small plugin registration API
  - Distributed as a Ruby GEM
What Next?

- Visit us http://theforeman.org/
- If you do something cool with Foreman, let us know!
- Find us:
  - IRC: irc.freenode.net
    - #theforeman
    - #theforeman-dev
  - Mailing Lists on Google groups
    - foreman-users
    - foreman-dev
Demo: Foreman Plugins