



FOREMAN

Foreman in Your Data Center

Lukáš Zapletal | @lzap
Stephen Benjamin | @stbenjam



Agenda

- Introduction
 - Provisioning
 - Configuration
 - Monitoring
- Demo
- Customizing foreman
 - Automating with CLI + API
 - Hooks
 - Plugins
 - Discovery
 - Docker
 - Katello
 - Chef/Salt
 - Write your Own



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
 - Image-based
 - via PXELinux and kickstart, preseed, AutoYAST, etc
 - 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

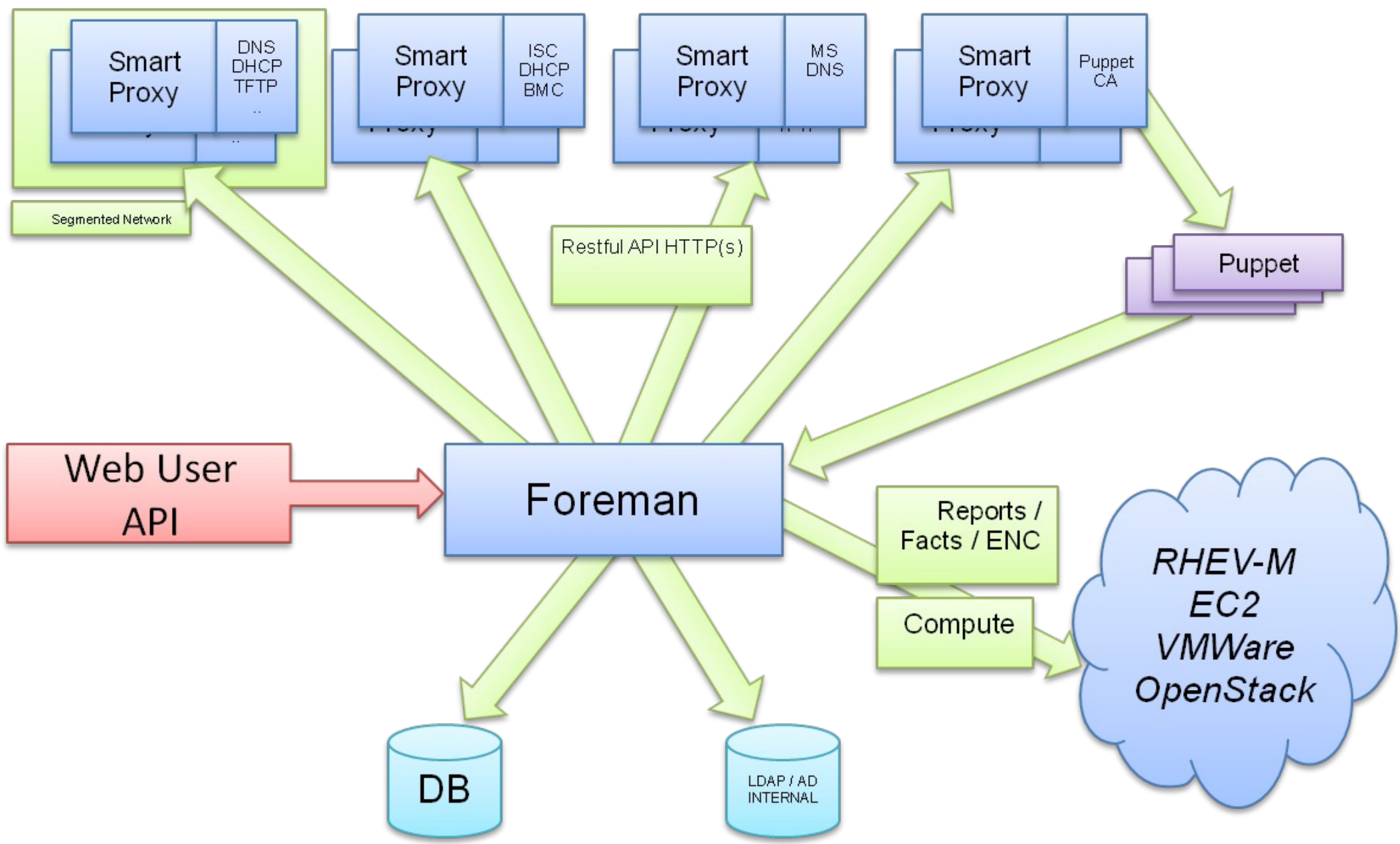
- Generic API with graphs/trends:
 - System Inventories
 - Reports from runs
 - Generic reports: ABRT, OpenSCAP
- Context sensitive search:
 - Not full-text (SQL level)
 - Keyword completion
 - Works across whole application



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** / MSAD 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
- Smart Proxy
 - Ruby / Sinatra application
 - 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: Adminster → Settings
 - Smart proxy configuration values (features)
 - Automation with API + CLI
 - Foreman Hooks
 - Foreman Plugins



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

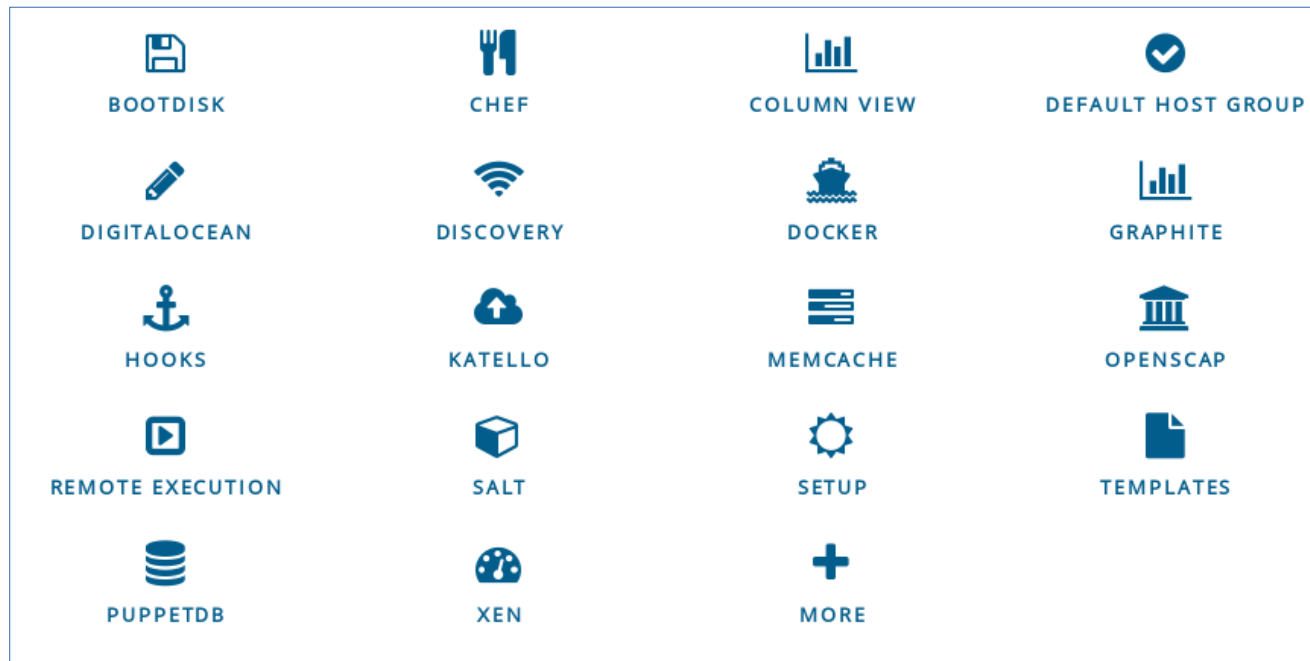
- On par with UI
- username/password authentication
- Easy to use, great for working in shell

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



Plugins

Rich ecosystem of existing plugins



More Info: http://projects.theforeman.org/projects/foreman/wiki/List_of_Plugins



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

```
Discovery status

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>

Foreman Discovery Image v3.0.1 (20151002.1)
```



Discovery plugin

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



Manual/PXE-less provisioning workflow

Select Manual network setup to select primary interface, configure network (no DHCP required), setup Foreman server credentials, add custom facts and trigger auto-provisioning via Discovery rules. This will lead to kernel reload (kexec) into installer. Select Discover with DHCP to select primary interface and proceed with DHCP configuration and standard discovery without any custom facts. This will reboot the host once the system is provisioned either manually or via Discovery rules.

Manual network setup

Discover with DHCP

Foreman Discovery Image v3.0.1 (20151002.1)



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



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



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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
- Decommission nodes from Chef server when deleted in Foreman



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

