Foreman Basics

Be smart. Think open source.

Foreman - Basics

Lifecycle management of physical and virtual machines made easy!

Agenda

- Introduction to Foreman
- Architecture
- Setup
- Provisioning
- Configuration
- Monitoring
- Advanced features

Introduction to Foreman

What's it all about?

Facts

- Project started in 2009
- Licensed under the GPLv3
- Development pushed by Red Hat
- Very active & helpful community

Overview

- Tool for provisioning of VMs & bare metal
- Provides config management & monitoring integration
- Rails & JavaScript application
- Exposes a web interface, REST API & CLI

Ecosystem

- Foreman
- Smart Proxy (foreman-proxy)
- Katello
- Tons of plugins

Strong suite

- Very flexible
- Offers tons of features
- Active development & open community
- Modular setup, start small then expand

Strong suite

- Can serve as a source of truth (CMDB)
- Can be used as an ENC
- Proper ACL implementation
- Enterprise Support available (Red Hat Satellite 6)

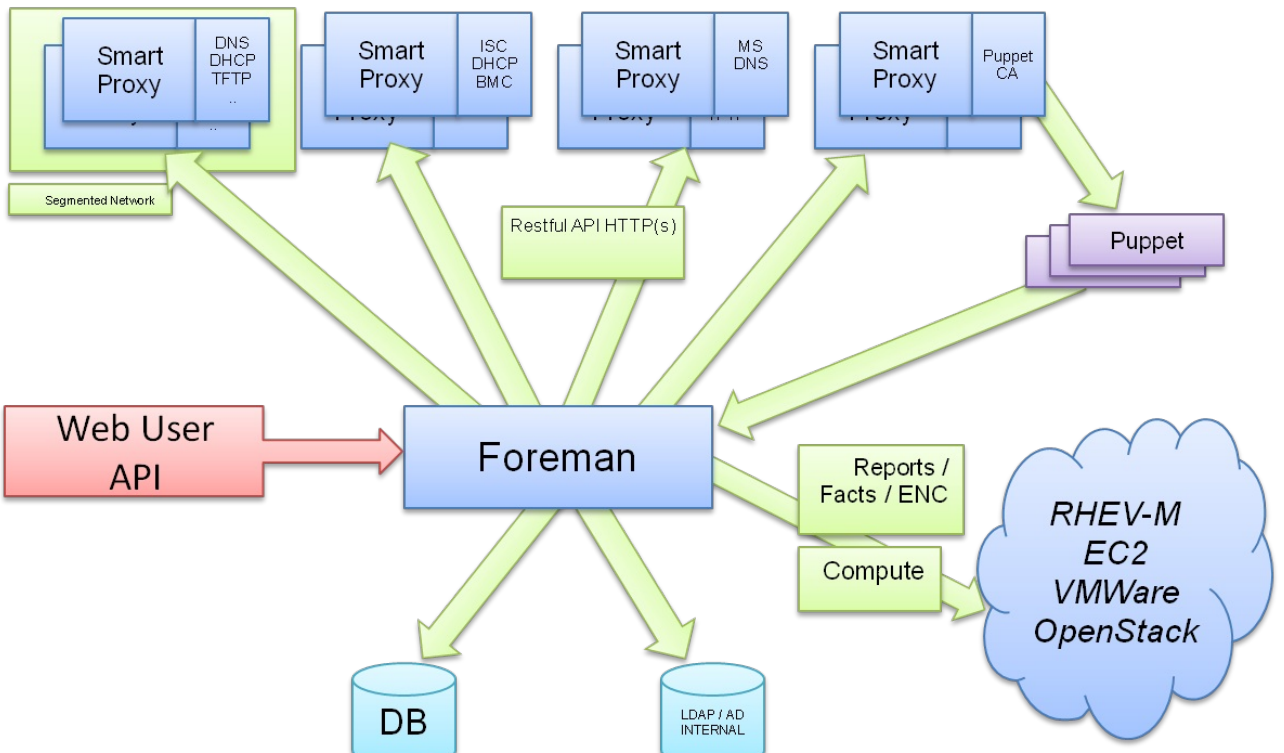
Weak spots

- Somewhat steep learning curve
- Can be quite tricky to debug an issue
- API has room for improvement
- Offers sometimes too many possible ways to implement a task

Architecture

Overview of the different components

Bird's-eye view



Foreman

- Heart of the whole stack
- Stores all resources & information
- Rails stack, use Passenger + nginx / Apache to run it
- Stores most data in a DB (SQLite, MySQL or PostgreSQL)
- Local or LDAP users for authentication

Smart Proxy

- Small autonomous HTTP application
- Exposes a REST API to provide different services
- Allows Foreman to control components in isolated networks
- Also called foreman-proxy

Smart Proxy

- DHCP
- DNS
- TFTP
- BMC / IPMI
- Puppet / Salt / Chef / Ansible
- Realm / FreeIPA

Smart Proxy - DHCP

- Takes care of reserving the required IPs
- Provides IP auto-assignment
- Supports ISC DHCP, MS DHCP & libvirt
- More providers can be installed or developed (e.g. InfoBlox)

Smart Proxy - DNS

- Update and remove DNS records automatically
- Takes care of A, AAAA & PTR records
- Supports Bind, MS DNS & libvirt
- More providers can be installed or developed (e.g. AWS53)

Smart Proxy - TFTP

- Provide images during PXE boot
- Automagically downloads kernel + initrd (installer)
- Prepares MAC specific config depending on the build state
- Fallback to `default`

Terminology

- Host
- Installation media
- Partition tables
- Provisioning templates

Terminology

- Environment
- Compute resources
- Compute profiles

Hands-on :: Basics 01

Discover the basics of Foreman

Foreman Setup

Get Foreman up and running in minutes

Requirements

Supported distributions:

- RHEL 7, CentOS 7 & Scientific Linux 7
- Fedora 24
- Debian 8
- Ubuntu 14.04 & 16.04

Requirements

- Standard VM is sufficient for the start
- Additional repositories depending on the distribution
- Internet access
- Firewall ports

Installation paths

- foreman-installer (recommended by the project)
- Install from package
- Install from source
- Alternatives (Ansible playbook, etc.)

foreman-installer

Makes use of different Puppet modules to deploy a complete Foreman stack:

- Foreman
- Smart proxy
- Passenger
- TFTP, DNS & DHCP

foreman-installer

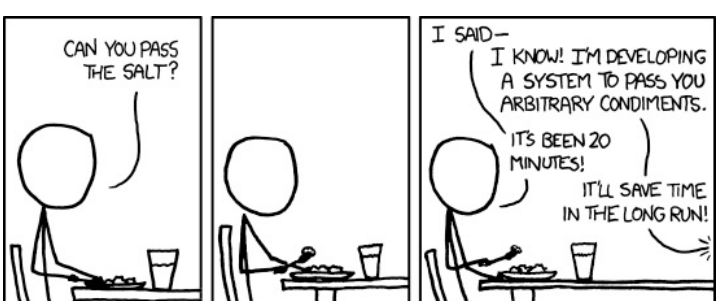
- Customizable with CLI parameters
- Answers file
- Scenarios

Provisioning

Making deployments as easy as pie

Introduction

- Provisioning includes all the tasks required to setup a new machine
- Saving time isn't the main goal
- Enforce consistency across all deployments is key



Workflow

1. Boot the installer
2. Start the installation
3. Get further instructions from Foreman

Boot the installer

- PXE Boot (TFTP provided by Foreman)
- ISO image
- iPXE image

Start the installation

- Tell the installer where further instructions are located
- Red Hat Kickstart

```
ks=http://foreman.example.com/unattended/provision
```

- Debian Preseed

```
url=http://foreman.example.com/unattended/provision
```

- Defined as kernel parameters when loading the installer

Installer instructions

- Foreman provides templating functionality
- ERB templates are rendered per host
- Contain variables, loops, snippets, etc.
- See provisioning templates & partition tables

Templates

- Foreman provides community templates
- Vanilla templates are locked by default
- Can be deleted but some are mandatory (e.g. `PXELinux global default`)

Templates

- Partition tables are used to define the filesystem layout

Different provisioning template types are available:

- Provisioning
- Finish
- etc.

Requirements

For a complete provisioning workflow we need some resources:

- Architecture
- Installation media (mirror)
- OS
- Templates

Example

- x86_64
- http://mirror.centos.org/centos/$version/os/$arch
- CentOS 7
- Default FS Layout, Kickstart & Finish script

Hands-on :: Basics 02

Automating OS deployments is hard you've said?

Configuration

Bring order into your organization

Structure

Foreman provides different resources to organize hosts:

- Hostgroup
- Domains
- Environments
- Organizations & Locations

Structure

Parameter inheritance looks like this:

Config Management

„Define how a system should look like in an abstract way.“

Integration

- Foreman provides ENC functionality
- Supports mainly Puppet but extendable with plugins

Ansible

- Ansible plugin is still the new face in town
- Ansible provides dynamic Foreman inventory script
- Roles can be assigned to hosts and hostgroups
- Play roles through the GUI
- Import and delete roles through the GUI

Hands-on :: Basics 03

Looking into the Ansible integration

Monitoring

Collect and aggregate everything

Facts

- Foreman saves facts for each host
- Collect facts regularly and store them in Foreman
- Leverage them again in your Config Management Tool

Reports

- Collect and track config changes
- Mainly supported for Puppet / Salt

More data

- Audit log keeps track of all changes, very handy
- Trends give an overview of your infrastructure

Advanced features

Adding even more fancy stuff

Plugins

- Cloud providers (Azure, Digitalocean, etc.)
- Docker
- VMWare & libvirt
- Katello
- OpenSCAP

Foreman Automation

- Foreman provides REST API
- Can be easily used to automate additional tasks
- Hammer is a CLI tool
- Somewhat limited because internal IDs have to be looked up first
- Other tools (foreman-yml, etc.)

Field report

What have you learned?

- Architecture
- Setup
- Provisioning
- Configuration
- Monitoring
- Advanced features

Quo vadis?

- Foreman Automation
- External services (password stores, CMDB, etc.)
- Development Workflow (CI & CT)

Feedback

The good, the bad and the ugly

Thank you!

Be smart. Think open source.

Feel Free to Contact Us

www.adfinis-sygroup.ch

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GitHub

info@adfinis-sygroup.ch

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