

Systemmanagement mit Puppet und Foreman

CeBIT 2016

17. März 2016



Mattias Giese
System Management & Monitoring Architect
B1 Systems GmbH
giese@b1-systems.de

Vorstellung B1 Systems

- gegründet 2004
- primär Linux/Open Source-Themen
- national & international tätig
- über 70 Mitarbeiter
- unabhängig von Soft- und Hardware-Herstellern
- Leistungsangebot:
 - Beratung & Consulting
 - Support
 - Entwicklung
 - Training
 - Betrieb
 - Lösungen
- dezentrale Strukturen

Schwerpunkte

- Virtualisierung (XEN, KVM & RHEV)
- Systemmanagement (Spacewalk, Red Hat Satellite, SUSE Manager)
- Konfigurationsmanagement (Puppet & Chef)
- Monitoring (Nagios & Icinga)
- IaaS Cloud (OpenStack & SUSE Cloud & RDO)
- Hochverfügbarkeit (Pacemaker)
- Shared Storage (GPFS, OCFS2, DRBD & CEPH)
- Dateiaustausch (ownCloud)
- Paketierung (Open Build Service)
- Administratoren oder Entwickler zur Unterstützung des Teams vor Ort

Puppet Kurzvorstellung



Puppet 1/2

- Konfigurationsverwaltungssystem
- Entwicklung seit 2005 durch Puppet Labs
- eine der drei „Großen“ neben cfengine/Chef
- unterstützt verschiedene Unixe/Linux, Windows
- Community und Enterprise Variante

Puppet 2/2

- implementiert eine Modellsprache auf Ruby
- wir beschreiben, was getan werden soll, nicht wie
- führt nur benötigte Änderungen am System durch
- abstrahiert Unterschiede zwischen Distributionen/Betriebssystemen
- dynamische Konfiguration basierend auf Hardware/Softwareinfo (factor)

Einfaches Manifest

Einfaches Manifest

```
file{'/etc/myservice.conf':  
  ensure => present,  
  content => "Hallo Welt\n",  
  owner   => 'root',  
  group   => 'root',  
  mode    => '644',  
}  
package{'firefox':  
  ensure => present,  
}
```

Abstraktion des Codes

- Ressource: Datei, Paket, Dienst, Benutzer, Gruppe, usw.
- Manifest: Datei mit Endung `.pp`
 - enthält ein oder mehrere Ressourcen
 - Anwendung: `puppet apply myconfig.pp`
- Klassen bündeln Ressourcen, z.B.: Paket, Datei und Dienst
- Module bündeln Klassen und weitere Dateien

Einfache Klasse

Einfache Klasse

```
class sshserver() {
  package{'openssh':
    ensure => present,
  }
  file{'/etc/ssh/sshd_config':
    ensure => present,
    source => puppet:///sshd_config,
    [...]
    notify => Service['sshd'],
    require => Package['openssh'],
  }
  service{'sshd',
    ensure => running,
    enable => true,
  }
}
```

Deployment-Szenarios

- Puppet benötigt keinen zentralen Server (apply)
- Puppet Master als zentrale Einheit erleichtert Datenhaltung
- zentrale Dienste können genutzt werden um Konfiguration für Systeme vorzugeben (Foreman)

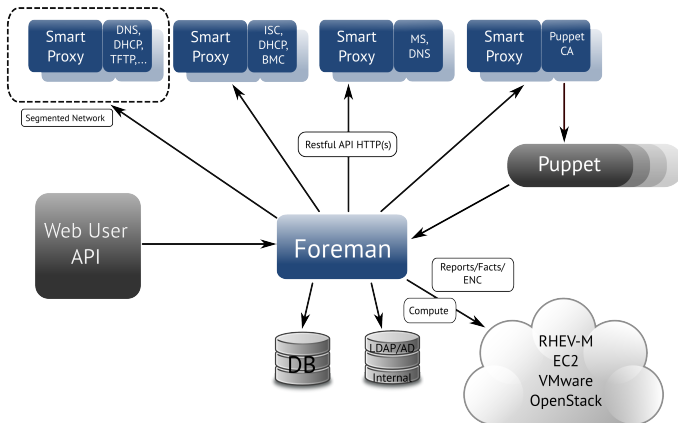
Foreman Vorstellung



Foreman

- System Lifecycle Management Software
- Benutzung via Web-UI/CLI/Restful API
- Verwaltung von DHCP/DNS/TFTP/Puppet und mehr
- modular aufgebaut, erweiterbar durch Plugins
- Rollenbasiertes Zugriffskonzept macht Self-Service Portal möglich

Foreman Architektur



Foreman Architektur

- Provisionierung
 - Bare-Metal via PXE/Bootmedium
 - VM Deployment auf vSphere, libvirt, ovirt (RHEV)
 - Cloud: GCE, EC2, Rackspace, OpenStack, DigitalOcean
- Infrastruktur
 - DHCP: ISC DHCPD, Microsoft DHCP Server
 - DNS: Bind, PowerDNS, Microsoft DNS
 - TFTP (verschiedene)
 - verschiedene Konfigurationsverwaltungen

Foreman GUI: Dashboard

FOREMAN
Admin User ▾

Monitor ▾ | Hosts ▾ | Configure ▾ | Infrastructure ▾
 Administer ▾

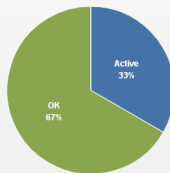
Overview

Filter ... × Search ▾

Generated at 23 Oct 14:59

Host Configuration Status

■ Hosts that had performed modifications without error	3
■ Hosts in error state	0
■ Good host reports in the last 35 minutes	6
■ Hosts that had pending changes	0
■ Out of sync Hosts	0
■ Hosts with no reports	0
■ Hosts with alerts disabled	0



Total Hosts: 9

Host Pool

Unassigned hosts	0
------------------	---










Foreman GUI: Hosts Overview

Hosts


Filter ... x

Q Search v

New Host

<input type="checkbox"/>	Name	Operating system	Environment	Model	Host group	Last report	
<input type="checkbox"/>	<input checked="" type="checkbox"/> foreman.demo.int	 CentOS 6.5	production	Bochs		8 minutes ago	Edit v
<input type="checkbox"/>	<input checked="" type="checkbox"/> hypervisor.demo.int	 Ubuntu 12....	production	BladeCenter...		12 minutes ago	Edit v
<input type="checkbox"/>	<input checked="" type="checkbox"/> sles1.demo.int	 SUSE Linux...	production	Bochs	Testmachines	1 minute ago	Edit v
<input type="checkbox"/>	<input checked="" type="checkbox"/> sles2.demo.int	 SUSE Linux...	production	Bochs	Testmachines	4 minutes ago	Edit v
<input type="checkbox"/>	<input checked="" type="checkbox"/> spacewalk.demo.int	 CentOS 6.5	production	Bochs		5 minutes ago	Edit v
<input type="checkbox"/>	<input checked="" type="checkbox"/> ubuntu1.demo.int	 Ubuntu 12....	production	Bochs		4 minutes ago	Edit v
<input type="checkbox"/>	<input checked="" type="checkbox"/> webserver1.demo.int	 CentOS 6.5	production	Bochs	Web-Server	2 minutes ago	Edit v
<input type="checkbox"/>	<input checked="" type="checkbox"/> webserver2.demo.int	 CentOS 6.5	production	Bochs	Web-Server	2 minutes ago	Edit v
<input type="checkbox"/>	<input checked="" type="checkbox"/> windows1.demo.int	 windows 6.3	production	Bochs		about 9 hours ago	Edit v

Foreman GUI: Hosts Detail

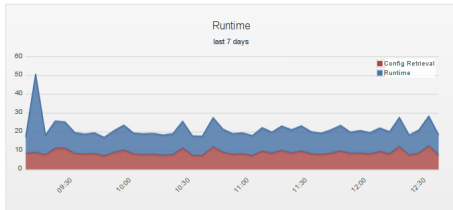
 **webserver1.demo.int**

Reports from the last days - 43 reports found

Details

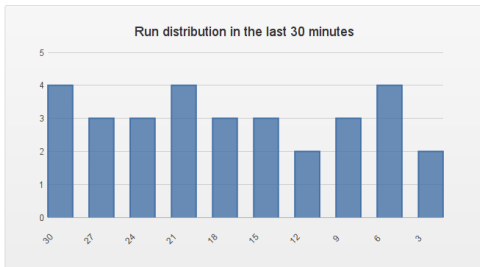
Properties

Domain	demo.int
IP Address	10.30.0.72
MAC Address	52:54:00:1d:17:69
Puppet Environment	production
Host Architecture	x86_64
Operating System	CentOS 6.5
Host group	Web-Server
Owner	Admin User



Foreman GUI: Puppet Overview

Latest Events						
Host	A	R	F	FR	S	P
ubuntu1.dem...	1	1	0	0	0	0
sles1.demo.int	1	1	0	0	0	0
ubuntu1.dem...	1	1	0	0	0	0
sles1.demo.int	1	1	0	0	0	0
ubuntu1.dem...	1	1	0	0	0	0
sles2.demo.int	1	1	0	0	0	0



Foreman GUI: Puppet Reports Overview

Reports

eventful = true Q Search ▾

Host	Last report	Applied	Restarted	Failed	Restart Failures	Skipped	Pending	
ubuntu1.demo.int	2 minutes ago	1	1	0	0	0	0	Delete
sles1.demo.int	4 minutes ago	1	1	0	0	0	0	Delete
ubuntu1.demo.int	7 minutes ago	1	1	0	0	0	0	Delete
sles1.demo.int	9 minutes ago	1	1	0	0	0	0	Delete
ubuntu1.demo.int	12 minutes ago	1	1	0	0	0	0	Delete
sles2.demo.int	12 minutes ago	1	1	0	0	0	0	Delete
sles1.demo.int	14 minutes ago	1	1	0	0	0	0	Delete
webserver2.demo.int	15 minutes ago	1	1	0	0	0	0	Delete
webserver1.demo.int	15 minutes ago	1	1	0	0	0	0	Delete
webserver2.demo.int	20 minutes ago	1	1	0	0	0	0	Delete

[an_demo_int/reports?search=eventful+%3D+true#](#)

Foreman GUI: Puppet Report Detail

sles1.demo.int

Show log messages:

[Back](#)

[Delete](#)

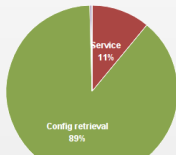
[Host details](#)

[Other reports for this host](#)

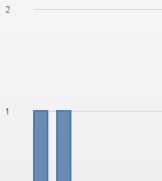
Reported at 2014-10-23 15:01:30 +0200

Level	Resource	message
notice	/Stage[main]/Ssh::Server::Service/Service[sshd]	Triggered 'refresh' from 1 events
notice	/Stage[main]/Ssh::Server::Config/File[/etc/ssh/ssh_config]/content	content changed '[md5]821a028431ed6d3e666f378445f995a5' to '[md5]6d6c8e24fe3e7bd6dd54a936157826d4'

Report Metrics



Report Status



config_retrieval	4.1759
file	0.0167
package	0.0023
schedule	0.0011
service	0.5179

Foreman GUI: Puppet Classes Overview

FOREMAN Admin User

Monitor - Hosts - **Configure** - Infrastructure - Administer

Puppet classes

Host groups
Global parameters

PUPPET
Environments
Puppet classes
Config groups
Smart variables

Filter ...

Class name	Environments and documentation	Host group	Hosts	Parameters	Variables	
apache	production testing		0	46	0	Delete
apache::confd::no_accf	production testing		0	0	0	Delete
apache::default_conf_files	production testing		0	1	0	Delete
apache::default_mods	production testing		0	3	0	Delete
apache::dev	production testing		0	0	0	Delete
apache::mod::actions	production testing		0	0	0	Delete
apache::mod::alias	production testing		0	1	0	Delete
apache::mod::auth_basic	production testing		0	0	0	Delete
apache::mod::auth_kerb	production testing		0	0	0	Delete
apache::mod::authnz_ldap	production testing		0	1	0	Delete

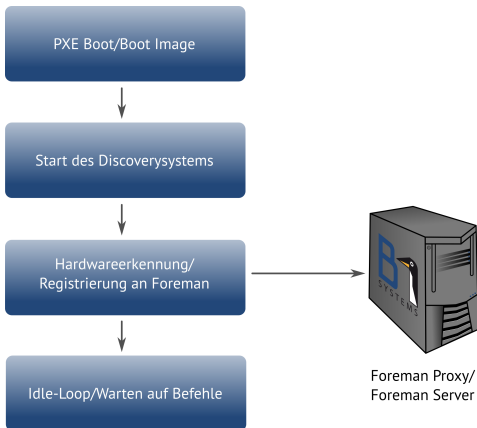
Foreman – Plugins

- erweiterbar durch Plugins
 - Foreman Discovery: Metal as a Service
 - Remote Execution: Tasks auf verwalteten Maschinen ausführen
 - Docker: Verwaltung von Containern auf Docker-Hosts
 - Hooks: Beliebigen Code in verschiedenen Phasen ausführen
 - Chef, Ansible, Salt: Anbindung von Konfigurationsverwaltung neben Puppet
 - Katello: Software-/Patchmanager (Basis für Satellite 6)
 - u.v.m., siehe <http://theforeman.org/plugins/>

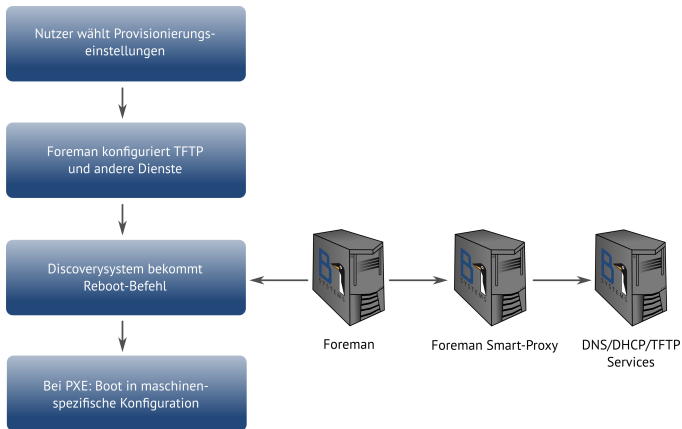
Foreman Discovery 1/4

- besteht aus zwei Teilen
 - Plugin für Foreman Web-Applikation
 - Livesystem basierend auf oVirt-Node

Foreman Discovery 2/4



Foreman Discovery 3/4



Foreman Discovery 4/4

Discovery Rules

Name	
Primary x	
Name *	<input type="text" value="New DB Servers"/>
Search *	<input type="text" value="memory >= 32000 and cpu_count >= 4"/> x
Host Group *	<input type="text" value="DB-Server"/> v <small>Target host group for this rule with all properties set</small>
Hostname	<input type="text" value="dbsrv-customer-<math>\<</math>%= ran"/> Template
Hosts limit	<input type="text" value="10"/> <small>Maximum hosts provisioned with this rule (0 = unlimited)</small>
Priority *	<input type="text" value="0"/> <small>Rule priority (lower integer means higher priority)</small>
Enabled	<input checked="" type="checkbox"/>

Foreman Remote Execution 1/9





- Foreman
 - Scheduler (Foreman Tasks/Dynflow)
 - Frontend für Templatedefinition
 - Frontend zur Taskplanung
- Foreman Proxy
 - Executor Plugin (aktuell nur SSH)

Foreman Remote Execution 2/9

Job Templates

Filter ... ×

[Documentation](#) [New Job Template](#)

Name	Snippet	Locked	
Package Action - SSH Default			Run <input type="button" value="v"/>
Puppet Run Once - SSH Default			Run <input type="button" value="v"/>
Run Command - SSH Default			Run <input type="button" value="v"/>
Service Action - SSH Default			Run <input type="button" value="v"/>

Displaying **all 4** entries

Foreman Remote Execution 3/9

Name
Package Action - SSH Default
Puppet Run Once - SSH Default
Run Command - SSH Default
Service Action - SSH Default

Template Job Type History

Name * Service Action - SSH Default

Warning: This template is locked. You may only change the associations. Please [clone](#) it to customize.

Template editor

Input Diff Preview

ruby Default

```
<# if @host.operatingsystem.family == "Redhat" && @host.operatingsystem.major.to_i > 6 <#
systemctl <#- input("action") &# <#- input("service") &#
<# else &#
service <#- input("service") &# <#- input("action") &#
<# end -&#
```

Foreman Remote Execution 4/9

Job invocation

Job category *

Job template *

Bookmark

Search query

Resolves to 1 hosts

Type of query Static Query Dynamic Query [Explanation](#)

command * Command to run on the host

Foreman Remote Execution 5/9

Job invocations

Filter ... x Search

[Documentation](#)[Run Job](#)

Description	Status	Succeeded	Failed	Pending	Total hosts	Start
Run date	queued	N/A	N/A	N/A	N/A	in 1 minute
Run date	succeeded	1	0	0	1	1 minute ago
Run date	failed	0	1	0	1	3 minutes ago

Displaying all 3 entries

Foreman Remote Execution 6/9

Run date

Refresh Rerun Rerun failed Job Task Cancel Job

Overview Hosts Recurring logic

Target hosts

Manual selection using Static Query

name - [REDACTED]

Evaluated at: 2016-03-11 09:48:08 UTC

Total hosts

1

Providers and templates

Run Command - SSH Default through SSH

Preview for target lemon.color.b1-systems.de

date

succeeded



Foreman Remote Execution 7/9

Run date

Refresh Rerun Rerun failed Job Task Cancel Job

Overview Hosts Recurring logic

Filter ... x Search

Host	Status	Actions
[REDACTED]	🟢 success	Host detail ▾

Displaying 1 entry

Foreman Remote Execution 8/9

Detail of Commands run

Target: XXXXXXXXXX


[Back to Job](#)[Toggle command](#)[Toggle STDERR](#)[Toggle STDOUT](#)[Toggle DEBUG](#)[Task Details](#)[Cancel Job](#)

```
1: Fri Mar 11 04:48:10 EST 2016
2: Exit status: 0
```

[Scroll to bottom](#)[Scroll to top](#)

Foreman Remote Execution 9/9

Recurring logics

Cronline	Task count	Action	Last occurrence	Next occurrence	Current iteration	Iteration limit	Repeat until	State	
*?2 * * * *	6	Run hosts job	2016-03-11 09:54:09 UTC	2016-03-11 04:56:00 -0500	6	10	Unlimited	 Active	<input type="button" value="Cancel"/>

Displaying 1 entry

Foreman Docker Plugin 1/7

- Docker wird zur Compute Resource in Foreman
- Erstellung, Anzeige und Verwaltung von Containern auf verschiedenen Docker-Hosts

Foreman Docker Plugin 2/7

New container



☰ Compute resource

Resource selection

Where do you want to deploy your container?:

Deploy on *

Foreman-Test (Docker)



Foreman Docker Plugin 3/7

New container

1 Preliminary 2 **Image** 3 Configuration 4 Environment

 Docker hub

 External registry

Search



Tag *

[memcached](#)

★ 295

Free & open source, high-perf...

[bitnami/memcached](#)

★ 5

Bitnami Memcached Docker Image

[subindepier/memcached](#)

Foreman Docker Plugin 4/7

New container

1 Preliminary 2 Image 3 Configuration 4 Environment

Basic options

Name

Command *

Entrypoint

Compute options

CPU sets

[learn more about CPU sets](#)

Foreman Docker Plugin 5/7

1 Preliminary 2 Image 3 Configuration 4 Environment

Environment variables

[Add environment variable](#)

Exposed Ports

[Add Exposed Port](#)

DNS

[Add DNS](#)

Run ?

If selected, the container will start after it is created

[← Back](#)

Shell

TTY Allocate a pseudo-tty

Attach STDIN

Attach STDOUT

Attach STDERR

Foreman Docker Plugin 6/7

Containers

[New container](#)

Foreman-Test

Search:

Name ▲	Status ▾	Image ▾	Command ▾	Uptime ▾	Running on ▾	Managed ▾	
Somecache	On	memcached:latest	memcached	🕒 1 minute	Foreman-Test (Docker)	Yes	Power Off ▾

Showing 1 to 1 of 1 entries

[← Previous](#) **1** [Next →](#)

Foreman Docker Plugin 7/7

Somecache - /somecache

Commit

Power Off

Delete

Properties			
Name	/somecache		
Image Repository	memcached		
Image Tag	latest		
IP Address	172.17.0.2		
CPU shares	0		
CPU set			
UUID	5bd83df0d2839d308259ad088433a...		
Memory	0 Bytes		
Command	memcached		
Exposed ports	<table><tr><td>11211</td><td>tcp</td></tr></table>	11211	tcp
11211	tcp		

Processes

Logs

memcached

polkitd

```
{
  "UID": "polkitd",
  "PID": "31926",
  "PPID": "2301",
  "C": "0",
  "STIME": "04:27",
  "TTY": "?",
  "TIME": "00:00:00",
  "CMD": "memcached"
}
```

Vielen Dank für Ihre Aufmerksamkeit!

Bei weiteren Fragen wenden Sie sich bitte an info@b1-systems.de
oder +49 (0)8457 - 931096.

Besuchen Sie uns auch hier auf der CeBIT,
Halle 3, D36/410.