

Systemmanagement mit Puppet und Foreman

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Vorstellung B1 Systems

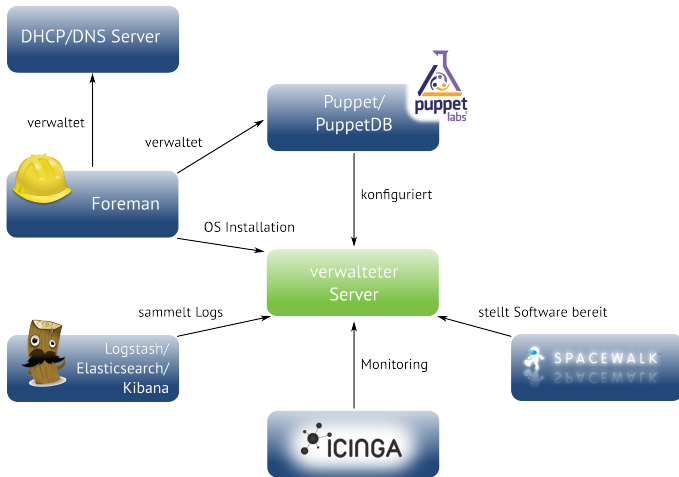
- gegründet 2004
- primär Linux/Open Source-Themen
- national & international tätig
- über 60 Mitarbeiter
- unabhängig von Soft- und Hardware-Herstellern
- Leistungsangebot:
 - Beratung & Consulting
 - Support
 - Entwicklung
 - Training
 - Betrieb
 - Lösungen
- dezentrale Strukturen

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

Überblick über verwendete Komponenten

Verwendete Komponenten



Foreman Kurzvorstellung



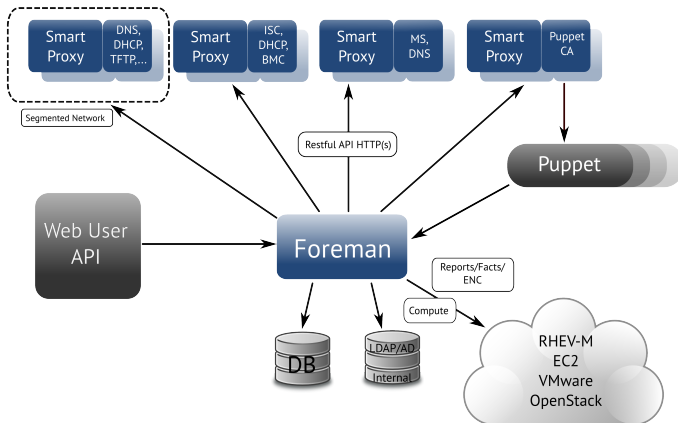
Foreman 1/2

- System Lifecycle Management Software
- Benutzung via Web-UI/CLI/Restful API
- modular aufgebaut
- kann DHCP/DNS/TFTP/Puppet/Puppet CA verwalten
- teilweise Support von Chef (Reports)
- Zukunft: Support von cfengine

Foreman 2/2

- Provisionierung von virtuellen Maschinen (libvirt, VMWare)
- Cloud: AWS, OpenStack, GCE, oVirt, RHEV
- Steuerung von iLO/DRAC/andere
- installierbar auf RHEL/Fedora/Debian/Ubuntu

Foreman Architektur



Foreman – Komponenten

- erweiterbar durch Plugins
 - Foreman Discovery: Metal as a Service
 - Hooks: Beliebigen Code in verschiedenen Phasen ausführen

Foreman Discovery

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

Foreman GUI: Dashboard

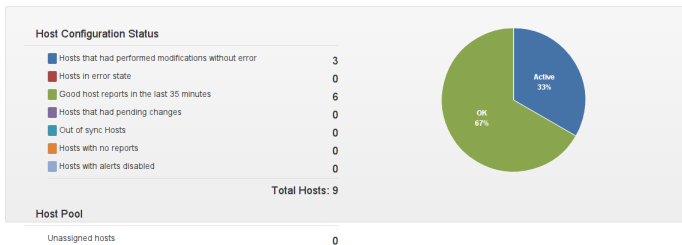
FOREMAN Admin User

Monitor ▾ Hosts ▾ Configure ▾ Infrastructure ▾ Administer ▾

Overview

Filter ... × ▾










Generated at 23 Oct 14:59



Foreman GUI: Hosts Overview

Hosts

Filter ... Q Search ▼ New Host

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

Foreman GUI: Hosts Detail

🌐 **webserver1.demo.int**

Reports from the last days - 43 reports found

[Edit](#) [Build](#) [Run puppet](#) [Delete](#)

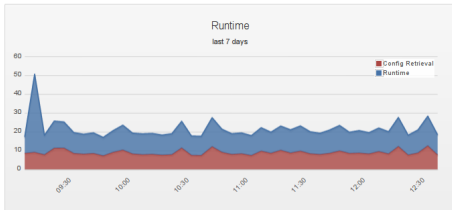
[Properties](#) [Metrics](#) [Templates](#)

Details

[Audits](#) [Facts](#) [Reports](#) [YAML](#)

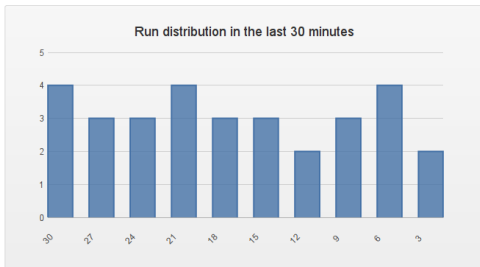
Properties

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 × ▼

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](#)

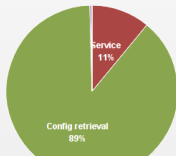
[Host details](#)

[Other reports for this host](#)

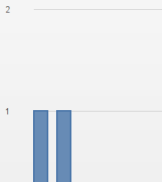
Reported at 2014-10-23 15:01:30 +0200

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 ... Search

Import

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

Icinga Kurzvorstellung



Icinga

- Fork des Monitoringsystems Nagios (2009)
- Kompatibel mit Nagios-Konfiguration und Plugins
- verbessertes CGI Interface sowie neue Oberfläche Icinga-Web
- zusätzliche Bugfixes und Features, die nicht in Nagios aufgenommen wurden

Icinga CGI GUI: Services

0 / 0 UNREACHABLE 0 PENDING 1 / 9 TOTAL

9 / 0 / 0
3.03 / 4.06 / 3.926 s
0.04 / 0.30 / 0.195 s

19 / 0 / 0
0.02 / 10.02 / 0.771 s
0.04 / 0.28 / 0.156 s

0 / 1 CRITICAL 0 / 0 / 0 UNKNOWN 0 PENDING 1 / 19 TOTAL

[View Notifications For All Hosts](#)
[View Host AND Services For All Hosts](#)
[View Host Status Detail For All Hosts](#)

Service Status Details For All Hosts

Page 1 of 1 Results: 50

Host	Service	Status	Last Check	Duration	Attempt	Status Information
foreman.demo.int	SSH	OK	10-23-2014 14:55:33	223d 23h 1m 44s	1/3	SSH OK - OpenSSH_5.3 (protocol 2.0)
hypervisor.demo.int	SSH	OK	10-23-2014 14:55:46	123d 18h 59m 23s	1/3	SSH OK - OpenSSH_5.9p1 Debian-Subuntu1.4 (protocol 2.0)
localhost	Current Load	OK	10-23-2014 14:53:16	231d 0h 54m 53s	1/4	OK - load average: 0.11, 0.16, 0.16
	Current Users	OK	10-23-2014 14:54:43	231d 0h 54m 20s	1/4	USERS OK - 1 users currently logged in
	HTTP	OK	10-23-2014 14:52:10	2d 11h 3m 55s	1/4	HTTP OK: HTTP/1.1 302 Found - 509 bytes in 0.010 second response time
	icinga Startup Delay	OK	10-23-2014 14:53:33	231d 0h 53m 13s	1/4	OK: icinga started with 0 seconds delay
	PING	OK	10-23-2014 14:55:00	231d 0h 53m 44s	1/4	PING OK - Packet loss = 0%, RTA = 0.10 ms
	Root Partition	OK	10-23-2014 14:51:28	231d 0h 53m 44s	1/4	DISK OK - free space: /2145 MB (33% inode=67%);
	SSH	OK	10-23-2014 14:53:51	231d 0h 53m 44s	1/4	SSH OK - OpenSSH_5.3 (protocol 2.0)
	Swap Usage	OK	10-23-2014 14:53:09	231d 0h 56m 0s	1/4	SWAP OK - 96% free (777 MB out of 815 MB)
Total Processes	OK	10-23-2014 14:55:05	231d 0h 55m 26s	1/4	PROCS OK: 157 processes with STATE = RSZDT	
sles1.demo.int	SSH	OK	10-23-2014 14:55:04	0d 2h 15m 1s	1/3	SSH OK - OpenSSH_6.2 (protocol 2.0)
spacewalk.demo.int	SSH	OK	10-23-2014 14:55:09	176d 14h 1m 51s	1/3	SSH OK - OpenSSH_5.3 (protocol 1.99)
ubuntu1.demo.int	SSH	OK	10-23-2014 14:55:54	0d 2h 12m 11s	1/3	SSH OK - OpenSSH_5.9p1 Debian-Subuntu1.1 (protocol 2.0)
webserver1.demo.int	Corporate Webapp	OK	10-23-2014 14:55:44	0d 2h 13m 21s	1/3	HTTP OK: HTTP/1.1 200 OK - 445 bytes in 0.003 second response time
	SSH	OK	10-23-2014 14:55:48	0d 2h 13m 17s	1/3	SSH OK - OpenSSH_5.3 (protocol 1.99)
webserver2.demo.int	Corporate Webapp	OK	10-23-2014 14:55:55	0d 2h 13m 10s	1/3	HTTP OK: HTTP/1.1 200 OK - 445 bytes in 0.002 second response time
	SSH	OK	10-23-2014 14:55:15	0d 2h 13m 50s	1/3	SSH OK - OpenSSH_5.3 (protocol 1.99)

Icinga CGI GUI: Hosts Down

Current Network Status

Last Updated: Thu Oct 23 14:56:48 CEST 2014 - Update in 75 seconds [\[pause\]](#)

Icinga Classic UI 1.11.6 (Backend 1.11.6) - Logged in as *icingadadmin*

- Notifications are disabled

- ▶ View **Alert History** For **All Hosts**
- ▶ View **Notifications** For **All Hosts**
- ▶ View **Host AID Services** For **All Hosts**
- ▶ View **Service Status Detail** For **All Hosts**

Commands for checked host(s)

Select command

Set Filters

Host Status Details For All Hosts

Page 1 of 1 Results: 50

Host	Status	Last Check	Duration	Attempt	Status Information
site2.demo.it	DOWN	10-23-2014 14:56:23	0d 0h 0m 15s	3/3	CRITICAL - Host Unreachable (10.30 0.76)

Page 1 of 1 Results: 50

Displaying Result 1 - 1 of 1 Matching Hosts

Logstash Kurzvorstellung



Logstash 1/2

- komplette Log-Infrastruktur
- unterstützt eine Vielzahl von Protokollformaten durch Filter
- einfach zu implementieren

Logstash 2/2

- benutzt Elasticsearch für Datenhaltung
- skaliert horizontal (Indexer, Elasticsearch, Redis)
- Kibana3 ist eine sehr flexible GUI zur Visualisierung der Logs

Logstash Inputs

file: Normale Datei

syslog: lauscht auf Port 514 und kann somit Ziel von rsyslog/syslog-ng usw. sein

lumberjack: Input für eigenen Transportmechanismus (logstash-forwarder)

...

Logstash Filters

- grok**: Regexes auf Steroiden. Vorgefertigte Pattern erleichtern die Benutzung von Regex
- mutate**: Log nachträglich anpassen
- geoip**: z. B. das Land zu einer IP-Adresse im Log herausfinden.
- ...

Logstash Outputs

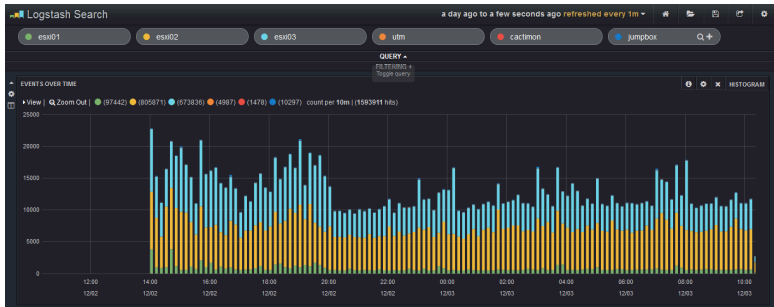
`elasticsearch`: Empfohlen für Produktiveinsatz (und für Kibana)

`file`: In Datei schreiben

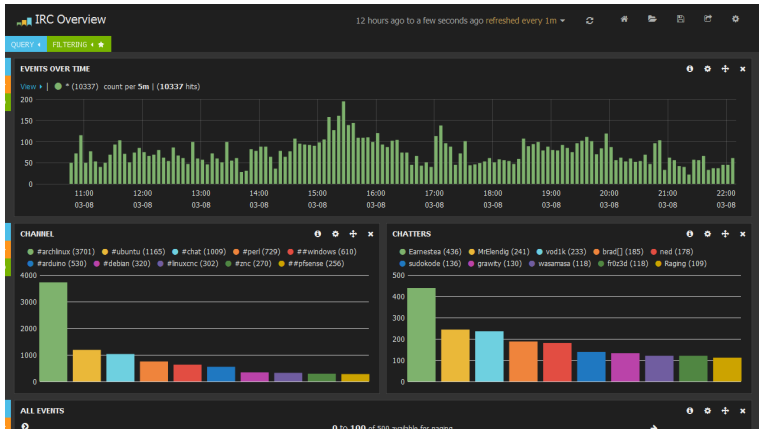
`graphite`: Output nach Graphite für Graphing

...

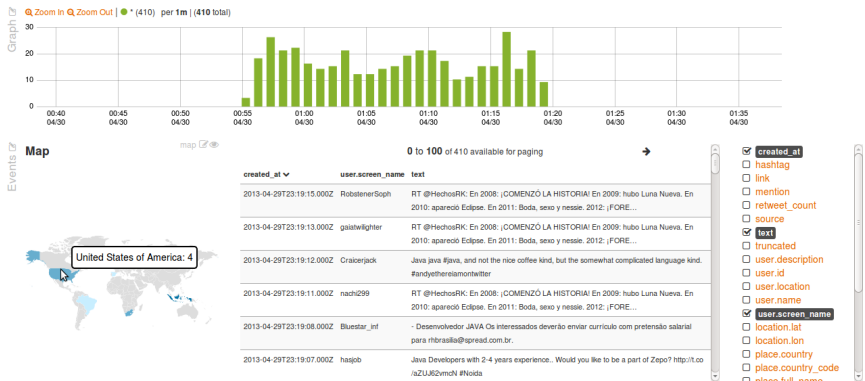
Kibana3: Log Search and Filters



Kibana3: IRC Log Example



Kibana3: Twitter Example mit Geo-IP



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

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,
  }
}
```

Einstieg in PuppetDB

PuppetDB

- Data Warehouse für Puppet
- Ablösung für altes storeconfigs Konzept
- Deduplizierung der gesammelten Daten
- bietet Restful-API für Abfragen
- Anwendungsfall: Exportierte Ressourcen
- Web-UI: PuppetBoard

PuppetDB

Exportierte Ressourcen am Beispiel von Monitoring

- Ressourcen werden auf den zu überwachenden Systemen eingesammelt (exportiert)
- exportierte Ressourcen werden in PuppetDB gespeichert
- exportierte Ressourcen werden dann auf dem Monitoringsystem (Icinga) angewendet

PuppetDB

Exportierte Nagios Host Ressource

```
@@nagios_host{"nagios_${::hostname}":  
  ensure => present,  
  address => "${::ipaddress}",  
  host_name => "${::fqdn}",  
  check_command => 'check_ping!100.0,20%!500.0,60%',  
  display_name => "${::fqdn}",  
  max_check_attempts => '3',  
  use => 'generic-host',  
  target => \  
    "/etc/icinga/conf.d/service_ssh_${::hostname}.cfg",  
}
```

PuppetDB

Anwenden der exportierten Ressourcen

```
# Collect all exported monitoring resources
if $::monitoring_server == $::fqdn {
  Nagios_Host<<| |>> {
  }
  Nagios_Service<<| |>> {
  }
```

Beispielabfragen

Beispielabfragen








Alle Nodes mit Debian

```
["and",  
  ["=", "name", "operatingsystem"],  
  ["=", "value", "Debian"]]
```

Uptime zwischen ca. 28h und ca. 12d

```
["and",  
  ["=", "name", "uptime_seconds"],  
  [">=", "value", 100000],  
  ["<", "value", 1000000]]
```

PuppetDB Dashboard 1/2

JVMHeap bytes	96.3M	
Nodes in the population	10	
Resources in the population	149	
Resource duplication % of resources stored	18.1%	
Catalog duplication % of catalogs encountered	0.0%	
Command Queue depth	0	
Command Processing sec/command	0.00	

PuppetDB Dashboard 2/2

Processed since startup	0		_____
Retried since startup	0		_____
Discarded since startup	0		_____
Rejected since startup	0		_____
Enqueueing service time, seconds	?		_____
Collection Queries service time, seconds	?		_____
DB Compaction round trip time, seconds	0.0140		_____
DLO Compression round trip time, seconds	?		_____

Spacewalk Kurzvorstellung



Spacewalk Kurzvorstellung

- System Lifecycle Management Software (2002)
- Grundlage für RH Satellite bis 5.x und SUSE Manager
- seit 2008 offenes Software Projekt (GPL2)
- unterstützt RHEL/SUSE (und Derivate), teilweise Debian/Ubuntu (nur Softwareverwaltung)

Spacewalk Features 1/2

- Provisionierung von Systemen (Anbindung an Cobbler)
- Steuerung von Hypervisoren (KVM/Xen)
- Softwaremanagement mit Channelstruktur
- Staging (Einfrieren bestimmter Versionsstände)
- einfache Konfigurationsverwaltung
- Ausführung von Skripten auf verwalteten Maschinen

Spacewalk Features 2/2

- zeitgesteuerte Ausführung von Aufgaben
- Monitoring
- „Verwaltung“ von Crashes (abrt)
- OpenSCAP Einbindung (Software-Auditing)
- Bedienung durch Web-UI/CLI/XMLRPC-API


Spacewalk: GUI Overview

System Overview




















View System Groups

0 1 2 3 4 5 6 7 8 9 | A B C D E F G H I J K L M N O P Q R **S T U V W X Y Z**

1 - 6 of 6


Filter by System Name: 

25 Items per page

<input type="checkbox"/>	System 	Updates	Health	Errata	Packages	Configs	Crashes	Base Channel	Entitlement
<input type="checkbox"/>	 sles1.demo.int			0	0	0	(none)	SLES 11 SP3 x86_64	Management, Monitoring, Provisioning
<input type="checkbox"/>	 sles2.demo.int			0	0	0	(none)	SLES 11 SP3 x86_64	Management, Monitoring, Provisioning
<input type="checkbox"/>	 tangerine.demo.int			0	34	0	(none)	CentOS 6 (x86_64)	Management, Monitoring, Provisioning
<input type="checkbox"/>	 ubuntu1.demo.int			0	0	0	(none)	Ubuntu 12.04 Base	Management, Monitoring, Provisioning
<input type="checkbox"/>	 webserver1.demo.int			0	34	0	(none)	CentOS 6 (x86_64)	Management, Monitoring, Provisioning
<input type="checkbox"/>	 webserver2.demo.int			0	34	0	(none)	CentOS 6 (x86_64)	Management, Monitoring, Provisioning

Select All

Spacewalk: System Details

 **webserver1.demo.int**
delete system | add to ssm

Details
Software
Configuration
Provisioning
Monitoring
Groups
Audit
Events

Overview
Properties
Remote Command
Reactivation
Hardware
Migrate
Notes
Custom Info

System Status

⚠ Software Updates Available **Packages:** 34

System Info

Hostname:	webserver1.demo.int
IP Address:	10.30.0.72
IPv6 Address:	::1
Virtualization:	KVM/QEMU
UUID:	738e7aea9c8dbe56c8e471ba75876dd3
Kernel:	2.6.32-431.el6.x86_64
Spacewalk System ID:	1000010058
Activation key:	1-centos6-upstream

System Events

Checked In:	10/23/14 12:42:08 PM CEST
Registered:	10/23/14 11:09:35 AM CEST
Last Booted:	10/23/14 10:59:50 AM CEST (Schedule System Reboot)
OSA Status:	online as of unknown Ping System

System Properties ([Edit These Properties](#))

Entitlements: [Management] [Provisioning] [Monitoring]

Spacewalk: Channel Overview

Channel Name	Provider	Packages	Systems
[-] CentOS 6 (x86_64)	Spacewalk Default Organization	6367	2
[-] CentOS 6 Puppet	Spacewalk Default Organization	346	2
[-] CentOS 6 Puppet Deps	Spacewalk Default Organization	60	2
[-] CentOS 6 Updates (x86_64)	Spacewalk Default Organization	463	2
[-] EPEL 6 for CentOS 6 (x86_64)	Spacewalk Default Organization	10455	2
[-] Spacewalk Client 2.0 for CentOS 6 (x86_64)	Spacewalk Default Organization	22	0
[-] Spacewalk Client 2.1 for CentOS 6 (x86_64)	Spacewalk Default Organization	23	2
[+] dev-centos6-x86_64	Spacewalk Default Organization	6367	0
[+] prod-centos6-x86_64	Spacewalk Default Organization	6367	0
[-] SLES 11 SP3 x86_64	Spacewalk Default Organization	2855	4
[-] SLES 11 SP3 Puppet x86_64	Spacewalk Default Organization	107	4
[-] SLES 11 SP3 SDK Pool x86_64	Spacewalk Default Organization	2754	4
[-] SLES 11 SP3 SDK Updates x86_64	Spacewalk Default Organization	444	4
[-] SLES 11 SP3 Spacewalk Client 2.1 x86_64	Spacewalk Default Organization	60	4
[-] SLES 11 SP3 Updates x86_64	Spacewalk Default Organization	822	4

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 6, H16/312.