

Gestione del ciclo di vita dei server con Foreman e Puppet

Giuseppe Misurelli

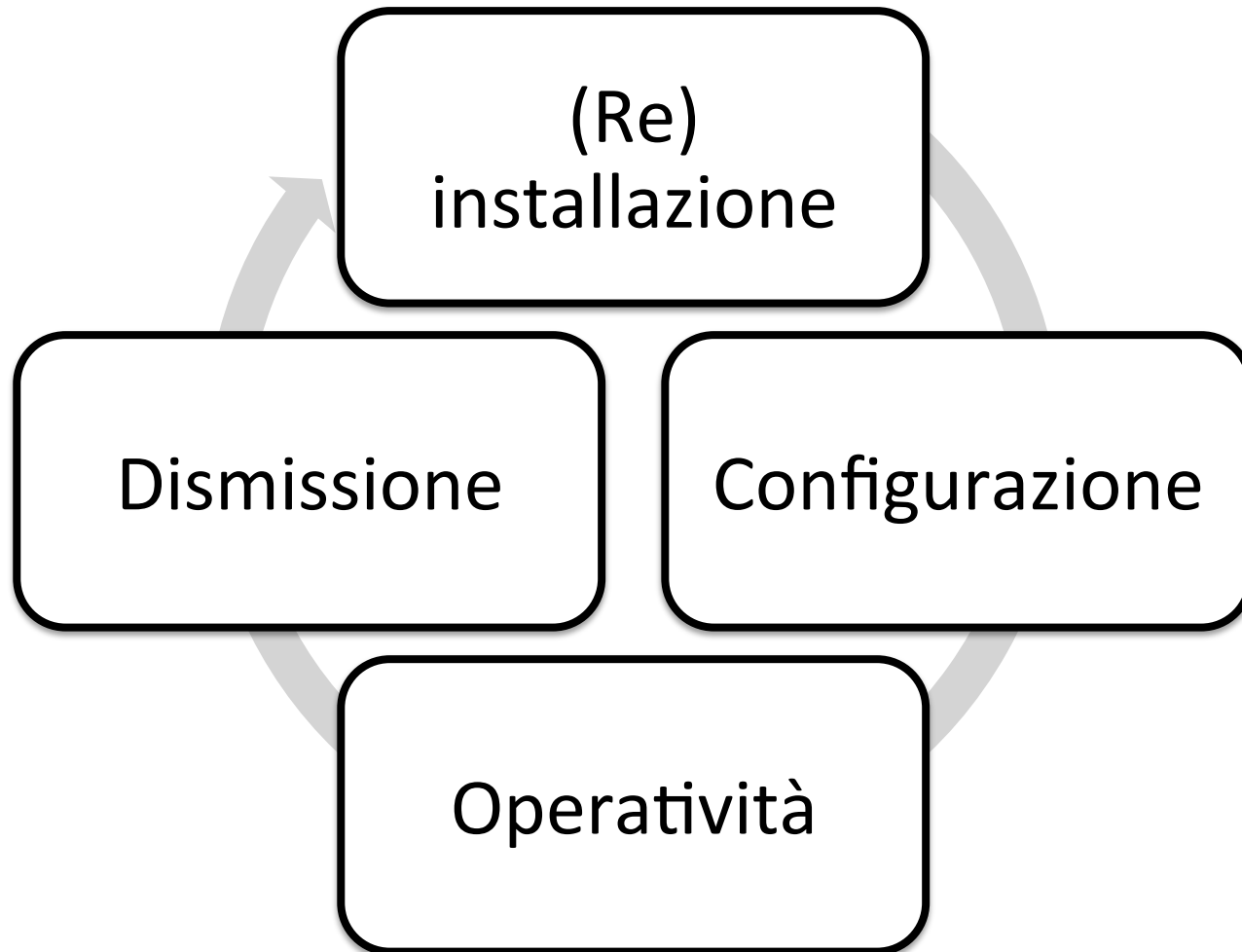
Michele Pezzi

Paolo Veronesi

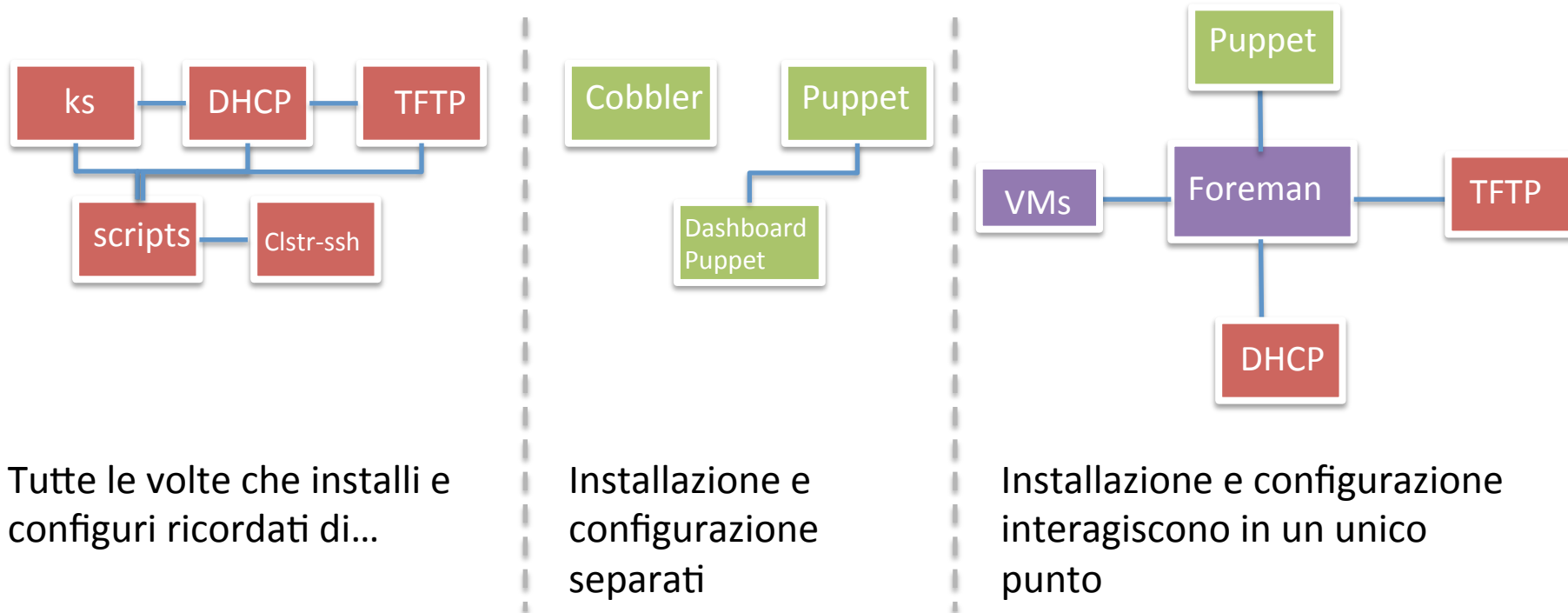
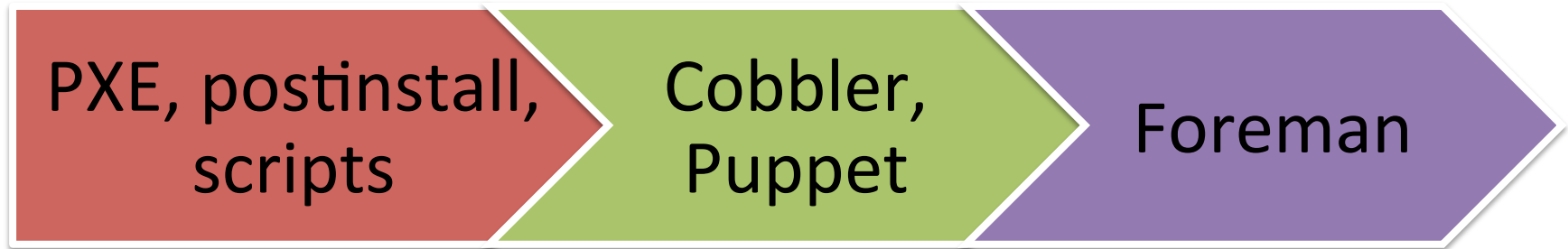
Argomenti di discussione

- Descrizione di Foreman (Misurelli)
 - Funzionalità del sistema
- Integrazione di Puppet (Veronesi)
 - Configurazione e reportistica
 - Evoluzione seminario
<https://agenda.cnaf.infn.it/conferenceDisplay.py?confId=579>
- Estensione ad altri casi d'uso CNAF (Pezzi)
 - Adozione in altri ambiti

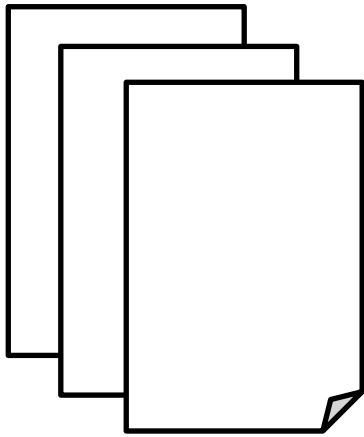
Ciclo di vita di un server



Evoluzione della gestione nel nostro reparto

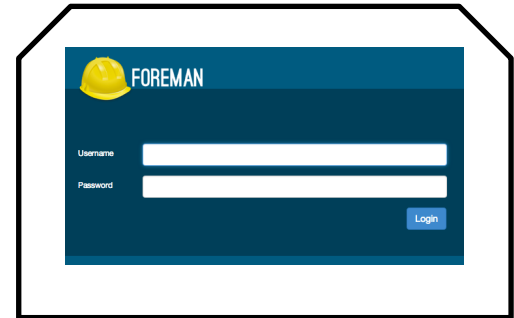
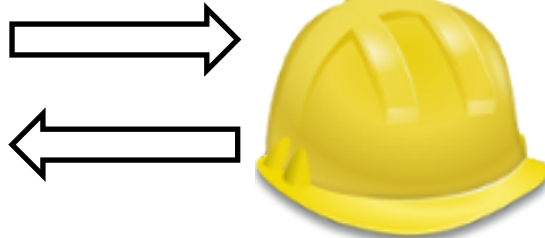


Cos'è Foreman?



Smart Proxy (DHCP, TFTP)

Ruby on Rails app



Web UI, API, CLI



CFG mgmt (Puppet)



Compute resources

Limiti di Cobbler – Vantaggi di Foreman

	Cobbler	Foreman
Supporto oVirt/OpenStack/Libvirt		
Interazione con Puppet		
Integrazione con reportistica Puppet		
Gestione utenti e domini di competenza		
Separazione del controllo dei servizi TFTP e DHCP		

Concetto di Smart Proxy in Foreman

Moduli da installare sui servizi coinvolti



Smart Proxies

[New Smart Proxy](#)

Name	URL	Features	
DHCP	[REDACTED]	DHCP	Import subnets ▾
Puppet	[REDACTED]	Puppet and Puppet CA	Certificates ▾
TFTP	[REDACTED]	TFTP	Refresh features ▾

Deleghe a servizi pre-esistenti

- API usate da Foreman per l'orchestrazione

Funzionamento dei principali Smart Proxy

API DHCP (interazione via OMAPI)

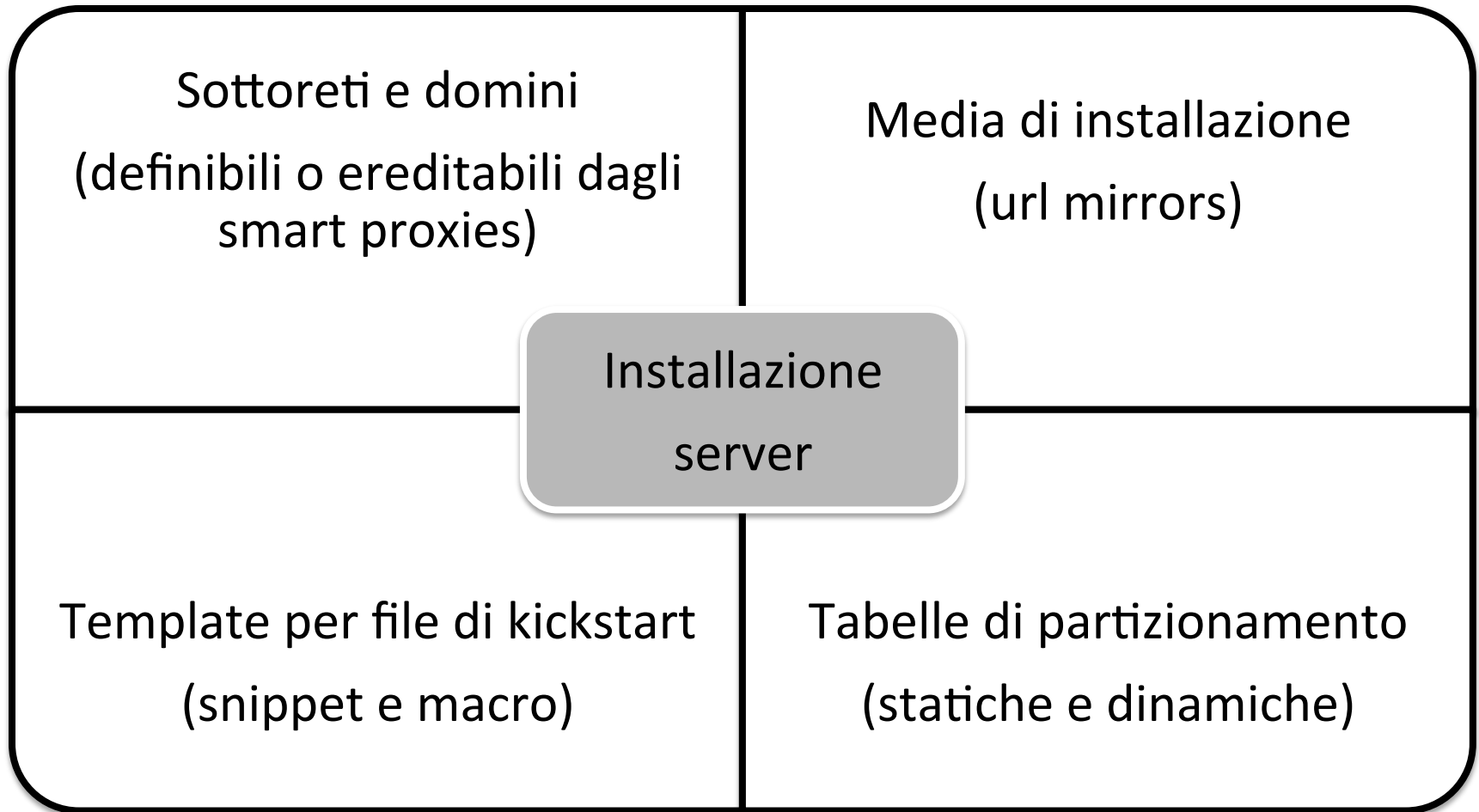
DHCP			
/dhcp	GET	Retrieve a list of subnets	
/dhcp/10.1.2.0	GET	Retrieve 10.1.2.0 subnets records	
/dhcp/10.1.2.0/10.1.2.5	GET	Retrieve 10.1.2.5 reservation information	
/dhcp/10.1.2.0/unused_ip	GET	Provides an unused ip address in 10.1.2.0 subnet	
/dhcp/10.1.2.0	POST	creates new reservation in 10.1.2.0 subnet	{"hostname":string, "name":string, "filename":string, "ip":string, "nextserver":string, "mac":string}
/dhcp/10.1.2.0/10.1.2.5	DELETE	Deletes 10.1.2.5 reservation from 10.1.2.0 subnet	

API TFTP (carica i file pxe e le img di boot)

TFTP			
/tftp/00:11:22:33:44:55	POST	creates pxelinux configuration file for host with MAC address 00:11:22:33:44:55	{"syslinux_config":string}. Implicit variant of "syslinux"
/tftp/<variant>/00:11:22:33:44:55	POST	creates pxeconfig configuration file for host with MAC address 00:11:22:33:44:55	{"pxeconfig":string}. Variant can be "syslinux" or "pxegrub"
/tftp/00:11:22:33:44:55	DELETE	remove pxelinux configuration file for host with MAC address 00:11:22:33:44:55	Implicit variant of "syslinux"
/tftp/<variant>/00:11:22:33:44:55	DELETE	remove pxeconfig configuration file for host with MAC address 00:11:22:33:44:55	Variant can be "syslinux" or "pxegrub"

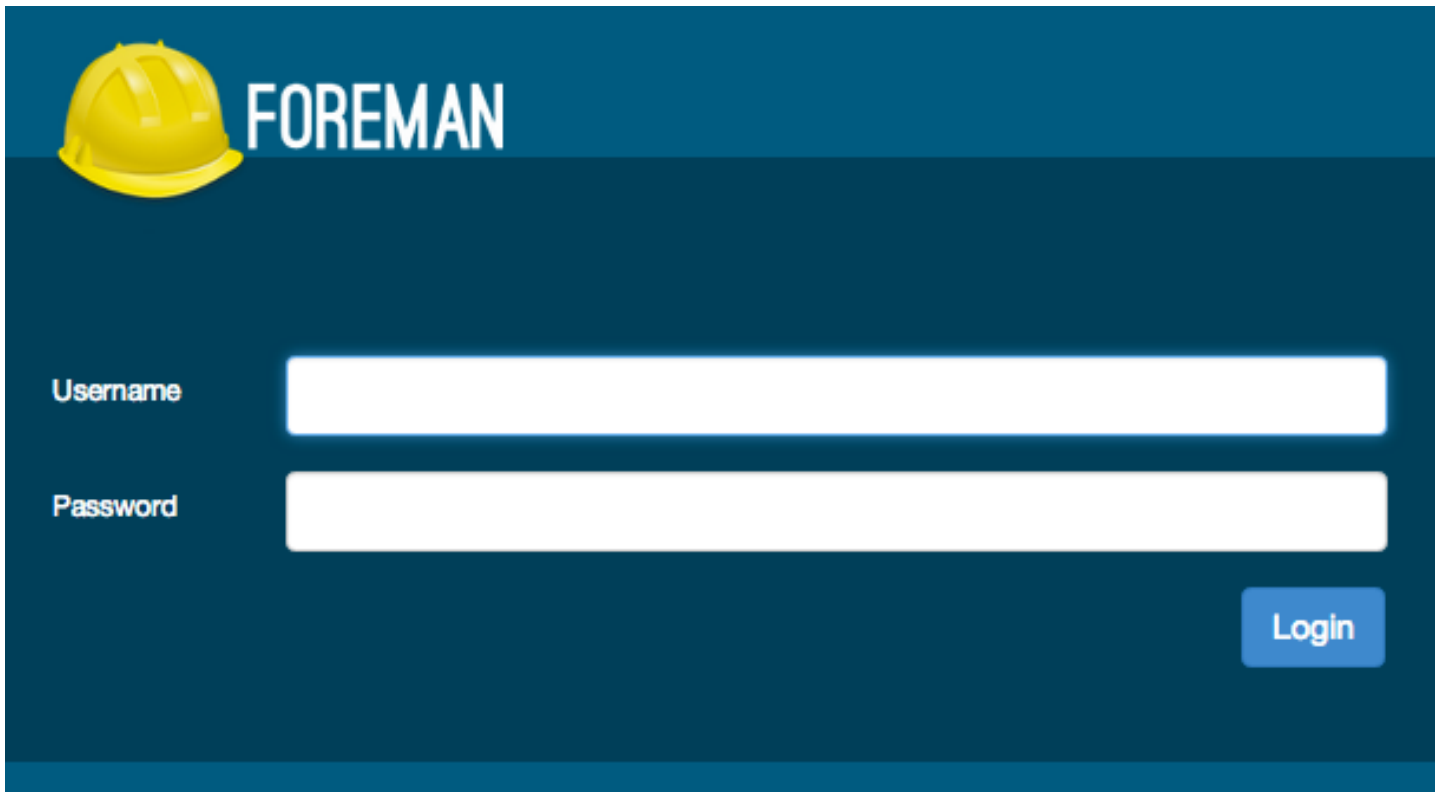
Analogamente anche per i proxy DNS/Puppet/PuppetCA

Principi del funzionamento di Foreman Installazione



Contesti di interazione

Utenti, gruppi, ruoli e profili di competenza permettono un ambiente multi-utenza controllato



The image shows a login interface for a system named 'FOREMAN'. At the top left, there is a yellow hard hat icon next to the word 'FOREMAN' in white capital letters. Below this, there are two white input fields for 'Username' and 'Password'. A blue 'Login' button is located at the bottom right of the form area.

 **FOREMAN**

Username

Password

Login

Raggruppamenti e domini di competenza /1

Gerarchia, nome, ambiente e smart proxy Puppet



Edit Farming

Host Group Puppet Classes Network Operating System Parameters

Parent

Name

Environment

Compute profile

Puppet CA Use this puppet server as a CA server

Puppet Master Use this puppet server as an initial Puppet Server or to execute puppet runs

Raggruppamenti e domini di competenza /2

Classi Puppet incuse e da includere



Edit Farming

Host Group **Puppet Classes** Network Operating System Parameters

Included Classes

- cnaf-cron
- cnaf-cron::params
- cnaf-puppet
- cnaf-puppet::params
- resolv
- yum

Available Classes

Filter classes

- centrallog-client
- cnaf-cron
- cnaf-puppet
- egi-ca
- emi3-igi-siteinfo
- emi3-igi-siteinfo-mpi
- emi3-igi-siteinfo-mpi-sl6
- emi3-topbdll
- emi3-wn
- fail2ban

- lemon
- motd
- nagiosclient
- ntp
- packages
- resolv
- ssh
- stdlib
- test-notify
- yum

Cancel

Submit

Raggruppamenti e domini di competenza /3

Domini e sottoreti di competenza



Edit Farming

Host Group Puppet Classes **Network** Operating System Parameters

Domain

Subnet

Raggruppamenti e domini di competenza /4

Architetture, SO, media, ...



Edit Farming

Host Group Puppet Classes Network **Operating System** Parameters

Architecture

Operating system

Media

Partition table

Root password

Hostgroup funzionali dunque a...

“Build” di un nuovo host

Compilazione di un form web (abilitazione in Build)



New Host

Host Puppet Classes Network Operating System Parameters Additional Information

Name

Host Group

Deploy on

Environment

Puppet CA Use this puppet server as a CA server

Puppet Master Use this puppet server as an initial Puppet Server or to execute puppet runs

Cancel

Submit



Hosts

New Host

☐	Name	Operating system	Environment	Model	Host group	Last report	
☐	seminario.cr.cnaf.infn.it	Tier1-SL6 6	production		Farming		Edit

Interazione programmatica (verso installazioni cumulative)

<http://theforeman.org/api/apidoc/v1.html>

```
import requests

endpoint = 'https://lifecycle.cnaf.infn.it/api/hosts'
certs = ('mycert.pem', 'mykey.pem')
cafile = 'cafile.pem'
credentials = ('user', 'pass')

# Set requests parameters
payload = {
    'name': 'test-api',
    'environment_id': '2',      # Environment (see hostgroups APIs)
    'domain_id': '1',          # Domain (see domains APIs)
    'ip': '10.10.0.21',
    'mac': 'c8:33:65:52:07:2d',
    'architecture_id': '1',    # Arch (see architecture APIs)
    'operatingsystem_id': '3'  # OS (see operatingsystem APIs)
}

# Post host creation requests
r = requests.post(
    endpoint,
    data=payload,
    cert=certs,
    auth=credentials,
    verify=cafile
)

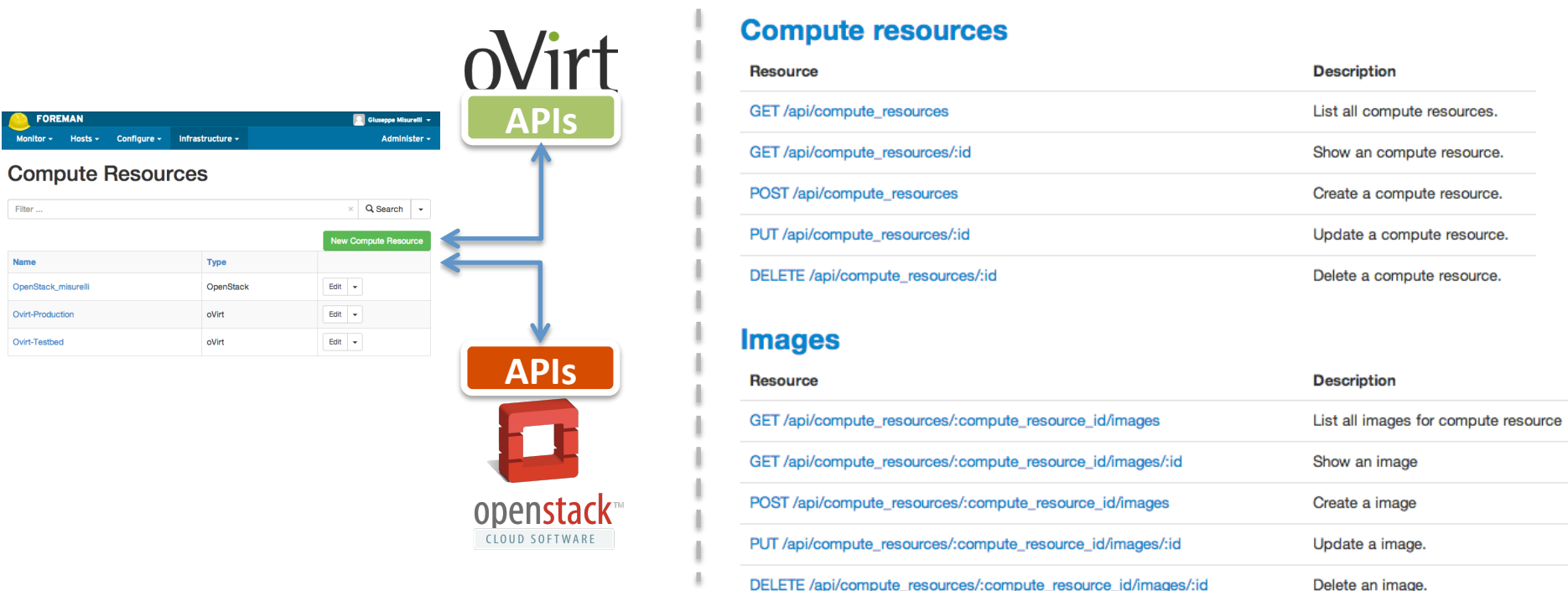
# Print form-encoded requests
print r.text
```

POST /api/hosts

```
{
  "host": {
    "name": "test-api",
    "environment_id": "2",
    "domain_id": "1",
    "ip": "10.10.0.21",
    "mac": "c8:33:65:52:07:2d",
    "architecture_id": "1",
    "operatingsystem_id": "3",
  }
}
```

Interazioni con i “compute resources” (oVirt e OpenStack)

- Creazione di server come VM nei domini utente/tenant
- Richieste basate sulle impostazioni fornite dai vari fornitori di compute resources



Installiamo un nuovo server...



Username

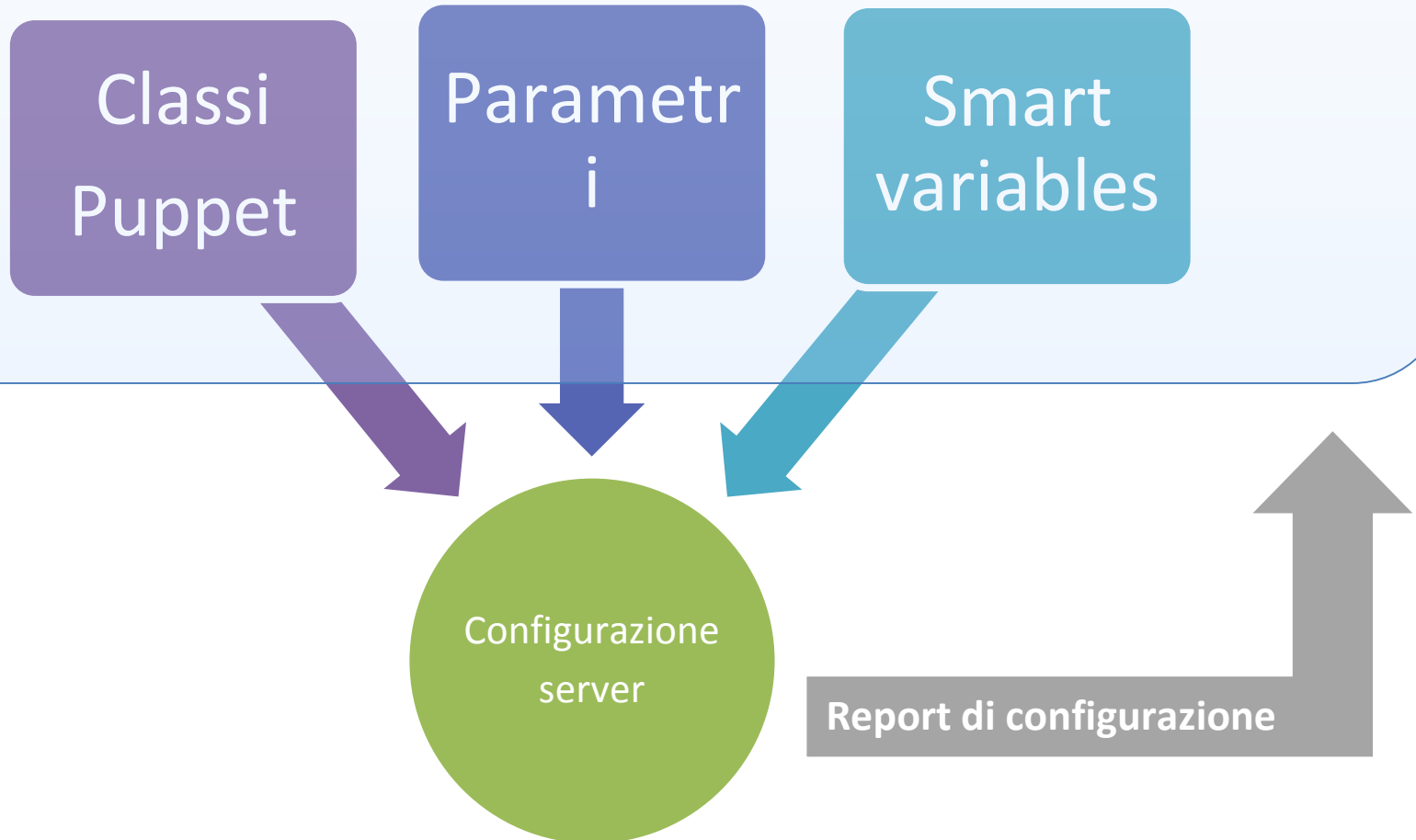
Password

Login

Welcome to Foreman
Version 1.4.0-RC2

Utilizzo di puppet (attraverso foreman) a runtime

Foreman agisce da **External Node Classifier** fornendo a Puppet
YAML descrittivi delle configurazioni da impartire ai nodi



Demo installazione top-bdii

```
class emi3-topbdii {

  file { 'site-info.def':
    name  => "/root/igi-siteinfo/site-info.def",
    ensure => file,
    owner  => "root",
    group  => "root",
    mode   => 600,
    require => File["/root/igi-siteinfo"],
    content => template("emi3-topbdii/site-info.def.erb"),
  }

  # run exec only if /etc/emi-release does not exist
  exec { "install-emi3-repo":
    path    => [ "/bin/", "/sbin/", "/usr/bin/", "/usr/sbin/" ],
    command => "rpm -ivh http://emisoft.web.cern.ch/emisoft/dist/EMI/3/sl6/x86_64/base/emi-release-3.0.0-2.el6.noarch.rpm",
    creates  => "/etc/emi-release",
    logoutput => true,
    require  => [ Package["ca-policy-egi-core"], Service["fail2ban" ] ],
  }

  package { "emi-release":
    ensure => "latest",
    require => Exec["install-emi3-repo"],
  }

}
```

[...]

Generazione site-
info.def

Gestione
repository EMI3

Demo installazione top-bdii

[...]

```
package {"emi-bdii-top":  
  ensure => "installed",  
  require => Package["emi-release"],  
}
```

```
exec { "yaim-config":  
  command  => "/opt/glite/yaim/bin/yaim -c -d 6 -s /root/igi-siteinfo/site-info.def -n BDII_top",  
  require  => Package["emi-bdii-top"],  
  subscribe => [ File["site-info.def"] ],  
  refreshonly => true,  
  logoutput => true,  
}
```

```
}
```

Installazione
metapackage emi-
top-bdii

Configurazione del
servizio via yaim



DEMO

Classi puppet parametriche

- Scrivere bene moduli in puppet non e' facile.
- Se i moduli sono parametrici, e' possibile gestire i parametri con foreman

```
class cnaf-puppet (  
  $autoupgrade = false,  
  $config_file = '/etc/puppet/puppet.conf',  
  $ensure = 'present',  
  $server = 'puparo.cnaf.infn.it',  
  $service_ensure = 'stopped',  
  $service_enable = true,  
  $service_hasstatus = true,  
  $service_hasrestart = true,  
) inherits cnaf-puppet::params {  
  case $ensure {  
    /(present)/: {  
      if $autoupgrade == true {  
        $package_ensure = 'latest'  
      } else {  
        $package_ensure = 'present'  
      }  
    }  
    /(absent)/: {  
      $package_ensure = 'absent'  
    }  
    default: {  
      fail('ensure parameter must be present or absent')  
    }  
  }  
  package {$package:  
    ensure => $package_ensure,  
  }  
}
```

FOREMAN

Monitor ▾ Hosts ▾ Configure ▾ Infrastructure ▾

Edit Puppet Class cnaf-puppet

Puppet Class | Smart Class Parameter | Smart Variables

Filter By Name @

autoupgrade	Puppet Environments	development and production
config file	Parameter	autoupgrade
ensure	Description	
server	Override	☐
service enable	Whether the smart-variable should override the Puppet class default value.	
service ensure	Parameter type	boolean
service hasrestart	Parameter Types	
service hasstatus	Default value	false

Value to use when there is no match

Cancel Submit

A proposito di reportistica...



Overview

Filter ...

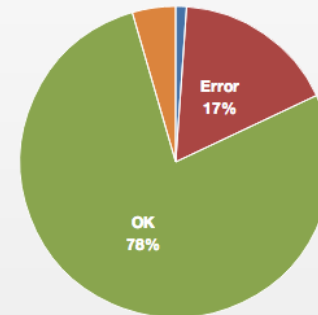
Q Search

Generated at 01 Mar 14:47

Host Configuration Status

Hosts that had performed modifications without error	1
Hosts in error state	15
Good host reports in the last about 1 hour	69
Hosts that had pending changes	0
Out of sync Hosts	0
Hosts with no reports	4
Hosts with alerts disabled	0

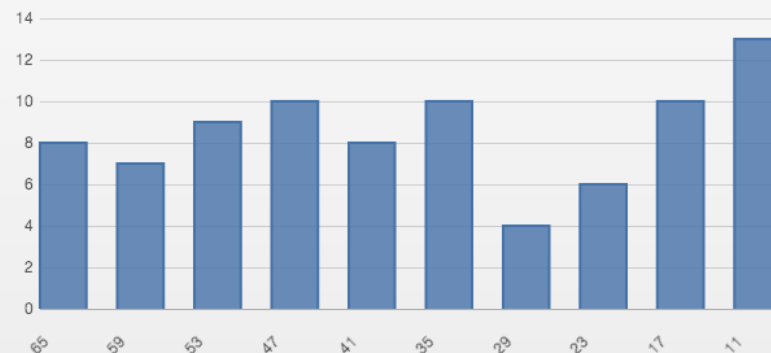
Total Hosts: 89



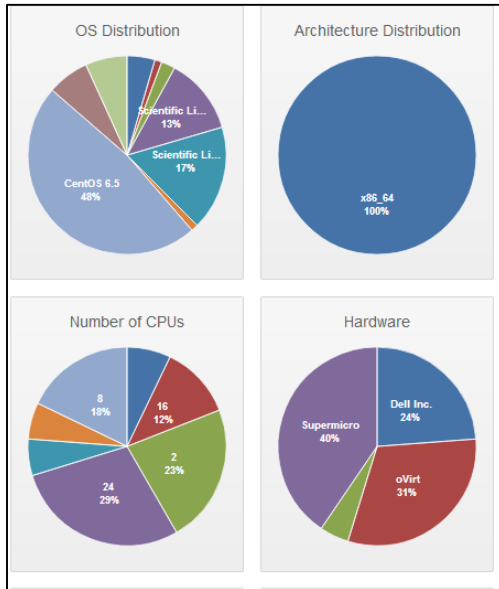
Latest Events

Host	A	R	F	FR	S	P
wn09.cnaf.i...	0	0	3	0	2	0
wn12.cnaf.i...	0	0	3	0	2	0
wn17.cnaf.i...	0	0	3	0	2	0
wn20.cnaf.i...	0	0	3	0	2	0
wn13.cnaf.i...	0	0	3	0	2	0
wn06.cnaf.i...	0	0	3	0	2	0

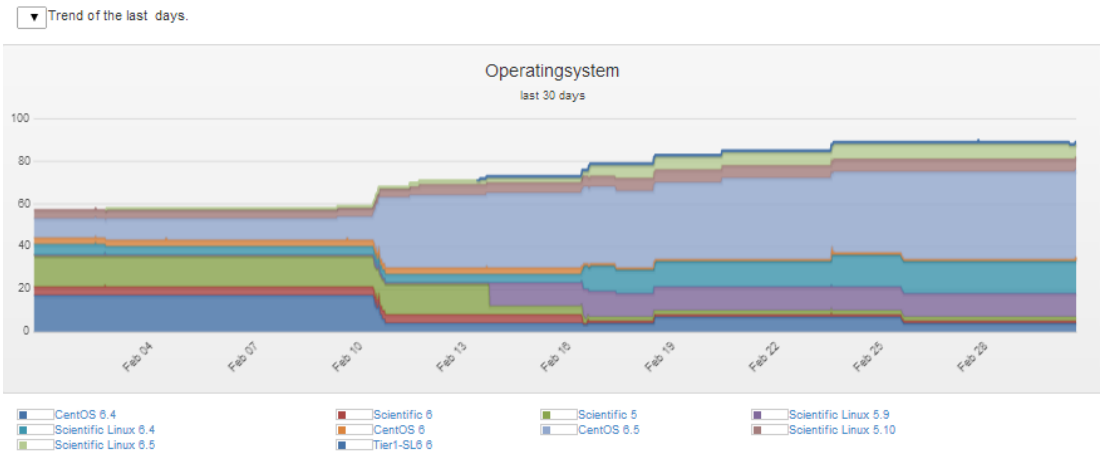
Run distribution in the last 65 minutes



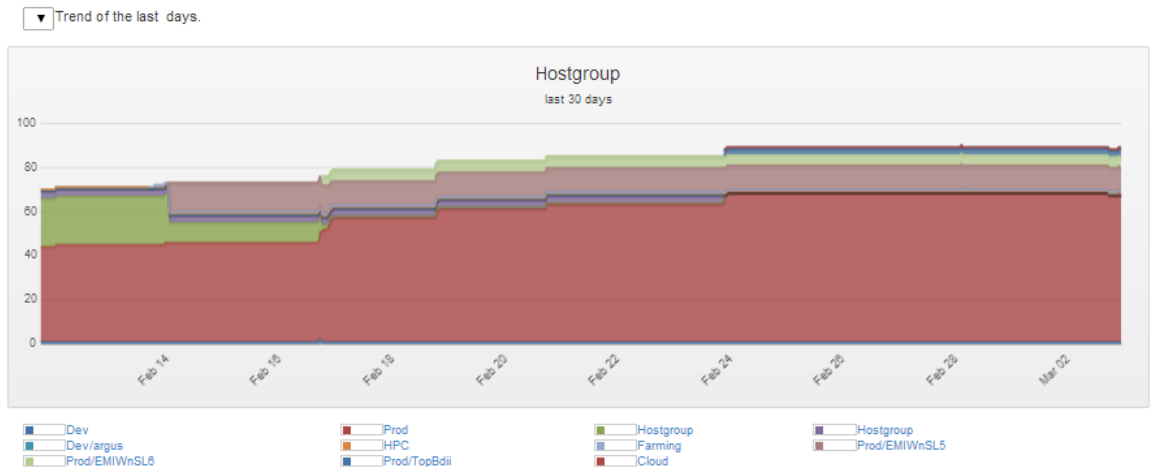
Esempi di report



Trends for Operatingssystem



Trends for Hostgroup



Puppet at Cnaf-Storage

- Making of
- What we need
- What we do
- Prospect

Manifest :
where machine are defined

Modules :
where “action-to-do” are
defined

Facter :
information about machine

Puppet at Cnaf-Storage

- Making of
- What we need
- What we do
- Prospect

- Package provider definition (rpm, deb ...)
- Upgrade/downgrade pkg & kernel
- Change conf file
- Network configuration

Puppet at Cnaf-Storage

- Making of
- What we need
- **What we do**
- Prospect

Package provider

```
Package { provider => "apttrpm" }
```

Upgrade/Downgrade:
fix software version

Configuration file :
managing via template

Puppet at Cnaf-Storage

- Making of
- What we need
- **What we do**
- Prospect

Network configuration:

- common config
- bonding (conf file & module)
- bridge
- routing
- 10 Gb
- squid proxy

Puppet at Cnaf-Storage

- Making of
- What we need
- What we do
- **Prospect**

Puppet can work together with other software like cobbler and foreman.

Our work (modules) can be integrated inside formman.

Verso un ambiente di produzione

- Alta affidabilità per Foreman/Puppet
 - Come webapp con DB da integrare in un cluster?
- Orientamenti altre realtà (CERN)
 - Più di 4000 macchine; circa 100 gruppi di host
- Installazioni cumulative
 - Approcci alla <https://github.com/plytro/foreman-bulk-provision>
- Sponsors
 - Redhat, Rackspace, ...

Verso un ambiente di produzione

- Alta affidabilità per Foreman/Puppet
 - Come webapp con DB da integrare in un cluster?
- Orientamenti altre realtà (CERN)
 - Più di 4000 macchine; circa 100 gruppi di host
- Installazioni cumulative
 - Approcci alla <https://github.com/plytro/foreman-bulk-provision>
- Sponsors
 - Redhat, Rackspace, ...