CIRRAX

Puppet

Benedikt Trefzer

benedikt.trefzer@cirrax.com

Cirrax GmbH

Table of contents

what is "puppet"

software for configuration management

Software for configuration management:

- puppet[1]
- ansible[2]
- CFEngine[3]
- chef[4]
- salt[5]

Also look at comparison of configuration management software on wikipedia[6]

---

[1] https://en.wikipedia.org/wiki/Puppet_(software)

[2] https://en.wikipedia.org/wiki/Ansible_(software)

[3] https://en.wikipedia.org/wiki/CFEngine

[4] https://en.wikipedia.org/wiki/Chef_(software)

[5] https://en.wikipedia.org/wiki/Salt_(software)

[6] https://en.wikipedia.org/wiki/Comparison_of_open-source_configuration_management_software

definition

- puppet is designed to manage the configuration of computers (called nodes)
- the user describes the node and the desired state using Puppet's declarative language
- this information is stored in files called "Puppet manifests".[7]

Steps during a puppet run (simplified):

1. discover the actual state of the target computer (using facts)
2. compile the manifest into a system-specific catalog
3. transfer the catalog to the target system (node)
4. apply catalog on the node

[7] https://en.wikipedia.org/wiki/Puppet_(software)

puppet declarative language

- the Puppet programming language is a declarative language that describes the state of a computer system in terms of "resources"
- the user assembles resources into manifests that describe the desired state of the system
- these manifests are stored on the server and compiled into configuration instructions for agents on request

Example:

```
user { 'jbond':
  ensure  => present,
  comment => 'James bond',
  uid     => '1007',
  shell   => '/bin/bash',
  home    => '/home/jbond'
}
```

resource abstraction

- puppet allows to configure systems in a platform-agnostic way
- instead of specify a system command to perform an action you:
  1. create a system-agnostic puppet resource
  2. puppet translates into system-specific instruction(s)
  3. puppet send and executes them on the node to configure
- eg. user creation can be declared with the same code for Windows and Unix systems
- the operation system specific implentation to use is called 'provider'

demo

let's have a look ...

the puppet master

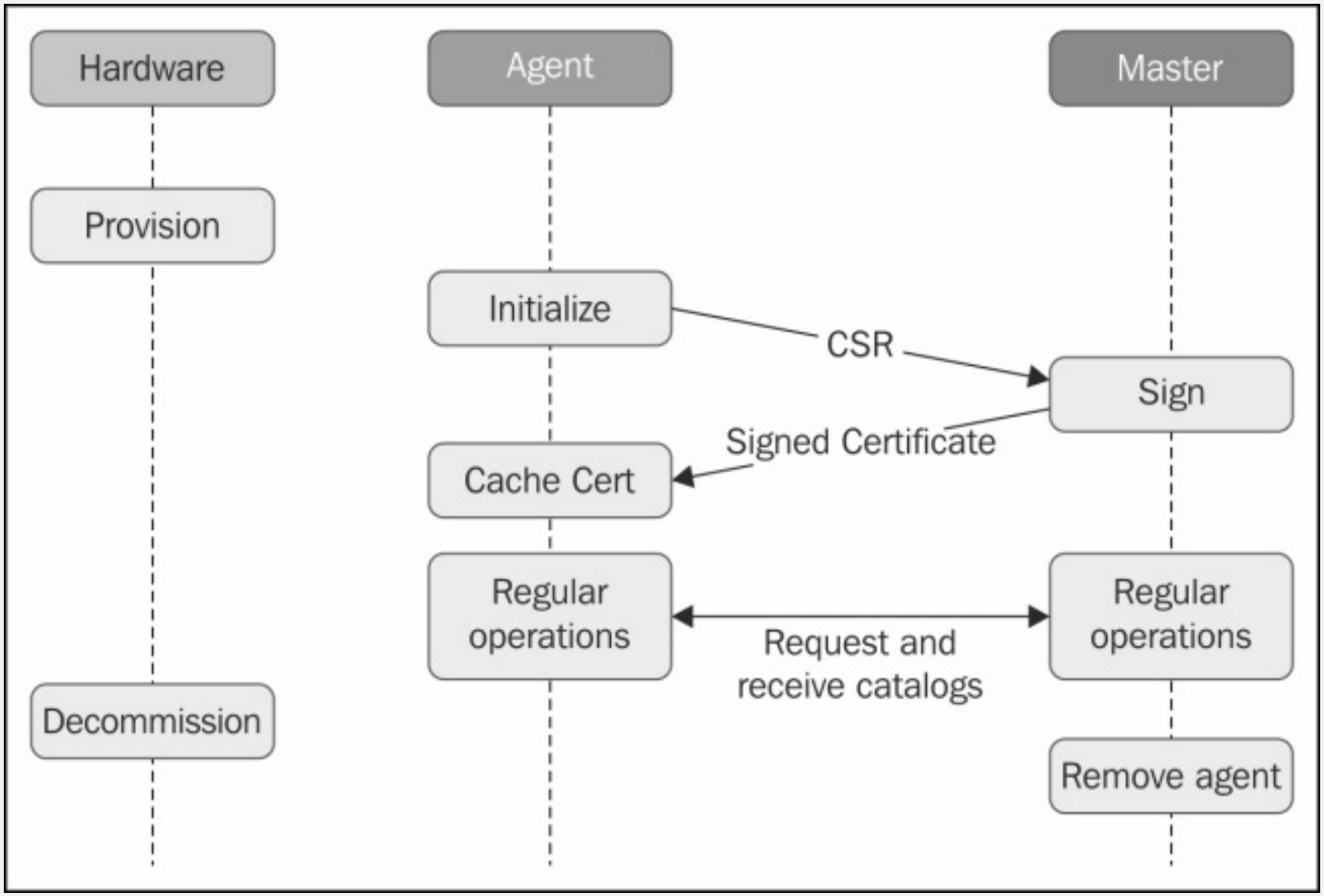
Master tasks

- storing and compiling manifests
- serving as the SSL certification authority
- processing reports from the agent machines
- gathering and storing information about the agents

a detailed description about the communication between master and agent is available from puppetlabs[8]

[8] https://docs.puppet.com/puppet/latest/subsystem_agent_master_comm.html

The agent's life cycle



Puppet 4 essentials: chapter 2

demo

let's have a look ...

modules

Modules are self-contained bundles of code and data.

- nearly all Puppet manifests belong in modules. (exception: site.pp manifest)
- a module consists of:
  - classes
  - defined types (or just defines)
  - templates
  - static files for download by a node
  - plugins
  - tests
- allowed module names must match [a-z][a-z0-9_]* (and not a reserved word[9])
- modules can be downloaded or written by you

[9] for reserved words see: `https://docs.puppet.com/puppet/latest/lang_reserved.html`

Howto install modules

- just copy into the file structure
- *puppet module install*
  - installs from the net (from puppetlabs)
  - also gets (and installs) all depend modules
- use git (eg. with submodules)
- use special software (eg. r10k[10] or librarian-puppet[11])

Where to find modules:

- puppetforge[12] from puppetlabs
- github

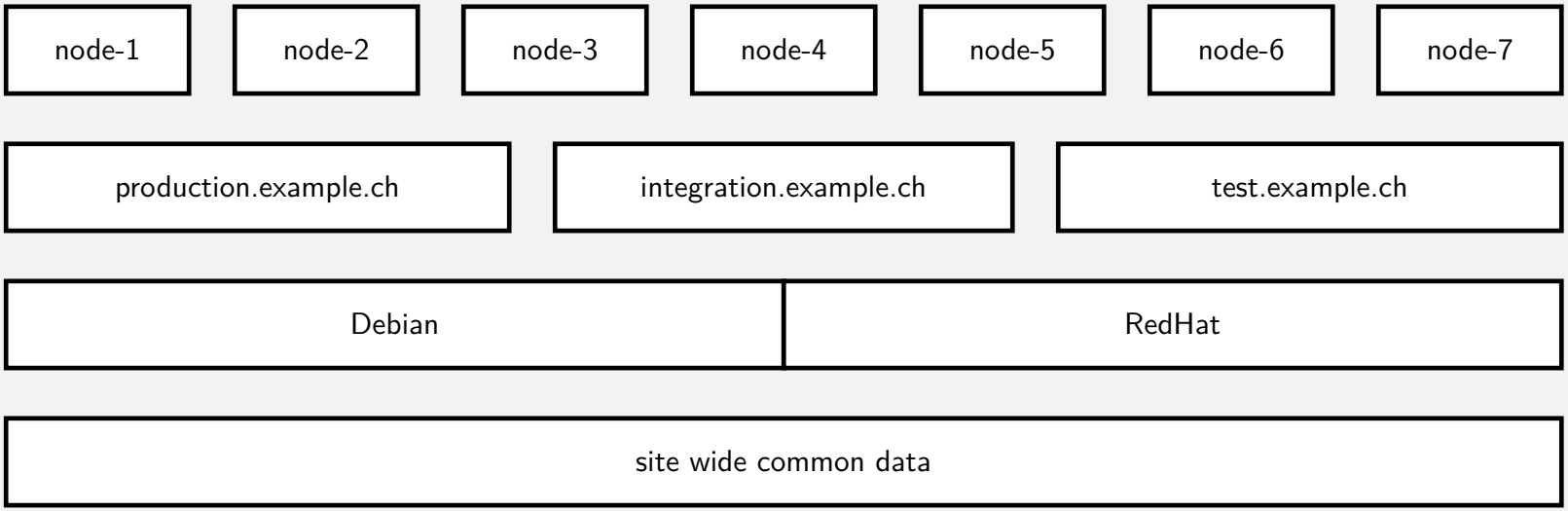
[10] https://github.com/puppetlabs/r10k

[11] http://librarian-puppet.com/

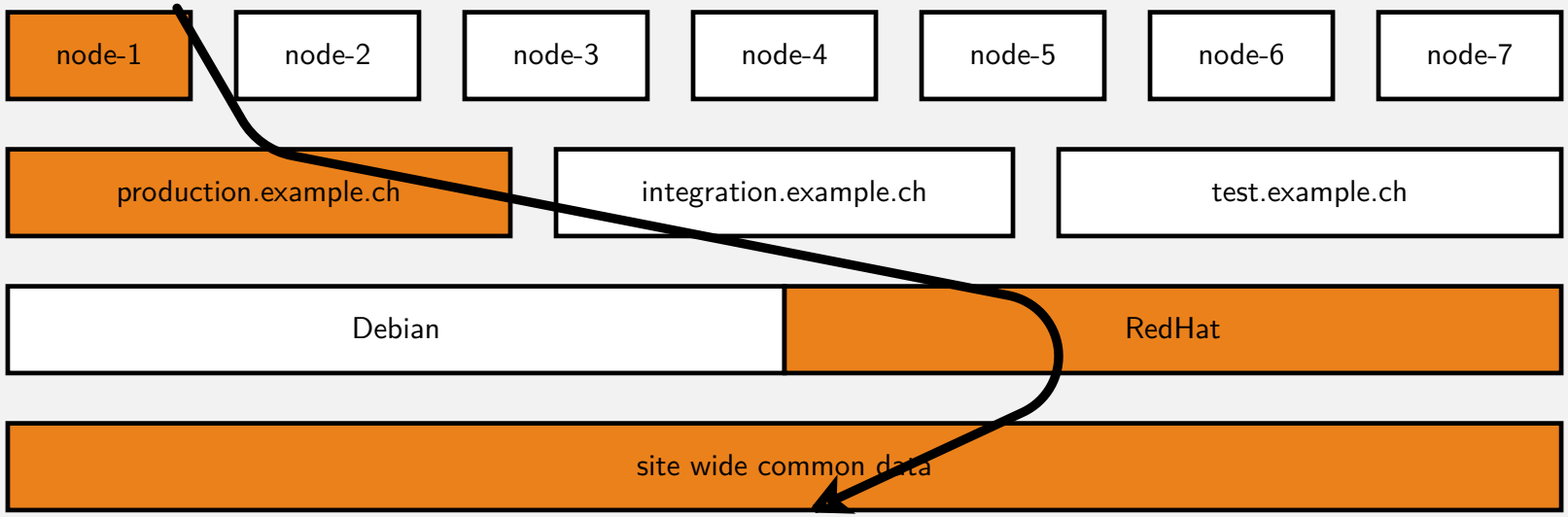
[12] https://forge.puppet.com/

lookup (hiera)

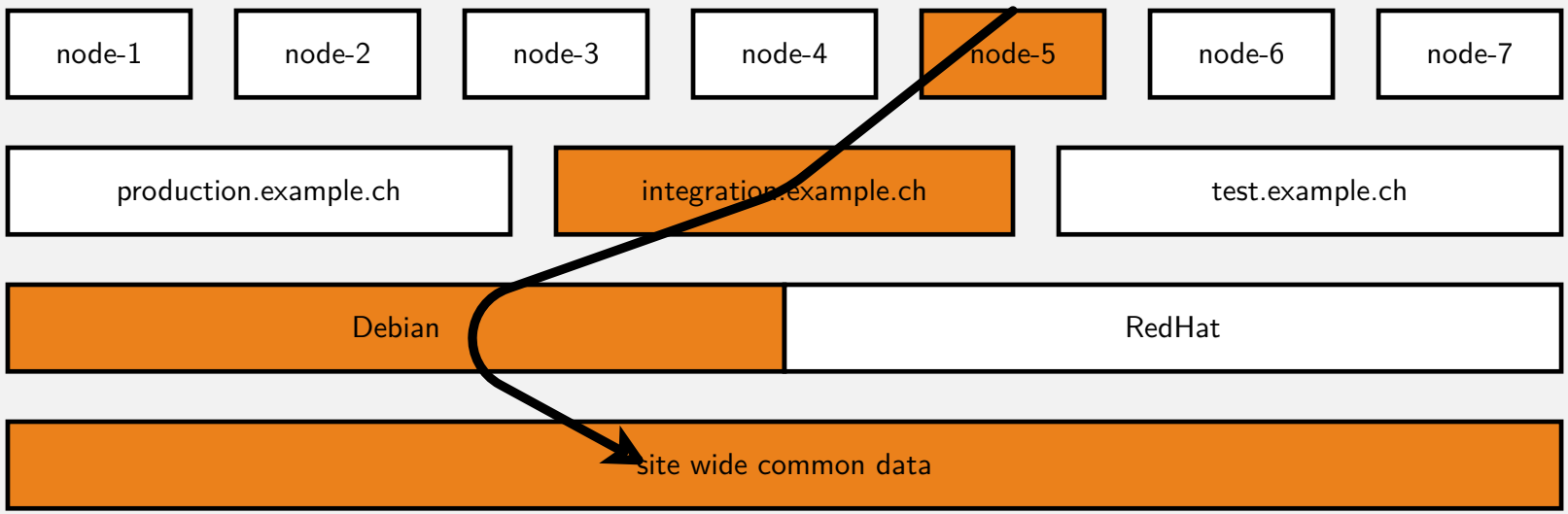
hiera/lookup



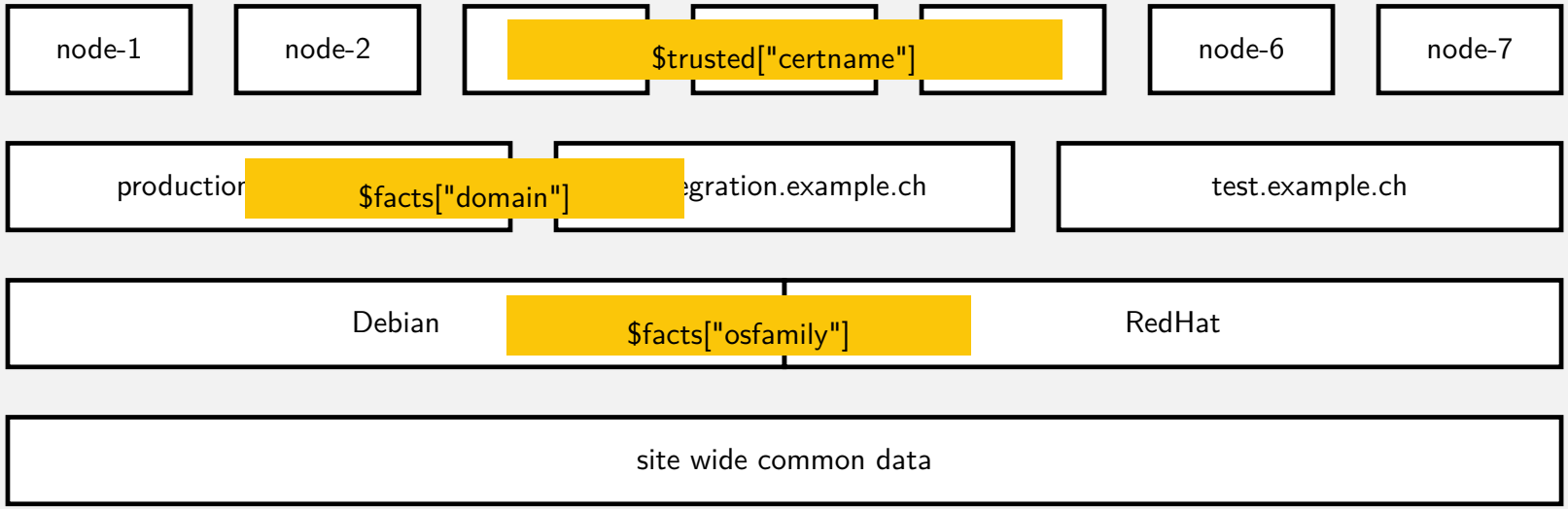
hiera/lookup



hiera/lookup



hiera/lookup




```
hierarchy:
  - name: 'Per-node data'
    path: "nodes/%{trusted.certname}.yaml"
  - name: 'domain'
    path: "%{::domain}.yaml"
  - name: 'OS'
    path: "%{::osfamily}.yaml"
  - name: 'common'
    path: "common.yaml"
```

Hiera lookup examples

nodes

```
# node/node1.yaml
color: green
```

```
# node/node2.yaml
city: zurich
drink: coffee
```

```
# node/node3.yaml
city: paris
country: france
```

osfamily

```
# osfamily/RedHat.yaml
city: bern
country: canada
```

```
# osfamily/Debian.yaml
country: switzerland
drink: beer
color: red
```

common

```
# common.yaml
city: berlin
country: switzerland
color: blue
```

Hiera

hiera is key/value lookup tool. Data is organized in a hirarchy of several yaml (or json) files.

- separate code (structure) and data
- Hiera is fully integrated into Puppet (puppet >= 4.3 uses hiera 4, puppet >=4.9 uses hiera 5)[13]
- many new features for puppet > 5[14]
- eyaml[15] allows you to encrypt data you store in hiera
- new *puppet lookup <KEY> –explain* command [16]
- lookup_options in hiera ![17]
- think a lot about the hirarchy you choose !

---

[13] https://puppet.com/docs/puppet/4.10/hiera_intro.html#what-happened-to-hiera-4-to-puppet-lookup

[14] https://docs.puppet.com/puppet/latest/hiera_intro.html#whats-the-deal-with-hiera-5

[15] for puppet < 4: https://github.com/voxpupuli/hiera-eyaml included in newer

[16] https://puppet.com/docs/puppet/5.5/hiera_automatic.html#ariaid-title4

[17] https://puppet.com/docs/puppet/5.5/hiera_merging.html#ariaid-title5

demo

let's have a look ...

PuppetDB

PuppetDB collects data generated by Puppet. It enables advanced Puppet features like exported resources.

- PuppeDB stores:
  - The most recent facts from every node
  - The most recent catalog for every node
  - Optionally, 14 days (configurable) of event reports for every node
- queried by the puppet master (using puppetdb-termini)
- some performace patterns are available on http://localhost:8080[18]
- several dashboards[19] are available that also query puppetdb
- to install use the *puppetdb*[20] module

---

[18] hint: use ssh -L 8080:localhost:8080 root@YOUR_VM_IP to access with client

[19] eg. `https://github.com/dalen/puppetexplorer` or `https://github.com/voxpupuli/puppetboard` or `https://github.com/gillarkod/panopuppet`

[20] `https://forge.puppet.com/puppetlabs/puppetdb`