



Configuration Management with Puppet

DevOps Practitioner

transforming performance
through learning

Outline

- **What is configuration management**
 - Aims and advantages
 - Different tools available
- **Introduction to Puppet**
 - What is puppet
 - How does puppet work
- **Master / Agent setup**
 - Installing puppet enterprise
 - Installing from repositories

Objective

- **By the end of this session you should be able to...**
 - Explain what configuration management is
 - Be able to discuss some of the advantages of using a config management tool

Definition of Configuration Management

“Identifying and acquiring configuration items, controlling changes, reporting the status of configuration items, as well as software builds and release engineering.”

- IEEE

<http://standards.ieee.org/findstds/standard/828-2012.html>

Why do we need Configuration Management?



Initial build and bootstrapping

Why do we need Configuration Management?



Web server

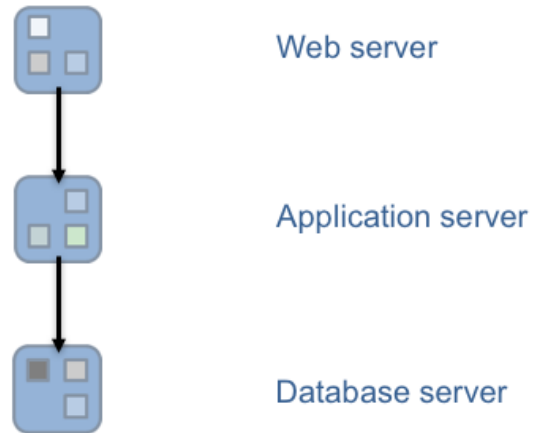


Application server

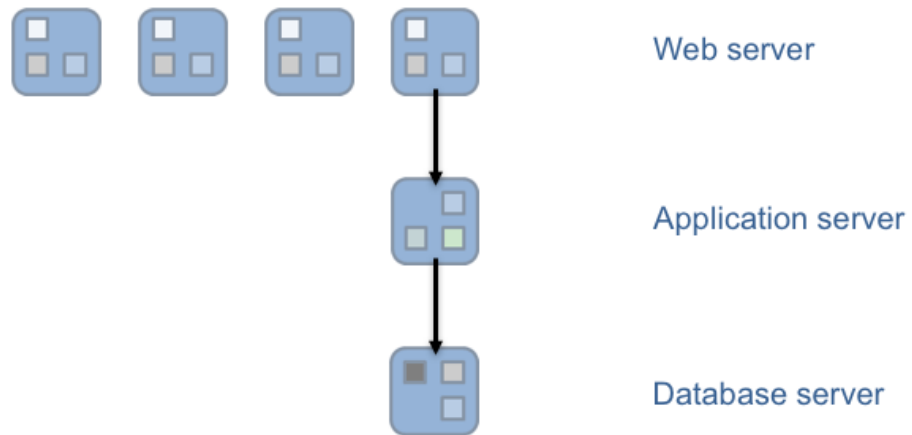


Database server

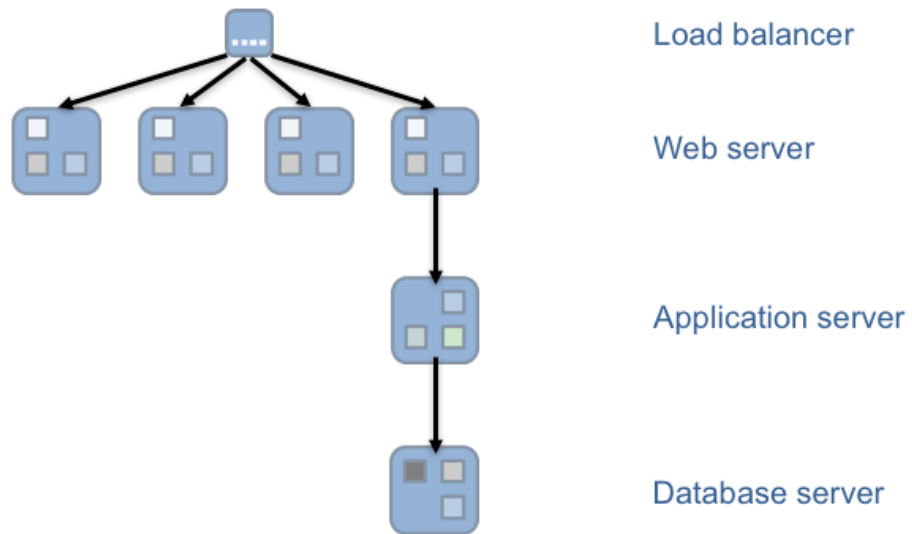
Why do we need Configuration Management?



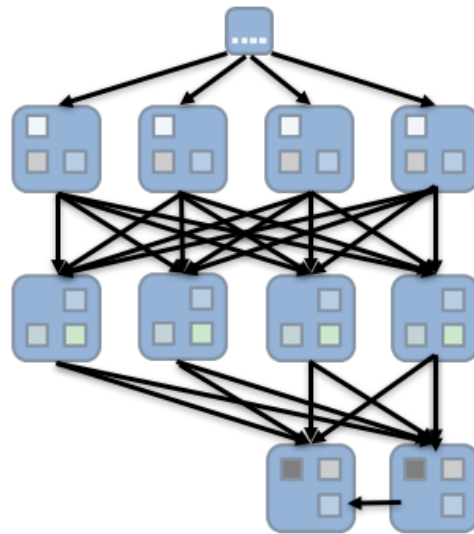
Why do we need Configuration Management?



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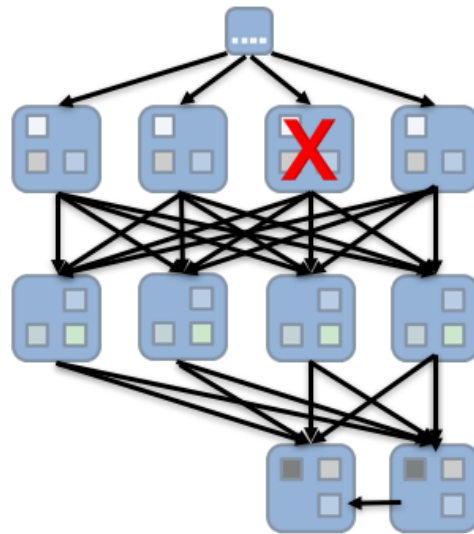
Load balancer

Web server

Application server

Database server

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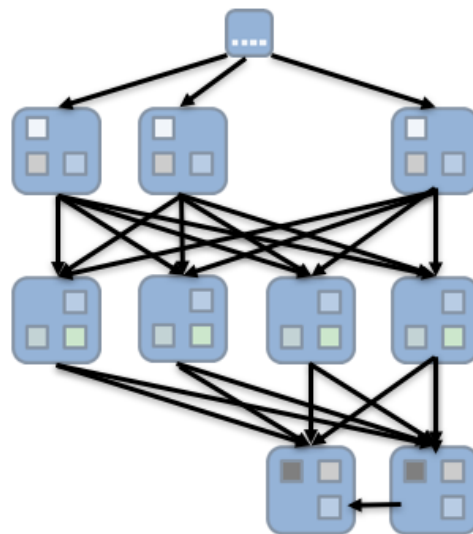
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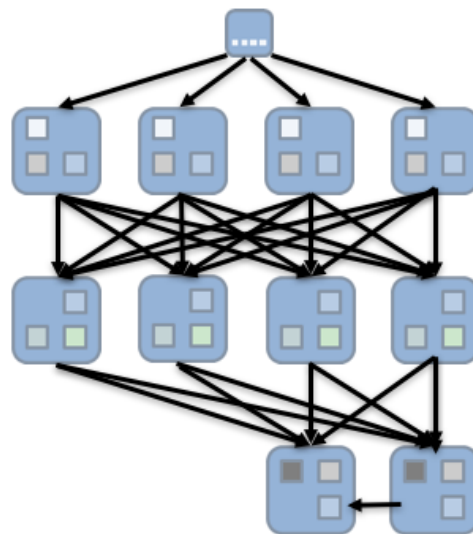
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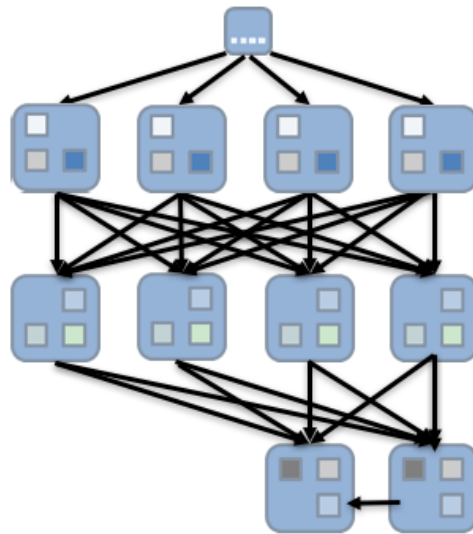
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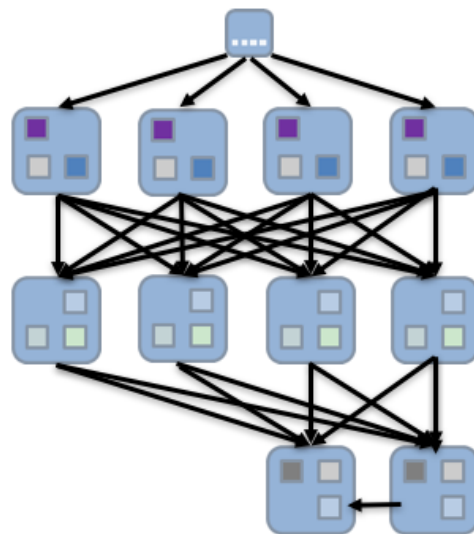
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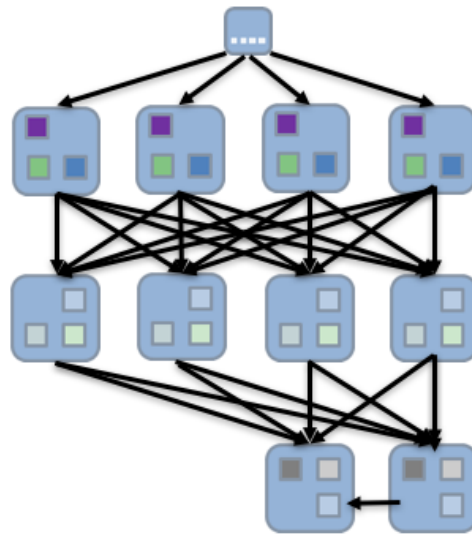
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Why do we need Configuration Management?



Load balancer

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What are the components of Configuration Management?

1. **Management model for:**
 - Infrastructure
 - Applications
 - Data
2. **Documentation of attributes and operations**
3. **Organisation of attributes and operations**
4. **Validation, audit, and verification**

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4 things we need to know to build good config management:

1. Infrastructure: what infrastructure, applications and data we need to have
2. Documentation of the operations of the machine – was in state A, after update is in state B. it should to be done auto.
3. We need to be able to say with version of the software/libs/attributes we need to have on machine (e.g. java 7 rather java 8)
4. Verification should be done to know what is our machine (software, libs, updates, status...)

What are the benefits of Configuration Management?

- **Benefits include:**
 - Reproducibility/Scalability
 - Homogeneity
 - Accuracy
 - Fewer incidents
 - Faster recovery
 - Reduction in workload
 - Improved service
 - Higher quality

Homogeneity -

What are the common tools for Configuration Management?



Introducing Puppet

- **Puppet's main goal is to make configuration management easier**
 - Also has features for discovery, provisioning, orchestration and reporting
- **Two main parts**
 - Puppet Master
 - Main control point
 - Holds the recipes
 - Dashboards and metrics
 - Puppet agent
 - Checks in with the master every half an hour
 - Performs changes as necessary

Model Based Approach

- **Puppet Enterprise uses a declarative, model-based approach to IT automation.**



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Puppet Enterprise uses a declarative, model-based approach to IT automation.

1. Define the desired state of the infrastructure's configuration using Puppet's declarative language.
2. Simulate configuration changes before enforcing them.
3. Enforce the deployed desired state automatically, correcting any drift.
4. Report on differences between actual and desired states, and any changes made enforcing the desired state.

Puppet Component Roles - Master

- puppet master **service**
 - authenticates agents
 - signs certificates
 - serves compiled catalogs to agent nodes
 - serves files
 - processes reports
- **Does not run on AIX, Solaris(*) or Windows**
- **Runs on JVM (version 3.7 and above)**



(*)Puppet Master can now be installed on Solaris 11.2 onwards.

Puppet Component Roles - Master

- **Puppet Enterprise Console**
- **Graphical interface to the Puppet infrastructure**
 - presents an overview of your systems
 - provides detailed information about each node
 - collates and displays statistics
 - provides an interface for node classification
 - enables report browsing and viewing



Puppet Component Roles - Master

Required ports



Port	Use
8140	Puppet master uses this port to accept inbound traffic/requests from Puppet agents and PE Console.
443, 80	This port provides host access to the PE console.
8081	PuppetDB accepts traffic/requests on this port.
61613	MCollective uses this port to accept inbound traffic/requests from Puppet agents for orchestration.
5432	PostgreSQL runs on this port.
4433	This port is used as a Classifier/Console Services API endpoint. The Puppet master needs to be able to talk to the Console over this port.
4435	This port is used as a report submission endpoint. The Puppet master communicates with the PE console over this port.
61616	This port is used for ActiveMQ hub and spoke communication.
3000	Puppet Master installation

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Some of these ports are specific to the Puppet master.

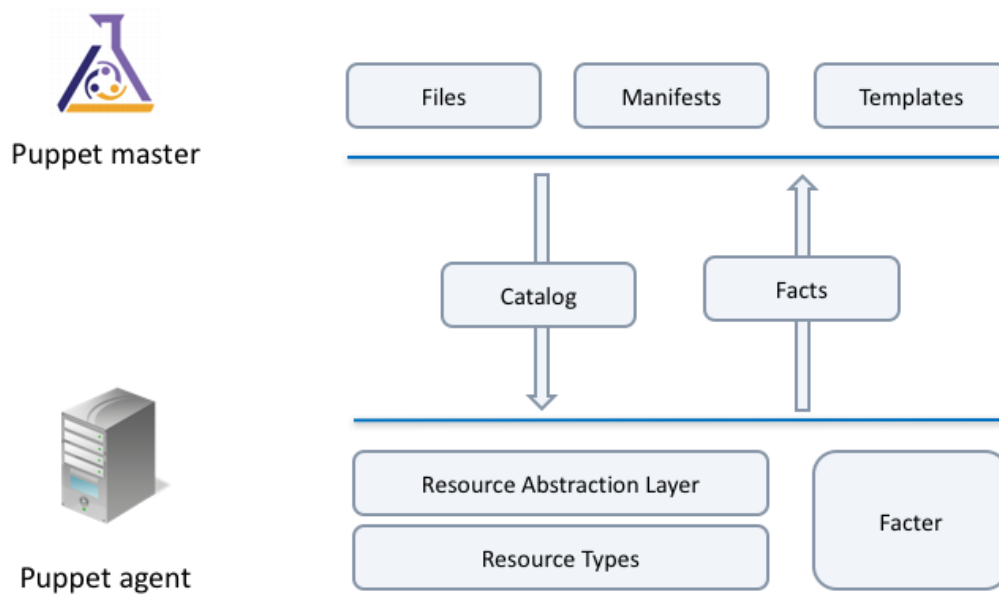
The Puppet Agent node would need port 8140 to be open in order to communicate with the Puppet Master.

Puppet Component Roles - Agent

- puppet agent service **runs on all managed nodes**
- puppet agent **service**
 - initiates secure and authenticated connection to the puppet master
 - sends information about its current state
 - enforces a retrieved configuration state (catalog)
 - retrieves any required files



Master / Agent Architecture



Installing Puppet Enterprise

- **On the server:**
 - Ensure the ports are open
 - Download the installer from puppet
 - Untar and run
 - Connect to the running instance on port 3000
- **Puppet enterprise will guide you through installation and configure everything for you.**
- **Two types**
 - Monolithic – One puppet master, will work for up to 500 nodes
 - Split – Distributed masters, for more than 500 nodes
- **Puppet agent can be installed either from the server or from apt/yum repositories**

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See https://docs.puppetlabs.com/pe/latest/install_basic.html for the most up to date version

Docker Containers

- **Puppet can be run inside a docker container**
 - There are several images that do this in the hub
- **Requirements**
 - Software installed
 - Mounted volumes for the data store, modules and manifests
 - Open ports

```
docker run -d \  
    --name puppetmaster \  
    --restart always \  
    -h puppet.local \  
    -p 8140:8140 \  
    -e 'ACLGRANT=a.b.c.d/24' \  
    -v /path/to/datastore:/var/lib/puppet \  
    -v /path/to/modules:/etc/puppet/modules \  
    -v /path/to/manifests:/etc/puppet/manifests \  
    -t vpetersson/puppetmaster
```

See <http://blog.viktorpetersson.com/post/100997217139/running-puppet-master-in-docker> for the full explanation

All the docker flags are at: <https://docs.docker.com/reference/run/>

Exercise

- **Setup a puppet master and agent machine**
 - Have them talking to one another

To read more about Puppet

Books:

- Puppet Best Practices (2016. link: <https://www.safaribooksonline.com/library/view/puppet-best-practices/9781491922996/>)
- Documentation (2017. link: <https://puppet.com/docs>)
- Learning Puppet 4 (2016. link: <http://shop.oreilly.com/product/0636920034131.do>)

Tutorials:

- <https://www.tutorialspoint.com/puppet/>
- <https://learn.puppet.com/>
- <https://www.edureka.co/blog/puppet-tutorial/>
- <https://www.example42.com/tutorials/PuppetTutorial/#slide-0>

Summary

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- **Introduction to Puppet**
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