

Configuration Management

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Automate, automate, automate

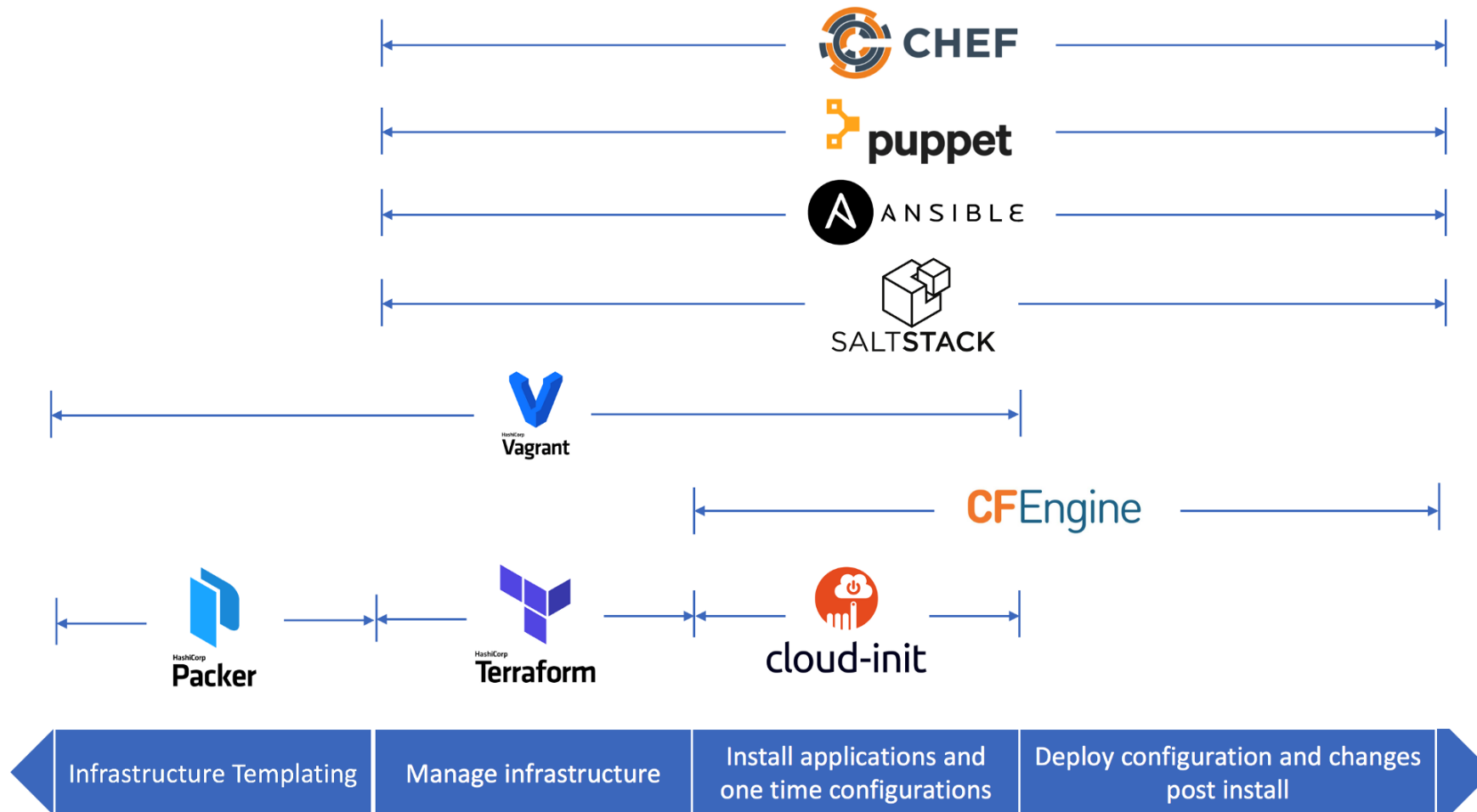
- ❑ Automated setup of new machines
 - Not just OS installation, also includes all the additional software and local configuration necessary
- ❑ Systematic patching and updating of existing machines
 - Deploy updates to all affected machines
- ❑ A monitoring system
 - You need some kind of monitoring system that raises an alarm as soon as problems are evident
- ❑ A communication system
 - Keep in touch with the needs of your users
 - A request-tracking system is a necessity
 - A central location where users can find system status and contact information is also helpful

Infrastructure as Code (IaC) (1)

- ❑ A process of managing and provisioning IT infrastructure through machine-readable definition files
- ❑ The definition files are usually stored on a version control system, it can use either scripts or declarative definitions
- ❑ Three measurable categories for the value of IaC
 - Cost (Reduction)
 - Speed (Faster execution)
 - Risk (Remove errors and security violations)

Infrastructure as Code (IaC) (2)

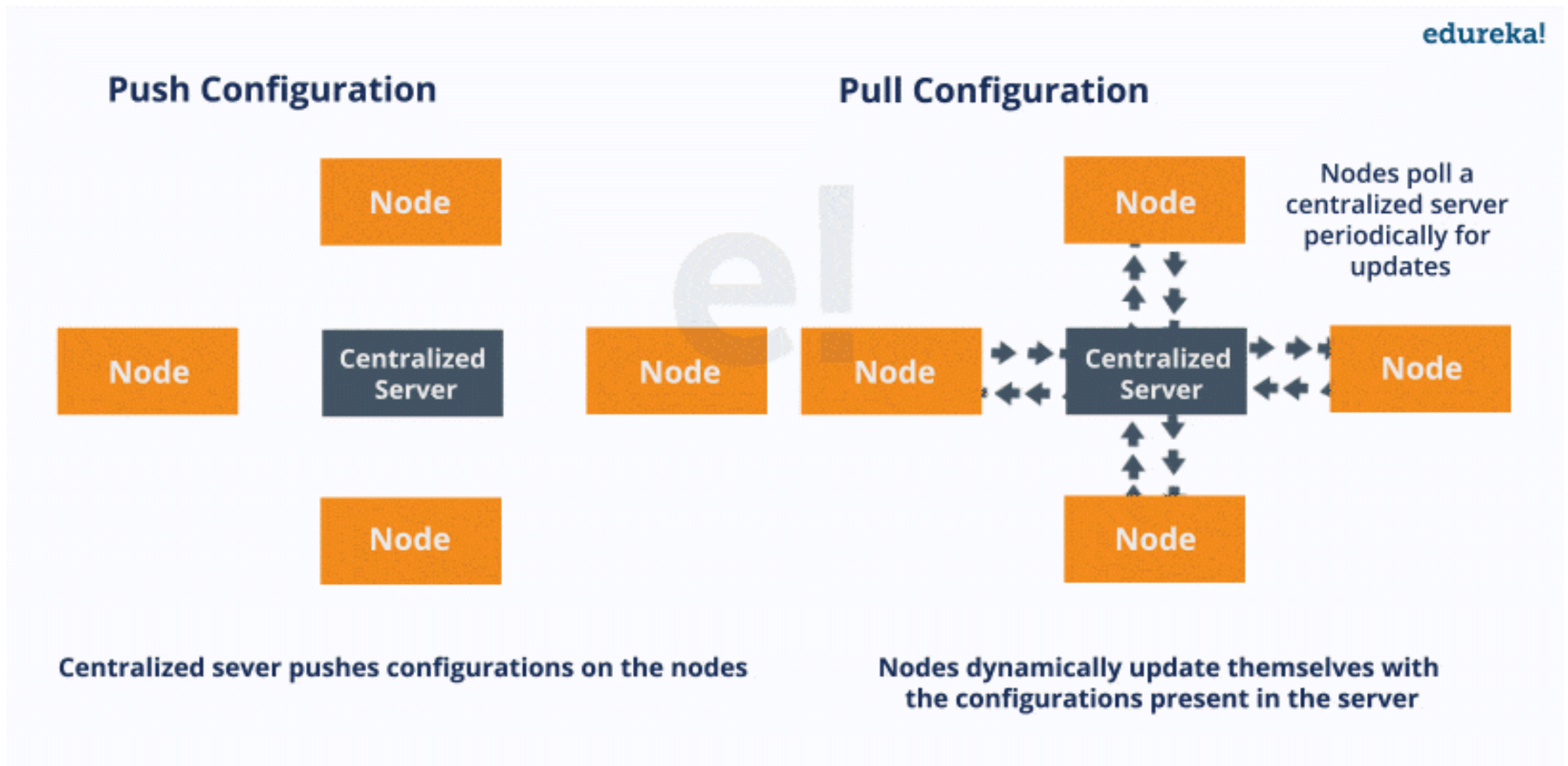
- The spectrum of leading IaC tools available today



When to use which Infrastructure-as-code tool

<https://medium.com/cloudnativeinfra/when-to-use-which-infrastructure-as-code-tool-665af289fbde>

Push Model vs. Pull Model



What Is Chef? – A Tool Used For Configuration Management

<https://www.edureka.co/blog/what-is-chef>

Ansible – Introduction (1)



- ❑ A software provisioning, configuration management, and application deployment tool
- ❑ Manages machines in an agentless manner
- ❑ Cross platform
 - FreeBSD, Linux, macOS, Solaris, Windows
- ❑ Use ‘push’ model by default
- ❑ Pull mode is provided for when you would rather have nodes check in every N minutes on a particular schedule
 - ansible-pull
 - Pulls playbooks from a VCS repo and executes them for the local host

Ansible – Introduction (2)

❑ Playbook

- Ordered lists of tasks, saved so you can run those tasks in that order repeatedly

❑ Task

- The units of action in Ansible

❑ Module

- The units of code Ansible executes

❑ Ansible Galaxy

- A repository for Ansible Roles that are available to drop directly into your Playbooks

Playbook

```
---
- name: Update web servers
  hosts: webservers
  remote_user: root
  tasks:
    - name: Ensure apache is at the latest version
      ansible.builtin.yum:
        name: httpd
        state: latest
    - name: Write the apache config file
      ansible.builtin.template:
        src: /srv/httpd.j2
        dest: /etc/httpd.conf

- name: Update db servers
  hosts: databases
  remote_user: bot
  become: yes
  tasks:
    - name: Ensure postgresql is at the latest version
      ansible.builtin.yum:
        name: postgresql
        state: latest
    - name: Ensure that postgresql is started
      ansible.builtin.service:
        name: postgresql
        state: started
```

Play

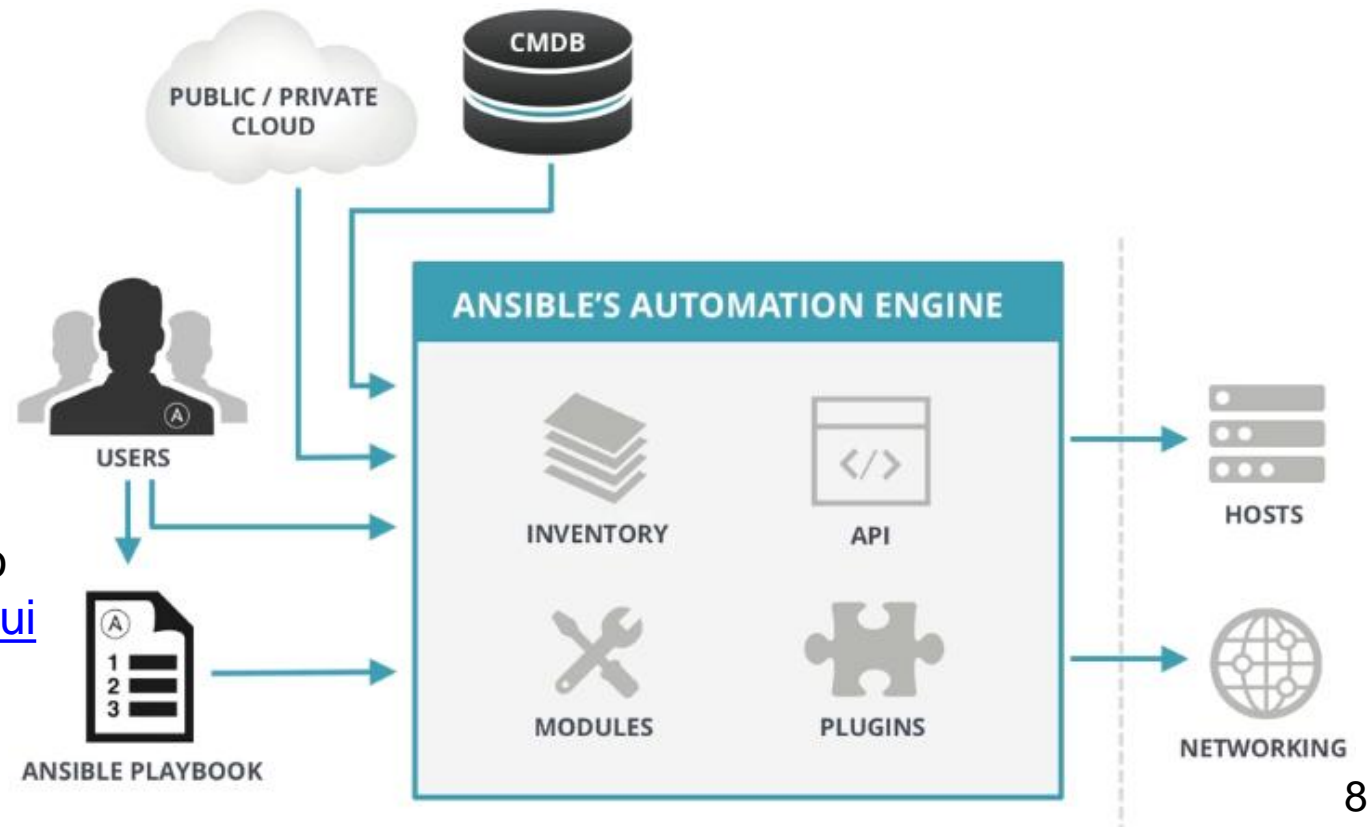
Play

https://docs.ansible.com/ansible/latest/user_guide
https://docs.ansible.com/ansible/2.5/user_guide/become.html

Please manage nodes as a **Non-Root** user
Use *become*, *become_user*, and *become_method* directives to achieve privilege escalation

Ansible – Architecture

- ❑ Control node
 - Any machine with Ansible installed
- ❑ Managed nodes
 - The network devices (and/or servers) you manage with Ansible
- ❑ Inventory
 - A list of managed nodes (hostfile)



What is Ansible? | Ansible Quick Start Video
<https://www.ansible.com/resources/videos/quick-start-video>

Chef – Introduction



- ❑ A configuration management tool written in Ruby and Erlang
- ❑ Cross platform agents
 - FreeBSD, Linux, macOS, Windows, AIX, Solaris
- ❑ Use ‘pull’ model

- ❑ Cookbook
 - Provide structure to your recipes and, in general, helps you stay organized
- ❑ Recipe
 - A file that groups related resources, such as everything needed to configure a web server, database server, or a load balancer

Chef – Architecture

❑ Chef Workstation

- Allows you to author cookbooks and administer your infrastructure
- Command line tools for interacting with Chef Infra
 - knife: interacts with the Chef Infra Server, e.g., upload your cookbooks
 - chef: interacts with your local chef code repository (chef-repo)

❑ Chef Infra Server

❑ Chef Infra Client

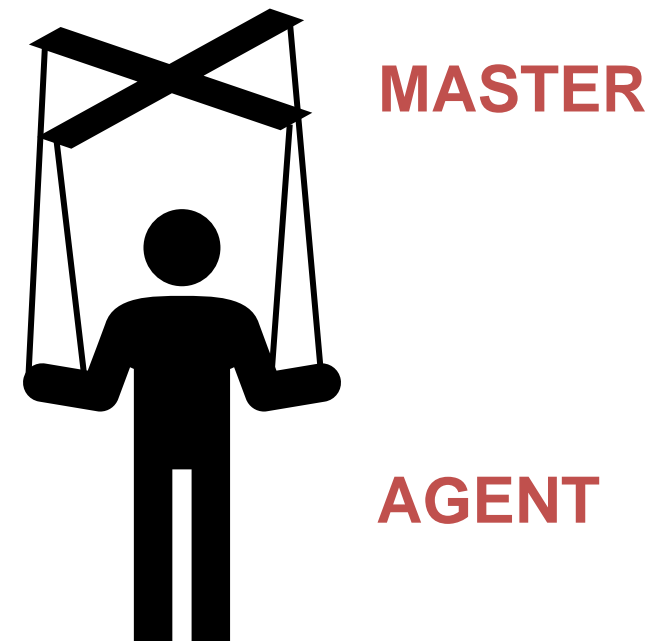


An Overview of Chef Infra https://docs.chef.io/chef_overview

Puppet – Introduction (1)



- ❑ A configuration management system written in C++, Clojure and Ruby
- ❑ Master-agent architecture
- ❑ Cross platform agents
 - FreeBSD, Linux, macOS, Windows
- ❑ Use 'pull' model



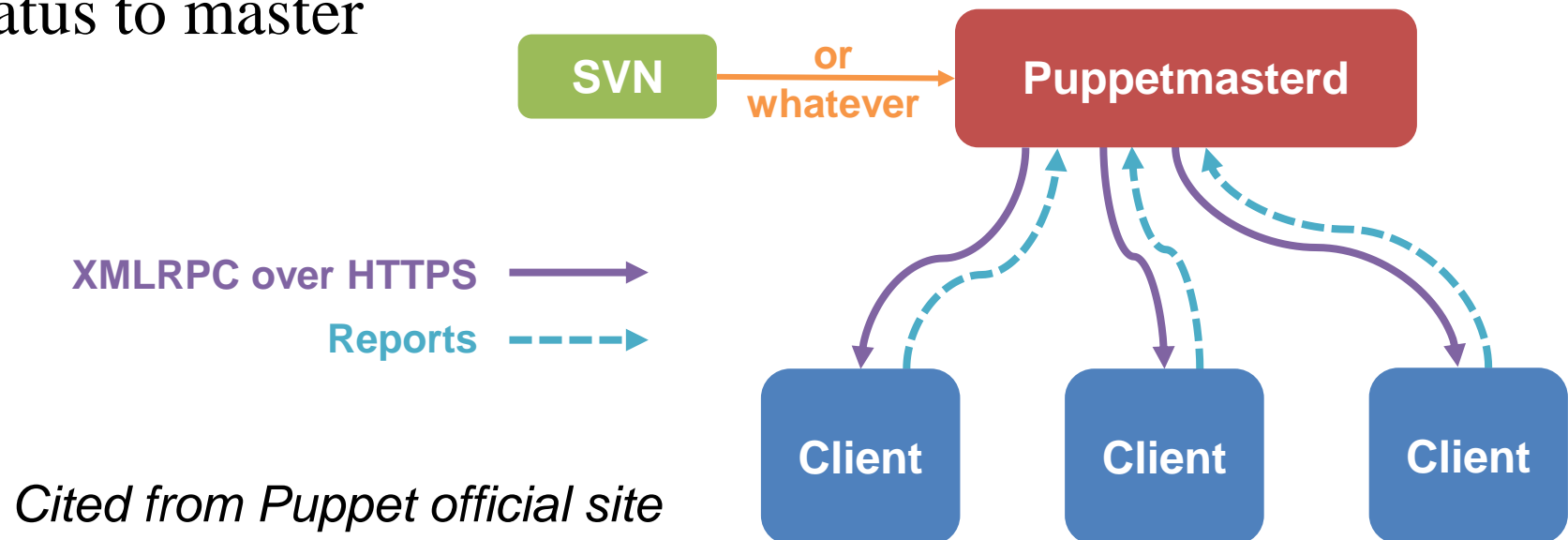
Puppet – Architecture

❑ Master (Server)

- Write and keep the manifests
- Passively wait for connection from agents

❑ Agent (Client)

- Fetch manifests from master (periodically or manually)
- Compare and execute manifests if needed
- Report status to master



SaltStack – Introduction



- ❑ A configuration management system, capable of maintaining remote nodes in defined states
- ❑ Server-agent communication model
- ❑ Cross platform agents
 - FreeBSD, Linux, macOS, Windows
- ❑ Use ‘pull’ model

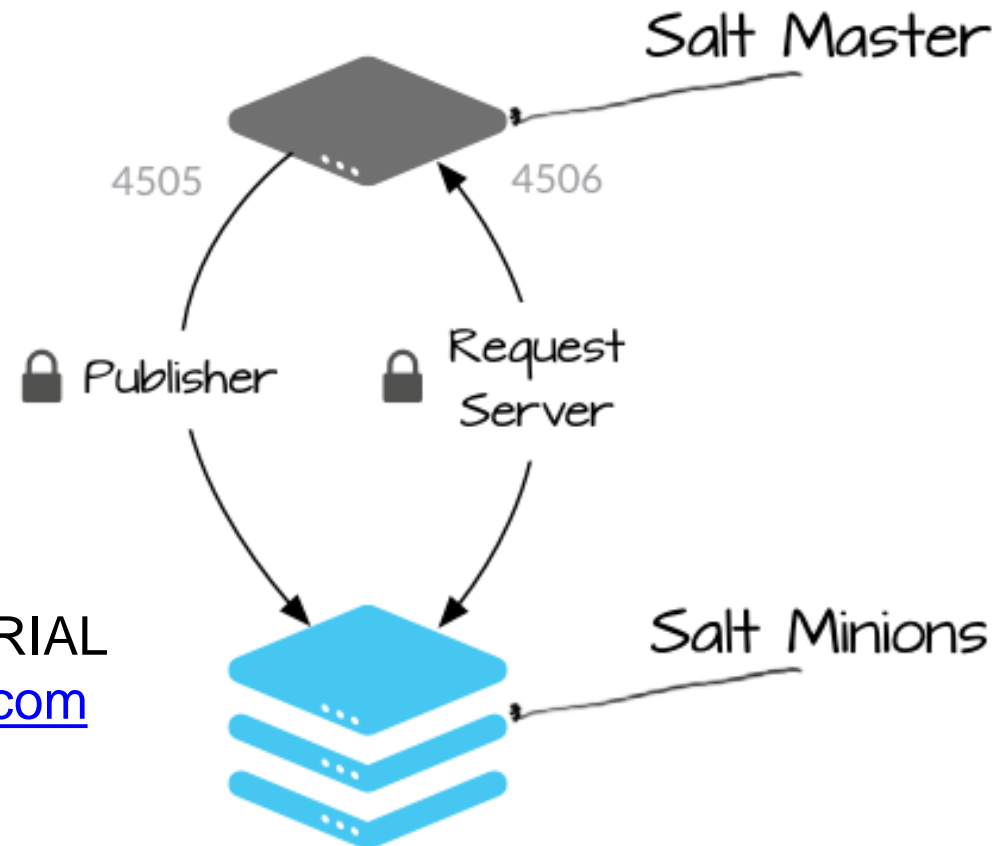
- ❑ State module
- ❑ Formula
- ❑ Package Manager
- ❑ Repo System

SaltStack – Architecture

❑ Salt Master (Server)

- Responsible for sending commands to minions, and then aggregating and displaying the results of those commands
- A single Salt master can manage thousands of systems

❑ Salt Minion (Agent)



Understanding SaltStack GET STARTED TUTORIAL
<https://docs.saltstack.com/en/getstarted/system/communication.html>

Comparison of CM Tools

	Ansible	Chef	Puppet	SaltStack
Method	Push, Pull	Pull	Pull, Push	Pull, Push
	Agentless	Agent	Agent Agentless (Bolt)	Agent Agentless (Salt SSH)
Configuration Language	YAML Python	Ruby DSL	Puppet DSL	YAML Python
Implementation Language	Python	Ruby Erlang	Ruby C++ Clojure	Python
Company	Red Hat	Chef	Puppet	SaltStack

DSL: Domain Specific Language

Terms used by each CM tool

Table 23.2: Configuration management Rosetta Stone

Our term	Ansible	Salt	Puppet	Chef
operation	task	state	resource	resource
op type	module	function	resource type, provider	provider
op list	tasks	states	class, manifest	recipe
parameter binding	parameter play(book)	parameter top file	property, attribute classification, declaration	attribute run list
master host	control	master	master	server
client host	host	minion	agent, node	node
client group	group	nodegroup	node group	role
variable	variable	variable	parameter, variable	attribute
fact	fact	grain	fact	automatic attribute
notification handler	notification handler	requisite state	notify subscribe	notifies subscribes
bundle	role	formula	module	cookbook
bundle repo	galaxy	GitHub	forge	supermarket

Reference

- ❑ Chef vs Puppet vs Ansible - Whizlabs Blog
 - <https://www.whizlabs.com/blog/chef-vs-puppet-vs-ansible>
- ❑ User Guide — Ansible Documentation
 - https://docs.ansible.com/ansible/latest/user_guide/index.html
- ❑ Chef Web Docs
 - <https://docs.chef.io>
- ❑ Puppet documentation
 - https://puppet.com/docs/puppet/latest/puppet_index.html
- ❑ SaltStack Documentation
 - <https://docs.saltstack.com/en/latest>