

# Configuration Management

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# Automate, automate, automate

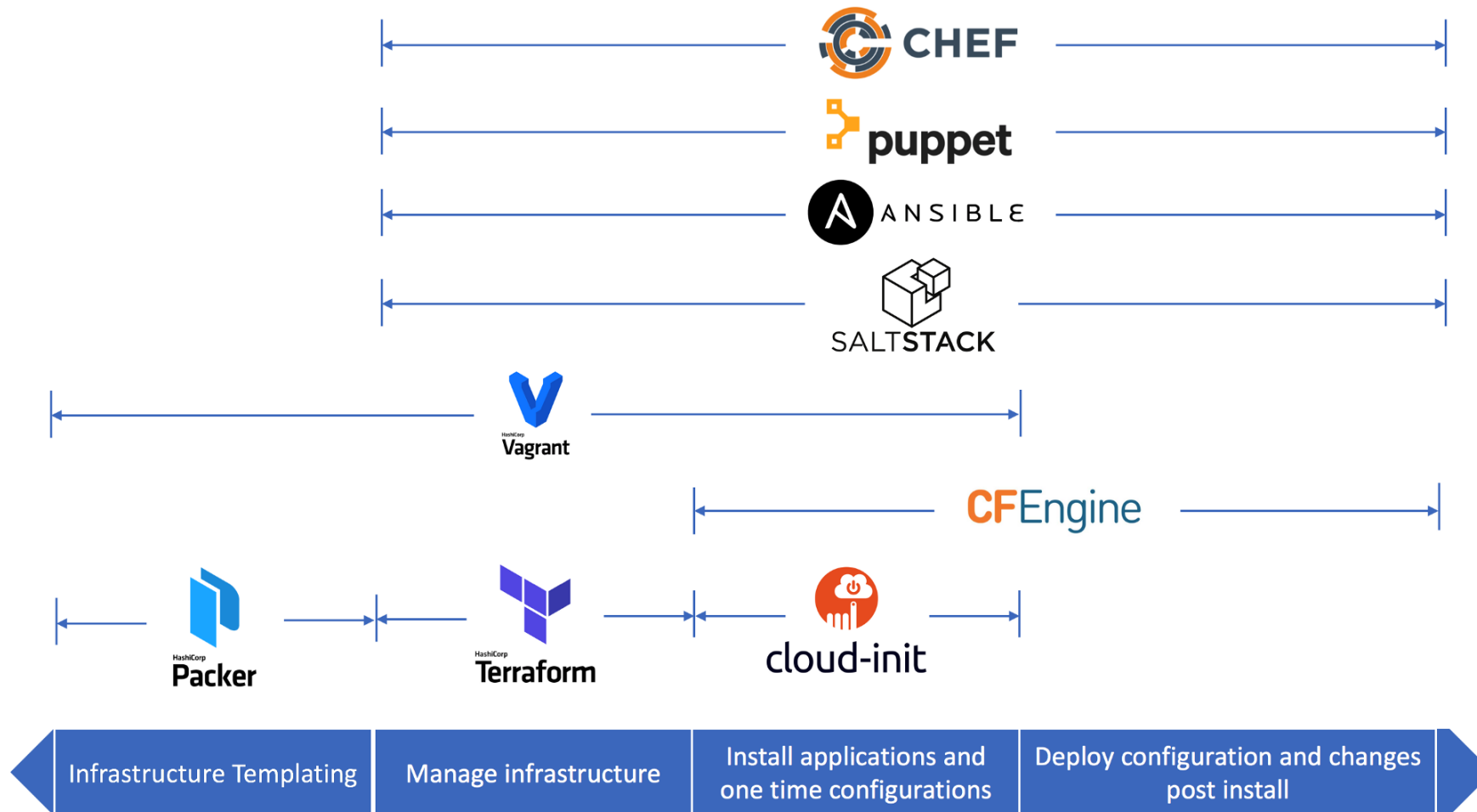
- ❑ Automated setup of new machines
  - Not just OS installation, also includes all the additional software and local configuration necessary
- ❑ Systematic patching and updating of existing machines
  - Deploy updates to all affected machines
- ❑ A monitoring system
  - You need some kind of monitoring 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



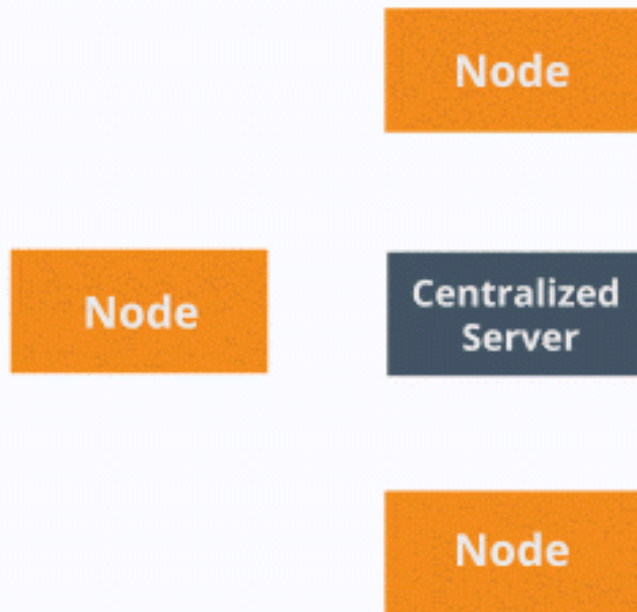
When to use which Infrastructure-as-code tool

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

# Push Model vs. Pull Model

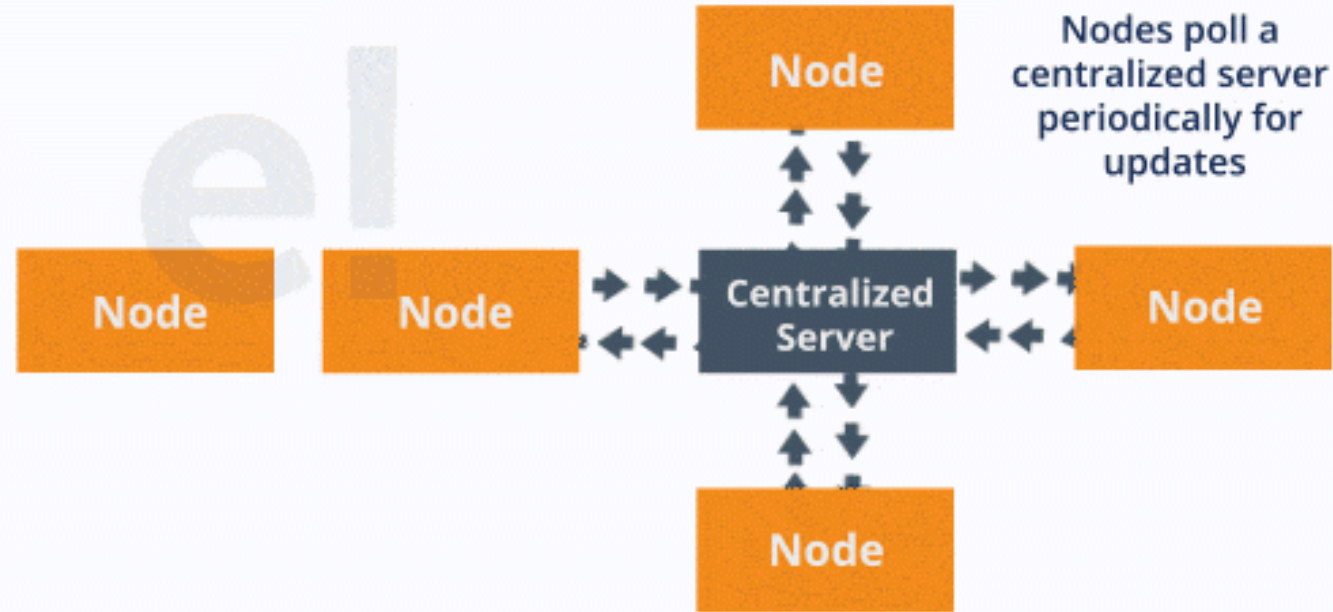
edureka!

## Push Configuration



Centralized sever pushes configurations on the nodes

## Pull Configuration



Nodes dynamically update themselves with the configurations present in the server

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

```
---
- 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/latest/user_guide)

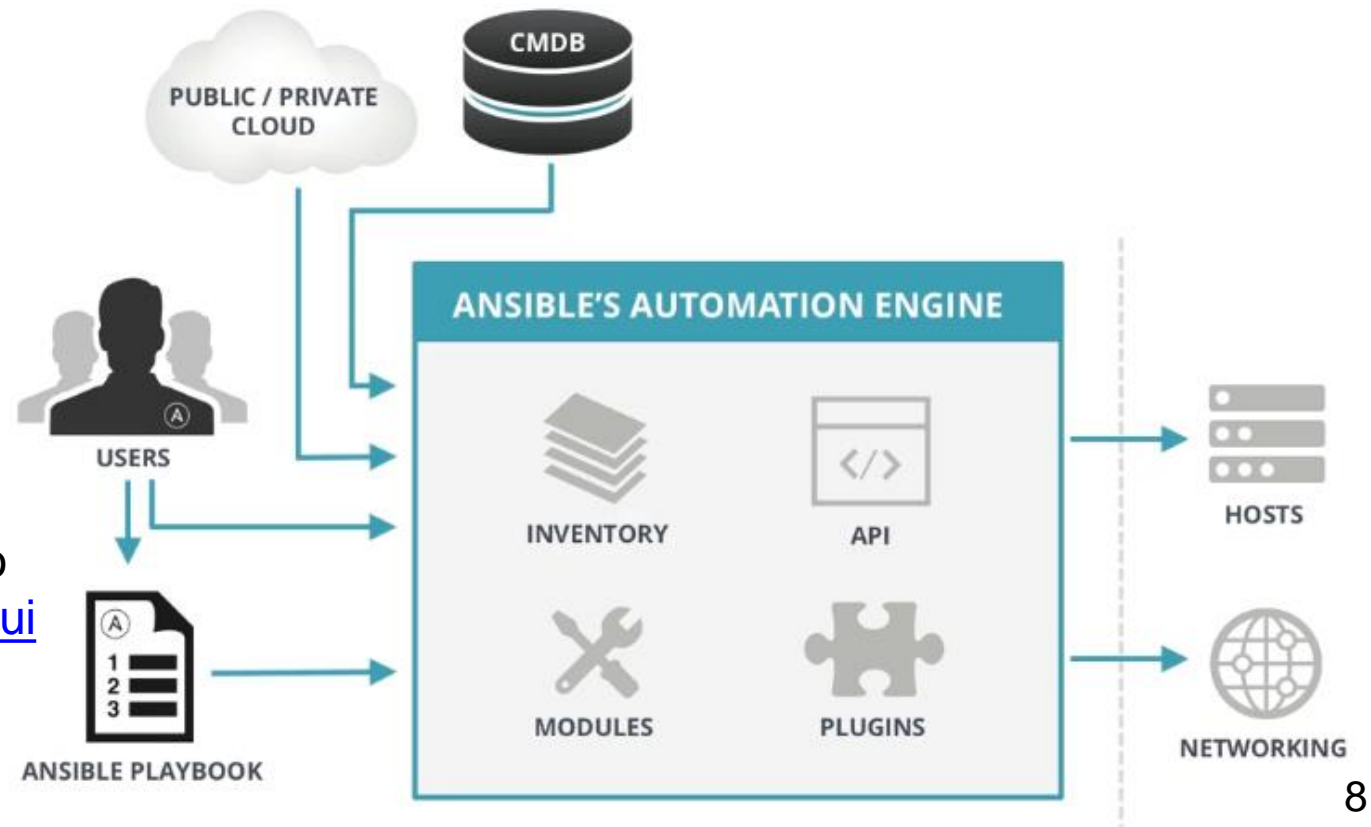
[https://docs.ansible.com/ansible/2.5/user\\_guide/become.html](https://docs.ansible.com/ansible/2.5/user_guide/become.html)

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

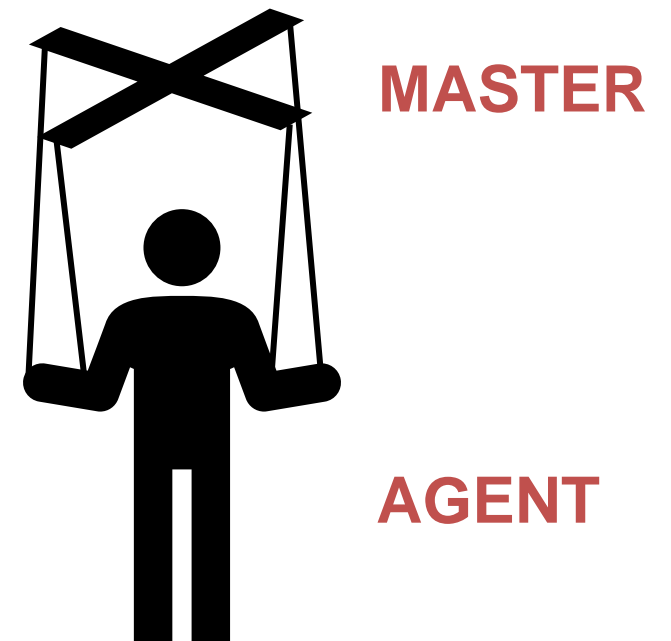


An Overview of Chef Infra [https://docs.chef.io/chef\\_overview](https://docs.chef.io/chef_overview)

# 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



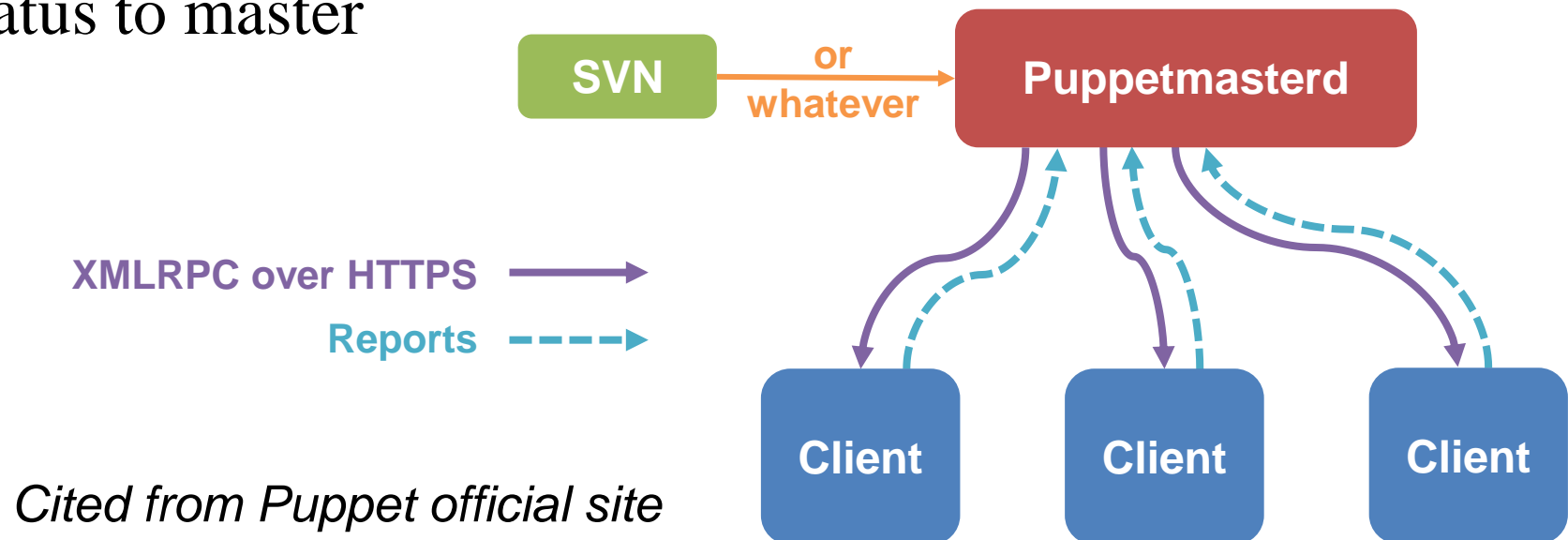
# Puppet – Architecture

## ❑ 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



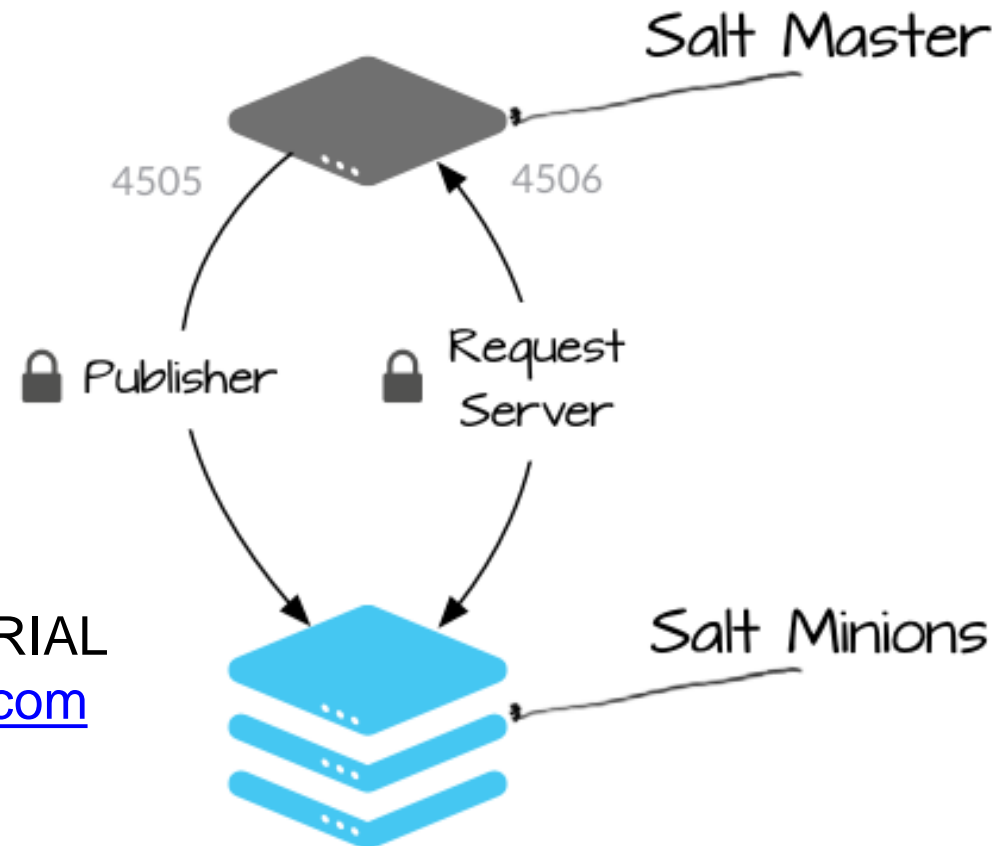
- ❑ A configuration management system, capable of maintaining remote nodes in defined states
- ❑ Server-agent communication model
- ❑ Cross platform agents
  - FreeBSD, Linux, macOS, Windows
- ❑ Use ‘pull’ model
  
- ❑ State module
- ❑ Formula
- ❑ Package Manager
- ❑ Repo System

# 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

	<b>Ansible</b>	<b>Chef</b>	<b>Puppet</b>	<b>SaltStack</b>
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**

<b>Our term</b>	<b>Ansible</b>	<b>Salt</b>	<b>Puppet</b>	<b>Chef</b>
<b>operation op type</b>	task module	state function	resource resource type, provider	resource provider
<b>op list parameter binding</b>	tasks parameter play(book)	states parameter top file	class, manifest property, attribute classification, declaration	recipe attribute run list
<b>master host client host client group</b>	control host group	master minion nodegroup	master agent, node node group	server node role
<b>variable fact</b>	variable fact	variable grain	parameter, variable fact	attribute automatic attribute
<b>notification handler</b>	notification handler	requisite state	notify subscribe	notifies subscribes
<b>bundle bundle repo</b>	role galaxy	formula GitHub	module forge	cookbook 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](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](https://puppet.com/docs/puppet/latest/puppet_index.html)
- ❑ SaltStack Documentation
  - <https://docs.saltstack.com/en/latest>