6.1 Learning Objectives

By the end of this lesson, you will be able to:

- Explain the concepts of configuration management tools
- Demonstrate Puppet installation
- Demonstrate Chef installation
- Demonstrate Ansible installation and its usage
- Select the suitable CM tool for your organization

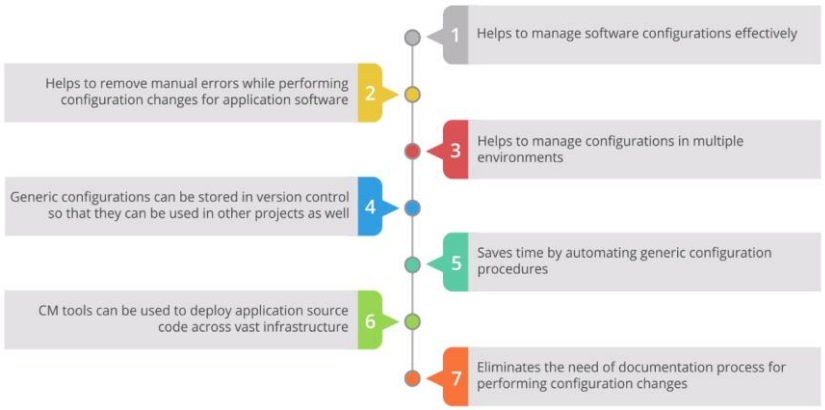
6.2 Overview of Configuration Managment Tools

Configuration Management Tools

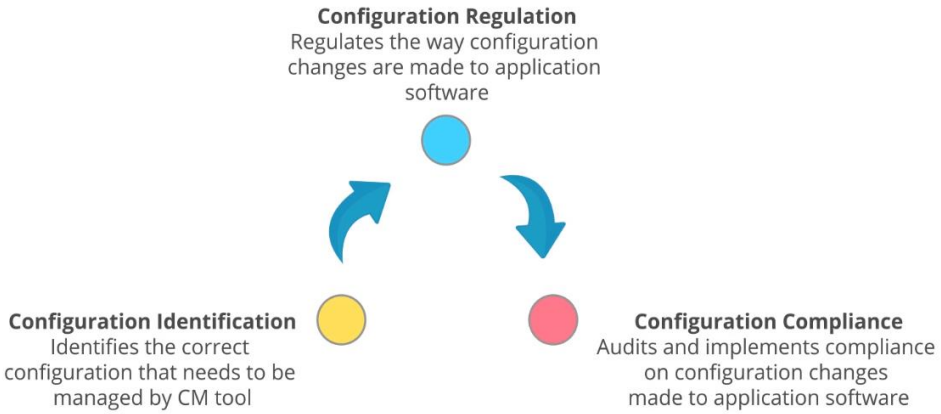
- Configuration management tools manage all configuration items in a software for all environments.
- These configuration items can be software application files, software packages, and software installations which need to be configured for specific environments.
- Configuration management tools cover both, software and server configurations.
- They help enforce standardization in software configurations without any errors.
- They also help to reduce the time taken to manage configurations manually on each and every server.

Popular Configuration Management Tools

Purpose of a Configuration Management Tool

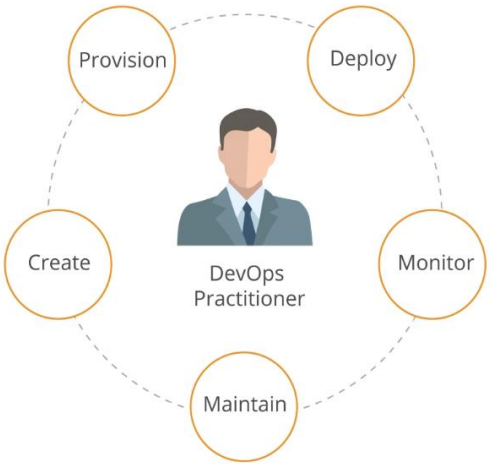


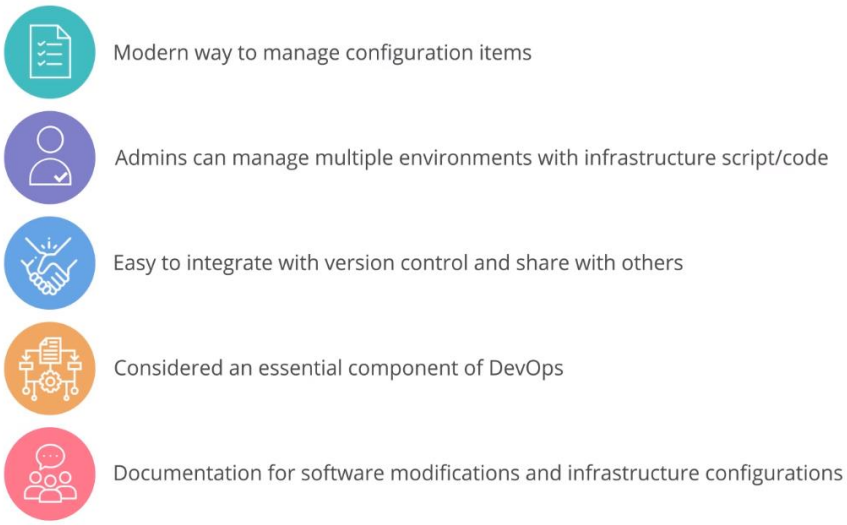
Configuration Management Process



6.3 Management Infrastructure

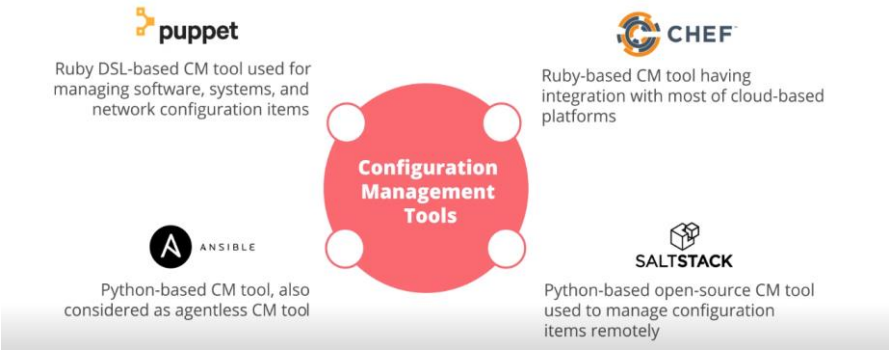
Role of Infracstructure as Code in DevOps Environment





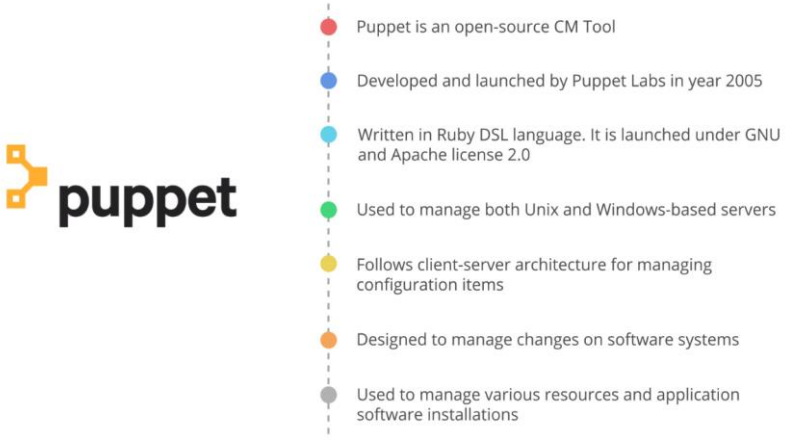
6.4 Types of Configuration Management Tools

Types of Congiguration Management Tools

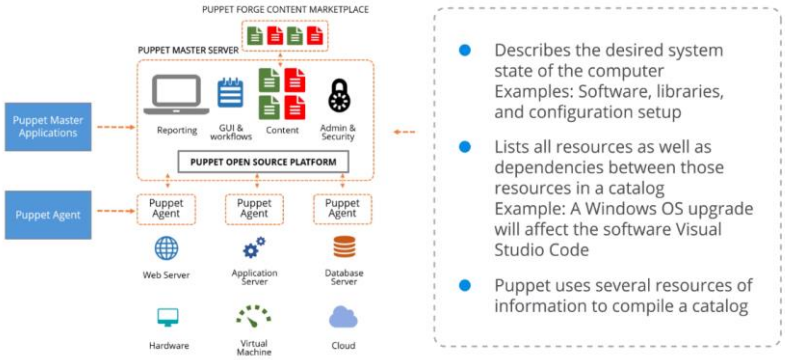


6.5 Overview of Puppet

Puppet



Puppet Architecture



6.6. Demonstrate Puppet Configuration

Praxisbeispiel

- Login to your Ubuntu Lab, and open the terminal.
- Create a Docker network for Puppet.
- Pull the Puppet images.
- Start the Puppet server, and log it.
- Start the agent, and connect to the server.
- Locate the packages managed by Puppet.

6.7 Overview of Chef

Chef Architecture

Chef was developed in Ruby and Erlang languages. It was initially launched in the year 2009.

It uses pure-Ruby DSL-based language for managing system resources.

It's extensive integration with the latest cloud platforms like AWS and GoogChef runs in both, client-server and solo architecture for managing both, infra and software resources.

Both, Unix-based and Windows-based systems can be managed using Chef.

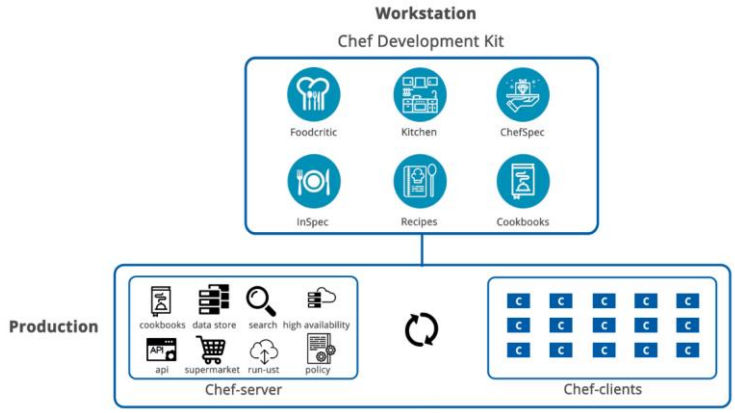
Chef is comprised of three main components: Chef-server, Chef-client, and Workstation.

Chef-server is used to manage various Chef resources, information on nodes, and cookbooks.

Chef-client should be deployed on various systems in a Chef environment.

Workstation is one of the components used to manage all Chef resources.

Chef Architecture



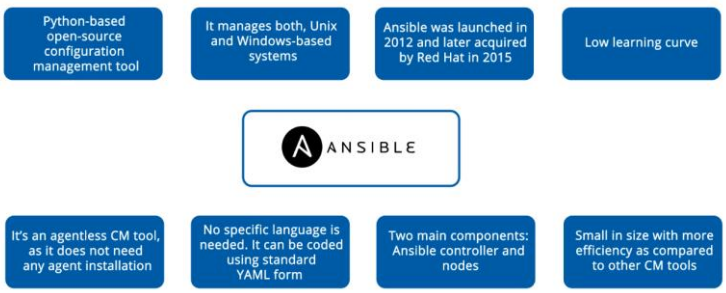
6.8 Demonstrate Chef Configuration

Praxisbeispiel

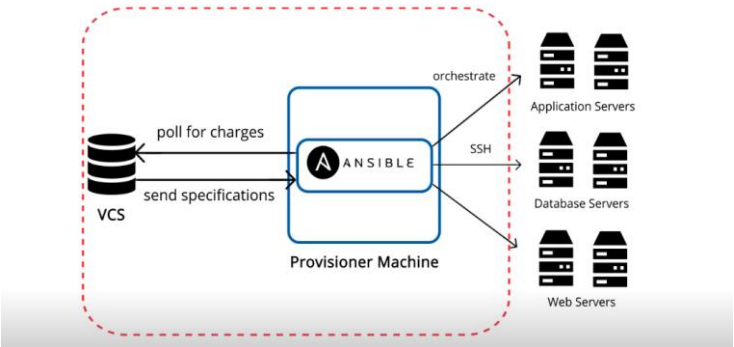
- Login to your Ubuntu Lab, and open the terminal.
- Download and reconfigure Chef.
- Confirm the installation of Chef-client.

6.9 Overview of Ansible

Ansible:



Ansible Architecture:



Ansible Installation Steps:

- SSH connectivity has to be set up between Ansible controller machine and node machines to manage configuration items.
- Generate SSH Key Pair on Ansible controller machine using the command "ssh-keygen –t rsa".
- Now, copy public key to "authorized_keys" file on other node machines.
- Once the key is copied, it can be verified using the SSH command. It should work without a password.
- The same procedure needs to be repeated for all the other nodes one by one.
- Once the setup is completed, the node's IP address should be mentioned in the Ansible inventory file.

Ansible Modules:

Ansible has different types of module libraries. They can be used directly, or they can be included in playbooks. These modules are predefined source code provided by Ansible to execute a set of steps. It's easy to use Ansible modules, as they do not need any coding experience.

- The modules use key-value arguments while managing resources.
- The modules can be used to manage services, packages, and files.

Ansible Playbook:

Ansible playbook is a YAML template used to manage system resources automatically. There is no need to login to each and every server. These templates can be scheduled for both, system configuration and application deployment.

Below is the example of one YAML template used to install and manage the NTP package on Ansible systems.

```
root@ansible:~# cat ntp.yaml
---
- hosts: all
  tasks:
    - name: Run the equivalent of "apt-get update" as a separate step
      apt: update_cache=yes
    - name: Install NTP package
      apt: name=ntp state=present
    - name: Restart NTP service
      service: name=ntp state=restarted
```

6.10 Set Up Apache Web Server Using Ansible

Praxisbeispiel

1. Login to your Ubuntu Lab, and open the terminal.
2. Install Ansible in Ubuntu.
3. Establish connection between Ansible controller and the node machine.
4. Write Ansible YAML script to install Ansible software.
5. Run Ansible YAML script.

6.11 Overview of SaltStack

SaltStack Configuration Management Tool

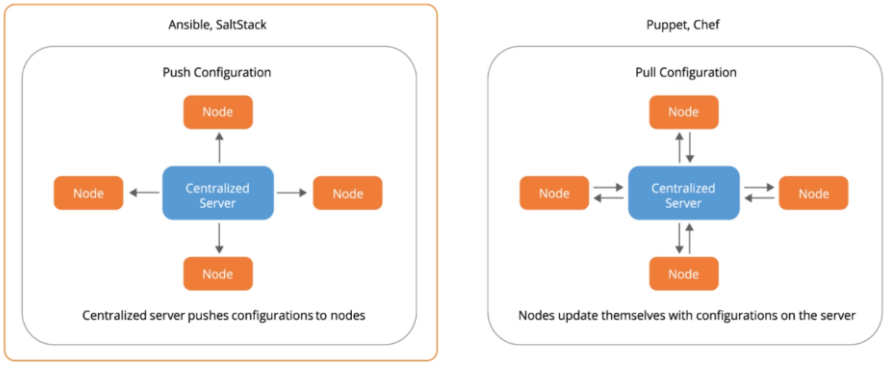
- SaltStack, like Ansible, is also a Python-based system provisioning tool.
- Tom Hatch, an IT Architect, built SaltStack in 2011. He was involved in both, Puppet and Chef configuration management tools.
- SaltStack is an open-source CM tool that comes under Apache 2.0 license.
- Like Ansible, YAML or Python-based scripts are used to manage system resources.

SALTSTACK

- SaltStack is one of the CM tools competing with Chef, Puppet, and Ansible.
- Like Ansible, learning curve is less difficult in case of SaltStack, as the same modules are here to manage system resources.
- SaltStack modules can be used to manage services, packages, and file resources.

SALTSTACK

Architecture Similarity



6.12 Comparision of Ansible Puppet Chef and Saltstack

Overview of Continiuous Integration:

CM Tools	Pros	Cons	Enterprise annual cost for an average of 100 nodes
Ansible	• Simple architecture • Low learning curve	• No Windows support for the controller machine • GUI is not good as compared to Chef and Puppet	Ansible open-source for 100 nodes →$0 Ansible Tower for 100 nodes →$3000 Ansible Tower Enterprise for 100 nodes→$10,000
SaltStack	• Scalable and fast • Easy to manage	• GUI is not good	SaltStack Enterprise for 100 nodes →$15,000
Chef	• More features • Perfect GUI with a lot of features	• Needs knowledge of Ruby • Takes more time to understand • Learning curve is more in Chef • Only 10 nodes allowed in open-source license	Chef Enterprise for 100 nodes →$7200
Puppet	• Oldest tool in the market • GUI with better features	• Difficult to understand and configure • Has less number of integrations with other tools	Puppet Enterprise for 100 nodes →$10,500

6.13 Key Takeaways

You are now able to:

- Explain the concepts of configuration management tools
- Demonstrate Puppet installation
- Demonstrate Chef installation
- Demonstrate Ansible installation and its usage
- Select the suitable CM tool for your organization