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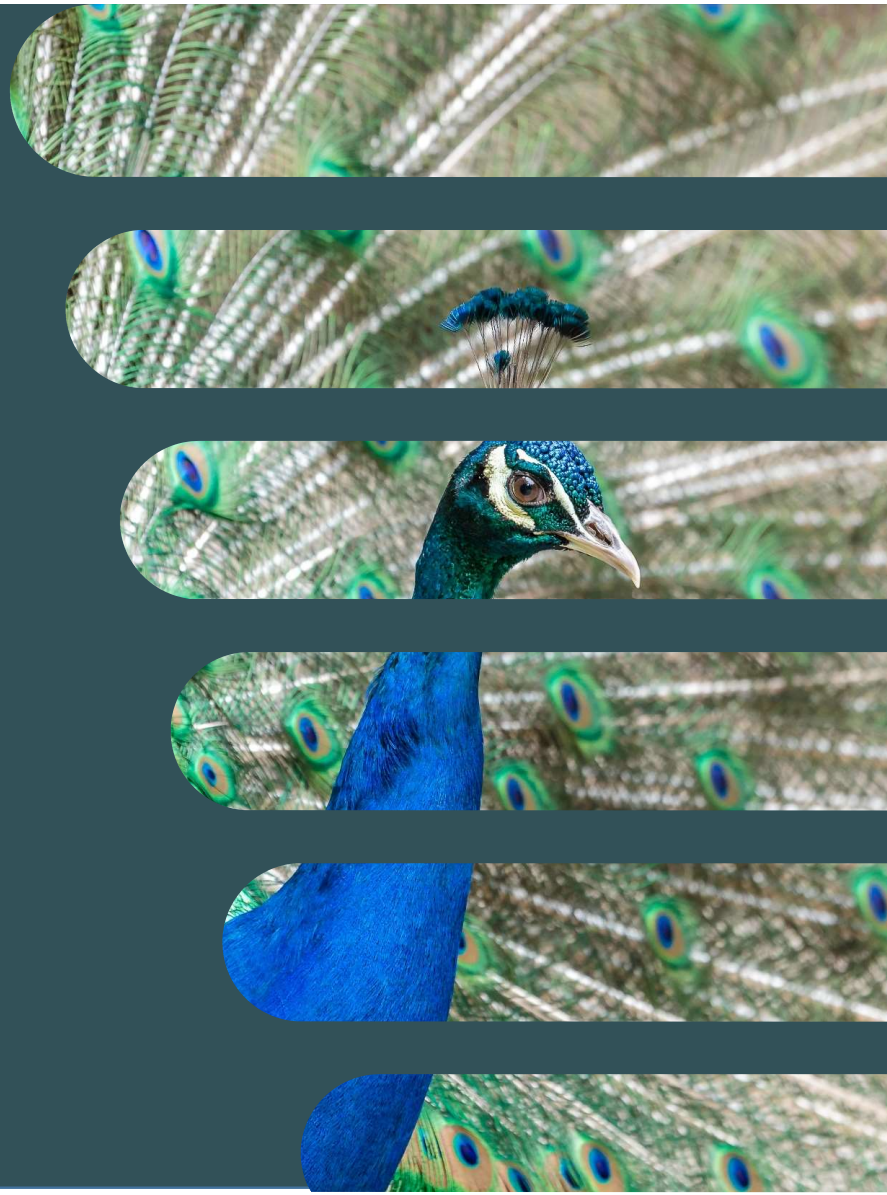
What is Puppet ?



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Puppet

- Configuration Management tool that is used for deploying, configuring and managing servers.
- Defining distinct configurations for each and every host, and continuously checking and confirming whether the required configuration is in place and is not altered on the host.
- Dynamic scaling-up and scaling-down of machines.
- Providing control over all your configured machines, so a centralized change gets propagated to all, automatically.

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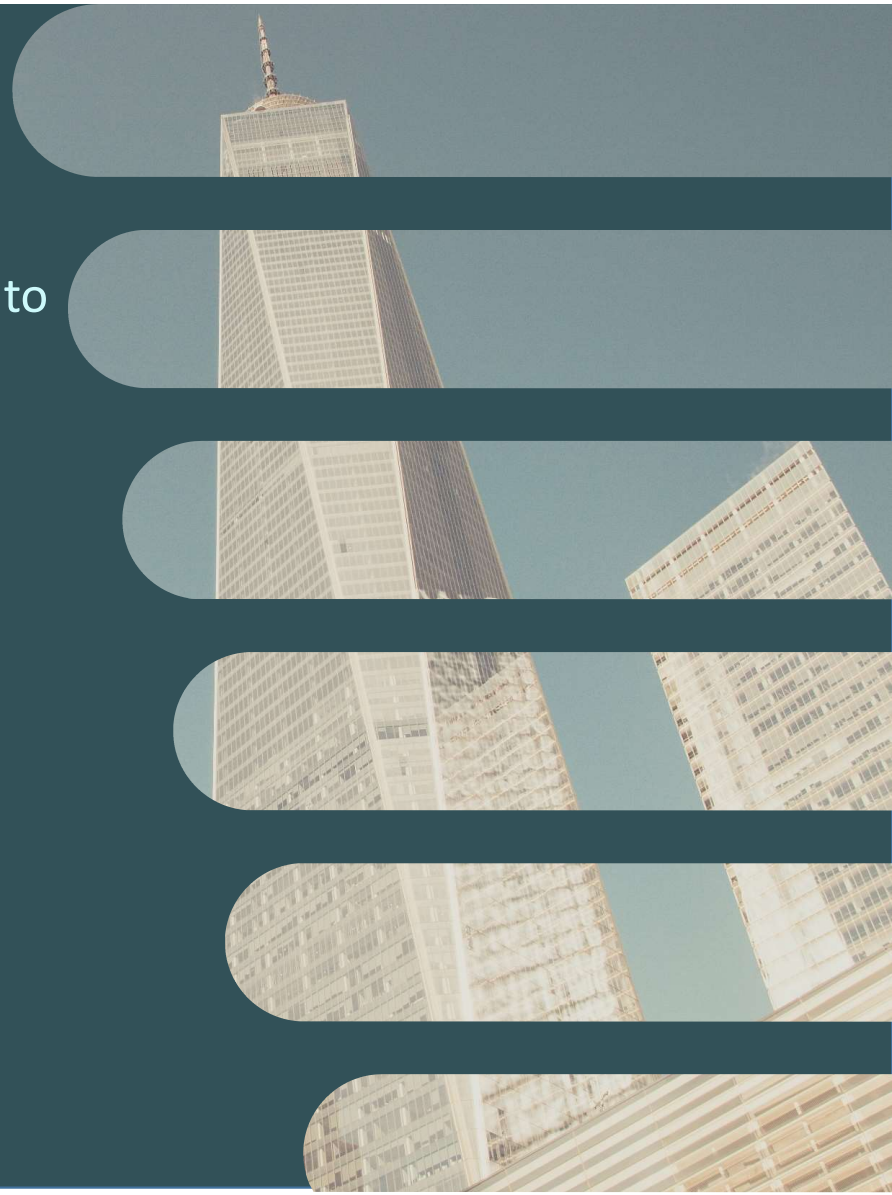
Features

- It controls all the step, right from the bootstrapping to the end of server life.
- Can define configuration at the node level
- Can group them according to roles.
  - Example: Webserver , DB server
- Maintains consistency across nodes.



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What is Configuration Management?

- A Configuration Item is any service component, infrastructure element, or other item that needs to be managed in order to ensure the successful delivery of services.
- Examples of CI include individual requirements documents, software, models, and plans.
- Configuration Management consists of the following elements:
  - Configuration Identification
  - Change Management
  - Configuration Status Accounting
  - Configuration Audits

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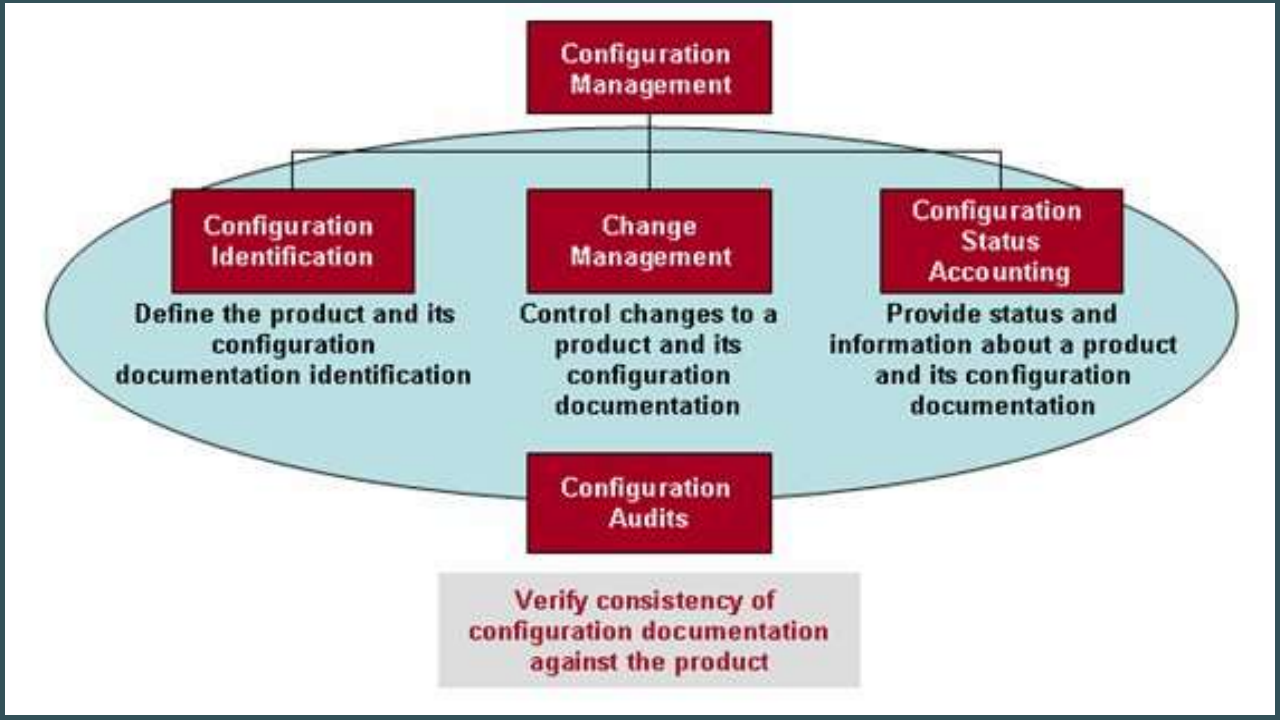
Configuration Management



Configuration Identification:

- Labeling software and hardware configuration items with unique identifiers
- Identifying the documentation that describes a configuration item
- Grouping related configuration items into baselines
- Labeling revisions to configuration items and baselines.

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Change Management:

- It is a systematic approach to dealing with change both from the perspective of an organization and the individual.

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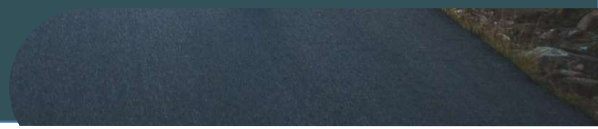
Configuration Status Accounting:

- It includes the process of recording and reporting configuration item descriptions
- All departures from the baseline during design and production.
- In the event of suspected problems, the verification of baseline configuration and approved modifications can be quickly determined.



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Configuration Audits:

- Configuration audits provide a mechanism for determining the degree to which the current state of the system is consistent with the latest baseline and documentation.
- Basically, it is a formal review to verify that the product being delivered will work as advertised, promoted or in any way promised to the customers.
- It uses the information available as an outcome of the quality audits and testing along with the configuration status accounting information
- To provide assurance that what was required has been build.

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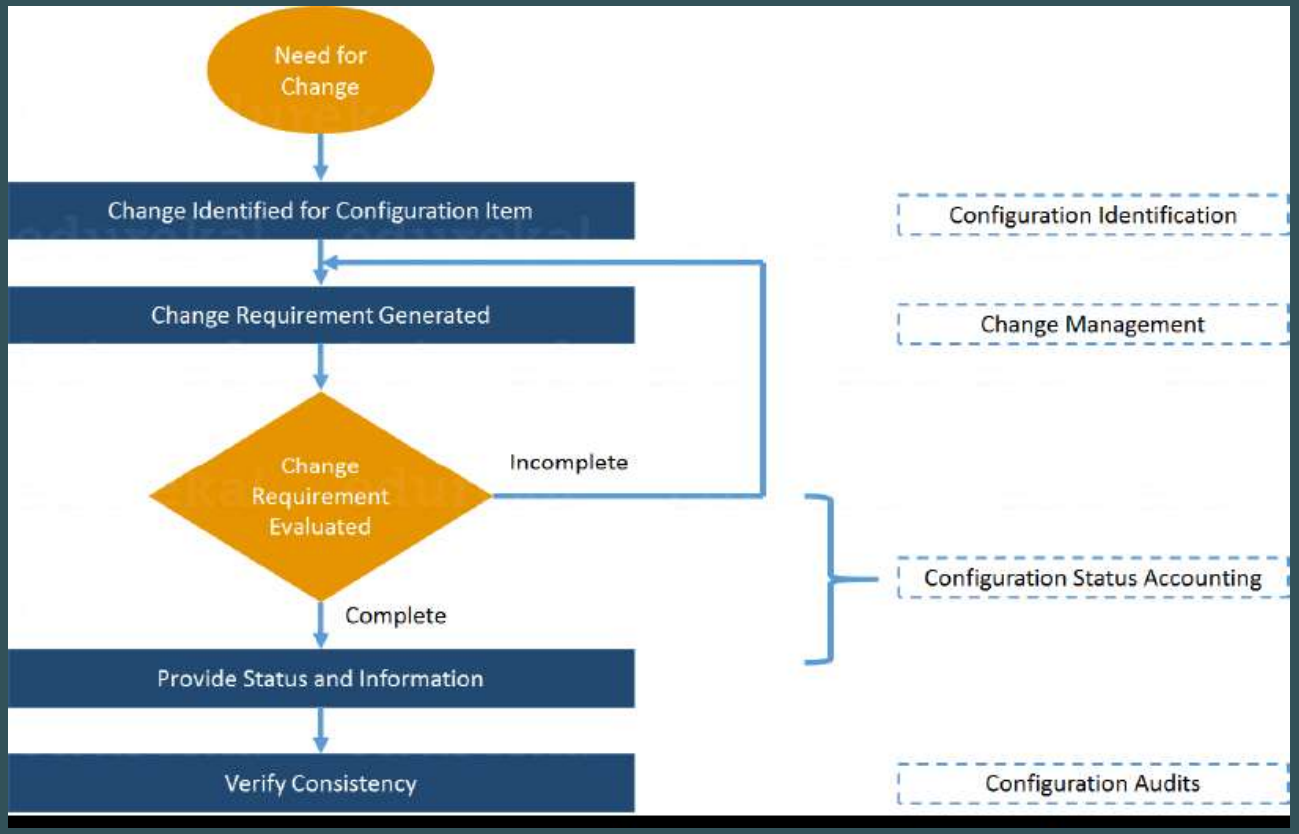
Configuration management flowchart



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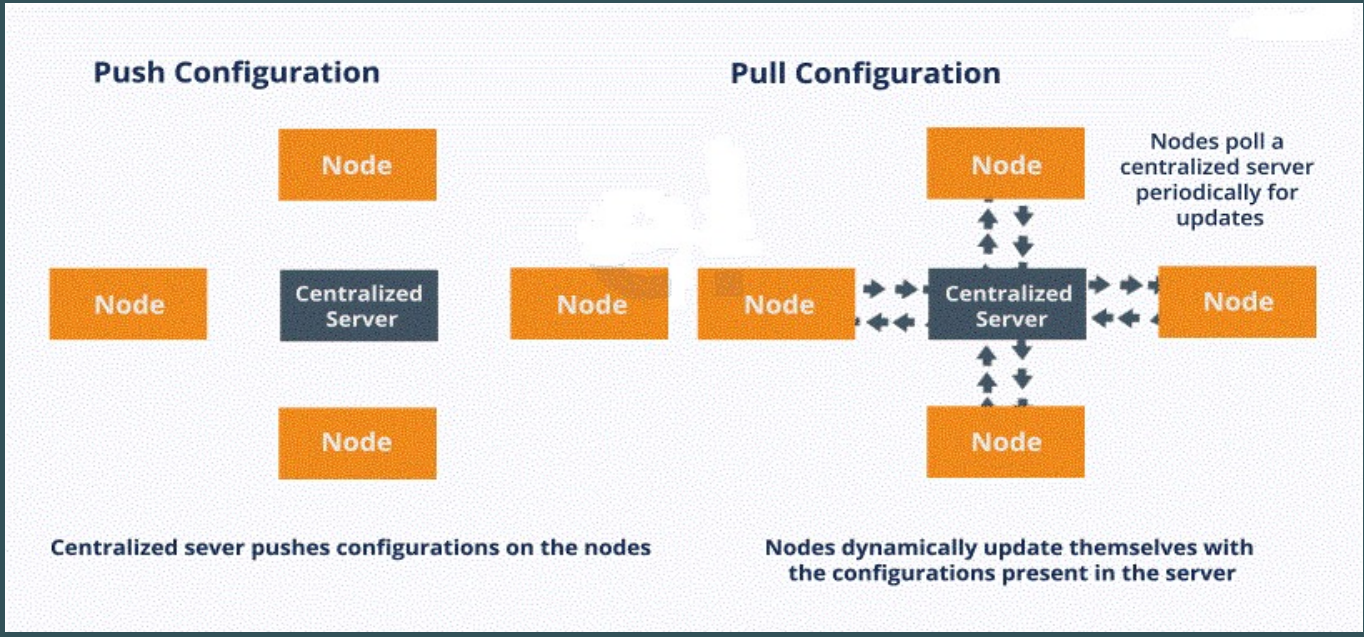
Configuration management components



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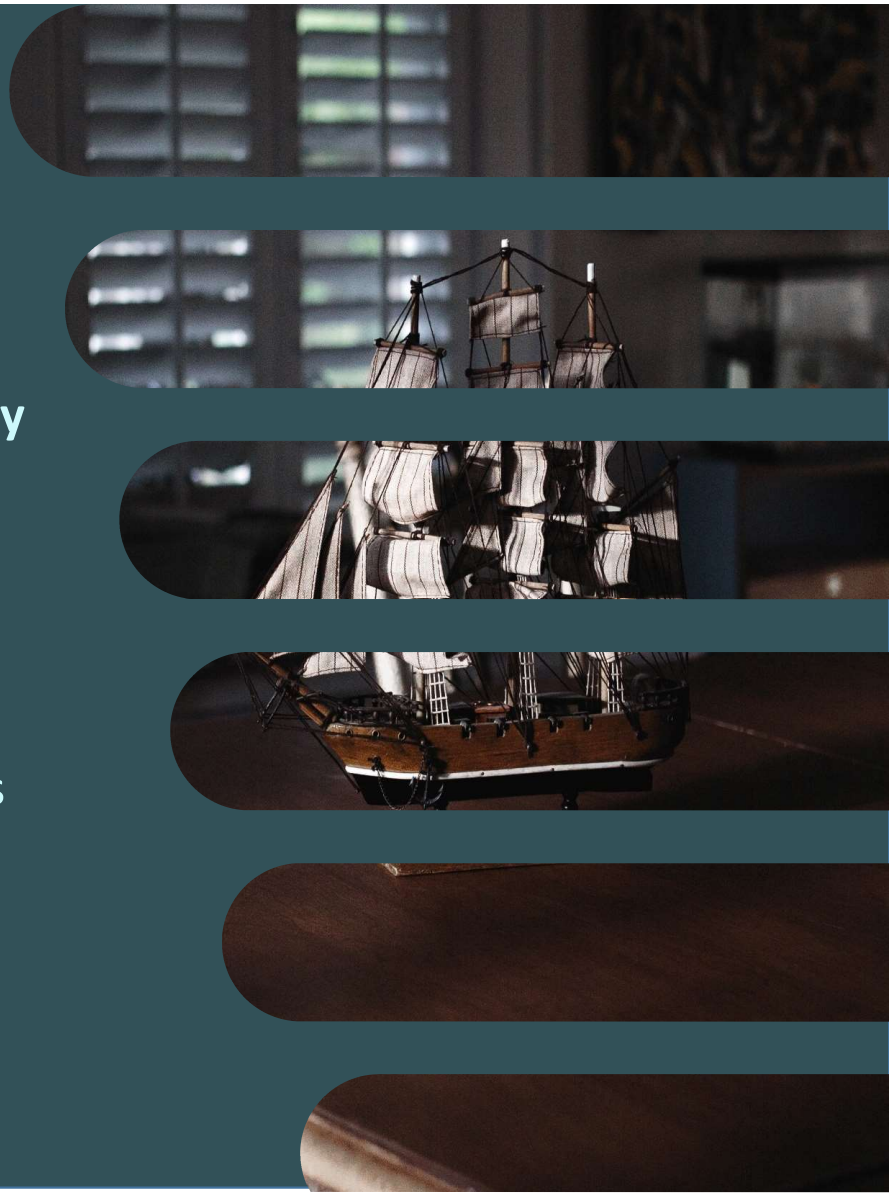
Configuration management Advantages :

- **Infrastructure as Code**: Track, Test, Deploy, Reproduce, Scale Code commits log shows the **history of change** on the infrastructure
- **Reproducible setups**: Do once, repeat forever
- **Scale** quickly: Done for one, use on many
- **Coherent** and consistent server setups
- **Aligned Environments** for devel, test, qa, prod nodes



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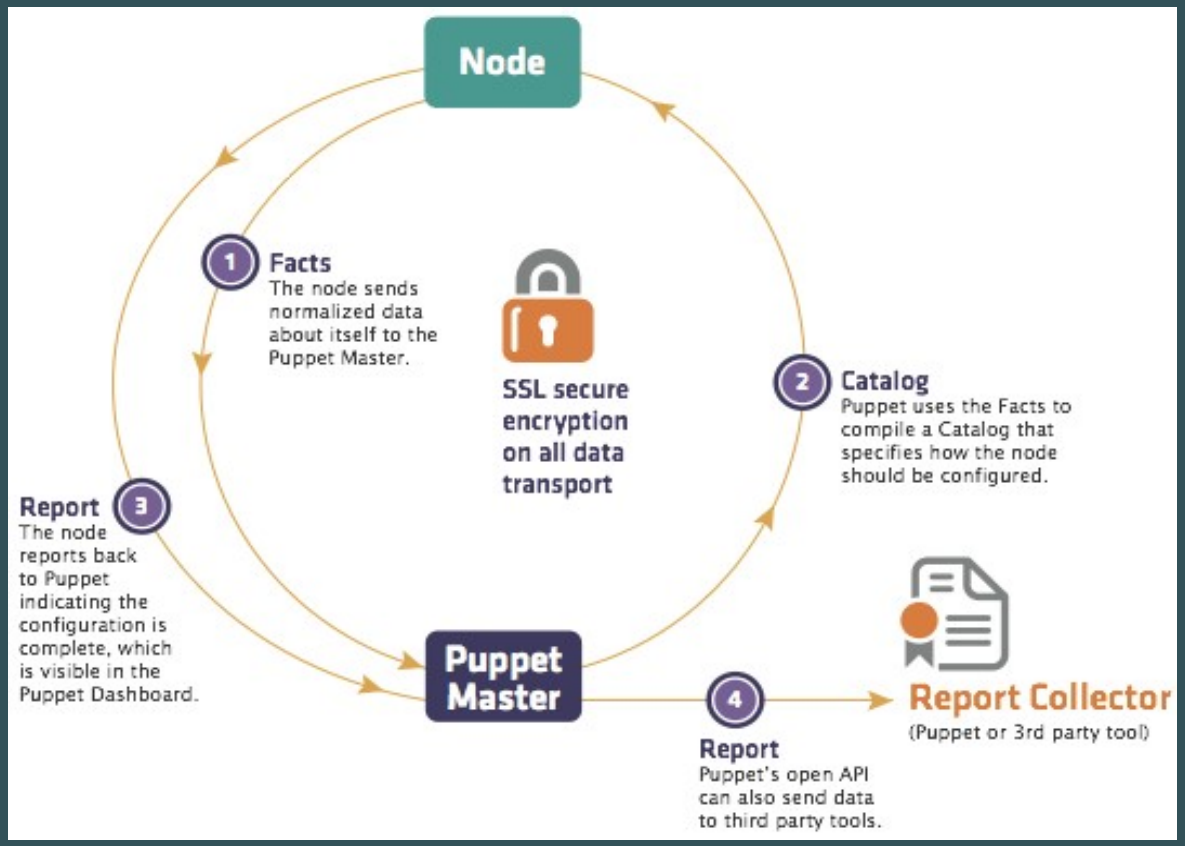
Architecture of Puppet :



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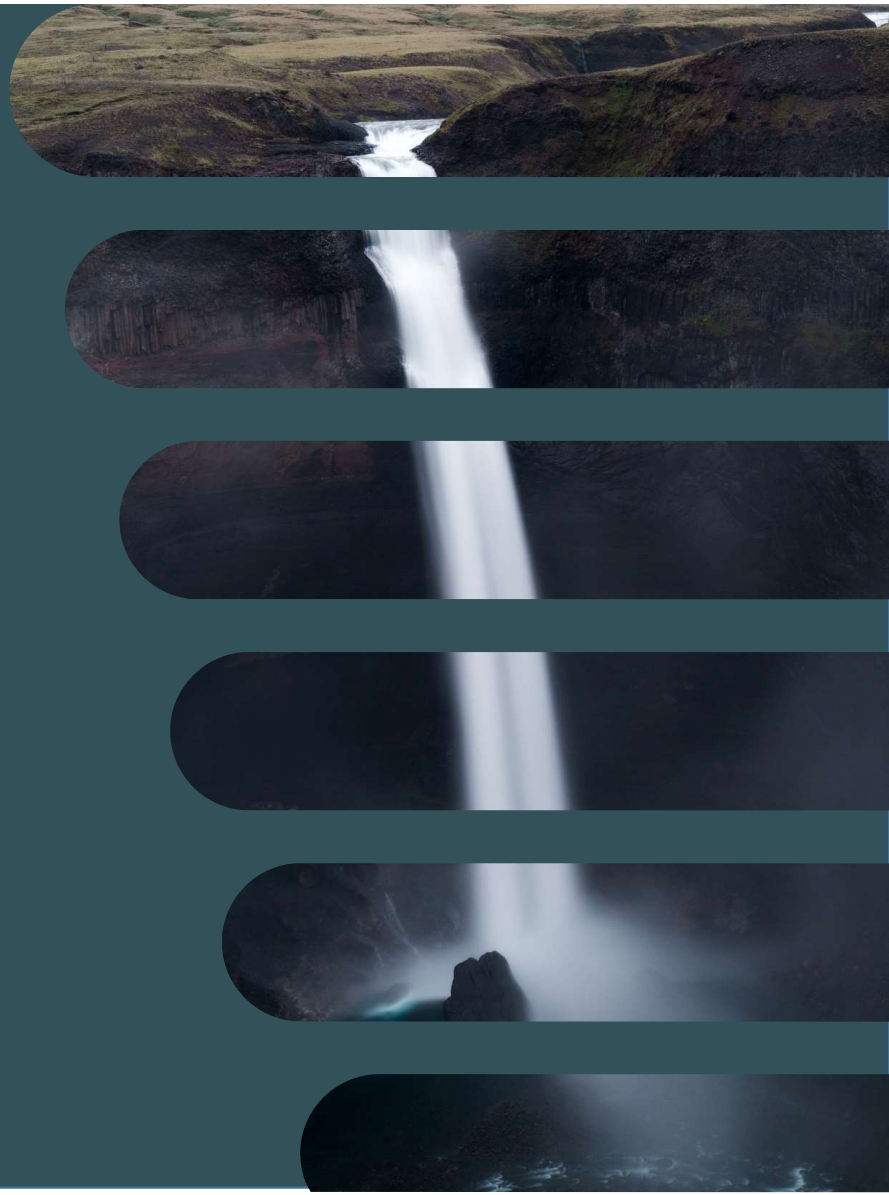

Puppet functions :

- The Puppet Agent sends the Facts to the Puppet Master. Facts are basically key/value data pair that represents some aspect of Slave state, such as its IP address, up-time, operating system, or whether it's a virtual machine.
- Puppet Master uses the facts to compile a Catalog that defines how the Slave should be configured. Catalog is a document that describes the desired state for each resource that Puppet Master manages on a Slave.
- Puppet Slave reports back to Master indicating that Configuration is complete, which is visible in the Puppet dashboard.

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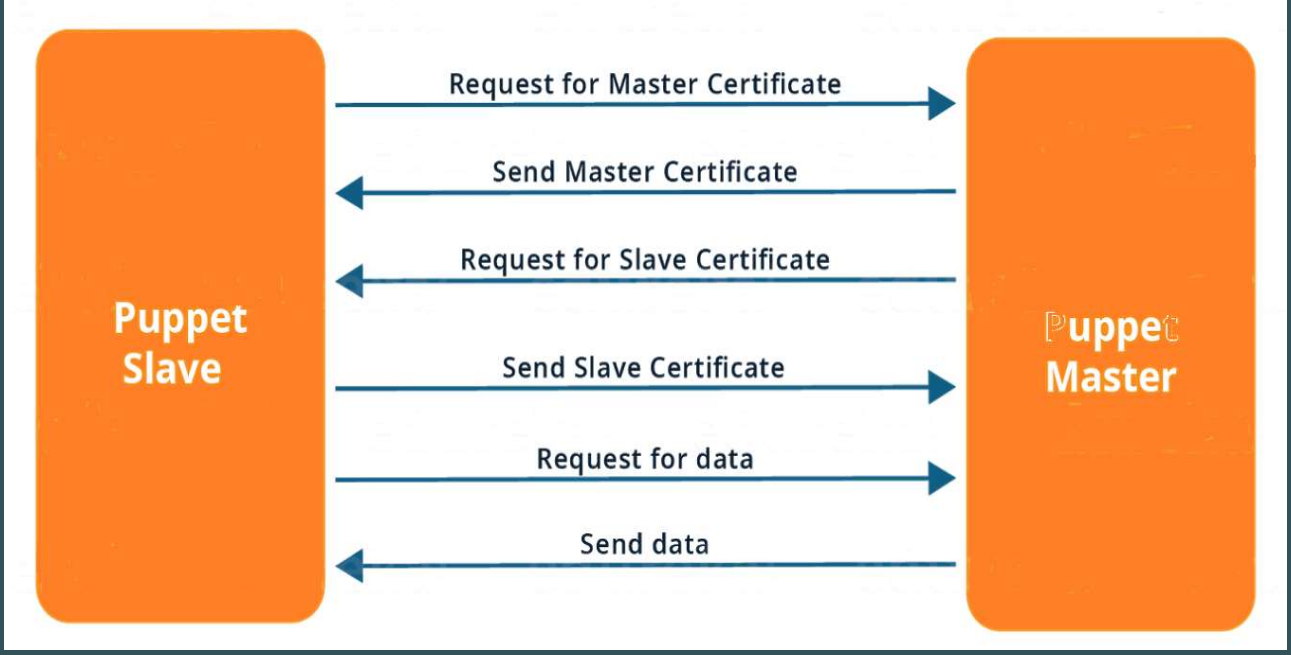
Puppet Master and Slave Communication



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Puppet Master and Slave Communication

- Puppet Slave asks for Puppet Master certificate.
- After receiving Puppet Master certificate, Master requests for Slave certificate.
- Once Master has signed the Slave certificate, Slave requests for configuration/data.
- Finally, Puppet Master will send the configuration to Puppet Slave.

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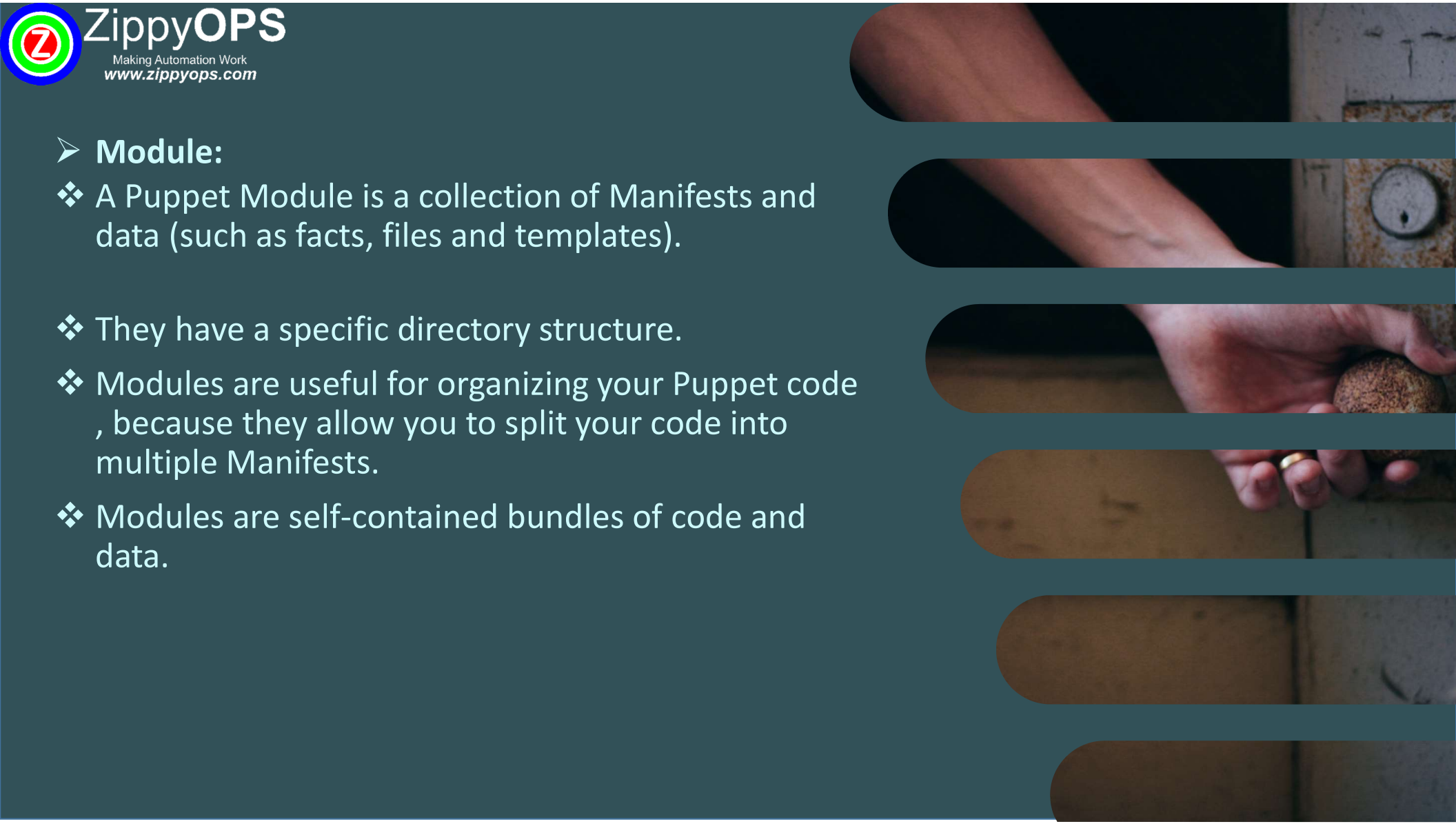
Components of Puppet

- **Manifests:**
- Every Slave has got its configuration details in Puppet Master, written in the native Puppet language.
- These details are written in the language which Puppet can understand and are termed as Manifests.
- They are composed of Puppet code and their filenames use the *.pp* extension.



- **Module:**
- A Puppet Module is a collection of Manifests and data (such as facts, files and templates).

- They have a specific directory structure.
- Modules are useful for organizing your Puppet code , because they allow you to split your code into multiple Manifests.
- Modules are self-contained bundles of code and data.

- **Resource:**
  - Resources are the fundamental unit for modeling system configurations.
  - Each Resource describes some aspect of a system, like a specific service or package.

- **Facter :**
  - Facter gathers basic information (facts) about Puppet Slave such as hardware details, network settings, OS type and version, IP addresses, MAC addresses, SSH keys, and more.
  - These facts are then made available in Puppet Master's Manifests as variables.

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- **Mcollective**
- It is a framework that allows several jobs to be executed in parallel on multiple Slaves.
- Interact with clusters of Slaves, whether in small groups or very large deployments.
- Use a broadcast paradigm to distribute requests. All Slaves receive all requests at the same time, requests have filters attached, and only Slaves matching the filter will act on requests.
- Use simple command-line tools to call remote Slaves.
- Write custom reports about your infrastructure.

- **Catalogs:**
- A Catalog describes the desired state of each managed resource on a Slave.
- It is a compilation of all the resources that the Puppet Master applies to a given Slave, as well as the relationships between those resources.
- Catalogs are compiled by a Puppet Master from Manifests and Slave-provided data .
- As well as an optional external data (such as data from an external Slave classifier, exported resources, and functions)
- The Master then serves the compiled Catalog to the Slave when requested.

Installation Puppet Enterprise

- Puppet Master install command: ./puppet-enterprise-installer
- Installation Flags
  - -c – Use a pe.conf file to configure the Puppet server.
  - -D – Displays debugging information.
  - -h – Display help.
  - -q – Run in quite mode; the installation process is not displayed.
  - -V – Display very verbose debugging information.
  - -y – Assumes yes/default and bypass any prompts for user input.

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pe.conf

§ The pe.conf file is a HOCON-formatted file that declares parameters and values needed to install and configure Puppet Enterprise.

§ When the installation completes, you can find an updated pe.conf file in /etc/puppetlabs/enterprise/conf.d.

```
{
  "console_admin_password": "password",
  "puppet_enterprise::puppet_master_host":
  "<puppet-master-fqdn>",
  "pe_install::puppet_master_dnsaltnames": [
    "puppet"
  ]
}
```

Installation Directories

- Puppet Enterprise configuration files are installed in /etc/puppetlabs/puppet for

  *nix nodes and <COMMON_APPDATA>\\PuppetLabs for Windows nodes.

- Puppet Enterprise software binaries are installed in /opt/puppetlabs.
- Executable binaries are in /opt/puppetlabs/bin and /opt/puppetlabs/sbin.
- The installer automatically creates symlinks in /usr/local/bin.

Code and Data Directories

- R10k: /etc/puppetlabs/r10k
- Environments: /etc/puppetlabs/code/environments
- modules: Main directory for puppet modules (applies to master only)
- manifests: Contains the main starting point for catalog compilation (applies to master only)
- ssl: Contains each node's certificate infrastructure (all nodes) /etc/puppetlabs/puppet/ssl

Important Ports

- 3000: Used for the web-based installer of the Puppet master.
- 8140: The port on which the Puppet master and agents communicate.
- 61613: Used by MCollective for orchestration requests by Puppet agents.
- 443: The web port used to access the Puppet Enterprise Console.
- 5432: PostgreSQL runs on this port. It is used by PuppetDB in a split stack configuration.
- 8081: The PuppetDB traffic/request port.
- 8142: Used by Orchestration services to accept inbound traffic/responses from the Puppet agents.