

Experiment – 11: To learn Pull based Software Configuration Management and provisioning tools using Puppet.

1. **Aim:** To install and Configure Pull based Software Configuration Management and provisioning tools using Puppet.
2. **Objectives:** Aim of this experiment is that, the students will learn:
 - To Synthesize software configuration and provisioning using Puppet
 - To Build and operate a scalable automation system.
3. **Outcomes:** After study of this experiment, the students will learn following:
 - Architecture of Puppet
 - Puppet Master Slave Communication
 - Configuring Puppet Master and Agent on Linux machines
4. **Prerequisite:** None
5. **Requirements:** AWS account, putty, Personal Computer, Windows operating system, Internet Connection, Microsoft Word.
6. **Pre-Experiment Exercise:**
Brief Theory: Refer shared material
7. **Laboratory Exercise**
A. Procedure:

a. Answer the following:

- What is Puppet? Enlist its features.

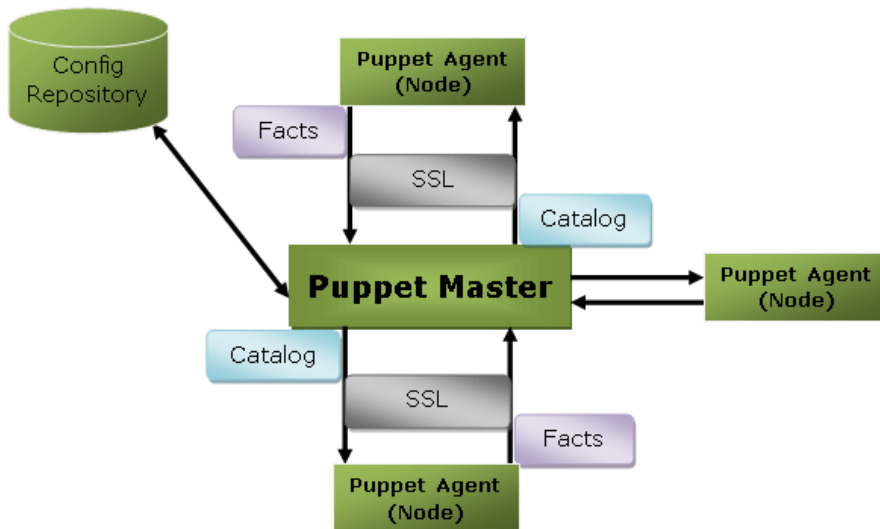
Puppet is an open-source configuration management and automation tool with the following key features:

- Declarative Language: Describes desired system states.
- Cross-Platform: Works on various OSs.
- Resource Abstraction: Manages system resources as types.
- Idempotence: Repeated configurations have the same result.
- Modularity: Organizes configurations into reusable modules.
- Agent-Client Model: Centralized control with agents on nodes.
- Reporting and Logging: Detailed tracking of changes.
- Dependency Resolution: Ensures proper order of configurations.
- Extensibility: Supports custom facts, functions, and modules.
- Version Control: Integrates with Git for code management.
- RBAC (Enterprise): Fine-grained access control.
- Community and Ecosystem: Active community and modules.
- Cloud and Container Support: Manages resources in cloud and container environments.

- Explain architecture of Puppet with a diagram.

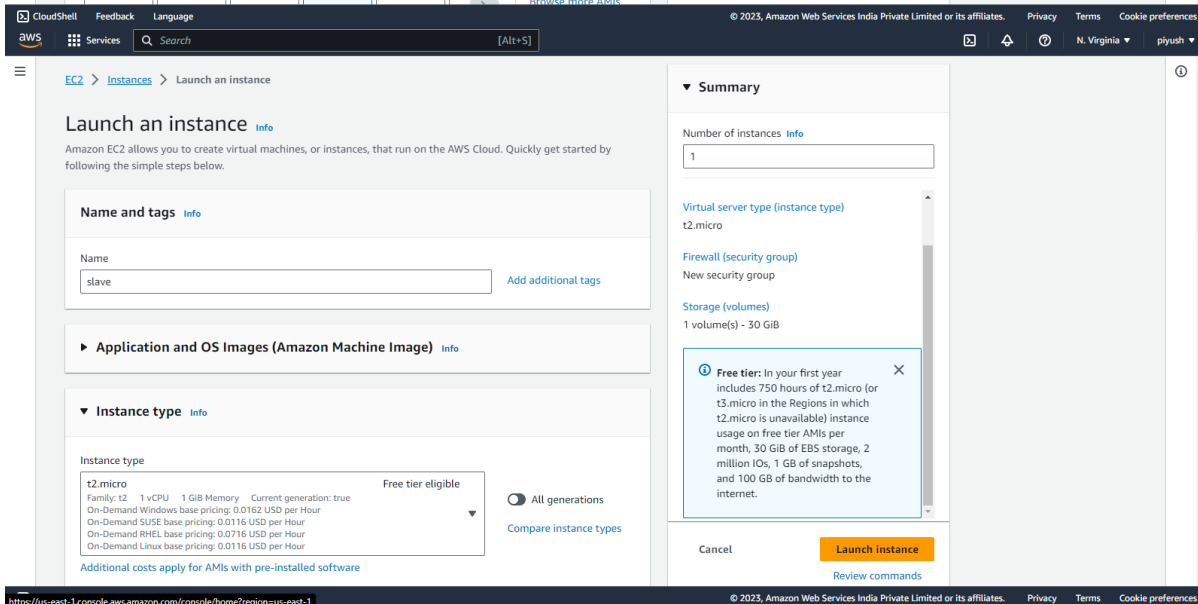
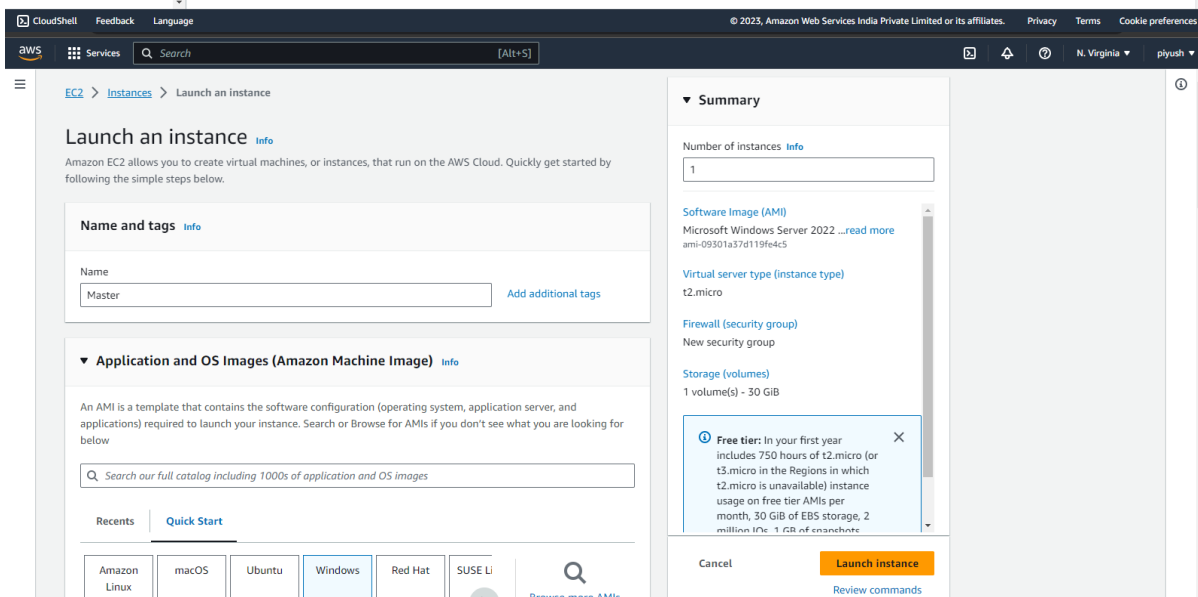
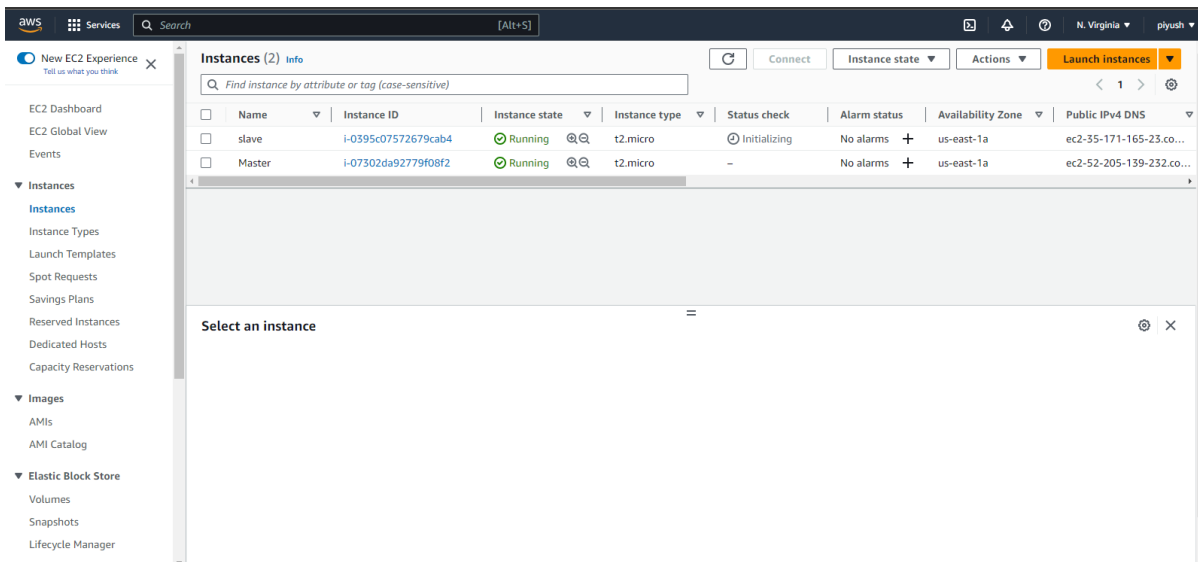
Puppet Architecture

Puppet uses master-slave or client-server architecture. Puppet client and server interconnected by SSL, which is a secure socket layer. It is a model-driven system.



Here, the client is referred to as a Puppet agent/slave/node, and the server is referred to as a Puppet master. Let's see the components of Puppet architecture:

- **Puppet Master**
Puppet master handles all the configuration related process in the form of puppet codes. It is a Linux based system in which puppet master software is installed. The puppet master must be in Linux. It uses the puppet agent to apply the configuration to nodes. This is the place where SSL certificates are checked and marked.
 - **Puppet Slave or Agent**
Puppet agents are the real working systems and used by the Client. It is installed on the client machine and maintained and managed by the puppet master. They have a puppet agent service running inside them.
The agent machine can be configured on any operating system such as Windows, Linux, Solaris, or Mac OS.
 - **Config Repository**
Config repository is the storage area where all the servers and nodes related configurations are stored, and we can pull these configurations as per requirements.
 - **Facts**
Facts are the key-value data pair. It contains information about the node or the master machine. It represents a puppet client states such as operating system, network interface, IP address, uptime, and whether the client machine is virtual or not.
These facts are used for determining the present state of any agent. Changes on any target machine are made based on facts. Puppet's facts are predefined and customized.
 - **Catalog**
The entire configuration and manifest files that are written in Puppet are changed into a compiled format. This compiled format is known as a catalog, and then we can apply this catalog to the target machine.
- b. Refer the shared material and do online research to answer following:**
- Mention steps for creating 2 EC2 instances on AWS for creating master and slave machines. Attach screenshots for the same.



- Commands used to configure master and slave machines using putty
Commands to run on puppet Master (which is one of the EC2 instances)
- `sudo apt-get update` :This command will update the packages
- `wget https://apt.puppetlabs.com/puppet-release-bionic.deb` :This command will download the puppet folder
- `sudo dpkg -i puppet-release-bionic.deb` :This command will unzip the puppet folder
- `sudo apt-get install puppetmaster` : This command will install the puppet master

- apt policy puppetmaster : This command will verify puppet master after installation
- sudo systemctl status puppet-master.service: This command will check status of puppet master service
- sudo nano /etc/default/puppet-master: This command will fine tune some settings....
- Add this line in the puppet master file: JAVA_ARGS="-Xms512m -Xmx512m"
This command will change the memory allocation to 512MB
- sudo systemctl restart puppet-master.service : This command will restart puppet master after the recent changes
- sudo ufw allow 8140/tcp : This command will open TCP port for puppet to communicate
- sudo nano /etc/hosts : This command will open hosts file for entering master's IP address
- sudo puppet cert list : This command will show puppet agent's certificate received for signing
- sudo puppet cert sign --all : This command will sign the received certificate
- **Commands to run on slave node/ puppet agent (which is the other EC2 instance)**
- sudo apt-get update: This command will update the packages
- wget <https://apt.puppetlabs.com/puppet-release-bionic.deb> This command will download the puppet folder
- sudo dpkg -i puppet-release-bionic.deb :This command will unzip the puppet folder
- sudo apt-get install puppet :This command will install the puppet agent
- sudo nano /etc/hosts :This command will open hosts file for entering master's IP address
- sudo systemctl start puppet :This command will start the puppet agent
- sudo systemctl enable puppet :This command will enable the puppet agent
- sudo puppet agent --test :This command will test communication between puppet master

8. Post-Experiments Exercise

A. Extended Theory:

Nil

B. Questions:

- Explain the two types of configuration management approaches.
- How does the connection between puppet master server and puppet agent nodes happen?

C. Conclusion:

- Write what was performed in the experiment.
- Write the significance of the topic studied in the experiment.

D. References:

<https://www.edureka.co/blog/puppet-tutorial/>
<https://www.simplilearn.com/puppet-tutorial-article>