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**Walchand College of Engineering, Sangli**  
**Department of Computer Science and Engineering**  
**Software Engineering Tools Lab**  
**Assignment No 4**  
**(Module 4- Configuration management tools)**

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**Q 1. Differentiate Chef Vs Puppet Vs Ansible Vs Saltstack w.r.t properties given below**

- a. Owner/ Company
- b. Open/free/proprietary
- c. Size
- d. Configuration type(push/pull)
- e. Components
- f. Written in language
- g. Tasks that can be performed (infrastructure/code management etc.)
- h. Advantages
- i. Disadvantages
- j. Website
- k. Installation prerequisite

**Ans:**

<b>Properties</b>	<b>Chef</b>	<b>Puppet</b>	<b>Ansible</b>	<b>Saltstack</b>
Owner/Company	Opscode	Yvonne Wassenaar	Michael DeHaan	VMware
Open/free/proprietary	Open source	Open source	Open source	Open source
Size	0.08 mb	0.08 mb	0.08 mb	0.08 mb
Configuration type(push/pull)	Pull based	Pull, Push	Push based	Push based
Components	3 main	Manifests	Inventory	Salt Master

	components 1. Workstation 2. Server 3. Nodes	Module Resource Factor M-collective Catalogs Class Nodes	Playbooks Plays Tasks Roles Handlers Templates Variables	Salt Minions Execution Modules Formulas (States) Grains Pillar Top File Runners Returners Reactor Salt Cloud/Salt Virt Salt SSH
Written in language	Ruby and Erlang	Ruby	Ruby, Python	Python
Tasks that can be performed (infrastructure/code management etc.)	Deployment task In devops	Deployment task In devops	Deployment task In devops	Deployment task In devops
Advantages	1.Manages huge amount node 2.Write once deploy many times 3.High availability	1.Reduce downtime 2.Faster deployment 3.Easy automation	1.Simple to learn 2.Easily understand to Python 3.No dependency on agents	1. Flexible 2.Python api 3.Parallel execution
Disadvantages	1.Not good documentation 2.Not easy to learn if you don't know ruby	1.Not good documentation 2.Not easy to learn if you don't know ruby 3.Not suitable for small businesses	1.Insufficient UI 2.Limited windows Support 3.Not have experience	Not good UI
Website	<a href="http://www.chef.io">www.chef.io</a>	<a href="http://www.puppet.com">www.puppet.com</a>	<a href="http://www.ansible.com">www.ansible.com</a>	<a href="http://saltprojects.io">saltprojects.io</a>

Installation prerequisite	4 GB RAM	4 GB RAM	4 GB RAM	4 GB RAM
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Q 2. What are the different flavors of **Chef configuration management tool**?

Ans: Chef comes in various flavors, such as Chef Solo, which has no remote server and cookbooks are located on the local site itself.

There's also Hosted Chef, where a Chef server is provided as a service on the cloud. Thus, there is no need to set up a server yourself.

If you want traditional Chef architecture, there's Chef Client/Server. With this flavor, a hosted remote server communicates between the workstation and node.

Finally, there is a Private Chef, which is the enterprise version of Chef. With this flavor, the server is hosted within the enterprise infrastructure.

Q 3. What is **Pull and Push** configuration?

Ans: Push configuration entails the server pushing configuration to the nodes. Pull configuration involves the nodes checking with the server periodically, and fetching the configurations from it.

Q 4. What is **Playbook and Inventory w.r.t Ansible** and **recipe and cookbook w.r.t Chef** configuration management tool?

Ans: **Playbook w.r.t. Ansible:** A playbook is where you define how to apply policies, declare configurations, orchestrate steps and launch tasks either synchronously or asynchronously on your servers. Each playbook is composed of one or more "plays". Playbooks are normally maintained and managed in a version control system like Git. They are expressed in **YAML** (Yet Another Markup Language).

**Inventory w.r.t. Ansible:** The "inventory" is a configuration file where you define the host information.

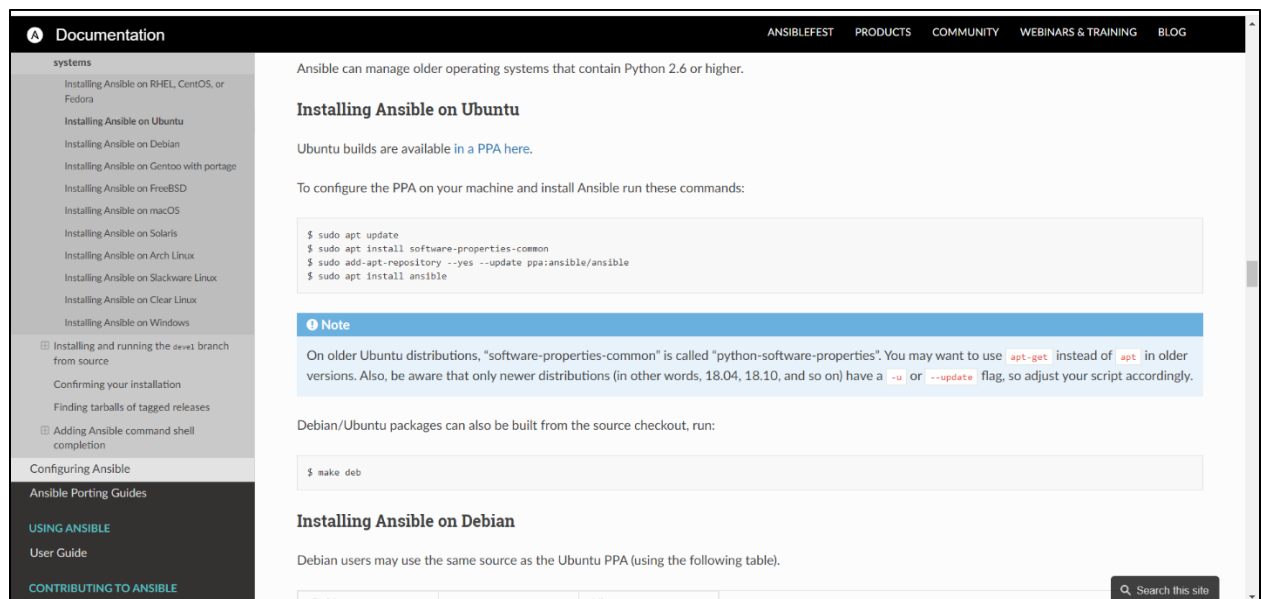
**Recipe w.r.t. Chef:** It can be defined as a collection of attributes which are used to manage the infrastructure. These attributes which are present in the recipe are used to change the existing state or setting a particular infrastructure node.

**Cookbook w.r.t. Chef:** A cookbook is a collection of recipes. They are the basic building blocks which get uploaded to Chef server.

Q 5. Perform below operations on your machine to check **working of Ansible**

- Install Ansible
- Setup an Inventory
- Create a playbook to install MySQL db on one node.
- Execute a playbook

Steps to execute installation of ansible:



The screenshot shows the Ansible documentation website. The left sidebar contains a navigation menu with categories like 'systems', 'Configuring Ansible', 'Ansible Porting Guides', 'USING ANSIBLE', and 'CONTRIBUTING TO ANSIBLE'. The main content area is titled 'Installing Ansible on Ubuntu'. It includes a note about Ubuntu builds being available in a PPA, a list of commands to install Ansible via the PPA, a note about older Ubuntu distributions, and a section for installing Ansible on Debian. The commands shown are:

```
$ sudo apt update
$ sudo apt install software-properties-common
$ sudo add-apt-repository --yes --update ppa:ansible/ansible
$ sudo apt install ansible
```

The note mentions that on older Ubuntu distributions, 'software-properties-common' is called 'python-software-properties'. The Debian section mentions that Debian users may use the same source as the Ubuntu PPA.

Updated the existing packages:

```
akshay0603@ARM631: /mnt/c/Users/Asus/Desktop
Get:35 http://archive.ubuntu.com/ubuntu focal-backports/universe amd64 Packages [22.7 kB]
Get:36 http://archive.ubuntu.com/ubuntu focal-backports/universe Translation-en [15.4 kB]
Get:37 http://archive.ubuntu.com/ubuntu focal-backports/universe amd64 c-n-f Metadata [804 B]
Get:38 http://archive.ubuntu.com/ubuntu focal-backports/multiverse amd64 c-n-f Metadata [116 B]
Fetched 21.2 MB in 1min 11s (299 kB/s)
Reading package lists... Done
akshay0603@ARM631: /mnt/c/Users/Asus/Desktop$ sudo apt-add-repository ppa:ansible/ansible
Ansible is a radically simple IT automation platform that makes your applications and systems easier to deploy. Avoid w
riting scripts or custom code to deploy and update your applications- automate in a language that approaches plain Engli
sh, using SSH, with no agents to install on remote systems.

http://ansible.com/
More info: https://launchpad.net/~ansible/+archive/ubuntu/ansible
Press [ENTER] to continue or Ctrl-c to cancel adding it.
```

```
akshay0603@ARM631: /mnt/c/Users/Asus/Desktop
Hit:3 http://archive.ubuntu.com/ubuntu focal-backports InRelease
Hit:4 http://security.ubuntu.com/ubuntu focal-security InRelease
Get:5 http://ppa.launchpad.net/ansible/ansible/ubuntu focal InRelease [18.0 kB]
Get:6 http://ppa.launchpad.net/ansible/ansible/ubuntu focal/main amd64 Packages [1128 B]
Get:7 http://ppa.launchpad.net/ansible/ansible/ubuntu focal/main Translation-en [756 B]
Fetched 19.9 kB in 3s (7088 B/s)
Reading package lists... Done
akshay0603@ARM631: /mnt/c/Users/Asus/Desktop$ sudo apt update
Hit:1 http://security.ubuntu.com/ubuntu focal-security InRelease
Hit:2 http://archive.ubuntu.com/ubuntu focal InRelease
Hit:3 http://ppa.launchpad.net/ansible/ansible/ubuntu focal InRelease
Hit:4 http://archive.ubuntu.com/ubuntu focal-updates InRelease
Hit:5 http://archive.ubuntu.com/ubuntu focal-backports InRelease
Reading package lists... Done
Building dependency tree
Reading state information... Done
30 packages can be upgraded. Run 'apt list --upgradable' to see them.
akshay0603@ARM631: /mnt/c/Users/Asus/Desktop$
```

Executed above commands to install ansible:

```
akshay0603@ARM631: /mnt/c/Users/Asus/Desktop
Reading package lists... Done
Building dependency tree
Reading state information... Done
30 packages can be upgraded. Run 'apt list --upgradable' to see them.
akshay0603@ARM631:/mnt/c/Users/Asus/Desktop$ sudo apt install ansible
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  ansible-core python3-bcrypt python3-jmespath python3-kerberos python3-ntlm-auth python3-packaging python3-paramiko
  python3-pyparsing python3-requests-kerberos python3-requests-ntlm python3-resolvelib python3-winrm python3-xmltodict
  sshpass
Suggested packages:
  python3-gssapi python-pyparsing-doc
The following NEW packages will be installed:
  ansible ansible-core python3-bcrypt python3-jmespath python3-kerberos python3-ntlm-auth python3-packaging
  python3-paramiko python3-pyparsing python3-requests-kerberos python3-requests-ntlm python3-resolvelib python3-winrm
  python3-xmltodict sshpass
0 upgraded, 15 newly installed, 0 to remove and 30 not upgraded.
Need to get 23.2 MB of archives.
After this operation, 303 MB of additional disk space will be used.
Do you want to continue? [Y/n]
```

Installation complete.

```
Selecting previously unselected package python-pkg-resources.
Preparing to unpack .../15-python-pkg-resources_39.0.1-2_all.deb ...
Unpacking python-pkg-resources (39.0.1-2) ...
Selecting previously unselected package python-setuptools.
Preparing to unpack .../16-python-setuptools_39.0.1-2_all.deb ...
Unpacking python-setuptools (39.0.1-2) ...
Selecting previously unselected package sshpass.
Preparing to unpack .../17-sshpas_1.06-1_amd64.deb ...
Unpacking sshpass (1.06-1) ...
Selecting previously unselected package ansible.
Preparing to unpack .../18-ansible_2.9.27-1ppa-bionic_all.deb ...
Unpacking ansible (2.9.27-1ppa-bionic) ...
Setting up sshpass (1.06-1) ...
Setting up libpython2.7-stdlib:amd64 (2.7.17-1~18.04ubuntu1.6) ...
Setting up python2.7 (2.7.17-1~18.04ubuntu1.6) ...
Setting up libpython-stdlib:amd64 (2.7.15~rc1-1) ...
Setting up python (2.7.15~rc1-1) ...
Setting up python-idna (2.6-1) ...
Setting up python-yaml (3.12-1build2) ...
Setting up python-asn1crypto (0.24.0-1) ...
Setting up python-crypto (2.6.1-8ubuntu2) ...
Setting up python-pyasn1 (0.4.2-3) ...
Setting up python-pkg-resources (39.0.1-2) ...
Setting up python-markupsafe (1.0-1build1) ...
Setting up python-httplib2 (0.9.2dfsg-1ubuntu0.3) ...
Setting up python-cffi-backend (1.11.5-1) ...
Setting up python-enum34 (1.1.6-2) ...
Setting up python-ipaddress (1.0.17-1) ...
Setting up python-setuptools (39.0.1-2) ...
Setting up python-jinja2 (2.10-1ubuntu0.18.04.1) ...
Setting up python-paramiko (2.0.0-1ubuntu1.2) ...
Setting up ansible (2.9.27-1ppa-bionic) ...
shreyash@LAPTOP-MKH4IS7B:~$
```

Checked installation of ansible on server:

```
akshay0603@ARM631:~$ ansible --version
ansible [core 2.12.2]
  config file = /etc/ansible/ansible.cfg
  configured module search path = ['/home/akshay0603/.ansible/plugins/modules', '/usr/share/ansible/plugins/modules']
  ansible python module location = /usr/lib/python3/dist-packages/ansible
  ansible collection location = /home/akshay0603/.ansible/collections:/usr/share/ansible/collections
  executable location = /usr/bin/ansible
  python version = 3.8.10 (default, Nov 26 2021, 20:14:08) [GCC 9.3.0]
  jinja version = 2.10.1
  libyaml = True
akshay0603@ARM631:~$
```

Edited hosts inventory file, added IP address of working node.

```
GNU nano 2.9.3 hosts
# This is the default ansible 'hosts' file.
#
# It should live in /etc/ansible/hosts
#
# - Comments begin with the '#' character
# - Blank lines are ignored
# - Groups of hosts are delimited by [header] elements
# - You can enter hostnames or ip addresses
# - A hostname/ip can be a member of multiple groups
#
# Ex 1: Ungrouped hosts, specify before any group headers.
## green.example.com
## blue.example.com
## 192.168.100.1
## 192.168.100.10
#
# Ex 2: A collection of hosts belonging to the 'webservers' group
## [webservers]
## alpha.example.org
## beta.example.org
## 192.168.1.100
## 192.168.1.110
#
# If you have multiple hosts following a pattern you can specify
# them like this:
## www[001:006].example.com
Read 44 lines
^G Get Help      ^O Write Out    ^W Where Is     ^K Cut Text     ^J Justify      ^C Cur Pos      M-U Undo        M-A Mark Text
^X Exit          ^R Read File    ^\ Replace      ^U Uncut Text   ^T To Spell     ^_ Go To Line    M-E Redo        M-G Copy Text
```

```
akshay0603@ARM631: /etc/ansible

## [webservers]
## alpha.example.org
## beta.example.org
## 192.168.1.100
## 192.168.1.110

# If you have multiple hosts following a pattern, you can specify
# them like this:

## www[001:006].example.com

# Ex 3: A collection of database servers in the 'dbservers' group:

## [dbservers]
##
## db01.intranet.mydomain.net
## db02.intranet.mydomain.net
## 10.25.1.56
## 10.25.1.57

# Here's another example of host ranges, this time there are no
# leading 0s:

## db-[99:101]-node.example.com

akshay0603@ARM631:/etc/ansible$ cd
akshay0603@ARM631:~$ ls
hosts.save  test.yml
akshay0603@ARM631:~$ sudo nano test.yml
akshay0603@ARM631:~$ cd /etc/ansible
akshay0603@ARM631:/etc/ansible$ ansible all -m ping -u admin5 --ask-pass
SSH password:
10.7.3.193 | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "changed": false,
  "ping": "pong"
}
akshay0603@ARM631:/etc/ansible$
```

Testing connection with working node:

```
akshay0603@ARM631: /etc/ansible

## [webservers]
## alpha.example.org
## beta.example.org
## 192.168.1.100
## 192.168.1.110

# If you have multiple hosts following a pattern, you can specify
# them like this:

## www[001:006].example.com

# Ex 3: A collection of database servers in the 'dbservers' group:

## [dbservers]
##
## db01.intranet.mydomain.net
## db02.intranet.mydomain.net
## 10.25.1.56
## 10.25.1.57

# Here's another example of host ranges, this time there are no
# leading 0s:

## db-[99:101]-node.example.com
```

Creating playbook named test.yml file to install MySQL server on that node.



```
GNU nano 2.9.3 test.yml Modified
---
- name: Install MySQL
  hosts: 10.7.3.151
  vars:
    mysql_root_password: password
  tasks:
    - name: install mysql
      apt: name=mysql-server update_cache=yes cache_valid_time=3600 state=present
      become: yes

```

Executed test.yml file for installation.

```
akshay0603@ARM631: ~
## 10.25.1.56
## 10.25.1.57

# Here's another example of host ranges, this time there are no
# leading 0s:

## db-[99:101]-node.example.com

akshay0603@ARM631:/etc/ansible$ cd
akshay0603@ARM631:~$ ls
hosts.save test.yml
akshay0603@ARM631:~$ sudo nano test.yml
akshay0603@ARM631:~$ cd /etc/ansible
akshay0603@ARM631:/etc/ansible$ ansible all -m ping -u admin5 --ask-pass
SSH password:
10.7.3.193 | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "changed": false,
  "ping": "pong"
}
akshay0603@ARM631:/etc/ansible$ ansible-playbook test.yml -u admin5 --ask-pass --ask-become-pass
ERROR! the playbook: test.yml could not be found
akshay0603@ARM631:/etc/ansible$ cd
akshay0603@ARM631:~$ ansible-playbook test.yml -u admin5 --ask-pass --ask-become-pass
SSH password:
BECOME password[defaults to SSH password]:

PLAY [Install MySQL] *****
TASK [Gathering Facts] *****
ok: [10.7.3.193]

TASK [install mysql] *****
changed: [10.7.3.193]

PLAY RECAP *****
10.7.3.193 : ok=2 changed=1 unreachable=0 failed=0 skipped=0 rescued=0 ignored=0

akshay0603@ARM631:~$
```

Tested whether the MySQL server installed on node:

```
Activities Terminal Mar 29 15:03
admin5@admin5-OptiPlex-9010: ~

## db01.intranet.mydomain.net
## db02.intranet.mydomain.net
## 10.25.1.56
## 10.25.1.57

# Here's another example of host ranges, this time there are no
# leading 0s:
## db-[99:101]-node.example.com
[Dbbservers]
db1 ansible_ssh_user=admin7 ansible_ssh_host=10.7.3.173

admin5@admin5-OptiPlex-9010:/etc/ansible$ cd
admin5@admin5-OptiPlex-9010:~$ lsw
Command 'lsw' not found, but can be installed with:
sudo apt install suckless-tools

admin5@admin5-OptiPlex-9010:~$ lst -a
Command 'lst' not found, but there are 20 similar ones.

admin5@admin5-OptiPlex-9010:~$ ls -a
. .bashrc Downloads Music .ssh
.. .cache .gnupg Pictures .sudo_as_admin_successful
.anstble .config .local .profile Templates
.bash_history Desktop medium-ansible Public .thunderbird
.bash_logout Documents .mozilla snap Videos
admin5@admin5-OptiPlex-9010:~$ ls -a
. .bashrc Downloads Music .ssh
.. .cache .gnupg Pictures .sudo_as_admin_successful
.anstble .config .local .profile Templates
.bash_history Desktop medium-ansible Public .thunderbird
.bash_logout Documents .mozilla snap Videos
admin5@admin5-OptiPlex-9010:~$ mysql --version
mysql Ver 8.0.28-0ubuntu0.20.04.3 for Linux on x86_64 ((Ubuntu))
admin5@admin5-OptiPlex-9010:~$
```

Q 6. Perform below operations on your machine to check **working of Chef**

- a. Install Chef
- b. Create a recipe and place it in a cookbook to install MySQL db on one node.
- c. Execute a recipe using knife command.