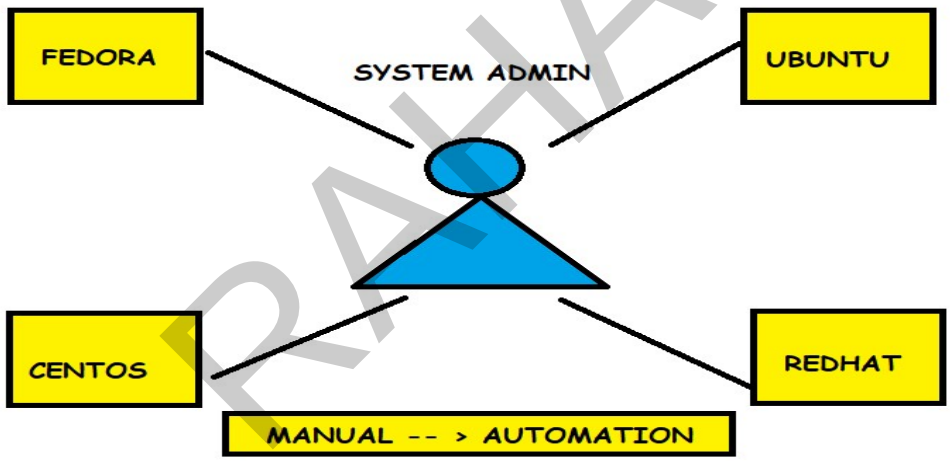
ANSIBLE

- It is a Configuration Management Tool.
- Configuration: Ram, Storage, OS, Software and IP address of device.
- Management: Update, Delete, Add.
- Ansible is simple open-source IT engine which automates application deployment.
- Orchestration, Security and compliance.
- Uses YAML Scripting language which works on KEY-PAIR
- Ansible GUI is called as Ansible Tower. It was just Drag and Drop.
- Used PYTHON for Back end.

HISTORY

- Michael Dehhan developed Ansible and the Ansible project began in Feb 2012.
- Ansible was taken over by Red-hat.
- Ansible is Available for RHEL, Debian, CentOS, Oracle Linux.
- Can use this tool whether your servers are in On-prem or in the Cloud.
- It turns your code into Infrastructure i.e. Your computing environment has some of the same attributes as your application.



If system admin has to install those Linux flavors across all the systems on his company, then he has to do it manually. In manual work there might be some errors so we use here automated tools like Ansible, Chef, Puppet etc.

ANSIBLE : PUSH CHEF : PULL

PUSH: if we have many servers then it will push the notification for updates in all devices.

PULL: It will go to client server and ask for the notifications for update.

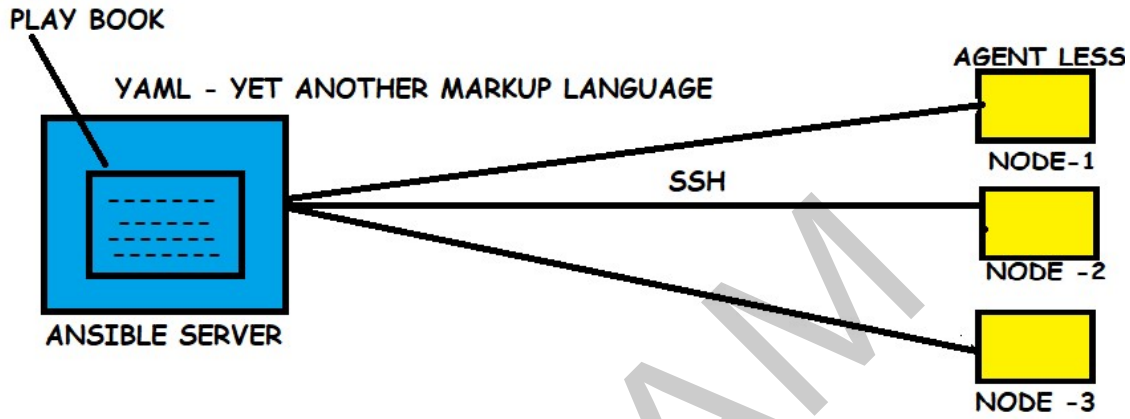
ADVANTAGES

- Very consistent and light weight and no constraints regarding the OS or underlying H.W.
- Secure less due to Agent less Capability and Open SSH Security features.
- Doesn't require any special system admin skills to install and use it (YAML).
- Push mechanism.

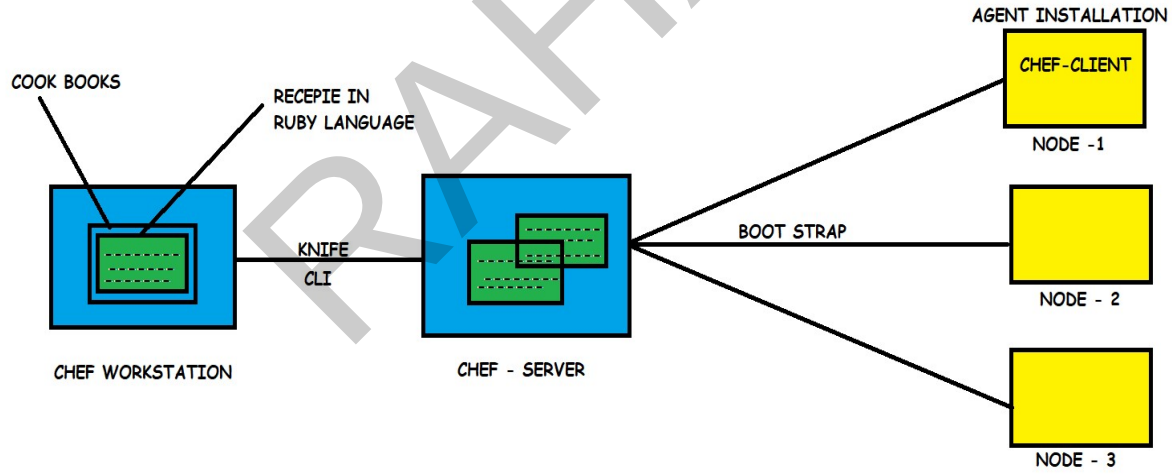
DIS ADVANTAGES

- Ansible does not have any notion of state like other automation tools such as Puppet
- Ansible does not track dependencies and simply executes sequential tasks and stops when tasks finish, fail, or any error comes.
- Ansible has external dependencies to Python modules
- Windows interaction requires some scheming

ANSIBLE WORKLOW



CHEF WORKFLOW



ANSIBLE SERVER: The machine where ansible is installed& from which all task and playbooks will run
MODULE: A command or set of similar Commands meant to be executed on Client side.
TASK: A section that consists of a single Procedure to be completed.
ROLE: A way of organizing the Tasks and Related files to be later called in playbook.
FACT: Info fetched from the client system from the Global variables with the Gather-facts operation.
INVENTORY: File containing Data about the Ansible client servers.
PLAY: Execution of Playbook.
HANDLER: Task which is called only if a notifier is present.
NOTIFIER: Section attributed to a task which calls a handler if the Output is changed.
PLAYBOOKS: It consist code in YAML format, which describes task to be Executed.
HOST: Host or Nodes, which are Automated by Ansible.

ANSIBLE INVENTORY HOST PATTREN

- Create 3 EC2 instances in same Availability Zone & Connect through Putty and give sudo su.
- yum update -y
- sudo amazon-linux-extras install ansible2 -y
- yum install git python python-level python-pip openssl -y & check versions.
- vi /etc/ansible/hosts file in Ansible server and [remo] & paste private IP of node-1 & node-2.
- # Vi etc/ansible/ansible.cfg
- Uncommented -- > inventory: /etc/ansible/hosts & Sudo-user: root. Save and quit.
- Create user called ansible and set password and add ansible user to sudo file.
- Now do this process on both other nodes too.
- Go to ansible server and install httpd package as ansible user and exit to root.
- Open vi /etc/ssh/sshd_config in **root** in all three servers.
- service sshd restart and login as ansible in all 3 servers .
- Su – ansible & ssh IP of any node it will ask password and enter it then you will be on node-1.
- Create some files on ansible server and it will replicate in node-1

Now again if you want to login in node-1 you need to give password to get rid of that we need to do

- Go to ansible server -- > ssh-keygen -- > ls -al -- > cd .ssh -- > ls -- > id_ras_pub
- Now we need to copy public key in both the nodes
- ssh-copy-id ansible@private-ipv4 of node-1 and it will ask password enter it.
- Ssh-copy-id ansible@private-ipv4 of node-2 and it will ask password enter it.
- Now go to ansible and ssh ipv4 node-1 it will not ask password now and exit
- ssh ipv4 of node-2 it will also not ask password now.

HOST PATTRENS

- **'all'** patterns refer to all the machines in an inventory.

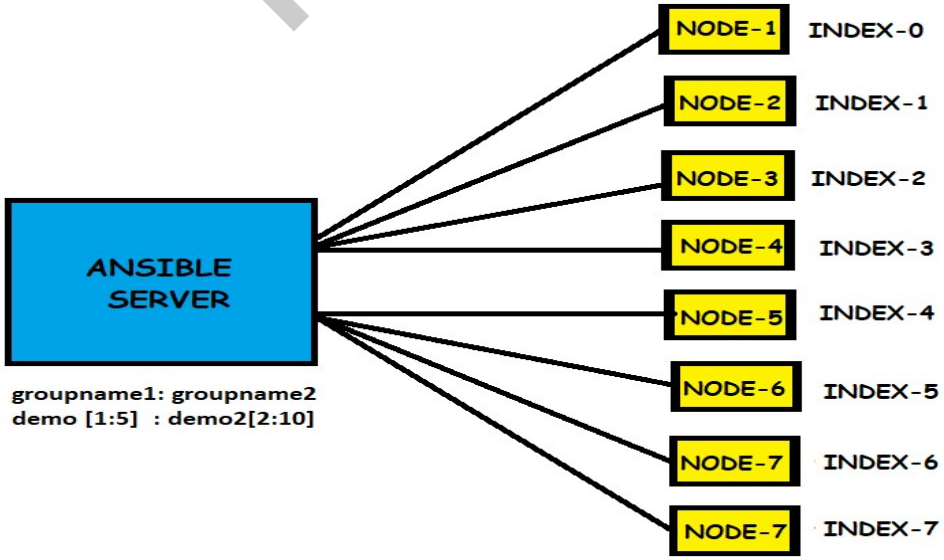
ansible all–list-hosts ansible <groupname[remo]> --list-hosts

ansible <groupname> [remo][0] --list-hosts

groupname [0] – picks first machine of group groupname [1] – picks second machine of group

groupname [-1] – picks last machine of group groupname [1:4] – picks 2,3,4,5 machines in group

groupname [2:5] – picks 3,4,5,6 machines in the group



If we want to push the code from Ansible server to nodes it can be done in 3 ways.

1. Ad-hoc Commands (Simple Linux) Ad-hoc means temporary & it will over-ride commands.
2. Modules – A Single Command.
3. Playbooks – More than one module is called Playbook.
   Both module and Playbook is in YAML.

Ad-Hoc Commands

- These commands can be run individually to perform Quick functions.
- Not used for configuration management and deployment, bcz the cmds are one time usage.
- The ansible ad-hoc cmds uses /usr/bin/ansible/ command line tool to automate single task.

Go to ansible server and switch to ansible server
ansible remo -a "ls" [remo: Group name, -a: argument, ls: command]
ansible remo [0] -a "touch file1"
ansible all -a "touch file2"
ansible remo -a "sudo yum install httpd -y"
ansible remo -ba "yum install httpd -y" (b: become you will become sudo user)
ansible remo -ba "yum remove httpd -y"

ANSIBLE MODULES

- Ansible ships with number of modules (called library modules) that can be executed directly to remote hosts or playbooks.
- Your library of modules can reside on any machine, and there are no servers, daemons or database required.
- The default location for the inventory file is /etc/ansible/hosts

Go to ansible server and switch to ansible server
ansible remo -b -m yum -a "pkg=httpd state=present" (install: present)
ansible remo -b -m yum -a "pkg=httpd state=latest" (update: latest)
ansible remo -b -m yum -a "pkg=httpd state=absent" (uninstall: absent)
ansible remo -b -m service -a "name=httpd state=started" (started: start)
ansible remo -b -m user -a "name=raj" (to check go to that servers and sudo cat /etc/passwd).
ansible remo -b -m copy -a "src=filename dest=/tmp" (to check go to that server and give ls /tmp).
ansible remo -m setup
ansible remo -m setup -a "filter=*ipv4*"

PLAYBOOKS

- Playbooks in ansible are written in YAML language.
- It is human readable & serialization language commonly used for configuration files.
- You can write codes consists of vars, tasks, handlers, files, templates and roles.
- Each playbook is composed of one or more modules in a list.
- Module is a collection of configuration files.
- Playbooks are mainly divided into sections like

TARGET SECTION: Defines host against which playbooks task has to be executed.
VARIABLE SECTION: Defines variables.
TASK SECTION: List of all modules that we need to run in an order.

YAML

For ansible, nearly every YAML file starts with a list

- Each item in the list is a list ok key-value pairs commonly called Dictionary.
- All YAML files have to begin with "---" and end with "…"
- All members of the list line must begin with same indentation level starting with " --- "

For example:

```
--- # A list of fruits
    Fruits:
    -mango
    -apple
    -papaya
    -guava
…
```

- A dictionary is required in a simple key: value form (note: space before value is must)

For example:

```
--- # Customer details
Customer:
   Name: Raham
   Age   : 22 y
   Salary: 30,000
   Exp   : 1 year
```

- Extension for playbook file is **.yml**

Go to ansible server and login as ansible and create one playbook

- Vi target.yml

---# Target Playbook

- hosts: remo -- > remo: Groupname
  user: ansible -- > ansible: You are ansible user now
  become: yes -- > become: become sudo user -- > yes
  connection: ssh
  gather_facts: yes -- > Gives private IP of the nodes -- > yes

now save that file and execute the playbook by giving the command: ansible-playbook target.yml

Now create one more playbook in ansible server with cmd Vi task.yml

```
--- #TASK
- hosts: remo
  user: ansible
  become: yes
  connection: ssh
  task:
                - name: install  httpd on linux
                  action: yum name=httpd state=installed
```

Now execute the file by command **ansible-playbook task.yml**

VARIABLES

- Ansible uses variables which are defined previously to enable more flexibility in playbooks and roles they can used loop through a set of given values, access various information like the host name of a system and replace certain strings in templates with specific values.
- Write Variable section above tasks so that we define in first and use it later.

Now go to ansible server and create one playbook

```
--- # MY VARIABLE FILE
- hosts: remo
  user: ansible
  become: yes
  connection: ssh
  vars:
          pkgname: httpd
  task:
                  - name: install  httpd
                    action: yum name='{{pkgname}}' state=installed
```

Now save and execute the playbook

HANDLERS

- Handler is same as task but it will run when called by another task. (OR)
- It will run if the task contains a notify directive and also indicates that it changed something.

DRY RUN: Check whether the playbook is formatted correctly or not.

Ansible-playbook handler.yml --check

```
--- # HANDLER
- hosts: remo
  user: ansible
  become: yes
  connection: ssh
  tasks:
        - name: install httpd server on centos
          action: yum name=httpd state=installed
          notify: restart httpd
  handlers:
          - name: restart httpd
            action: service name=httpd state=restarted
~
```

LOOPS

- Ansible loop includes changing ownership on several files & directories with file module, creating multiple users with user modules and repeating a polling step until result reached.

```
--- # LOOPS
- hosts: remo
  user: ansible
  become: yes
  connection: ssh
  tasks:
          - name: add list of users in my nodes
            user: name='{{item}}' state=present
            with_items:
                    - raham
                    - mustafa
                    - shafi
                    - nazeer
```

Now save and execute the file and go to the nodes and check with cat /etc/passwd.

Follow correct Indentation as previous yml files. **Replace (= with -)** in above file.

CONDITIONS

- If we have different scenarios, then we apply conditions according to the scenarios.

WHEN STATEMENT

- Sometimes we want to skip a particular command on a particular node.

```
--- # CONDITIONS
- hosts: remo
  user: ansible
  become: yes
  connection: ssh
  tasks:
          - name: Install apache server for debian family
            command: apt-get-y install apache2
            when: ansible_os_family== "Debian"
          - name: install apache server for redhat family
            command: yum install httpd -y
            when: ansible_os_family== "RedHat"
```

VAULT

- In ansible we can keep sensitive data like our passwords and keys in encrypted format.
- **ENCRYPTION TECHNIQUE: AES256** Used by Facebook.

ansible-vault create vault.yml	:	creating a new encrypted playbook.
ansible-vault edit vault.yml	:	Edit the encrypted playbook.
ansible-vault rekey vault.yml	:	To edit the password.
ansible-vault encrypt vault.yml	:	To encrypt the existing playbook.
ansible-vault decrypt vault.yml	:	To decrypt the encrypted playbook.

ROLES

- We can use two techniques for resulting a set of tasks they are Includes and Roles.
- Roles are good for organizing tasks & encapsulating data needed to accomplish the task.
- ANSIBLE ROLES: Default, Files, Handlers, Meta, Templates, Tasks, Vars.
- We can organize playbooks into directory structure called Roles.
- Adding more functionality to the playbooks will make it difficult to maintain in a single file.

DEFAULT: It stores the data about role/Application default variables

Ex: if you want to run to port 80 or 8080 then variables need to define in this path.

FILES: It contains files need to be transferred to remote VM (static files).

HANDLERS: Triggers or tasks. We can segregate all the handlers required in one Playbook.

META: Contains files that establish role dependencies. EX: Author name, platform, dependencies.

TASKS: Contains all the tasks that is normally in playbook. EX: Installing packages and copying files.

VARS: Variables for roles is specified in this Directory & used in Configuration files both variables and default stores variables.

- mkdir -p playbook/roles/webserver/tasks --- > To see o/p use tree command.
- Cd playbook & touch master.yml & touch roles/webserver/tasks/main.yml
- vi roles/webserver/tasks/main.yml

```
- name: install apache on redhat
  yum: pkg=httpd state=latest
```

```
--- #MASTER  PLAYBOOK
- hosts: remo
  user: ansible
  become: yes
  connection: ssh
  roles:
          - webserver
```

ansible-playbook master.yml