Automation Factory

Using Ansible

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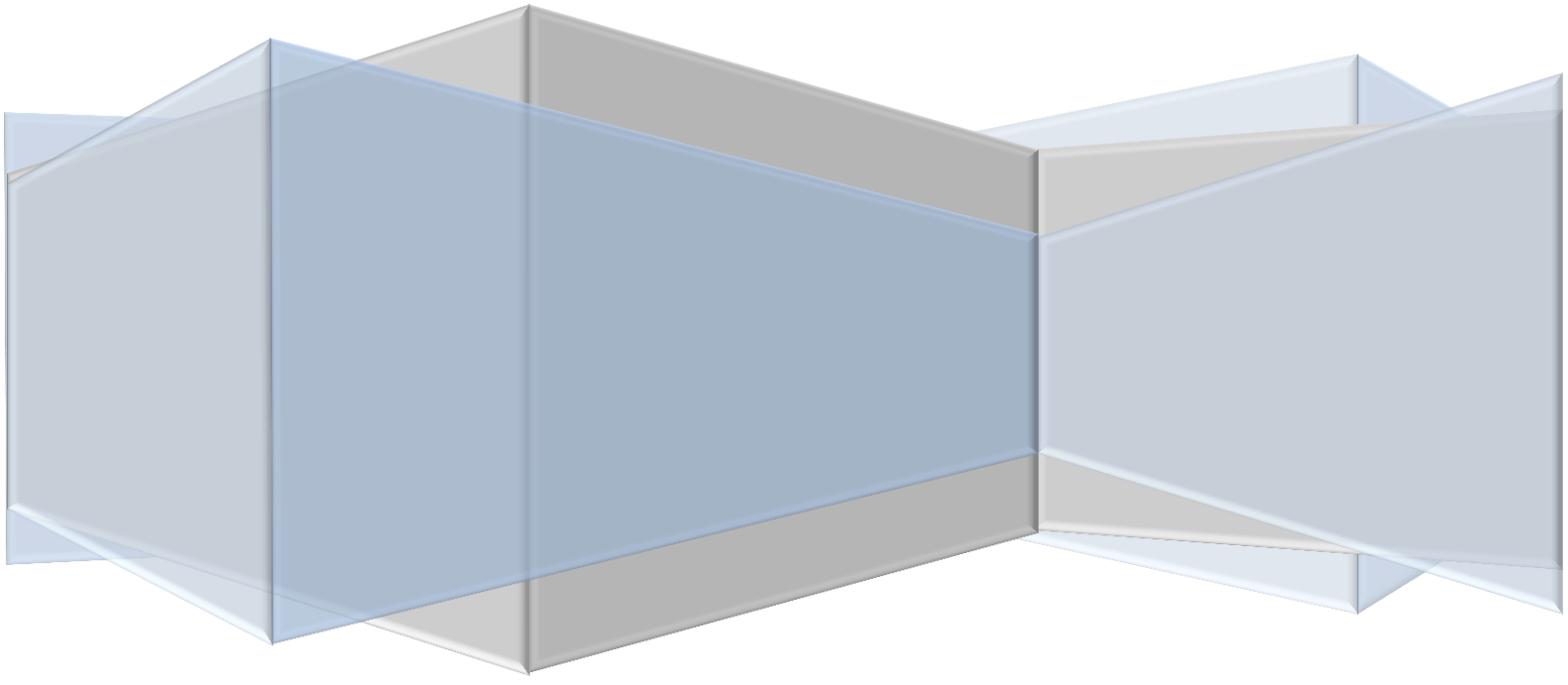


To start working with Ansible server and nodes, we have to make sure to comply pre-requisites, like establish ssh key sharing from Ansible server to nodes. To have Python running on the nodes.

vagrant@ansibleserver:~/project$ ssh-keygen

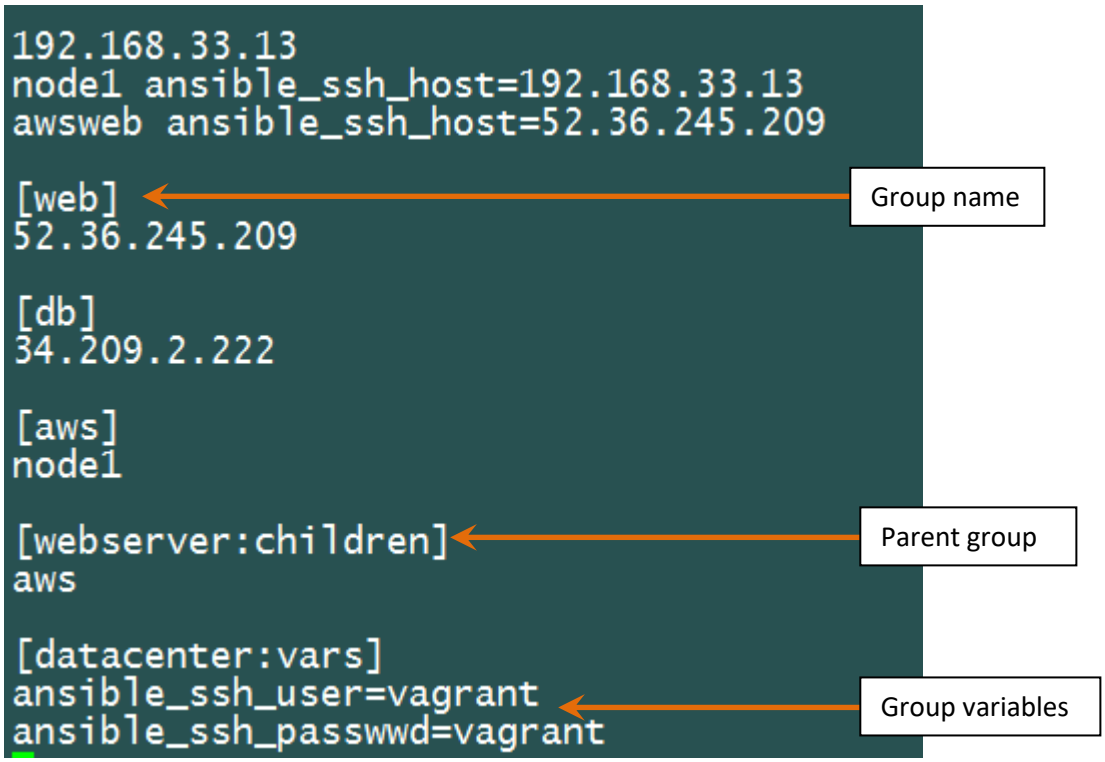
vagrant@ansibleserver:~/project$ ssh-copy-id –i ~/.ssh/id_rsa.pub vagrant@192.16.33.11

{ source of ssh key} **{Location of ssh key}** **{target user on remote node to copy public key**

Ansible Components:

Inventory file is the one in which we write all target (remote) servers that we want to manage using Ansible. This file can be updated manually or using a plugin, can be updated dynamically.

A sample inventory file looks like the one shown below.

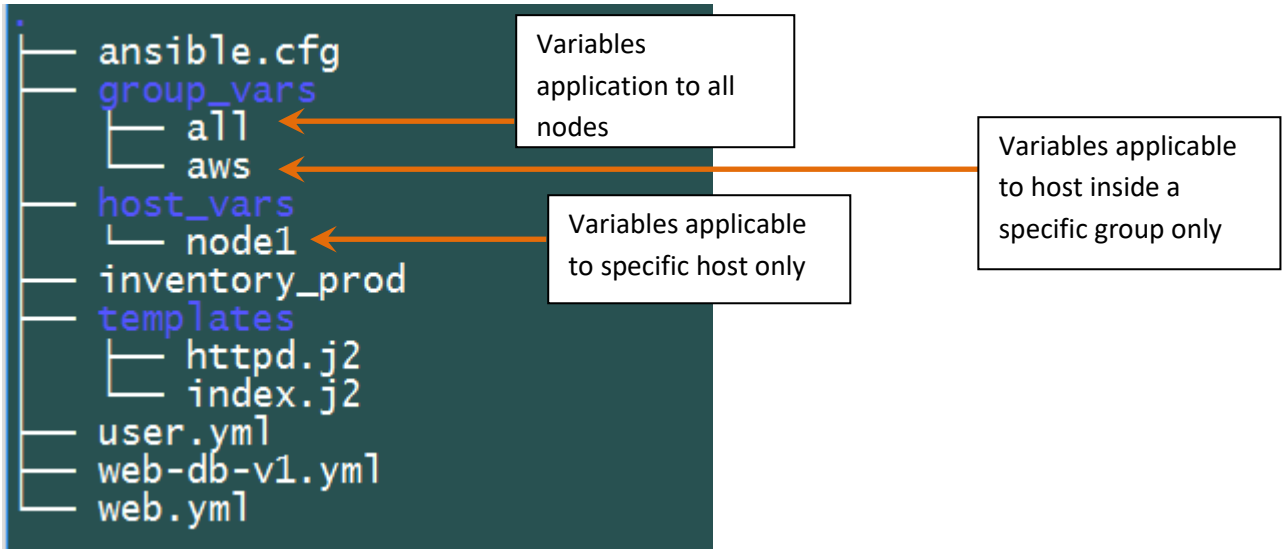


Inventory Management is important for effective and efficient use of Ansible to control your entire environment.

We can break it up in to the environments, like production and test etc. Thus, maintaining separate inventory files for specific environments.

Using **Variables** in **Ansible** inventory management will help in managing the inventory effectively.

This can be done by creating a folder structure as mentioned below.



Here variables mentioned in the 'all' file has the least precedence. Vars mentioned in the 'db' file which is the group_var directory, has the 2nd highest precedence and the variables mentioned in the web1 file inside the host_vars directory has the highest precedence.

Let's test this by using the user module to create a user using the 'username' variable mentioned inside these files.

Using user module to create user on remote node.

```
$ ansible webserver –i inventory_prod –m user –a "name={{username}} password=12345" – sudo
```

In the 'all' var file update the below lines. Once updated run the user create module using command mentioned above.

```
- - -
# comment
username: ganesh
```

Update the 'aws' file with below lines. Once updated run the user create module using command mentioned above. Here name of the file must match with name of the group mentioned in the inventory file.

```
- - -
# comment
username: ganesh_aws
```

Update the 'node1' file with below lines. Once updated run the user create module using command mentioned above. Here the file name must match with the hostname for which we want to apply the variables.

```
- - -
# comment
username: ganesh_node1
```

Understanding the Ansible defaults:

To know about what all options can be set in the ansible configuration file, visit, www.docs.ansible.com and in 'getting started' look for configuration file details. Here we can see all options that can be set in the configuration file as defaults.

The options set in the ansible.cgf in the current directory have the least precedence. The option set in the environment variable has the highest precedence.

To test this, we can set the default key value, 'host_key_checking = False' in the ansible.cfg file, and then try running the ping module on a target remote server. With this default key-value setting, we can override the requirement to check the host_key.

Few more default settings that we can modify and test are,

If we have python 3 installed on a specific remote server, we can update the inventory file and provide a behavioural pattern to be followed for that remote server. This patter is as mentioned below.

192.168.33.12 ansible_python_interpreter=usr/bin/python2.7 … in this case the python 2.7 is installed in the 'usr/bin' directory. This can be set as per the specific system settings.

```
[defaults]

# some basic default values...

hostfile       = /etc/ansible/production/inventory_prod
library        = /usr/share/ansible
remote_tmp     = $HOME/.ansible/tmp
pattern        = *
forks          = 5
poll_interval  = 15
sudo_user      = root
#ask_sudo_pass = True
#ask_pass      = True
transport      = smart
remote_port    = 22
```

The 'ansible.cgf' file has ansible setting that one can modify to suit the environment.

This config file 'ansible.cgf' can be copied into the production folder and changes made in the file are then applied only for the playbooks located inside the folder.

Ansible Modules

- Core modules … modules supported by Ansible
- Extras … module updated created by community members and not supported by Ansible
- Deprecated … module that will be removed soon.

$ ansible-doc –l … to display all available core modules on ansible repo.
$ ansible-doc <module name> … man page for a module
$ ansible-doc –s <name> … help with some snippets on who to use a module inside a play book.
Core modules are categorized into multiple groups, like package deployment, network config, virtual machine, etc.
Common module that we can discuss are, 'copy' module, 'fetch', 'apt', 'yum', 'service' module etc.
Let's use the module to install webserver on a centos machine.
We will use the yum module and provide input parameters for the module to work.
Using below command over command line,

```
$ ansible <hostname> –i hosts –m yum –a "name=httpd state=present" --become
```

```
$ ansible <hostname> -i hosts –m service –a "name=httpd enabled=yes state=started" --become
```

On the AWS DB node try running the yum module for package installation.

```
$ ansible <hostname> -i hosts –m apt –a "name=mariadb-server state=latest" --become
```

```
$ ansible <hostname> -i hosts –m service –a "name=mariadb state=started" --become
```

Understanding the setup module

'Setup' module is a module to gather facts from a system.

```
$ ansible web –i hosts –m setup –a "filter=ansible_os_family"
```

Module usage with example:

File Module:

```
$ ansible web –i inventory –m file –a "name=<path/filename> state touch"
```

```
$ ansible web –i inventory –m file –a "path=<path/filename> state touch"
```

Copy Module:

```
$ ansible web –i inventory –m copy –a "content<html><h1>Hello world</h1></html> dest=/var/www/html/index.html"
```

Template Module

```
$ ansible web –i inventory –m template –a "src=<path/file.j2> dest=<filepath>"
```

User module

```
$ ansible web - i inventory –m user –a "name=ganeshhp comment=Ganesh Palnitkar gid=4234 uid=4010"
```

Package Modules

```
$ ansible web – i inventory –m yum –a "name=ntp state=latest"

$ ansible web – i inventory –m apt –a "name=apache2 state=latest"
```

Service module

```
$ ansible web –I inventory –m service –a "name=apache2 state=started enabled=yes"
```

Host /group Target pattern

group1:group2 … grp1 OR grp2

!group1 …. Not grp1

web*.autofact.com ….. wildcard

group1:&group2 … host machines that are only common with both groups only be applied with the change.

Collecting Facts on remote system

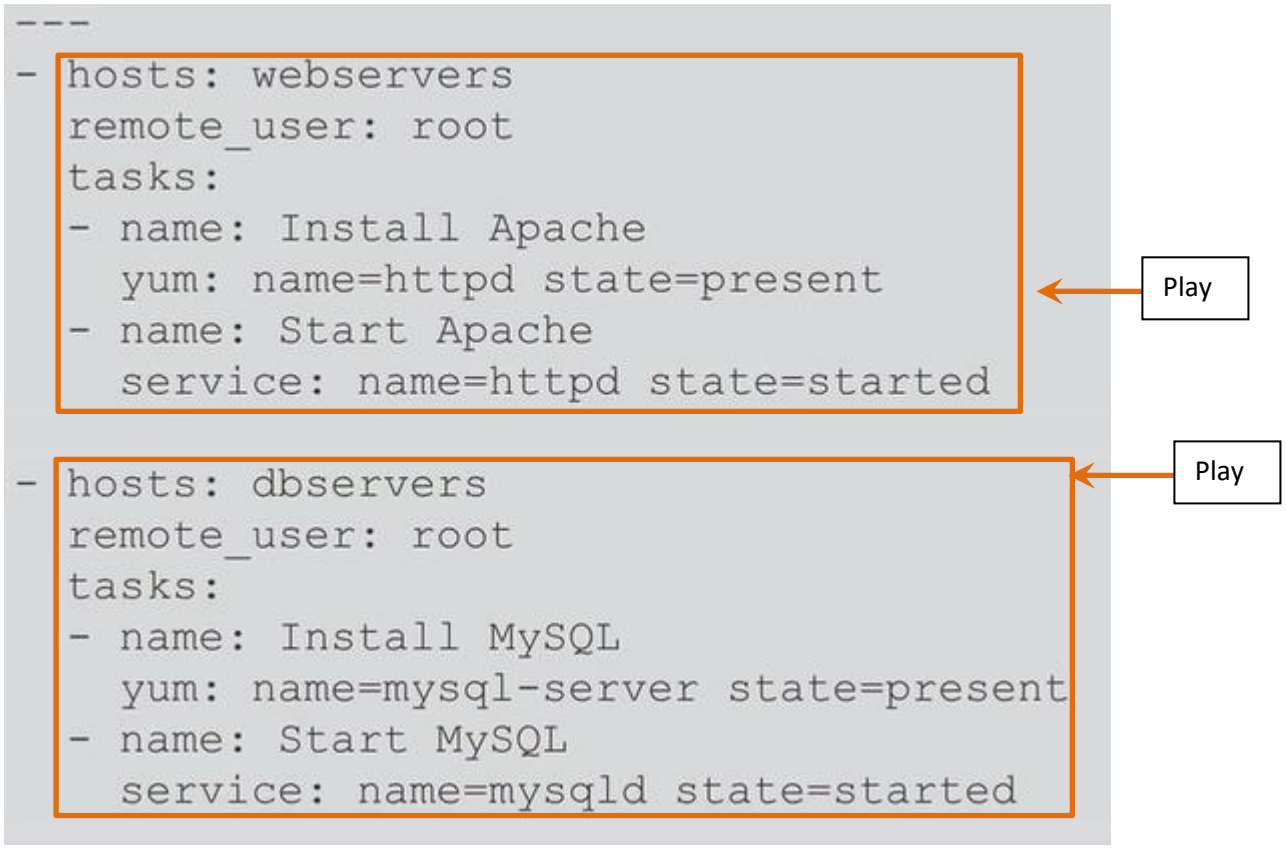
`$ ansible <hostname> -i inventory –m setup –a "filter=ansible_eth*"` ….

This will run the ohai profiler on the remote server and gather facts and return those to the ansible server.

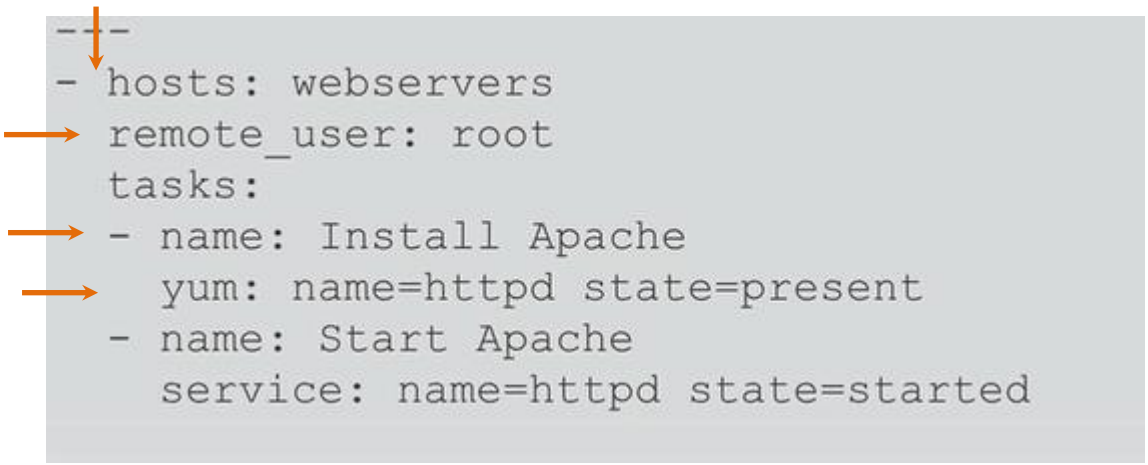
Play and Playbooks

- Plays help to map the hosts to tasks.
- A play can have multiple tasks
- A playbook can have multiple plays.

A sample playbook, each coloured rectangle represents a play. Each play is mapped to the host or a group, parent group etc.



Using white space / indentation is very specific and has to be followed while writing the play / playbook.



- Tasks are executed in the order – top down. Thus we have to be careful while specifying the tasks in the play.
- Tasks use modules

To execute a playbook use the command,

```
$ ansible-playbook <playbook.yml>
```

Optional parameters to pass while executing playbook,

```
$ ansible-playbook playbook.yml --step

$ ansible-playbook playbook.yml --limit playbook.retry
```

A sample playbook, note the indentation and syntax used for writing tasks and modules.

```
- hosts: webserver
  remote_user: root
  sudo: yes

  tasks:
  - name: ensure apache is at the latest version
    yum: name=httpd state=present

  - name: start the apache service
    service: name=httpd state=started enabled=yes

- hosts: dbserver
  remote_user: root
  sudo: yes

  tasks:
  - name: ensure MySQL is installed
    apt: name=mariadb-server state=present

  - name: ensure that MySQL service is started
    service: name=mariadb state=started
```

One can also call a playbook inside a play., like shown below.,

```
---
- hosts: webserver
  tasks:
  - include: common.yml
  - include: web.yml
```

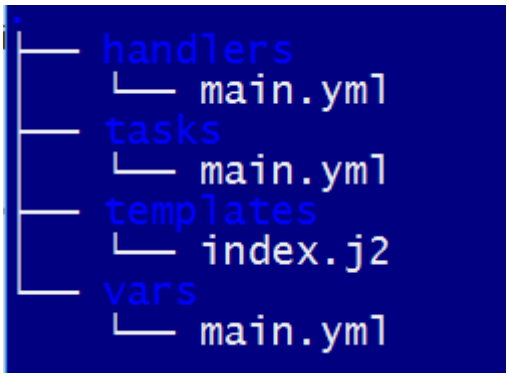
For failed task in the playbook execution one can use below command so as Ansible will confirm on running a particular task before executing it.

$ ansible-playbook playbook.yml --step. The step asks you on before executing each task and you could choose (N)o/(y)es/(c)ontinue.

Roles:

In order to create roles, create a Directory named as Role inside the Ansible directory.

As shown below create directories and files inside the roles directory. Here 'webserver' is the role.



The tasks will be located in the tasks directory and written in main.yml file.

Roles hold the tasks inside the tasks folder in the main.yml file. So the main.yml file inside the tasks folder would appear as shown below.,

```
---
- name: ensure Apache is installed
  apt: name=apache2 state=present

- name: starte the apache service
  service: name=apache2 state=started

- name: Copy site file
  template: src=index.j2 dest={{ doc_root }}/index.html
  notify:
  - Restart Apache
```

The file will only contain tasks and no hosts statement or vars definitions, etc.

The 'vars' folder thus has the main.yml file to store all variables for the role.

```
http_port: 80
doc_dir: /var/www/html/ansible/
doc_root: /var/www/html/
username: ganeshhp
```

Similar to this the template folder would contain the template file, like index.j2, etc. and main.yml file inside ‘handler’ folder will have action statement as notified in ‘notify’ command.

In order to call the role inside a playbook we can use below syntax. The playbook in such case will be located outside the ‘roles’ folder. And will typically have syntax similar to one mentioned below.

```
- hosts: web
  sudo: yes
  roles:
  - webserver
```

Here in this file we are calling the role with the ‘roles’ statement and then mentioned the role name.

Ansible Galaxy for preconfigured roles.

https://galaxy.ansible.com

Ansible provides a repository of ready-to-use roles for almost all requirements that you can think of.

Just pull the role to your Ansible controller and start using.

On the Galaxy web link we can explore all different roles categorized as, ‘Most starred’, ‘Most watched’, ‘Most Downloaded’, etc.

To install a particular role on to the Ansible control server, we can use the command,

$ ansible-galaxy install <role name>

Playbook- defining hosts and parameters

- hosts: servers
user: root
serial: 1 ….. *how many remote servers can be targeted at a time. If there are hundreds of servers, we can set this number to 5 or 10.*

Some ansible ad-hoc commands:

$ ansible <hostname> -m shell –a <shell command> --sudo ….. Here we can pass a shell command to be executed on a remote machine.

How to secure file or a string.

Ansible Vault

```
$ ansible-vault [create|decrypt|edit|encrypt|encrypt_string|rekey|view]
[options] [vaultfile.yml]
```

Common Options

`--ask-vault-pass`

ask for vault password

`--new-vault-id <NEW_VAULT_ID>`

the new vault identity to use for rekey

`--new-vault-password-file`

new vault password file for rekey

`--vault-id`

the vault identity to use

`--vault-password-file`

vault password file

`--version`

show program's version number and exit

`-h, --help`

show this help message and exit

`-v, --verbose`

verbose mode (-vvv for more, -vvvv to enable connection debugging)

To create a new encrypted key file

`$ ansible-vault create abc.yml` (a file abc.yml is create which will have encrypted contents stored)

To encrypt existing file

```
$ ansible-vault encrypt existing.yml
```

To update or rekey files

```
$ ansible-vault rekey abc.yml
```

Editing an encrypted file

```
$ ansible-vault edit abc.yml
```

Viewing an encrypted file

```
$ ansible-vault view abc.yml
```

Decrypting files

```
$ ansible-vault decrypt abc.yml
```

To use an encrypted file while executing a playbook.

```
$ ansible-playbook –i hosts abc.yml --ask-vault-pass
```

This will prompt the user for supplying vault password.

Using Ansible for Windows management.

We can configure Windows packages via Ansible by using Powershell module. to do that we need to install python WINRM module.

To start with make sure you have python install, i.e. ‘pip’ installed.

```
$ yum install python-setuptools
$ easy_install pip
$ pip install “pywinrm>=0.3.0”
```