**Ansible**

Ansible is simple open source IT engine which automates application deployment, intra service orchestration, cloud provisioning and many other IT tools.

Ansible is easy to deploy because it does not use any agents or custom security infrastructure.

Ansible uses playbook to describe automation jobs, and playbook uses very simple language i.e. **YAML** (It’s a human-readable data serialization language & is commonly used for configuration files, but could be used in many applications where data is being stored)which is very easy for humans to understand, read and write. Hence the advantage is that even the IT infrastructure support guys can read and understand the playbook and debug if needed (YAML – It is in human readable form).

Ansible is designed for multi-tier deployment. Ansible does not manage one system at time, it models IT infrastructure by describing all of your systems are interrelated. Ansible is completely agentless which means Ansible works by connecting your nodes through ssh(by default). But if you want other method for connection like Kerberos, Ansible gives that option to you.

After connecting to your nodes, Ansible pushes small programs called as “Ansible Modules”. Ansible runs that modules on your nodes and removes them when finished. Ansible manages your inventory in simple text files (These are the hosts file). Ansible uses the hosts file where one can group the hosts and can control the actions on a specific group in the playbooks.

Sample Hosts File

This is the content of hosts file −

#File name: hosts

#Description: Inventory file for your application. Defines machine type abc

node to deploy specific artifacts

# Defines machine type def node to upload

metadata.

[abc-node]

#server1 ansible\_host = <target machine for DU deployment> ansible\_user = <Ansible

user> ansible\_connection = ssh

server1 ansible\_host = <your host name> ansible\_user = <your unix user>

ansible\_connection = ssh

[def-node]

#server2 ansible\_host = <target machine for artifact upload>

ansible\_user = <Ansible user> ansible\_connection = ssh

server2 ansible\_host = <host> ansible\_user = <user> ansible\_connection = ssh

What is Configuration Management

Configuration management in terms of Ansible means that it maintains configuration of the product performance by keeping a record and updating detailed information which describes an enterprise’s hardware and software.

Such information typically includes the exact versions and updates that have been applied to installed software packages and the locations and network addresses of hardware devices. For e.g. If you want to install the new version of **WebLogic/WebSphere** server on all of the machines present in your enterprise, it is not feasible for you to manually go and update each and every machine.

You can install WebLogic/WebSphere in one go on all of your machines with Ansible playbooks and inventory written in the most simple way. All you have to do is list out the IP addresses of your nodes in the inventory and write a playbook to install WebLogic/WebSphere. Run the playbook from your control machine & it will be installed on all your nodes.

How Ansible Works?

The picture given below shows the working of Ansible.

**Ansible works** by connecting to your nodes and pushing out small programs, called "**Ansible** modules" to them. **Ansible** then executes these modules (over SSH by default), and removes them when finished. Your library of modules can reside on any machine, and there are no servers, daemons, or databases required.

The management node in the above picture is the controlling node (managing node) which controls the entire execution of the playbook. It’s the node from which you are running the installation. The inventory file provides the list of hosts where the Ansible modules needs to be run and the management node does a SSH connection and executes the small modules on the hosts machine and installs the product/software.

**Beauty** of Ansible is that it removes the modules once those are installed so effectively it connects to host machine , executes the instructions and if it’s successfully installed removes the code which was copied on the host machine which was executed.

Ansible uses YAML syntax for expressing Ansible playbooks. This chapter provides an overview of YAML. Ansible uses YAML because it is very easy for humans to understand, read and write when compared to other data formats like XML and JSON.

Every **YAML** file optionally starts with “---” and ends with “...”.

## Understanding YAML

In this section, we will learn the different ways in which the YAML data is represented.

### key-value pair

YAML uses simple key-value pair to represent the data. The dictionary is represented in key: value pair.

**Note** − There should be space between : and value.

### Example: A student record

--- #Optional YAML start syntax

james:

name: james john

rollNo: 34

div: B

sex: male

… #Optional YAML end syntax

### Abbreviation

You can also use abbreviation to represent dictionaries.

### Example

James: {name: james john, rollNo: 34, div: B, sex: male}

## Representing List

We can also represent List in YAML. Every element(member) of list should be written in a new line with same indentation starting with “- “ (- and space).

### Example

---

countries:

- America

- China

- Canada

- Iceland

…

### Abbreviation

You can also use abbreviation to represent lists.

### Example

Countries: [‘America’, ‘China’, ‘Canada’, ‘Iceland’]

### List inside Dictionaries

We can use list inside dictionaries, i.e., value of key is list.

### Example

---

james:

name: james john

rollNo: 34

div: B

sex: male

likes:

- maths

- physics

- english

…

### List of Dictionaries

We can also make list of dictionaries.

### Example

---

- james:

name: james john

rollNo: 34

div: B

sex: male

likes:

- maths

- physics

- english

- robert:

name: robert richardson

rollNo: 53

div: B

sex: male

likes:

- biology

- chemistry

…

YAML uses “|” to include newlines while showing multiple lines and “>” to suppress newlines while showing multiple lines. Due to this we can read and edit large lines. In both the cases intendentation will be ignored.

We can also represent **Boolean** (True/false) values in YAML. where **boolean**values can be case insensitive.

### Example

---

- james:

name: james john

rollNo: 34

div: B

sex: male

likes:

- maths

- physics

- english

result:

maths: 87

chemistry: 45

biology: 56

physics: 70

english: 80

passed: TRUE

messageIncludeNewLines: |

Congratulation!!

You passed with 79%

messageExcludeNewLines: >

Congratulation!!

You passed with 79%

## Some common words related to Ansible.

**Service/Server** − A process on the machine that provides the service.

**Machine** − A physical server, vm(virtual machine) or a container.

**Target machine** − A machine we are about to configure with Ansible.

**Task** − An action(run this, delete that) etc managed by Ansible.

**Playbook** − The yml file where Ansible commands are written and yml is executed on a machine.

AD-HOC Commands

Ad hoc commands are commands which can be run individually to perform quick functions. These commands need not be performed later.

For example, you have to reboot all your company servers. For this, you will run the Adhoc commands from ‘**/usr/bin/ansible**’.

These ad-hoc commands are not used for configuration management and deployment, because these commands are of one time usage.

ansible-playbook is used for configuration management and deployment.

Parallelism and Shell Commands

Reboot your company server in 12 parallel forks at time. For this, we need to set up SSHagent for connection.

$ ssh-agent bash

$ ssh-add ~/.ssh/id\_rsa

To run reboot for all your company servers in a group, 'abc', in 12 parallel forks −

$ Ansible abc -a "/sbin/reboot" -f 12

By default, Ansible will run the above Ad-hoc commands form current user account. If you want to change this behavior, you will have to pass the username in Ad-hoc commands as follows −

$ Ansible abc -a "/sbin/reboot" -f 12 -u username

File Transfer

You can use the Ad-hoc commands for doing **SCP** (Secure Copy Protocol) lots of files in parallel on multiple machines.

Transferring file to many servers/machines

$ Ansible abc -m copy -a "src = /etc/yum.conf dest = /tmp/yum.conf"

Creating new directory

$ Ansible abc -m file -a "dest = /path/user1/new mode = 777 owner = user1 group = user1 state = directory"

Deleting whole directory and files

$ Ansible abc -m file -a "dest = /path/user1/new state = absent"

Managing Packages

The Ad-hoc commands are available for yum and apt. Following are some Ad-hoc commands using yum.

The following command checks if yum package is installed or not, but does not update it.

$ Ansible abc -m yum -a "name = demo-tomcat-1 state = present"

The following command check the package is not installed.

$ Ansible abc -m yum -a "name = demo-tomcat-1 state = absent"

The following command checks the latest version of package is installed.

$ Ansible abc -m yum -a "name = demo-tomcat-1 state = latest"

Gathering Facts

Facts can be used for implementing conditional statements in playbook. You can find adhoc information of all your facts through the following Ad-hoc command −

$ Ansible all -m setup

Ansible-playbooks

Playbooks are the files where Ansible code is written. Playbooks are written in YAML format. YAML stands for Yet Another Markup Language. **Playbooks** are one of the core features of Ansible and tell Ansible what to execute. They are like a to-do list for Ansible that contains a list of tasks.

Playbooks contain the steps which the user wants to execute on a particular machine. Playbooks are run sequentially. Playbooks are the building blocks for all the use cases of Ansible.

## Playbook Structure

Each playbook is an aggregation of one or more plays in it. Playbooks are structured using Plays. There can be more than one play inside a playbook.

The function of a play is to map a set of instructions defined against a particular host.

YAML is a strict typed language; so, extra care needs to be taken while writing the YAML files. There are different YAML editors but we will prefer to use a simple editor like notepad++. Just open notepad++ and copy and paste the below yaml and change the language to YAML (Language → YAML).

A YAML starts with --- (3 hyphens)

## Create a Playbook

Let us start by writing a sample YAML file. We will walk through each section written in a yaml file.

---

name: install and configure DB

hosts: testServer

become: yes

vars:

oracle\_db\_port\_value : 1521

tasks:

-name: Install the Oracle DB

yum: <code to install the DB>

-name: Ensure the installed service is enabled and running

service:

name: <your service name>

The above is a sample Playbook where we are trying to cover the basic syntax of a playbook. Save the above content in a file as **test.yml**. A YAML syntax needs to follow the correct indentation and one needs to be a little careful while writing the syntax.

## The Different YAML Tags

Let us now go through the different YAML tags. The different tags are described below −

### name

This tag specifies the name of the Ansible playbook. As in what this playbook will be doing. Any logical name can be given to the playbook.

### hosts

This tag specifies the lists of hosts or host group against which we want to run the task. The hosts field/tag is mandatory. It tells Ansible on which hosts to run the listed tasks. The tasks can be run on the same machine or on a remote machine. One can run the tasks on multiple machines and hence hosts tag can have a group of hosts’ entry as well.

### vars

Vars tag lets you define the variables which you can use in your playbook. Usage is similar to variables in any programming language.

### tasks

All playbooks should contain tasks or a list of tasks to be executed. Tasks are a list of actions one needs to perform. A tasks field contains the name of the task. This works as the help text for the user. It is not mandatory but proves useful in debugging the playbook. Each task internally links to a piece of code called a module. A module that should be executed, and arguments that are required for the module you want to execute.

Roles

Roles provide a framework for fully independent, or interdependent collections of variables, tasks, files, templates, and modules.

In Ansible, the role is the primary mechanism for breaking a playbook into multiple files. This simplifies writing **complex playbooks**, and it makes them easier to reuse. The breaking of playbook allows you to logically break the playbook into reusable components.

Each role is basically limited to a particular functionality or desired output, with all the necessary steps to provide that result either within that role itself or in other roles listed as dependencies.

Roles are not playbooks. Roles are small functionality which can be independently used but have to be used within playbooks. There is no way to directly execute a role. Roles have no explicit setting for which host the role will apply to.

Top-level playbooks are the bridge holding the hosts from your inventory file to roles that should be applied to those hosts.

Creating a New Role

The directory structure for roles is essential to create a new role.

Role Structure

Roles have a structured layout on the file system. The default structure can be changed but for now let us stick to defaults.

Each role is a directory tree in itself. The role name is the directory name within the /roles directory.

$ ansible-galaxy -h

Usage

ansible-galaxy [delete|import|info|init|install|list|login|remove|search|setup] [--help] [options] ...

Options

* **-h, --help** − Show this help message and exit.
* **-v, --verbose** − Verbose mode (-vvv for more, -vvvv to enable connection debugging)
* **--version** − Show program's version number and exit.

Creating a Role Directory

The above command has created the role directories.

$ ansible-galaxy init vivekrole

ERROR! The API server (https://galaxy.ansible.com/api/) is not responding, please try again later.

$ ansible-galaxy init --force --offline vivekrole

- vivekrole was created successfully

$ tree vivekrole/

vivekrole/

├── defaults

│ └── main.yml

├── files ├── handlers

│ └── main.yml

├── meta

│ └── main.yml

├── README.md ├── tasks

│ └── main.yml

├── templates ├── tests │ ├── inventory

│ └── test.yml

└── vars

└── main.yml

8 directories, 8 files

Not all the directories will be used in the example and we will show the use of some of them in the example.

Utilizing Roles in Playbook

This is the code of the playbook we have written for demo purpose. This code is of the playbook vivek\_orchestrate.yml. We have defined the hosts: **tomcat-node** and called the two roles – **install-tomcat** and **start-tomcat**.

The problem statement is that we have a war which we need to deploy on a machine via Ansible.

---

- hosts: tomcat-node

roles:

- {role: install-tomcat}

- {role: start-tomcat}

Contents of our directory structure from where we are running the playbook.



$ ls

ansible.cfg hosts roles vivek\_orchestrate.retry vivek\_orchestrate.yml



There is a tasks directory under each directory and it contains a main.yml. The main.yml contents of install-tomcat are −

---

#Install vivek artifacts

-

block:

- name: Install Tomcat artifacts

action: >

yum name = "demo-tomcat-1" state = present

register: Output

always:

- debug:

msg:

- "Install Tomcat artifacts task ended with message: {{Output}}"

- "Installed Tomcat artifacts - {{Output.changed}}"

The contents of main.yml of the start tomcat are −

#Start Tomcat

-

block:

- name: Start Tomcat

command: <path of tomcat>/bin/startup.sh"

register: output

become: true

always:

- debug:

msg:

- "Start Tomcat task ended with message: {{output}}"

- "Tomcat started - {{output.changed}}"

The advantage of breaking the playbook into roles is that anyone who wants to use the Install tomcat feature can call the Install Tomcat role.

Breaking a Playbook into a Role

If not for the roles, the content of the main.yml of the respective role can be copied in the playbook **yml** file. But to have modularity, roles were created.

Any logical entity which can be reused as a reusable function, that entity can be moved to role. The example for this is shown above

Ran the command to run the playbook.

-vvv option for verbose output – verbose output

$ cd vivek-playbook/

This is the command to run the playbook

$ sudo ansible-playbook -i hosts vivek\_orchestrate.yml –vvv

-----------------------------------------------------------------

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Output

The generated output is as seen on the screen −

Using **/users/demo/vivek-playbook/ansible.cfg** as config file.

PLAYBOOK: vivek\_orchestrate.yml \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

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1 plays in vivek\_orchestrate.yml

PLAY [tomcat-node] \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

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TASK [Gathering Facts] \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

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Tuesday 21 November 2017 13:02:05 +0530 (0:00:00.056) 0:00:00.056 \*\*\*\*\*\*

Using module file /usr/lib/python2.7/sitepackages/ansible/modules/system/setup.py

<localhost> ESTABLISH LOCAL CONNECTION FOR USER: root

<localhost> EXEC /bin/sh -c 'echo ~ && sleep 0'

<localhost> EXEC /bin/sh -c '( umask 77 && mkdir -p "` echo

/root/.ansible/tmp/ansible-tmp-1511249525.88-259535494116870 `" &&

echo ansible-tmp-1511249525.88-259535494116870="`

echo /root/.ansible/tmp/ansibletmp-1511249525.88-259535494116870 `" ) && sleep 0'

<localhost> PUT /tmp/tmpPEPrkd TO

/root/.ansible/tmp/ansible-tmp-1511249525.88259535494116870/setup.py

<localhost> EXEC /bin/sh -c 'chmod u+x

/root/.ansible/tmp/ansible-tmp1511249525.88-259535494116870/

/root/.ansible/tmp/ansible-tmp-1511249525.88259535494116870/setup.py && sleep 0'

<localhost> EXEC /bin/sh -c '/usr/bin/python

/root/.ansible/tmp/ansible-tmp1511249525.88-259535494116870/setup.py; rm -rf

"/root/.ansible/tmp/ansible-tmp1511249525.88-259535494116870/" > /dev/null 2>&1 && sleep 0'

ok: [server1]

META: ran handlers

TASK [install-tomcat : Install Tomcat artifacts] \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

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task path: /users/demo/vivek-playbook/roles/install-tomcat/tasks/main.yml:5

Tuesday 21 November 2017 13:02:07 +0530 (0:00:01.515) 0:00:01.572 \*\*\*\*\*\*

Using module file /usr/lib/python2.7/sitepackages/ansible/modules/packaging/os/yum.py

<localhost> ESTABLISH LOCAL CONNECTION FOR USER: root

<localhost> EXEC /bin/sh -c 'echo ~ && sleep 0'

<localhost> EXEC /bin/sh -c '( umask 77 && mkdir -p "` echo

/root/.ansible/tmp/ansible-tmp-1511249527.34-40247177825302 `" && echo

ansibletmp-1511249527.34-40247177825302="` echo

/root/.ansible/tmp/ansible-tmp1511249527.34-40247177825302 `" ) && sleep 0'

<localhost> PUT /tmp/tmpu83chg TO

/root/.ansible/tmp/ansible-tmp-1511249527.3440247177825302/yum.py

<localhost> EXEC /bin/sh -c 'chmod u+x

/root/.ansible/tmp/ansible-tmp1511249527.34-40247177825302/

/root/.ansible/tmp/ansible-tmp-1511249527.3440247177825302/yum.py && sleep 0'

<localhost> EXEC /bin/sh -c '/usr/bin/python

/root/.ansible/tmp/ansible-tmp1511249527.34-40247177825302/yum.py; rm -rf

"/root/.ansible/tmp/ansible-tmp1511249527.34-40247177825302/" > /dev/null 2>

&1 && sleep 0'

changed: [server1] => {

"changed": true,

"invocation": {

"module\_args": {

"conf\_file": null,

"disable\_gpg\_check": false,

"disablerepo": null,

"enablerepo": null,

"exclude": null,

"install\_repoquery": true,

"installroot": "/",

"list": null,

"name": ["demo-tomcat-1"],

"skip\_broken": false,

"state": "present",

"update\_cache": false,

"validate\_certs": true

}

},

"msg": "",

"rc": 0,

"results": [

"Loaded plugins: product-id,

search-disabled-repos,

subscriptionmanager\nThis system is not registered to Red Hat Subscription Management.

You can use subscription-manager to register.\nResolving Dependencies\n-->

Running transaction check\n--->

Package demo-tomcat-1.noarch 0:SNAPSHOT-1 will be installed\n--> Finished Dependency

Resolution\n\nDependencies Resolved\n

\n================================================================================\n

Package Arch Version Repository

Size\n==================================================================\nInstalling:\n

demo-tomcat-1 noarch SNAPSHOT-1 demo-repo1 7.1 M\n\nTransaction

Summary\n==================================================================\nInstall 1

Package\n\nTotal download size: 7.1 M\nInstalled size: 7.9 M\nDownloading

packages:\nRunning transaction

check\nRunning transaction test\nTransaction test succeeded\nRunning transaction\n Installing :

demotomcat-1-SNAPSHOT-1.noarch 1/1 \n Verifying :

demo-tomcat-1-SNAPSHOT-1.noarch 1/1 \n\nInstalled:\n

demo-tomcat-1.noarch 0:SNAPSHOT-1 \n\nComplete!\n"

]

}

TASK [install-tomcat : debug] \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

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task path: /users/demo/vivek-playbook/roles/install-tomcat/tasks/main.yml:11

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ok: [server1] => {

"changed": false,

"msg": [

"Install Tomcat artifacts task ended with message: {

u'msg': u'', u'changed': True, u'results':

[u'Loaded plugins: product-id,

search-disabledrepos,

subscription-manager\\nThis system is not registered to Red Hat Subscription Management.

You can use subscription-manager to register.\\nResolving Dependencies\\n-->

Running transaction check\\n--->

Package demo-tomcat-1.noarch 0:SNAPSHOT-1 will be installed\\n-->

Finished Dependency Resolution\\n

\\nDependencies

Resolved\\n\\n==================================================================\\n

Package Arch Version Repository

Size\\n========================================================================

=====\\nInstalling:\\n demo-tomcat-1 noarch SNAPSHOT-1 demo-repo1 7.1 M\\n\\nTransaction

Summary\\n=========================================================\\nInstall 1

Package\\n\\nTotal download size: 7.1 M\\nInstalled size: 7.9 M\\nDownloading

packages:\\nRunning

transaction check\\nRunning transaction test\\nTransaction test succeeded\\nRunning

transaction\\n

Installing : demo-tomcat-1-SNAPSHOT-1.noarch 1/1 \\n Verifying :

demo-tomcat-1-SNAPSHOT-1.noarch

1/1 \\n\\nInstalled:\\n demo-tomcat-1.noarch 0:SNAPSHOT-1 \\n\\nComplete!\\n'], u'rc': 0

}",

"Installed Tomcat artifacts - True"

]

}

TASK [install-tomcat : Clean DEMO environment] \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

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task path: /users/demo/vivek-playbook/roles/install-tomcat/tasks/main.yml:19

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[WARNING]: when statements should not include jinja2 templating delimiters such as {{ }} or

{% %}. Found: {{installationOutput.changed}}

Using module file /usr/lib/python2.7/sitepackages/ansible/modules/files/file.py

<localhost> ESTABLISH LOCAL CONNECTION FOR USER: root

<localhost> EXEC /bin/sh -c 'echo ~ && sleep 0'

<localhost> EXEC /bin/sh -c '( umask 77 && mkdir -p "` echo

/root/.ansible/tmp/ansible-tmp-1511249534.13-128345805983963 `" && echo

ansible-tmp-1511249534.13-128345805983963="` echo

/root/.ansible/tmp/ansibletmp-1511249534.13-128345805983963 `" ) && sleep 0'

<localhost> PUT /tmp/tmp0aXel7 TO

/root/.ansible/tmp/ansible-tmp-1511249534.13128345805983963/file.py

<localhost> EXEC /bin/sh -c 'chmod u+x

/root/.ansible/tmp/ansible-tmp1511249534.13-128345805983963/

/root/.ansible/tmp/ansible-tmp-1511249534.13128345805983963/file.py && sleep 0'

<localhost> EXEC /bin/sh -c '/usr/bin/python

/root/.ansible/tmp/ansible-tmp1511249534.13-128345805983963/file.py; rm -rf

"/root/.ansible/tmp/ansible-tmp1511249534.13-128345805983963/" > /dev/null 2>&1

&& sleep 0'

changed: [server1] => {

"changed": true,

"diff": {

"after": {

"path": "/users/demo/DEMO",

"state": "absent"

},

"before": {

"path": "/users/demo/DEMO",

"state": "directory"

}

},

"invocation": {

"module\_args": {

"attributes": null,

"backup": null,

"content": null,

"delimiter": null,

"diff\_peek": null,

"directory\_mode": null,

"follow": false,

"force": false,

"group": null,

"mode": null,

"original\_basename": null,

"owner": null,

"path": "/users/demo/DEMO",

"recurse": false,

"regexp": null,

"remote\_src": null,

"selevel": null,

"serole": null,

"setype": null,

"seuser": null,

"src": null,

"state": "absent",

"unsafe\_writes": null,

"validate": null

}

},

"path": "/users/demo/DEMO",

"state": "absent"

}

TASK [install-tomcat : debug] \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

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task path: /users/demo/vivek-playbook/roles/install-tomcat/tasks/main.yml:29

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ok: [server1] => {

"changed": false,

"msg": [

"Clean DEMO environment task ended with message:{u'diff': {u'after': {u'path':

u'/users/demo/DEMO', u'state': u'absent'},

u'before': {u'path': u'/users/demo/DEMO', u'state': u'directory'}}, u'state': u'absent',

u'changed': True, u'path': u'/users/demo/DEMO'}",

"check value :True"

]

}

TASK [install-tomcat : Copy Tomcat to user home] \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

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task path: /users/demo/vivek-playbook/roles/install-tomcat/tasks/main.yml:37

Tuesday 21 November 2017 13:02:14 +0530 (0:00:00.055) 0:00:08.701 \*\*\*\*\*\*

[WARNING]: when statements should not include jinja2 templating delimiters such as {{ }} or

{% %}. Found: {{installationOutput.changed}}

Using module file /usr/lib/python2.7/sitepackages/ansible/modules/commands/command.py

<localhost> ESTABLISH LOCAL CONNECTION FOR USER: root

<localhost> EXEC /bin/sh -c 'echo ~ && sleep 0'

<localhost> EXEC /bin/sh -c '( umask 77 && mkdir -p "` echo

/root/.ansible/tmp/ansible-tmp-1511249534.43-41077200718443 `" && echo

ansibletmp-1511249534.43-41077200718443="` echo

/root/.ansible/tmp/ansible-tmp1511249534.43-41077200718443 `" ) && sleep 0'

<localhost> PUT /tmp/tmp25deWs TO

/root/.ansible/tmp/ansible-tmp-1511249534.4341077200718443/command.py

<localhost> EXEC /bin/sh -c 'chmod u+x

/root/.ansible/tmp/ansible-tmp1511249534.43-41077200718443/

/root/.ansible/tmp/ansible-tmp-1511249534.4341077200718443/command.py && sleep 0'

<localhost> EXEC /bin/sh -c '/usr/bin/python

/root/.ansible/tmp/ansible-tmp1511249534.43-41077200718443/command.py; rm -rf

"/root/.ansible/tmp/ansibletmp-1511249534.43-41077200718443/" > /dev/null 2>&1

&& sleep 0'

changed: [server1] => {

"changed": true,

"cmd": [

"cp",

"-r",

"/opt/ansible/tomcat/demo",

"/users/demo/DEMO/"

],

"delta": "0:00:00.017923",

"end": "2017-11-21 13:02:14.547633",

"invocation": {

"module\_args": {

"\_raw\_params": "cp -r /opt/ansible/tomcat/demo /users/demo/DEMO/",

"\_uses\_shell": false,

"chdir": null,

"creates": null,

"executable": null,

"removes": null,

"warn": true

}

},

"rc": 0,

"start": "2017-11-21 13:02:14.529710",

"stderr": "",

"stderr\_lines": [],

"stdout": "",

"stdout\_lines": []

}

TASK [install-tomcat : debug] \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

task path: /users/demo/vivek-playbook/roles/install-tomcat/tasks/main.yml:47

Tuesday 21 November 2017 13:02:14 +0530 (0:00:00.260) 0:00:08.961 \*\*\*\*\*\*

ok: [server1] => {

"changed": false,

"msg": "Copy Tomcat to user home task ended with message {

'stderr\_lines': [], u'changed': True, u'end': u'2017-11-21 13:02:14.547633', u'stdout':

u'', u'cmd': [u'cp', u'-r', u'/opt/ansible/tomcat/demo', u'/users/demo/DEMO/'], u'rc': 0,

u'start': u'2017-11-21 13:02:14.529710', u'stderr': u'', u'delta': u'0:00:00.017923',

'stdout\_lines': []}"

}

TASK [start-tomcat : Start Tomcat] \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

task path: /users/demo/vivek-playbook/roles/start-tomcat/tasks/main.yml:5

Tuesday 21 November 2017 13:02:14 +0530 (0:00:00.044) 0:00:09.006 \*\*\*\*\*\*

Using module file /usr/lib/python2.7/sitepackages/ansible/modules/commands/command.py

<localhost> ESTABLISH LOCAL CONNECTION FOR USER: root

<localhost> EXEC /bin/sh -c 'echo ~ && sleep 0'

<localhost> EXEC /bin/sh -c '( umask 77 && mkdir -p "` echo

/root/.ansible/tmp/ansible-tmp-1511249534.63-46501211251197 `" && echo

ansibletmp-1511249534.63-46501211251197="` echo

/root/.ansible/tmp/ansible-tmp1511249534.63-46501211251197 `" ) && sleep 0'

<localhost> PUT /tmp/tmp9f06MQ TO

/root/.ansible/tmp/ansible-tmp-1511249534.6346501211251197/command.py

<localhost> EXEC /bin/sh -c 'chmod u+x

/root/.ansible/tmp/ansible-tmp1511249534.63-46501211251197/

/root/.ansible/tmp/ansible-tmp-1511249534.6346501211251197/command.py && sleep 0'

<localhost> EXEC /bin/sh -c '/usr/bin/python

/root/.ansible/tmp/ansible-tmp1511249534.63-46501211251197/command.py; rm -rf

"/root/.ansible/tmp/ansibletmp-1511249534.63-46501211251197/" > /dev/null 2>&1

&& sleep 0'

changed: [server1] => {

"changed": true,

"cmd": [ "/users/demo/DEMO/bin/startup.sh" ],

"delta": "0:00:00.020024",

"end": "2017-11-21 13:02:14.741649",

"invocation": {

"module\_args": {

"\_raw\_params": "/users/demo/DEMO/bin/startup.sh",

"\_uses\_shell": false,

"chdir": null,

"creates": null,

"executable": null,

"removes": null,

"warn": true

}

},

"rc": 0,

"start": "2017-11-21 13:02:14.721625",

"stderr": "",

"stderr\_lines": [],

"stdout": "Tomcat started.",

"stdout\_lines": [ "Tomcat started." ]

}

TASK [start-tomcat : debug] \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

task path: /users/demo/vivek-playbook/roles/start-tomcat/tasks/main.yml:10

Tuesday 21 November 2017 13:02:14 +0530 (0:00:00.150) 0:00:09.156 \*\*\*\*\*\*

ok: [server1] => {

"changed": false,

"msg": [

"Start Tomcat task ended with message: {'

stderr\_lines': [], u'changed': True, u'end': u'2017-11-21 13:02:14.741649', u'stdout':

u'Tomcat started.', u'cmd': [u'/users/demo/DEMO/bin/startup.sh'], u'rc': 0, u'start':

u'2017-11-21 13:02:14.721625', u'stderr': u'', u'delta': u'0:00:00.020024',

'stdout\_lines': [u'Tomcat started.']}",

"Tomcat started - True"

]

}

META: ran handlers

META: ran handlers

PLAY RECAP \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

server1 : ok = 9 changed = 4 unreachable = 0 failed = 0

Tuesday 21 November 2017 13:02:14 +0530 (0:00:00.042) 0:00:09.198 \*\*\*\*\*\*

===============================================================================

install-tomcat : Install Tomcat artifacts ------------------------------- 6.76s

/users/demo/vivek-playbook/roles/install-tomcat/tasks/main.yml:5 --------------

Gathering Facts --------------------------------------------------------- 1.52s

------------------------------------------------------------------------------

install-tomcat : Copy Tomcat to user home ------------------------------- 0.26s

/users/demo/vivek-playbook/roles/install-tomcat/tasks/main.yml:37 -------------

install-tomcat : Clean DEMO environment --------------------------------- 0.26s

/users/demo/vivek-playbook/roles/install-tomcat/tasks/main.yml:19 -------------

start-tomcat : Start Tomcat --------------------------------------------- 0.15s

/users/demo/vivek-playbook/roles/start-tomcat/tasks/main.yml:5 ----------------

install-tomcat : debug -------------------------------------------------- 0.06s

/users/demo/vivek-playbook/roles/install-tomcat/tasks/main.yml:11 -------------

install-tomcat : debug -------------------------------------------------- 0.06s

/users/demo/vivek-playbook/roles/install-tomcat/tasks/main.yml:29 -------------

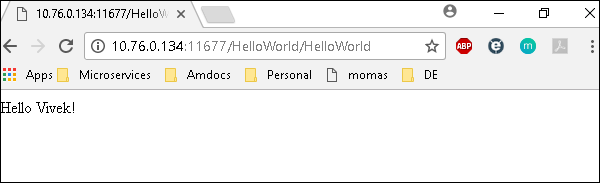
install-tomcat : debug -------------------------------------------------- 0.04s

/users/demo/vivek-playbook/roles/install-tomcat/tasks/main.yml:47 -------------

start-tomcat : debug ---------------------------------------------------- 0.04s

/users/demo/vivek-playbook/roles/start-tomcat/tasks/main.yml:10 ---------------

Hit the following URL and you will be directed to a page as shown below −**http://10.76.0.134:11677/HelloWorld/HelloWorld**



The deployed war just has a servlet which displays “Hello World”. The detailed output shows the time taken by each and every task because of the entry added in ansible.cfg file −

[defaults]

callback\_whitelist = profile\_tasks

Variable:

Variable in playbooks are **very similar** to using variables in any programming language. It helps you to use and assign a value to a variable and use that anywhere in the playbook. One can put conditions around the value of the variables and accordingly use them in the playbook.

Example

- hosts : <your hosts>

vars:

tomcat\_port : 8080

In the above example, we have defined a variable name **tomcat\_port** and assigned the value 8080 to that variable and can use that in your playbook wherever needed.

Now taking a reference from the example shared. The following code is from one of the roles (install-tomcat) −

block:

- name: Install Tomcat artifacts

action: >

yum name = "demo-tomcat-1" state = present

register: Output

always:

- debug:

msg:

- "Install Tomcat artifacts task ended with message: {{Output}}"

- "Installed Tomcat artifacts - {{Output.changed}}"

Here, the output is the variable used.

Let us walk through all the keywords used in the above code −

* **block** − Ansible syntax to execute a given block.
* **name** − Relevant name of the block - this is used in logging and helps in debugging that which all blocks were successfully executed.
* **action** − The code next to action tag is the task to be executed. The action again is a Ansible keyword used in yaml.
* **register** − The output of the action is registered using the register keyword and Output is the variable name which holds the action output.
* **always** − Again a Ansible keyword , it states that below will always be executed.
* **msg** − Displays the message.

Usage of variable - {{Output}} -->

This will read the value of variable Output. Also as it is used in the msg tab, it will print the value of the output variable.

Additionally, you can use the sub properties of the variable as well. Like in the case checking {{Output.changed}} whether the output got changed and accordingly use it.

Exception Handling in Playbooks

Exception handling in Ansible is similar to exception handling in any programming language. An example of the exception handling in playbook is shown below.

tasks:

- name: Name of the task to be executed

block:

- debug: msg = 'Just a debug message , relevant for logging'

- command: <the command to execute>

rescue:

- debug: msg = 'There was an exception.. '

- command: <Rescue mechanism for the above exception occurred)

always:

- debug: msg = "this will execute in all scenarios. Always will get logged"

Following is the syntax for exception handling.

* **rescue** and **always** are the keywords specific to exception handling.
* **Block** is where the code is written (anything to be executed on the Unix machine).
* If the command written inside the block feature fails, then the execution reaches rescue block and it gets executed. In case there is no error in the command under block feature, then rescue will not be executed.
* **Always** gets executed in all cases.
* So if we compare the same with java, then it is similar to try, catch and finally block.
* Here, **Block** is similar to **try block** where you write the code to be executed and **rescue** is similar to **catch block** and **always** is similar to **finally**.

Loops

Below is the example to demonstrate the usage of Loops in Ansible.

The tasks is to copy the set of all the war files from one directory to tomcat webapps folder.

Most of the commands used in the example below are already covered before. Here, we will concentrate on the usage of loops.

Initially in the 'shell' command we have done ls \*.war. So, it will list all the war files in the directory.

Output of that command is taken in a variable named output.

To loop, the 'with\_items' syntax is being used.

with\_items: "{{output.stdout\_lines}}" --> output.stdout\_lines gives us the line by line output and then we loop on the output with the with\_items command of Ansible.

Attaching the example output just to make one understand how we used the stdout\_lines in the with\_items command.

---

#Tsting

- hosts: tomcat-node

tasks:

- name: Install Apache

shell: "ls \*.war"

register: output

args:

chdir: /opt/ansible/tomcat/demo/webapps

- file:

src: '/opt/ansible/tomcat/demo/webapps/{{ item }}'

dest: '/users/demo/vivek/{{ item }}'

state: link

with\_items: "{{output.stdout\_lines}}"

Blocks

The playbook in totality is broken into blocks. The smallest piece of steps to execute is written in block. Writing the specific instruction in blocks helps to segregate functionality and handle it with exception handling if needed.

Example of blocks is covered in variable usage,exception handling and loops above.

Conditionals

Conditionals are used where one needs to run a specific step based on a condition.

---

#Tsting

- hosts: all

vars:

test1: "Hello Vivek"

tasks:

- name: Testing Ansible variable

debug:

msg: "Equals"

when: test1 == "Hello Vivek"

In this case, Equals will be printed as the test1 variable is equal as mentioned in the when condition. **when** can be used with a logical OR and logical AND condition as in all the programming languages.

Just change the value of test1 variable from Hello Vivek to say Hello World and see the output.