Introduction to Ansible

05.12.2020

Tasks

- * Tasks are basic builing blocks of Ansible's execution and configuration.
- * Running adhoc commands are great for troubleshooting and quick testing against your inventory
- * The return results will gives us details about th success or failure of the executed commands.
- * We can define tasks in form of plays run within playbooks, which is the real power of Ansible

Playbooks

- * Playbooks are a way to congregate ordered processes and manage configuration needed to build out a remote system.
- * Playbooks make configuration management easy and gives us the ability to deploy to a multi-machine setup.
- * Playbooks can declare configuration and orchestrate steps (normally done in a manual ordered process) and when run, can ensure our remote system is configured as expected.
- * The written tasks within a playbook can be run synchronously or asynchronously.
- * Playbooks gives us the ability to create infrastructure as code and manage it all in source control.

Design of Playbooks

Update

update all packages

patching needed

Install

install item x

install item y

Configure

setup services

update config files

restart services

Check status

ensure up status

- * List out everything we need want to apply to each instance
- * Group them according to configuration usage.
- * Ensure they are logically defined order.
- * Run each tasks according to the order they are listed.

- * Playbooks use YAML syntax which allow you to model a configuration or a process.
- * Playbooks are composed of one or more plays in a list.
- * The goal of a play is to map a group of host to a tasks that are used to call Ansible modules.
- * By composing a playbook of multiple plays, it makes it possible to orchestrate multi-machine deployments and allows us to run certain steps on all machines in a group.

Playbooks in Action

① Package management

Install all packages needed to run our system.

- *patching
- *package manager

Example Playbook

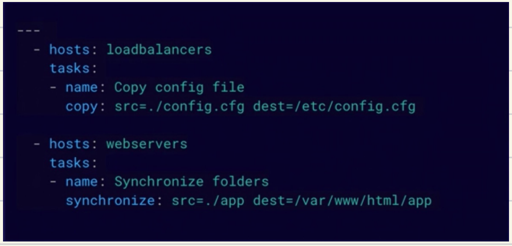
```
- hosts: loadbalancers
  tasks:
   - name: Install Apache
     yum: name=httpd state=latest
```

② Configure infrastructure

Configure our system with necessary application files or configuration files that are needed to configure environment.

- *copy files
- *edit configuration files

Example Playbook



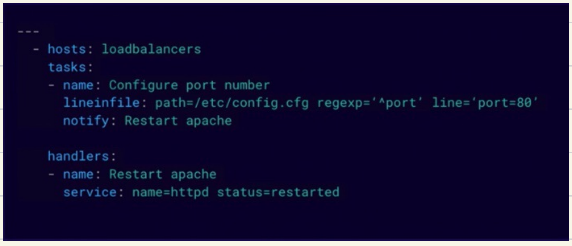
```
---
  - hosts: loadbalancers
    tasks:
    - name: Copy config file
      copy: src=./config.cfg dest=/etc/config.cfg

  - hosts: webservers
    tasks:
    - name: Synchronize folders
      synchronize: src=./app dest=/var/www/html/app
```

③ Service Handlers

Create service handlers to start, stop, or restart our system when changes are made.

- * command
- * service
- * handlers

Example Playbook



```
---
  - hosts: loadbalancers
    tasks:
    - name: Configure port number
      lineinfile: path=/etc/config.cfg regexp='^port' line='port=80'
      notify: Restart apache

    handlers:
    - name: Restart apache
      service: name=httpd status=restarted
```

① → ② → ③

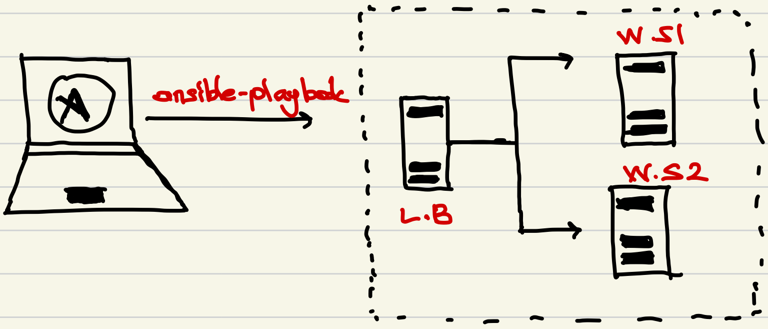
Package Management → Configure infrastructure → Service Handlers

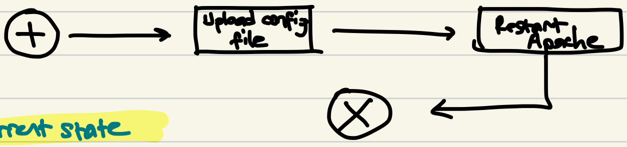
Constructing a system

① Package Management
- * apache
- * php

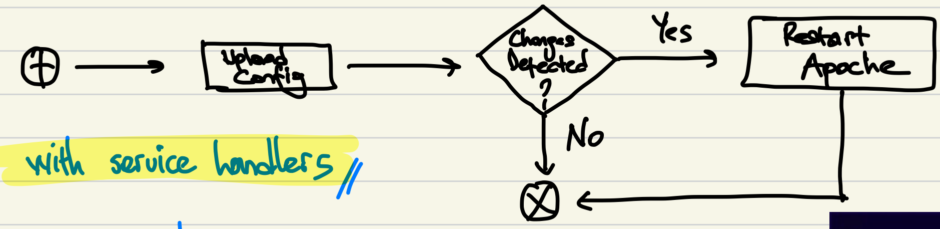
② Configure infrastructure
- * upload index.php
- * configure php.ini
- * configure load balancer

③ Service Handlers
- * restart services

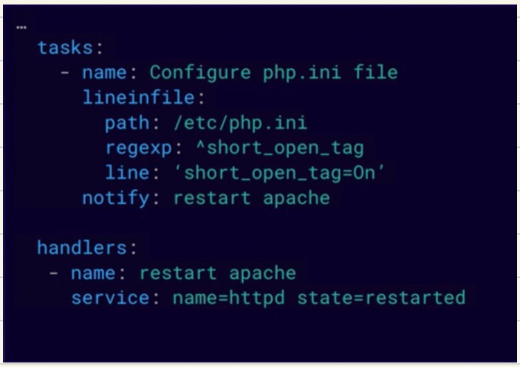




Current state



with service handlers



```
...
tasks:
  - name: Configure php.ini file
    lineinfile:
      path: /etc/php.ini
      regexp: ^short_open_tag
      line: 'short_open_tag=On'
    notify: restart apache

handlers:
 - name: restart apache
   service: name=httpd state=restarted
```

Summary

- * Playbooks are an ordered list of plays that can run tasks for configuration and orchestration.
- * These plays allow us to run commands on a group or subset of servers within our inventory.
- * Create infrastructure as code that can be managed in source control.
- * Playbooks can be multiple times without affecting previous runs.
- * Package management, configuration, service handlers.

Link: https://github.com/mrturkmencom/learning-journey

– Variables –

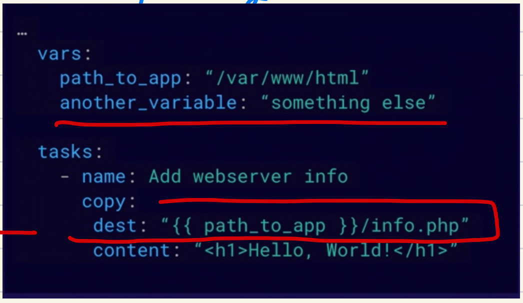
Ansible provides us with variables and metadata about the host we are interacting with when running playbooks.

* During the TASK [Gathering Facts] step, these variables become populated.
* Gathers useful facts about our host and can be used in playbooks.
* Use the status module to see all of the facts gathered during the TASK [Gathering Facts]
* Uses jinja2 templating to evaluate these expressions.

Ansible also gives us the ability to create local variables within our playbooks.

* Create playbook variables using vars to create key/value pairs and dictionary/map of variables.
* Nice to use when referencing variables directly in a playbook.
* Create variables files and import them into our playbook.

– Example Playbook –

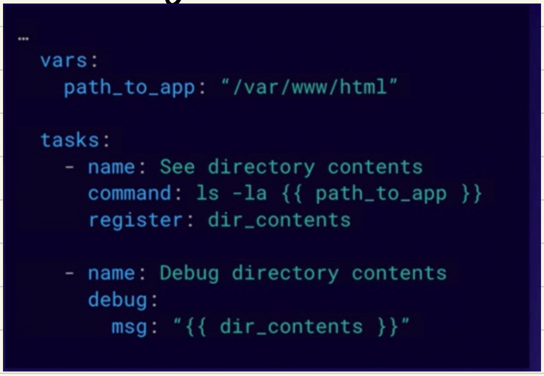


```
...
  vars:
    path_to_app: "/var/www/html"
    another_variable: "something else"

  tasks:
    - name: Add webserver info
      copy:
        dest: "{{ path_to_app }}/info.php"
        content: "<h1>Hello, World!</h1>"
```

jinja2 template

Ansible also gives us the ability to register variables from tasks that run to get information about it's execution.

* Create variables from info returned from tasks ran using register.
* Call the registered variables for later use.
* Use the debug module anytime to see variables and debug our playbooks.



```
...
  vars:
    path_to_app: "/var/www/html"

  tasks:
    - name: See directory contents
      command: ls -la {{ path_to_app }}
      register: dir_contents

    - name: Debug directory contents
      debug:
        msg: "{{ dir_contents }}"
```

In order to see variables in gathering facts step following command can be used.

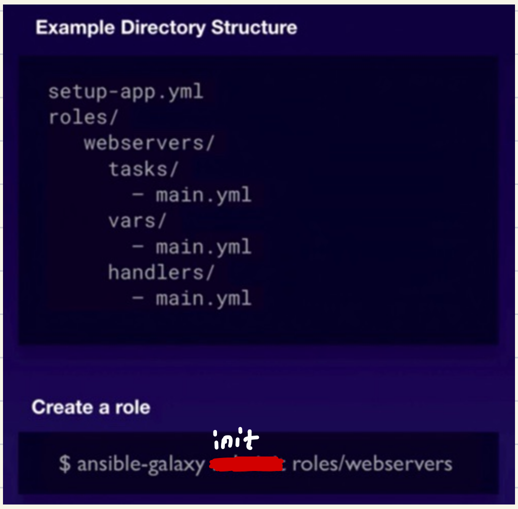
ansible -m setup all

Summary

* Ansible provides us with many ways to use variables and include them within our setup.
* Use variables within the TASK [Gathering Facts] dictionary.
* Create user-defined variables using the vars feature for in-line variables within our playbooks
* Use the debug module to print messages to standard out.

– Roles –

* Ansible provides a framework that makes each part of variables, tasks, templates, and modules fully independent.
  → Group tasks together in a way that is self containing
  → Clean and pre-defined dictionary structure.
  → Break up the configurations into files.
  → Reuse code by others who need similar configurations
  → Easy to modify and reduces syntax errors.



Example Directory Structure

```
setup-app.yml
roles/
   webservers/
     tasks/
       - main.yml
     vars/
       - main.yml
     handlers/
       - main.yml
```

Create a role

```
                  init
$ ansible-galaxy [redacted] roles/webservers
```

- Check Mode ("Dry Run") -

* Reports changes that Ansible would have to make on the end hosts rather than applying the changes.

→ Run Ansible commands without affecting the remote system

→ Reports changes back rather than actually making them

→ Great for one node at a time basic configuration management use cases.

Example dry run execution

$ ansible-playbook setup.yml --check

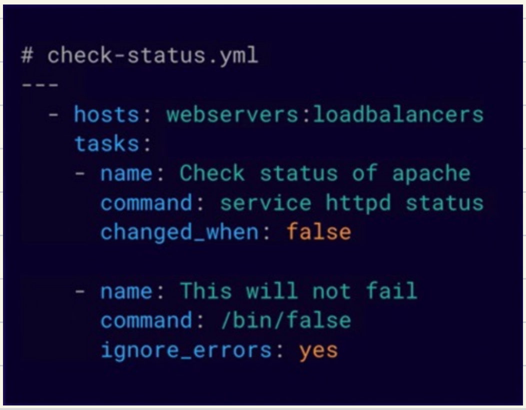
- Error Handling -

* Change the default behaviour of Ansible when certain events happen that may or may not need to report as a failure or changed status.

→ Sometimes a non-zero exit code is a-okay.

→ Sometimes commands might not always need to report a changed status.

→ Explicitly force Ansible to ignore errors or changes that occur.



```
# check-status.yml
---
  - hosts: webservers:loadbalancers
    tasks:
      - name: Check status of apache
        command: service httpd status
        changed_when: false

      - name: This will not fail
        command: /bin/false
        ignore_errors: yes
```

- Tags -

* Assigning tags to specific tasks in playbooks allows you to only call certain tasks in a very long playbook.

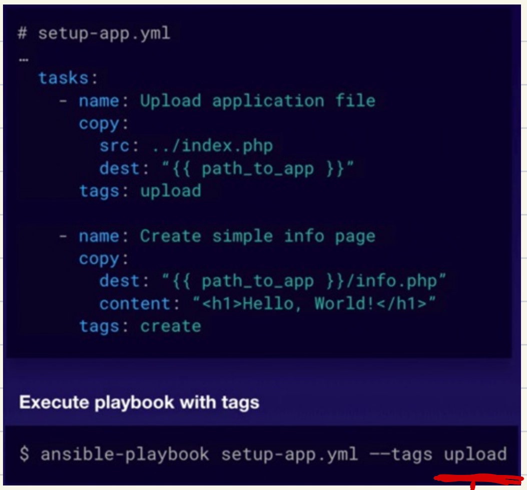
→ Only run specific parts of a playbook rather than all of the plays.

→ Add tags to any tasks and reuse if needed.

→ Specify the tags you want to run (or not run) on the command line.

→ Tasks can also be skipped with following command:

$ ansible-playbook setup-app.yml --skip-tags upload



```
# setup-app.yml
…
  tasks:
    - name: Upload application file
      copy:
        src: ../index.php
        dest: “{{ path_to_app }}”
      tags: upload

    - name: Create simple info page
      copy:
        dest: “{{ path_to_app }}/info.php”
        content: “<h1>Hello, World!</h1>”
      tags: create
```

Execute playbook with tags

```
$ ansible-playbook setup-app.yml --tags upload
```

only runs specific tasks

- Ansible Vault -

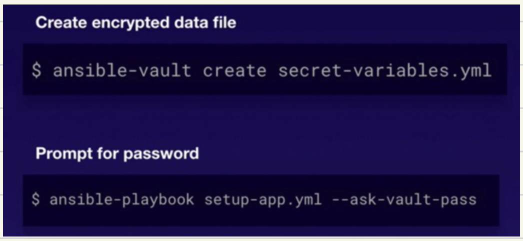
* Ansible "Vault" is a way to keep sensitive information in encrypted files, rather than plain text, in our playbooks.

→ Keep passwords, keys, and sensitive variables in encrypted vault files.

→ Vault files can be shared through source control.

→ Vault can encrypt pretty much any data structure file used by Ansible.

→ Password protected and the default cipher is AES.



Create encrypted data file

```
$ ansible-vault create secret-variables.yml
```

Prompt for password

```
$ ansible-playbook setup-app.yml --ask-vault-pass
```

- Prompts -

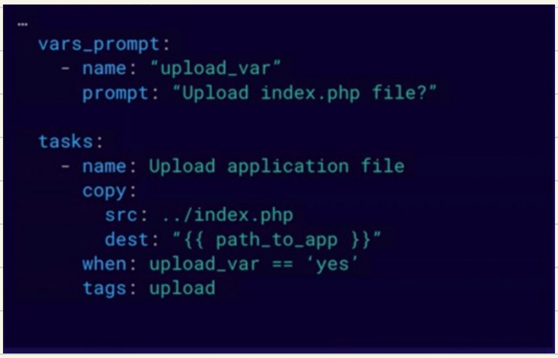
* There may be playbooks you run that need to prompt the user for certain input. You can do this using the "vars_prompt" section.

→ Can use the users input as variables within our playbooks.

→ Run certain tasks with conditional logic.

→ Common use is to ask for sensitive data.

→ Has uses outside of security as well.



```
…
  vars_prompt:
    - name: “upload_var”
      prompt: “Upload index.php file?”

  tasks:
    - name: Upload application file
      copy:
        src: ../index.php
        dest: “{{ path_to_app }}”
      when: upload_var == ‘yes’
      tags: upload
```