Ansible Roles

Ansible Advanced

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- Authoring Roles

Ansible Roles

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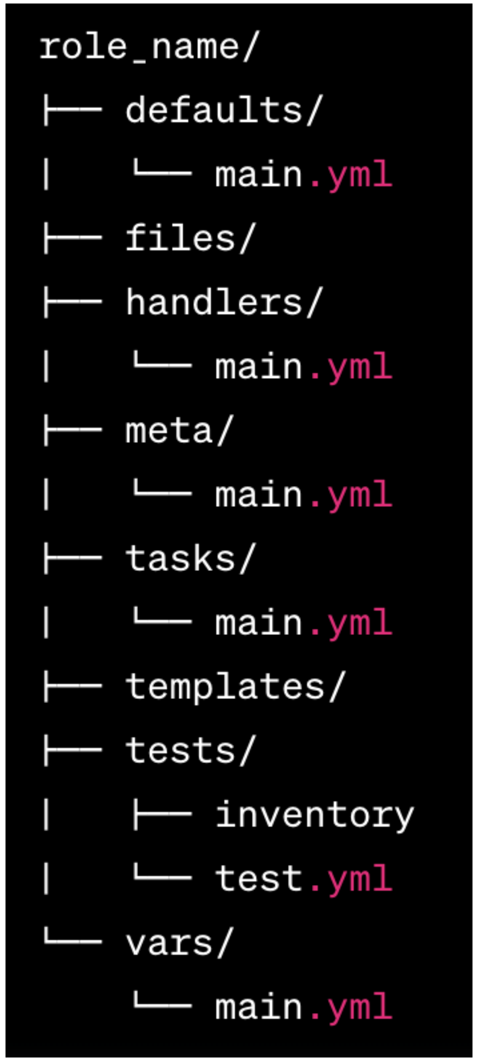
What are Ansible Roles

- Ansible role is a pre-defined structure for organizing automation tasks in a way that allows for code reuse, ease of testing, and modular organization
- Roles encapsulate a specific piece of functionality or configuration, making it easier to drop that functionality into multiple playbooks or share with other users
- They are a key aspect of Ansible's playbook organization, enabling the reuse of code and modularization of configuration tasks
- These building blocks are easily shared using Ansible Galaxy

Role directory structure

- **`defaults/`**: Default variables for the role. These have the lowest priority
- **`files/`**: Contains files that the role can deploy onto the target system
- **`handlers/`**: Contains handlers, which are tasks that respond to a "notify" directive from other tasks
- **`meta/`**: Contains metadata about the role, such as role dependencies.
- **`tasks/`**: This directory contains the main list of tasks that the role will execute.
- **`templates/`**: Contains template files, which use the Jinja2 templating engine, and can be deployed using the template module
- **`tests/`**: Contains files for testing the role, often using tools like Molecule or simple playbooks.
- **`vars/`**: Variables for the role with higher priority than defaults.



```
role_name/
├── defaults/
|    └── main.yml
├── files/
├── handlers/
|    └── main.yml
├── meta/
|    └── main.yml
├── tasks/
|    └── main.yml
├── templates/
├── tests/
|    ├── inventory
|    └── test.yml
└── vars/
     └── main.yml
```

Benefits

- Modularity
  - Roles allow you to break down complex playbooks into smaller, reusable components
  - Each role focuses on a specific task or service, making it easier to understand and manage.
- Reusability
  - Once you've created a role, you can reuse it across multiple playbooks or even different projects
  - This reduces duplication and ensures consistency across your infrastructure.
- Sharing and Collaboration
  - Roles can be easily shared with others, either within your organization or with the broader community through platforms like Ansible Galaxy
  - This promotes collaboration and allows teams to benefit from the work of others.
- Version Control
  - Roles can be versioned, allowing you to track changes over time, roll back to previous versions if needed, and ensure that you're always using the correct version of a role.
- Separation of Concerns
  - By encapsulating specific functionalities into roles, you can separate the logic of your configuration from the data
  - This means you can use the same role in different environments (e.g., staging, production) with different variables.

Benefits

- Testing
  - Roles can be individually tested, ensuring that a specific piece of functionality works as expected
  - Tools like Molecule can be used to test roles in isolation, improving the reliability of your automation.
- Organization
  - Roles provide a standardized directory structure, making it easier to find where specific tasks, templates, files, and variables are defined
  - This structure improves readability and maintainability.
- Flexibility
  - Roles can be conditionally included or excluded in playbooks, and they can also depend on other roles
  - This allows for the creation of layered and flexible automation workflows.
- Role Dependencies
  - Roles can have dependencies on other roles, ensuring that prerequisites are always met
  - For example, a role that configures a web application might depend on another role that installs and configures the web server.
- Isolation
  - If a role is updated or modified, it won't affect other roles or playbooks unless they specifically depend on it
  - This isolation reduces the risk of unintended side effects when making changes

Using Roles

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How to use Roles

- First step is to get role files to execute on your playbook
- The default way to get files is to integrate with Ansible Galaxy
- After downloading the role you can use it directly on your playbook, like a task or na handler

PHP Role

- Get from Ansible Galaxy

```
ansible-galaxy install geerlingguy.php
```

- Add the role to playbook

```
- hosts: your_target_host
  become: yes  # Use elevated privileges
  vars:
    php_packages:
      - php
      - php-cli
      - php-fpm
      - php-json
      - php-common
      - php-mysql
      - php-zip
      - php-gd
      - php-mbstring
      - php-curl
      - php-xml
      - php-pear
      - php-bcmath
    php_memory_limit: "256M"
    php_max_execution_time: "60"
    php_upload_max_filesize: "32M"
    php_post_max_size: "32M"
  roles:
    - geerlingguy.php
```

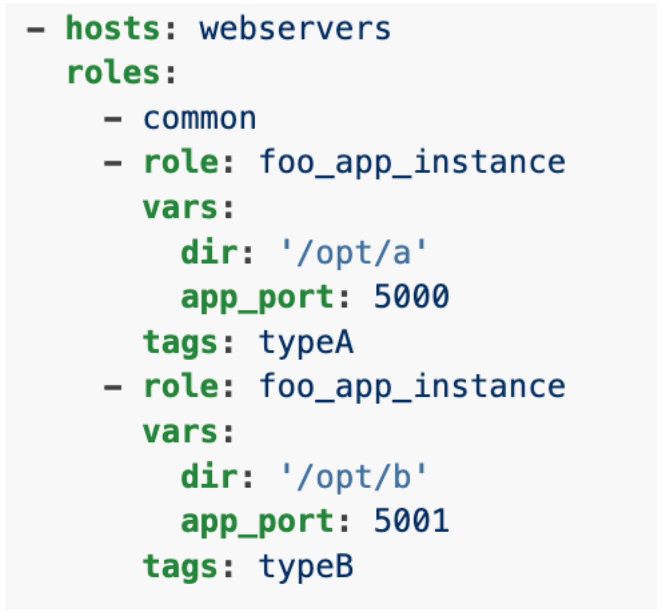
Execution order

- You can have roles, tasks and handlers on your playbook
- The playbook will execute on the following order
  - Each role listed in **`roles:`** in the order listed.
    - Any role dependencies defined in the role's **`meta/main.yml`** run first
  - Any tasks defined in the play.
  - Any handlers triggered by the roles or tasks.

```yaml
- hosts: your_target_host
  become: yes

  vars:
    php_memory_limit: "256M"
    php_max_execution_time: "60"

  roles:
    - geerlingguy.php

  tasks:
    - name: Ensure git is installed
      ansible.builtin.package:
        name: git
        state: present

    - name: Clone a repository
      ansible.builtin.git:
        repo: 'https://github.com/example/repo.git'
        dest: '/path/to/destination'
        clone: yes
        update: yes

    - name: Another task
      ...
```

Use same role with different variables

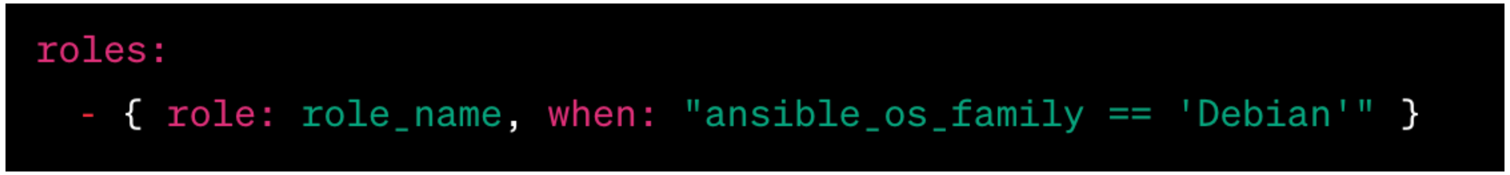
- Every role have a set of variables (with defaults)
- Depending the variables value on your playbook, you can get diferente outcome
- Variables values to send to role can be set as playbook variables or directly on role block in playbook



```yaml
- hosts: webservers
  roles:
    - common
    - role: foo_app_instance
      vars:
        dir: '/opt/a'
        app_port: 5000
      tags: typeA
    - role: foo_app_instance
      vars:
        dir: '/opt/b'
        app_port: 5001
      tags: typeB
```

Conditional execution

- You may execute your role based on a condition
- For the condition, you may follow all rules defined for conditional on playbook tasks



```
roles:
  - { role: role_name, when: "ansible_os_family == 'Debian'" }
```

Role Dependencies

- Role dependencies let you automatically pull in other roles when using a role
- Role dependencies are prerequisites, not true dependencies
- The roles do not have a parent/child relationship
- Ansible loads all listed roles, runs the roles listed under dependencies first, then runs the role that lists them
- For exemple, if you list role **`foo`** under **`roles:`**, role **`foo`** lists role **`bar`** under dependencies in its **`meta/main.yml`** file, and role **`bar`** lists role **`baz`** under dependencies in its **`meta/main.yml`**, Ansible executes **`baz`**, then **`bar`**, then **`foo`**.

Ansible Galaxy

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Ansible Galaxy

- Ansible Galaxy is a community hub for sharing and discovering Ansible roles and collections
- It provides a centralized platform for Ansible users to find reusable content and contribute their own
- Interacting with Galaxy:
  - Web Interface: Accessible at https://galaxy.ansible.com, where you can search, download, and rate roles/collections.
  - CLI: Ansible Galaxy has a command-line interface bundled with Ansible, accessed using ansible-galaxy.

Ansible Galaxy CLI

- Install Roles: **`ansible-galaxy install username.role_name`**
- List Installed Roles: **`ansible-galaxy list`**
- Remove Roles: **`ansible-galaxy remove role_name`**
- Search Roles: **`ansible-galaxy search "search_term"`**
- Create Role Skeleton: **`ansible-galaxy init role_name`**
- Import Roles/Collections: **`ansible-galaxy import`**
- Setup Configuration: **`ansible-galaxy setup`**

Authentication

- Ansible Galaxy uses GitHub for authentication
- Users need a GitHub account to log in to Ansible Galaxy
- When you first log in to Galaxy via the web interface, you'll be asked to authorize the application with GitHub, granting access to your public repositories.

Sharing Roles

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Sharing Roles

- Ansible Galaxy is the usual way to share roles but make them public
- If you want to share privately you only need a git repository
- You can reference roles using folder path only but using git repositor is the recommended way

Reference private role

- Create a requirements.yml with following contente

```
- name: custom_role_name
  src: <repository_url>
  scm: git
  version: master
```

- Then install your role like a Ansible Galaxy Role

```
ansible-galaxy install -r requirements.yml
```

Authoring Roles

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Create directory structure

- Ansible Galaxy help you creating role directory structure

```
ansible-galaxy init user_setup
```

- This command automatically creates all folders and empty YAML files inside that folders

Author your code

- Now you can start to edit the generated files
- Some considerations
  - File **`meta/main.yml`**, you should specify role dependencies but you should add additional details like role version, author, etc.
  - File **`README.md`** contains a template to document role. This information is crucial if you want to share your role
  - Mandatory files to be changed are **`defaults`** and **`tasks`**. **`Defaults`** to define your role parameters and **`tasks`** to define your role execution

Demo: Using custom role

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Lab: Author your role

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