Roles

Roles let you automatically load related vars, files, tasks, handlers, and other Ansible artifacts based on a known file structure. After you group your content in roles, you can easily reuse them and share them with other users.

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Role directory structure

An Ansible role has a defined directory structure with eight main standard directories. You must include at least one of these directories in each role. You can omit any directories the role does not use. For example:

```
# playbooks
site.yml
webservers.yml
fooservers.yml
roles/
    common/
        tasks/
        handlers/
        library/
        files/
        templates/
        vars/
        defaults/
        meta/
    webservers/
        tasks/
        defaults/
```

By default Ansible will look in each directory within a role for a main.yml file for relevant content (also main.yaml and main):

- tasks/main.yml the main list of tasks that the role executes.
- handlers/main.yml handlers, which may be used within or outside this role.
- library/my_module.py modules, which may be used within this role (see ref. embedding modules_and_plugins_in_roles for more information).

```
System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\ansible-devel\docs\docsite\rst\user_guide\[ansible-devel] [docs] [docsite] [rst] [user_guide] playbooks_reuse_roles.rst, line 42); backlink
Unknown interpreted text role "ref".
```

defaults/main.yml - default variables for the role (see ref. playbooks_variables) for more information). These variables have the lowest priority of any variables available, and can be easily overridden by any other variable, including inventory variables.

```
System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\ansible-devel\docs\docsite\rst\user_guide\[ansible-devel] [docs] [docsite] [rst] [user_guide] playbooks_reuse_roles.rst, line 43); backlink
Unknown interpreted text role "ref".
```

• vars/main.yml - other variables for the role (see ref. playbooks variables for more information).

```
System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\ansible-devel\docs\docsite\rst\user_guide\[ansible-devel] [docs] [docsite] [rst] [user_guide] playbooks_reuse_roles.rst, line 44); backlink
Unknown interpreted text role "ref".
```

- files/main.yml files that the role deploys.
- templates/main.yml templates that the role deploys.
- meta/main.yml metadata for the role, including role dependencies.

You can add other YAML files in some directories. For example, you can place platform-specific tasks in separate files and refer to them in the tasks/main.yml file:

```
# roles/example/tasks/main.yml
- name: Install the correct web server for RHEL
  import tasks: redhat.yml
 when: ansible facts['os family']|lower == 'redhat'
- name: Install the correct web server for Debian
  import tasks: debian.yml
 when: ansible_facts['os_family']|lower == 'debian'
# roles/example/tasks/redhat.vml
- name: Install web server
 ansible.builtin.yum:
   name: "httpd"
   state: present
# roles/example/tasks/debian.yml
- name: Install web server
  ansible.builtin.apt:
   name: "apache2"
   state: present
```

Roles may also include modules and other plugin types in a directory called library. For more information, please refer to ref. embedding modules and plugins in roles' below.

```
System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\ansible-devel\docs\docsite\rst\user_guide\[ansible-devel] [docs] [docsite] [rst] [user_guide] playbooks_reuse_roles.rst, line 74); backlink
Unknown interpreted text role "ref".
```

Storing and finding roles

By default, Ansible looks for roles in the following locations:

- in collections, if you are using them
- in a directory called roles/, relative to the playbook file
- in the configured ref roles_path < DEFAULT_ROLES_PATH>`. The default search path is ~/.ansible/roles:/usr/share/ansible/roles:/etc/ansible/roles.

```
System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\ansible-devel\docs\docsite\rst\user_guide\[ansible-devel] [docs] [docsite] [rst] [user_guide] playbooks_reuse_roles.rst, line 85); backlink
Unknown interpreted text role "ref".
```

• in the directory where the playbook file is located

If you store your roles in a different location, set the ref: roles_path DEFAULT_ROLES_PATH configuration option so Ansible can find your roles. Checking shared roles into a single location makes them easier to use in multiple playbooks. See ref: intro_configuration for details about managing settings in ansible.cfg.

```
System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\ansible-devel\docs\docsite\rst\user guide\[ansible-devel] [docs] [docsite] [rst]
```

```
[user_guide]playbooks_reuse_roles.rst, line 88); backlink
Unknown interpreted text role 'ref'.
```

```
System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\ansible-devel\docs\docsite\rst\user_guide\[ansible-devel] [docs] [docsite] [rst] [user_guide] playbooks_reuse_roles.rst, line 88); backlink
Unknown interpreted text role "ref".
```

Alternatively, you can call a role with a fully qualified path:

```
---
- hosts: webservers
roles:
- role: '/path/to/my/roles/common'
```

Using roles

You can use roles in three ways:

- at the play level with the roles option: This is the classic way of using roles in a play.
- at the tasks level with include_role: You can reuse roles dynamically anywhere in the tasks section of a play using include_role.
- at the tasks level with import_role: You can reuse roles statically anywhere in the tasks section of a play using import role.

Using roles at the play level

The classic (original) way to use roles is with the roles option for a given play:

```
---
- hosts: webservers
roles:
- common
- webservers
```

When you use the roles option at the play level, for each role 'x':

- If roles/x/tasks/main.yml exists, Ansible adds the tasks in that file to the play.
- If roles/x/handlers/main.yml exists, Ansible adds the handlers in that file to the play.
- If roles/x/vars/main.yml exists, Ansible adds the variables in that file to the play.
- If roles/x/defaults/main.yml exists, Ansible adds the variables in that file to the play.
- If roles/x/meta/main.yml exists, Ansible adds any role dependencies in that file to the list of roles.
- Any copy, script, template or include tasks (in the role) can reference files in roles/x/{files,templates,tasks}/ (dir depends on task) without having to path them relatively or absolutely.

When you use the roles option at the play level, Ansible treats the roles as static imports and processes them during playbook parsing. Ansible executes each play in this order:

- Any pre tasks defined in the play.
- Any handlers triggered by pre tasks.
- Each role listed in roles:, in the order listed. Any role dependencies defined in the role's meta/main.yml run first, subject to tag filtering and conditionals. See ref: role dependencies` for more details.

```
System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\ansible-devel\docs\docsite\rst\user_guide\[ansible-devel] [docs] [docsite] [rst] [user_guide] playbooks_reuse_roles.rst, line 136); backlink
Unknown interpreted text role "ref".
```

- Any tasks defined in the play.
- Any handlers triggered by the roles or tasks.
- Any post tasks defined in the play.
- Any handlers triggered by post tasks.

Note

If using tags with tasks in a role, be sure to also tag your pre tasks, post tasks, and role dependencies and pass

those along as well, especially if the pre/post tasks and role dependencies are used for monitoring outage window control or load balancing. See ref" tags for details on adding and using tags.

```
System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\ansible-devel\docs\docsite\rst\user_guide\[ansible-devel] [docs] [docsite] [rst] [user_guide] playbooks_reuse_roles.rst, line 143); backlink
Unknown interpreted text role "ref".
```

You can pass other keywords to the roles option:

```
---
- 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
```

When you add a tag to the role option, Ansible applies the tag to ALL tasks within the role.

When using vars: within the roles: section of a playbook, the variables are added to the play variables, making them available to all tasks within the play before and after the role. This behavior can be changed by ref DEFAULT PRIVATE ROLE VARS'.

```
System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\ansible-devel\docs\docsite\rst\user_guide\[ansible-devel] [docs] [docsite] [rst] [user_guide] playbooks_reuse_roles.rst, line 166); backlink
Unknown interpreted text role "ref".
```

Including roles: dynamic reuse

You can reuse roles dynamically anywhere in the tasks section of a play using include_role. While roles added in a roles section run before any other tasks in a play, included roles run in the order they are defined. If there are other tasks before an include role task, the other tasks will run first.

To include a role:

```
---
- hosts: webservers
tasks:
- name: Print a message
ansible.builtin.debug:
    msg: "this task runs before the example role"

- name: Include the example role
include_role:
    name: example

- name: Print a message
ansible.builtin.debug:
    msg: "this task runs after the example role"
```

You can pass other keywords, including variables and tags, when including roles:

```
---
- hosts: webservers
  tasks:
    - name: Include the foo_app_instance role
    include_role:
        name: foo_app_instance
    vars:
        dir: '/opt/a'
        app_port: 5000
    tags: typeA
...
```

When you add a ref: tag < tags > to an include role task, Ansible applies the tag only to the include itself. This means you can

pass --tags to run only selected tasks from the role, if those tasks themselves have the same tag as the include statement. See ref. selective reuse for details.

```
System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\ansible-devel\docs\docsite\rst\user_guide\[ansible-devel] [docs] [docsite] [rst] [user_guide] playbooks_reuse_roles.rst, line 208); backlink
Unknown interpreted text role "ref".
```

```
System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\ansible-devel\docs\docsite\rst\user_guide\[ansible-devel][docs][docsite][rst][user_guide]playbooks_reuse_roles.rst, line 208); backlink
Unknown interpreted text role "ref".
```

You can conditionally include a role:

```
---
- hosts: webservers
tasks:
- name: Include the some_role role
include_role:
    name: some_role
when: "ansible_facts['os_family'] == 'RedHat'"
```

Importing roles: static reuse

You can reuse roles statically anywhere in the tasks section of a play using import_role. The behavior is the same as using the roles keyword. For example:

```
---
- hosts: webservers
tasks:
- name: Print a message
ansible.builtin.debug:
msg: "before we run our role"

- name: Import the example role
import_role:
name: example

- name: Print a message
ansible.builtin.debug:
msg: "after we ran our role"
```

You can pass other keywords, including variables and tags, when importing roles:

```
---
- hosts: webservers
tasks:
- name: Import the foo_app_instance role
import_role:
    name: foo_app_instance
vars:
    dir: '/opt/a'
    app_port: 5000
...
```

When you add a tag to an import_role statement, Ansible applies the tag to *all* tasks within the role. See ref: tag_inheritance for details.

```
System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\ansible-devel\docs\docsite\rst\user_guide\[ansible-devel] [docs] [docsite] [rst] [user_guide]playbooks_reuse_roles.rst, line 259); backlink
Unknown interpreted text role "ref".
```

Role argument validation

Beginning with version 2.11, you may choose to enable role argument validation based on an argument specification. This specification is defined in the <code>meta/argument_specs.yml</code> file (or with the <code>.yaml</code> file extension). When this argument specification is defined, a new task is inserted at the beginning of role execution that will validate the parameters supplied for the role against the specification. If the parameters fail validation, the role will fail execution.

Note

Ansible also supports role specifications defined in the role meta/main.yml file, as well. However, any role that defines the specs within this file will not work on versions below 2.11. For this reason, we recommend using the meta/argument specs.yml file to maintain backward compatibility.

Note

When role argument validation is used on a role that has defined <a href="ref": dependencies < role_dependencies">role_dependencies, then validation on those dependencies will run before the dependent role, even if argument validation fails for the dependent role.

Specification format

The role argument specification must be defined in a top-level <code>argument_specs</code> block within the role <code>meta/argument_specs.yml</code> file. All fields are lower-case.

entry-point-name:

- The name of the role entry point.
- This should be main in the case of an unspecified entry point.
- This will be the base name of the tasks file to execute, with no .yml or .yaml file extension.

short_description:

Unknown interpreted text role 'ref'.

- A short, one-line description of the entry point.
- The short description is displayed by ansible-doc -t role -1.

description:

• A longer description that may contain multiple lines.

author:

- Name of the entry point authors.
- Use a multi-line list if there is more than one author.

options:

- Options are often called "parameters" or "arguments". This section defines those
 options.
- For each role option (argument), you may include:

option-name:

• The name of the option/argument.

description:

• Detailed explanation of what this option does. It should be written in full sentences.

type:

• The data type of the option. See <a href: Argument spec argument_spec for allowed values for type. Default is str.

System Message: ERROR/3
(D:\onboardingresources\sampleonboardingresources\ansibledevel\docs\docsite\rst\user_guide\
[ansible-devel][docs]
[docsite][rst]
[user_guide]playbooks_reuse_roles.rst,
line 323); backlink

• If an option is of type list, elements should be specified.

Unknown interpreted text role 'ref'.

required:

- Only needed if true.
- If missing, the option is not required.

default:

- If required is false/missing, default may be specified (assumed 'null' if missing).
- Ensure that the default value in the docs matches the default value in the code. The actual default for the role variable will always come from defaults/main.yml.
- The default field must not be listed as part of the description, unless it requires additional information or conditions.
- If the option is a boolean value, you can use any of the boolean values recognized by Ansible: (such as true/false or yes/no). Choose the one that reads better in the context of the option.

choices: • List of option values.

Should be absent if empty.

elements:
• Specifies the data type for list elements when type is

list

 If this option takes a dict or list of dicts, you can define the structure here.

Sample specification

```
# roles/myapp/meta/argument specs.yml
argument specs:
 # roles/myapp/tasks/main.yml entry point
 main:
   short description: The main entry point for the myapp role.
     myapp_int:
       type: "int"
       required: false
       default: 42
       description: "The integer value, defaulting to 42."
     myapp str:
       type: "str"
        required: true
       description: "The string value"
  # roles/maypp/tasks/alternate.yml entry point
 alternate:
   short description: The alternate entry point for the myapp role.
    options:
     myapp int:
        type: "int"
        required: false
        description: "The integer value, defaulting to 1024."
```

options:

Running a role multiple times in one play

Ansible only executes each role once in a play, even if you define it multiple times, unless the parameters defined on the role are different for each definition. For example, Ansible only runs the role $f \circ o$ once in a play like this:

```
---
- hosts: webservers
roles:
- foo
- bar
- foo
```

You have two options to force Ansible to run a role more than once.

Passing different parameters

If you pass different parameters in each role definition, Ansible runs the role more than once. Providing different variable values is not the same as passing different role parameters. You must use the roles keyword for this behavior, since <code>import_role</code> and <code>include role</code> do not accept role parameters.

This play runs the foo role twice:

```
---
- hosts: webservers
roles:
- { role: foo, message: "first" }
- { role: foo, message: "second" }
```

This syntax also runs the foo role twice;

```
---
- hosts: webservers
roles:
- role: foo
    message: "first"
- role: foo
    message: "second"
```

In these examples, Ansible runs foo twice because each role definition has different parameters.

Using allow duplicates: true

Add allow duplicates: true to the meta/main.yml file for the role:

```
# playbook.yml
---
- hosts: webservers
  roles:
    - foo
    - foo

# roles/foo/meta/main.yml
---
allow_duplicates: true
```

In this example, Ansible runs foo twice because we have explicitly enabled it to do so.

Using role dependencies

Role dependencies let you automatically pull in other roles when using a role. Ansible does not execute role dependencies when you include or import a role. You must use the roles keyword if you want Ansible to execute role dependencies.

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. The play object is the parent of all roles, including roles called by a dependencies list.

Role dependencies are stored in the meta/main.yml file within the role directory. This file should contain a list of roles and parameters to insert before the specified role. For example:

```
# roles/myapp/meta/main.yml
---
dependencies:
    - role: common
    vars:
        some_parameter: 3
    - role: apache
    vars:
        apache_port: 80
    - role: postgres
    vars:
        dbname: blarg
        other_parameter: 12
```

Ansible always executes roles listed in dependencies before the role that lists them. Ansible executes this pattern recursively when you use the roles keyword. For example, 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.

Running role dependencies multiple times in one play

Ansible treats duplicate role dependencies like duplicate roles listed under roles:: Ansible only executes role dependencies once, even if defined multiple times, unless the parameters, tags, or when clause defined on the role are different for each definition. If two roles in a play both list a third role as a dependency, Ansible only runs that role dependency once, unless you pass different parameters, tags, when clause, or use allow_duplicates: true in the role you want to run multiple times. See ref. 'Galaxy role dependencies <galaxy_dependencies>' for more details.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\ansible-devel\docs\docsite\rst\user_guide\[ansible-devel] [docs] [docsite] [rst]

```
[user_guide]playbooks_reuse_roles.rst, line 485); backlink
```

Unknown interpreted text role 'ref'.

Note

Role deduplication does not consult the invocation signature of parent roles. Additionally, when using vars: instead of role params, there is a side effect of changing variable scoping. Using vars: results in those variables being scoped at the play level. In the below example, using vars: would cause n to be defined as 4 through the entire play, including roles called before it.

In addition to the above, users should be aware that role de-duplication occurs before variable evaluation. This means that .term:`Lazy Evaluation` may make seemingly different role invocations equivalently the same, preventing the role from running more than once.

```
System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\ansible-devel\docs\docsite\rst\user_guide\[ansible-devel] [docs] [docsite] [rst] [user_guide] playbooks_reuse_roles.rst, line 491); backlink
```

Unknown interpreted text role "term".

For example, a role named car depends on a role named wheel as follows:

```
dependencies:
- role: wheel
n: 1
- role: wheel
n: 2
- role: wheel
n: 3
- role: wheel
n: 4
```

And the wheel role depends on two roles: tire and brake. The meta/main.yml for wheel would then contain the following:

```
dependencies:
    role: tire
    role: brake
```

And the meta/main.yml for tire and brake would contain the following:

```
--- allow duplicates: true
```

The resulting order of execution would be as follows:

```
tire(n=1)
brake(n=1)
wheel(n=1)
tire(n=2)
brake(n=2)
wheel(n=2)
...
car
```

To use allow_duplicates: true with role dependencies, you must specify it for the role listed under dependencies, not for the role that lists it. In the example above, allow_duplicates: true appears in the meta/main.yml of the tire and brake roles. The wheel role does not require allow_duplicates: true, because each instance defined by car uses different parameter values.

Note

See ref 'playbooks_variables' for details on how Ansible chooses among variable values defined in different places (variable inheritance and scope). Also deduplication happens ONLY at the play level, so multiple plays in the same playbook may rerun the roles.

```
System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\ansible-devel\docs\docsite\rst\user_guide\[ansible-devel] [docs] [docsite] [rst] [user_guide] playbooks_reuse_roles.rst, line 541); backlink
```

Embedding modules and plugins in roles

If you write a custom module (see <a href="ref" developing_modules" modules") or a plugin (see <a href="ref" developing_plugins" module wish to distribute it as part of a role. For example, if you write a module that helps configure your company's internal software, and you want other people in your organization to use this module, but you do not want to tell everyone how to configure their Ansible library path, you can include the module in your internal_config role.

```
System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\ansible-devel\docs\docsite\rst\user_guide\[ansible-devel] [docs] [docsite] [rst] [user_guide] playbooks_reuse_roles.rst, line 549); backlink
Unknown interpreted text role "ref".
```

```
System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\ansible-devel\docs\docsite\rst\user_guide\[ansible-devel][docs][docsite][rst] [user_guide]playbooks_reuse_roles.rst, line 549); backlink
Unknown interpreted text role "ref".
```

To add a module or a plugin to a role: Alongside the 'tasks' and 'handlers' structure of a role, add a directory named 'library' and then include the module directly inside the 'library' directory.

Assuming you had this:

```
roles/
   my_custom_modules/
    library/
     module1
   module2
```

The module will be usable in the role itself, as well as any roles that are called *after* this role, as follows:

```
---
- hosts: webservers
roles:
- my_custom_modules
- some_other_role_using_my_custom_modules
- yet_another_role_using_my_custom_modules
```

If necessary, you can also embed a module in a role to modify a module in Ansible's core distribution. For example, you can use the development version of a particular module before it is released in production releases by copying the module and embedding the copy in a role. Use this approach with caution, as API signatures may change in core components, and this workaround is not guaranteed to work.

The same mechanism can be used to embed and distribute plugins in a role, using the same schema. For example, for a filter plugin:

```
roles/
   my_custom_filter/
   filter_plugins
   filter1
   filter2
```

These filters can then be used in a Jinja template in any role called after 'my_custom_filter'.

Sharing roles: Ansible Galaxy

Ansible Galaxy is a free site for finding, downloading, rating, and reviewing all kinds of community-developed Ansible roles and can be a great way to get a jumpstart on your automation projects.

The client ansible-galaxy is included in Ansible. The Galaxy client allows you to download roles from Ansible Galaxy, and also provides an excellent default framework for creating your own roles.

Read the Ansible Galaxy documentation page for more information

```
System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\ansible-devel\docs\docsite\rst\user_guide\[ansible-devel][docs][docsite][rst] [user_guide]playbooks_reuse_roles.rst, line 598)
Unknown directive type "seealso".
```

```
.. seealso::
   :ref:`ansible_galaxy`
       How to create new roles, share roles on Galaxy, role management
   :ref:`yaml_syntax`
       Learn about YAML syntax
   :ref:`working_with_playbooks
       Review the basic Playbook language features
   :ref:`playbooks_best_practices`
    Tips and tricks for playbooks
   :ref: `playbooks variables`
       Variables in playbooks
   :ref:`playbooks conditionals`
       Conditionals in playbooks
   :ref:`playbooks_loops
   Loops in playbooks :ref:`tags`
       Using tags to select or skip roles/tasks in long playbooks
   :ref:`list_of_collections`
       Browse existing collections, modules, and plugins
   :ref:`developing_modules`
       Extending Ansible by writing your own modules
   `GitHub Ansible examples <a href="https://github.com/ansible/ansible-examples">https://github.com/ansible/ansible-examples</a>
       Complete playbook files from the GitHub project source
   `Mailing List <a href="https://groups.google.com/group/ansible-project">https://groups.google.com/group/ansible-project</a>
       Questions? Help? Ideas? Stop by the list on Google Groups
```