

Upgrade to Ansible 12/ansible-core 2.19 and above

Ansible Style Guide

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Survey on few Ansible Style
questions

Agenda

Upgrade to Ansible 12 and above (ansible-core 2.19 and above)

Ansible Style Guide

- Variables
- Tasks
- (some) Modules
- Jinja, filters, plugins

Installation of Ansible

Option 1: Ansible in repositories of your Linux distribution

It is likely to be outdated (even after e.g. `dnf update` 😊)

Option 2: Installation via `pip` (sometimes `pipx`) in a Python virtual environment

- Should be analysed considering Python version on Ansible control node and especially on managed nodes

Option 2.1 Multiple virtual environments depending on Managed nodes?

Option 3. Ansible Execution Environments

Ansible versions overview (as of February 2026)

Ansible community has certain ansible-core version as dependency		Requirements			Notes
Ansible community package version	ansible-core package version	Control node Python	Managed node Python	Managed node PowerShell	
14	2.21	3.12 - 3.14 (* I guess)	3.9 - 3.14 (* I guess)	5.1 (I guess)	Not released, planned to be released in June 2026
13	2.20	3.12 - 3.14	3.9 - 3.14	5.1	
12	2.19	3.11 - 3.13	3.8 - 3.13	5.1	
11	2.18	3.11 - 3.13	3.8 - 3.13	5.1	EOL in December 2025
10	2.17	3.10 - 3.12	3.7 - 3.12	5.1	EOL
9	2.16	3.10 - 3.12	2.7 / 3.6 - 3.12	3 - 5.1	EOL Last version compatible with CentOS 7 and AlmaLinux 8, Debian 10 (and SLES12?)
8	2.15	3.9 - 3.11	2.7 / 3.5 - 3.11	3 - 5.1	EOL

In previous Ansible versions

- `| succeeded` is not supported anymore, use `is succeeded`
- `include:` is not supported anymore, use `include_role` (or `import_role`)
- `pre_tasks/post_tasks` in playbooks are not necessary anymore, just use tasks with mix of tasks and e.g. `import_role`
- `is truthy/is falsy` was implemented in Ansible 2.10

Ansible 12 upgrade/Ansible-core 2.19 upgrade

😊 As with any newer Ansible versions: compatibility with newer collections (newer modules/new modules...)

😊 Faster templating leads to faster execution of certain tasks

😊 Better error reporting

Ansible 12 upgrade/Ansible-core 2.19 upgrade

😞 Evaluates variables in task attributes even in skipped tasks, eg. `delegate_to`.

😞 Evaluates variables in `import_tasks` that were skipped
((?) Could not reproduce today, probably not that straightforward...)

In general:

😞 Existing code must be changed

- Deprecation is not «quick» when you update often but it is «quick» when you update Ansible rarely
- 1-2 changes are needed per year in «the whole codebase». Sometimes via e.g. «sed» but not always...

😞 Certain improvements are not improvements but regressions ?

Ansible 12 upgrade: conditionals

No more support of conditionals like
(defaults/main.yml:

```
vip_ip_address: 10.0.0.1)
```

~~`when: vip_ip_address`~~

What needs to be done?

- Variables in conditionals (`when:`) should contain one of the following:
 - **Strings:** `is truthy/is falsy`; in this case `when: vip_ip_address is truthy`
 - **Lists/dictionaries:** `|length > 0`
 - **Booleans or strings that can be converted to booleans:** `| bool`.
(it is not necessary for actual Booleans but it is recommended so that it less risk of confusion)
 - ... or there is Ansible test (`«in», «is»`): this results in a Boolean

Buy yourself time with `ALLOW_BROKEN_CONDITIONALS` and then search in Ansible logs those warnings?

Conditionals: you will need |bool

Below will result in a string, no matter the spelling of `true/false` etc..

You should use `|bool` on expressions that result in `true/false` strings

```
input_verification_phase1: >-  
  {%- if trg_solution |d('') is truthy and trg_solution_id|d('') is truthy -%}  
  true  
  {%- elif src_solution_id |d('') is truthy -%}  
  true  
  {%- else -%}  
  false  
  {%- endif -%}
```

Ansible 12 upgrade: `delegate_to`

- Sometimes a «virtual host» is used
 - «virtual»: it is not in an inventory; nor it is added via `add_host`
 - it is sometimes part of a conditional
- What needs to be done:
 - It can't be an empty value ☹, it shouldn't be false
 - These variables in `delegate_to` should then have:
 - `|d (omit)`
 - Or «fake», non-empty string (for example `"void_host"`)

Ansible 12 upgrade: undefined variables as values of task attributes

For example: value of `delegate_to` can never be undefined variable in all tasks (including skipped ones):

```
[ERROR]: Task failed: 'new_ca_renewalmaster' is undefined
```

Task failed.

Origin: /repo/roles/umantis.infra_ipaserver/tasks/changefreeipamaster.yml:1:3

```
1 - name: Change CA renewal master
  ^ column 3
```

<<< caused by >>>

```
'new_ca_renewalmaster' is undefined
```

Origin: home/repo/roles/umantis.infra_ipaserver/tasks/changefreeipamaster.yml:3:16

```
1 - name: Change CA renewal master
2   shell: "ipa config-mod --ca-renewal-master-server {{ new_ca_renewalmaster }}"
3   delegate_to: "{{ new_ca_renewalmaster }}"
    ^ column 16
```

```
fatal: [freeipahost.domain.com -> {{ new_ca_renewalmaster }}]: FAILED! =>
  changed: false
  msg: 'Task failed: ''new_ca_renewalmaster'' is undefined'
```

References

<https://forum.ansible.com/t/python-3-7-impact-on-el8-future-for-el9/6229>

https://docs.ansible.com/projects/ansible/latest/reference_appendices/release_and_maintenance.html#support-life

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Acknowledgements/credits

Thanks to:

- My team: Site Reliability Team of Ansible Umantis
- Ansible core team
- Red Hat team that maintains «Automation Good Practices»;
- Companies that created and published their Style Guides:
LinuxFabrik, Whitecloud, Adfinis...
- People who published their Style Guide and other Ansible-related work: Thomas Jungbauer; Felix Fontein, Thomas C. Foulds, George Shuklin; Andreas Sommer; Vladimir Botka; Jeff Geerling...



HR Software for DACH (Germany, Austria, Switzerland)

- Applicant Management/Employee Management, On-/Off-boarding, Expense Management....
- Salary module

Leader in ERP- Software in Switzerland

- The largest independent SW vendor of Business Software for SME, founded in 1985
- Software for Finance, HR, Administration, Production, etc.
- 65'000 happy customers

Objectives

- To have an Ansible Style guide that:
 - leads to code that is written faster without compromises on quality - understood (results in less cognitive load)/maintained/debugged/reused easier...
 - doesn't suggest the code/code style that introduces a fault into managed node

also:

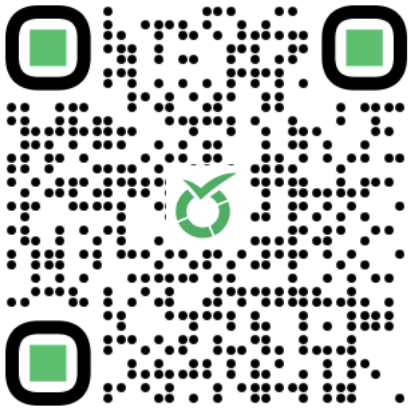
- Ansible code that has reasonable performance

And in general the suggested guideline:

Less typing is better in case it is not a compromise on risk...

(Somewhat) contentious questions

Contentious question	Alternative 1 (preferred by me and some other speakers and attendees)	Alternative 2
1. Dictionary notation	Dot notation (possible in ~95% of cases): some keys collide with attributes and methods of python dictionaries. Use bracket notation if you use keys that start and end with two underscores that have special meanings in python, or are any of the known public attributes: (...) <code>{{ mydictionary.examplekey }}</code>	Bracket notation <code>{{ mydictionary['examplekey'] }}</code>
2. Prefixing variables	Prefixes with role name so variable name is unique in the codebase	Additional prefixes like: Internal : double underscore __ Registered variable: r_
3. Usage of quotes	Only if necessary	All strings are to be quoted
4. Option for quotes	<ul style="list-style-type: none">- External quotes: double - ""- Internal quotes: - single ' '- Additional quotes – use YAML multiline >-	<ul style="list-style-type: none">- Single quotes: ' '- (because of Windows paths?)
5. Verb being used at the start of task name	Verbs like: “Install” “Create” “Configure” or prefer “Ensure”	
6. Format of the inventory file	INI or YAML, mostly YAML	



Types of variables

- String
- Integer
- Floats (fairly rare)
- List
 - Typically you use element from the list, like [0], [1]
- Boolean: `true` and `false` (other options are possible though!)

- Dictionaries

```
mydictionary:
```

```
    name: rene
```

```
    lastname: magritte
```

- List of dictionaries (it is a list but there are dictionaries)

```
mylistofdictionaries:
```

```
- name: rene
```

```
  lastname: magritte
```

```
  works:
```

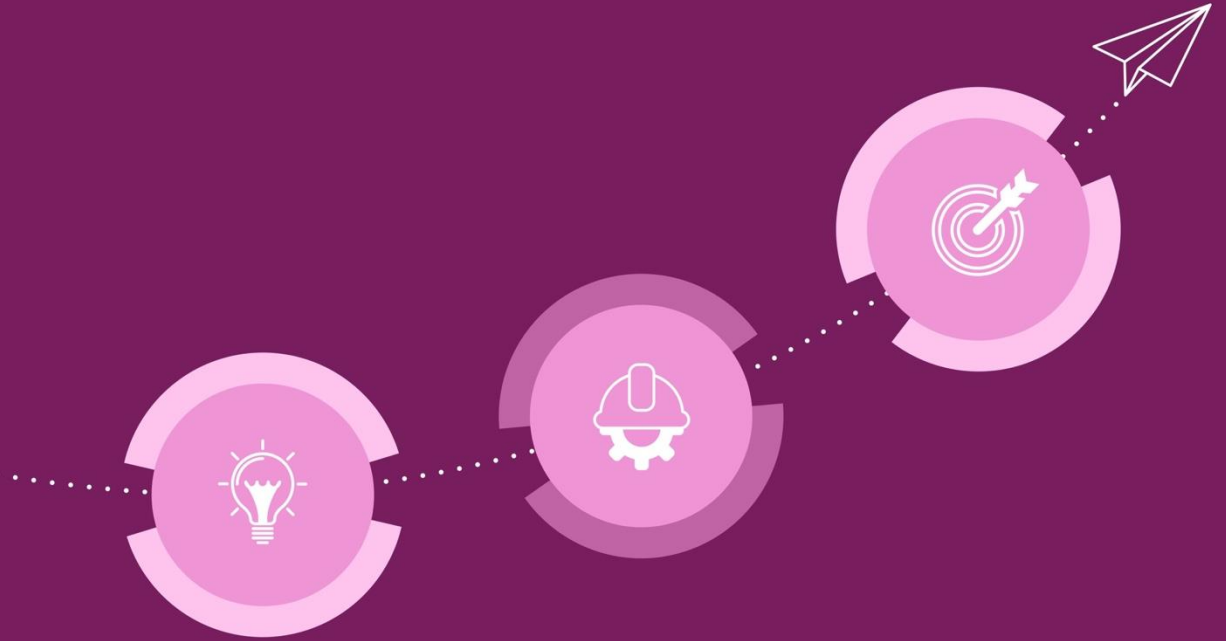
```
    - the son of a man
```

```
    - the treachery of images
```

```
- name: paul
```

```
  lastname: van Haver
```

```
  stagename: stromae
```



Notation for Ansible Style Guide guidelines

Short:

<Category>-<number>, categories are «VAR», «TASKS», «MODULE», etc.

Long shorm:

<Category>-<number>.o1 or o2.r<revision>

(«o» stands for option»

Example VAR-3 or VAR-3.o1.r1

Handling of conditional/boolean values

VAR-7

- Instead of:

```
myapp_upgrade_needed |d(True) == True
```

use:

```
myapp_upgrade_needed |bool
```

Instead of:

```
myapp_upgrade_needed |d(false) == False
```

use

```
not upgrade_needed |d(true)|bool
```

Mixing strings and None: using truthy/falsy

VAR-8

- Always use `else` in Jinja conditionals
- You might choose not to put anything after `else` : it will result in `None` and typically it should be fine (or you should implement e.g. `assert`)

```
peer_host: >-  
  {%- if other_datacenter |bool -%}  
  webproxy01.{{ peer_dns_zone }}  
  {%- else -%}  
  {%- endif -%}
```

| `bool` : only strings "1", "on", "yes", and "true" (case insensitive), or the numeral 1 return true. So you should use: `when: peer_host is truthy`

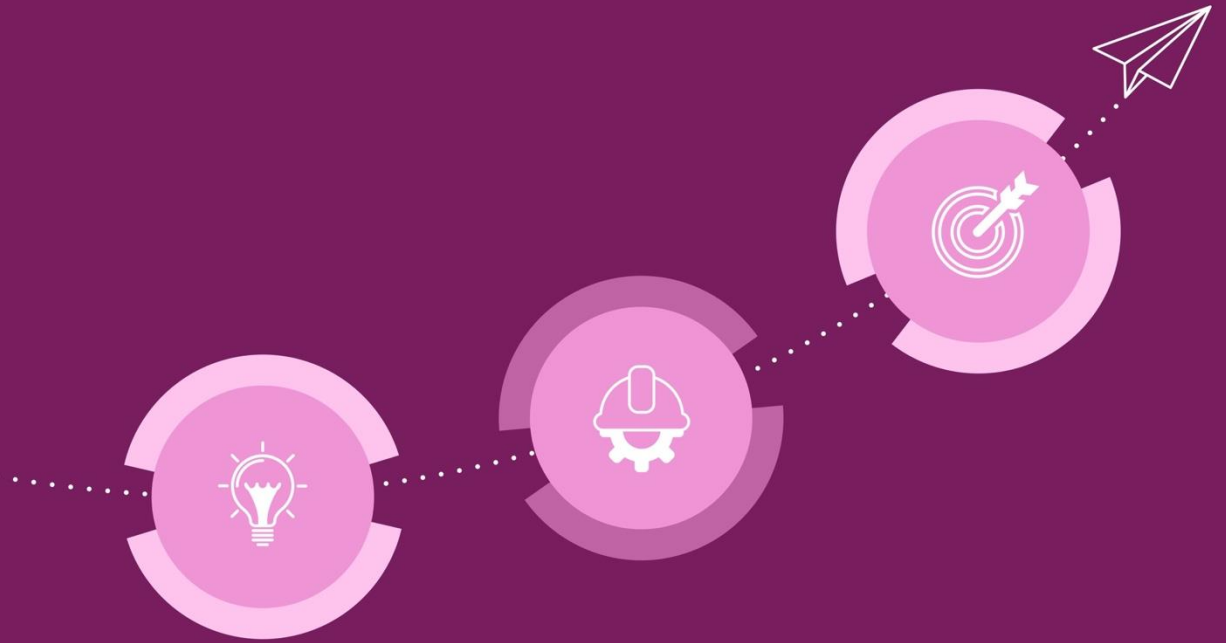
Variables: Jinja

Jinja2 allows to implement among other things:

- Templates:
 - **MODULE-3**
 - `ansible.builtin.template` should be preferred to `ansible.builtin.file`, it is more future-proof

In templates or in variables with those «directive methods»:

- Slightly more understandable conditionals (`if/elif/else`) for variables
- Loops using `for` (much faster than `loop:` and typically would give more features; but it is more complex)
- Changing values of variables



Conditionals

VAR-4

Simpler, one-liner:

```
vm_net_bridge_name: "{{ 'virtmgmt' if vm_net == 'infra_mgmt' and virt_node |bool else vm_net }}"
```

```
vault_installation_required: "{{ true if installed_vault_version.stdout |d('') != vault_version else false }}"
```

More complex conditions:

```
src_tenant: >-
  {%- if src_tenant_stable.rc == 0 and src_tenant_beta.rc == 1 -%}
  {{ src_tenant_stable }}
  {%- elif src_tenant_stable.rc == 1 and src_tenant_beta.rc == 0 -%}
  {{ src_tenant_beta }}
  {%- else -%}
  staging
  {%- endif -%}
```

Integers vs strings

- Integers:
 - implement comparison and arithmetic operations
- In case you don't need arithmetics:
 - You can't easily specify integer via extra-vars, so sometimes you use `|int` to cast to integer

Defining default values/ |default filter

VAR-9

- Default value for boolean: `|d(false)` (sometimes your better choice is `|d(true)`)
- Default value for a string: `|d('')`
- Default value for list `|d([])`
- Default value for dictionary `|d({})`

List of dictionaries

- **VAR-10**
- Recommended structure of variables that are more complex: **list of dictionaries**
- It is fairly easy to implement many things in list of dictionaries (in `configuration_properties` there are keys with name value :
 - **loop:** just specify `{{ configuration_properties }}` then use `{{ item.value }}`
 - Retrieval of a value: `selectattr`
 - Create list of certain values: `map`
 - More complex: write «Jinja with directives»

https://docs.ansible.com/ansible/latest/collections/ansible/builtin/subelements_lookup.html

https://docs.ansible.com/ansible/latest/playbook_guide/complex_data_manipulation.html

Nested loops/subelements

- **VAR-11**
- «One variable»: sometimes there is a **list inside a dictionary** that is inside of a list of dictionaries (sic!) and you need to iterate through that
 - Use: `| subelements filter`
- «Two variables»: sometimes there is a **separate** list; something should be executed for every element in the first list
 - For example there are 4 databases (`postgres_databases`) and for each one you need to enable 4 Postgres extensions (`postgres_extensions`)
- Use: `with_nested`

Defining default values/ |default filter

- **VAR-12**
 - **Option 1 (recommended)** Try to initialize variables, typically in `defaults/main.yml`
 - And then remove «`is defined`» statements; less «variable not defined» errors
 - No need to use `|d` everywhere
 - **Option 2**
 - Use `|d` a lot

`|d` will **always** be used on variables coming from «register» statements

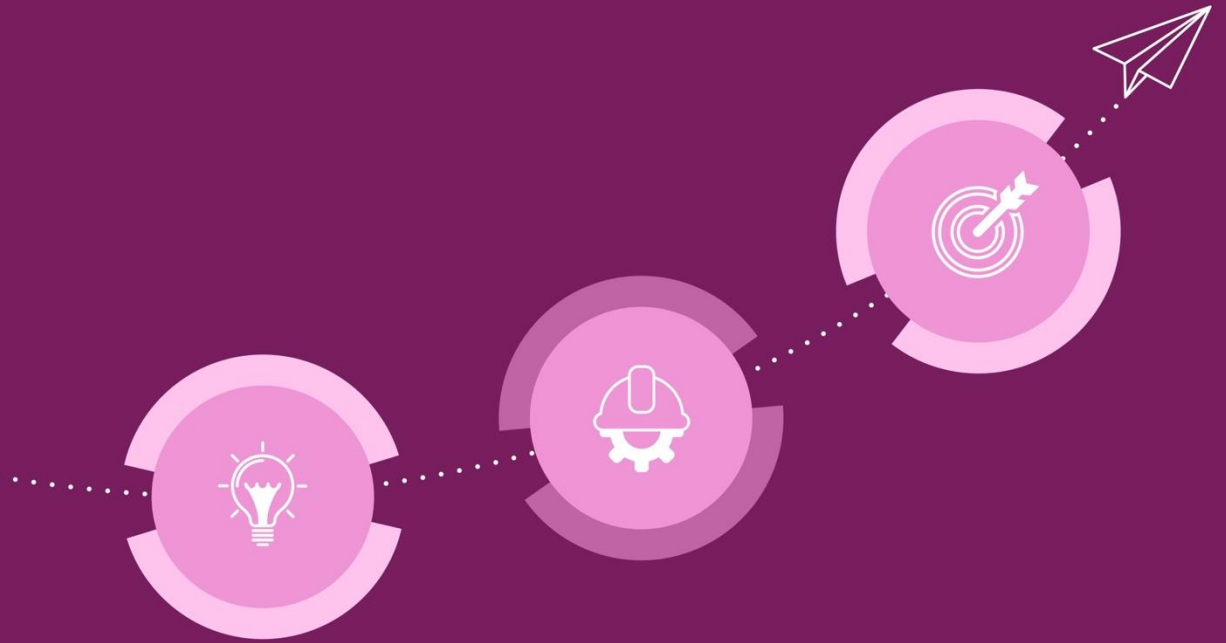
Variable definition 101

- `defaults/main.yml`
 - could be overridden by `group_vars` and/or `extra_vars`
- `vars/main.yml`
 - Those are **constants**: they have priority over `defaults/group_vars`. Even though you can - please do not override them via `extra_vars`

Then there are:

- `group_vars` (but remember about DRY and 'all' group)
- Inventory variables
- `set_fact`

And other places – but do you need them?



vars vs. defaults; to_nice_yaml

- **VAR-13**
- Variable used by a single role
 - Typically: `defaults/main.yml` or `vars/main.yml`;
- Variable used by several roles:
 - Variable used by **two (or 3)** roles: `include_vars`
 - When it is used more than that:
 - Alternative 1: `group_vars/all/`: particular when roles have nothing to do with each other
 - Alternative 2: more `include_vars`

`vars/main.yml` vs. `defaults/main.yml`

- In case it is overridden by `group_vars/extra_vars`: then it should be in `defaults/main.yml`
- In case you consider that sometime in future this configuration might change because of SW version change: put it to `defaults/main.yml` and not in `vars/main.yml`

Additional files. In case, for example variables that contain different messages:

`vars/communication.yml`

It won't be »sourced« automatically, you will need `include_vars`

Use cases of `set_fact`

Typical use cases:

- «finalizing» the variable, eg. a password
- «propagating» variable to other hosts (`set_fact` with `delegate_facts`)
- it is done in a loop (but maybe you could use Jinja?), `include_tasks` implemented via a loop

Overwrite variable «dynamically»:

- in the beginning of the execution variable has certain value, but you need to get it changed (or you overwrite Ansible built-in variable)

A pitfall, static nature of `import_tasks`:

set_fact and **when**: you can't use `import_tasks` on a «new value», you should use `include_tasks`

Recommendations

VAR-14

- A lot of `set_fact` usage can be avoided
 - typically to be replaced by `vars/main.yml`

VAR-15

- Avoid 'variable undefined' error by going through checklist:
 - Does a variable have a sensible default?
 - Use `defaults/main.yml` or other location
 - Empty value is sometimes fine but sometimes you need to avoid that («assert») to avoid «empty» getting e.g. as script parameter unintentionally
 - Is the variable a «runtime» one (`register`)? Then use `|d` filter

Extra-vars vs. tags

- **Extra-vars (-e option of ansible-playbook command)**
- In most of the cases it will end up as a string (non-strings are to be JSON)

VAR-16:

- Extra vars should not be mandatory for Day0/Day1 playbooks

VAR-17:

- Extra vars must be documented; typically should be verified by `assert/fail`
- **Tags (-t of ansible-playbook command)**
 - Shorten the execution time/show clearly which tasks are executed/speed up troubleshooting
- **TASKS-6**
 - There should be no changes in outcomes of «execute with all tags» vs. «execute with a specific tag»

Debugging

When writing play, use tags and debug statements:

- Tags:
 - Some of the tags are useful in normal operation (less time for executing some exact task)
 - Tags are very useful in troubleshooting
 - Some of the tags are useful also in the maintenance of Ansible code
- Debug

Two main alternatives:

```
debug:  
  msg: "{{ variable_to_debug }}"
```

- Fairly often it is nice to leave them in code with `verbosity: 1`

```
pause:  
  prompt: "{{variable_to_debug }}"
```

Use **to_nice_yaml** filter in most of cases to make nicer output of various eg. dictionaries/lists within eg. «debug» module

Meta/main.yml

- In case you publish to Galaxy: OK!
- Otherwise look at your `meta/main.yml`:
 - Does anyone read/update it?
 - It is not used automatically by most of Ansible functionality
 - Do not use dependencies there, use `import_role`

TASKS-2

`meta/main.yml` directory can be removed completely in most cases
meta subdirectory is to say in case use `argument_specs.yml`

Blocks

TASKS-3

Main use case:

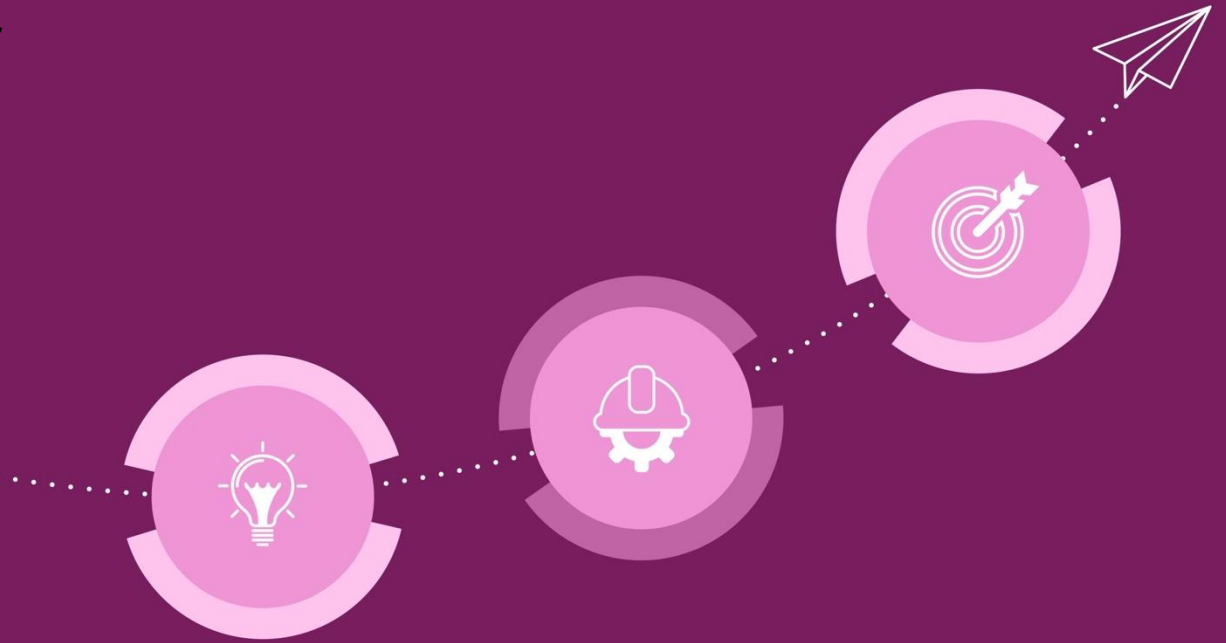
- You must use `block` when you would like to use `rescue`:

Other use cases:

- 2 or 3 tasks with common task attributes: maybe `block` is better, up to you!
- More than 3 tasks: consider using separate file and `import_tasks`

import_tasks/include_tasks

- **TASKS-4** Prefer `import_tasks` over `include_tasks` in case possible
- `import_tasks` is good because it can decrease the amount of same values for certain attributes over and over, attributes like:
 - `become:`
 - `become_user:`
 - `run_once:`
 - `delegate_to:`
 - `tags:`



Assert vs. fail

MODULE-6

- `ansible.builtin.assert/ansible.builtin.fail` modules implement «fail early» principle and provide user-friendly failure handling
- One of the main parameters is information that you give within: it is meant to be used by user executing Ansible
- Any playbook with more complicated input or somewhat «unreliable output» will benefit from `assert/fail`
- For multiple conditions `assert`: seems better than `fail`

Assert

MODULE-7

- `ansible.builtin.assert`

You might skip using `fail_msg` in case name of the task describes the condition

MODULE-3

- In case there are multiple conditions:
 - make sure that they are on separate lines and make sure that `fail_msg` contains text that covers all conditions!

Ansible filters vs. Jinja built-in methods

- Ansible filters
 - **Pipe** notation
- Ansible tests
- Jinja built-in methods
 - Very similar to Ansible filters
 - **Dot** notation

Lookup plugin(s)

- Always executed on Ansible control node (!)
- Functionality of various lookup plugins:
 - Generate random password
 - Check file contents
 - Find files that match the pattern (`find`)
 - Execute some Linux command (so that output of command is in Ansible variable)
 - For example `date` or `dig`

MODULE-4

Even though there are facts on `ansible_date_time` in most of cases lookup/pipe

An example of the value for variable below: 2024-08-16T13:42:45.906+0200

```
current_date_full: "{{ lookup('pipe', 'date +%Y-%m-%dT%H:%M:%S.%3N%z') }}"
```

Comparison/search/grep

FILTER_TEST_JINJA-1

- Equal to `==` ; not equal to: `!=` ; Comparison: `>` and `<` , typically with casting to **integer** (`| int`)
- Check if particular element is a element in a list or substring is part of a string:

`in`

- Search is done via Ansible **test**:

```
release_jira_description |lower is search('secondary')
```

- `regex_search/regex_findall`: Ansible filters that extract part of line
 - `k8stool_download.dest | regex_search('.*\.(gz|zip|bz2|xz)$')`
 - `found_rpms_base: "{{ found_issues.meta.issues[0].fields.description | regex_findall('application-(?:package1| package2)_(?:beta|stable).*?\.\rpm') }}"`

Checking if a file exists/read a file

Ansible Control Node:

FILTER_TEST_JINJA-2

Check if a file exists in Ansible control node:

```
hosts_path: /etc/hosts
```

```
...
```

```
  debug:
```

```
    msg: "host file exists"
```

```
  when: hosts_path is exists
```

Read file contents , file is on Ansible control node:

```
lookup/'file'
```

```
info_new_dc: "{{ lookup('file', 'somedirectory/example.yml') | from_yaml }}"
```

Managed Node:

MODULE-5

Checking if file exists in managed node

- `ansible.builtin.stat` and `register`
- `exists` dictionary key with boolean

Read file contents, file is on the managed node:

```
ansible.builtin.slurp
```

QR code to PDF with this task



Right now there is only a PDF with this talk but I plan to put Markdown version of the Style Guide and, later, some examples in YAML files

References

RedHat Automation Good Practices:

https://redhat-cop.github.io/automation-good-practices/#_introduction

Linuxfabrik's Ansible Development Guidelines:

<https://github.com/Linuxfabrik/lfops/blob/main/CONTRIBUTING.rst>

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<https://github.com/tjungbauer/ansible-style-guide/blob/main/AnsibleStyleGuide.adoc>

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