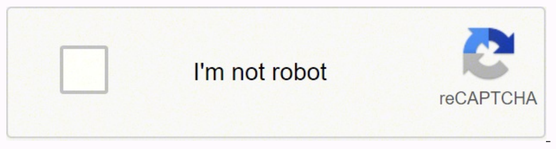
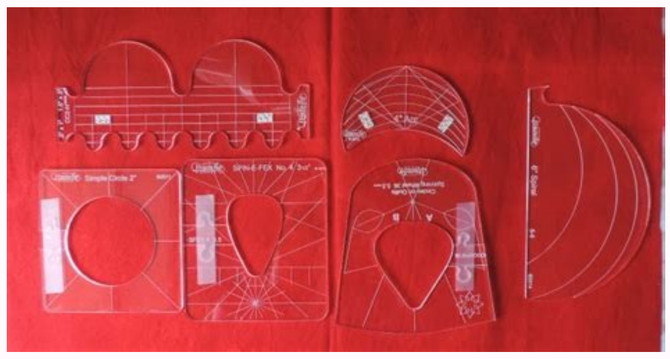
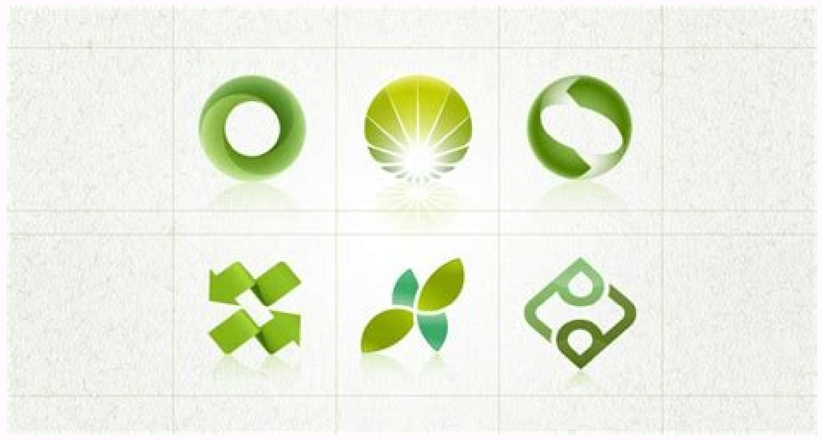


Next

Ansible jinja2 template set variable





This post is the first in the Jinja tutorial series where it will provide an overview of the language, discussion of its features and a healthy dose of example case use. If you are new to the world of templating, you know which models are but never used Jinja before, or you simply need to update your memory, then you should find this series useful. Jinja2 Tutorial Series Content Introduction What is Jinja2? Jinja2 is a language-rich feature models widely used in the Python ecosystem. It can be used directly in your Python programs and many larger applications use it as a model rendering engine. Templation languages allow the creation of text-based documents in which some of the contents can be generated dynamically. The resulting files can be HTML, JSON, XML or anything that uses pure text as encoding. The idea is to acquire corporate logic in the code while providing model design tools to control the flow and layout of the final document. Where is it used? Some notable examples of Jinja2 applications are ansible, django, bottle, salt and trac. Many other Python Web paintings also use this as well © countless other Python projects. What is so good? Jinja2 is equipped with a lot of fantastic features: control structures (rings and conditional declarations) rich in filters and integrated tests Support for inheritance macro for custom filters HTML Sandbox Sandbox Environment for rendering in a safe way unreliable models easy to conduct debug discussions of syntax and example The use of the above characteristics will form a large part of this series. Why? © Should I use it? Web frames such as balloon and django or automation frames such as ansible and salt, provide box support for Jinja. It is a natural choice for the model of models when using one of those. Responsible even a lot of the Jinja syntax in its playback games. For your programs, you should consider using Jinja2 if you have text blocks generally generated by data structures. Not only will he do it separating your templates from your code will also allow others to make changes to the templates independently without having to change the application source code. I think having a good knowledge of Jinja2 will allow you to become more productive. It is also present in the world of network automation. With the widespread use of Jinja you will find that it is worth spending your time learning it. How does that work? Jinja2 essentially needs two ingredients of origin, model and data that will be used to make the final document. Jinja2 no matter where the data comes from, this could come from JSON returned by some APIs, be loaded from static YAML file, or simply be a Python Dice defined in our app. What matters is that we have Jinja's model and some data to do it with. Now we know what Jinja is and why one would use it. It is time to start looking at simple examples to familiarise yourself with the general look and structure of the models. The basic idea behind templating is to take some text documents and figure out which bits are unchanged among all cases and which can be parameterized. This means that we want some elements of the text to change depending on the available data. Since I work mainly with network device configurations, this is what I will use in my examples. Below you will find a short configuration fragment of Cisco IOS that we will use in our first example. hostname par-rtr-core-01 in ip domain lookup ip domain name local. ip name-server laboratory 1.1. 1.1 ip name server 8.8. 8.8 ntp server 0. Pool. ntp org prefers ntp server 1. Pool. ntp The first step we need to take is to identify the static elements and those that might change between devices. In our case, words such as "hostname", "ip name-server" etc. are configuration statements used by a particular network operating system. These remain Finish the same nos is running on the device. The actual host name, and eventually name and NTP server names, NTP, be transformed into variables that will be replaced by actual values when the model is rendered. Now, I said'maybe'about some of the elements because © These decisions are specific to your environment. Generally, it is easier to parameterize these elements in advance, although currently the same values are used everywhere. Over time, our network may grow and some of the values may depend on the region or the data center position that is naturally suited to the use of variable reference. Or maybe you want to change one of the name servers, by parameterizing these values you just need to change them in a place followed by the regeneration of the configurations for all devices. For our example, I have decided to convert the host name, server names and ntp servers into variables. Our final model can be found below: hostname {{{hostname} no ip domain lookup ip domain name local. Laboratory name server {{{name}u server at}} ip name server {{{{name}u server sec}} ntp server {{{{ntp server} at} prefer ntp server {{{{{ntp server} In Jinja something found between double openings and double curly closures tells the engine to evaluate and then print it out. Here the only thing that is found between the curly straps is a name, in particular a variable name. Jinja expects this variable to be supplied to the engine by you and simply takes the value indicated by the variable by replacing the {name} statement with that value. In other words, Jinja substitutes the variable name for its value. This is the most fundamental component you will use in your models. Okay, one thing gets replaced by another. But how do we define "what" and how do we give it to the Jinja engine? This is where we need to choose a format and a data tool that feeds the data to our model. There are a lot of options, with those below that are the most commonly used. For the data: YAML file JSON For glue, some of the options: Python script Ansible playbook Integrated support inframework (Flask, Django) Examples For most of my examples I will use several Python scripts and Ansible playbooks, with data from Python's native dictate as well as YAML and JSON files. Here I will use a minimal script in Python followed by Ansible playbook. Ansible's example shows how easy it is to generate models with little or no programming capabilities. You will also see Ansible in the world of infrastructure automation, so it's good to know how to use it to generate files with templates. Example Python First of all, Python script: by jinja2 import Template = «»hostname {{ hostname name }}} no domain name ip ip ip domain name local.lab name-server {{name_server_pri }} name-server ip {{name_server_sec }}} server ntp {{ntp_server_pri }} prefer server ntp {{ «core-sw-waw-01», «name_server_pri»: '1.1.1.1', 'name_server_sec': '8.8.8.8', 'ntp_server_pri': «0.pool.ntp.org», «ntp_ server_sec»: «1.pool.ntp.org», } j2_template = Template (template) print (j2_template.render (data) And output: hostname core-sw-waw-01 no domain lookup ip domain name local.lab ip name-server 1.1.1.1 ip name-server 8.8.8 ntp server 0.pool.ntp.org prefer ntp server 1.pool.ntp.org It worked wonderfully. The template was made with the data we gave him. As you can see it is very simple, template is only a text with a postcard, date is a standard Python dictionary with each key name corresponding to the variable name in the template. We just need to create the jinja2 Template object and pass our data to its rendering method. I must say that the way we make Jinja in the script above should only be used for debugging and verification of the concept code. In the real world data should come from external files or databases and models should be loaded after creating the Jinja environment. I didn't want to change the water at first because we're going to go furtherConcepts a little later. Ansible example Just to show the alternatives, we also make the same model using Ansible. Here the model is stored in a separate file and the data comes from the var host file that corresponds to the device name, and it is so that we usually record the per-host data. Below is the structure of the directory: przemek@quasar :~/nauto/jinja/ansible$ls -R.: cough. yml host whose out template-simple-render models. yml whose host: core-sw-waw-01. yml./ out: /Top templates: core-sw-waw-01. j2./ vars: YAML file with data: (venv) przemek@quasar :~/nauto/jinja/ansible$cat host vars/core-sw-waw-01. yml ---hostname: core-sw-waw-01 name'u server'at: 1.1. 1.1 name of server sec: 8.8. 8.8 ntp server price: 0. pool. ntp org ntp server sec: 1. pool. ntp org The model is identical to the one used in the Python example but is stored in an external file: (venv) przemek@quasar :~/nauto/jinja/ansible$cat templates/base-cfg. j2 hostname {{{hostname} no ip domain lookup ip domain name local. Laboratory name server {{{name}u server at}} ip name server {{{name}sec server}} ntp server {{{ntp server}at} prefer ntp server {{{{ntp server sec} And finally, playbook that does the rendering: (venv) przemek@quasar :~/nauto/jinja/ansible$cat j2-simple-render. yml ---- -host: core-sw-waw-01 collect'u facts: no link: local activities: -Name: Render config for host template: src: "templates/base-cfg.j2" dest: "out/{Inventory hostname}.cfg" All that remains to run our Playbook: (venv) przemek@quasar :~/nauto/jinja/ansible$ansible-playbook -and hosts. yml j2-simple-render. yml [core-sw-waw-01] It's something that's wrong. TASK [Host Memory Configuration] It's something that's wrong. Changed: It's something that's wrong. core-sw-waw-01: ok=1 change=1 unreachable=0 fail=0 skipped=0 ignored=0 corresponds to the output of the Python script, except here we save the output in the file: (venv) mek@quasar :~/nauto/jinja/ansible$cat out/core-sw-waw-01. cfg hostname core-sw-waw-01 in ip domain lookup ip domain name local. lab ip name server 1.1. 1.1 ip name server 8.8. 8.8 ntp server 0. pool. ntp org prefers ntp server 1. pool. ntp org These examples may not be too exciting, but with the mere substitution of variables we can create some useful models. You can also see how little was required to start with the rendering models in Ansible. Dictionaries as variables We continue with the substitution of variables but will use a more complex data structure. This time we'll use variables that are dictionary. The use of dictionaries (also called hash tables or objects) allows the logical grouping of related data pieces. For example, attributes related to a single interface can be stored in a dictionary, shown in JSON format here: {"interface": {"name": "GigabEth1/1/1I I'address': 10.0.0.0.1.1/311/I'interface''Description: Uplink to Korean'Uplink to Korean'Uplink to Korean'91212Link912124Uplink to 9124Uplink to 91212to 444444Access to the elements in the dictionary is very convenient, It is enough to know the key to get the corresponding value, and therefore they are omnipresent in the world of JSON and YAML. Jinja provides a practical way to access the dictionary keys using the point notation. "However, this only works for keys that do not have special characters in the name. Using the interface dictionary above we can create configuration fragments of the interface using the following templates: interface {interface.name} description {{interface.description} ip address {{{{interface.ip address} speed {{interface.speed}}} duplex {{interface.duplex} mtu {{interface.mtu} once rendered: GigabitEthernet1/1 Description Uplink to core ip address 10.0. 0.1/31 speed 1000 duplex full mtu 9124 So was quite simple but already offers more possibilities than using simple variables, especially for objects with Attributes. Now, remember I mentioned that the dot notation cannot be used with keys with special characters in their names. If you have. dot, – - dash, or anything else that is not allowed as a character in the Python variable name then you cannot use the dot notation. In these cases, you need to use the standard Python subscription notation []. I find this to be mostly a problem with keys that are IP addresses. For example, to access the 10.0. 0.0/24 key in the dictionary below we need to use Python subscriptions: prefixes: 10.0. 0.0/24: description: Business NAS region: European website: Telehouse-West Template using 10.0. 0.0/24: Details for 10.0. 0.0/24 prefixes: Description: {} prefixes['10.0.0/24*].Description} Region:}}}} Prefixes['10.0.0/24'} region}}} Site: {prefixes['10.0 This is actually relatively common when it comes to larger models that use a lot of variables. By default, when you encounter a valuation statement with the undefined variable, Jinja will replace it with an empty string. This often comes as a surprise to people writing their first models. This behavior can be changed by setting undefined arguments, taken from the Template and Environment objects, to a different undefined Jinja type. The default type is Unefined, but there are other types available, RigneUnefined is the most useful. Using the Rightindefined type we tell Jinja to increase the error whenever there is an attempt to use the indefinite variable. Compare the rendering results of the underlying model with the data provided, the first one with the default Undefined type and the second one using Rigned: from jinja2 template import template = "Device {name}} is a {}}} type located in the {datacenter} site". data ="name": "waw-rtr-core-01", "site": " warsaw-01",} j2_template = template (template) print (j2_template.render (data) } Device waw-rtr-core-01 is a in Warsaw 01-datacenter. Our model has referred to the type of variable name, but the data we supplied have not var so that the final assessment results in an empty string. Second run will use StrictUndefined type: from Jinja2 import Template, StrictUndefined template = "Device {{name}} is a {{type}} located in the {{site}} datacenter." data = {name: waw-RTR-core-01, website: warsaw-01, j2_template} = Template (template, StrictUndefined = undefined) (venknja $ prme j2_undef_var_strict.py python Traceback (most recent call last :) j2_undef_var_strict.py File , line 12, print (j2_template.render (date) Home / przemek / Nauto / jinja / python / venv / lib / python3.6 / site-packages / Jinja2 / environment.py, line 1090, to render self .environment.handle_exception) (Home / przemek / Nauto / jinja / venv / lib / python3.6 / site-packages / jipynja2 / environment UndefinedError: the type is undefined With the strict error checking we get the error right away. It is worth noting that Ansible StrictUndefined uses by default, so when using the Jinja model errors will be obtained every time that there is a reference to an undefined variable. Overall suggest always to enable the type is not defined in StrictUndefined. If you do not you can get some very subtle bugs in your models that will be difficult to t rovare. At first it might be easy to see why © missing a value in the output but over time, with patterns that grow bigger, it's hard for the human eye to notice something is not right. Definitely do not want to be the realization of your models are broken when you load the configuration on your devices! Before closing this post I just wanted to show to include comments in your templates. Generally, models should be self-explanatory, but comments are useful when more people are working on the same model and your future car will probably be thankful for explaining even the non-obvious bits. You can also use the comment syntax to disable parts of the template during debugging. Comments are added using the syntax {# ... #}. Anything between {# and #} is treated as a comment and will be ignored by the engine. Here is our first example with some comments added: from jinja2 import Template = Â"Â"Â"Â"hostname {{ hostname }} {# DNS configuration -#} no search for the domain ip ip domain name local.lab ip name-server {{ name_server_pri }}}} ip name-server {{name_server_sec }}}} {{{{name_sec }}}}}}}}} { # Configuring server time, we should use pool.ntp.org -#} ntp server {{ ntp_server_pri }}} prefer ntp server {{ ntp_server_sec }}} ntp server {{ ntp_server_trd }Â"Â"Â"Â"Â"Â"Â"Â"Â"Â"Â"Â"Â" { "hostname": "core-sw-waw-01", "pri_server_name": "1.1.1.1", "sec_name": "8.8.8.8", "ntp_server_pri": "0.pool.ntp.org", "ntp_server_server_ secÂ": "1.pool.ntp.orgÂ", } j2_template = Template (template) print [j2_template.render (data)] output: hostname core-sw-waw-01 no ip domain lookup ip domain name local.lab ip name-server 1.1.1.1 ip name-server 8.8.8 ntp server 0.pool.ntp.ntp.org prefer ntp server 1.pool.ntp.org ntp server No comments. Although you might have noticed â (hyphen) character just before closing #}. Without that hyphen, an extra blank line would have been added after every comment. The treatment of white spaces in Jinja is not very intuitive and is probably one of the most confusing parts of the language. In one of the next posts I will discuss in detail different scenarios and techniques that will allow you to make your models exactly as you want. Conclusion This concludes the first post of the Jinja Tutorial series. What I've shown you here should be enough to start your models. In future posts we will take a look at othersAnd we will work through examples illustrating the cases of use. Stay tuned! References References

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