Discovering variables: facts and magic variables

With Ansible you can retrieve or discover certain variables containing information about your remote systems or about Ansible itself. Variables related to remote systems are called facts. With facts, you can use the behavior or state of one system as configuration on other systems. For example, you can use the IP address of one system as a configuration value on another system. Variables related to Ansible are called magic variables.

- Ansible facts
 - Package requirements for fact gathering
 - Caching facts
 - Disabling facts
 - Adding custom facts
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 - Ansible version

Ansible facts

Ansible facts are data related to your remote systems, including operating systems, IP addresses, attached filesystems, and more. You can access this data in the ansible_facts variable. By default, you can also access some Ansible facts as top-level variables with the ansible_prefix. You can disable this behavior using the ref: INJECT_FACTS_AS_VARS' setting. To see all available facts, add this task to a play:

```
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_vars_facts.rst, line 15); backlink
Unknown interpreted text role "ref".
```

```
- name: Print all available facts
ansible.builtin.debug:
  var: ansible_facts
```

To see the 'raw' information as gathered, run this command at the command line:

```
ansible <hostname> -m ansible.builtin.setup
```

Facts include a large amount of variable data, which may look like this:

```
"ansible_all_ipv4_addresses": [
   "REDACTED IP ADDRESS"
"ansible all ipv6 addresses": [
    "REDACTED IPV6 ADDRESS"
"ansible apparmor": {
   "status": "disabled"
"ansible architecture": "x86 64",
"ansible_bios_date": "11/28/2013",
"ansible bios version": "4.1.5",
"ansible cmdline": {
    "BOOT IMAGE": "/boot/vmlinuz-3.10.0-862.14.4.el7.x86 64",
    "console": "ttyS0,115200",
    "no timer check": true,
   "nofb": true,
   "nomodeset": true,
    "ro": true,
    "root": "LABEL=cloudimg-rootfs",
   "vga": "normal"
"ansible date time": {
   "date": "2018-10-25",
"day": "25",
   "epoch": "1540469324", "hour": "12",
   "iso8601": "2018-10-25T12:08:44Z",
    "iso8601 basic": "20181025T120844109754",
    "iso8601 basic short": "20181025T120844",
    "iso8601 micro": "2018-10-25T12:08:44.109968Z",
    "minute": "08",
```

```
"month": "10",
    "second": "44",
    "time": "12:08:44",
    "tz": "UTC",
    "tz_offset": "+0000",
    "weekday": "Thursday",
    "weekday_number": "4",
    "weeknumber": "43",
    "year": "2018"
},
"ansible_default_ipv4": {
    "    "DEDACTED"
    "address": "REDACTED",
    "alias": "eth0",
    "broadcast": "REDACTED",
    "gateway": "REDACTED",
    "interface": "eth0",
    "macaddress": "REDACTED",
    "mtu": 1500,
    "netmask": "255.255.255.0",
    "network": "REDACTED",
    "type": "ether"
"ansible default ipv6": {},
"ansible_device_links": {
    "ids": {},
    "labels": {
        "xvda1": [
            "cloudimg-rootfs"
        "xvdd": [
            "config-2"
    "masters": {},
    "uuids": {
        "xvda1": [
            "cac81d61-d0f8-4b47-84aa-b48798239164"
        "xvdd": [
            "2018-10-25-12-05-57-00"
"ansible devices": {
    "xvda": {
        "holders": [],
        "host": "",
        "links": {
            "ids": [],
            "labels": [],
            "masters": [],
            "uuids": []
        "model": null,
        "partitions": {
            "xvda1": {
                 "holders": [],
                 "links": {
                     "ids": [],
                     "labels": [
                         "cloudimg-rootfs"
                     "masters": [],
                     "uuids": [
                         "cac81d61-d0f8-4b47-84aa-b48798239164"
                 "sectors": "83883999",
                 "sectorsize": 512,
                 "size": "40.00 GB",
"start": "2048",
                 "uuid": "cac81d61-d0f8-4b47-84aa-b48798239164"
            }
        "removable": "0",
        "rotational": "0",
        "sas address": null,
        "sas device handle": null,
        "scheduler_mode": "deadline",
        "sectors": "83886080",
        "sectorsize": "512",
```

```
"size": "40.00 GB",
        "support discard": "0",
        "vendor": null,
        "virtual": 1
    },
"xvdd": {
        "holders": [],
        "host": "",
        "links": {
            "ids": [],
"labels": [
                 "config-2"
             "masters": [],
             "uuids": [
                 "2018-10-25-12-05-57-00"
        "model": null,
        "partitions": {},
        "removable": "0",
        "rotational": "0"
        "sas address": null,
        "sas_device_handle": null,
        "scheduler mode": "deadline",
        "sectors": "131072",
        "sectorsize": "512",
        "size": "64.00 MB",
        "support discard": "0",
        "vendor": null,
        "virtual": 1
    "xvde": {
        "holders": [],
        "host": "",
        "links": {
            "ids": [],
             "labels": [],
             "masters": [],
            "uuids": []
        "model": null,
        "partitions": {
             "xvde1": {
                 "holders": [],
                 "links": {
                     "ids": [],
                     "labels": [],
                     "masters": [],
                     "uuids": []
                 "sectors": "167770112",
                 "sectorsize": 512,
                 "size": "80.00 GB",
                 "start": "2048",
                 "uuid": null
            }
        "removable": "0",
        "rotational": "0",
        "sas address": null,
        "sas_device_handle": null,
        "scheduler mode": "deadline",
        "sectors": "167772160",
        "sectorsize": "512",
        "size": "80.00 GB",
        "support_discard": "0",
        "vendor": null,
        "virtual": 1
    }
"ansible_distribution": "CentOS",
"ansible_distribution_file_parsed": true,
"ansible_distribution_file_path": "/etc/redhat-release",
"ansible distribution file variety": "RedHat",
"ansible_distribution_major_version": "7",
"ansible distribution release": "Core",
"ansible_distribution_version": "7.5.1804",
"ansible_dns": {
    "nameservers": [
        "127.0.0.1"
```

```
"ansible domain": "",
"ansible effective group id": 1000,
"ansible_effective_user_id": 1000,
"ansible env": {
    "HOME": "/home/zuul",
    "LANG": "en_US.UTF-8",
    "LESSOPEN": "||/usr/bin/lesspipe.sh %s",
    "LOGNAME": "zuul",
    "MAIL": "/var/mail/zuul",
    "PATH": "/usr/local/bin:/usr/bin",
    "PWD": "/home/zuul",
    "SELINUX_LEVEL_REQUESTED": "",
    "SELINUX_ROLE_REQUESTED": "",
    "SELINUX USE CURRENT RANGE": "",
    "SHELL": "/bin/bash",
"SHLVL": "2",
    "SSH CLIENT": "REDACTED 55672 22",
    "SSH CONNECTION": "REDACTED 55672 REDACTED 22",
    "USER": "zuul",
    "XDG_RUNTIME_DIR": "/run/user/1000",
    "XDG SESSION ID": "1",
    "_": "/usr/bin/python2"
"ansible_eth0": {
    "active": true,
    "device": "eth0",
    "ipv4": {
        "address": "REDACTED",
        "broadcast": "REDACTED",
"netmask": "255.255.255.0",
        "network": "REDACTED"
    "ipv6": [
        {
            "address": "REDACTED",
            "prefix": "64",
            "scope": "link"
    "macaddress": "REDACTED",
    "module": "xen_netfront",
    "mtu": 1500,
    "pciid": "vif-0",
    "promisc": false,
    "type": "ether"
"ansible eth1": {
    "active": true,
    "device": "eth1",
    "ipv4": {
        "address": "REDACTED",
        "broadcast": "REDACTED",
        "netmask": "255.255.224.0",
        "network": "REDACTED"
    "ipv6": [
        {
            "address": "REDACTED",
"prefix": "64",
            "scope": "link"
    "macaddress": "REDACTED",
    "module": "xen netfront",
    "mtu": 1500,
    "pciid": "vif-1",
    "promisc": false,
    "type": "ether"
"ansible_fips": false,
"ansible_form_factor": "Other",
"ansible fqdn": "centos-7-rax-dfw-0003427354",
"ansible hostname": "centos-7-rax-dfw-0003427354",
"ansible_interfaces": [
   "lo",
"eth1",
    "eth0"
"ansible_is_chroot": false,
```

```
"ansible kernel": "3.10.0-862.14.4.el7.x86 64",
"ansible lo": {
    "active": true,
    "device": "lo",
    "ipv4": {
        "address": "127.0.0.1",
        "broadcast": "host",
"netmask": "255.0.0.0",
        "network": "127.0.0.0"
    },
"ipv6": [
        {
            "address": "::1",
            "prefix": "128",
"scope": "host"
    ],
    "mtu": 65536,
    "promisc": false,
    "type": "loopback"
},
"ansible_local": {},
"ansible lsb": {
    "codename": "Core",
    "description": "CentOS Linux release 7.5.1804 (Core)",
    "id": "CentOS",
    "major_release": "7",
    "release": "7.5.1804"
"ansible machine": "x86 64",
"ansible_machine_id": "2db133253c984c82aef2fafcce6f2bed",
"ansible memfree mb": 7709,
"ansible_memory_mb": {
    "nocache": {
        "free": 7804,
        "used": 173
    "real": {
        "free": 7709,
        "total": 7977,
        "used": 268
    "swap": {
        "cached": 0,
        "free": 0,
        "total": 0,
        "used": 0
    }
"ansible_memtotal_mb": 7977,
"ansible mounts": [
        "block_available": 7220998,
        "block size": 4096,
        "block_total": 9817227,
        "block used": 2596229,
        "device": "/dev/xvda1",
        "fstype": "ext4",
        "inode_available": 10052341,
        "inode_total": 10419200,
        "inode used": 366859,
        "mount": "/",
        "options": "rw, seclabel, relatime, data=ordered",
        "size available": 29577207808,
        "size total": 40211361792,
        "uuid": "cac81d61-d0f8-4b47-84aa-b48798239164"
        "block_available": 0,
        "block size": 2048,
        "block total": 252,
        "block_used": 252,
        "device": "/dev/xvdd",
        "fstype": "iso9660",
        "inode available": 0,
        "inode_total": 0,
        "inode used": 0,
        "mount": "/mnt/config",
        "options": "ro, relatime, mode=0700",
        "size available": 0,
        "size_total": 516096,
```

```
"uuid": "2018-10-25-12-05-57-00"
    }
"ansible nodename": "centos-7-rax-dfw-0003427354",
"ansible_os_family": "RedHat",
"ansible pkg mgr": "yum",
"ansible_processor": [
    "0",
    "GenuineIntel",
    "Intel(R) Xeon(R) CPU E5-2670 0 @ 2.60GHz",
    "GenuineIntel",
    "Intel(R) Xeon(R) CPU E5-2670 0 @ 2.60GHz",
    "2",
    "GenuineIntel",
    "Intel(R) Xeon(R) CPU E5-2670 0 @ 2.60GHz",
    "3",
    "GenuineIntel",
    "Intel(R) Xeon(R) CPU E5-2670 0 @ 2.60GHz",
   "4",
    "GenuineIntel",
    "Intel(R) Xeon(R) CPU E5-2670 0 @ 2.60GHz",
    "GenuineIntel",
    "Intel(R) Xeon(R) CPU E5-2670 0 @ 2.60GHz",
    "GenuineIntel",
    "Intel(R) Xeon(R) CPU E5-2670 0 @ 2.60GHz",
    "GenuineIntel",
    "Intel(R) Xeon(R) CPU E5-2670 0 @ 2.60GHz"
"ansible_processor_cores": 8,
"ansible_processor_count": 8,
"ansible_processor_nproc": 8,
"ansible_processor_threads_per_core": 1,
"ansible processor vcpus": 8,
"ansible_product_name": "HVM domU",
"ansible product serial": "REDACTED",
"ansible_product_uuid": "REDACTED",
"ansible_product_version": "4.1.5",
"ansible python": {
    "executable": "/usr/bin/python2",
    "has sslcontext": true,
    "type": "CPython",
    "version": {
        "major": 2,
        "micro": 5,
        "minor": 7,
        "releaselevel": "final",
        "serial": 0
    "version_info": [
       2,
        7,
        "final",
   ]
"ansible python version": "2.7.5",
"ansible_real_group_id": 1000,
"ansible_real_user_id": 1000,
"ansible_selinux": {
    "config_mode": "enforcing",
    "mode": "enforcing",
    "policyvers": 31,
   "status": "enabled",
    "type": "targeted"
"ansible_selinux_python_present": true,
"ansible_service_mgr": "systemd",
"ansible_ssh_host_key_ecdsa_public": "REDACTED KEY VALUE",
"ansible_ssh_host_key_ed25519_public": "REDACTED KEY VALUE",
"ansible ssh host key rsa public": "REDACTED KEY VALUE",
"ansible_swapfree_mb": 0,
"ansible swaptotal mb": 0,
"ansible_system": "Linux",
"ansible_system_capabilities": [
],
```

```
"ansible system capabilities enforced": "True",
"ansible system vendor": "Xen",
"ansible_uptime_seconds": 151,
"ansible user dir": "/home/zuul",
"ansible_user_gecos": "",
"ansible user gid": 1000,
"ansible_user_id": "zuul",
"ansible_user_shell": "/bin/bash",
"ansible user uid": 1000,
"ansible_userspace_architecture": "x86_64",
"ansible userspace bits": "64",
"ansible_virtualization_role": "guest",
"ansible virtualization type": "xen",
"gather_subset": [
    "all"
"module setup": true
```

You can reference the model of the first disk in the facts shown above in a template or playbook as:

```
{{ ansible_facts['devices']['xvda']['model'] }}
```

To reference the system hostname:

```
{{ ansible facts['nodename'] }}
```

You can use facts in conditionals (see ref. playbooks_conditionals) and also in templates. You can also use facts to create dynamic groups of hosts that match particular criteria, see the ref. group_by module < group_by module > documentation 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_vars_facts.rst, line 502); 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_vars_facts.rst, line 502); backlink
Unknown interpreted text role "ref".
```

Note

Because ansible_date_time is created and cached when Ansible gathers facts before each playbook run, it can get stale with long-running playbooks. If your playbook takes a long time to run, use the pipe filter (for example, lookup('pipe', 'date +%Y-%m-%d.%H:%M:%S')) or ref.now() <templating_now>` with a Jinja 2 template instead of ansible_date_time.

```
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_vars_facts.rst, line 504); backlink
Unknown interpreted text role "ref".
```

Package requirements for fact gathering

On some distros, you may see missing fact values or facts set to default values because the packages that support gathering those facts are not installed by default. You can install the necessary packages on your remote hosts using the OS package manager. Known dependencies include:

 \bullet Linux Network fact gathering - Depends on the <code>ip</code> binary, commonly included in the <code>iproute2</code> package.

Caching facts

Like registered variables, facts are stored in memory by default. However, unlike registered variables, facts can be gathered independently and cached for repeated use. With cached facts, you can refer to facts from one system when configuring a second system, even if Ansible executes the current play on the second system first. For example:

```
{{ hostvars['asdf.example.com']['ansible_facts']['os_family'] }}
```

Caching is controlled by the cache plugins. By default, Ansible uses the memory cache plugin, which stores facts in memory for the duration of the current playbook run. To retain Ansible facts for repeated use, select a different cache plugin. See ref cache _plugins` 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_vars_facts.rst, line 526); backlink
Unknown interpreted text role "ref".
```

Fact caching can improve performance. If you manage thousands of hosts, you can configure fact caching to run nightly, then manage configuration on a smaller set of servers periodically throughout the day. With cached facts, you have access to variables and information about all hosts even when you are only managing a small number of servers.

Disabling facts

By default, Ansible gathers facts at the beginning of each play. If you do not need to gather facts (for example, if you know everything about your systems centrally), you can turn off fact gathering at the play level to improve scalability. Disabling facts may particularly improve performance in push mode with very large numbers of systems, or if you are using Ansible on experimental platforms. To disable fact gathering:

```
- hosts: whatever gather_facts: no
```

Adding custom facts

The setup module in Ansible automatically discovers a standard set of facts about each host. If you want to add custom values to your facts, you can write a custom facts module, set temporary facts with a <code>ansible.builtin.set_fact</code> task, or provide permanent custom facts using the facts.d directory.

facts.d or local facts

```
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_vars_facts.rst, line 552)
Unknown directive type "versionadded".
... versionadded:: 1.3
```

You can add static custom facts by adding static files to facts.d, or add dynamic facts by adding executable scripts to facts.d. For example, you can add a list of all users on a host to your facts by creating and running a script in facts.d.

To use facts.d, create an /etc/ansible/facts.d directory on the remote host or hosts. If you prefer a different directory, create it and specify it using the fact_path play keyword. Add files to the directory to supply your custom facts. All file names must end with .fact. The files can be JSON, INI, or executable files returning JSON.

To add static facts, simply add a file with the .fact extension. For example, create /etc/ansible/facts.d/preferences.fact with this content:

```
[general]
asdf=1
bar=2
```

```
Note
```

Make sure the file is not executable as this will break the ansible.builtin.setup module.

The next time fact gathering runs, your facts will include a hash variable fact named general with asdf and bar as members. To validate this, run the following:

```
ansible <hostname> -m ansible.builtin.setup -a "filter=ansible_local"
```

And you will see your custom fact added:

```
}
}
}
```

The ansible_local namespace separates custom facts created by facts.d from system facts or variables defined elsewhere in the playbook, so variables will not override each other. You can access this custom fact in a template or playbook as:

```
{{ ansible_local['preferences']['general']['asdf'] }}
```

Note

The key part in the key=value pairs will be converted into lowercase inside the ansibl_local variable. Using the example above, if the ini file contained XYZ=3 in the [general] section, then you should expect to access it as: {{ ansible_local['preferences']['general']['xyz'] }} and not {{ ansible_local['preferences']['general']['XYZ'] }}. This is because Ansible uses Python's ConfigParser which passes all option names through the optionxform method and this method's default implementation converts option names to lower case.

You can also use facts.d to execute a script on the remote host, generating dynamic custom facts to the ansible_local namespace. For example, you can generate a list of all users that exist on a remote host as a fact about that host. To generate dynamic custom facts using facts.d:

- 1. Write and test a script to generate the JSON data you want.
- 2. Save the script in your facts.d directory.
- 3. Make sure your script has the .fact file extension.
- 4. Make sure your script is executable by the Ansible connection user.
- 5. Gather facts to execute the script and add the JSON output to ansible local.

By default, fact gathering runs once at the beginning of each play. If you create a custom fact using facts.d in a playbook, it will be available in the next play that gathers facts. If you want to use it in the same play where you created it, you must explicitly re-run the setup module. For example:

If you use this pattern frequently, a custom facts module would be more efficient than facts.d.

Information about Ansible: magic variables

You can access information about Ansible operations, including the python version being used, the hosts and groups in inventory, and the directories for playbooks and roles, using "magic" variables. Like connection variables, magic variables are refi`special_variables`. Magic variable names are reserved - do not set variables with these names. The variable environment is also reserved.

```
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_vars_facts.rst, line 637); backlink
Unknown interpreted text role "ref".
```

The most commonly used magic variables are hostvars, groups, group_names, and inventory_hostname. With hostvars, you can access variables defined for any host in the play, at any point in a playbook. You can access Ansible facts using the hostvars variable too, but only after you have gathered (or cached) facts.

If you want to configure your database server using the value of a 'fact' from another node, or the value of an inventory variable

assigned to another node, you can use hostvars in a template or on an action line:

```
{{ hostvars['test.example.com']['ansible facts']['distribution'] }}
```

With groups, a list of all the groups (and hosts) in the inventory, you can enumerate all hosts within a group. For example:

```
{% for host in groups['app_servers'] %}
    # something that applies to all app servers.
{% endfor %}
```

You can use groups and hostvars together to find all the IP addresses in a group.

```
{% for host in groups['app_servers'] %}
   {{ hostvars[host]['ansible_facts']['eth0']['ipv4']['address'] }}
{% endfor %}
```

You can use this approach to point a frontend proxy server to all the hosts in your app servers group, to set up the correct firewall rules between servers, and so on. You must either cache facts or gather facts for those hosts before the task that fills out the template.

With group_names, a list (array) of all the groups the current host is in, you can create templated files that vary based on the group membership (or role) of the host:

```
{% if 'webserver' in group_names %}
  # some part of a configuration file that only applies to webservers
{% endif %}
```

You can use the magic variable <code>inventory_hostname</code>, the name of the host as configured in your inventory, as an alternative to <code>ansible_hostname</code> when fact-gathering is disabled. If you have a long FQDN, you can use <code>inventory_hostname_short</code>, which contains the part up to the first period, without the rest of the domain.

Other useful magic variables refer to the current play or playbook. These vars may be useful for filling out templates with multiple hostnames or for injecting the list into the rules for a load balancer.

ansible play hosts is the list of all hosts still active in the current play.

ansible play batch is a list of hostnames that are in scope for the current 'batch' of the play.

The batch size is defined by serial, when not set it is equivalent to the whole play (making it the same as ansible_play_hosts).

ansible playbook python is the path to the python executable used to invoke the Ansible command line tool.

inventory dir is the pathname of the directory holding Ansible's inventory host file.

inventory file is the pathname and the filename pointing to the Ansible's inventory host file.

playbook_dir contains the playbook base directory.

role path contains the current role's pathname and only works inside a role.

ansible_check_mode is a boolean, set to True if you run Ansible with --check.

Ansible version

```
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_vars_facts.rst, line 700)

Unknown directive type "versionadded".

.. versionadded:: 1.8
```

To adapt playbook behavior to different versions of Ansible, you can use the variable <code>ansible_version</code>, which has the following structure:

```
{
    "ansible_version": {
        "full": "2.10.1",
        "major": 2,
        "minor": 10,
        "revision": 1,
        "string": "2.10.1"
    }
}
```