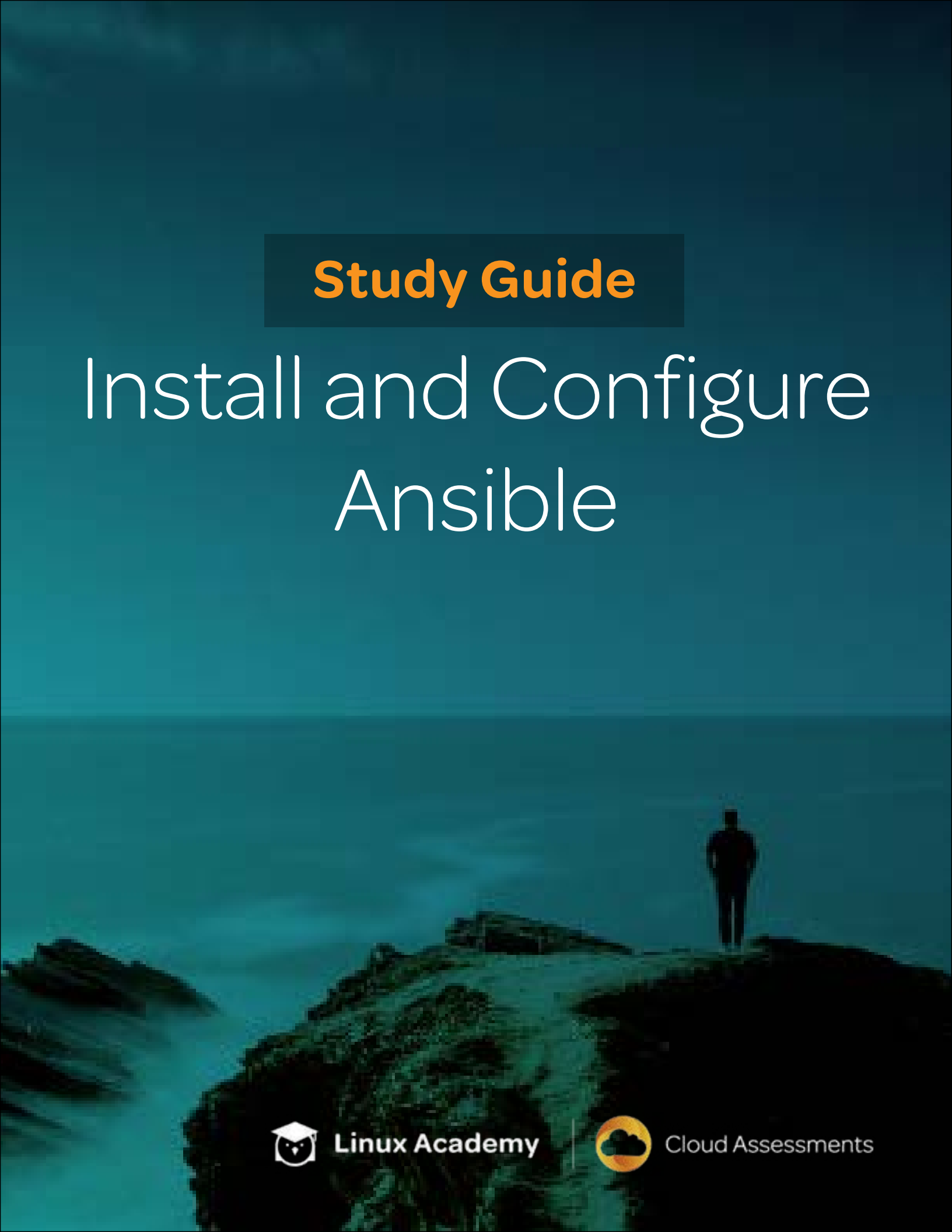
Study Guide

Install and Configure Ansible



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Install Ansible

- In order to install Ansible, you must configure the EPEL repository on your system.
- Once the EPEL repository is configured, your package manager installs Ansible and manage dependencies.
  - `sudo yum install ansible`
- It is advisable to install some means of source control as well.
  - `sudo yum install git`
- Configuration Files:
  - `/etc/ansible/ansible.cfg`:
    - The primary Ansible configuration file.
    - Notable configurations include:
      - Default inventory configuration.
      - Default remote user.
  - `/etc/ansible/hosts`:
    - Default Ansible Inventory File.
    - An inventory is a list of hosts that Ansible manages.
    - Inventory location may be specified as follows:
      - Default: `/etc/ansible/hosts`
      - Specified by CLI: `ansible -i`
      - Can be set in `ansible.cfg`

- Example Inventory file:

```
mail.example.com ansible_port=5556 ansible_host=192.168.0.10


[webservers]
httpd1.example.com
httpd2.example.com

[labservers]
lab[01:99]
```

  - The first line defines a host \mail.example.com\.
  - Two variables are affiliated with the host, \ansible_port\ and \ansible_host\
  - The group's web servers and lab servers are defined in this example.
  - Note the lab servers group has 99 hosts in it that are defined via a pattern.
  - The expression \lab[01:03]\\ is the same as specifying \lab01\, \lab02\, \lab03\.

- Configure SSH users (with sudo) and keys:
  - While it is possible to connect to a remote host with Ansible using password authentication using -k (note lowercase), it is not a common practice as it can incur significant overhead concerning manual intervention.
  - Ansible is best implemented using a common user across all Ansible controlled systems.
  - The ssh-keygen and ssh-copy-id command can facilitate creating a pre-shared key for user authentication.
  - /etc/sudoers may be edited to allow your selected user to sudo any command without a password for the most automated configuration using the line ansible ALL=(ALL) NOPASSWD: ALL.
  - It is also possible to prompt for a sudo password at runtime using -K (note uppercase) if desired; this can become a challenge when executing against many systems.

When you need help

- Useful documentation is provided at docs.ansible.com.
- A module index is provided at docs.ansible.com that provides detailed information on each module.
- Ansible ships with the `ansible-doc` command which:
  - Specifies a module name as a parameter will provide module specific documentation.
  - Uses the `-l` flag to list installed modules with a brief description.

Ansible ad-hoc

- Ansible ad-hoc commands are analogous to bash commands.
- Playbooks are analogous to bash scripts.
- Syntax: ansible <HOST> -b -m <MODULE> -a "<ARG1 ARG2 ARGN>" -f <NUM_FORKS>:
  - HOST is a host or host group defined in the Ansible inventory file.
  - b is for become:
    - Replaces the depreciated -s flag as in sudo.
    - Ansible escalates permission to –become-user using the method defined by –become-method.
    - Default become-user is root.
    - Default become-method is sudo.
  - m is for modules for the command to use.
  - a is used for parameters to pass, if used without m, it is like running a shell command on the target system(s).
  - f is used to set forks for parallelism, which is how you can have Ansible execute plays simultaneously on many hosts.
- Common modules with required parameters:
  - ping
  - setup
  - yum "name=<NAME> state=<STATE>"
  - service "name=<NAME> state=<STATE>"
  - copy "src=<SOURCE_PATH> dest=<ABSOLUTE_DESTINATION_PATH>"

Ansible Playbooks

- Basic Ansible Playbook structure:
  - As ad-hoc commands are to bash commands, playbooks are to bash scripts.
  - Playbooks are ran using the ansible-playbook command, not the ansible command.
  - You must specify the playbook to run as a parameter.
  - Playbooks are written in YAML:
    - Each play is an element in a sequence.
    - Plays contain lists of hosts and, at minimum, one or more tasks.
    - Each task has a name and module.
    - Modules may have parameters.
    - Improper indentation can cause a playbook to err in a vague way.
    - Spaces matter.

- Sample playbook:

```
---
      - hosts: webservers
        become: yes


        tasks:
        - name: ensure apache is at the latest version
        yum:
           name: httpd
           state: latest
        - name: write the apache config file
        template:
           src: /srv/httpd.j2
           dest: /etc/httpd.conf


      - hosts: databases
        remote_user: root


      tasks:
      - name: ensure postgresql is at the latest version
        yum:
           name: postgresql
           state: latest
      - name: ensure that postgresql is started
        service:
           name: postgresql
           state: started
```

- The above playbook is composed of two plays:
  - The first play installs a package (using the yum module) and creates a configuration file from a template (using the template module):
    - Note that become is set for the first play:
      - This is the same as using -b when running an ad-hoc command.
      - Ansible will use sudo to escalate to the root account on the remote system.
      - This is required for the tasks defined.
  - The second play ensures postgresql is installed and running using both the yum and service modules.
  - Note that become is not set in the second play yet the remote_user is set to root:

        - This is not a particularly good security practice but does demonstrate some basic Ansible configuration.

- Check Mode provides a quick sanity check:
    - Dry run that does not affect the systems.
    - Syntax: ansible-playbook foo.yml –check
- Retry file:
    - If a playbook fails, a retry file is generated containing the list of hosts where the play failed.
    - A file called <playbook-name>.retry is created upon a playbook failure.
    - The file may be specified using --limit with the same playbook to reattempt the playbook at a later time.
- Plays should be safe to run repeatedly against the same target without ill effect.

Ansible Variables

- Variable names should be letters, numbers, and underscores.
- Variables should always start with a letter.
- Examples of valid variable names:
  - foobar
  - foo_bar
  - foo5
- Examples of invalid variable names:
  - foo-bar
  - 1foobar
  - foo.bar
- Variables can be scoped by group, host, or within a playbook.
- Variables are passed in via the command line using the --extra-vars or -e flag or are defined within a playbook:
  - CLI Example: ansible-playbook service.yml -e "target_hosts=localhost target_service=httpd"
  - Playbook Example:

```
---

 hosts: webservers
 become: yes
 vars:
      target_service: httpd
      target_state: started
 tasks:
      - name: Ensure target service is at target state
        service:
        name: "{{ target_service }}"
        state: "{{ target_state }}"
```

- Variables are referenced using double curly braces.
- It is good practice to wrap variable names or statements containing variable names in weak quotes:
  - Example: `hosts: "{{ my_host_var }}"`
- Typical uses of variables:
- Customize configuration values.
- Hold return values of commands.
- Ansible has many default variables for controlling Ansible's behavior.

Ansible Facts

- Ansible facts are simply various properties regarding a given remote system.
- The `setup` module can retrieve facts:
  - The filter parameter takes regex to allow you to prune fact output.
- Facts are gathered by default in Ansible playbook execution:
  - The keyword `gather_facts` may be set in a playbook to change fact gathering behavior.
- It is possible to print Ansible facts in files using variables.
- Facts may be filtered using the setup module ad-hoc by passing a value for the `filter` parameter.
- Ansible command output may be directed to a file using the –tree outputfile flag which may be helpful when working with facts.
- It is possible to use `{{ ansible_facts }}` for conditional plays based on facts.

Debugging in Ansible

- The debug module may be used to help troubleshoot plays:
  - Used to print detail information about in-progress plays.
  - Handy for troubleshooting.
- Debug takes two primary parameters that at mutually exclusive:
  - msg: A message that is printed to STDOUT
  - var: A variable whose content is printed to STDOUT.
  - Example:

```
- debug:
    msg: “System {{ inventory_hostname }} has uuid {{ ansible_
    product_uuid }}”
```

- The register module is used to store task output:
  - It essentially can save results of a command.
  - Several attributes are available: return code, stderr, and stdout.
  - Example:

```
- hosts: all
  tasks:
  - shell: cat /etc/motd register: motd_contents
  - shell: echo “motd contains the word hi”
    when: motd_contents.stdout.find(‘hi’) != -1
```

Notifications and Handlers

- Ansible provides a mechanism that allows an action to be flagged for execution when a task performs a change.
- By only executing certain tasks during a change, plays are more efficient.
- This mechanism is known as a handler in Ansible.
- A handler may be called using the notify keyword.
- No matter how many times a handler is flagged in a play, it is only run once during a play's final phase.
- notify will only flag a handler if a task block makes changes:
  - Example:

```
- name: template configuration file
  template:
       src: template.j2
       dest: /etc/foo.conf
  notify:
       - restart memcached
       - restart apache
```

- The calls made in the notify section correspond to handler definitions within the play.
- A handler may be defined similarly to tasks:
  - Example:

```
handlers:
    - name: restart memcached
      service:
         name: memcached
         state: restarted
      listen: "restart cache service"
    - name: restart apache
      service:
         name: apache
         state:restarted
      listen: "restart web services"
```