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1.Ansible Introduction(puppet)

What is Ansible?

Ansible is an open-source IT automation tool. It helps automate tasks like:

- Installing software
- Configuring servers
- Managing networks
- Deploying applications

Ansible uses simple YAML files called **Playbooks** to describe what should be done. It is **agentless**, meaning you only need SSH access to the remote machines—no need to install extra software on them.

What is Puppet?

Puppet is another popular configuration management tool. It:

- Uses its own domain-specific language (DSL), similar to Ruby
- Usually follows a **client-server** model, with a central Puppet master
- Uses a **pull** model—clients pull configurations from the server

Ansible vs Puppet (Comparison):

Feature	Ansible	Puppet
Language	YAML (simple and readable)	DSL (Ruby-like, more complex)
Setup	Agentless (uses SSH)	Agent-based (requires installation)
Architecture	Push-based	Pull-based
Learning Curve	Easier	Steeper
Best For	Quick automation and provisioning	Large-scale infrastructure management

Why choose Ansible?

- Easy to learn and use
- No need to install agents on target machines
- Works well for quick setup and automation
- Flexible and suitable for various use cases, especially for small to mid-sized environments

2. Ad-hoc Ansible(puppet) commands

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Step 1: Setting Up Ubuntu and Ansible

Install Ubuntu

wsl --install –d Ubuntu: This installs **Ubuntu Linux** on your Windows system using WSL.

wsl.exe –d Ubuntu: This opens Ubuntu in the terminal.

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS C:\Windows\system32> wsl.exe -d Ubuntu
Provisioning the new WSL instance Ubuntu
This might take a while...
Create a default Unix user account: bvimit
New password:
Retype new password:
passwd: password updated successfully
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

Welcome to Ubuntu 24.04.2 LTS (GNU/Linux 5.15.167.4-microsoft-standard-WSL2 x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/pro

 System information as of Mon Apr  7 04:03:44 UTC 2025

  System load:  0.13               Processes:             32
  Usage of /:   0.1% of 1006.85GB  Users logged in:       0
  Memory usage: 11%                IPv4 address for eth0: 172.24.26.198
  Swap usage:   0%
```

sudo apt update && sudo apt u: This updates the list of available software and upgrades everything to the latest version.

```
pgrade -yITNM-DES-0028: /mnt/c/Windows/system32$ sudo apt update && sudo apt u
[sudo] password for bvimit:
Hit:1 http://archive.ubuntu.com/ubuntu noble InRelease
Get:2 http://archive.ubuntu.com/ubuntu noble-updates InRelease [126 kB]
Get:3 http://security.ubuntu.com/ubuntu noble-security InRelease [126 kB]
Get:4 http://archive.ubuntu.com/ubuntu noble-backports InRelease [126 kB]
Get:5 http://archive.ubuntu.com/ubuntu noble/universe amd64 Packages [15.0 MB]Get:6 http://security.ubuntu.com/ubuntu noble-security/main amd64 Packages [737 kB]
Get:7 http://security.ubuntu.com/ubuntu noble-security/main Translation-en [141 kB]
Get:8 http://security.ubuntu.com/ubuntu noble-security/main amd64 Components [9008 B]
Get:9 http://security.ubuntu.com/ubuntu noble-security/main amd64 c-n-f Metadata [7068 B]
Get:10 http://security.ubuntu.com/ubuntu noble-security/universe amd64 Packages [828 kB]
Get:11 http://security.ubuntu.com/ubuntu noble-security/universe Translation-en [180 kB]
Get:12 http://security.ubuntu.com/ubuntu noble-security/universe amd64 Components [52.3 kB]
Get:13 http://security.ubuntu.com/ubuntu noble-security/universe amd64 c-n-f Metadata [17.0 kB]
Get:14 http://security.ubuntu.com/ubuntu noble-security/restricted amd64 Packages [849 kB]
Get:15 http://security.ubuntu.com/ubuntu noble-security/restricted Translation-en [172 kB]
Get:16 http://security.ubuntu.com/ubuntu noble-security/restricted amd64 Components [212 B]
Get:17 http://security.ubuntu.com/ubuntu noble-security/restricted amd64 c-n-f Metadata [468 B]
Get:18 http://security.ubuntu.com/ubuntu noble-security/multiverse amd64 Packages [17.6 kB]
Get:19 http://security.ubuntu.com/ubuntu noble-security/multiverse Translation-en [3792 B]
Get:20 http://security.ubuntu.com/ubuntu noble-security/multiverse amd64 Components [212 B]
Get:21 http://security.ubuntu.com/ubuntu noble-security/multiverse amd64 c-n-f Metadata [380 B]
Get:22 http://archive.ubuntu.com/ubuntu noble/universe Translation-en [5982 kB]
Get:23 http://archive.ubuntu.com/ubuntu noble/universe amd64 Components [3871 kB]
Get:24 http://archive.ubuntu.com/ubuntu noble/universe amd64 c-n-f Metadata [301 kB]
Get:25 http://archive.ubuntu.com/ubuntu noble/multiverse amd64 Packages [269 kB]
Get:26 http://archive.ubuntu.com/ubuntu noble/multiverse Translation-en [118 kB]
Get:27 http://archive.ubuntu.com/ubuntu noble/multiverse amd64 Components [35.0 kB]
Get:28 http://archive.ubuntu.com/ubuntu noble/multiverse amd64 c-n-f Metadata [8328 B]
Get:29 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 Packages [987 kB]
```

ansible –version: This checks if Ansible is installed and shows the version.

```
bvimit@ITNM-DES-0028: /mnt/c/Windows/system32$ ansible --version
ansible [core 2.16.3]
  config file = None
  configured module search path = ['/home/bvimit/.ansible/plugins/modules', '/usr/share/ansible/plugins/modules']ntu noble/main amd64 python3-jmespath all 1  ansible python module location = /usr/l
hon3/dist-packages/ansible
  ansible collection location = /home/bvimit/.ansible/collections:/usr/share/ansible/collectionsil d9 [21.2 kB]
  executable location = /usr/bin/ansiblenoble/universe amd64 python3-lockfile
  python version = 3.12.3 (main, Feb  4 2025, 14:48:35) [GCC 13.3.0] (/usr/bin/python3)tp://archive.ubuntu.com/ubuntu noble/main amd64 python3-simplejson am  jinja version = 3.1.25 kB]
  libyaml = Truechive.ubuntu.com/ubuntu noble/universe amd64 python3-libcloud
bvimit@ITNM-DES-0028: /mnt/c/Windows/system32$
```

ansible localhost -m ping: Sends a test "ping" to your own system using Ansible to check if it works.

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```
bvimit@IMITNM-DES-0028:/mnt/c/Windows/system32$ ansible localhost -m ping
[WARNING]: No inventory was parsed, only implicit localhost is available
localhost | SUCCESS => {
    "changed": false,
    "ping": "pong"
}
bvimit@IMITNM-DES-0028:/mnt/c/Windows/system32$
```

Run following command in Ubuntu

ansible localhost -m shell -a "whoami": Runs the whoami command to see the current user using the shell module.

```
bvimit@IMITNM-DES-0028: ~
bvimit@IMITNM-DES-0028:~$ ansible localhost -m shell -a "whoami"
[WARNING]: No inventory was parsed, only implicit localhost is available
localhost | CHANGED | rc=0 >>
bvimit
bvimit@IMITNM-DES-0028:~$
```

ansible localhost -m shell -a "ls -la /home/$USER": Lists all files and folders in your home directory (in detail).

```
bvimit@IMITNM-DES-0028:~$ ansible localhost -m shell -a "ls -la /home/$USER"
[WARNING]: No inventory was parsed, only implicit localhost is available
localhost | CHANGED | rc=0 >>
total 32
drwxr-x--- 5 bvimit bvimit 4096 Apr  7 04:08 .
drwxr-xr-x 3 root   root   4096 Apr  7 04:03 ..
drwxr-xr-x 3 bvimit bvimit 4096 Apr  7 04:08 .ansible
-rw-r--r-- 1 bvimit bvimit  220 Apr  7 04:03 .bash_logout
-rw-r--r-- 1 bvimit bvimit 3771 Apr  7 04:03 .bashrc
drwx------ 2 bvimit bvimit 4096 Apr  7 04:03 .cache
drwxr-xr-x 2 bvimit bvimit 4096 Apr  7 04:03 .landscape
-rw-r--r-- 1 bvimit bvimit    0 Apr  7 04:03 .motd_shown
-rw-r--r-- 1 bvimit bvimit  807 Apr  7 04:03 .profile
-rw-r--r-- 1 bvimit bvimit    0 Apr  7 04:04 .sudo_as_admin_successful
bvimit@IMITNM-DES-0028:~$
```

ansible localhost -m shell -a "mkdir -p /tmp/temp": Makes a folder called temp inside /tmp. The -p allows it to create parent folders if needed.

```
bvimit@IMITNM-DES-0028:~$ ansible localhost -m shell -a "mkdir -p /tmp/temp"
[WARNING]: No inventory was parsed, only implicit localhost is available
localhost | CHANGED | rc=0 >>

bvimit@IMITNM-DES-0028:~$
```

ansible localhost -m shell -a "echo 'Welcome in BVIMIT' > /tmp/temp/hello.txt": Creates a file called hello.txt in the temp folder and adds the text “Welcome in BVIMIT”.

```
bvimit@IMITNM-DES-0028:~$ ansible localhost -m shell -a "echo 'Welcome in BVIMIT' > /tmp/temp/hello.txt"
[WARNING]: No inventory was parsed, only implicit localhost is available
localhost | CHANGED | rc=0 >>
```

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ansible localhost -m shell -a "ls -l /tmp/temp/": Lists all files in the /tmp/temp directory.

```
bvimit@IMITNM-DES-0028:~$ ansible localhost -m shell -a "ls -l /tmp/temp/"
[WARNING]: No inventory was parsed, only implicit localhost is available
localhost | CHANGED | rc=0 >>
total 4
-rw-r--r-- 1 bvimit bvimit 18 Apr  7 04:36 hello.txt
bvimit@IMITNM-DES-0028:~$
```

ansible localhost -m command -a "cat /etc/os-release" : Shows information about the Ubuntu version you are using.

```
bvimit@IMITNM-DES-0028:~$ ansible localhost -m command -a "cat /etc/os-release"
[WARNING]: No inventory was parsed, only implicit localhost is available
localhost | CHANGED | rc=0 >>
PRETTY_NAME="Ubuntu 24.04.2 LTS"
NAME="Ubuntu"
VERSION_ID="24.04"
VERSION="24.04.2 LTS (Noble Numbat)"
VERSION_CODENAME=noble
ID=ubuntu
ID_LIKE=debian
HOME_URL="https://www.ubuntu.com/"
SUPPORT_URL="https://help.ubuntu.com/"
BUG_REPORT_URL="https://bugs.launchpad.net/ubuntu/"
PRIVACY_POLICY_URL="https://www.ubuntu.com/legal/terms-and-policies/privacy-policy"
UBUNTU_CODENAME=noble
LOGO=ubuntu-logo
bvimit@IMITNM-DES-0028:~$
```

Here we try to install the ngix package

ansible localhost -m apt -a "name=nginx state=present" -b: Installs **nginx**. The -b means **"become root"**, which gives admin access (needs password).

```
bvimit@IMITNM-DES-0028:~$ ansible localhost -m apt -a "name=nginx state=present" -b
[WARNING]: No inventory was parsed, only implicit localhost is available
localhost | FAILED! => {
    "changed": false,
    "module_stderr": "sudo: a password is required\n",
    "module_stdout": "",
    "msg": "MODULE FAILURE\nSee stdout/stderr for the exact error",
    "rc": 1
}
```

This error because it's require password so we enter following command

If you get a permission error, you may have to enter your password.

```
bvimit@IMITNM-DES-0028:~$ sudo visudo
[sudo] password for bvimit:
visudo: /etc/sudoers.tmp unchanged
```

ansible localhost -m apt -a "name=nginx state=present" -b

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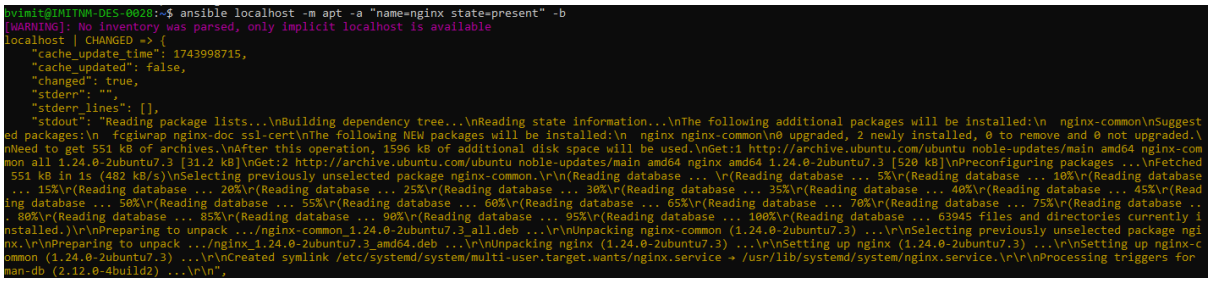
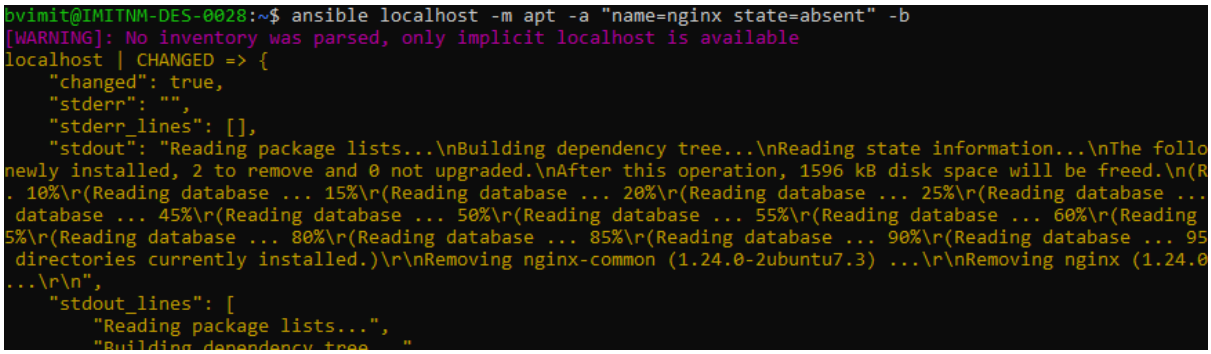
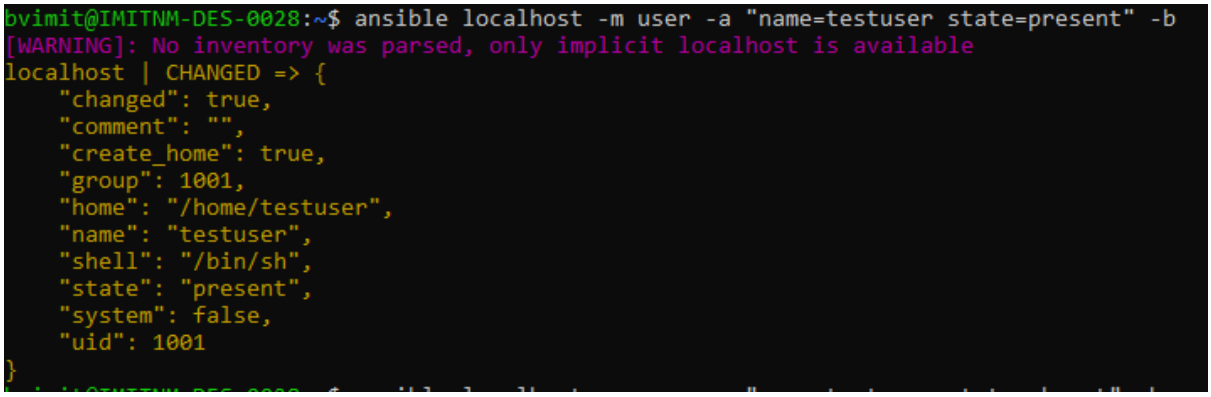


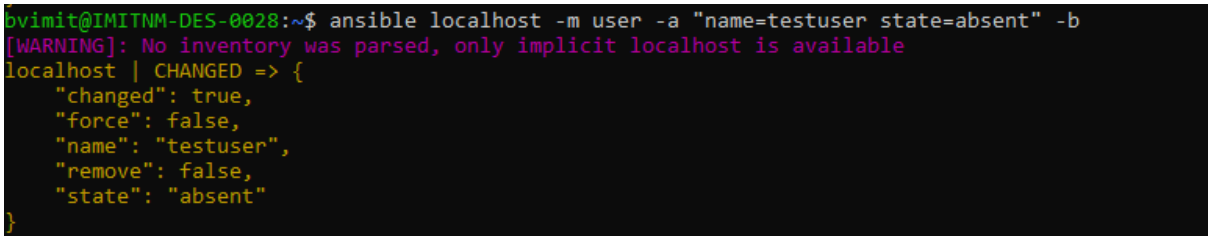
ansible localhost -m apt -a "name=nginx state=absent" -b : Uninstalls nginx.



ansible localhost -m user -a "name=testuser state=present" -b : Creates a user named testuser.



ansible localhost -m user -a "name=testuser state=absent" -b: Deletes the user named testuser.



ansible localhost -m file -a "path=/tmp/myfile.txt state=touch": Creates an empty file named myfile.txt in the /tmp folder.

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```
bvimit@IMITNM-DES-0028:~$ ansible localhost -m file -a "path=/tmp/myfile.txt state=touch"
[WARNING]: No inventory was parsed, only implicit localhost is available
localhost | CHANGED => {
    "changed": true,
    "dest": "/tmp/myfile.txt",
    "gid": 1000,
    "group": "bvimit",
    "mode": "0644",
    "owner": "bvimit",
    "size": 0,
    "state": "file",
    "uid": 1000
}
bvimit@IMITNM-DES-0028:~$
```

ansible localhost -m shell -a "echo 'this is first line .'>/tmp/myfile.txt": Adds the text "this is first line ." to the file (overwrites if file already exists).

```
bvimit@IMITNM-DES-0028:~$ ansible localhost -m shell -a "echo 'this is first line .'>/tmp/myfile.txt"
[WARNING]: No inventory was parsed, only implicit localhost is available
localhost | CHANGED | rc=0 >>
```

ansible localhost -m shell -a "echo 'this is additional line .'>/tmp/myfile.txt": Adds another line to the file (appends without deleting existing content).

```
bvimit@IMITNM-DES-0028:~$ ansible localhost -m shell -a "echo 'this is additional line .'>/tmp/myfile.txt"
[WARNING]: No inventory was parsed, only implicit localhost is available
localhost | CHANGED | rc=0 >>
```

ansible localhost -m command -a "cat /tmp/myfile.txt" : Shows the content of the file.

```
bvimit@IMITNM-DES-0028:~$ ansible localhost -m command -a "cat /tmp/myfile.txt"
[WARNING]: No inventory was parsed, only implicit localhost is available
localhost | CHANGED | rc=0 >>
this is additional line .
bvimit@IMITNM-DES-0028:~$
```

How to create,display,delete directory

ansible localhost -m file -a "path=/tmp/mydir state=directory mode=0755": Creates a directory called mydir with permission 0755 (read/write/execute for owner, read/execute for others).

```
bvimit@IMITNM-DES-0028:~$ ansible localhost -m file -a "path=/tmp/mydir state=directory mode=0755"
[WARNING]: No inventory was parsed, only implicit localhost is available
localhost | CHANGED => {
    "changed": true,
    "gid": 1000,
    "group": "bvimit",
    "mode": "0755",
    "owner": "bvimit",
    "path": "/tmp/mydir",
    "size": 4096,
    "state": "directory",
    "uid": 1000
}
```

ls -la /tmp | grep mydir: Manually checks if the mydir folder exists inside /tmp.

```
bvimit@IMITNM-DES-0028:~$ ls -la /tmp | grep mydir
drwxr-xr-x  2 bvimit bvimit 4096 Apr  7 05:16 mydir
```

ansible localhost -m file -a "path=/tmp/mydir state=absent": Deletes the folder mydir.

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```
bvimit@IMITNM-DES-0028:~$ ansible localhost -m file -a "path=/tmp/mydir state=absent"
[WARNING]: No inventory was parsed, only implicit localhost is available
localhost | CHANGED => {
    "changed": true,
    "path": "/tmp/mydir",
    "state": "absent"
}
```

Now we try to display the file, it's display null because we delete that directory

```
bvimit@IMITNM-DES-0028:~$ ls -la /tmp | grep mydir
bvimit@IMITNM-DES-0028:~$
```

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3. Using Ansible(puppet) playbooks

Playbook

A **Playbook** is a YAML file that defines a series of actions to be executed on managed nodes. It contains one or more "plays" that map groups of hosts to roles.

Example

```
---
- name: Update web
  servers hosts:
  webservers
  remote_user: root

  tasks:
  - name: Ensure apache is at the latest
    version ansible.builtin.yum:
      name: httpd
      state: latest

  - name: Write the apache config file
    ansible.builtin.templ
      ate: src: /srv/
      httpd.j2 dest: /
      etc/httpd.conf

- name: Update db
  servers hosts:
  databases
  remote_user: root

  tasks:
  - name: Ensure postgresql is at the latest
```

Play

A Play is a single, complete execution unit within a playbook. It specifies which hosts to target and what tasks to execute on those hosts. Plays are used to group related tasks and execute them in a specific order.

```
  hosts: webservers
  tasks:
    - name: Install
      Nginx apt:
```

- name: Install and configure Nginx

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Modules

Modules are the building blocks of Ansible tasks. They are small programs that perform a specific action on a managed node, such as installing a package, copying a file, or managing services. Example

The apt module used in a task to install a package:

```
- name: Install
  Nginx apt:
    name: nginx
```

Tasks

Tasks are individual actions within a play that use modules to perform operations on managed nodes. Each task is executed in order and can include conditionals, loops, and handlers.
Collections

```
-     name: Install
Nginx



-     name: Start
service
service:
```

Collections are a distribution format for Ansible content. They bundle together multiple roles, modules, plugins, and other Ansible artifacts. Collections make it easier to share and reuse Ansible content. Example

A collection structure might look like this:

```
my_collection/ ├── roles/

│       └── tasks/

├── plugins/
│   └── modules/
```

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1. Directory Setup

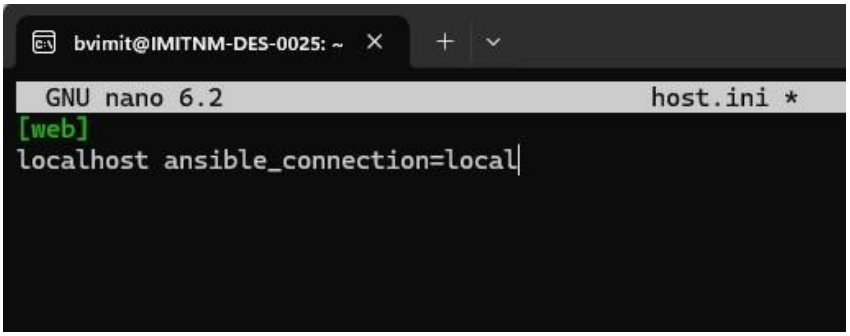
Create a folder to work in:

mkdir ansible-web-demo cd
ansible-web-demo

2. Create the Inventory File (hosts.ini)

Create a file named hosts.ini:

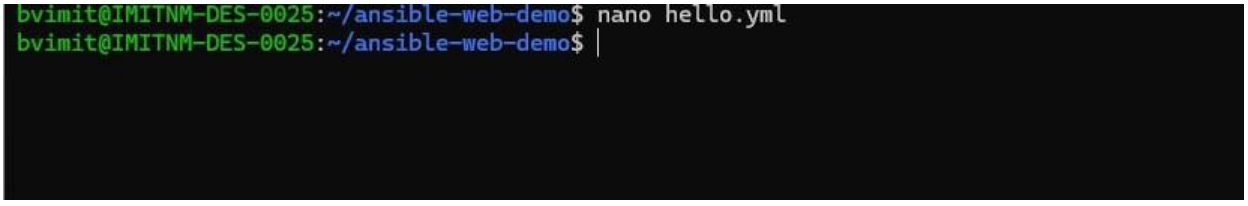
ini CopyEdit [web]



localhost ansible_connection=local

If you're testing on your own machine, use localhost.

3. Create a Simple Playbook (hello.yml)



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yaml
CopyEdit

- name: Serve Hello World HTML Page
  hosts: web become: yes

tasks:
- name: Install Apache Web Server apt:
    name: apache2
state: present update_cache:
yes

- name: Create custom index.html
  copy:
    dest: /var/www/html/index.html content: |
      <html>
      <head><title>Hello</title></head>
<body>
        <h1>Hello from Ansible 👋</h1>
      </body>
      </html>

- name: Ensure Apache is running
  service:
    name: apache2
state: started enabled: yes

This installs Apache, creates /var/www/html/index.html, and starts the service.

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bvimit@IMITNM-DES-0025: ~

GNU nano 6.2 hello.yml

```
tasks:
  - name: Install Apache Web Server
    apt:
      name: apache2
      state: present
      update_cache: yes

  - name: Create custom index.html
    copy:
      dest: /var/www/html/index.html
      content: |
        <html>
        <head><title>Hello bvimit</title></head>
        <body>
          <h1>Hello from Ansible 👋</h1>
        </body>
        </html>

  - name: Ensure Apache is running
    service:
      name: apache2
      state: started
      enabled: yes
```

Save and Exit

- Press Ctrl + O, then Enterto save
- Press Ctrl + Xto exit

Run the Playbook

```
bvimit@IMITNM-DES-0025:~/ansible-web-demo$ ansible-playbook -i hosts.ini hello.yml  --ask-become-pass
BECOME password:

PLAY [Serve Hello World HTML Page] *********************************************************************************

TASK [Gathering Facts] *********************************************************************************************
ok: [localhost]

TASK [Install Apache Web Server] ***********************************************************************************
ok: [localhost]

TASK [Create custom index.html] ************************************************************************************
ok: [localhost]

TASK [Ensure Apache is running] ************************************************************************************
ok: [localhost]

PLAY RECAP *********************************************************************************************************
localhost                  : ok=4    changed=0    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
```

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Check the Result

Open a browser and go to: