

An abstract graphic design featuring three blue circles of varying sizes. The top circle is in the upper right, the middle one is smaller and centered, and the bottom one is the largest and partially cut off by the right edge. Two thin, light blue diagonal lines cross the page, one from the top left to the middle circle, and another from the top right to the bottom circle.

DEVOPS PROJECT DOCUMENTATION

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Ansible installation using ubuntu

```
lenovo@DESKTOP-PAN9VTB: ~  
The following NEW packages will be installed:  
build-essential bzip2 cpp cpp-13 cpp-13-x86-64-linux-gnu cpp-x86-64-linux-gnu dpkg-dev  
fakeroot g++ g++-13 g++-13-x86-64-linux-gnu g++-x86-64-linux-gnu gcc gcc-13  
gcc-13-base gcc-13-x86-64-linux-gnu gcc-x86-64-linux-gnu javascript-common  
libalgorithm-diff-perl libalgorithm-diff-xs-perl libalgorithm-merge-perl libaom3  
libasan8 libatomic1 libc-dev-bin libc-devtools libc6-dev libcc1-0 libcrypt-dev  
libde265-0 libdpkg-perl libexpat1-dev libfakeroot libfile-fcntllock-perl libgcc-13-dev  
libgd3 libgomp1 libheif-plugin-aomdec libheif-plugin-aomenc libheif-plugin-libde265  
libheif1 libhwasan0 libisl23 libitm1 libjs-jquery libjs-sphinxdoc libjs-underscore  
liblsan0 libmpc3 libpython3-dev libpython3.12-dev libquadmath0 libstdc++-13-dev  
libtsan2 libubsan1 libxpm4 linux-libc-dev lto-disabled-list make manpages-dev  
python3-dev python3-pip python3-wheel python3.12-dev rpcsvc-proto zlib1g-dev  
The following packages will be upgraded:  
libexpat1 libpython3.12-minimal libpython3.12-stdlib libpython3.12t64 python3.12  
python3.12-minimal  
6 upgraded, 66 newly installed, 0 to remove and 105 not upgraded.  
Need to get 88.9 MB of archives.  
After this operation, 283 MB of additional disk space will be used.  
Get:1 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 libexpat1 amd64 2.6.1-2ubuntu0.3 [88.0 kB]  
Get:2 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 libpython3.12t64 amd64 3.12.3-1ubuntu0.5 [2339 kB]  
Get:3 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 python3.12 amd64 3.12.3-1ubuntu0.5 [651 kB]  
Get:4 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 libpython3.12-stdlib amd64 3.12.3-1ubuntu0.5 [2069 kB]  
Get:5 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 python3.12-minimal amd64 3.12.3-1ubuntu0.5 [2342 kB]  
Get:6 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 libpython3.12-minimal amd64 3.12.3-1ubuntu0.5 [835 kB]  
Get:7 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 libc-dev-bin amd64 2.39-0ubuntu8.4 [20.4 kB]  
Get:8 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 linux-libc-dev amd64 6.8.0-60.63 [1874 kB]  
Get:9 http://archive.ubuntu.com/ubuntu noble/main amd64 libcrypt-dev amd64 1:4.4.36-4build1 [112 kB]  
11% [9 libcrypt-dev 66.7 kB/112 kB 60%] 756 kB/s 1min 43s
```

Initializing the project

```
lenovo@DESKTOP-PAN9VTB: ~/devops_project
Setting up cpp-13 (13.3.0-6ubuntu2~24.04) ...
Setting up gcc-13-x86-64-linux-gnu (13.3.0-6ubuntu2~24.04) ...
Setting up libexpat1-dev:amd64 (2.6.1-2ubuntu0.3) ...
Setting up gcc-13 (13.3.0-6ubuntu2~24.04) ...
Setting up zlib1g-dev:amd64 (1:1.3.dfsg-3.1ubuntu2.1) ...
Setting up cpp (4:13.2.0-7ubuntu1) ...
Setting up g++-13-x86-64-linux-gnu (13.3.0-6ubuntu2~24.04) ...
Setting up gcc-x86-64-linux-gnu (4:13.2.0-7ubuntu1) ...
Setting up libpython3.12-dev:amd64 (3.12.3-1ubuntu0.5) ...
Setting up gcc (4:13.2.0-7ubuntu1) ...
Setting up python3.12-dev (3.12.3-1ubuntu0.5) ...
Setting up g++-x86-64-linux-gnu (4:13.2.0-7ubuntu1) ...
Setting up g++-13 (13.3.0-6ubuntu2~24.04) ...
Setting up libpython3-dev:amd64 (3.12.3-0ubuntu2) ...
Setting up python3-dev (3.12.3-0ubuntu2) ...
Setting up g++ (4:13.2.0-7ubuntu1) ...
update-alternatives: using /usr/bin/g++ to provide /usr/bin/c++ (c++) in auto mode
Setting up build-essential (12.10ubuntu1) ...
Setting up libheif1:amd64 (1.17.6-1ubuntu4.1) ...
Setting up libgd3:amd64 (2.3.3-9ubuntu5) ...
Setting up libc-devtools (2.39-0ubuntu8.4) ...
Setting up libheif-plugin-aomdec:amd64 (1.17.6-1ubuntu4.1) ...
Setting up libheif-plugin-libde265:amd64 (1.17.6-1ubuntu4.1) ...
Setting up libheif-plugin-aomenc:amd64 (1.17.6-1ubuntu4.1) ...
Processing triggers for libc-bin (2.39-0ubuntu8.4) ...
Processing triggers for systemd (255.4-1ubuntu8.5) ...
Processing triggers for man-db (2.12.0-4build2) ...
lenovo@DESKTOP-PAN9VTB:~$ cd ~
lenovo@DESKTOP-PAN9VTB:~$ mkdir devops_project
lenovo@DESKTOP-PAN9VTB:~$ cd devops_project
lenovo@DESKTOP-PAN9VTB:~/devops_project$ mkdir terraform ansible app
lenovo@DESKTOP-PAN9VTB:~/devops_project$ touch terraform/main.tf terraform/variables.tf
lenovo@DESKTOP-PAN9VTB:~/devops_project$ touch ansible/install_web.yml
lenovo@DESKTOP-PAN9VTB:~/devops_project$ touch app/index.html
lenovo@DESKTOP-PAN9VTB:~/devops_project$ touch Jenkinsfile
lenovo@DESKTOP-PAN9VTB:~/devops_project$ touch README.md
lenovo@DESKTOP-PAN9VTB:~/devops_project$
```

Project in vs code using wsl extension

```
lenovo@DESKTOP-PAN9VTB: ~/devops_project
Setting up gcc-13 (13.3.0-6ubuntu2~24.04) ...
Setting up zlib1g-dev:amd64 (1:1.3.dfsg-3.1ubuntu2.1) ...
Setting up cpp (4:13.2.0-7ubuntu1) ...
Setting up g++-13-x86-64-linux-gnu (13.3.0-6ubuntu2~24.04) ...
Setting up gcc-x86-64-linux-gnu (4:13.2.0-7ubuntu1) ...
Setting up libpython3.12-dev:amd64 (3.12.3-1ubuntu0.5) ...
Setting up gcc (4:13.2.0-7ubuntu1) ...
Setting up python3.12-dev (3.12.3-1ubuntu0.5) ...
Setting up g++-x86-64-linux-gnu (4:13.2.0-7ubuntu1) ...
Setting up g++-13 (13.3.0-6ubuntu2~24.04) ...
Setting up libpython3-dev:amd64 (3.12.3-0ubuntu2) ...
Setting up python3-dev (3.12.3-0ubuntu2) ...
Setting up g++ (4:13.2.0-7ubuntu1) ...
update-alternatives: using /usr/bin/g++ to provide /usr/bin/c++ (c++) in auto mode
Setting up build-essential (12.10ubuntu1) ...
Setting up libheif1:amd64 (1.17.6-1ubuntu4.1) ...
Setting up libgd3:amd64 (2.3.3-9ubuntu5) ...
Setting up libc-devtools (2.39-0ubuntu8.4) ...
Setting up libheif-plugin-aomdec:amd64 (1.17.6-1ubuntu4.1) ...
Setting up libheif-plugin-libde265:amd64 (1.17.6-1ubuntu4.1) ...
Setting up libheif-plugin-aomenc:amd64 (1.17.6-1ubuntu4.1) ...
Processing triggers for libc-bin (2.39-0ubuntu8.4) ...
Processing triggers for systemd (255.4-1ubuntu8.5) ...
Processing triggers for man-db (2.12.0-4build2) ...
lenovo@DESKTOP-PAN9VTB:~$ cd ~
lenovo@DESKTOP-PAN9VTB:~$ mkdir devops_project
lenovo@DESKTOP-PAN9VTB:~$ cd devops_project
lenovo@DESKTOP-PAN9VTB:~/devops_project$ mkdir terraform ansible app
lenovo@DESKTOP-PAN9VTB:~/devops_project$ touch terraform/main.tf terraform/variables.tf
lenovo@DESKTOP-PAN9VTB:~/devops_project$ touch ansible/install_web.yml
lenovo@DESKTOP-PAN9VTB:~/devops_project$ touch app/index.html
lenovo@DESKTOP-PAN9VTB:~/devops_project$ touch Jenkinsfile
lenovo@DESKTOP-PAN9VTB:~/devops_project$ touch README.md
lenovo@DESKTOP-PAN9VTB:~/devops_project$ code .
Installing VS Code Server for Linux x64 (258e40fedc6cb8edf399a463ce3a9d32e7e1f6f3)
Downloading: 100%
Unpacking: 0%_
```

Run Jenkins in docker

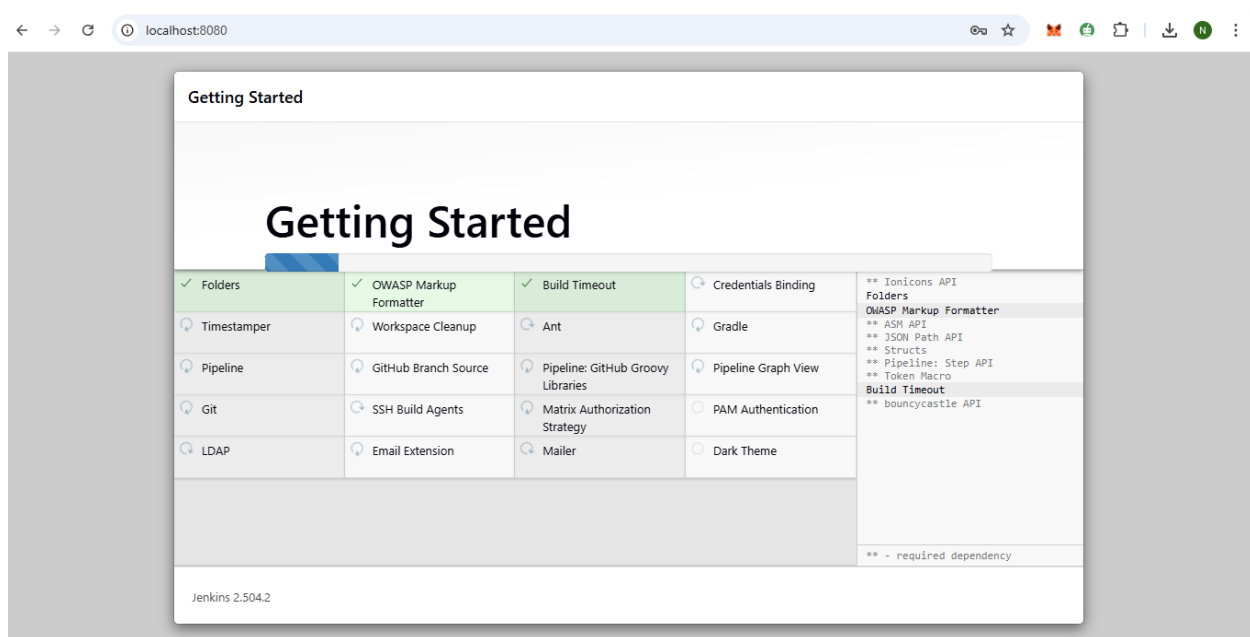
```
Command Prompt - docker run -d --name jenkins -p 8080:8080 -p 50000:50000 -v jenkins_home:/var/jenkins_home -v /var/run/docker.sock:/var/run/d...
C:\Users\Lenovo>wsl --install
Downloading: Ubuntu
Installing: Ubuntu
A distribution with the supplied name already exists. Use --name to chose a different name.
Error code: Wsl/InstallDistro/Service/RegisterDistro/ERROR_ALREADY_EXISTS

C:\Users\Lenovo>docker run -d --name jenkins -p 8080:8080 -p 50000:50000 -v jenkins_home:/var/jenkins_home -v /var/run/d...
docker.sock:/var/run/docker.sock -v ${PWD}:/workspace jenkins/jenkins:lts
docker: error during connect: Head "http://%2F%2F.%2Fpipe%2FdockerDesktopLinuxEngine/_ping": open //./pipe/dockerDesktopLinuxEngine: The system cannot find the file specified.

Run 'docker run --help' for more information

C:\Users\Lenovo>docker run -d --name jenkins -p 8080:8080 -p 50000:50000 -v jenkins_home:/var/jenkins_home -v /var/run/d...
docker.sock:/var/run/docker.sock -v ${PWD}:/workspace jenkins/jenkins:lts
Unable to find image 'jenkins/jenkins:lts' locally
lts: Pulling from jenkins/jenkins
10e8fd64a503: Download complete
3e6b9d1a9511: Downloading [=====] 33.55MB/48.49MB
1c0b6121482a: Downloading [=====] 35.65MB/61.64MB
37306438988a: Download complete
82349c49f528: Download complete
c10eb6e1ab33: Downloading [=====] 26.21MB/71.97MB
p9b1866598bd: Download complete
d53560724658: Download complete
88ce37b37f54: Download complete
cbd1283dc3b2: Download complete
57daf441aeec: Downloading [=====] 45.09MB/94.17MB
d9f1facce911: Download complete
```

Unlock Jenkins



Installing azure cli using ubuntu

```
lenovo@DESKTOP-PAN9VTB: ~/devops_project
Setting up libgd3:amd64 (2.3.3-9ubuntu5) ...
Setting up libc-devtools (2.39-0ubuntu8.4) ...
Setting up libheif-plugin-aomdec:amd64 (1.17.6-1ubuntu4.1) ...
Setting up libheif-plugin-libde265:amd64 (1.17.6-1ubuntu4.1) ...
Setting up libheif-plugin-aomenc:amd64 (1.17.6-1ubuntu4.1) ...
Processing triggers for libc-bin (2.39-0ubuntu8.4) ...
Processing triggers for systemd (255.4-1ubuntu8.5) ...
Processing triggers for man-db (2.12.0-4build2) ...
lenovo@DESKTOP-PAN9VTB:~$ cd ~
lenovo@DESKTOP-PAN9VTB:~$ mkdir devops_project
lenovo@DESKTOP-PAN9VTB:~$ cd devops_project
lenovo@DESKTOP-PAN9VTB:~/devops_project$ mkdir terraform ansible app
lenovo@DESKTOP-PAN9VTB:~/devops_project$ touch terraform/main.tf terraform/variables.tf
lenovo@DESKTOP-PAN9VTB:~/devops_project$ touch ansible/install_web.yml
lenovo@DESKTOP-PAN9VTB:~/devops_project$ touch app/index.html
lenovo@DESKTOP-PAN9VTB:~/devops_project$ touch Jenkinsfile
lenovo@DESKTOP-PAN9VTB:~/devops_project$ touch README.md
lenovo@DESKTOP-PAN9VTB:~/devops_project$ code .
Installing VS Code Server for Linux x64 (258e40fedc6cb8edf399a463ce3a9d32e7e1f6f3)
Downloading: 100%
Unpacking: 100%
Unpacked 2042 files and folders to /home/lenovo/.vscode-server/bin/258e40fedc6cb8edf399a463ce3a9d32e7e1f6f3.
Looking for compatibility check script at /home/lenovo/.vscode-server/bin/258e40fedc6cb8edf399a463ce3a9d32e7e1f6f3/bin/helpers/check-requirements.sh
Running compatibility check script
Compatibility check successful (0)
lenovo@DESKTOP-PAN9VTB:~/devops_project$ az login
az: command not found
lenovo@DESKTOP-PAN9VTB:~/devops_project$ curl -sL https://aka.ms/InstallAzureCLIDeb | sudo
bash
[sudo] password for lenovo:
Hit:1 http://archive.ubuntu.com/ubuntu noble InRelease
Hit:2 http://security.ubuntu.com/ubuntu noble-security InRelease
Hit:3 http://archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:4 http://archive.ubuntu.com/ubuntu noble-backports InRelease
Reading package lists... 5%
```

Installing Terraform

```
lenovo@DESKTOP-PAN9VTB: ~/devops_project/terraform
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
gnupg is already the newest version (2.4.4-2ubuntu17.2).
gnupg set to manually installed.
curl is already the newest version (8.5.0-2ubuntu10.6).
The following additional packages will be installed:
  python3-software-properties
The following packages will be upgraded:
  python3-software-properties python3-software-properties-common
2 upgraded, 0 newly installed, 0 to remove and 89 not upgraded.
Need to get 44.3 kB of archives.
After this operation, 1024 B of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 software-properties-common all 0.99.49.2 [14.4 kB]
Get:2 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 python3-software-properties all 0.99.49.2 [29.8 kB]
Fetched 44.3 kB in 1s (43.8 kB/s)
(Reading database ... 102471 files and directories currently installed.)
Preparing to unpack .../software-properties-common_0.99.49.2_all.deb ...
Unpacking software-properties-common (0.99.49.2) over (0.99.49.1) ...
Preparing to unpack .../python3-software-properties_0.99.49.2_all.deb ...
Unpacking python3-software-properties (0.99.49.2) over (0.99.49.1) ...
Setting up python3-software-properties (0.99.49.2) ...
Processing triggers for man-db (2.12.0-4build2) ...
Processing triggers for dbus (1.14.18-4ubuntu4.1) ...
lenovo@DESKTOP-PAN9VTB:~/devops_project/terraform$ curl -fsSL https://apt.releases.hashicorp.com/gpg | sudo gpg --dearmor -o /usr/share/keyrings/hashicorp-archive-keyring
ng.gpg
lenovo@DESKTOP-PAN9VTB:~/devops_project/terraform$
lenovo@DESKTOP-PAN9VTB:~/devops_project/terraform$ echo "deb [signed-by=/usr/share/keyrings/hashicorp-archive-keyring.gpg] https://apt.releases.hashicorp.com $(lsb_rele
ase -cs) main" | \
$
$ sudo tee /etc/apt/sources.list.d/hashicorp.list
deb [signed-by=/usr/share/keyrings/hashicorp-archive-keyring.gpg] https://apt.releases.hashicorp.com noble main
lenovo@DESKTOP-PAN9VTB:~/devops_project/terraform$ sudo apt update && sudo apt install terraform -y
Get:1 https://apt.releases.hashicorp.com noble InRelease [12.9 kB]
Hit:2 https://packages.microsoft.com/repos/azure-cli noble InRelease
Hit:3 http://archive.ubuntu.com/ubuntu noble InRelease
Hit:4 http://security.ubuntu.com/ubuntu noble-security InRelease
Get:5 https://apt.releases.hashicorp.com noble/main amd64 Packages [186 kB]
Hit:6 http://archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:7 http://archive.ubuntu.com/ubuntu noble-backports InRelease
Fetched 199 kB in 2s (93.5 kB/s)
Reading package lists... 35%
```

Run terraform

```
lenovo@DESKTOP-PAN9VTB: ~/devops_project/terraform
Processing triggers for dbus (1.14.10-4ubuntu4.1) ...
lenovo@DESKTOP-PAN9VTB:~/devops_project/terraform$ curl -fsSL https://apt.releases.hashicorp.com/gpg | sudo gpg --dearmor -o /usr/share/keyrings/hashicorp-archive-keyring.gpg
lenovo@DESKTOP-PAN9VTB:~/devops_project/terraform$
lenovo@DESKTOP-PAN9VTB:~/devops_project/terraform$
lenovo@DESKTOP-PAN9VTB:~/devops_project/terraform$ echo "deb [signed-by=/usr/share/keyrings/hashicorp-archive-keyring.gpg] https://apt.releases.hashicorp.com $(lsb_release -cs) main" | \
>
> sudo tee /etc/apt/sources.list.d/hashicorp.list
deb [signed-by=/usr/share/keyrings/hashicorp-archive-keyring.gpg] https://apt.releases.hashicorp.com noble main
lenovo@DESKTOP-PAN9VTB:~/devops_project/terraform$ sudo apt update && sudo apt install terraform -y
Get:1 https://apt.releases.hashicorp.com noble InRelease [12.9 kB]
Hit:2 https://packages.microsoft.com/repos/azure-cli noble InRelease
Hit:3 http://archive.ubuntu.com/ubuntu noble InRelease
Hit:4 http://security.ubuntu.com/ubuntu noble-security InRelease
Get:5 https://apt.releases.hashicorp.com noble/main amd64 Packages [186 kB]
Hit:6 http://archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:7 http://archive.ubuntu.com/ubuntu noble-backports InRelease
Fetched 199 kB in 2s (93.5 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
89 packages can be upgraded. Run 'apt list --upgradable' to see them.
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
  terraform
0 upgraded, 1 newly installed, 0 to remove and 89 not upgraded.
Need to get 28.4 MB of archives.
After this operation, 93.6 MB of additional disk space will be used.
Get:1 https://apt.releases.hashicorp.com noble/main amd64 terraform amd64 1.12.1-1 [28.4 MB]
Fetched 28.4 MB in 23s (1226 kB/s)
Selecting previously unselected package terraform.
(Reading database ... 102471 files and directories currently installed.)
Preparing to unpack .../terraform_1.12.1-1_amd64.deb ...
Unpacking terraform (1.12.1-1) ...
Setting up terraform (1.12.1-1) ...
lenovo@DESKTOP-PAN9VTB:~/devops_project/terraform$ terraform init
Initializing the backend...
Initializing provider plugins...
- Finding latest version of hashicorp/azurerm...
- Installing hashicorp/azurerm v4.32.0...
```

Generating ssh key pairs

```
lenovo@DESKTOP-PAN9VTB: ~
lenovo@DESKTOP-PAN9VTB:~$ ssh-keygen -t rsa -b 4096
Generating public/private rsa key pair.
```


Run terraform

```
lenovo@DESKTOP-PAN9VTB: ~/devops_project/terraform
^Clenovo@DESKTOP-PAN9VTB:~$ az login --use-device-code
To sign in, use a web browser to open the page https://microsoft.com/devicelogin and enter the code ITTH5CTJG to authenticate.

Retrieving tenants and subscriptions for the selection...
Authentication failed against tenant 8a24a544-ef29-4122-b286-2a5daafca38d 'Default Directory': AADSTS50076: Due to a configuration change made by your administrator, or because you moved to a new location, you must use multi-factor authentication to access '797f4846-ba00-4fd7-ba43-dac1f8f63013'. Trace ID: 32b03401-20f3-4762-aacf-173f07fd7900 Correlation ID: d171a44b-cb34-47dc-8f6d-3efdad19a946 Timestamp: 2025-06-08 10:15:30Z
If you need to access subscriptions in the following tenants, please use `az login --tenant TENANT_ID`.
8a24a544-ef29-4122-b286-2a5daafca38d 'Default Directory'
No subscriptions found for bscs2112159@szabist.pk.
lenovo@DESKTOP-PAN9VTB:~$ cd devops_project/terraform
lenovo@DESKTOP-PAN9VTB:~/devops_project/terraform$ terraform init
Initializing the backend...
Initializing provider plugins...
- Reusing previous version of hashicorp/azurerm from the dependency lock file
- Using previously-installed hashicorp/azurerm v4.32.0

Terraform has been successfully initialized!

You may now begin working with Terraform. Try running "terraform plan" to see any changes that are required for your infrastructure. All Terraform commands should now work.

If you ever set or change modules or backend configuration for Terraform, rerun this command to reinitialize your working directory. If you forget, other commands will detect it and remind you to do so if necessary.
lenovo@DESKTOP-PAN9VTB:~/devops_project/terraform$ terraform apply -auto-approve
```

```
lenovo@DESKTOP-PAN9VTB: ~/devops_project/terraform
+ "10.0.1.0/24",
]
+ default_outbound_access_enabled = true
+ id = (known after apply)
+ name = "devops-subnet"
+ private_endpoint_network_policies = "Disabled"
+ private_link_service_network_policies_enabled = true
+ resource_group_name = "devops-rg"
+ virtual_network_name = "devops-vnet"
}

# azurerm_virtual_network.vnet will be created
+ resource "azurerm_virtual_network" "vnet" {
+ address_space = [
+ "10.0.0.0/16",
+ ]
+ dns_servers = (known after apply)
+ guid = (known after apply)
+ id = (known after apply)
+ location = "eastus"
+ name = "devops-vnet"
+ private_endpoint_vnet_policies = "Disabled"
+ resource_group_name = "devops-rg"
+ subnet = (known after apply)
}

Plan: 6 to add, 0 to change, 0 to destroy.
```



```
lenovo@DESKTOP-PAN9VTB: ~/devops_project/terraform
s/devops-rg/providers/Microsoft.Network/networkInterfaces/devops-nic]
azure_rm_linux_virtual_machine.vm: Refreshing state... [id=/subscriptions/5360a7b1-e347-43ae-9aab-1ac05b79f0d7/resourceGroups/devops-rg/providers/Microsoft.Compute/virtualMachines/devopsvm]

No changes. Your infrastructure matches the configuration.

Terraform has compared your real infrastructure against your configuration and found no differences, so no changes are needed.

Apply complete! Resources: 0 added, 0 changed, 0 destroyed.
lenovo@DESKTOP-PAN9VTB:~/devops_project/terraform$
lenovo@DESKTOP-PAN9VTB:~/devops_project/terraform$ terraform output public_ip_address

Warning: No outputs found

The state file either has no outputs defined, or all the defined outputs are empty. Please define an output in your configuration with the 'output' keyword and run 'terraform refresh' for it to become available. If you are using interpolation, please verify the interpolated value is not empty. You can use the 'terraform console' command to assist.

lenovo@DESKTOP-PAN9VTB:~/devops_project/terraform$
lenovo@DESKTOP-PAN9VTB:~/devops_project/terraform$ az vm list-ip-addresses --name devopsvm --resource-group devops-rg --output table

VirtualMachine   PublicIPAddresses   PrivateIPAddresses
-----
devopsvm         40.71.216.244       10.0.1.4
lenovo@DESKTOP-PAN9VTB:~/devops_project/terraform$
lenovo@DESKTOP-PAN9VTB:~/devops_project/terraform$
```

Use ansible to install web server

```
lenovo@DESKTOP-PAN9VTB: ~/devops_project/terraform
ERROR! the playbook: ansible/install_web.yml could not be found
lenovo@DESKTOP-PAN9VTB:~/devops_project/terraform$
lenovo@DESKTOP-PAN9VTB:~/devops_project/terraform$ ansible-playbook -i ansible/inventory.ini ../ansible/install_web.yml

[WARNING]: Unable to parse /home/lenovo/devops_project/terraform/ansible/inventory.ini as an inventory source
[WARNING]: No inventory was parsed, only implicit localhost is available
[WARNING]: provided hosts list is empty, only localhost is available. Note that the implicit localhost does not match 'all'

PLAY [Setup web server] *****
skipping: no hosts matched

PLAY RECAP *****

lenovo@DESKTOP-PAN9VTB:~/devops_project/terraform$
lenovo@DESKTOP-PAN9VTB:~/devops_project/terraform$ ansible-playbook -i ../ansible/inventory.ini ../ansible/install_web.yml

PLAY [Setup web server] *****

TASK [Gathering Facts] *****
fatal: [40.71.216.244]: UNREACHABLE! => {"changed": false, "msg": "Failed to connect to the host via ssh: ssh: connect to host 40.71.216.244 port 22: Connection timed out", "unreachable": true}

PLAY RECAP *****
40.71.216.244      : ok=0    changed=0    unreachable=1    failed=0    skipped=0    rescued=0    ignored=0

lenovo@DESKTOP-PAN9VTB:~/devops_project/terraform$
lenovo@DESKTOP-PAN9VTB:~/devops_project/terraform$
```

```
lenovo@DESKTOP-PAN9VTB: ~/devops_project/terraform
TASK [Copy index.html] *****
An exception occurred during task execution. To see the full traceback, use -vvv. The error was: If you are using a module and expect the file to exist on the remote, see the remote_src option
fatal: [40.71.216.244]: FAILED! => {"changed": false, "msg": "Could not find or access '../app/index.html'\nSearched in:\n\t/home/lenovo/devops_project/ansible/files/../../app/index.html\n\t/home/lenovo/devops_project/ansible/../../app/index.html\n\t/home/lenovo/devops_project/ansible/files/../../app/index.html\n\t/home/lenovo/devops_project/ansible/../../app/index.html on the Ansible Controller.\nIf you are using a module and expect the file to exist on the remote, see the remote_src option"}

PLAY RECAP *****
40.71.216.244 : ok=2  changed=0  unreachable=0  failed=1  skipped=0  rescued=0  ignored=0

lenovo@DESKTOP-PAN9VTB:~/devops_project/terraform$ ansible-playbook -i ../ansible/inventory.ini ../ansible/install_web.yml

PLAY [Setup web server] *****

TASK [Gathering Facts] *****
ok: [40.71.216.244]

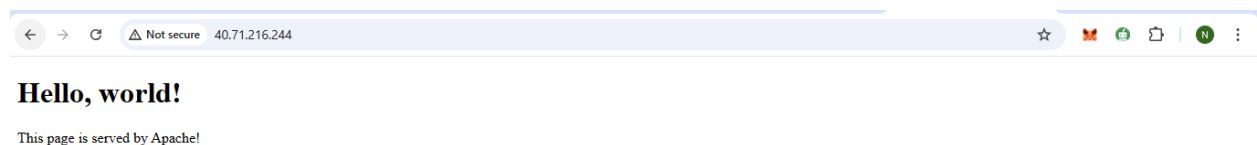
TASK [Install Apache] *****
ok: [40.71.216.244]

TASK [Copy index.html] *****
ok: [40.71.216.244]

PLAY RECAP *****
40.71.216.244 : ok=3  changed=0  unreachable=0  failed=0  skipped=0  rescued=0  ignored=0


lenovo@DESKTOP-PAN9VTB:~/devops_project/terraform$
```

Web server using apache



Jenkins Pipeline

← → × localhost:8080/login?from=%2F




Sign in to Jenkins

Username

Password

☐ Keep me signed in

Sign in




 **Jenkins** 🔍 🛡️ 1 👤 Nijla kamil ▾ 🚪 log out

Dashboard > New Item

New Item

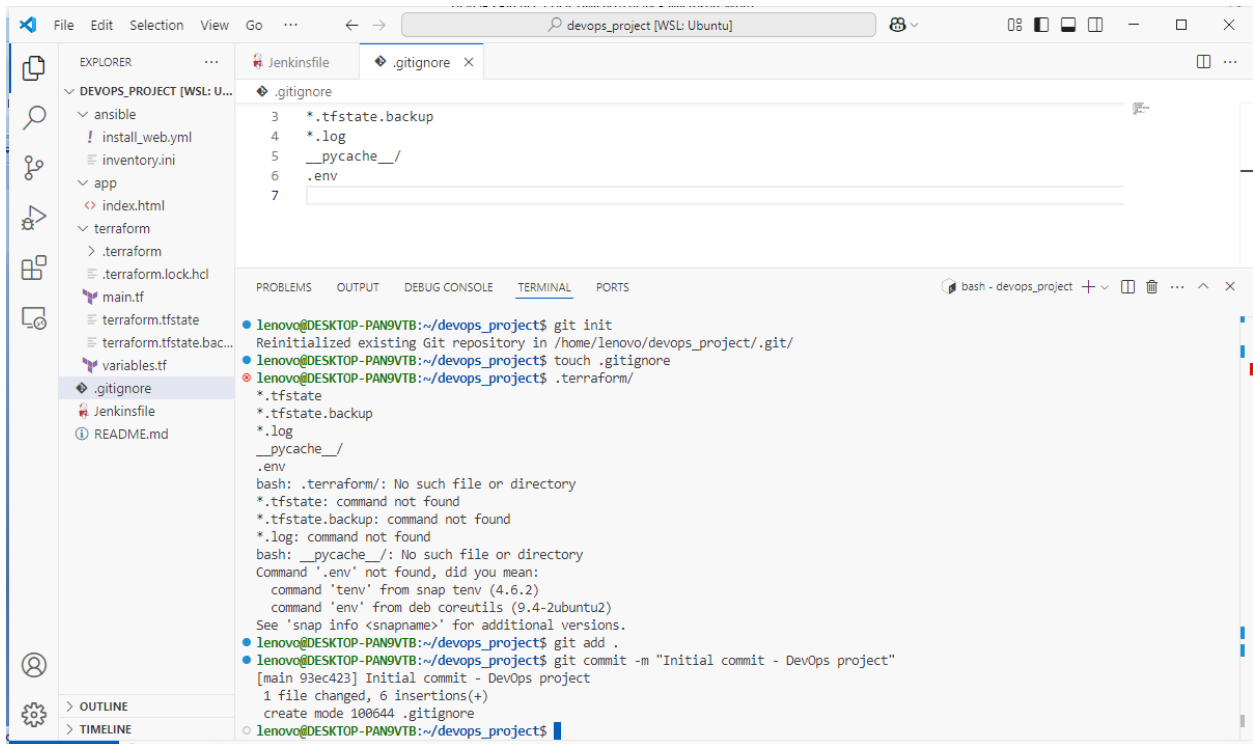
Enter an item name

Select an item type

-  **Freestyle project**
Classic, general-purpose job type that checks out from up to one SCM, executes build steps serially, followed by post-build steps like archiving artifacts and sending email notifications.
-  **Pipeline**
Orchestrates long-running activities that can span multiple build agents. Suitable for building pipelines (formerly known as workflows) and/or organizing complex activities that do not easily fit in free-style job type.
-  **Multi-configuration project**
Suitable for projects that need a large number of different configurations, such as testing on multiple environments, platform-specific builds, etc.

OK

Adding project to github

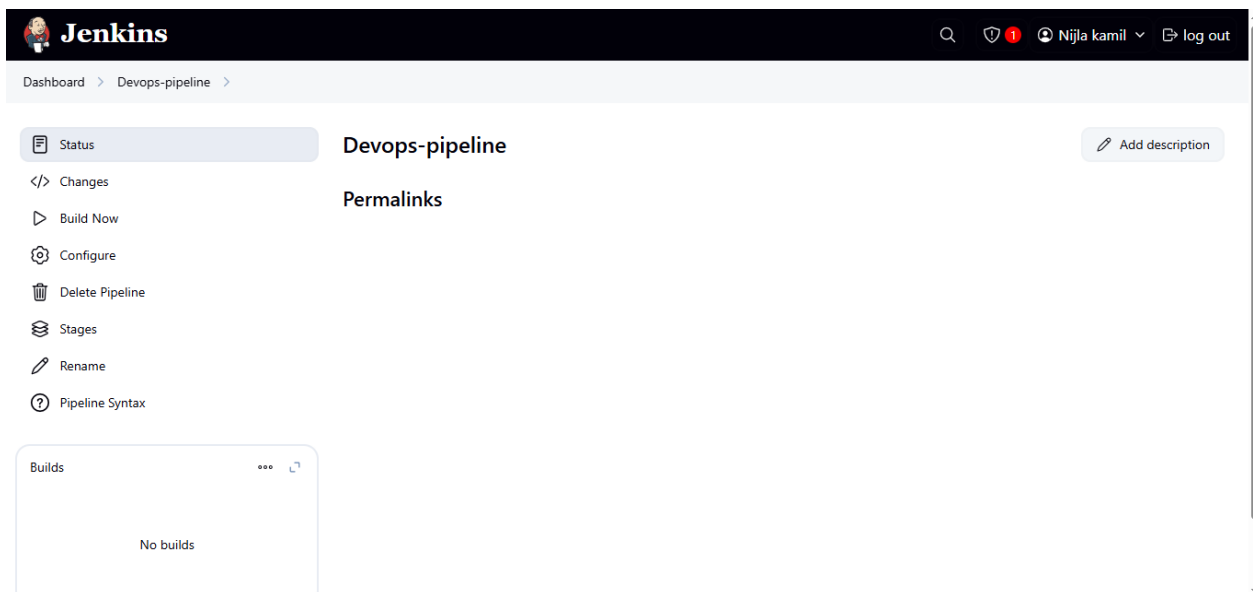


The screenshot shows a VS Code editor window titled 'devops_project [WSL: Ubuntu]'. The Explorer panel on the left shows a project structure with files like 'install_web.yml', 'inventory.ini', 'main.tf', and '.gitignore'. The .gitignore file is open in the editor, showing the following content:

```
3 *.tfstate.backup
4 *.log
5 __pycache__/_
6 .env
7
```

The Terminal panel at the bottom shows the following commands and output:

```
lenovo@DESKTOP-PAN9VTB:~/devops_project$ git init
Reinitialized existing Git repository in /home/lenovo/devops_project/.git/
lenovo@DESKTOP-PAN9VTB:~/devops_project$ touch .gitignore
lenovo@DESKTOP-PAN9VTB:~/devops_project$ terraform/
*.tfstate
*.tfstate.backup
*.log
__pycache__/_
.env
bash: .terraform/: No such file or directory
*.tfstate: command not found
*.tfstate.backup: command not found
*.log: command not found
bash: __pycache__/: No such file or directory
Command '.env' not found, did you mean:
  command 'env' from snap tenv (4.6.2)
  command 'env' from deb coreutils (9.4-2ubuntu2)
See 'snap info <snapname>' for additional versions.
lenovo@DESKTOP-PAN9VTB:~/devops_project$ git add .
lenovo@DESKTOP-PAN9VTB:~/devops_project$ git commit -m "Initial commit - DevOps project"
[main 93ec423] Initial commit - DevOps project
1 file changed, 6 insertions(+)
create mode 100644 .gitignore
lenovo@DESKTOP-PAN9VTB:~/devops_project$
```



The screenshot shows the Jenkins web interface. The top navigation bar includes the Jenkins logo, a search icon, a shield icon with a red exclamation mark, a user profile icon labeled 'Nijla kamil', and a 'log out' button. The main content area is titled 'Devops-pipeline' and includes a 'Status' tab, a 'Permalinks' section, and a 'Builds' section. The 'Builds' section shows 'No builds'.

Installing terraform in container

```
lenovo@DESKTOP-PAN9VTB: ~  
lenovo@DESKTOP-PAN9VTB:~$ docker exec -u root -it jenkins bash  
root@df38c4fb329e:/# apt-get update  
Get:1 http://deb.debian.org/debian bookworm InRelease [151 kB]  
Get:2 http://deb.debian.org/debian bookworm-updates InRelease [55.4 kB]  
Get:3 http://deb.debian.org/debian-security bookworm-security InRelease [48.0 kB]  
Get:4 http://deb.debian.org/debian bookworm/main amd64 Packages [8793 kB]  
Get:5 http://deb.debian.org/debian bookworm-updates/main amd64 Packages [512 B]  
Get:6 http://deb.debian.org/debian-security bookworm-security/main amd64 Packages [266 kB]  
Fetched 9314 kB in 8s (1097 kB/s)  
Reading package lists... Done  
root@df38c4fb329e:/# apt-get install -y wget unzip  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
unzip is already the newest version (6.0-28).  
The following NEW packages will be installed:  
  wget  
0 upgraded, 1 newly installed, 0 to remove and 2 not upgraded.  
Need to get 937 kB of archives.  
After this operation, 3606 kB of additional disk space will be used.  
Get:1 http://deb.debian.org/debian bookworm/main amd64 wget amd64 1.21.3-1+deb12u1 [937 kB]  
Fetched 937 kB in 2s (454 kB/s)  
debconf: delaying package configuration, since apt-utils is not installed  
Selecting previously unselected package wget.  
(Reading database ... 10537 files and directories currently installed.)  
Preparing to unpack .../wget_1.21.3-1+deb12u1_amd64.deb ...  
Unpacking wget (1.21.3-1+deb12u1) ...  
Setting up wget (1.21.3-1+deb12u1) ...  
root@df38c4fb329e:/#
```

```
lenovo@DESKTOP-PAN9VTB: ~  
unzip is already the newest version (6.0-28).  
The following NEW packages will be installed:  
  wget  
0 upgraded, 1 newly installed, 0 to remove and 2 not upgraded.  
Need to get 937 kB of archives.  
After this operation, 3606 kB of additional disk space will be used.  
Get:1 http://deb.debian.org/debian bookworm/main amd64 wget amd64 1.21.3-1+deb12u1 [937 kB]  
Fetched 937 kB in 2s (454 kB/s)  
debconf: delaying package configuration, since apt-utils is not installed  
Selecting previously unselected package wget.  
(Reading database ... 10537 files and directories currently installed.)  
Preparing to unpack .../wget_1.21.3-1+deb12u1_amd64.deb ...  
Unpacking wget (1.21.3-1+deb12u1) ...  
Setting up wget (1.21.3-1+deb12u1) ...  
root@df38c4fb329e:/# wget https://releases.hashicorp.com/terraform/1.5.7/terraform_1.5.7_linux_amd64.zip  
--2025-06-09 17:24:56-- https://releases.hashicorp.com/terraform/1.5.7/terraform_1.5.7_linux_amd64.zip  
Resolving releases.hashicorp.com (releases.hashicorp.com)... 3.161.104.50, 3.161.104.17, 3.161.104.27, ...  
Connecting to releases.hashicorp.com (releases.hashicorp.com)|3.161.104.50|:443... connected.  
HTTP request sent, awaiting response... 200 OK  
Length: 21019880 (20M) [application/zip]  
Saving to: 'terraform_1.5.7_linux_amd64.zip'  
  
terraform_1.5.7_linux_amd64.z 100%[=====] 20.05M 1.80MB/s in 11s  
  
2025-06-09 17:25:07 (1.87 MB/s) - 'terraform_1.5.7_linux_amd64.zip' saved [21019880/21019880]  
  
root@df38c4fb329e:/# unzip terraform_1.5.7_linux_amd64.zip  
Archive: terraform_1.5.7_linux_amd64.zip  
  inflating: terraform  
root@df38c4fb329e:/#
```

```
lenovo@DESKTOP-PAN9VTB: ~
Fetched 937 kB in 2s (454 kB/s)
debconf: delaying package configuration, since apt-utils is not installed
Selecting previously unselected package wget.
(Reading database ... 10537 files and directories currently installed.)
Preparing to unpack .../wget_1.21.3-1+deb12u1_amd64.deb ...
Unpacking wget (1.21.3-1+deb12u1) ...
Setting up wget (1.21.3-1+deb12u1) ...
root@df38c4fb329e:/# wget https://releases.hashicorp.com/terraform/1.5.7/terraform_1.5.7_linux_amd64.zip
--2025-06-09 17:24:56-- https://releases.hashicorp.com/terraform/1.5.7/terraform_1.5.7_linux_amd64.zip
Resolving releases.hashicorp.com (releases.hashicorp.com)... 3.161.104.50, 3.161.104.17, 3.161.104.27, ...
Connecting to releases.hashicorp.com (releases.hashicorp.com)|3.161.104.50|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 21019880 (20M) [application/zip]
Saving to: 'terraform_1.5.7_linux_amd64.zip'

terraform_1.5.7_linux_amd64.z 100%[=====] 20.05M 1.80MB/s in 11s

2025-06-09 17:25:07 (1.87 MB/s) - 'terraform_1.5.7_linux_amd64.zip' saved [21019880/21019880]

root@df38c4fb329e:/# unzip terraform_1.5.7_linux_amd64.zip
Archive: terraform_1.5.7_linux_amd64.zip
  inflating: terraform
root@df38c4fb329e:/# mv terraform /usr/local/bin/
root@df38c4fb329e:/# terraform -v
Terraform v1.5.7
on linux_amd64

Your version of Terraform is out of date! The latest version
is 1.12.1. You can update by downloading from https://www.terraform.io/downloads.html
root@df38c4fb329e:/#
```

```
lenovo@DESKTOP-PAN9VTB: ~
(Reading database ... 10537 files and directories currently installed.)
Preparing to unpack .../wget_1.21.3-1+deb12u1_amd64.deb ...
Unpacking wget (1.21.3-1+deb12u1) ...
Setting up wget (1.21.3-1+deb12u1) ...
root@df38c4fb329e:/# wget https://releases.hashicorp.com/terraform/1.5.7/terraform_1.5.7_linux_amd64.zip
--2025-06-09 17:24:56-- https://releases.hashicorp.com/terraform/1.5.7/terraform_1.5.7_linux_amd64.zip
Resolving releases.hashicorp.com (releases.hashicorp.com)... 3.161.104.50, 3.161.104.17, 3.161.104.27, ...
Connecting to releases.hashicorp.com (releases.hashicorp.com)|3.161.104.50|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 21019880 (20M) [application/zip]
Saving to: 'terraform_1.5.7_linux_amd64.zip'

terraform_1.5.7_linux_amd64.z 100%[=====] 20.05M 1.80MB/s in 11s

2025-06-09 17:25:07 (1.87 MB/s) - 'terraform_1.5.7_linux_amd64.zip' saved [21019880/21019880]

root@df38c4fb329e:/# unzip terraform_1.5.7_linux_amd64.zip
Archive: terraform_1.5.7_linux_amd64.zip
  inflating: terraform
root@df38c4fb329e:/# mv terraform /usr/local/bin/
root@df38c4fb329e:/# terraform -v
Terraform v1.5.7
on linux_amd64

Your version of Terraform is out of date! The latest version
is 1.12.1. You can update by downloading from https://www.terraform.io/downloads.html
root@df38c4fb329e:/# mkdir -p /var/jenkins_home/.ssh
root@df38c4fb329e:/# ssh-keygen -t rsa -b 4096 -f /var/jenkins_home/.ssh/id_rsa -q -N ""
root@df38c4fb329e:/# chown -R jenkins:jenkins /var/jenkins_home/.ssh
root@df38c4fb329e:/#
```

```
lenovo@DESKTOP-PAN9VTB: ~  
Hit:1 http://deb.debian.org/debian bookworm InRelease  
Hit:2 http://deb.debian.org/debian bookworm-updates InRelease  
Hit:3 http://deb.debian.org/debian-security bookworm-security InRelease  
Reading package lists... Done  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
ca-certificates is already the newest version (20230311).  
curl is already the newest version (7.88.1-10+deb12u12).  
gnupg is already the newest version (2.2.40-1.1).  
The following NEW packages will be installed:  
  apt-transport-https lsb-release  
0 upgraded, 2 newly installed, 0 to remove and 2 not upgraded.  
Need to get 31.7 kB of archives.  
After this operation, 53.2 kB of additional disk space will be used.  
Get:1 http://deb.debian.org/debian bookworm/main amd64 apt-transport-https all 2.6.1 [25.2 kB]  
Get:2 http://deb.debian.org/debian bookworm/main amd64 lsb-release all 12.0-1 [6416 B]  
Fetched 31.7 kB in 1s (27.1 kB/s)  
debconf: delaying package configuration, since apt-utils is not installed  
Selecting previously unselected package apt-transport-https.  
(Reading database ... 10631 files and directories currently installed.)  
Preparing to unpack .../apt-transport-https_2.6.1_all.deb ...  
Unpacking apt-transport-https (2.6.1) ...  
Selecting previously unselected package lsb-release.  
Preparing to unpack .../lsb-release_12.0-1_all.deb ...  
Unpacking lsb-release (12.0-1) ...  
Setting up apt-transport-https (2.6.1) ...  
Setting up lsb-release (12.0-1) ...  
root@df38c4fb329e:/# curl -sL https://aka.ms/InstallAzureCLIDeb | bash
```