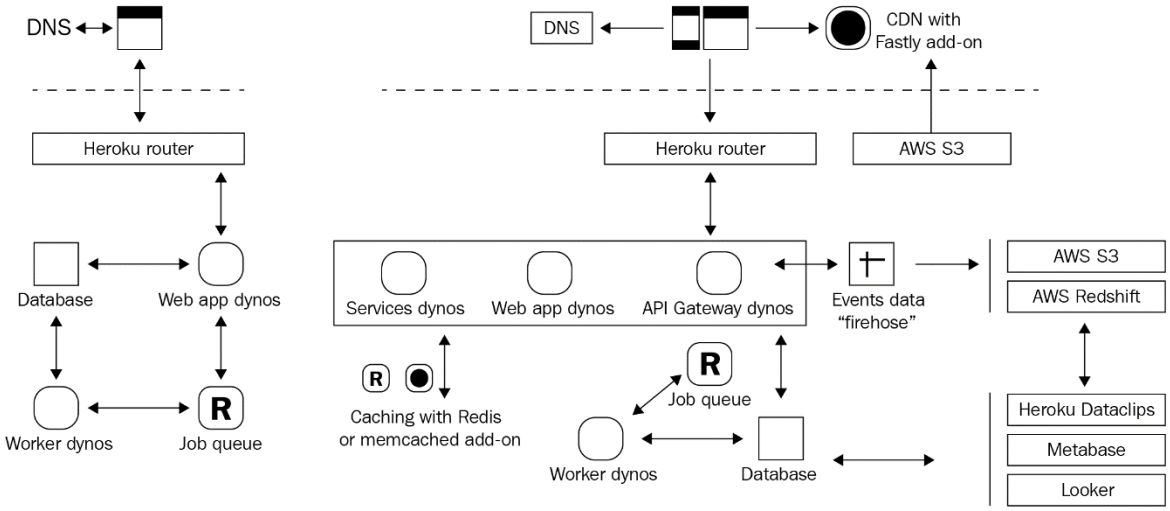
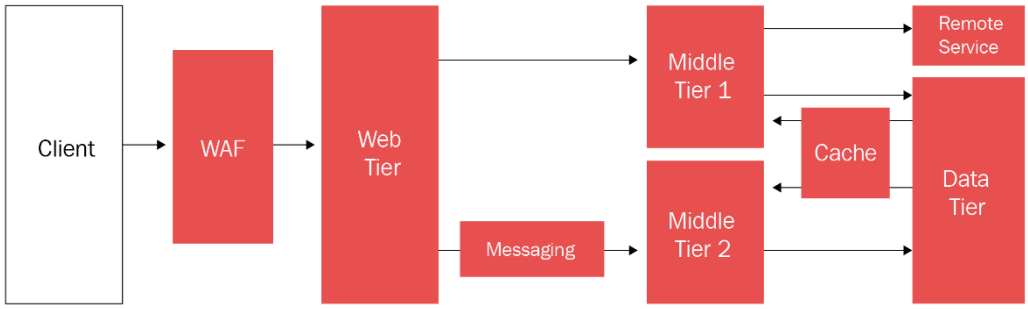
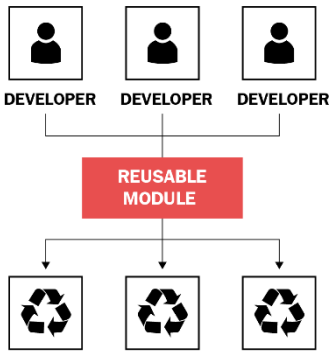
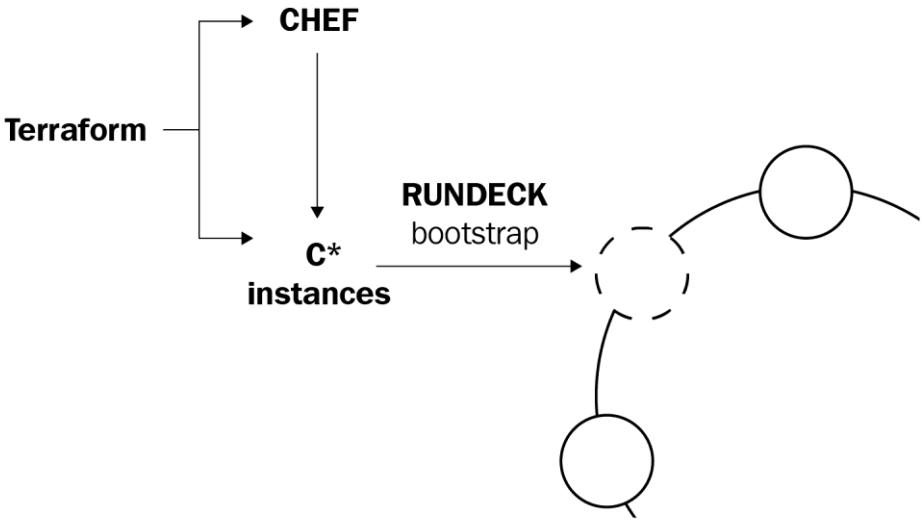
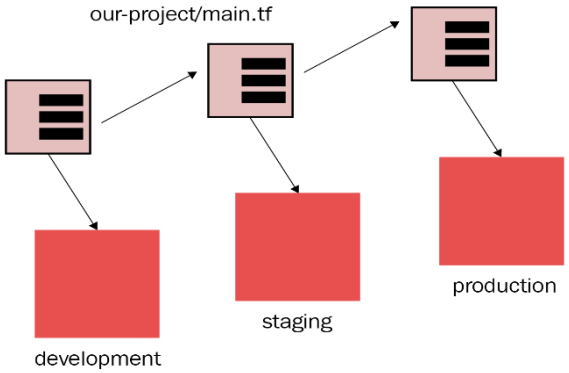
Chapter 1: Getting to Know IaC

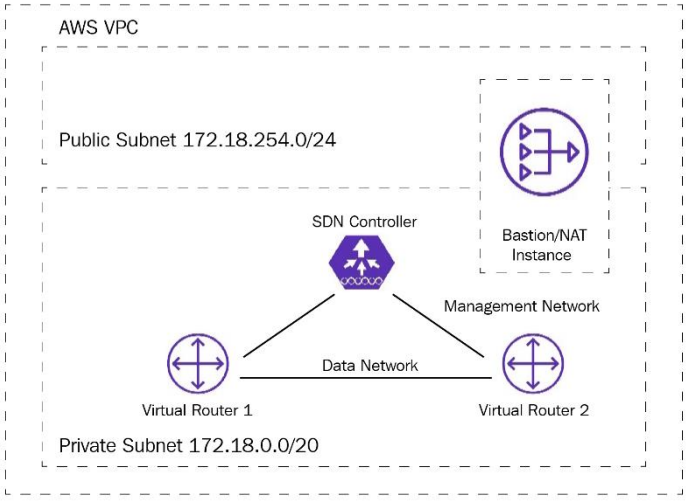


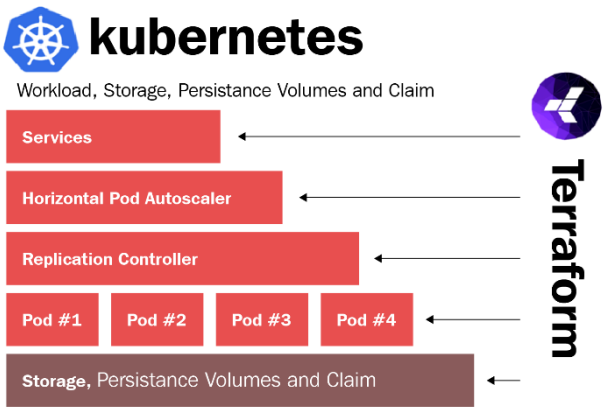


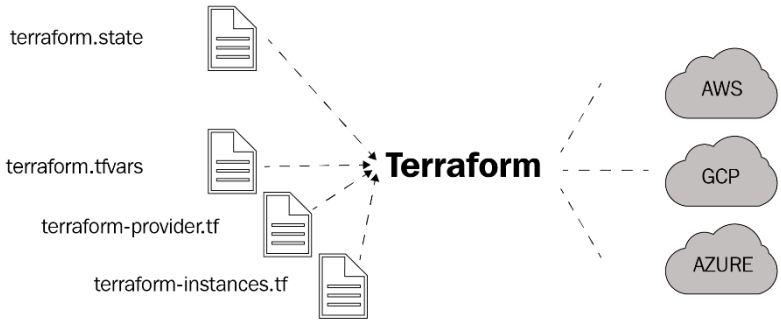



CHEF
Terraform
RUNDECK
bootstrap
C*
instances

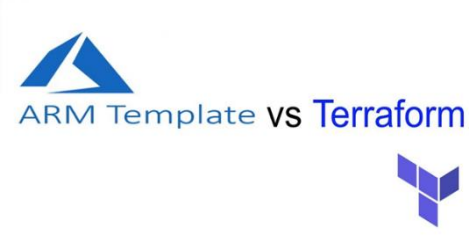

our-project/main.tf
development
staging
production


AWS VPC
Public Subnet 172.18.254.0/24
SDN Controller
Bastion/NAT
Instance
Management Network
Data Network
Virtual Router 1
Virtual Router 2
Private Subnet 172.18.0.0/20

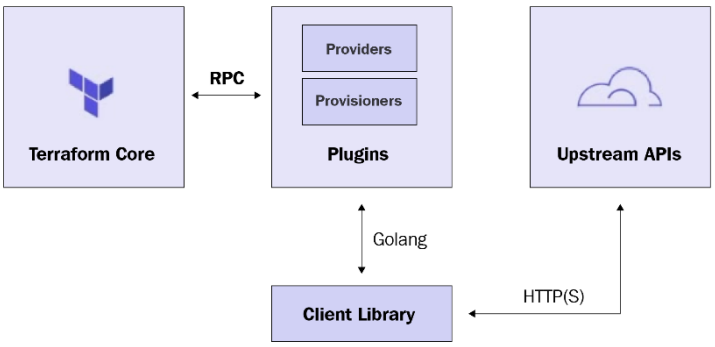




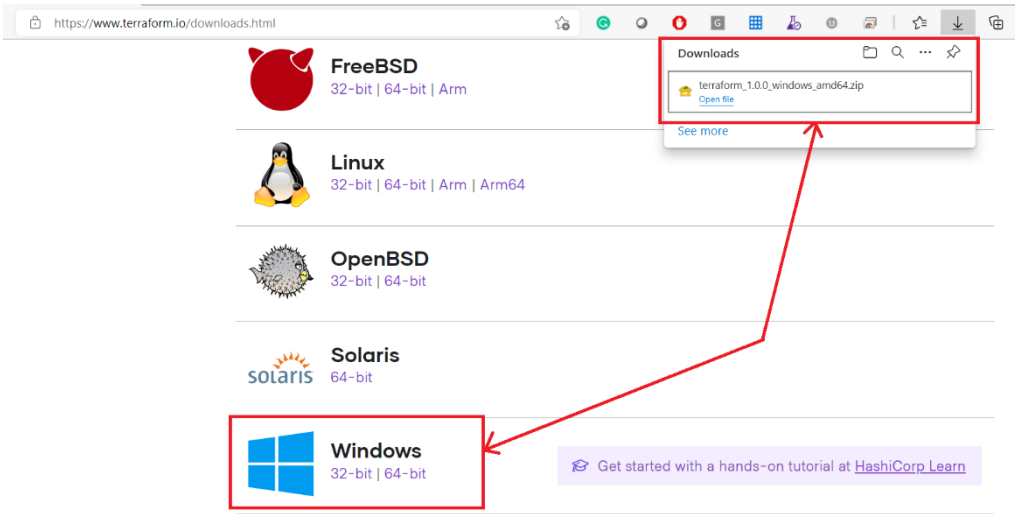
CloudFormation vs Terraform

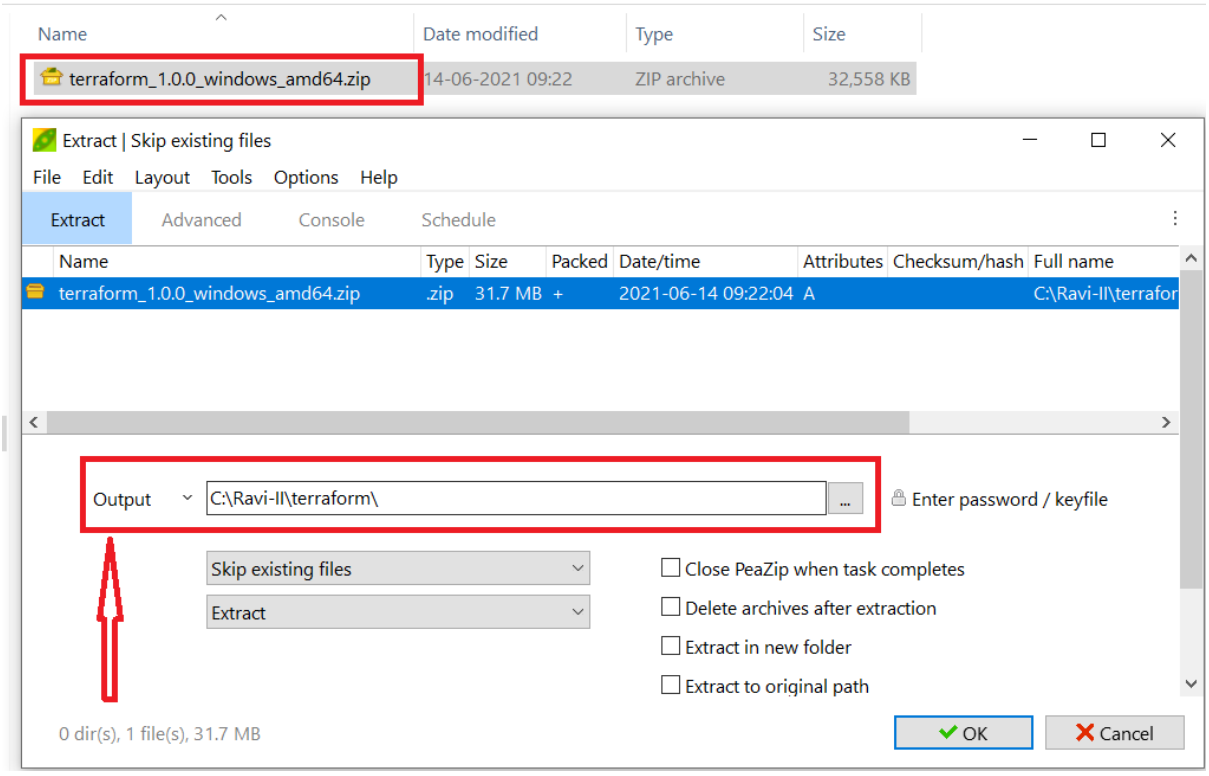


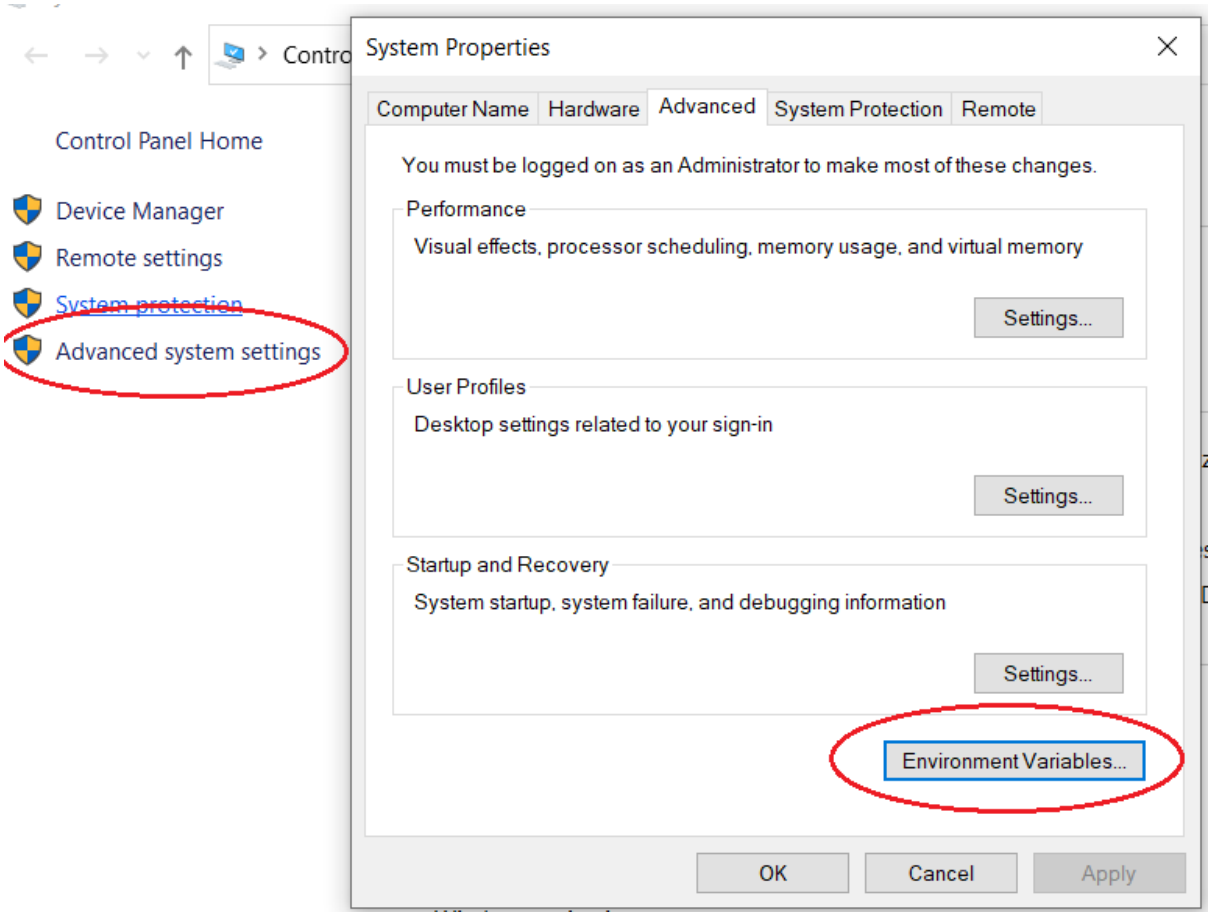
Cloud Deployment Manager vs Terraform

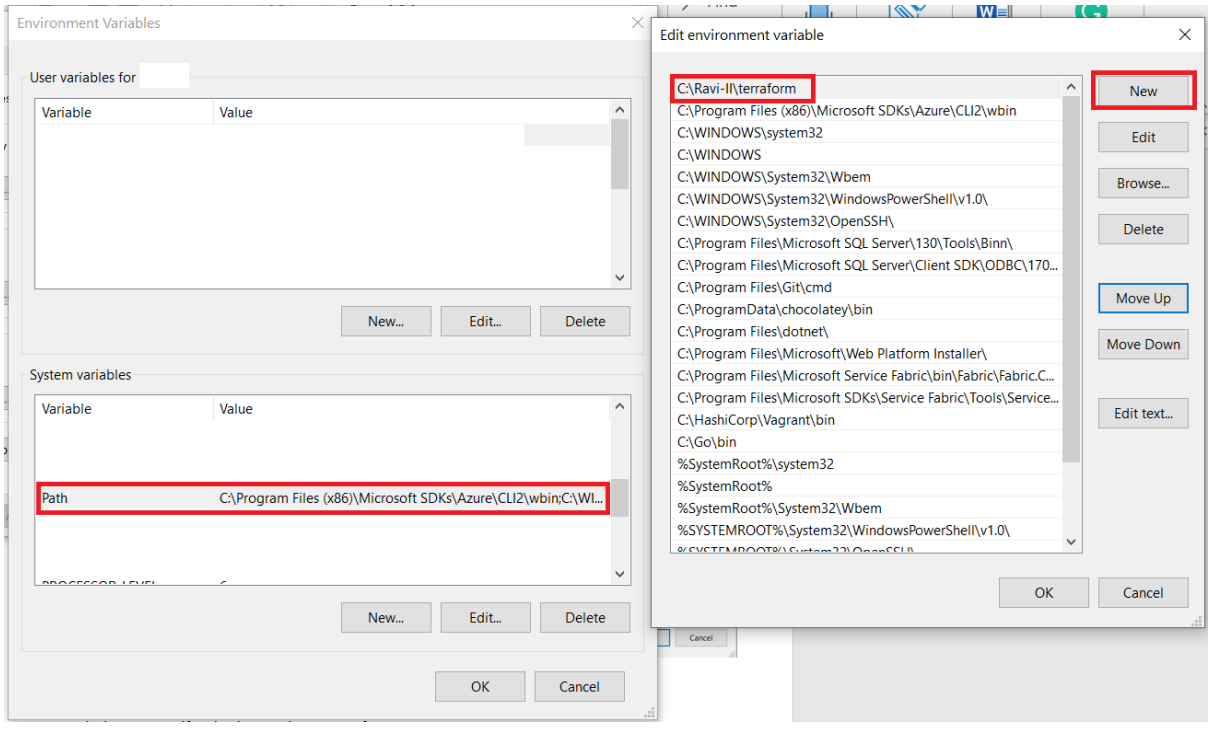


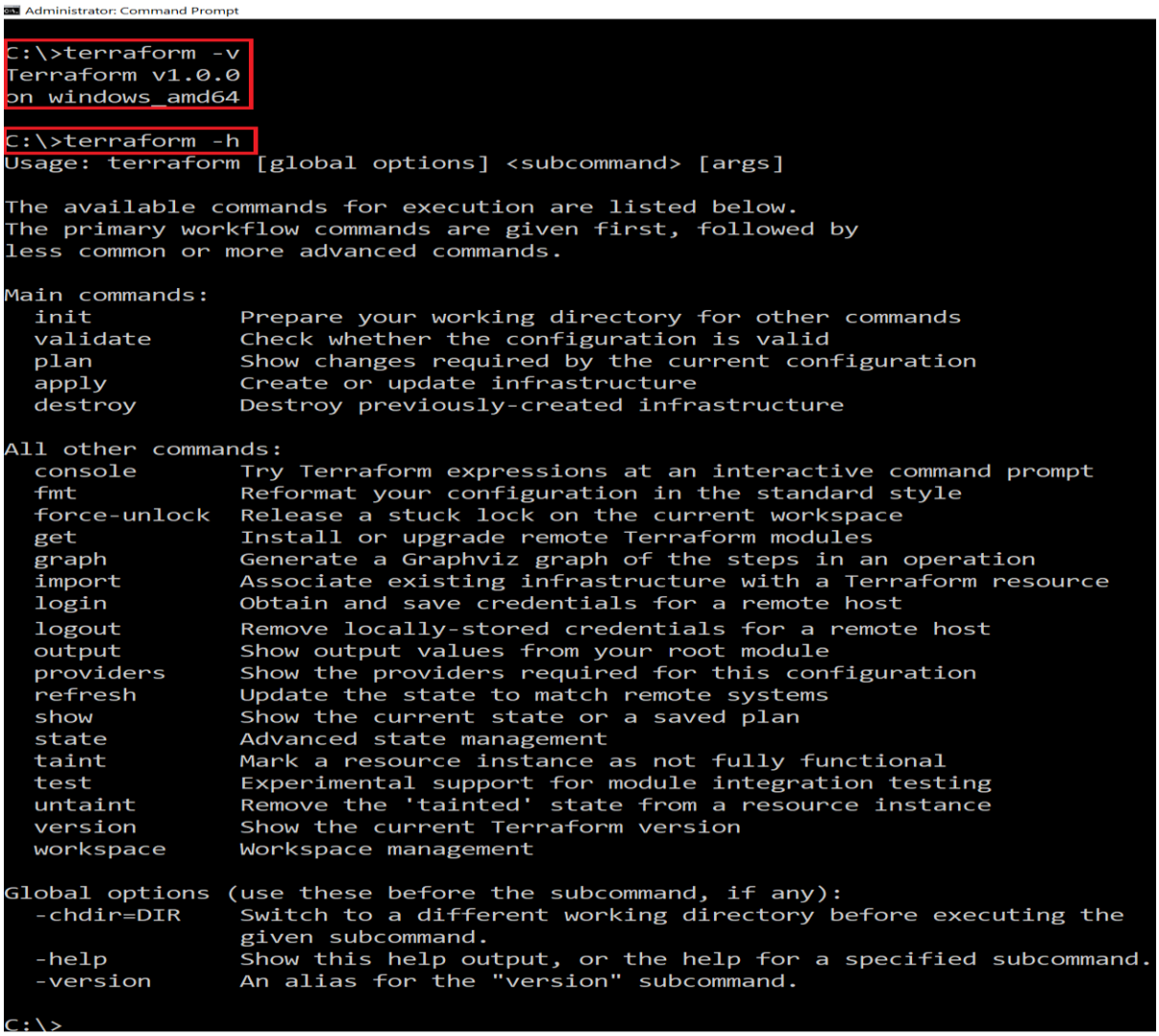
Chapter 2: Terraform Installation Guide






Control Panel Home
Device Manager
Remote settings
System protection
Advanced system settings
System Properties
Computer Name
Hardware
Advanced
System Protection
Remote
You must be logged on as an Administrator to make most of these changes.
Performance
Visual effects, processor scheduling, memory usage, and virtual memory
Settings...
User Profiles
Desktop settings related to your sign-in
Settings...
Startup and Recovery
System startup, system failure, and debugging information
Settings...
Environment Variables...
OK
Cancel
Apply

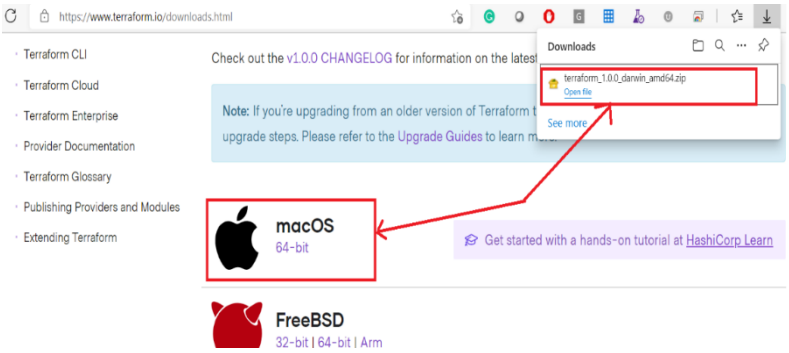

Environment Variables
User variables for
Variable
Value
New...
Edit...
Delete
System variables
Variable
Value
Path
C:\Program Files (x86)\Microsoft SDKs\Azure\CLI2\wbin;C:\WI...
New...
Edit...
Delete
OK
Cancel
Edit environment variable
C:\Ravi-II\terraform
C:\Program Files (x86)\Microsoft SDKs\Azure\CLI2\wbin
C:\WINDOWS\system32
C:\WINDOWS
C:\WINDOWS\System32\Wbem
C:\WINDOWS\System32\WindowsPowerShell\v1.0\
C:\WINDOWS\System32\OpenSSH\
C:\Program Files\Microsoft SQL Server\130\Tools\Binn\
C:\Program Files\Microsoft SQL Server\Client SDK\ODBC\170...
C:\Program Files\Git\cmd
C:\ProgramData\chocolatey\bin
C:\Program Files\dotnet\
C:\Program Files\Microsoft\Web Platform Installer\
C:\Program Files\Microsoft Service Fabric\bin\Fabric\Fabric.C...
C:\Program Files\Microsoft SDKs\Service Fabric\Tools\Service...
C:\HashiCorp\Vagrant\bin
C:\Go\bin
%SystemRoot%\system32
%SystemRoot%
%SystemRoot%\System32\Wbem
%SYSTEMROOT%\System32\WindowsPowerShell\v1.0\
New
Edit
Browse...
Delete
Move Up
Move Down
Edit text...
OK
Cancel




```
inmishrar@terraform-vm:~$ sudo apt update -y
Hit:1 http://azure.archive.ubuntu.com/ubuntu bionic InRelease
Get:2 http://azure.archive.ubuntu.com/ubuntu bionic-updates InRelease [88.7 kB]
Get:3 http://azure.archive.ubuntu.com/ubuntu bionic-backports InRelease [74.6 kB
]
Get:4 http://security.ubuntu.com/ubuntu bionic-security InRelease [88.7 kB]
Get:5 http://azure.archive.ubuntu.com/ubuntu bionic/universe amd64 Packages [857
0 kB]
```

```
inmishrar@terraform-vm: ~/terraform
inmishrar@terraform-vm:~/terraform$ wget https://releases.hashicorp.com/terraform/1.0.0/terraform_1.0.0_linux_amd64.zip
--2021-06-14 05:08:36--  https://releases.hashicorp.com/terraform/1.0.0/terraform_1.0.0_linux_amd64.zip
Resolving releases.hashicorp.com (releases.hashicorp.com)... 151.101.209.183, 2a04:4e42:3b::439
Connecting to releases.hashicorp.com (releases.hashicorp.com)|151.101.209.183|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 33043000 (32M) [application/zip]
Saving to: 'terraform_1.0.0_linux_amd64.zip'

terraform_1.0.0_linux_amd64.zip   100%[===========================================================>]  31.51M  59.8MB/s    in 0.5s

2021-06-14 05:08:37 (59.8 MB/s) - 'terraform_1.0.0_linux_amd64.zip' saved [33043000/33043000]

inmishrar@terraform-vm:~/terraform$ ls
terraform_1.0.0_linux_amd64.zip
inmishrar@terraform-vm:~/terraform$
```

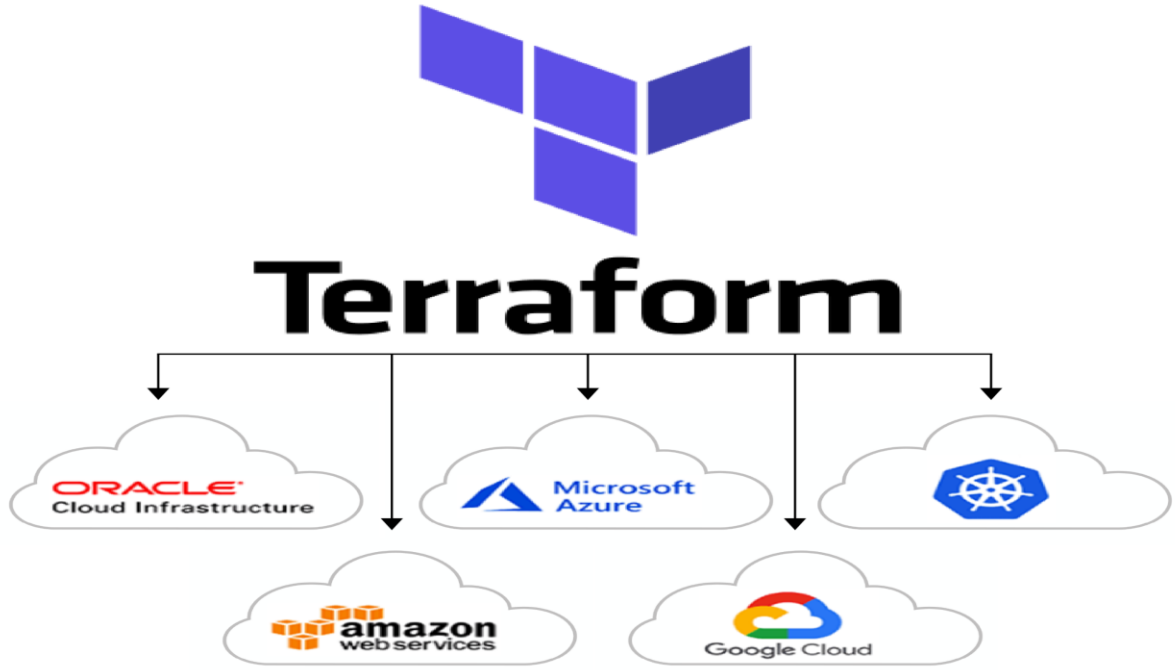
```
inmishrar@terraform-vm:~/terraform$ sudo apt install unzip -y
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following package was automatically installed and is no longer required:
  linux-headers-4.15.0-144
Use 'sudo apt autoremove' to remove it.
Suggested packages:
  zip
The following NEW packages will be installed:
  unzip
0 upgraded, 1 newly installed, 0 to remove and 9 not upgraded.
Need to get 168 kB of archives.
After this operation, 567 kB of additional disk space will be used.
Get:1 http://azure.archive.ubuntu.com/ubuntu bionic-updates/main amd64 unzip amd64 6.0-21ubuntu1.1 [168 kB]
Fetched 168 kB in 0s (7014 kB/s)
Selecting previously unselected package unzip.
(Reading database ... 76932 files and directories currently installed.)
Preparing to unpack .../unzip_6.0-21ubuntu1.1_amd64.deb ...
Unpacking unzip (6.0-21ubuntu1.1) ...
Setting up unzip (6.0-21ubuntu1.1) ...
Processing triggers for mime-support (3.60ubuntu1) ...
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
inmishrar@terraform-vm:~/terraform$ sudo unzip terraform_1.0.0_linux_amd64.zip
Archive:  terraform_1.0.0_linux_amd64.zip
  inflating: terraform
inmishrar@terraform-vm:~/terraform$ ls
terraform  terraform_1.0.0_linux_amd64.zip
inmishrar@terraform-vm:~/terraform$
```



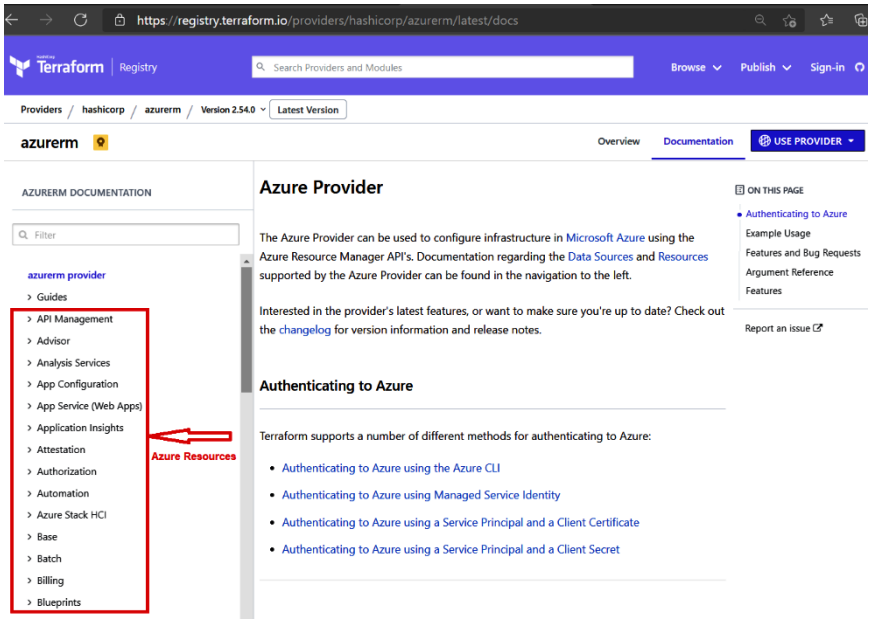
```
MacBook-Pro:n komminenisrinandini$ sudo mv terraform /usr/local/bin
Password:
MacBook-Pro:n komminenisrinandini$ ls
MacBook-Pro:n komminenisrinandini$ cd /usr/local/bin
MacBook-Pro:bin komminenisrinandini$ ls
2to3                    dumpcap                 python3.8
2to3-3.8                easy_install-3.8        python3.8-config
VBoxAutostart           editcap                 randpkt
VBoxBalloonCtrl         idle3                   rawshark
VBoxBugReport           idle3.8                 reordercap
VBoxDTrace              mergecap                terraform
VBoxHeadless            mmdbresolve             text2pcap
VBoxManage              pip3                    tshark
VBoxVRDP                pip3.8                  vbox-img
VirtualBox              pydoc3                  vboxwebsrv
capinfos                pydoc3.8                wireshark
captype                 python3
dftest                  python3-config
MacBook-Pro:bin komminenisrinandini$
```

```
Hamids-MacBook-Pro:~ hamidraza$ terraform -v
Terraform v1.0.0
on darwin_amd64
Hamids-MacBook-Pro:~ hamidraza$ terraform -h
Usage: terraform [global options] <subcommand> [args]

The available commands for execution are listed below.
The primary workflow commands are given first, followed by
less common or more advanced commands.

Main commands:
  init          Prepare your working directory for other commands
  validate      Check whether the configuration is valid
  plan          Show changes required by the current configuration
  apply         Create or update infrastructure
  destroy       Destroy previously-created infrastructure

All other commands:
  console       Try Terraform expressions at an interactive command prompt
  fmt           Reformat your configuration in the standard style
  force-unlock  Release a stuck lock on the current workspace
  get           Install or upgrade remote Terraform modules
  graph         Generate a Graphviz graph of the steps in an operation
  import        Associate existing infrastructure with a Terraform resource
  login         Obtain and save credentials for a remote host
  logout        Remove locally-stored credentials for a remote host
  output        Show output values from your root module
  providers     Show the providers required for this configuration
  refresh       Update the state to match remote systems
  show          Show the current state or a saved plan
  state         Advanced state management
  taint         Mark a resource instance as not fully functional
  test          Experimental support for module integration testing
  untaint       Remove the 'tainted' state from a resource instance
  version       Show the current Terraform version
  workspace     Workspace management

Global options (use these before the subcommand, if any):
  -chdir=DIR    Switch to a different working directory before executing the
                given subcommand.
  -help         Show this help output, or the help for a specified subcommand.
  -version      An alias for the "version" subcommand.
```

Chapter 3: Getting Started with Terraform




```
resource "azurerm_resource_group" "example" {
  name     = "test-resources"
  location = "West US 2"
}
resource "azurerm_public_ip" "azure-pip" {
  name                    = "test-pip"
  location                = azurerm_resource_group.example.location
  resource_group_name     = azurerm_resource_group.example.name
  allocation_method       = "Dynamic"
  idle_timeout_in_minutes = 30

  tags = {
    environment = "test"
  }
}
```




```hcl
# To Create Azure Resource Group
resource "azurerm_resource_group" "example" {
  name     = "Terraform-rg"
  location = "West Europe"
}
# To Create Azure Public IP Address
resource "azurerm_public_ip" "example" {
  name                    = "Terraform-pip"
  location                = azurerm_resource_group.example.location
  resource_group_name     = azurerm_resource_group.example.name
  allocation_method       = "Static"
  idle_timeout_in_minutes = 10
}
# To Create Azure Load Balancer
resource "azurerm_lb" "example" {
  name                = "Terraform-LoadBalancer"
  location            = azurerm_resource_group.example.location
  resource_group_name = azurerm_resource_group.example.name

  frontend_ip_configuration {
    name                 = azurerm_public_ip.example.name
    public_ip_address_id = azurerm_public_ip.example.id
  }
}
```

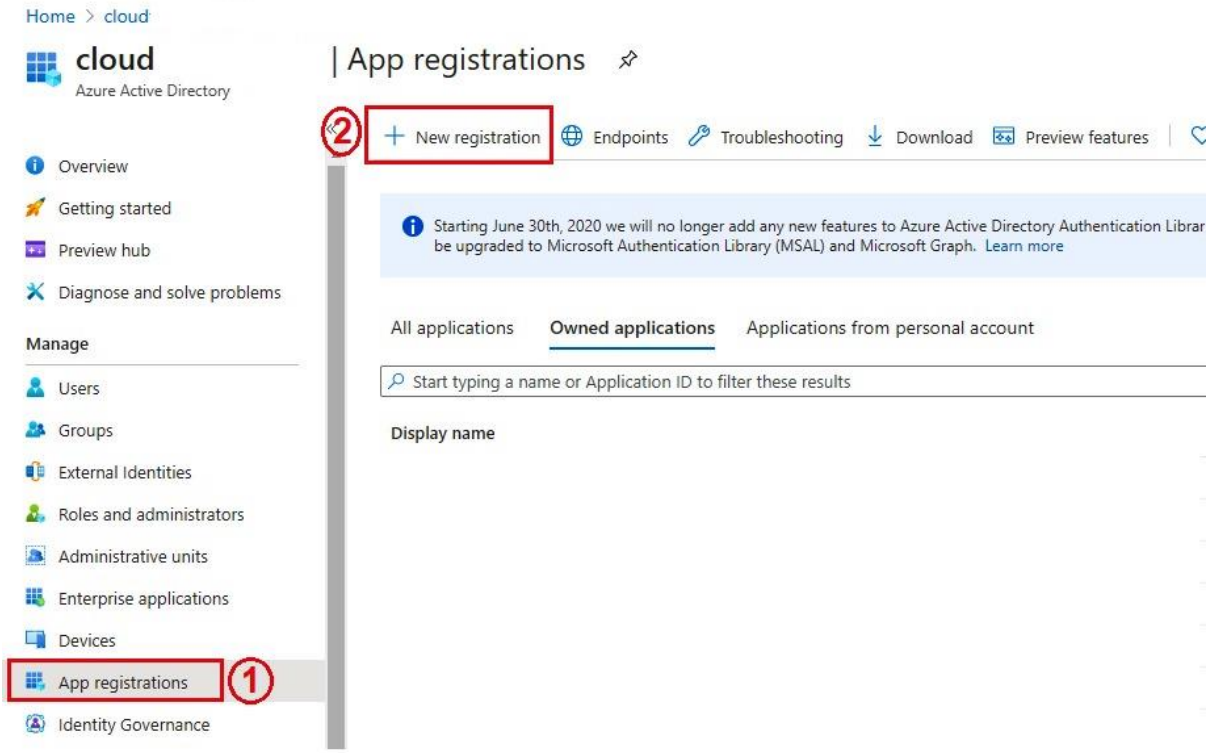
- `arn` - Amazon Resource Name (ARN) of VPC
- `id` - The ID of the VPC
- `cidr_block` - The CIDR block of the VPC
- `instance_tenancy` - Tenancy of instances spin up within VPC.
- `enable_dns_support` - Whether or not the VPC has DNS support
- `enable_dns_hostnames` - Whether or not the VPC has DNS hostname support
- `enable_classiclink` - Whether or not the VPC has Classiclink enabled
- `main_route_table_id` - The ID of the main route table associated with this VPC. Note that you can change a VPC's main route table by using an `aws_main_route_table_association`.
- `default_network_acl_id` - The ID of the network ACL created by default on VPC creation
- `default_security_group_id` - The ID of the security group created by default on VPC creation
- `default_route_table_id` - The ID of the route table created by default on VPC creation
- `ipv6_association_id` - The association ID for the IPv6 CIDR block.
- `ipv6_cidr_block` - The IPv6 CIDR block.
- `owner_id` - The ID of the AWS account that owns the VPC.

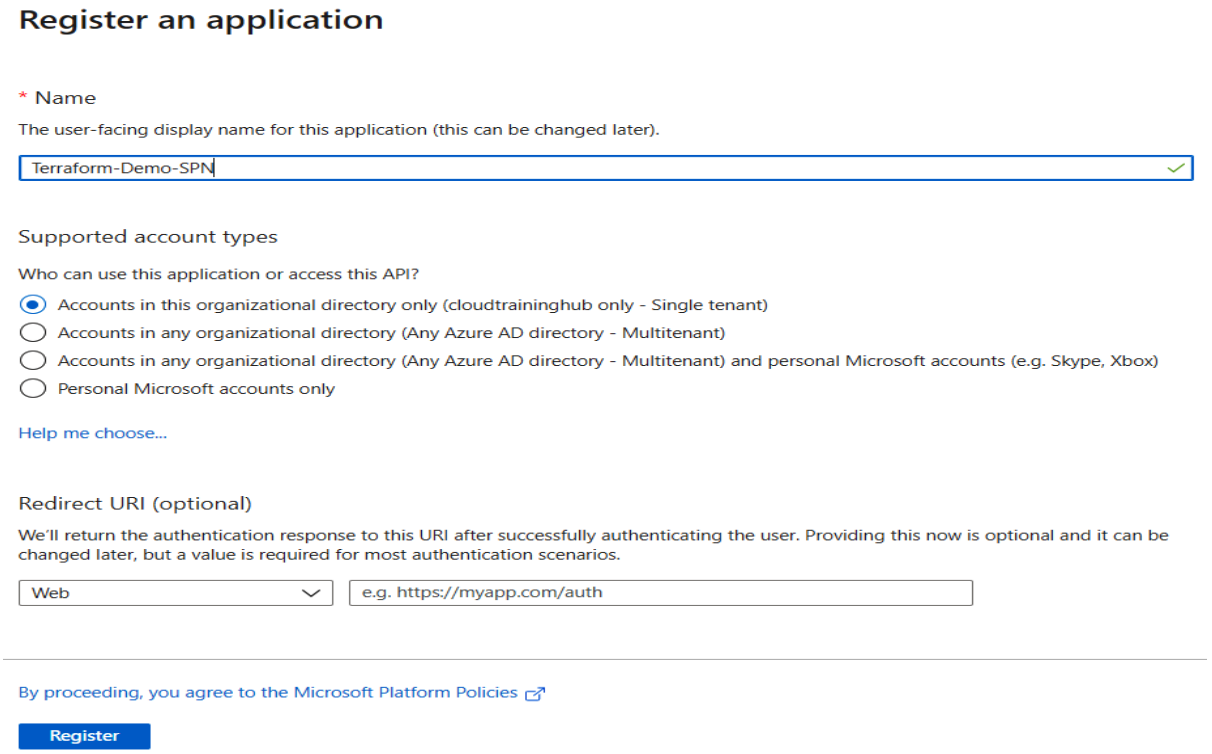
- `id` - an identifier for the resource with format `{{project}}`
- `name` - Unique name of the app, usually `apps/{PROJECT_ID}`
- `app_id` - Identifier of the app, usually `{PROJECT_ID}`
- `url_dispatch_rule` - A list of dispatch rule blocks. Each block has a `domain`, `path`, and `service` field.
- `code_bucket` - The GCS bucket code is being stored in for this app.
- `default_hostname` - The default hostname for this app.
- `default_bucket` - The GCS bucket content is being stored in for this app.
- `gcr_domain` - The GCR domain used for storing managed Docker images for this app.
- `iap` - Settings for enabling Cloud Identity Aware Proxy
    - `oauth2_client_secret_sha256` - Hex-encoded SHA-256 hash of the client secret.

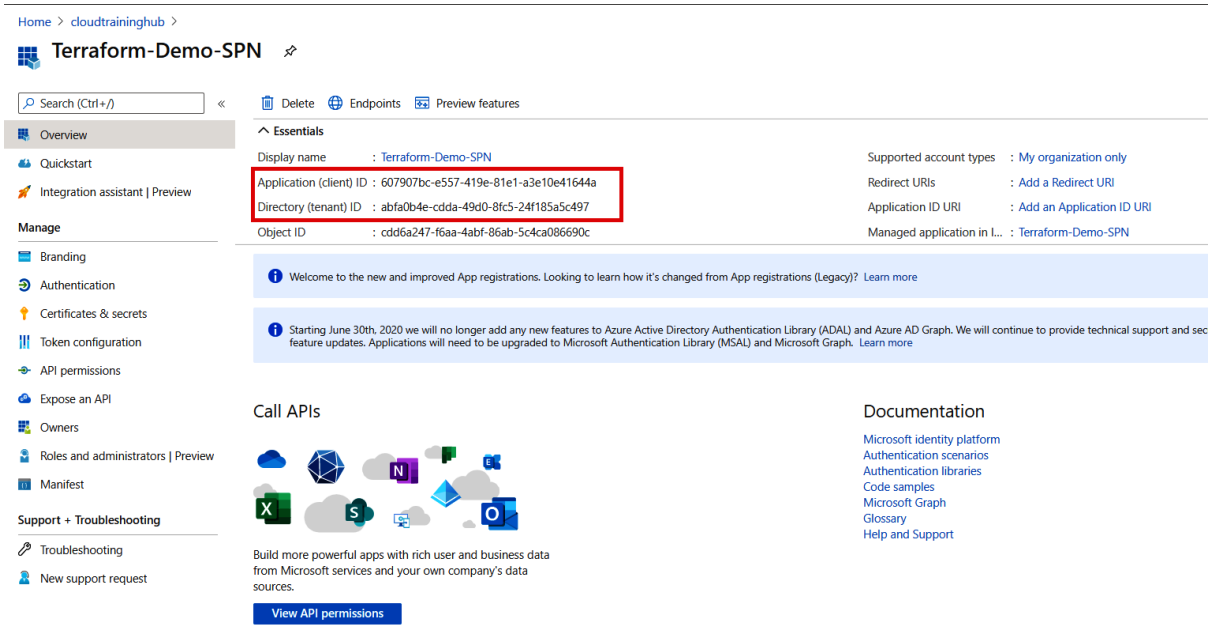
Chapter 4: Deep Dive into Terraform

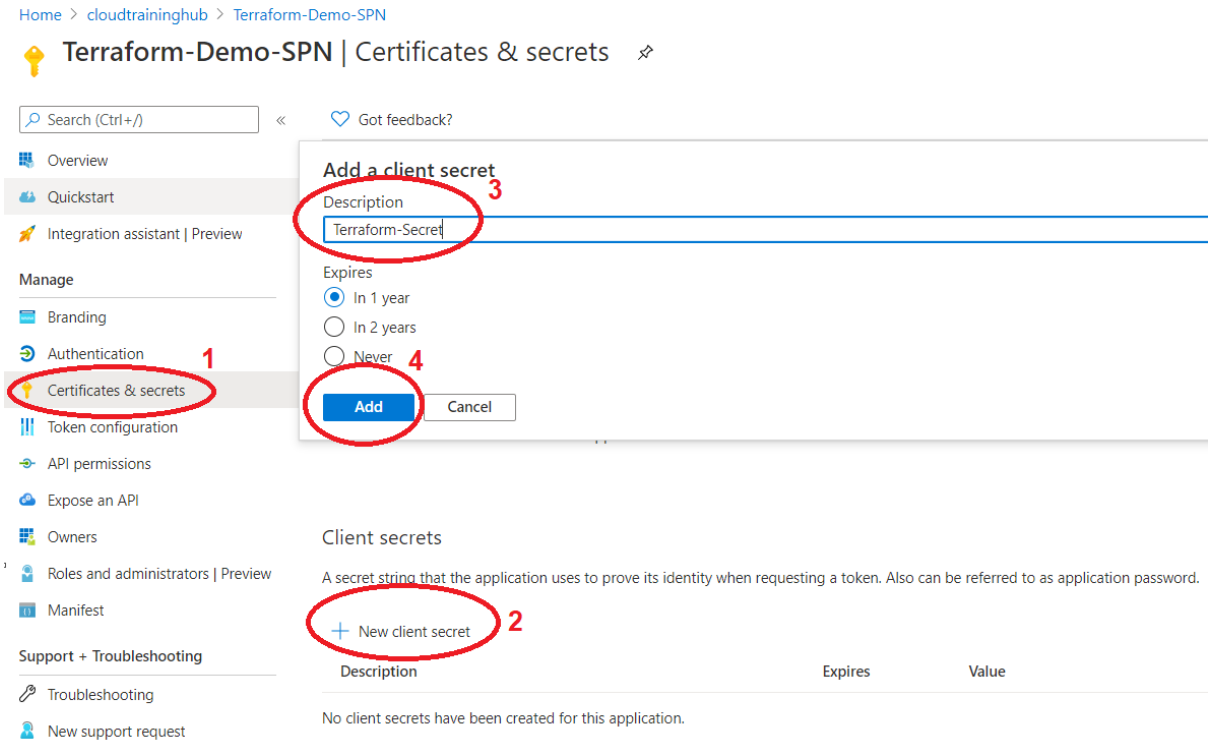
- Alibaba Cloud: `user_data` on `alicloud_instance` or `alicloud_launch_template`.
- Amazon EC2: `user_data` or `user_data_base64` on `aws_instance`, `aws_launch_template`, and `aws_launch_configuration`.
- Amazon Lightsail: `user_data` on `aws_lightsail_instance`.
- Microsoft Azure: `custom_data` on `azurerm_virtual_machine` or `azurerm_virtual_machine_scale_set`.
- Google Cloud Platform: `metadata` on `google_compute_instance` or `google_compute_instance_group`.
- Oracle Cloud Infrastructure: `metadata` or `extended_metadata` on `oci_core_instance` or `oci_core_instance_configuration`.
- VMware vSphere: Attach a virtual CDROM to `vsphere_virtual_machine` using the `cdrom` block, containing a file called `user-data.txt`.

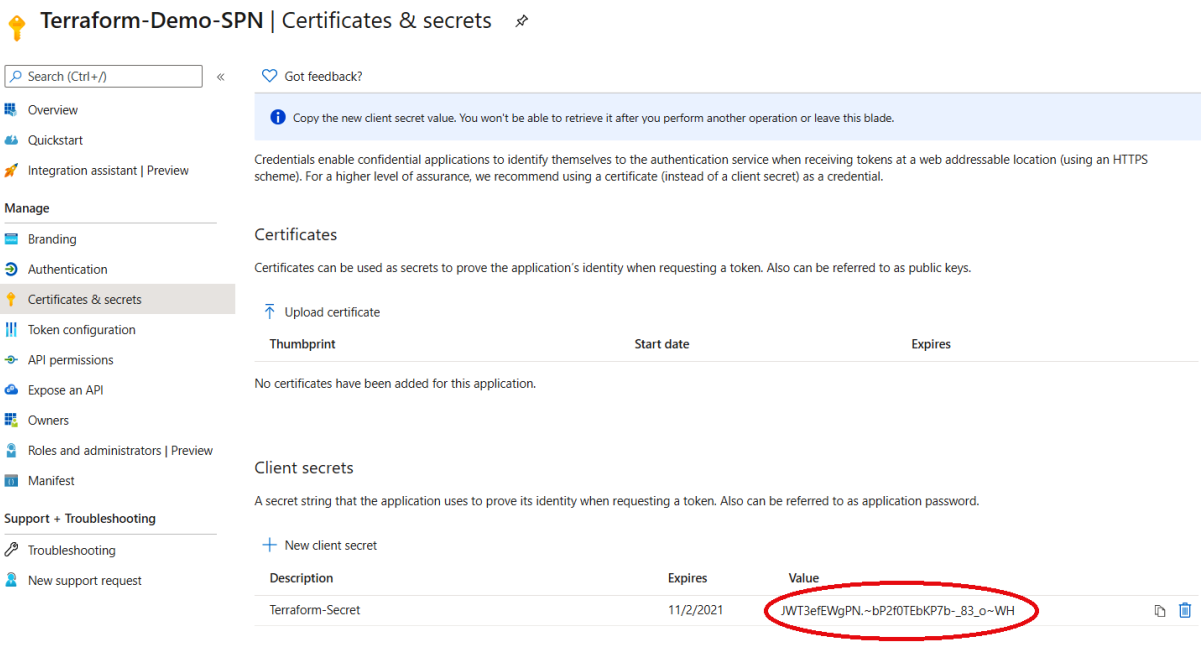
Chapter 5: Terraform CLI

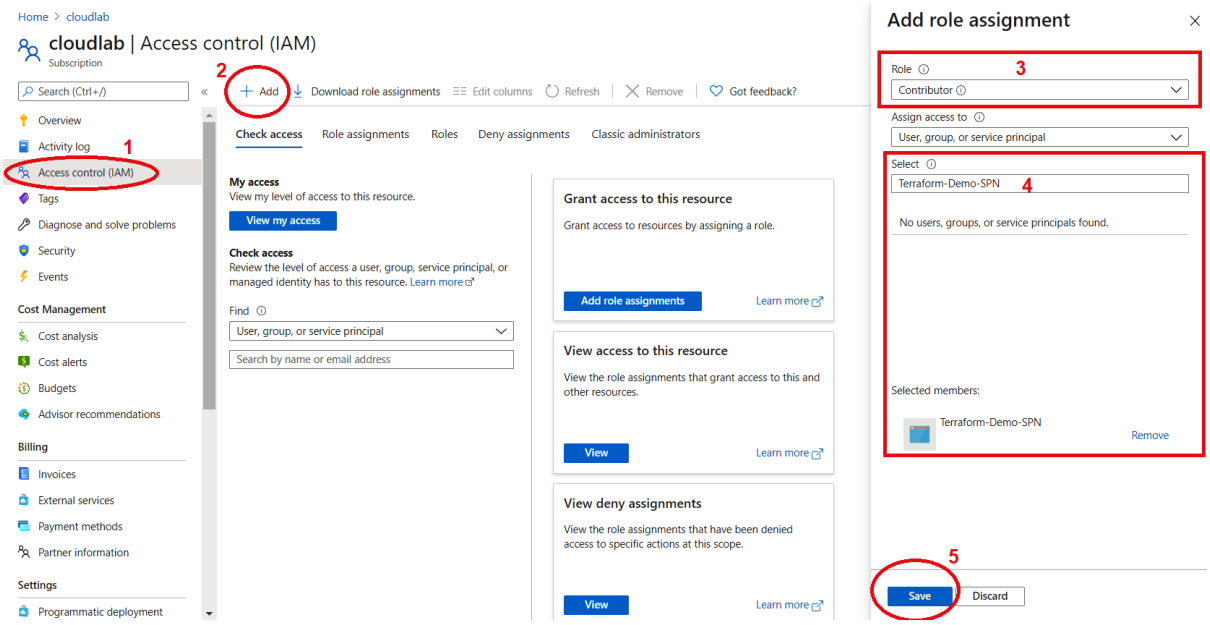


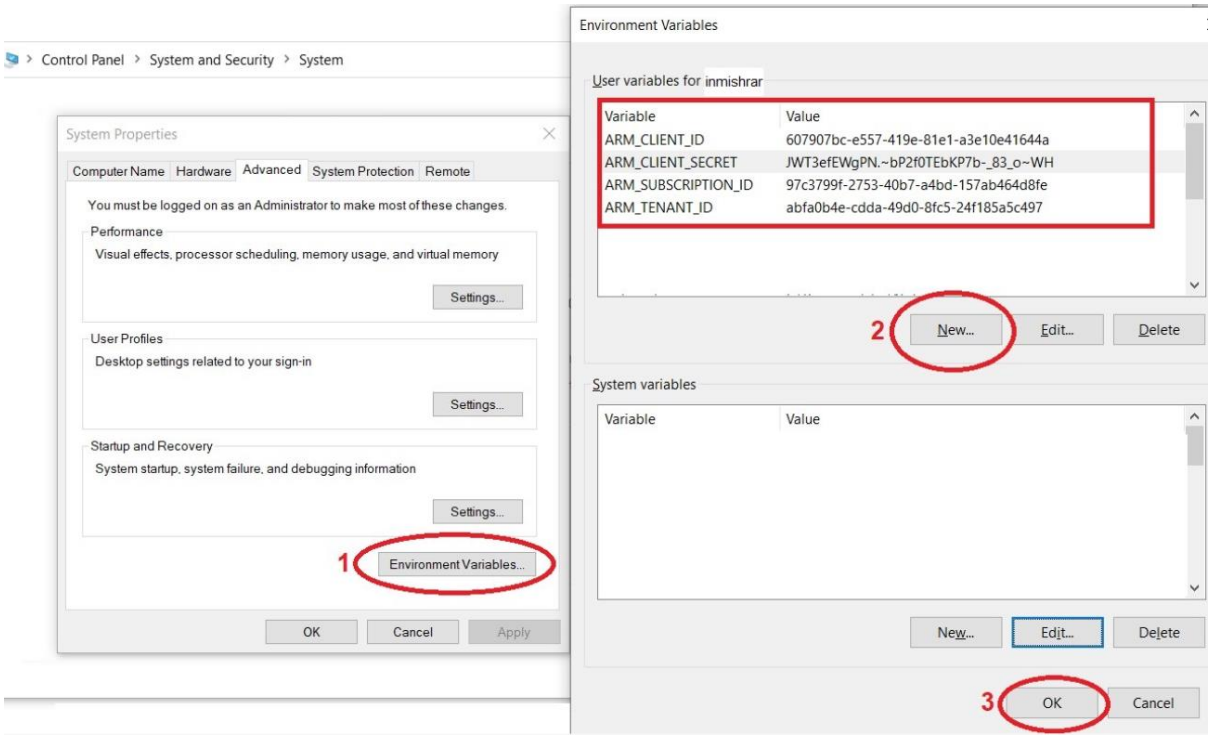


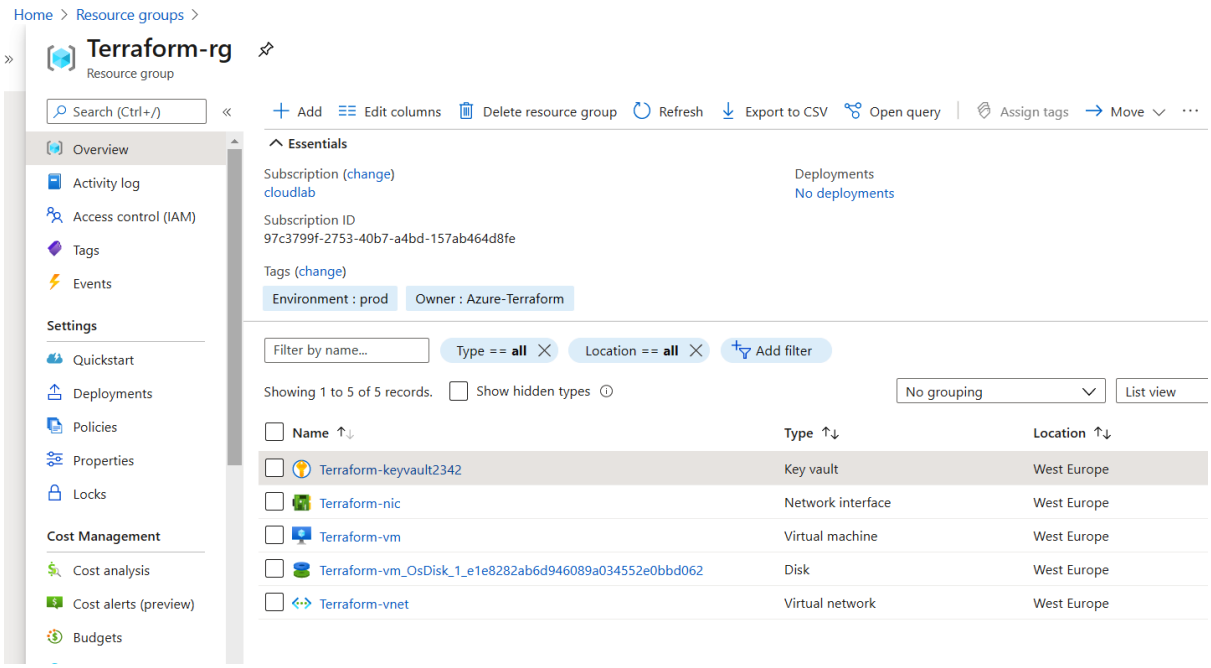

Home > cloudtraininghub >
Terraform-Demo-SPN
Search (Ctrl+/)
Overview
Quickstart
Integration assistant | Preview
Manage
Branding
Authentication
Certificates & secrets
Token configuration
API permissions
Expose an API
Owners
Roles and administrators | Preview
Manifest
Support + Troubleshooting
Troubleshooting
New support request
Delete
Endpoints
Preview features
Essentials
Display name : Terraform-Demo-SPN
Application (client) ID : 607907bc-e557-419e-81e1-a3e10e41644a
Directory (tenant) ID : abfa0b4e-cdda-49d0-8fc5-24f185a5c497
Object ID : cdd6a247-f6aa-4abf-86ab-5c4ca086690c
Supported account types : My organization only
Redirect URIs : Add a Redirect URI
Application ID URI : Add an Application ID URI
Managed application in l... : Terraform-Demo-SPN
Welcome to the new and improved App registrations. Looking to learn how it's changed from App registrations (Legacy)? Learn more
Starting June 30th, 2020 we will no longer add any new features to Azure Active Directory Authentication Library (ADAL) and Azure AD Graph. We will continue to provide technical support and sec
feature updates. Applications will need to be upgraded to Microsoft Authentication Library (MSAL) and Microsoft Graph. Learn more
Call APIs
Build more powerful apps with rich user and business data from Microsoft services and your own company's data sources.
View API permissions
Documentation
Microsoft identity platform
Authentication scenarios
Authentication libraries
Code samples
Microsoft Graph
Glossary
Help and Support

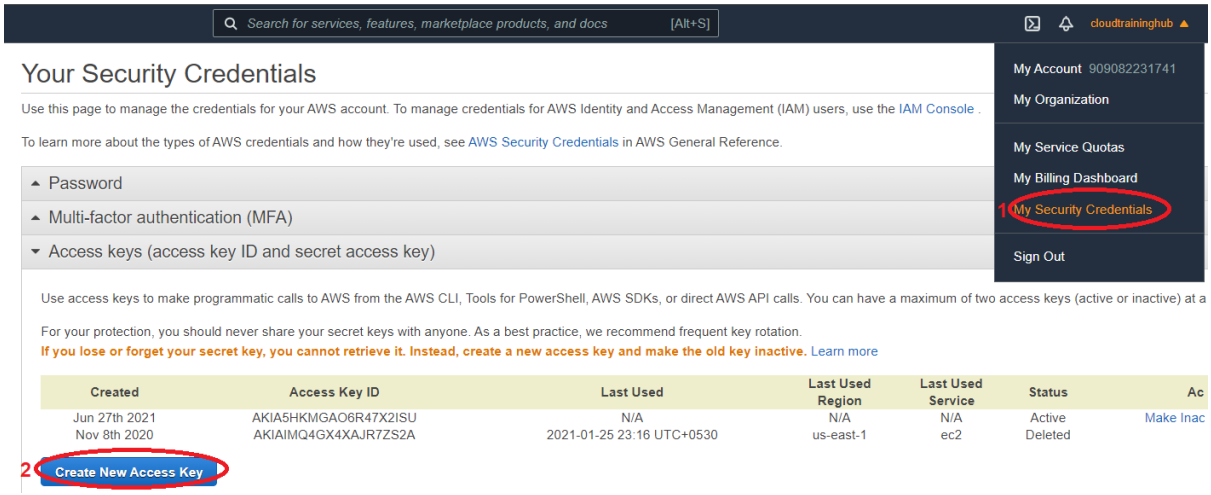

Home > cloudtraininghub > Terraform-Demo-SPN
Terraform-Demo-SPN | Certificates & secrets
Search (Ctrl+/)
Got feedback?
Overview
Quickstart
Integration assistant | Preview
Manage
Branding
Authentication
Certificates & secrets
Token configuration
API permissions
Expose an API
Owners
Roles and administrators | Preview
Manifest
Support + Troubleshooting
Troubleshooting
New support request
1
Add a client secret
3
Description
Terraform-Secret
Expires
In 1 year
In 2 years
Never
4
Add
Cancel
Client secrets
A secret string that the application uses to prove its identity when requesting a token. Also can be referred to as application password.
New client secret
2
Description
Expires
Value
No client secrets have been created for this application.

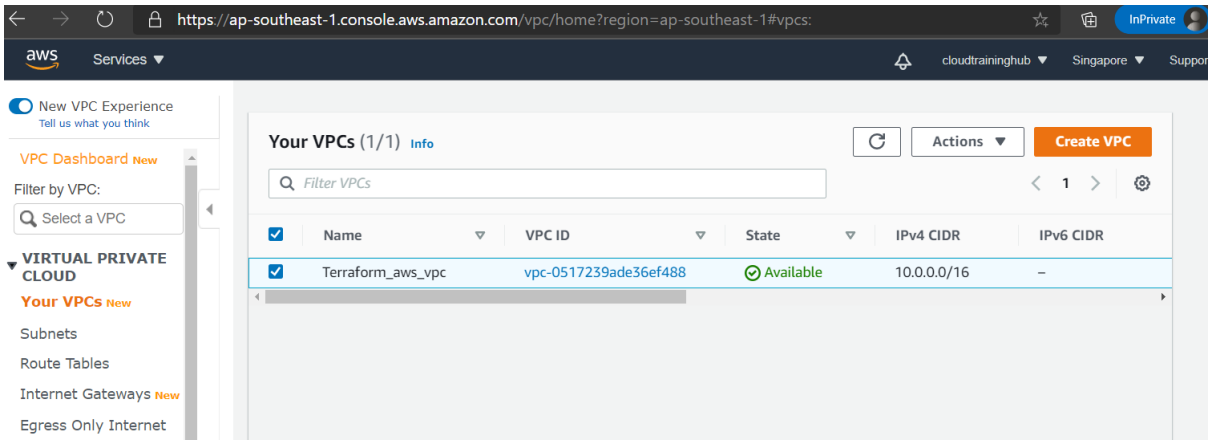

Terraform-Demo-SPN | Certificates & secrets
Search (Ctrl+/)
Overview
Quickstart
Integration assistant | Preview
Manage
Branding
Authentication
Certificates & secrets
Token configuration
API permissions
Expose an API
Owners
Roles and administrators | Preview
Manifest
Support + Troubleshooting
Troubleshooting
New support request
Got feedback?
Copy the new client secret value. You won't be able to retrieve it after you perform another operation or leave this blade.
Credentials enable confidential applications to identify themselves to the authentication service when receiving tokens at a web addressable location (using an HTTPS scheme). For a higher level of assurance, we recommend using a certificate (instead of a client secret) as a credential.
Certificates
Certificates can be used as secrets to prove the application's identity when requesting a token. Also can be referred to as public keys.
Upload certificate
Thumbprint
Start date
Expires
No certificates have been added for this application.
Client secrets
A secret string that the application uses to prove its identity when requesting a token. Also can be referred to as application password.
New client secret
Description
Expires
Value
Terraform-Secret
11/2/2021
JWT3efEWgPN.~bP2f0TEbKP7b-_83_o~WH

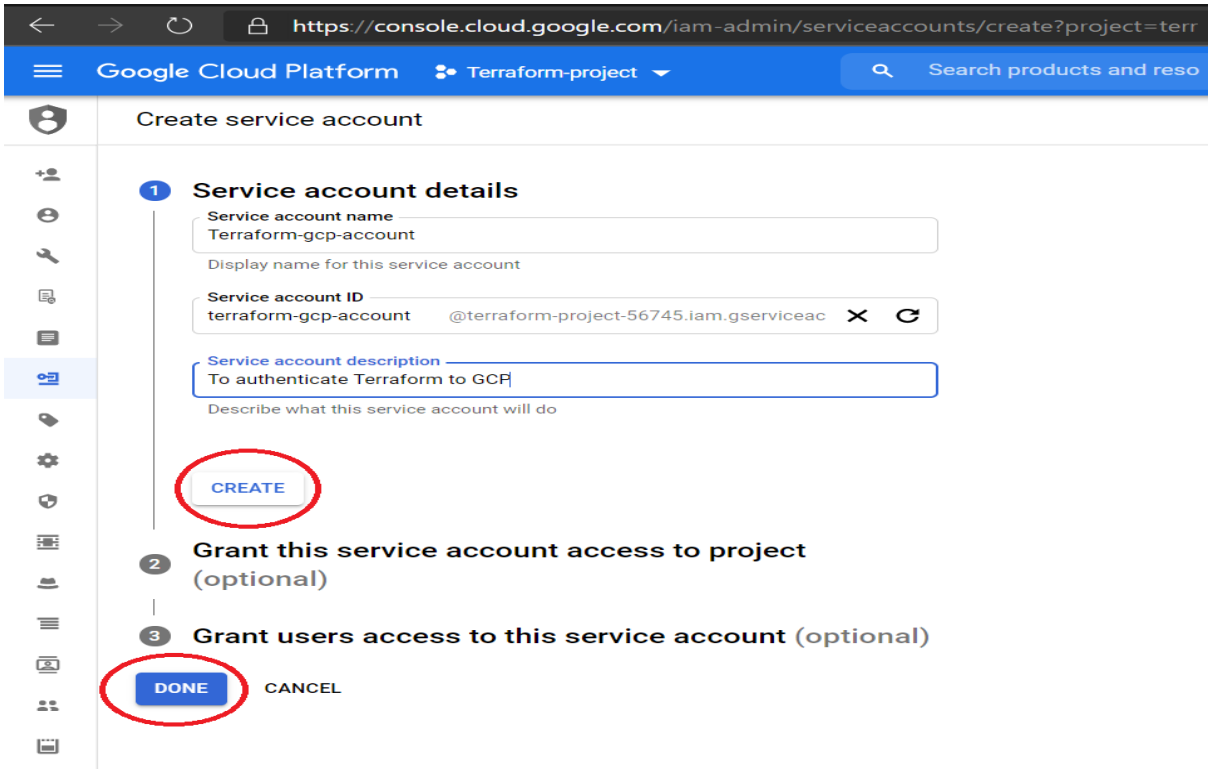

Home > cloudlab
cloudlab | Access control (IAM)
Subscription
Search (Ctrl+/)
Overview
Activity log
Access control (IAM)
Tags
Diagnose and solve problems
Security
Events
Cost Management
Cost analysis
Cost alerts
Budgets
Advisor recommendations
Billing
Invoices
External services
Payment methods
Partner information
Settings
Programmatic deployment
1
2
Add
Download role assignments
Edit columns
Refresh
Remove
Got feedback?
Check access
Role assignments
Roles
Deny assignments
Classic administrators
My access
View my level of access to this resource.
View my access
Check access
Review the level of access a user, group, service principal, or managed identity has to this resource. Learn more
Find
User, group, or service principal
Search by name or email address
Grant access to this resource
Grant access to resources by assigning a role.
Add role assignments
Learn more
View access to this resource
View the role assignments that grant access to this and other resources.
View
Learn more
View deny assignments
View the role assignments that have been denied access to specific actions at this scope.
View
Learn more
Add role assignment
Role
3
Contributor
Assign access to
User, group, or service principal
Select
Terraform-Demo-SPN
4
No users, groups, or service principals found.
Selected members:
Terraform-Demo-SPN
Remove
5
Save
Discard

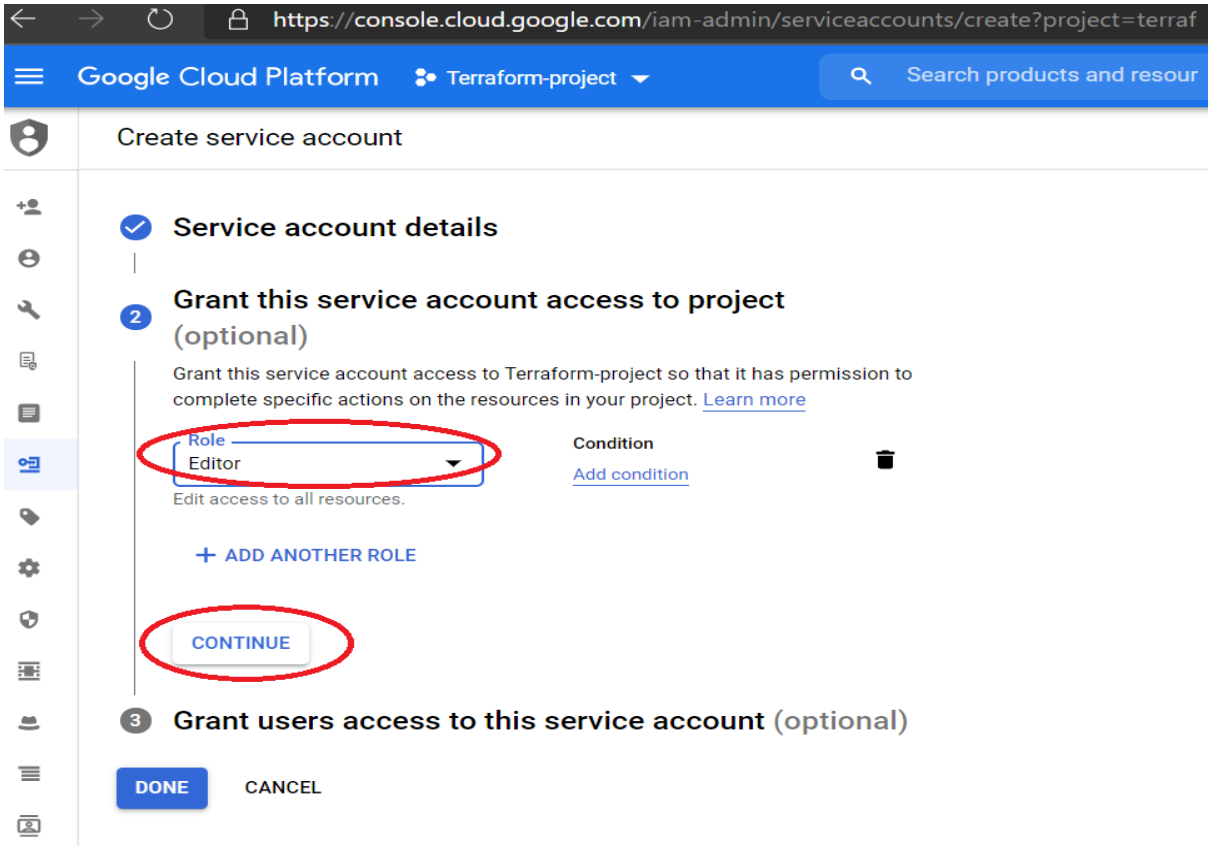

Control Panel › System and Security › System
System Properties
Computer Name
Hardware
Advanced
System Protection
Remote
You must be logged on as an Administrator to make most of these changes.
Performance
Visual effects, processor scheduling, memory usage, and virtual memory
Settings...
User Profiles
Desktop settings related to your sign-in
Settings...
Startup and Recovery
System startup, system failure, and debugging information
Settings...
1
Environment Variables...
OK
Cancel
Apply
Environment Variables
User variables for inmishrar
Variable
Value
ARM_CLIENT_ID
607907bc-e557-419e-81e1-a3e10e41644a
ARM_CLIENT_SECRET
JWT3efEWgPN.~bP2f0TEbKP7b-_83_o~WH
ARM_SUBSCRIPTION_ID
97c3799f-2753-40b7-a4bd-157ab464d8fe
ARM_TENANT_ID
abfa0b4e-cdda-49d0-8fc5-24f185a5c497
2
New...
Edit...
Delete
System variables
Variable
Value
New...
Edit...
Delete
3
OK
Cancel

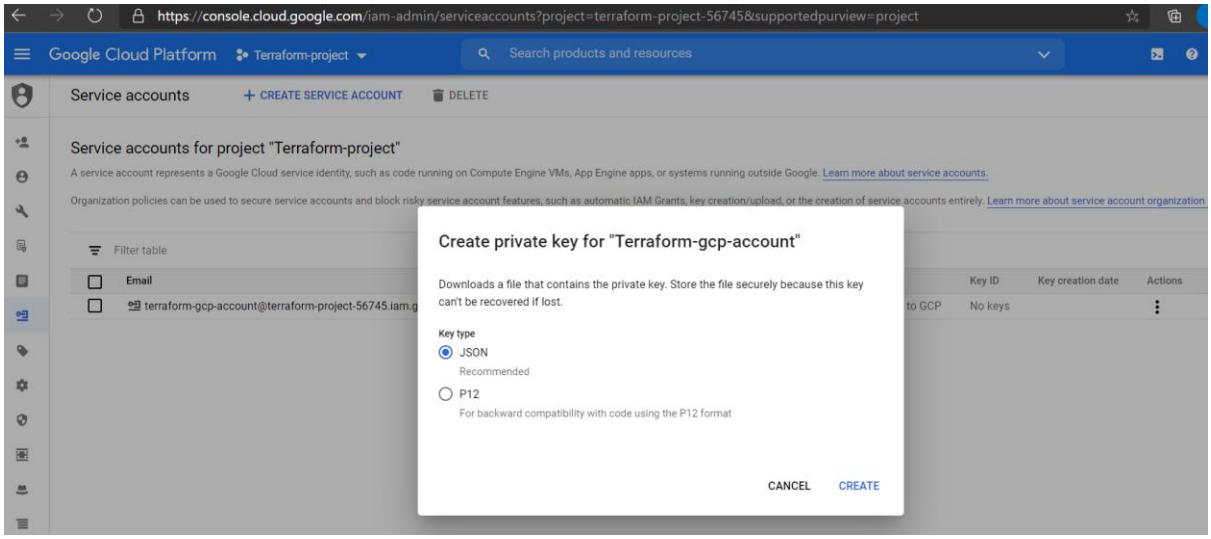

Home › Resource groups ›
Terraform-rg
Resource group
Search (Ctrl+/)
Add
Edit columns
Delete resource group
Refresh
Export to CSV
Open query
Assign tags
Move
Overview
Activity log
Access control (IAM)
Tags
Events
Settings
Quickstart
Deployments
Policies
Properties
Locks
Cost Management
Cost analysis
Cost alerts (preview)
Budgets
Essentials
Subscription (change)
cloudlab
Subscription ID
97c3799f-2753-40b7-a4bd-157ab464d8fe
Tags (change)
Environment : prod
Owner : Azure-Terraform
Deployments
No deployments
Filter by name...
Type == all
Location == all
Add filter
Showing 1 to 5 of 5 records.
Show hidden types
No grouping
List view
Name
Type
Location
Terraform-keyvault2342
Key vault
West Europe
Terraform-nic
Network interface
West Europe
Terraform-vm
Virtual machine
West Europe
Terraform-vm_OsDisk_1_e1e8282ab6d946089a034552e0bbd062
Disk
West Europe
Terraform-vnet
Virtual network
West Europe

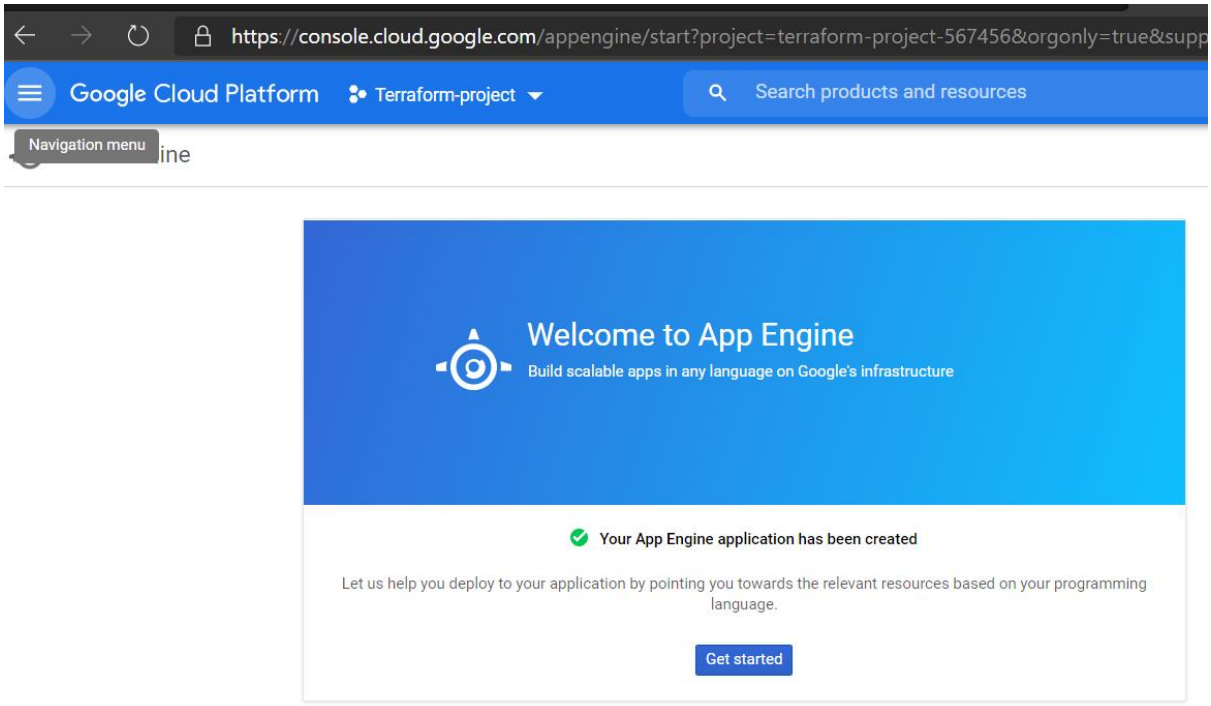

Search for services, features, marketplace products, and docs [Alt+S]
cloudtraininghub
Your Security Credentials
Use this page to manage the credentials for your AWS account. To manage credentials for AWS Identity and Access Management (IAM) users, use the IAM Console .
To learn more about the types of AWS credentials and how they're used, see AWS Security Credentials in AWS General Reference.
Password
Multi-factor authentication (MFA)
Access keys (access key ID and secret access key)
My Account 909082231741
My Organization
My Service Quotas
My Billing Dashboard
1 My Security Credentials
Sign Out
Use access keys to make programmatic calls to AWS from the AWS CLI, Tools for PowerShell, AWS SDKs, or direct AWS API calls. You can have a maximum of two access keys (active or inactive) at a
For your protection, you should never share your secret keys with anyone. As a best practice, we recommend frequent key rotation.
If you lose or forget your secret key, you cannot retrieve it. Instead, create a new access key and make the old key inactive. Learn more
Created
Access Key ID
Last Used
Last Used Region
Last Used Service
Status
Ac
Jun 27th 2021
AKIA5HKMGAO6R47X2ISU
N/A
N/A
N/A
Active
Make Inac
Nov 8th 2020
AKIAIMQ4GX4XAJR7ZS2A
2021-01-25 23:16 UTC+0530
us-east-1
ec2
Deleted
2 Create New Access Key


https://ap-southeast-1.console.aws.amazon.com/vpc/home?region=ap-southeast-1#vpcs:
InPrivate
aws
Services
cloudtraininghub
Singapore
New VPC Experience
Tell us what you think
VPC Dashboard New
Filter by VPC:
Select a VPC
VIRTUAL PRIVATE CLOUD
Your VPCs New
Subnets
Route Tables
Internet Gateways New
Egress Only Internet
Your VPCs (1/1) Info
Actions
Create VPC
Filter VPCs
1
Name
VPC ID
State
IPv4 CIDR
IPv6 CIDR
Terraform_aws_vpc
vpc-0517239ade36ef488
Available
10.0.0.0/16
–


https://console.cloud.google.com/iam-admin/serviceaccounts/create?project=terr
Google Cloud Platform
Terraform-project
Search products and reso
Create service account
1 Service account details
Service account name
Terraform-gcp-account
Display name for this service account
Service account ID
terraform-gcp-account
@terraform-project-56745.iam.gserviceac
Service account description
To authenticate Terraform to GCP
Describe what this service account will do
CREATE
2 Grant this service account access to project (optional)
3 Grant users access to this service account (optional)
DONE
CANCEL

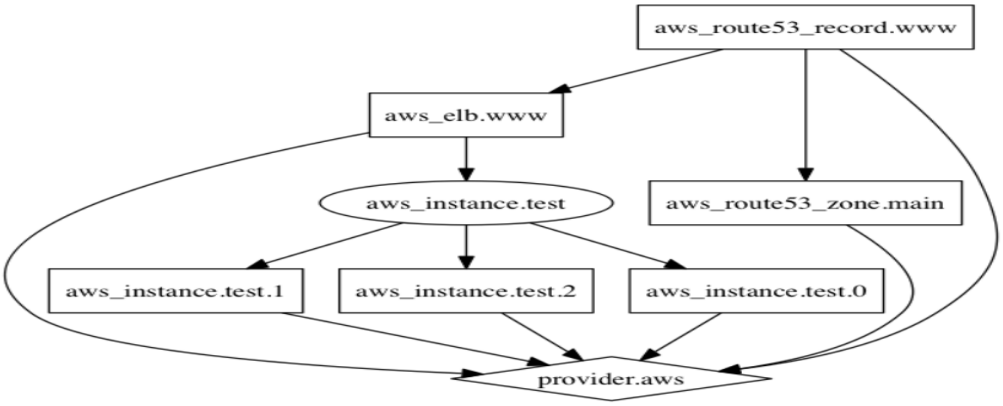

https://console.cloud.google.com/iam-admin/serviceaccounts/create?project=terraf
Google Cloud Platform
Terraform-project
Search products and resour
Create service account
Service account details
2 Grant this service account access to project (optional)
Grant this service account access to Terraform-project so that it has permission to complete specific actions on the resources in your project. Learn more
Role
Editor
Edit access to all resources.
Condition
Add condition
+ ADD ANOTHER ROLE
CONTINUE
3 Grant users access to this service account (optional)
DONE
CANCEL


https://console.cloud.google.com/iam-admin/serviceaccounts?project=terraform-project-56745&supportedpurview=project
Google Cloud Platform
Terraform-project
Search products and resources
Service accounts
+ CREATE SERVICE ACCOUNT
DELETE
Service accounts for project "Terraform-project"
A service account represents a Google Cloud service identity, such as code running on Compute Engine VMs, App Engine apps, or systems running outside Google. Learn more about service accounts.
Organization policies can be used to secure service accounts and block risky service account features, such as automatic IAM Grants, key creation/upload, or the creation of service accounts entirely. Learn more about service account organization
Filter table
Email
Key ID
Key creation date
Actions
terraform-gcp-account@terraform-project-56745.iam.g
to GCP
No keys
Create private key for "Terraform-gcp-account"
Downloads a file that contains the private key. Store the file securely because this key can't be recovered if lost.
Key type
JSON
Recommended
P12
For backward compatibility with code using the P12 format
CANCEL
CREATE

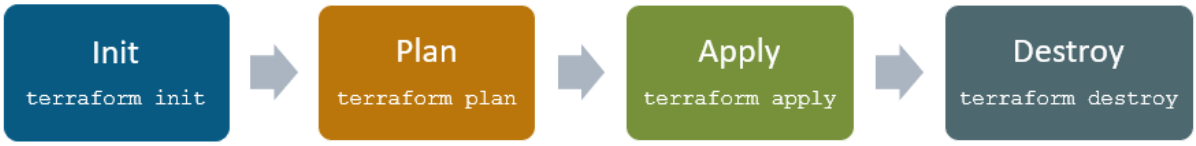

https://console.cloud.google.com/appengine/start?project=terraform-project-567456&orgonly=true&supp
Google Cloud Platform
Terraform-project
Search products and resources
Navigation menu
ine
Welcome to App Engine
Build scalable apps in any language on Google's infrastructure
Your App Engine application has been created
Let us help you deploy to your application by pointing you towards the relevant resources based on your programming language.
Get started

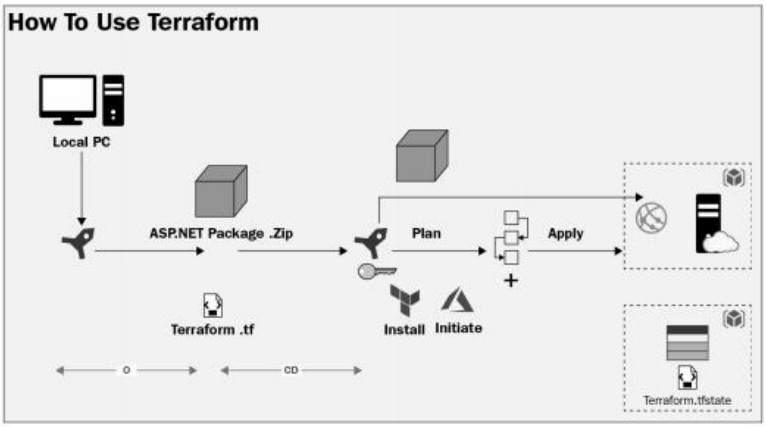
```
$ terraform graph | dot -Tsvg > graph.svg
```

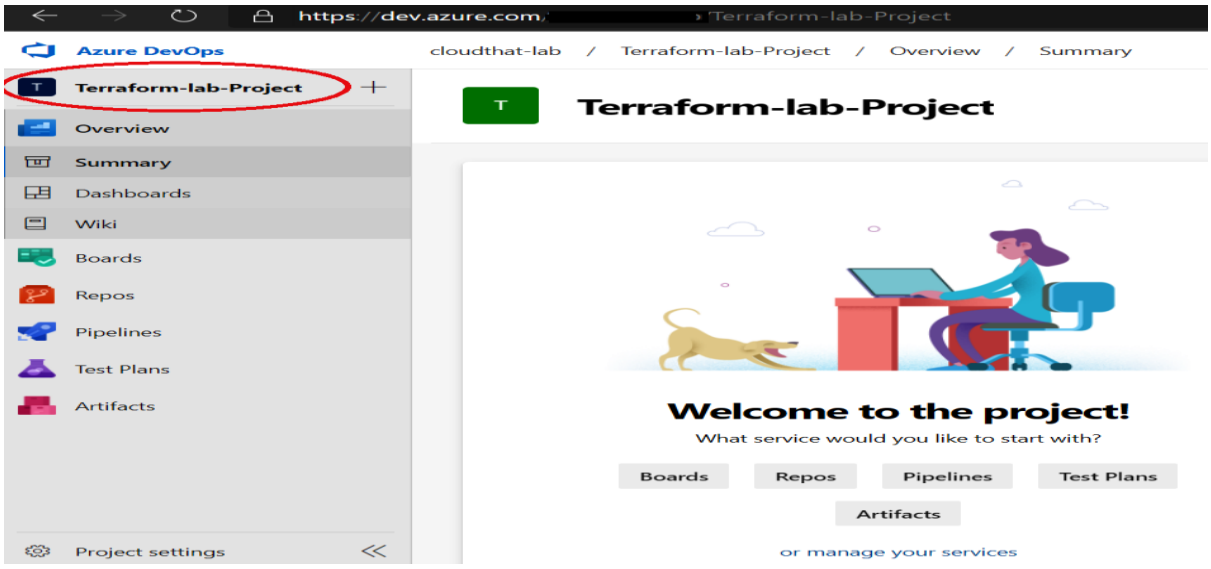
Here is an example graph output:

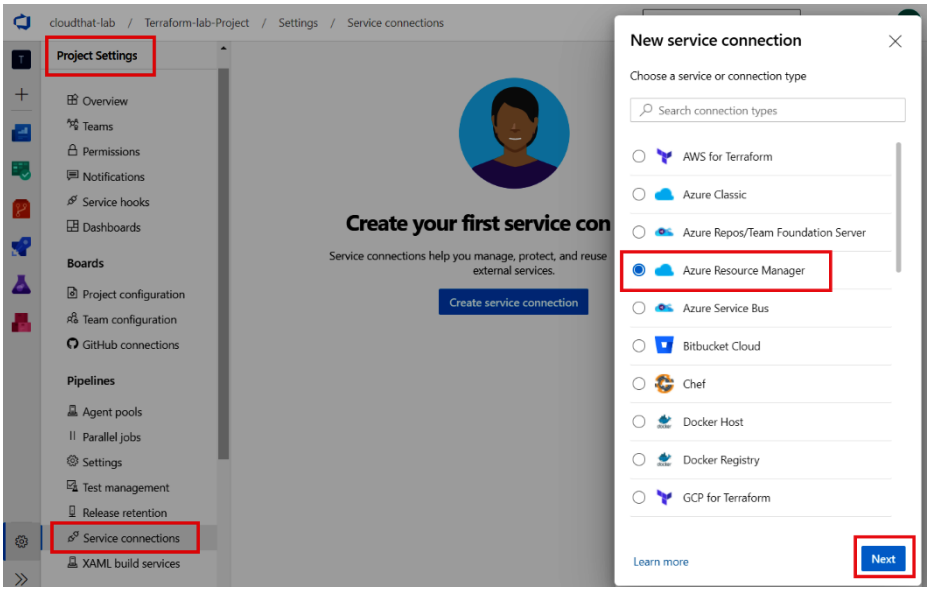


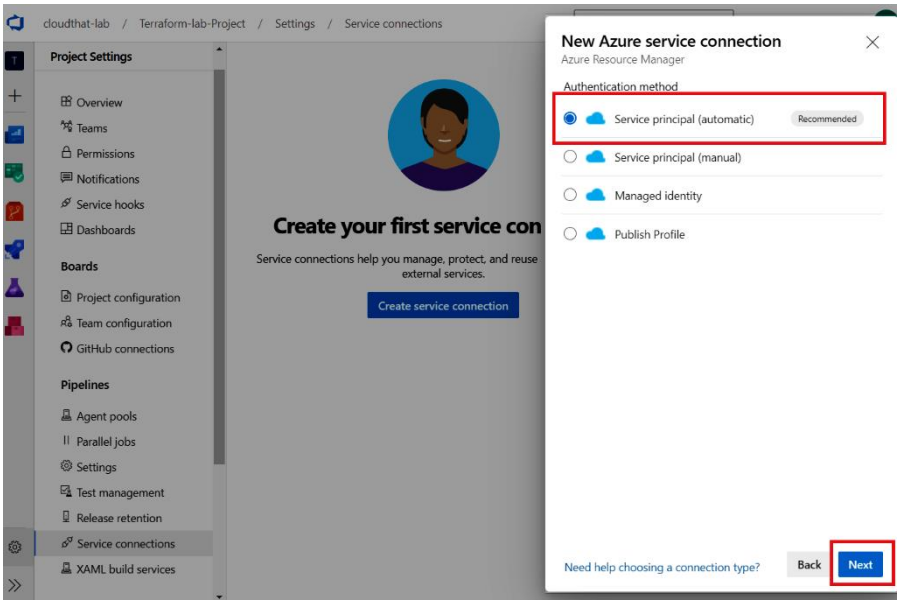
Chapter 6: Terraform Workflows

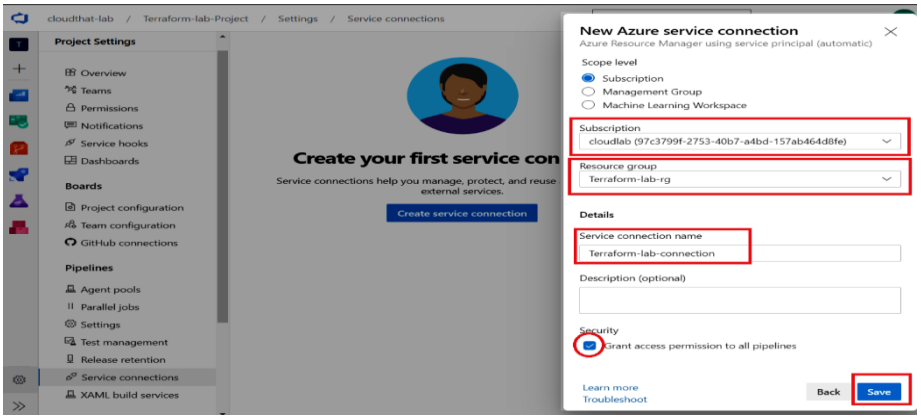


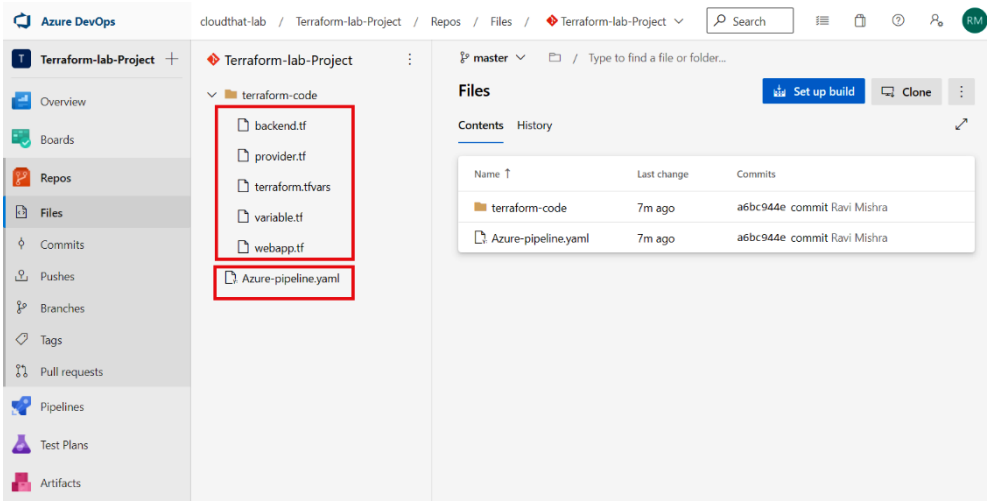


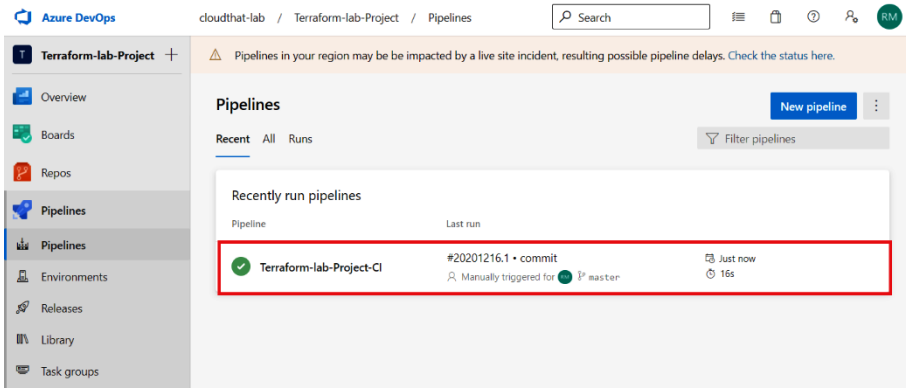


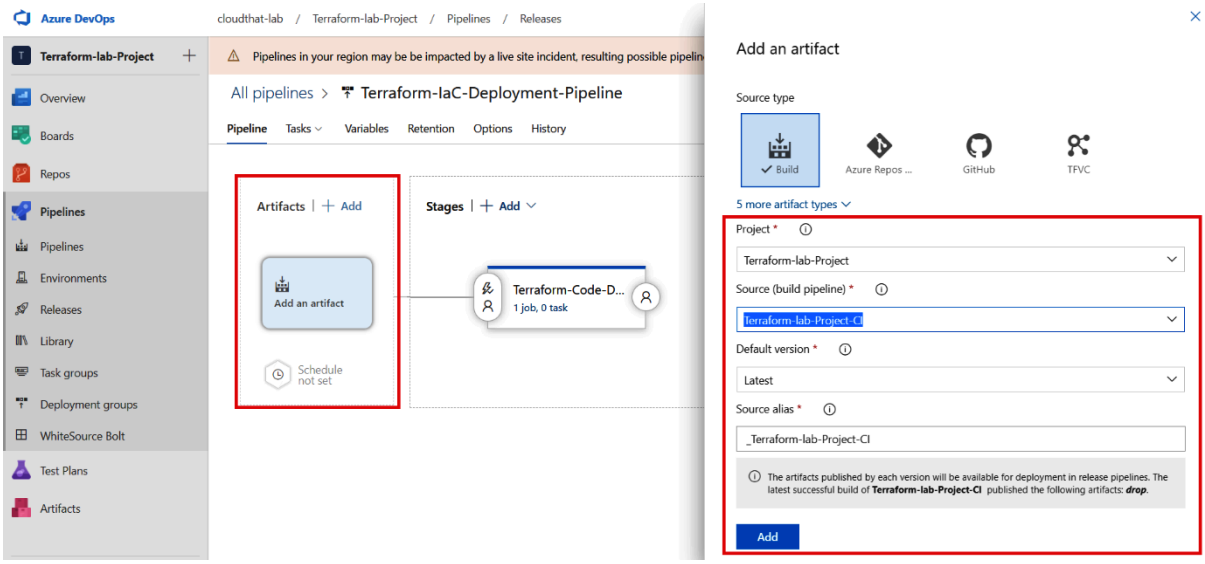

cloudthat-lab / Terraform-lab-Project / Settings / Service connections
Project Settings
Overview
Teams
Permissions
Notifications
Service hooks
Dashboards
Boards
Project configuration
Team configuration
GitHub connections
Pipelines
Agent pools
Parallel jobs
Settings
Test management
Release retention
Service connections
XAML build services
Create your first service con
Service connections help you manage, protect, and reuse external services.
Create service connection
New service connection
Choose a service or connection type
Search connection types
AWS for Terraform
Azure Classic
Azure Repos/Team Foundation Server
Azure Resource Manager
Azure Service Bus
Bitbucket Cloud
Chef
Docker Host
Docker Registry
GCP for Terraform
Learn more
Next

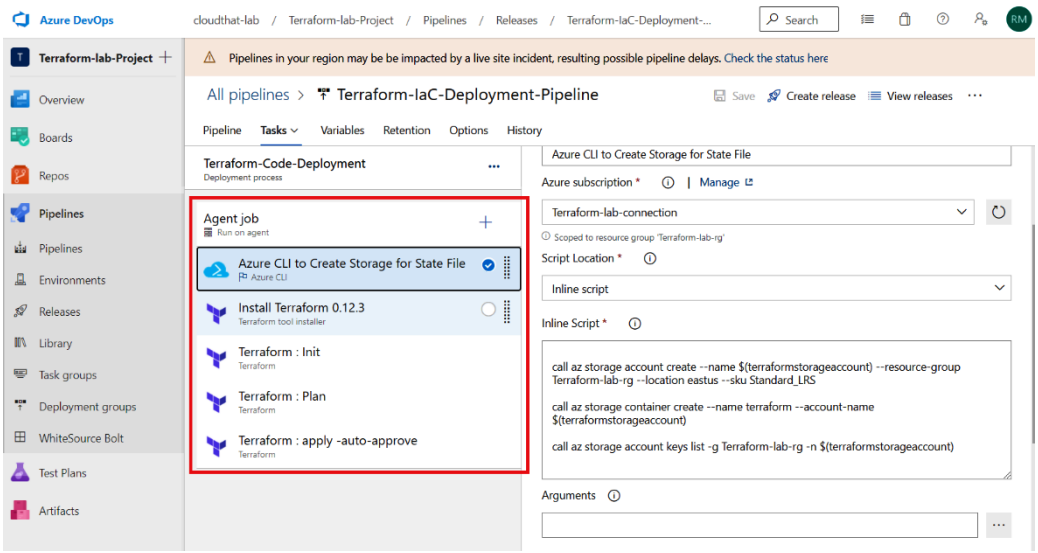

cloudthat-lab / Terraform-lab-Project / Settings / Service connections
Project Settings
Overview
Teams
Permissions
Notifications
Service hooks
Dashboards
Boards
Project configuration
Team configuration
GitHub connections
Pipelines
Agent pools
Parallel jobs
Settings
Test management
Release retention
Service connections
XAML build services
Create your first service con
Service connections help you manage, protect, and reuse external services.
Create service connection
New Azure service connection
Azure Resource Manager
Authentication method
Service principal (automatic)
Recommended
Service principal (manual)
Managed identity
Publish Profile
Need help choosing a connection type?
Back
Next

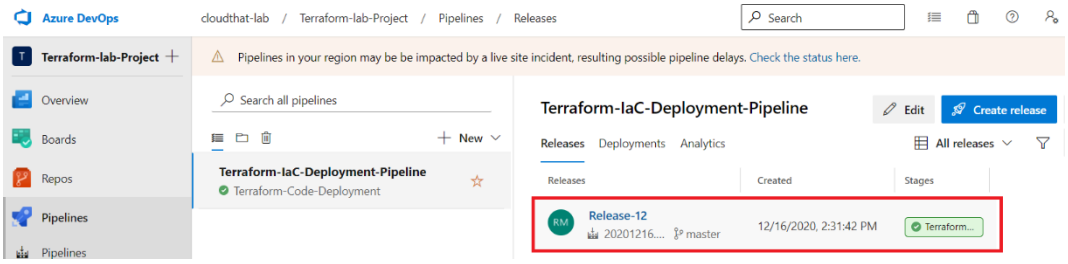

cloudthat-lab / Terraform-lab-Project / Settings / Service connections
Project Settings
Overview
Teams
Permissions
Notifications
Service hooks
Dashboards
Boards
Project configuration
Team configuration
GitHub connections
Pipelines
Agent pools
Parallel jobs
Settings
Test management
Release retention
Service connections
XAML build services
Create your first service con
Service connections help you manage, protect, and reuse external services.
Create service connection
New Azure service connection
Azure Resource Manager using service principal (automatic)
Scope level
Subscription
Management Group
Machine Learning Workspace
Subscription
cloudlab (97c3799f-2753-40b7-a4bd-157ab464d8fe)
Resource group
Terraform-lab-rg
Details
Service connection name
Terraform-lab-connection
Description (optional)
Security
Grant access permission to all pipelines
Learn more
Troubleshoot
Back
Save

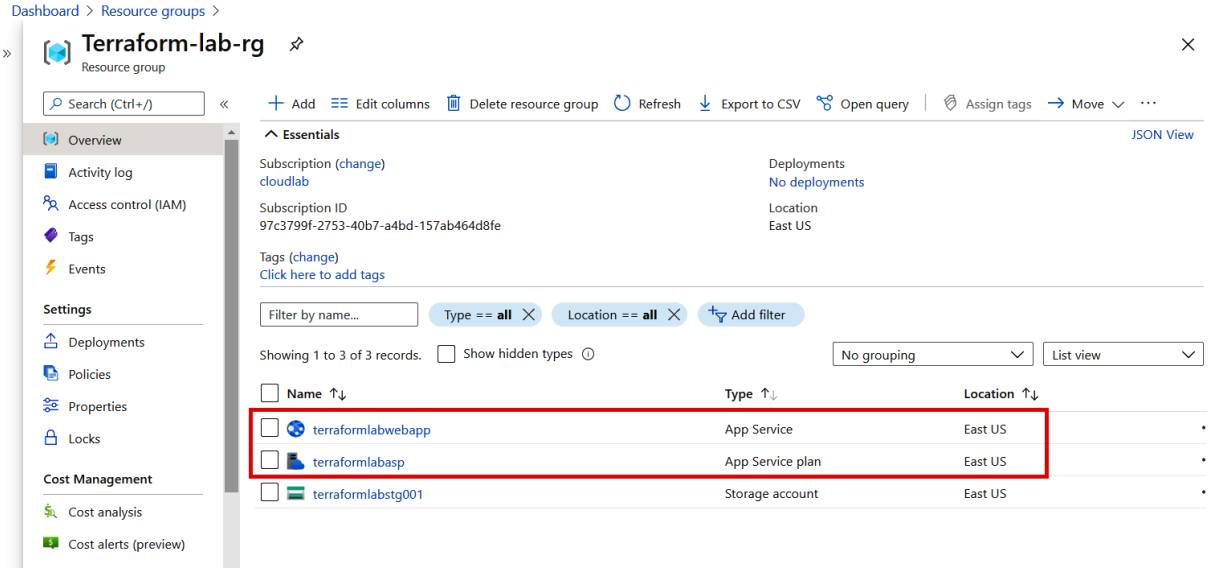

Azure DevOps
cloudthat-lab / Terraform-lab-Project / Repos / Files / Terraform-lab-Project
Search
Terraform-lab-Project
Overview
Boards
Repos
Files
Commits
Pushes
Branches
Tags
Pull requests
Pipelines
Test Plans
Artifacts
Terraform-lab-Project
terraform-code
backend.tf
provider.tf
terraform.tfvars
variable.tf
webapp.tf
Azure-pipeline.yaml
master
Type to find a file or folder...
Files
Set up build
Clone
Contents
History
Name
Last change
Commits
terraform-code
7m ago
a6bc944e commit Ravi Mishra
Azure-pipeline.yaml
7m ago
a6bc944e commit Ravi Mishra


Azure DevOps
cloudthat-lab / Terraform-lab-Project / Pipelines
Search
Terraform-lab-Project
Pipelines in your region may be be impacted by a live site incident, resulting possible pipeline delays. Check the status here.
Overview
Boards
Repos
Pipelines
Pipelines
Environments
Releases
Library
Task groups
Pipelines
New pipeline
Recent
All
Runs
Filter pipelines
Recently run pipelines
Pipeline
Last run
Terraform-lab-Project-CI
#20201216.1 • commit
Manually triggered for
master
Just now
16s

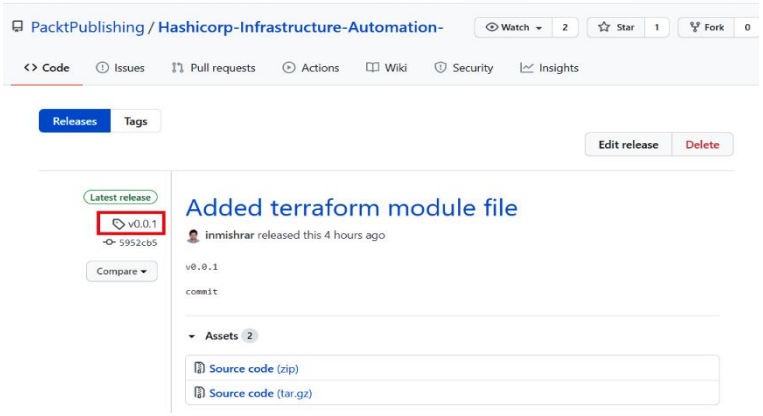

Azure DevOps
cloudthat-lab / Terraform-lab-Project / Pipelines / Releases
Terraform-lab-Project
Pipelines in your region may be be impacted by a live site incident, resulting possible pipelin
Overview
Boards
Repos
Pipelines
Pipelines
Environments
Releases
Library
Task groups
Deployment groups
WhiteSource Bolt
Test Plans
Artifacts
All pipelines > Terraform-IaC-Deployment-Pipeline
Pipeline
Tasks
Variables
Retention
Options
History
Artifacts | + Add
Add an artifact
Schedule not set
Stages | + Add
Terraform-Code-D...
1 job, 0 task
Add an artifact
Source type
Build
Azure Repos ...
GitHub
TFVC
5 more artifact types
Project *
Terraform-lab-Project
Source (build pipeline) *
Terraform-lab-Project-CI
Default version *
Latest
Source alias *
_Terraform-lab-Project-CI
The artifacts published by each version will be available for deployment in release pipelines. The latest successful build of Terraform-lab-Project-CI published the following artifacts: drop.
Add

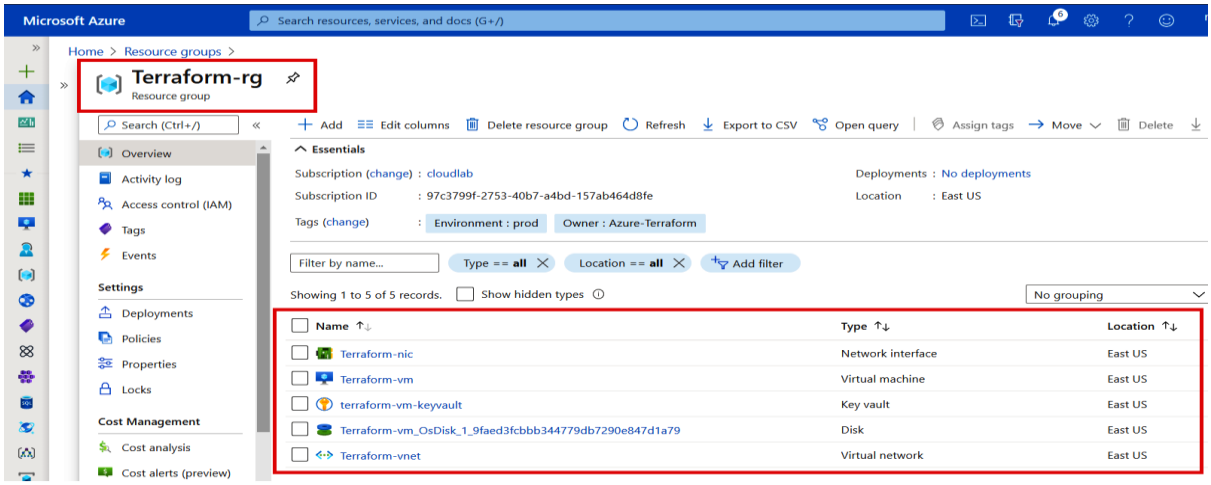

Azure DevOps
cloudthat-lab / Terraform-lab-Project / Pipelines / Releases / Terraform-IaC-Deployment-...
Search
Terraform-lab-Project
Pipelines in your region may be be impacted by a live site incident, resulting possible pipeline delays. Check the status here
Overview
Boards
Repos
Pipelines
All pipelines > Terraform-IaC-Deployment-Pipeline
Save
Create release
View releases
Pipeline
Tasks
Variables
Retention
Options
History
Terraform-Code-Deployment
Deployment process
Agent job
Run on agent
Azure CLI to Create Storage for State File
Azure CLI
Install Terraform 0.12.3
Terraform tool installer
Terraform : Init
Terraform
Terraform : Plan
Terraform
Terraform : apply -auto-approve
Terraform
Azure CLI to Create Storage for State File
Azure subscription *
Manage
Terraform-lab-connection
Scoped to resource group 'Terraform-lab-rg'
Script Location *
Inline script
Inline Script *
call az storage account create --name $(terraformstorageaccount) --resource-group Terraform-lab-rg --location eastus --sku Standard_LRS
call az storage container create --name terraform --account-name $(terraformstorageaccount)
call az storage account keys list -g Terraform-lab-rg -n $(terraformstorageaccount)
Arguments

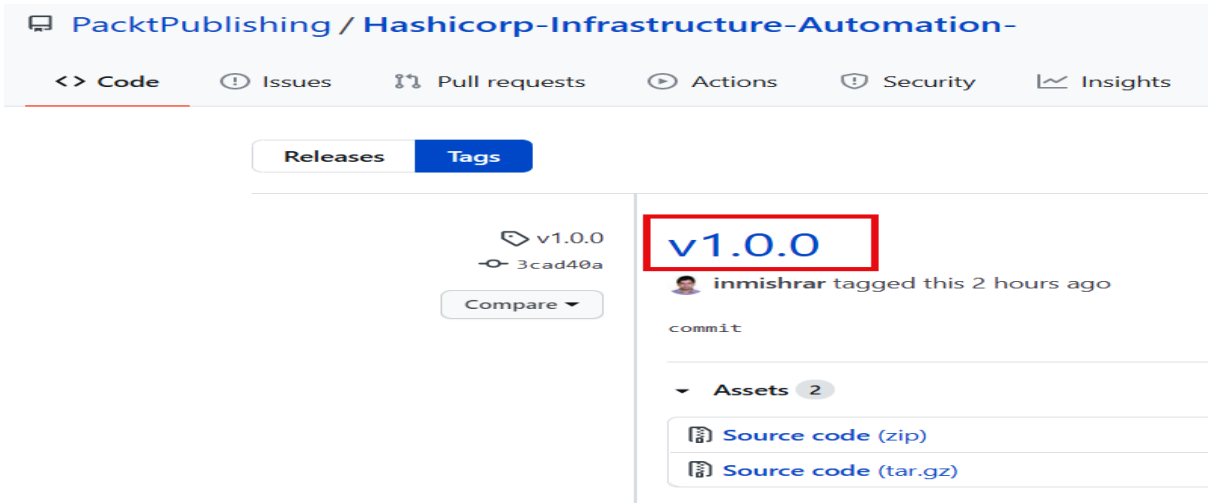

Azure DevOps
cloudthat-lab / Terraform-lab-Project / Pipelines / Releases
Search
Terraform-lab-Project
Pipelines in your region may be be impacted by a live site incident, resulting possible pipeline delays. Check the status here.
Overview
Boards
Repos
Pipelines
Search all pipelines
New
Terraform-IaC-Deployment-Pipeline
Terraform-Code-Deployment
Terraform-IaC-Deployment-Pipeline
Edit
Create release
Releases
Deployments
Analytics
All releases
Releases
Created
Stages
Release-12
20201216....
master
12/16/2020, 2:31:42 PM
Terraform...

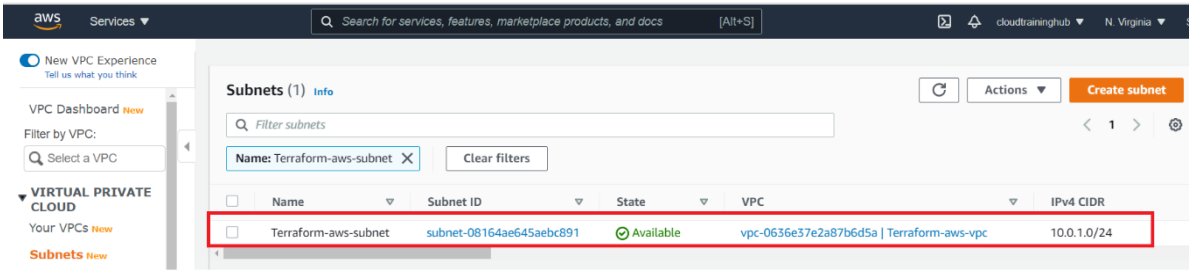

Dashboard > Resource groups >
Terraform-lab-rg
Resource group
Search (Ctrl+/)
Add
Edit columns
Delete resource group
Refresh
Export to CSV
Open query
Assign tags
Move
Overview
Activity log
Access control (IAM)
Tags
Events
Settings
Deployments
Policies
Properties
Locks
Cost Management
Cost analysis
Cost alerts (preview)
Essentials
JSON View
Subscription (change)
cloudlab
Subscription ID
97c3799f-2753-40b7-a4bd-157ab464d8fe
Tags (change)
Click here to add tags
Deployments
No deployments
Location
East US
Filter by name...
Type == all
Location == all
Add filter
Showing 1 to 3 of 3 records.
Show hidden types
No grouping
List view
Name
Type
Location
terraformlabwebapp
App Service
East US
terraformlabasp
App Service plan
East US
terraformlabstg001
Storage account
East US

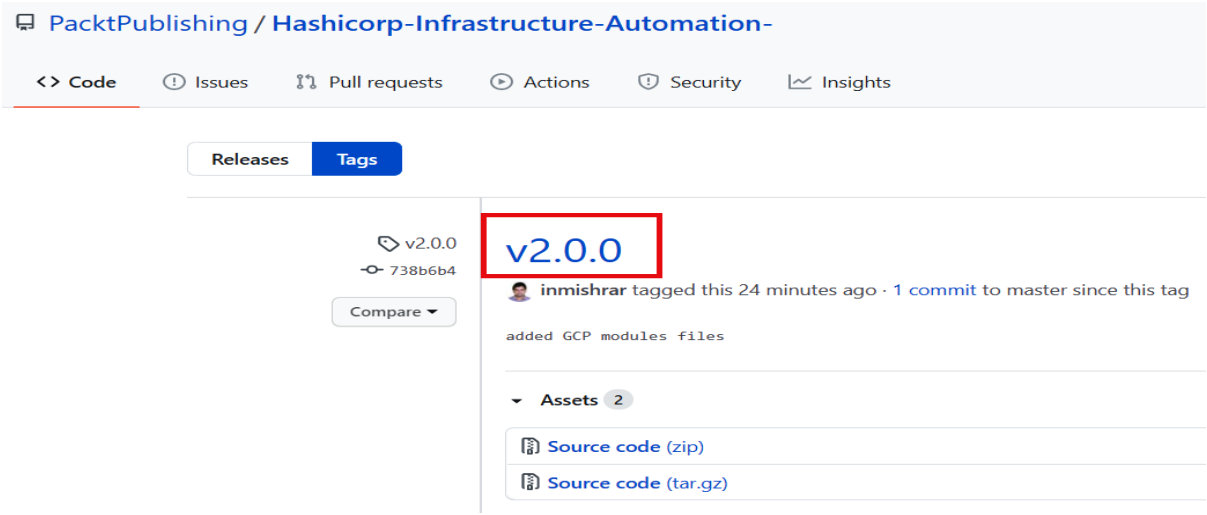
Chapter 7: Terraform Modules

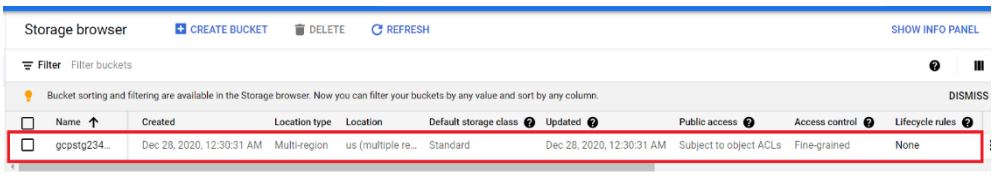


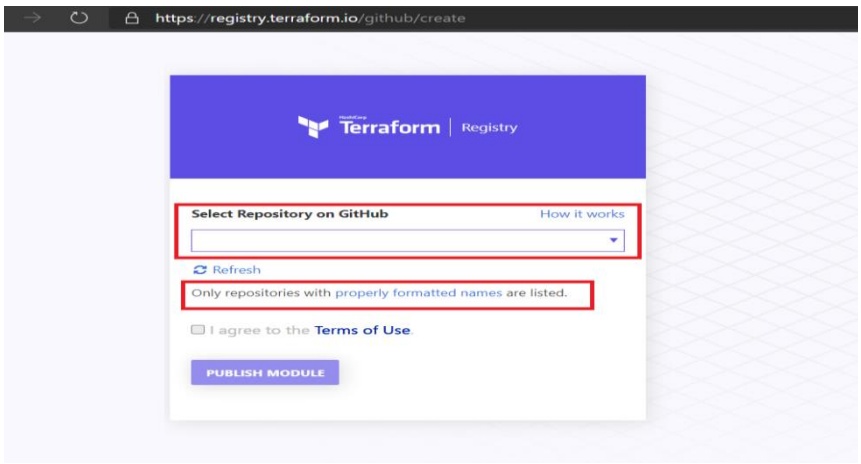


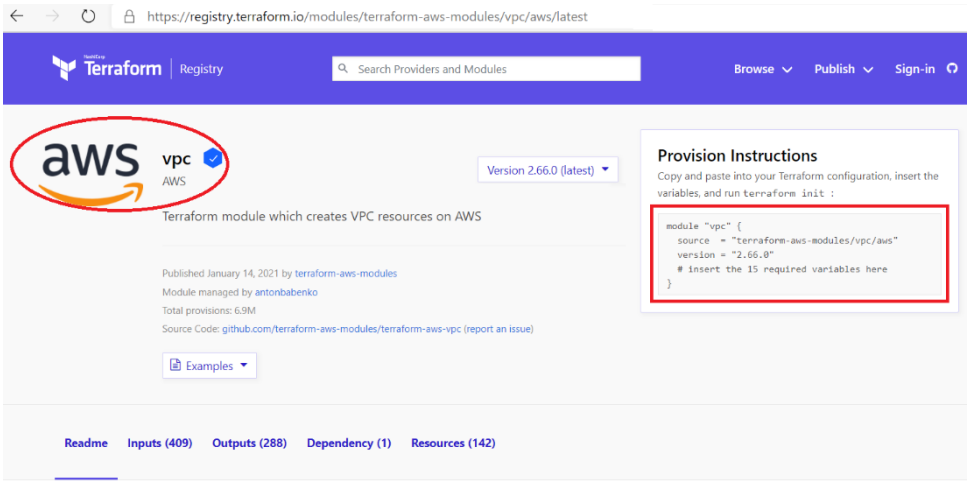



aws
Services
Search for services, features, marketplace products, and docs [Alt+S]
cloudtraininghub
N. Virginia
New VPC Experience
Tell us what you think
VPC Dashboard New
Filter by VPC:
Select a VPC
VIRTUAL PRIVATE CLOUD
Your VPCs New
Subnets New
Subnets (1) Info
Actions
Create subnet
Filter subnets
Name: Terraform-aws-subnet
Clear filters
Name
Subnet ID
State
VPC
IPv4 CIDR
Terraform-aws-subnet
subnet-08164ae645aebc891
Available
vpc-0636e37e2a87b6d5a | Terraform-aws-vpc
10.0.1.0/24


PacktPublishing / Hashicorp-Infrastructure-Automation-
Code
Issues
Pull requests
Actions
Security
Insights
Releases
Tags
v2.0.0
738b6b4
Compare
v2.0.0
inmishrar tagged this 24 minutes ago · 1 commit to master since this tag
added GCP modules files
Assets 2
Source code (zip)
Source code (tar.gz)


Storage browser
CREATE BUCKET
DELETE
REFRESH
SHOW INFO PANEL
Filter
Filter buckets
Bucket sorting and filtering are available in the Storage browser. Now you can filter your buckets by any value and sort by any column.
DISMISS
Name
Created
Location type
Location
Default storage class
Updated
Public access
Access control
Lifecycle rules
gcpstg234...
Dec 28, 2020, 12:30:31 AM
Multi-region
us (multiple re...
Standard
Dec 28, 2020, 12:30:31 AM
Subject to object ACLs
Fine-grained
None


https://registry.terraform.io/github/create
Terraform | Registry
Select Repository on GitHub
How it works
Refresh
Only repositories with properly formatted names are listed.
I agree to the Terms of Use
PUBLISH MODULE



AWS VPC Terraform module

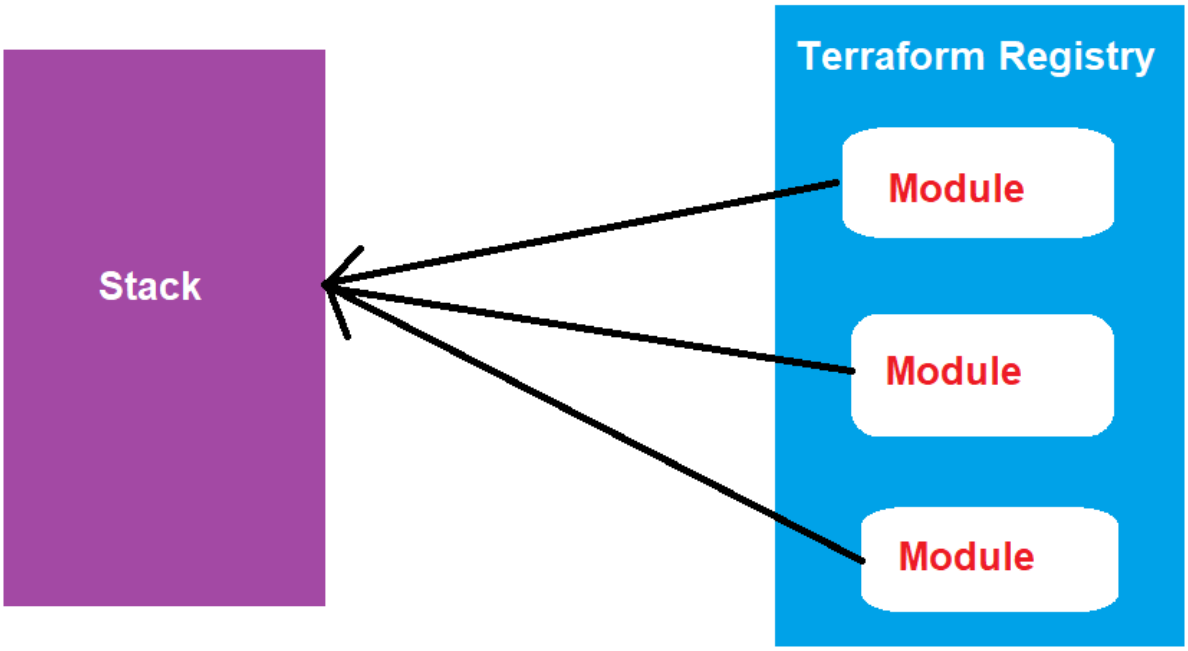
code helpers 10 tag v2.66.0

Terraform module which creates VPC resources on AWS.

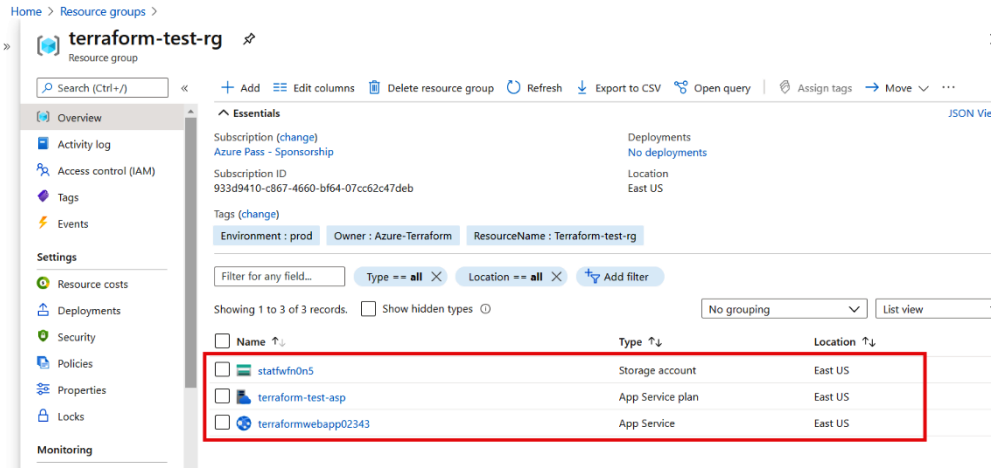
Chapter 8: Terraform Configuration Files

JSON	Terraform Language Interpretation
Boolean	A literal `bool` value.
Number	A literal `number` value.
String	Parsed as a string template and then evaluated as described below.
Object	Each property value is mapped per this table, producing an `object(...)` value with suitable attribute types.
Array	Each element is mapped per this table, producing a `tuple(...)` value with suitable element types.
Null	A literal `null`.

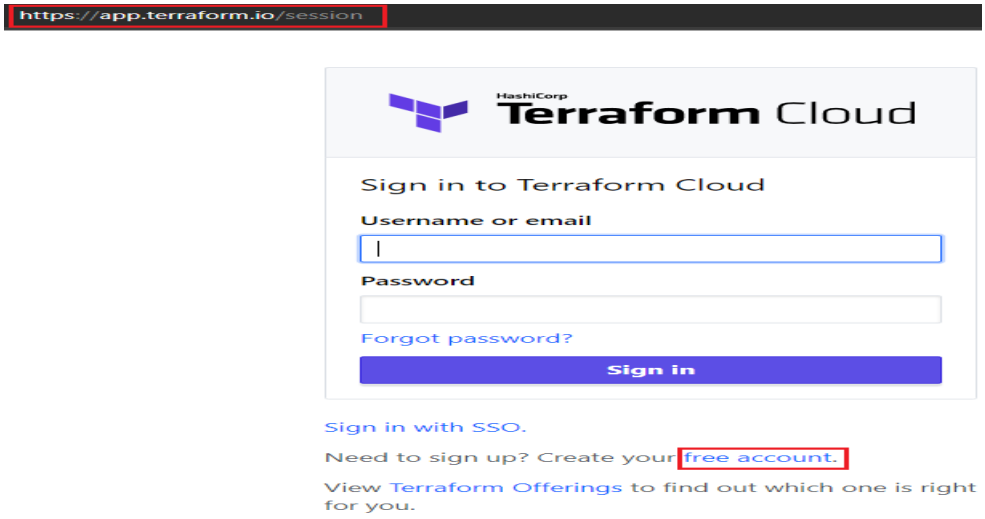
Chapter 9: Understanding Terraform Stacks

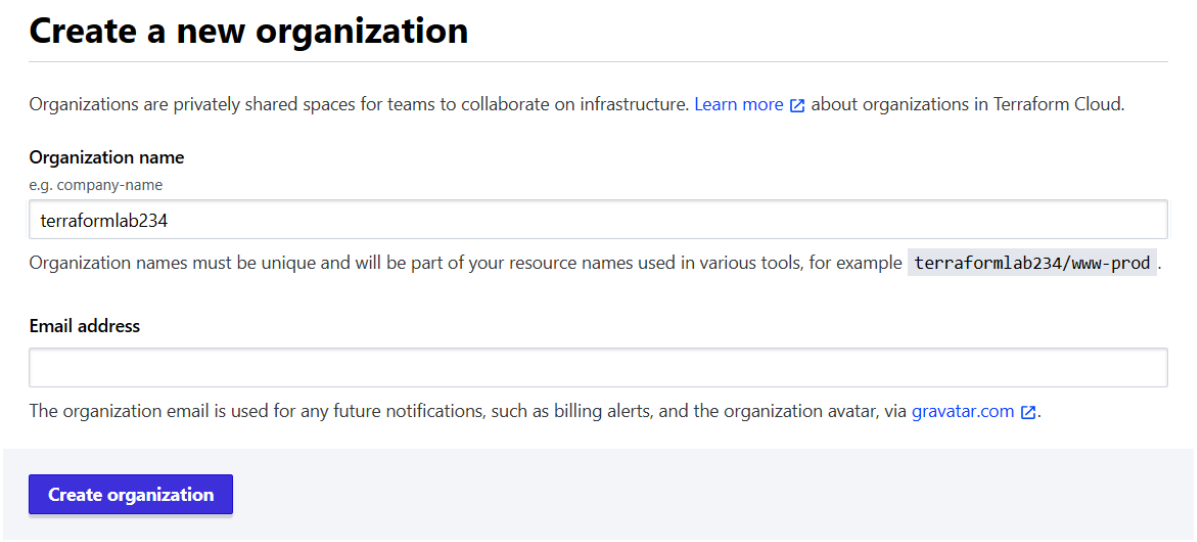


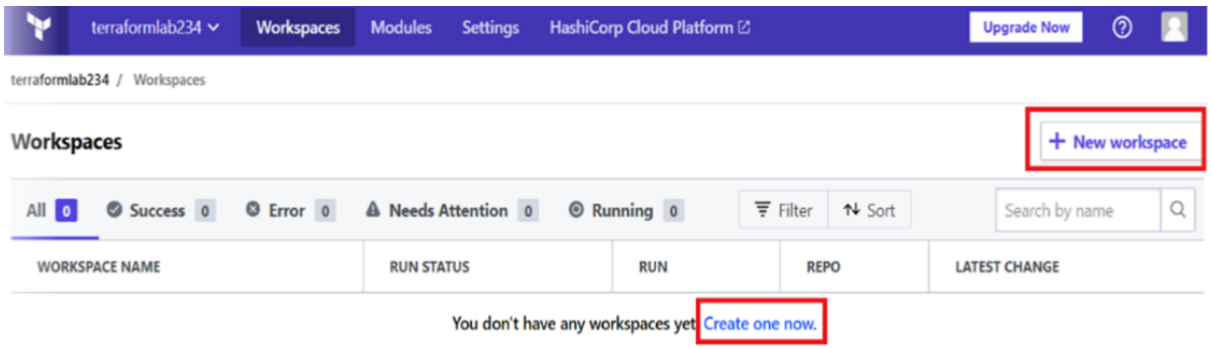
Stacks & Modules

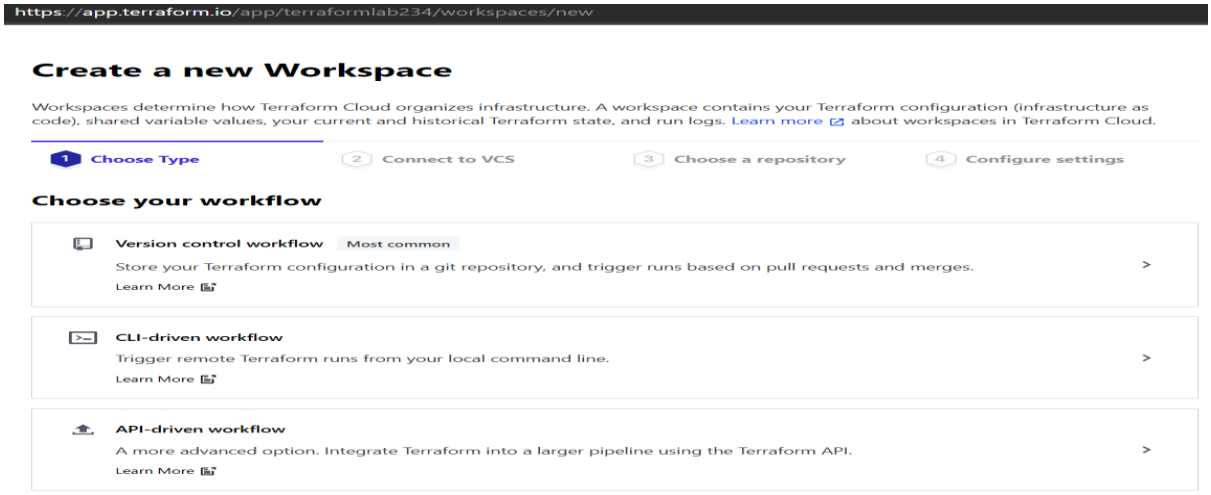


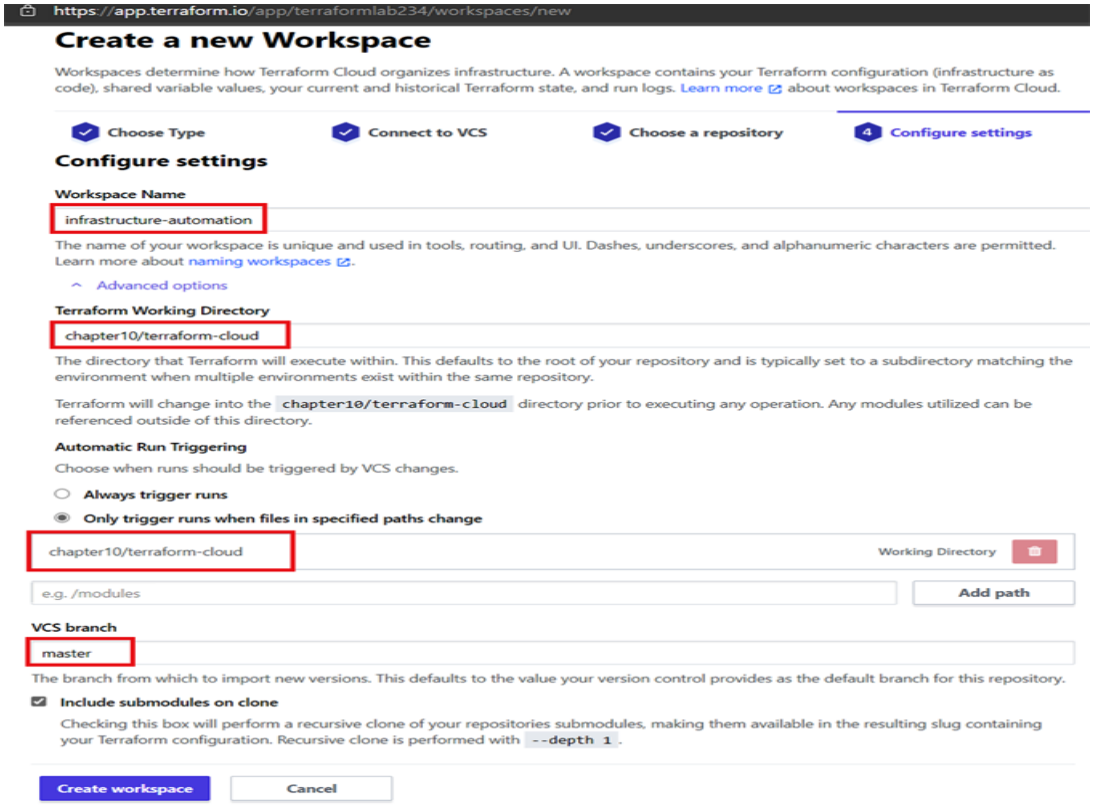
Chapter 10: Terraform Cloud and Terraform Enterprise

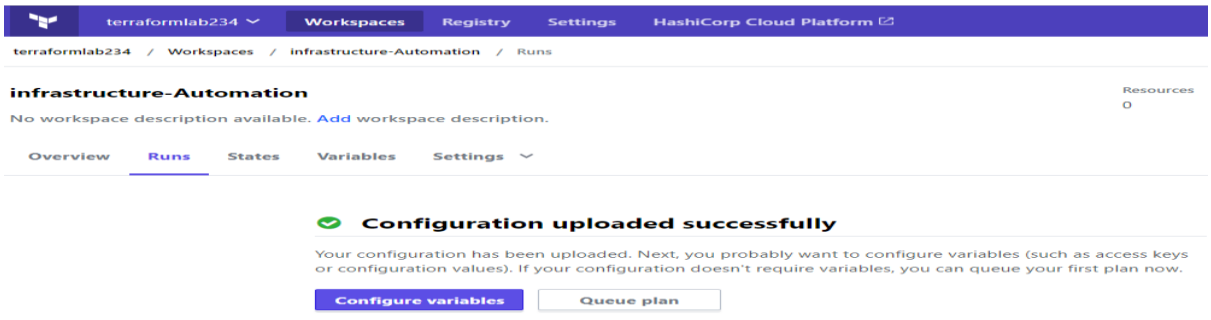







https://app.terraform.io/app/terraformlab234/workspaces/new
Create a new Workspace
Workspaces determine how Terraform Cloud organizes infrastructure. A workspace contains your Terraform configuration (infrastructure as code), shared variable values, your current and historical Terraform state, and run logs. Learn more about workspaces in Terraform Cloud.
1 Choose Type
2 Connect to VCS
3 Choose a repository
4 Configure settings
Choose your workflow
Version control workflow
Most common
Store your Terraform configuration in a git repository, and trigger runs based on pull requests and merges.
Learn More
CLI-driven workflow
Trigger remote Terraform runs from your local command line.
Learn More
API-driven workflow
A more advanced option. Integrate Terraform into a larger pipeline using the Terraform API.
Learn More


https://app.terraform.io/app/terraformlab234/workspaces/new
Create a new Workspace
Workspaces determine how Terraform Cloud organizes infrastructure. A workspace contains your Terraform configuration (infrastructure as code), shared variable values, your current and historical Terraform state, and run logs. Learn more about workspaces in Terraform Cloud.
Choose Type
Connect to VCS
Choose a repository
4 Configure settings
Configure settings
Workspace Name
infrastructure-automation
The name of your workspace is unique and used in tools, routing, and UI. Dashes, underscores, and alphanumeric characters are permitted. Learn more about naming workspaces.
Advanced options
Terraform Working Directory
chapter10/terraform-cloud
The directory that Terraform will execute within. This defaults to the root of your repository and is typically set to a subdirectory matching the environment when multiple environments exist within the same repository.
Terraform will change into the chapter10/terraform-cloud directory prior to executing any operation. Any modules utilized can be referenced outside of this directory.
Automatic Run Triggering
Choose when runs should be triggered by VCS changes.
Always trigger runs
Only trigger runs when files in specified paths change
chapter10/terraform-cloud
Working Directory
e.g. /modules
Add path
VCS branch
master
The branch from which to import new versions. This defaults to the value your version control provides as the default branch for this repository.
Include submodules on clone
Checking this box will perform a recursive clone of your repositories submodules, making them available in the resulting slug containing your Terraform configuration. Recursive clone is performed with --depth 1.
Create workspace
Cancel


terraformlab234
Workspaces
Registry
Settings
HashiCorp Cloud Platform
terraformlab234 / Workspaces / infrastructure-Automation / Runs
infrastructure-Automation
No workspace description available. Add workspace description.
Resources
0
Overview
Runs
States
Variables
Settings
Configuration uploaded successfully
Your configuration has been uploaded. Next, you probably want to configure variables (such as access keys or configuration values). If your configuration doesn't require variables, you can queue your first plan now.
Configure variables
Queue plan

infrastructure-automation ⓘ Runs State

Variables

These variables are used for all plans and applies in this workspace. Workspaces using Terraform 0.10.0 or later can also load default values from any `*.auto.tfva`

Sensitive variables are hidden from view in the UI and API, and can't be edited. (To change a sensitive variable, delete and replace it.) Sensitive variables can still app output them.

When setting many variables at once, the Terraform Cloud Provider or the variables API can often save time.

Terraform Variables

These Terraform variables are set using a `terraform.tfvars` file. To use interpolation or set a non-string value for a variable, click its HCL checkbox.

Key	Value
rgname Provide resource group name	`terraform-lab-rg`
rglocation provide name of the location	`eastus`

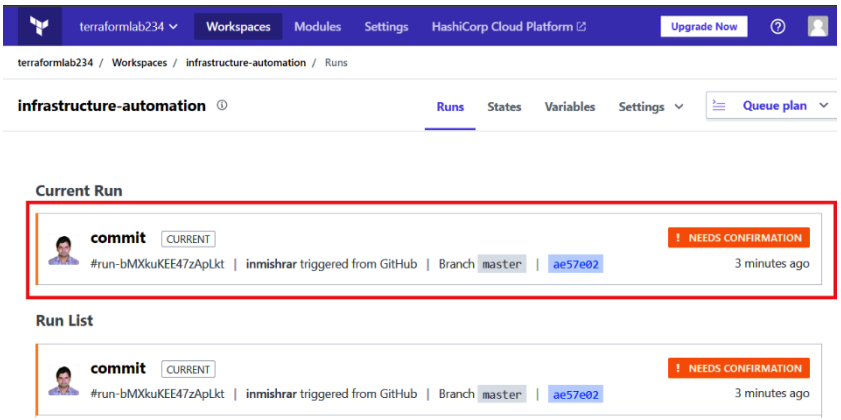
+ Add variable

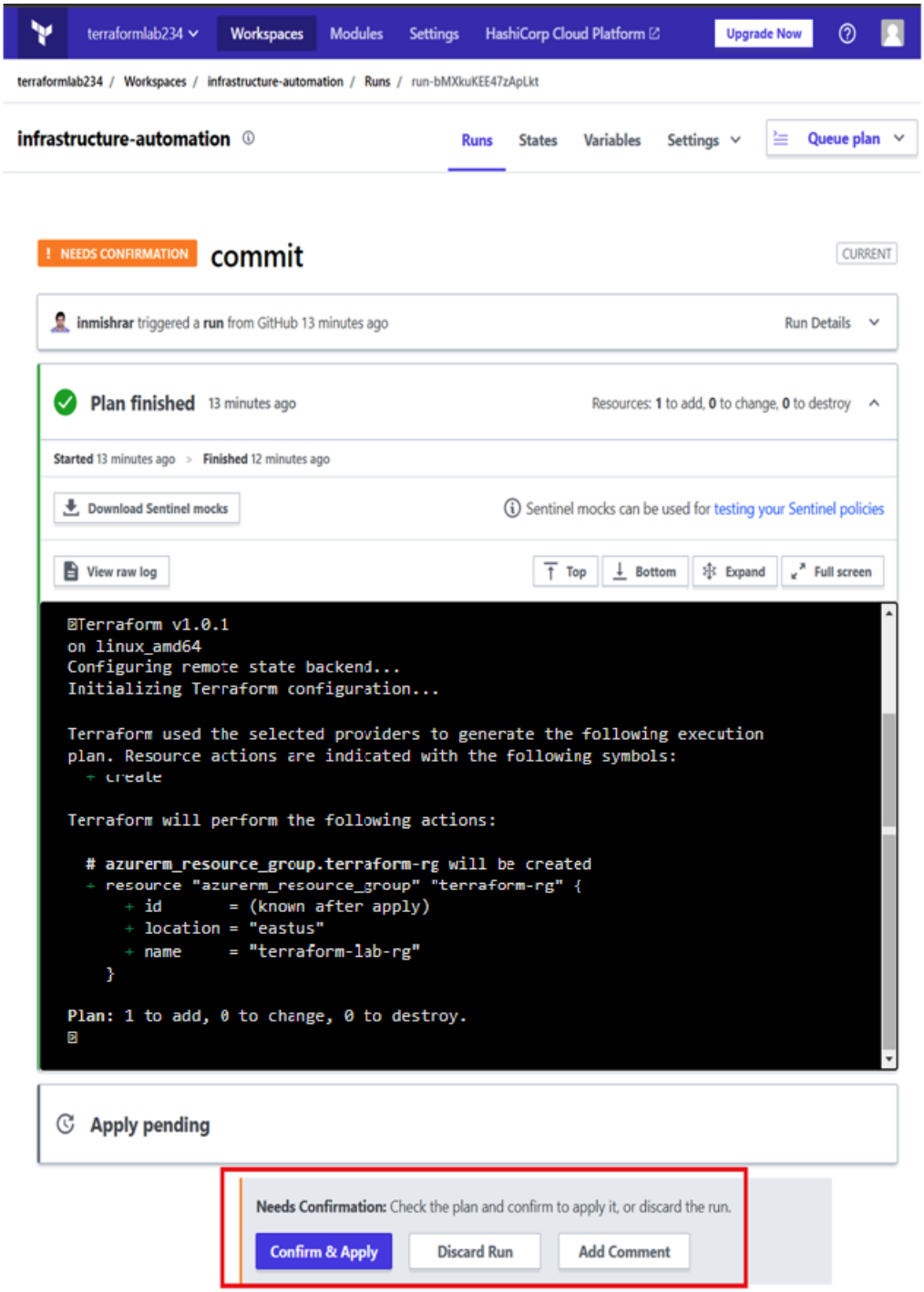
Environment Variables

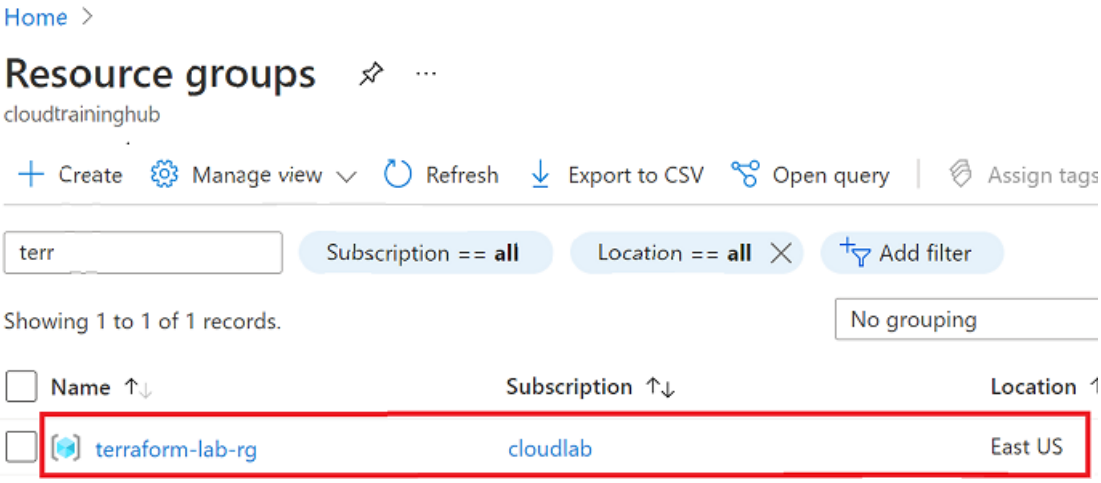
These variables are set in Terraform's shell environment using `export`.

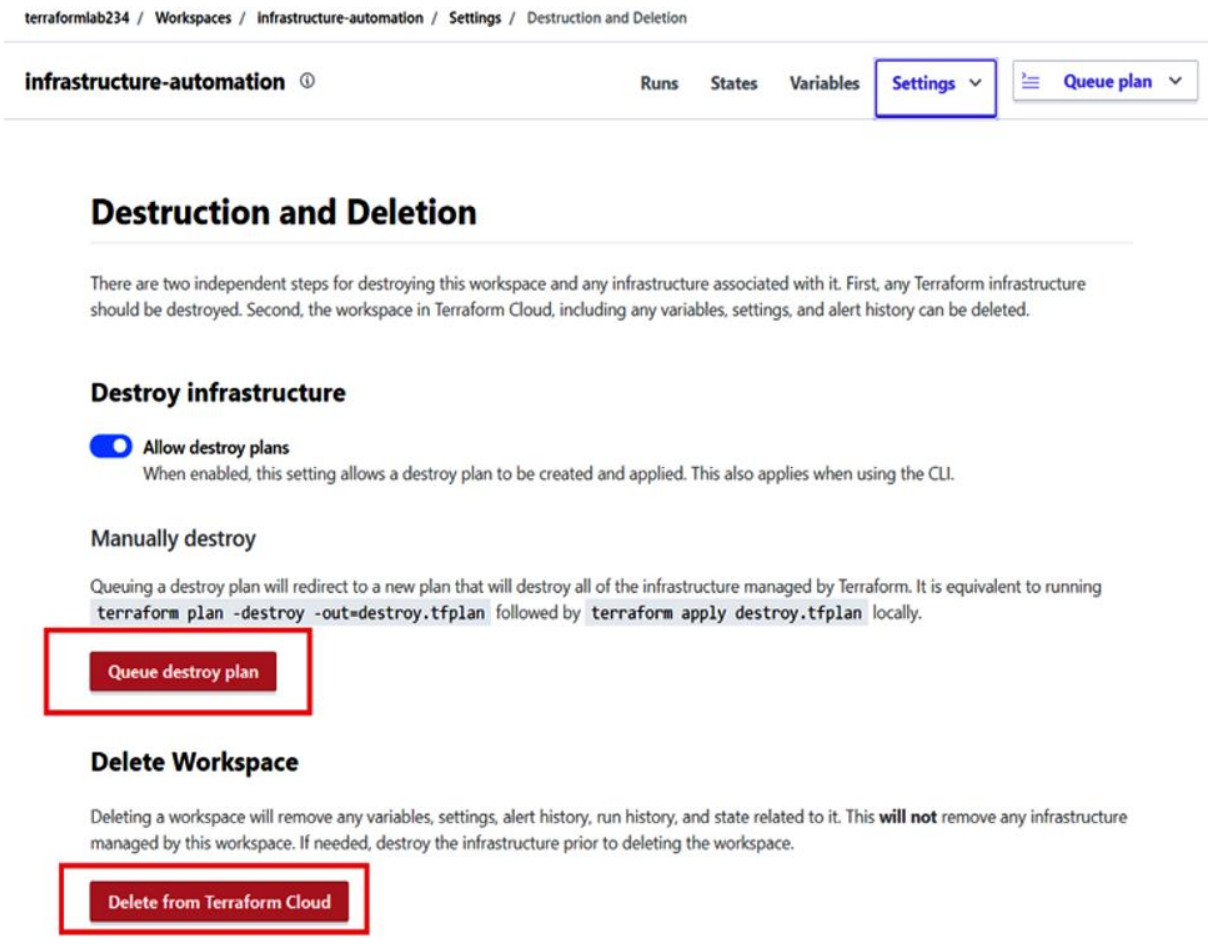
Key	Value
ARM_CLIENT_ID	607907bc-e557-419e-81e1-a3e10e41644a
ARM_CLIENT_SECRET SENSITIVE	*Sensitive - write only*
ARM_SUBSCRIPTION_ID	97c3799f-2753-40b7-a4bd-157ab464d8fe
ARM_TENANT_ID	abfa0b4e-cdda-49d0-8fc5-24f185a5c497

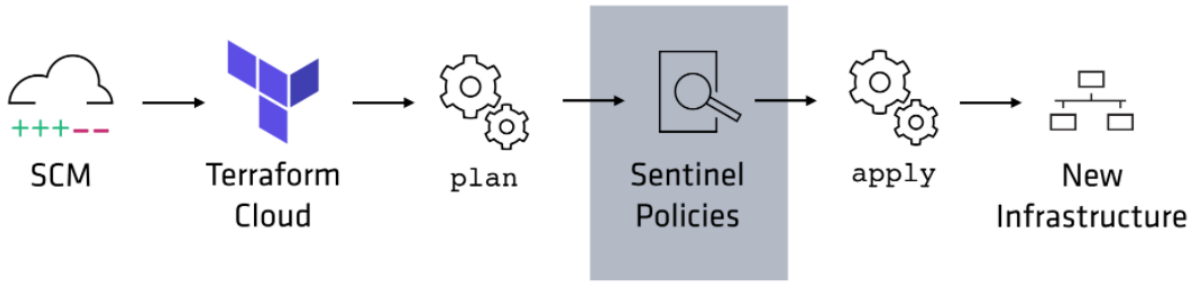
+ Add variable

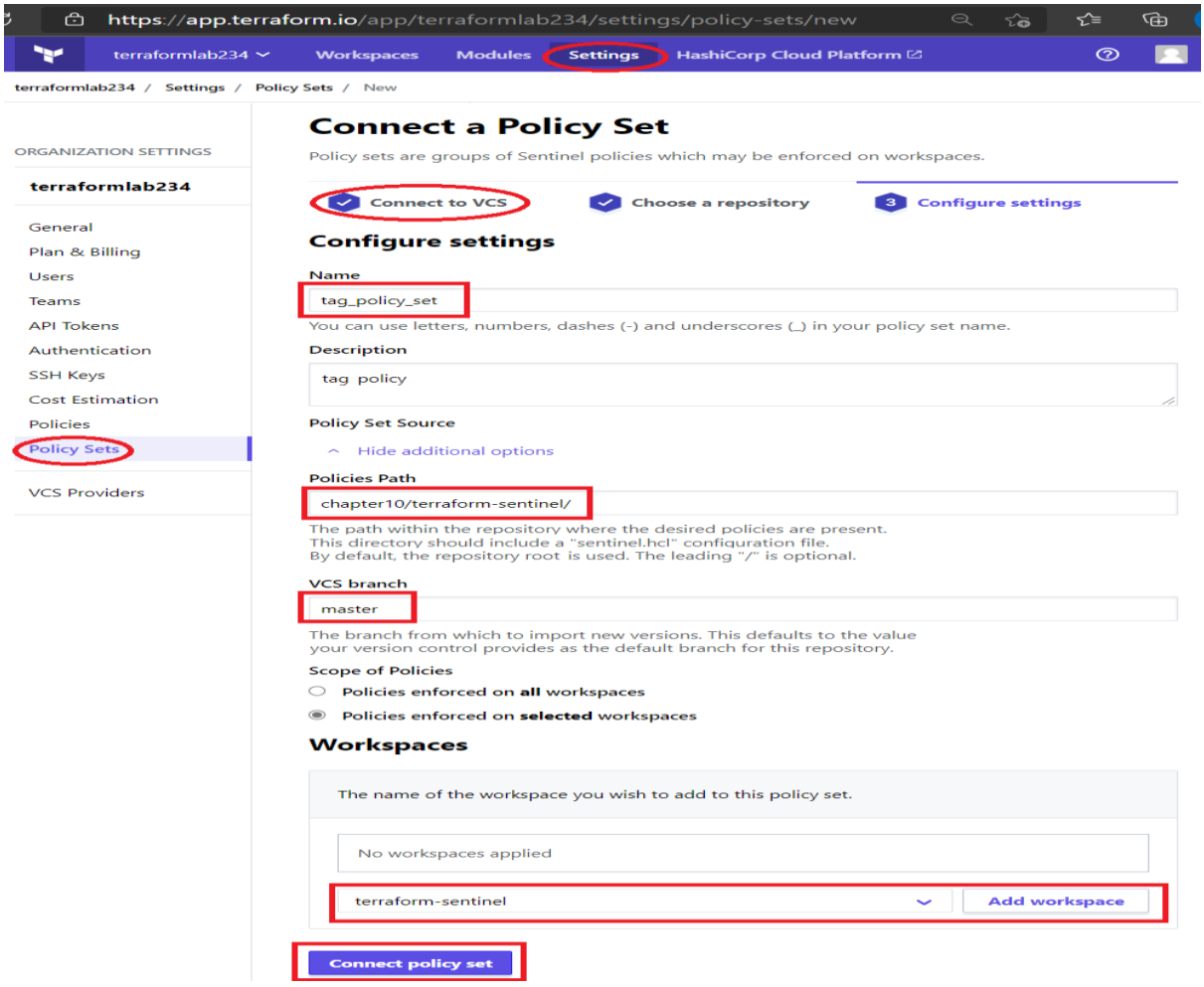


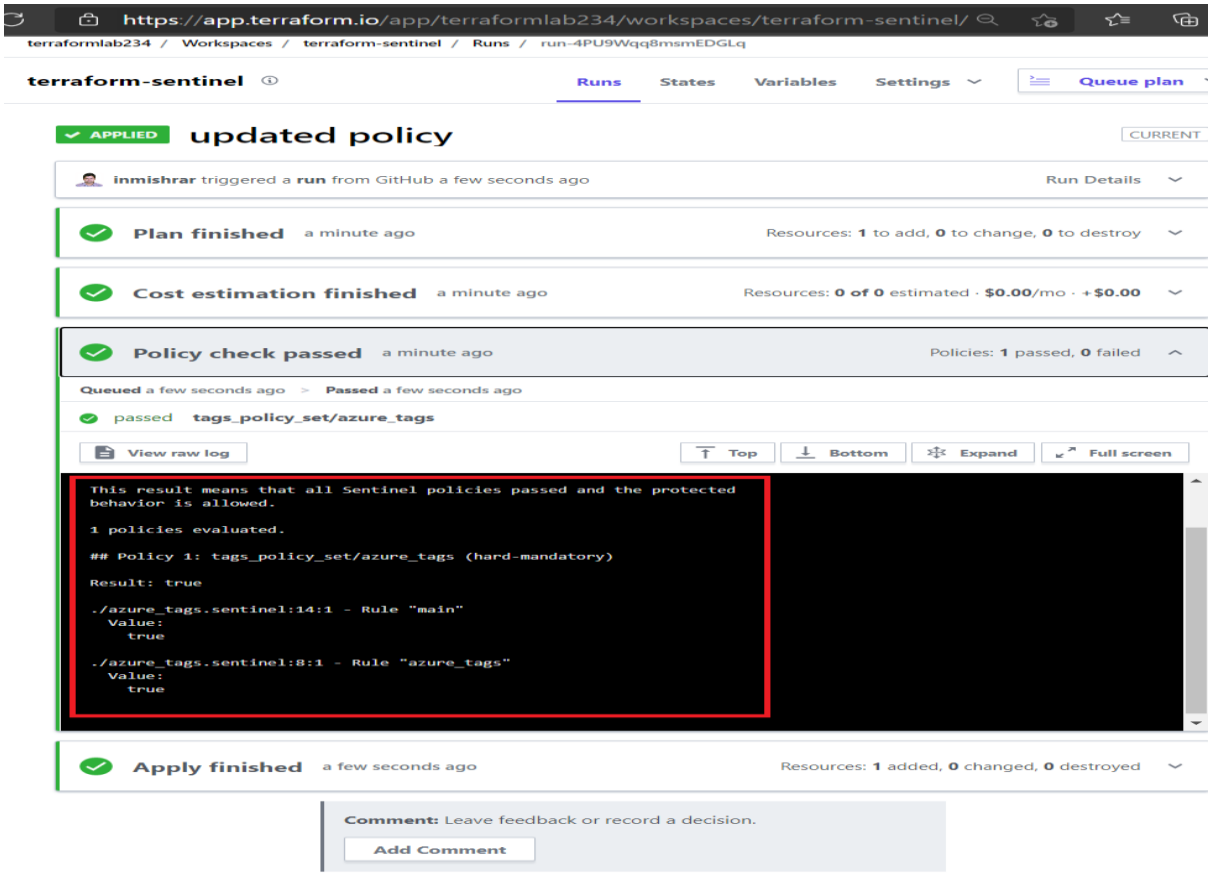

terraformlab234
Workspaces
Modules
Settings
HashiCorp Cloud Platform
Upgrade Now
terraformlab234 / Workspaces / infrastructure-automation / Runs / run-bMXkuKEE47zApLkt
infrastructure-automation
Runs
States
Variables
Settings
Queue plan
NEEDS CONFIRMATION
commit
CURRENT
inmishrar triggered a run from GitHub 13 minutes ago
Run Details
Plan finished 13 minutes ago
Resources: 1 to add, 0 to change, 0 to destroy
Started 13 minutes ago > Finished 12 minutes ago
Download Sentinel mocks
Sentinel mocks can be used for testing your Sentinel policies
View raw log
Top
Bottom
Expand
Full screen
Terraform v1.0.1
on linux_amd64
Configuring remote state backend...
Initializing Terraform configuration...
Terraform used the selected providers to generate the following execution
plan. Resource actions are indicated with the following symbols:
+ create
Terraform will perform the following actions:
# azurerm_resource_group.terraform-rg will be created
+ resource "azurerm_resource_group" "terraform-rg" {
+ id = (known after apply)
+ location = "eastus"
+ name = "terraform-lab-rg"
}
Plan: 1 to add, 0 to change, 0 to destroy.
Apply pending
Needs Confirmation: Check the plan and confirm to apply it, or discard the run.
Confirm & Apply
Discard Run
Add Comment

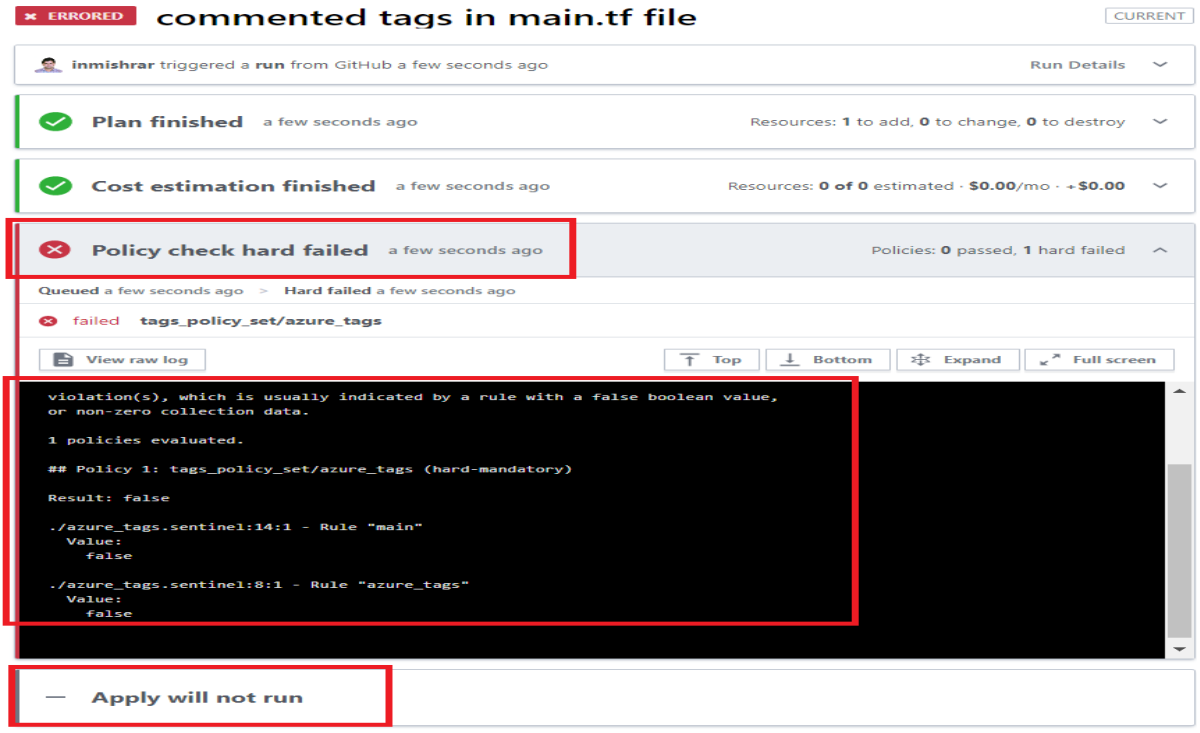

Home
Resource groups
cloudtraininghub
Create
Manage view
Refresh
Export to CSV
Open query
Assign tags
terr
Subscription == all
Location == all
Add filter
Showing 1 to 1 of 1 records.
No grouping
Name
Subscription
Location
terraform-lab-rg
cloudlab
East US


terraformlab234 / Workspaces / infrastructure-automation / Settings / Destruction and Deletion
infrastructure-automation
Runs
States
Variables
Settings
Queue plan
Destruction and Deletion
There are two independent steps for destroying this workspace and any infrastructure associated with it. First, any Terraform infrastructure should be destroyed. Second, the workspace in Terraform Cloud, including any variables, settings, and alert history can be deleted.
Destroy infrastructure
Allow destroy plans
When enabled, this setting allows a destroy plan to be created and applied. This also applies when using the CLI.
Manually destroy
Queuing a destroy plan will redirect to a new plan that will destroy all of the infrastructure managed by Terraform. It is equivalent to running terraform plan -destroy -out=destroy.tfplan followed by terraform apply destroy.tfplan locally.
Queue destroy plan
Delete Workspace
Deleting a workspace will remove any variables, settings, alert history, run history, and state related to it. This will not remove any infrastructure managed by this workspace. If needed, destroy the infrastructure prior to deleting the workspace.
Delete from Terraform Cloud


SCM
Terraform Cloud
plan
Sentinel Policies
apply
New Infrastructure


https://app.terraform.io/app/terraformlab234/settings/policy-sets/new
terraformlab234
Workspaces
Modules
Settings
HashiCorp Cloud Platform
terraformlab234 / Settings / Policy Sets / New
ORGANIZATION SETTINGS
terraformlab234
General
Plan & Billing
Users
Teams
API Tokens
Authentication
SSH Keys
Cost Estimation
Policies
Policy Sets
VCS Providers
Connect a Policy Set
Policy sets are groups of Sentinel policies which may be enforced on workspaces.
Connect to VCS
Choose a repository
3 Configure settings
Configure settings
Name
tag_policy_set
You can use letters, numbers, dashes (-) and underscores (_) in your policy set name.
Description
tag policy
Policy Set Source
Hide additional options
Policies Path
chapter10/terraform-sentinel/
The path within the repository where the desired policies are present.
This directory should include a "sentinel.hcl" configuration file.
By default, the repository root is used. The leading "/" is optional.
VCS branch
master
The branch from which to import new versions. This defaults to the value your version control provides as the default branch for this repository.
Scope of Policies
Policies enforced on all workspaces
Policies enforced on selected workspaces
Workspaces
The name of the workspace you wish to add to this policy set.
No workspaces applied
terraform-sentinel
Add workspace
Connect policy set


https://app.terraform.io/app/terraformlab234/workspaces/terraform-sentinel/
terraformlab234 / Workspaces / terraform-sentinel / Runs / run-4PU9Wqq8msmEDGLq
terraform-sentinel
Runs
States
Variables
Settings
Queue plan
APPLIED
updated policy
CURRENT
inmishrar triggered a run from GitHub a few seconds ago
Run Details
Plan finished
a minute ago
Resources: 1 to add, 0 to change, 0 to destroy
Cost estimation finished
a minute ago
Resources: 0 of 0 estimated · $0.00/mo · +$0.00
Policy check passed
a minute ago
Policies: 1 passed, 0 failed
Queued a few seconds ago
Passed a few seconds ago
passed
tags_policy_set/azure_tags
View raw log
Top
Bottom
Expand
Full screen
This result means that all Sentinel policies passed and the protected behavior is allowed.
1 policies evaluated.
Policy 1: tags_policy_set/azure_tags (hard-mandatory)
Result: true
./azure_tags.sentinel:14:1 - Rule "main"
Value:
true
./azure_tags.sentinel:8:1 - Rule "azure_tags"
Value:
true
Apply finished
a few seconds ago
Resources: 1 added, 0 changed, 0 destroyed
Comment: Leave feedback or record a decision.
Add Comment


ERRORED
commented tags in main.tf file
CURRENT
inmishrar triggered a run from GitHub a few seconds ago
Run Details
Plan finished
a few seconds ago
Resources: 1 to add, 0 to change, 0 to destroy
Cost estimation finished
a few seconds ago
Resources: 0 of 0 estimated · $0.00/mo · +$0.00
Policy check hard failed
a few seconds ago
Policies: 0 passed, 1 hard failed
Queued a few seconds ago
Hard failed a few seconds ago
failed
tags_policy_set/azure_tags
View raw log
Top
Bottom
Expand
Full screen
violation(s), which is usually indicated by a rule with a false boolean value,
or non-zero collection data.
1 policies evaluated.
Policy 1: tags_policy_set/azure_tags (hard-mandatory)
Result: false
./azure_tags.sentinel:14:1 - Rule "main"
Value:
false
./azure_tags.sentinel:8:1 - Rule "azure_tags"
Value:
false
Apply will not run

Chapter 11: Terraform Glossary

No Images