

Terraform GCP Sample: VM Instances and VPC

By Ronald Stewart Lim

Terraform GCP pre-requisites:

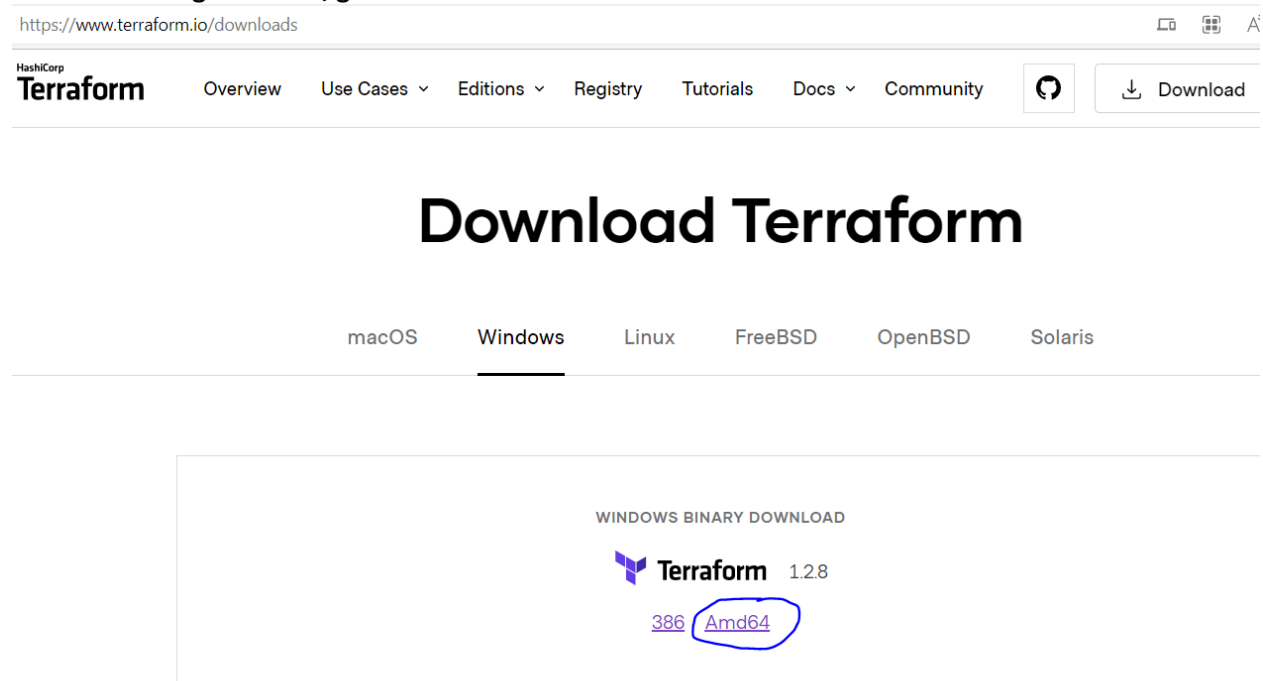
- Install Terraform and define in Windows environment path if it is in Windows OS
- Generate Access Key

Pre-requisite: Install Terraform

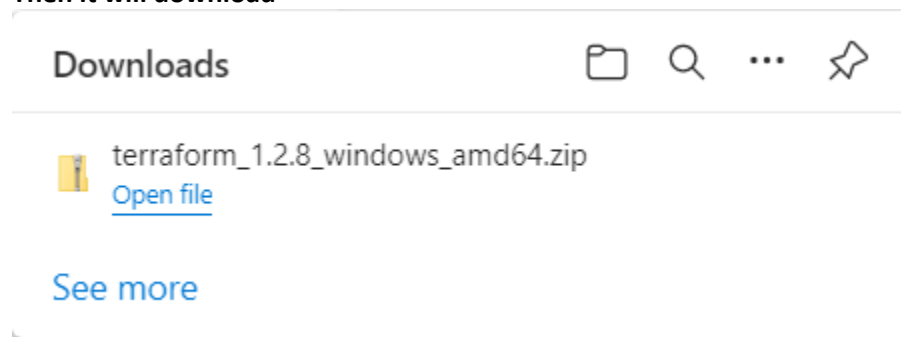
Download terraform exe file in terraform site:

<https://www.terraform.io/downloads>

Since I am using windows, go to windows tab and click Amd64



Then it will download



Then extract file you can see terraform executable file

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> This PC > DATA (D:) > edge downloads > terraform_1.2.8_windows_amd64

Name	Date modified	Type	Size
terraform	30/08/2022 4:05 am	Application	62,195 KB

Then create a directory and copy the file

> This PC > DATA (D:) > Terraform > bin

Name	Date modified	Type	Size
terraform	30/08/2022 4:05 am	Application	62,195 KB

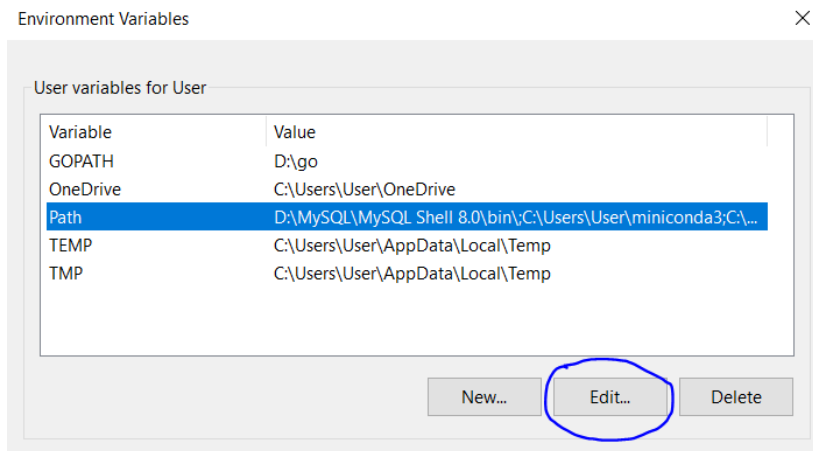
Then edit windows user path variable

The screenshot shows the Windows Start menu search interface. The search bar at the top contains the text 'Type here to search'. Below the search bar, a list of recent search results is displayed. The first result, 'Edit environment variables for your a...', is highlighted with a blue border. Other results include 'Snipping Tool', 'Word', 'Edit the system environment variables', 'Command Prompt', and 'Sign-in options'. On the right side of the search results, there is a section for 'Search people at sandboxcomp' with four user avatars: AD (Allan Deyoung), DS (Diego Siciliani), JS (Joni Sherman), and LR (Lynne Robbins). Below this, there is a section for 'Microsoft 365' with the text 'Find files or co-workers' and 'Get fast access to your info or team members.' followed by buttons for 'My documents', 'My profile', and 'My manager'.

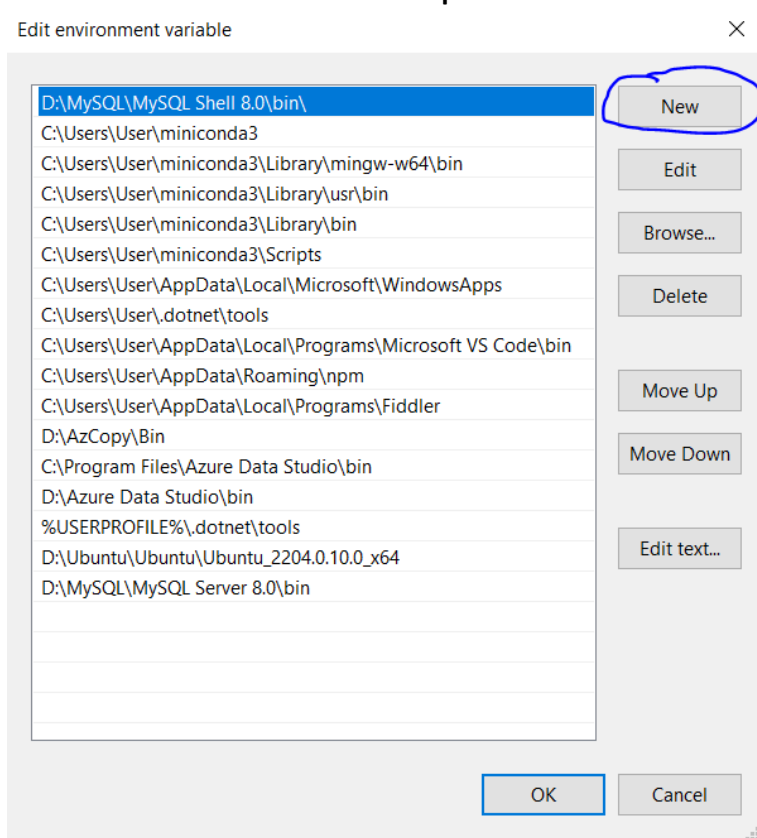
Go to Path variable and click Edit... button

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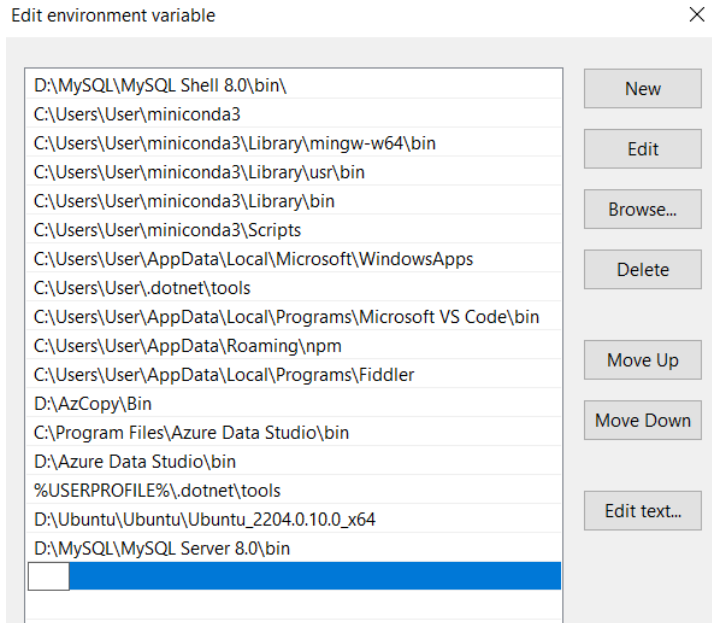


Click New button to Add Terraform path

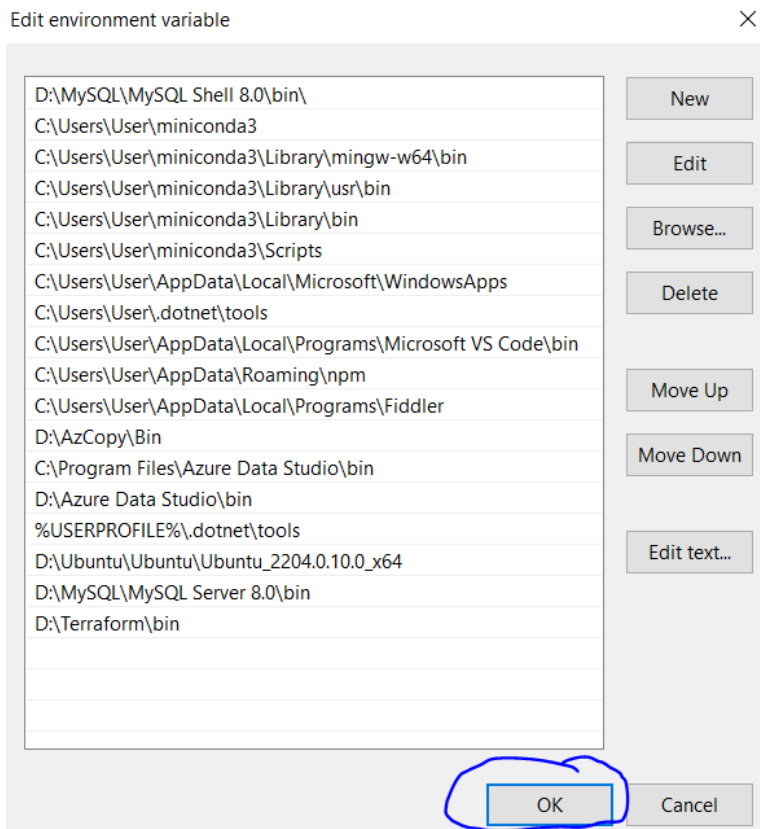


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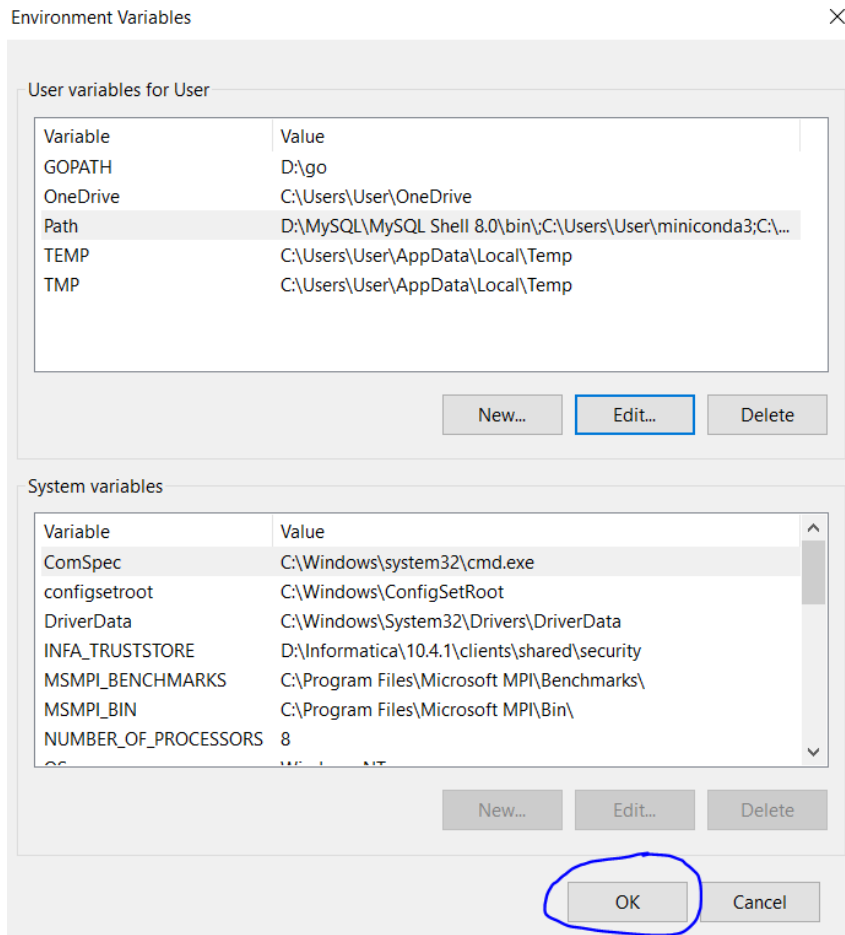
Click OK Button after specifying the path



Click OK Button again

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Open cmd and try to check if terraform is already accessible in any directory by typing:
terraform --version

```
Microsoft Windows [Version 10.0.19043.1889]
(c) Microsoft Corporation. All rights reserved.

C:\Users\User>terraform --version
Terraform v1.2.8
on windows_amd64

C:\Users\User>
```

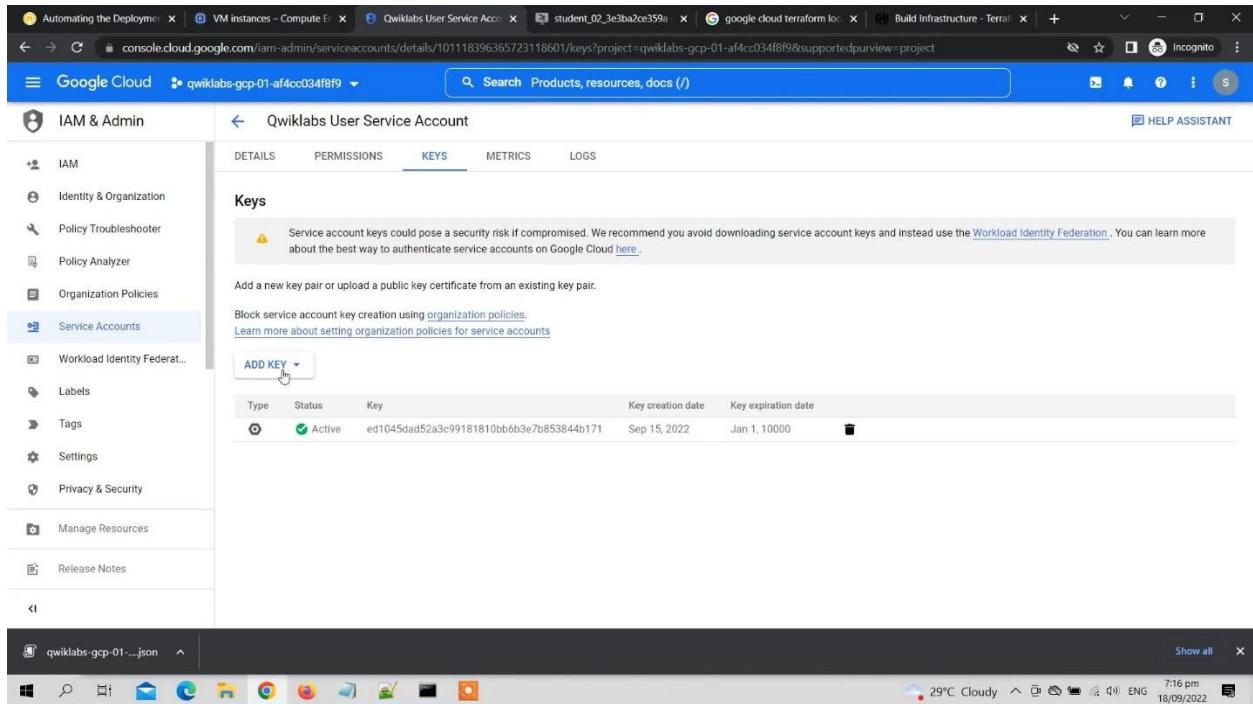
Pre-requisite: Generate Access Key

Now Terraform environment are ready. We will prepare the GCP access key required for executing Terraform scripts

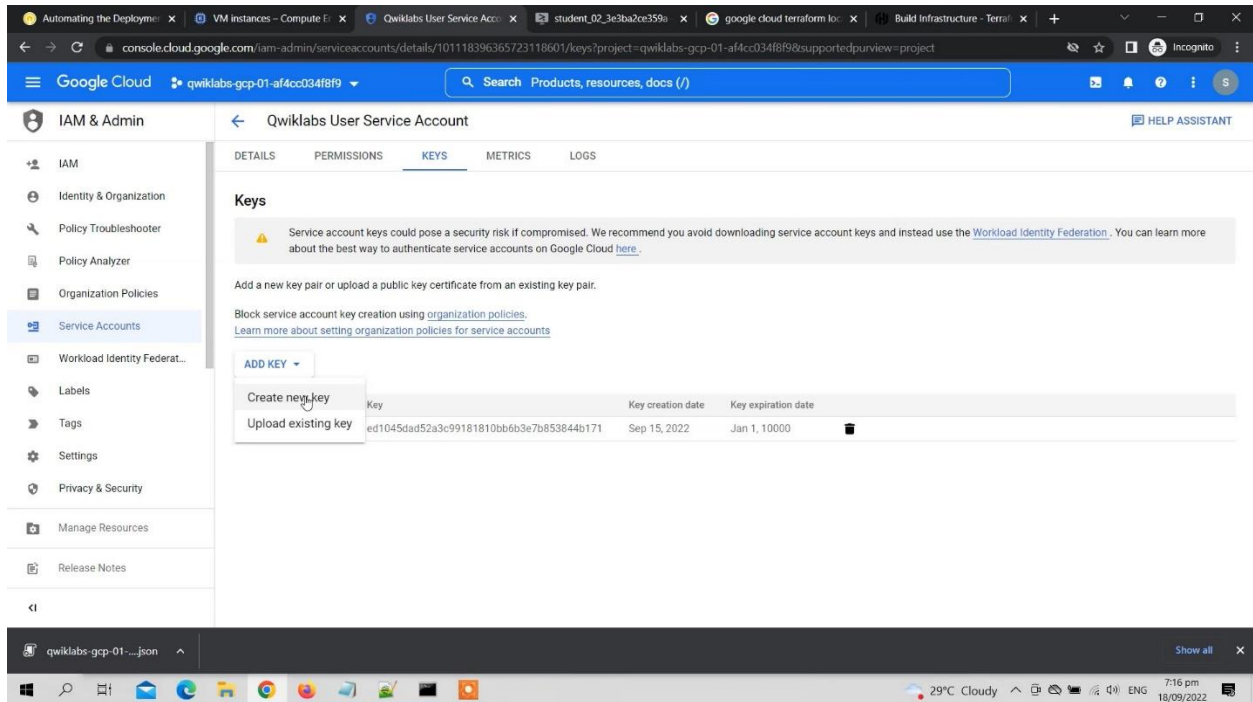
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Go to Google Cloud Console IAM Service Accounts and click a Service Account

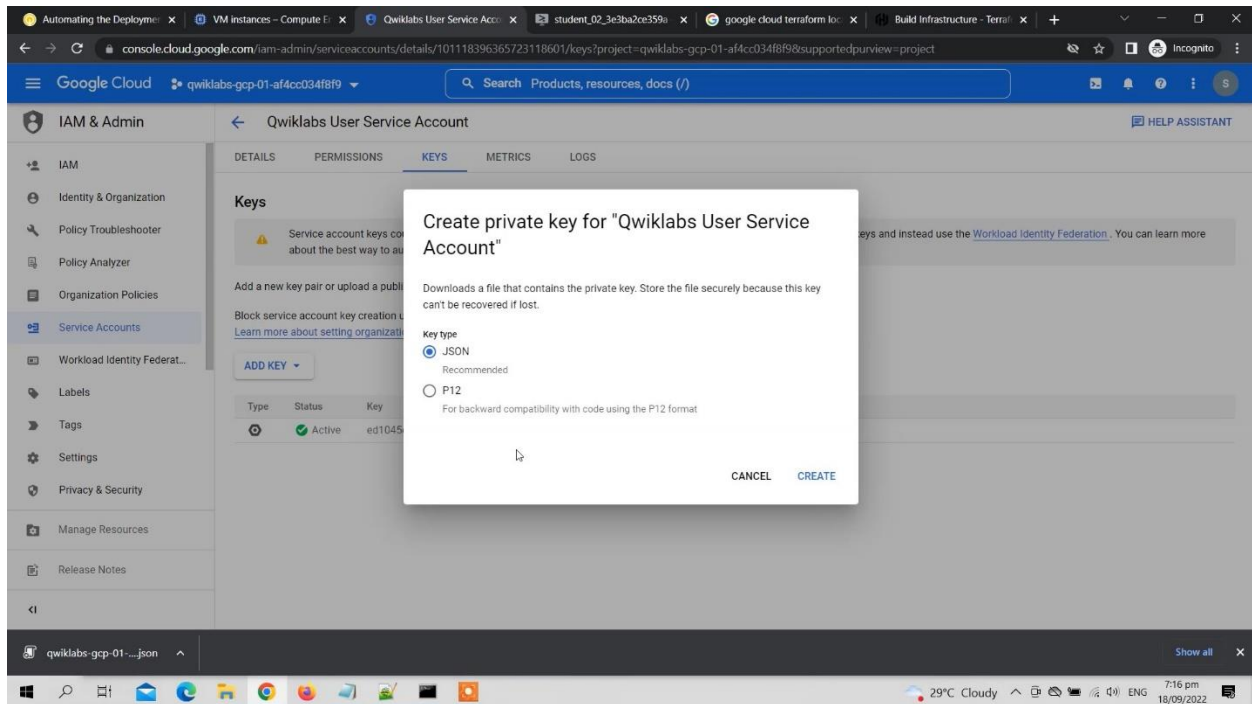


Click Add Key and click Create new key and choose JSON

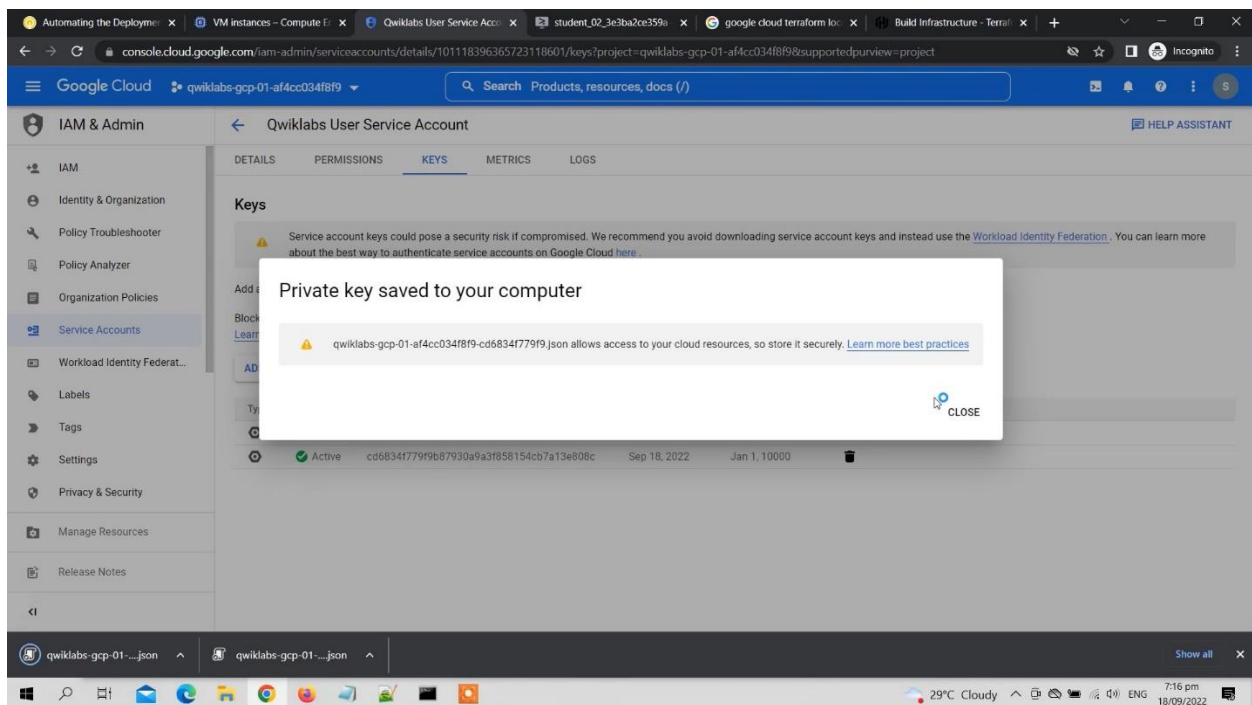


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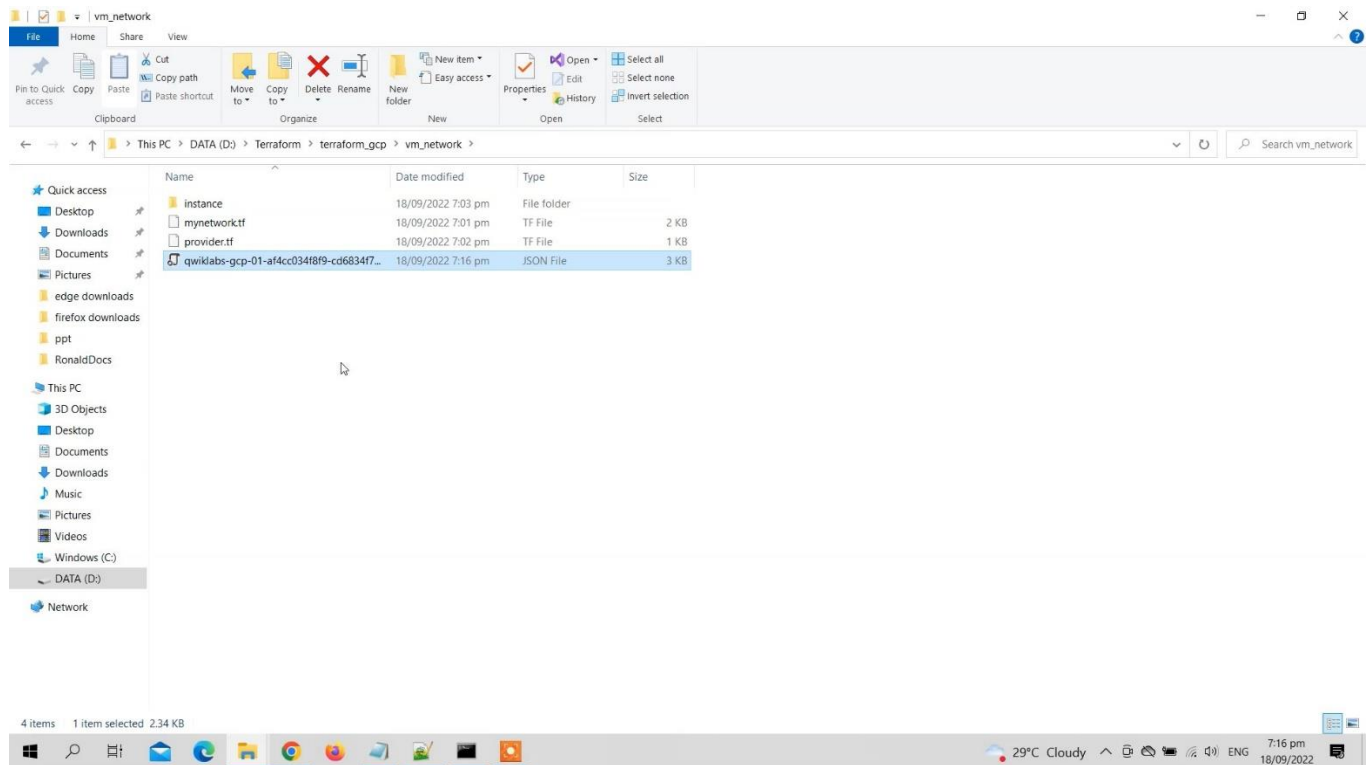
Then click CREATE button. Notice that the JSON Private Key file is downloaded.



Then copy the file to the desired directory

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Please see sample files to be used

mynetwork.tf

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```
mynetwork.tf - Notepad
File Edit Format View Help
# Create the mynetwork network
resource "google_compute_network" "mynetwork" {
  name = "mynetwork"
  # RESOURCE properties go here
  auto_create_subnetworks = "true"
}

# Add a firewall rule to allow HTTP, SSH, RDP and ICMP traffic on mynetwork
resource "google_compute_firewall" "mynetwork-allow-http-ssh-rdp-icmp" {
  name = "mynetwork-allow-http-ssh-rdp-icmp"
  # RESOURCE properties go here
  network = google_compute_network.mynetwork.self_link
  allow {
    protocol = "tcp"
    ports    = ["22", "80", "3389"]
  }
  allow {
    protocol = "icmp"
  }
  source_ranges = ["0.0.0.0/0"]
}

# Create the mynet-us-vm instance
module "mynet-us-vm" {
  source      = "../instance"
  instance_name = "mynet-us-vm"
  instance_zone = "us-central1-a"
  instance_network = google_compute_network.mynetwork.self_link
}

# Create the mynet-eu-vm instance
module "mynet-eu-vm" {
  source      = "../instance"
  instance_name = "mynet-eu-vm"
  instance_zone = "europe-west1-c"
  instance_network = google_compute_network.mynetwork.self_link
}
```

Provider.tf (Note, you need to specify the project ID and the location of Private Key JSON file and region and zone)


```
provider.tf - Notepad
File Edit Format View Help
provider "google" {
  credentials = file("qwiklabs-gcp-01-af4cc034f8f9-cd6834f779f9.json")

  project = "qwiklabs-gcp-01-af4cc034f8f9"
  region  = "us-central1"
  zone    = "us-central1-c"
}
```

main.tf


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 main.tf - Notepad

```
File Edit Format View Help
resource "google_compute_instance" "vm_instance" {
  name = "${var.instance_name}"
  # RESOURCE properties go here
  zone          = "${var.instance_zone}"
  machine_type  = "${var.instance_type}"
  boot_disk {
    initialize_params {
      image = "debian-cloud/debian-11"
    }
  }
  network_interface {
    network = "${var.instance_network}"
    access_config {
      # Allocate a one-to-one NAT IP to the instance
    }
  }
}
```

variables.tf

 variables.tf - Notepad

```
File Edit Format View Help
variable "instance_name" {}
variable "instance_zone" {}
variable "instance_type" {
  default = "e2-micro"
}
variable "instance_network" {}
```

Initialize the Terraform using command below:

terraform init

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```
D:\Terraform\terraform_gcp\vm_network>terraform init
Initializing modules...
- mynet-eu-vm in instance
- mynet-us-vm in instance

Initializing the backend...

Initializing provider plugins...
- Finding latest version of hashicorp/google...
- Installing hashicorp/google v4.36.0...
- Installed hashicorp/google v4.36.0 (signed by HashiCorp)

Terraform has created a lock file .terraform.lock.hcl to record the provider
selections it made above. Include this file in your version control repository
so that Terraform can guarantee to make the same selections by default when
you run "terraform init" in the future.

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.

D:\Terraform\terraform_gcp\vm_network>
```

To check and validate the terraform-based codes, execute the command below:
terraform validate

If the validation found no errors, then it will output the success message

```
D:\Terraform\terraform_gcp\vm_network>terraform validate
Success! The configuration is valid.

D:\Terraform\terraform_gcp\vm_network>
```

(Optional) Check the Terraform execution plan by using the command below:
terraform plan

Sample output below:

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```
D:\Terraform\terraform_gcp\vm_network>terraform plan

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:

  + enable_confidential_compute = (known after apply)
    }

  + network_interface {
    + ipv6_access_type = (known after apply)
    + name             = (known after apply)
    + network          = (known after apply)
    + network_ip       = (known after apply)
    + stack_type       = (known after apply)
    + subnetwork       = (known after apply)
    + subnetwork_project = (known after apply)

    + access_config {
      + nat_ip       = (known after apply)
      + network_tier = (known after apply)
    }
  }

  + reservation_affinity {
    + type = (known after apply)

    + specific_reservation {
      + key    = (known after apply)
      + values = (known after apply)
    }
  }

  + scheduling {
    + automatic_restart      = (known after apply)
    + instance_termination_action = (known after apply)
    + min_node_cpus         = (known after apply)
    + on_host_maintenance   = (known after apply)
    + preemptible           = (known after apply)
    + provisioning_model     = (known after apply)

    + node_affinities {
      + key      = (known after apply)
      + operator = (known after apply)
      + values   = (known after apply)
    }
  }
}

Plan: 4 to add, 0 to change, 0 to destroy.

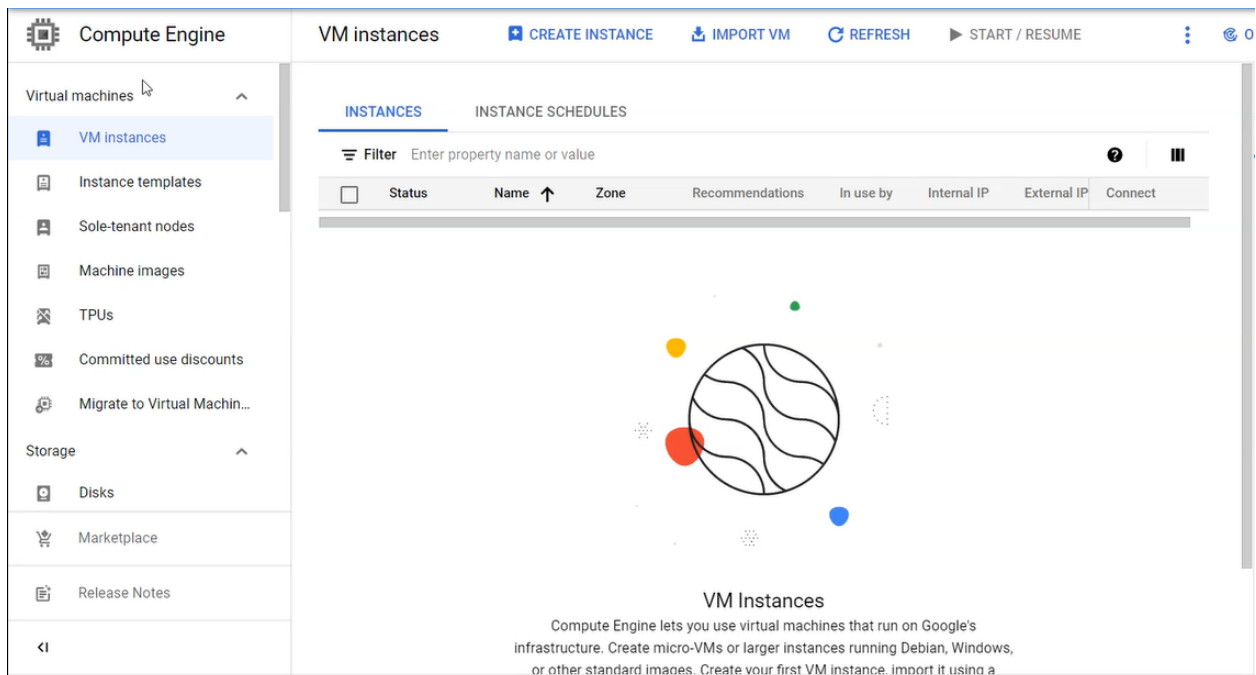
Note: You didn't use the -out option to save this plan, so Terraform can't guarantee to take exactly these

D:\Terraform\terraform_gcp\vm_network>
```

Before applying changes, check the before state of the VM instances by going to Compute Engine -> VM instances. Notice that the instances are not yet created.

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Execute the command below and confirm changes to create VM instances in GCP:
terraform apply

Note: terraform apply command already contains terraform plan so no need to execute terraform plan
terraform apply = terraform plan + confirmation to apply changes

sample output:

```
D:\Terraform\terraform_gcp\vm_network>terraform apply
```

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```
+ enable_confidential_compute = (known after apply)
}

+ network_interface {
  + ipv6_access_type = (known after apply)
  + name             = (known after apply)
  + network          = (known after apply)
  + network_ip       = (known after apply)
  + stack_type       = (known after apply)
  + subnetwork       = (known after apply)
  + subnetwork_project = (known after apply)

  + access_config {
    + nat_ip = (known after apply)
    + network_tier = (known after apply)
  }
}

+ reservation_affinity {
  + type = (known after apply)

  + specific_reservation {
    + key = (known after apply)
    + values = (known after apply)
  }
}

+ scheduling {
  + automatic_restart = (known after apply)
  + instance_termination_action = (known after apply)
  + min_node_cpus = (known after apply)
  + on_host_maintenance = (known after apply)
  + preemptible = (known after apply)
  + provisioning_model = (known after apply)

  + node_affinities {
    + key = (known after apply)
    + operator = (known after apply)
    + values = (known after apply)
  }
}
}

Plan: 4 to add, 0 to change, 0 to destroy.

Do you want to perform these actions?
  Terraform will perform the actions described above.
  Only 'yes' will be accepted to approve.

Enter a value: _
Enter a value: yes

google_compute_network.mynetwork: Creating...
google_compute_network.mynetwork: Still creating... [10s elapsed]
google_compute_network.mynetwork: Still creating... [20s elapsed]
google_compute_network.mynetwork: Still creating... [30s elapsed]
google_compute_network.mynetwork: Creation complete after 33s [id=projects/qwiklabs-gcp-01-af4cc034f8f9/global/networks/mynetwork]
module.mynet-us-vm.google_compute_instance.vm_instance: Creating...
module.mynet-eu-vm.google_compute_instance.vm_instance: Creating...
google_compute_firewall.mynetwork-allow-http-ssh-rdp-icmp: Creating...
module.mynet-us-vm.google_compute_instance.vm_instance: Still creating... [10s elapsed]
module.mynet-eu-vm.google_compute_instance.vm_instance: Still creating... [10s elapsed]
google_compute_firewall.mynetwork-allow-http-ssh-rdp-icmp: Still creating... [10s elapsed]
google_compute_firewall.mynetwork-allow-http-ssh-rdp-icmp: Creation complete after 11s [id=projects/qwiklabs-gcp-01-af4cc034f8f9/global/firewalls/mynetwork-allow-http-ssh-rdp-icmp]
module.mynet-us-vm.google_compute_instance.vm_instance: Creation complete after 16s [id=projects/qwiklabs-gcp-01-af4cc034f8f9/zones/us-central1-a/instances/mynet-us-vm]
module.mynet-eu-vm.google_compute_instance.vm_instance: Still creating... [20s elapsed]
module.mynet-eu-vm.google_compute_instance.vm_instance: Creation complete after 21s [id=projects/qwiklabs-gcp-01-af4cc034f8f9/zones/europe-west1-c/instances/mynet-eu-vm]

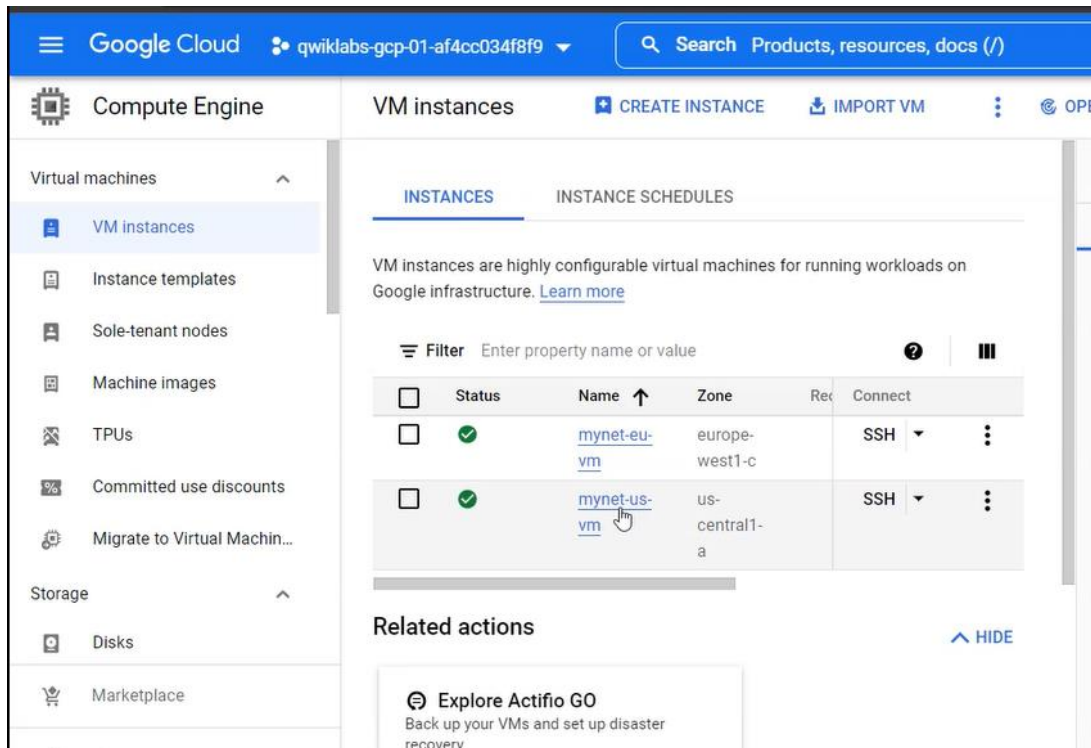
Apply complete! Resources: 4 added, 0 changed, 0 destroyed.

D:\Terraform\terraform_gcp\vm_network>
```

Check the after state of the VM instances by going to Compute Engine -> VM instances. Notice that the instances are now created successfully.

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Then let us try to destroy what we created for learning purposes using command below and confirm: *terraform destroy*

sample output:

```
D:\Terraform\terraform_gcp\vm_network>terraform destroy
google_compute_network.mynetwork: Refreshing state... [id=projects/qwiklabs-gcp-01-af4cc034f8f9/global/networks/mynetwork]
google_compute_firewall.mynetwork-allow-http-ssh-rdp-icmp: Refreshing state... [id=projects/qwiklabs-gcp-01-af4cc034f8f9/global/firewalls/mynetwork-allow-http-ssh-rdp-icmp]
module.mynet-us-vm.google_compute_instance.vm_instance: Refreshing state... [id=projects/qwiklabs-gcp-01-af4cc034f8f9/zones/us-central1-a/instances/mynet-us-vm]
module.mynet-eu-vm.google_compute_instance.vm_instance: Refreshing state... [id=projects/qwiklabs-gcp-01-af4cc034f8f9/zones/europe-west1-c/instances/mynet-eu-vm]

Terraform used the selected providers to generate the following execution plan. Resource actions are indicated with the following symbols:
- destroy

Terraform will perform the following actions:

# google_compute_firewall.mynetwork-allow-http-ssh-rdp-icmp will be destroyed
- resource "google_compute_firewall" "mynetwork-allow-http-ssh-rdp-icmp" {
  - creation_timestamp = "2022-09-18T04:19:05.378-07:00" -> null
  - destination_ranges = [] -> null
  - direction          = "INGRESS" -> null
  - disabled           = false -> null
  - id                 = "projects/qwiklabs-gcp-01-af4cc034f8f9/global/firewalls/mynetwork-allow-http-ssh-rdp-icmp" -> null
  - name               = "mynetwork-allow-http-ssh-rdp-icmp" -> null
  - network            = "https://www.googleapis.com/compute/v1/projects/qwiklabs-gcp-01-af4cc034f8f9/global/networks/mynetwork" -> null
  - priority           = 1000 -> null
  - project            = "qwiklabs-gcp-01-af4cc034f8f9" -> null
  - self_link          = "https://www.googleapis.com/compute/v1/projects/qwiklabs-gcp-01-af4cc034f8f9/global/firewalls/mynetwork-allow-http-ssh-rdp-icmp" -> null
  - source_ranges      = [
    - "0.0.0.0/0",
  ] -> null
  - source_service_accounts = [] -> null
  - source_tags            = [] -> null
  - target_service_accounts = [] -> null
  - target_tags            = [] -> null

  - allow {
    - ports = [
      - "22",
      - "80",
      - "3389",
    ] -> null
    - protocol = "tcp" -> null
  }
  - allow {
    - ports = [] -> null
    - protocol = "icmp" -> null
  }
}
```

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```
tags = [] -> null
tags_fingerprint = "42WmSp88rSM=" -> null
zone = "us-central1-a" -> null

- boot_disk {
  - auto_delete = true -> null
  - device_name = "persistent-disk-0" -> null
  - mode = "READ_WRITE" -> null
  - source = "https://www.googleapis.com/compute/v1/projects/qwiklabs-gcp-01-af4cc034f8f9/zones/us-central1-a/disks/mynet-us-vm" -> null
}

- initialize_params {
  - image = "https://www.googleapis.com/compute/v1/projects/debian-cloud/global/images/debian-11-bullseye-v20220822" -> null
  - labels = {} -> null
  - size = 10 -> null
  - type = "pd-standard" -> null
}

- network_interface {
  - name = "nic0" -> null
  - network = "https://www.googleapis.com/compute/v1/projects/qwiklabs-gcp-01-af4cc034f8f9/global/networks/mynetwork" -> null
  - network_ip = "10.128.0.2" -> null
  - queue_count = 0 -> null
  - stack_type = "IPV4_ONLY" -> null
  - subnetwork = "https://www.googleapis.com/compute/v1/projects/qwiklabs-gcp-01-af4cc034f8f9/regions/us-central1/subnetworks/mynetwork" -> null
  - subnetwork_project = "qwiklabs-gcp-01-af4cc034f8f9" -> null
}

- access_config {
  - nat_ip = "34.134.137.228" -> null
  - network_tier = "PREMIUM" -> null
}

- scheduling {
  - automatic_restart = true -> null
  - min_node_cpus = 0 -> null
  - on_host_maintenance = "MIGRATE" -> null
  - preemptible = false -> null
  - provisioning_model = "STANDARD" -> null
}

- shielded_instance_config {
  - enable_integrity_monitoring = true -> null
  - enable_secure_boot = false -> null
  - enable_vtpm = true -> null
}
}

Plan: 0 to add, 0 to change, 4 to destroy.
Do you really want to destroy all resources?
  Terraform will destroy all your managed infrastructure, as shown above.
  There is no undo. Only 'yes' will be accepted to confirm.

Enter a value: yes

google_compute_firewall.mynetwork-allow-http-ssh-rdp-icmp: Destroying... [id=projects/qwiklabs-gcp-01-af4cc034f8f9/global/firewalls/mynetwork-allow-http-ssh-rdp-icmp]
module.mynet-us-vm.google_compute_instance.vm_instance: Destroying... [id=projects/qwiklabs-gcp-01-af4cc034f8f9/zones/us-central1-a/instances/mynet-us-vm]
module.mynet-eu-vm.google_compute_instance.vm_instance: Destroying... [id=projects/qwiklabs-gcp-01-af4cc034f8f9/zones/europe-west1-c/instances/mynet-eu-vm]
module.mynet-us-vm.google_compute_instance.vm_instance: Still destroying... [id=projects/qwiklabs-gcp-01-af4cc034f8f9/zones/us-central1-a/instances/mynet-us-vm, 10s elapsed]
google_compute_firewall.mynetwork-allow-http-ssh-rdp-icmp: Still destroying... [id=projects/qwiklabs-gcp-01-af4cc034f8f9/global/firewalls/mynetwork-allow-http-ssh-rdp-icmp, 10s elapsed]
module.mynet-eu-vm.google_compute_instance.vm_instance: Still destroying... [id=projects/qwiklabs-gcp-01-af4cc034f8f9/zones/europe-west1-c/instances/mynet-eu-vm, 10s elapsed]
google_compute_firewall.mynetwork-allow-http-ssh-rdp-icmp: Destruction complete after 11s
module.mynet-us-vm.google_compute_instance.vm_instance: Still destroying... [id=projects/qwiklabs-gcp-01-af4cc034f8f9/zones/us-central1-a/instances/mynet-us-vm, 20s elapsed]
module.mynet-eu-vm.google_compute_instance.vm_instance: Still destroying... [id=projects/qwiklabs-gcp-01-af4cc034f8f9/zones/europe-west1-c/instances/mynet-eu-vm, 20s elapsed]
module.mynet-us-vm.google_compute_instance.vm_instance: Destruction complete after 24s
module.mynet-eu-vm.google_compute_instance.vm_instance: Destruction complete after 26s
google_compute_network.mynetwork: Destroying... [id=projects/qwiklabs-gcp-01-af4cc034f8f9/global/networks/mynetwork]
google_compute_network.mynetwork: Still destroying... [id=projects/qwiklabs-gcp-01-af4cc034f8f9/global/networks/mynetwork, 10s elapsed]
google_compute_network.mynetwork: Still destroying... [id=projects/qwiklabs-gcp-01-af4cc034f8f9/global/networks/mynetwork, 20s elapsed]
google_compute_network.mynetwork: Still destroying... [id=projects/qwiklabs-gcp-01-af4cc034f8f9/global/networks/mynetwork, 30s elapsed]
google_compute_network.mynetwork: Still destroying... [id=projects/qwiklabs-gcp-01-af4cc034f8f9/global/networks/mynetwork, 40s elapsed]
google_compute_network.mynetwork: Still destroying... [id=projects/qwiklabs-gcp-01-af4cc034f8f9/global/networks/mynetwork, 50s elapsed]
google_compute_network.mynetwork: Destruction complete after 53s

Destroy complete! Resources: 4 destroyed.
D:\Terraform\terraform_gcp\vm_network>
```

Check the destroy state of the VM instances by going to Compute Engine -> VM instances. Notice that the instances are now deleted.

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The screenshot shows the Google Cloud Platform interface for the Compute Engine VM instances page. The left sidebar contains a navigation menu with categories like 'Virtual machines' and 'Storage'. The main content area is titled 'VM instances' and includes tabs for 'INSTANCES' and 'INSTANCE SCHEDULES'. A filter bar is present above a table with columns for Status, Name, Zone, Recommendations, In use by, Internal IP, External IP, and Connect. The table is currently empty, displaying a large graphic of a globe with colored dots. Below the table, there is a section titled 'VM Instances' with a descriptive paragraph about Compute Engine.

Compute Engine

VM instances

CREATE INSTANCE IMPORT VM REFRESH START / RESUME

Virtual machines

VM instances

Instance templates

Sole-tenant nodes

Machine images

TPUs

Committed use discounts

Migrate to Virtual Machin...

Storage

Disks

Marketplace

Release Notes

<1

INSTANCES INSTANCE SCHEDULES

Filter Enter property name or value

Status	Name	Zone	Recommendations	In use by	Internal IP	External IP	Connect
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VM Instances

Compute Engine lets you use virtual machines that run on Google's infrastructure. Create micro-VMs or larger instances running Debian, Windows, or other standard images. Create your first VM instance. import it using a