

The background is a vibrant, abstract graphic. It features a central bright white light source from which numerous colorful rays emanate, creating a sunburst or starburst effect. The rays transition through a spectrum of colors including yellow, orange, red, and various shades of blue and green. Overlaid on this are large, flowing, wavy shapes in similar colors, giving the overall composition a sense of movement and energy.

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Let's go

#CiscoLive



The bridge to possible

# Automating Cloud Network Controller Operations on Public Clouds

From GUI to Terraform



Marina Ferreira, Cloud and DC TSA

@\_marinalf

DEVNET-2686

CISCO *Live!*

#CiscoLive



# Cisco Webex App

## Questions?

Use Cisco Webex App to chat with the speaker after the session

## How

- 1 Find this session in the Cisco Live Mobile App
- 2 Click “Join the Discussion”
- 3 Install the Webex App or go directly to the Webex space
- 4 Enter messages/questions in the Webex space

Webex spaces will be moderated by the speaker until June 9, 2023.



<https://ciscolive.ciscoevents.com/ciscolivebot/#DEVNET-2686>

# Agenda

- Cloud Networking Fundamentals
- Cloud Network Controller Architecture and Deployment
- **Demo:** CNC Config and Operations using GUI
- Programmability Options
- **Demo:** CNC Config and Operations using Terraform
- Additional Resources
- Q&A

# Rebranded!



Cisco Cloud ACI



Cisco Cloud  
Network Controller

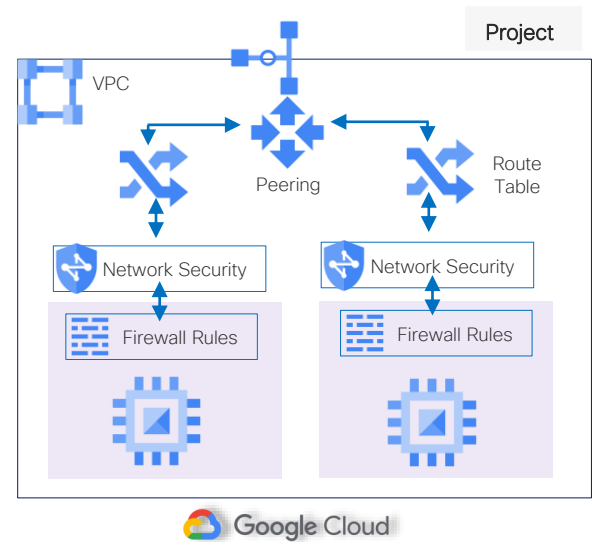
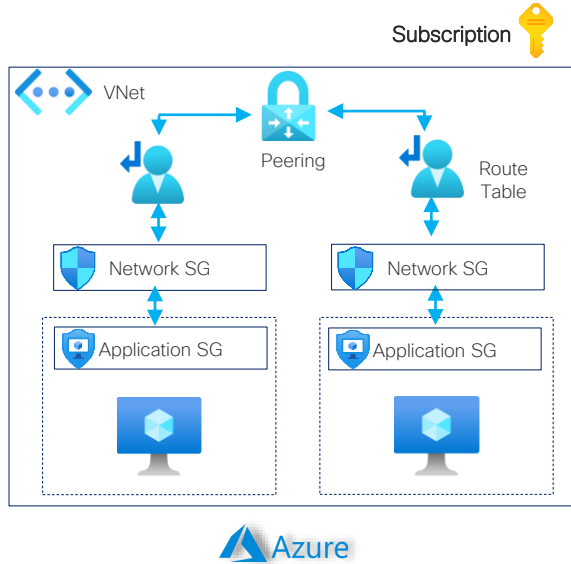
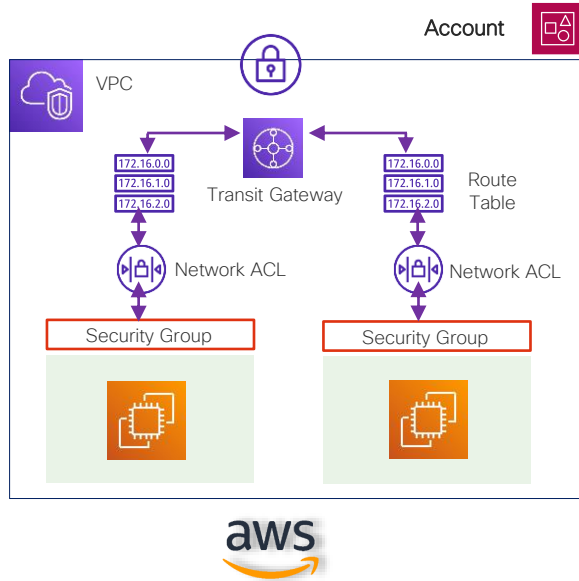
[Modernize your Multi-Cloud Network with Cisco Cloud Network Controller](#)



It is not only about **to the cloud** strategies. It is also about **inside** and across **different clouds**.

# Cloud Networking Fundamentals

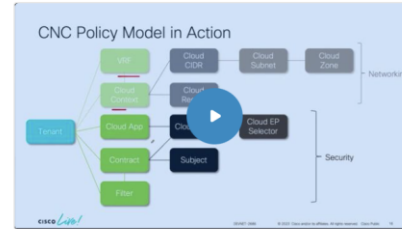
## Inside the Cloud



# Previous Sessions

## Automating Cloud Network Controller Operations on Public Clouds – DEVNET-2686

Event: 2023 Amsterdam



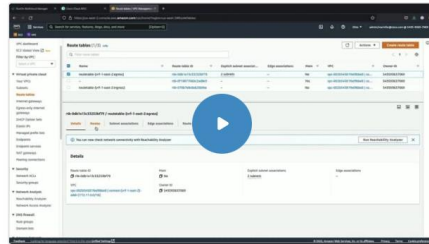
Marina Ferreira, Technical Solutions Architect, Cisco Systems, Inc.

This session will show participants how Cloud Networking Controller (formerly Cloud ACI) works on Public Clouds, how it normalizes and translates a cloud-like policy model into public cloud native constructs, and how Terraform can be leveraged to automate Cloud Network Controller operations. Part...



## Automating Cloud ACI Operations on Public Clouds – DEVNET-2686

Event: 2022 Las Vegas



Marina Ferreira, Technical Solutions Architect, Cisco Systems, Inc.

ACI has become the leading software-defined solution for Data Center and Cloud Networking. This session will show participants how Cloud ACI works on Public Clouds, how it normalizes and translates the ACI policy model into public cloud native constructs, and how Terraform can be leveraged to aut...





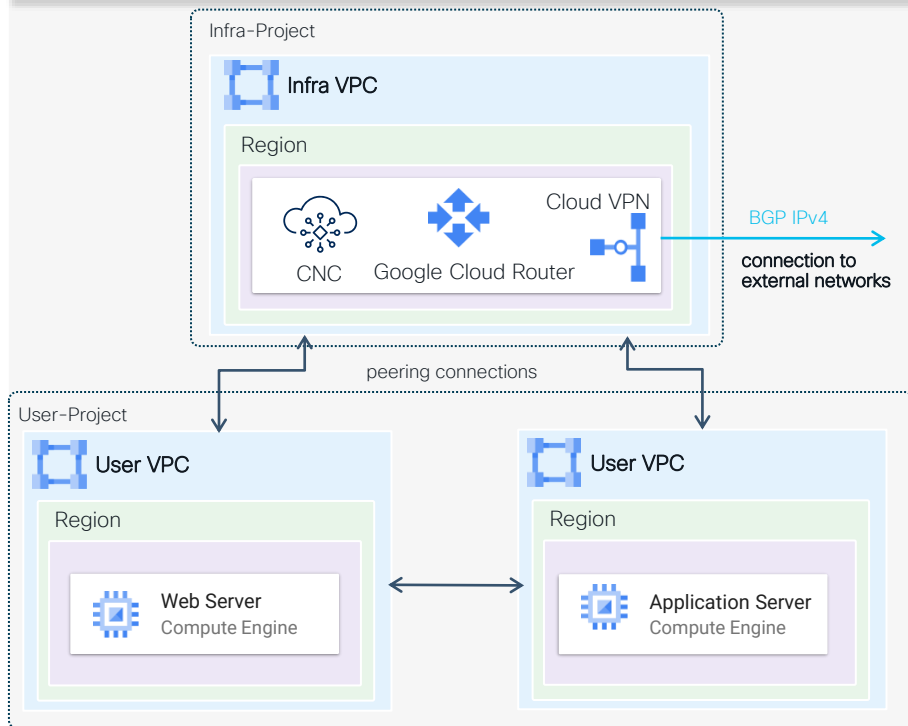
# Cloud Network Controller on GCP

# CNC to GCP Translation

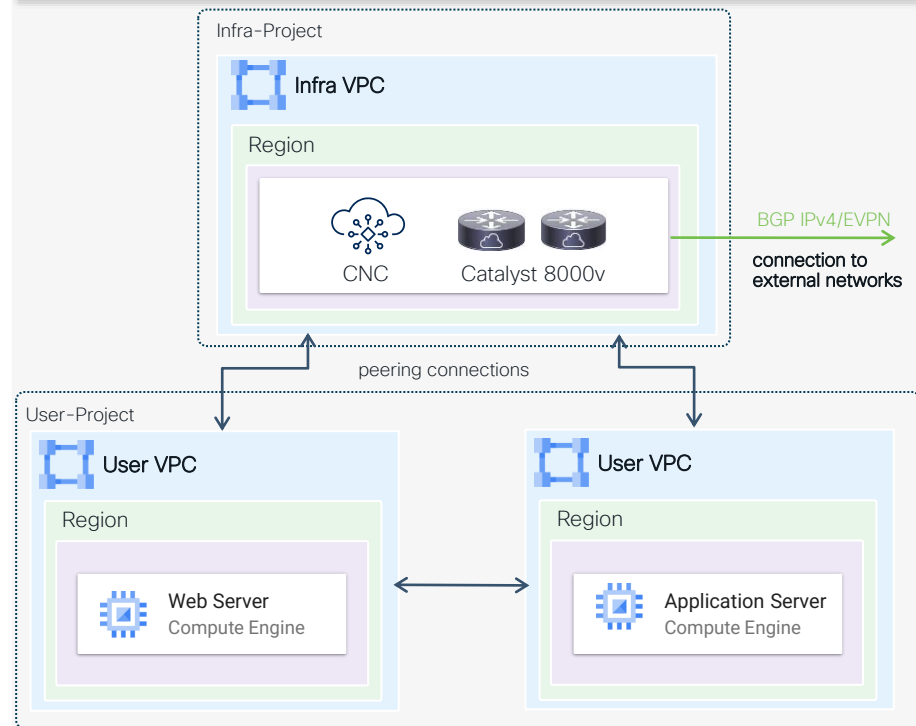


# Cloud Network Controller on GCP

Architecture: Cloud Network Controller with Google Cloud Router & Cloud VPN

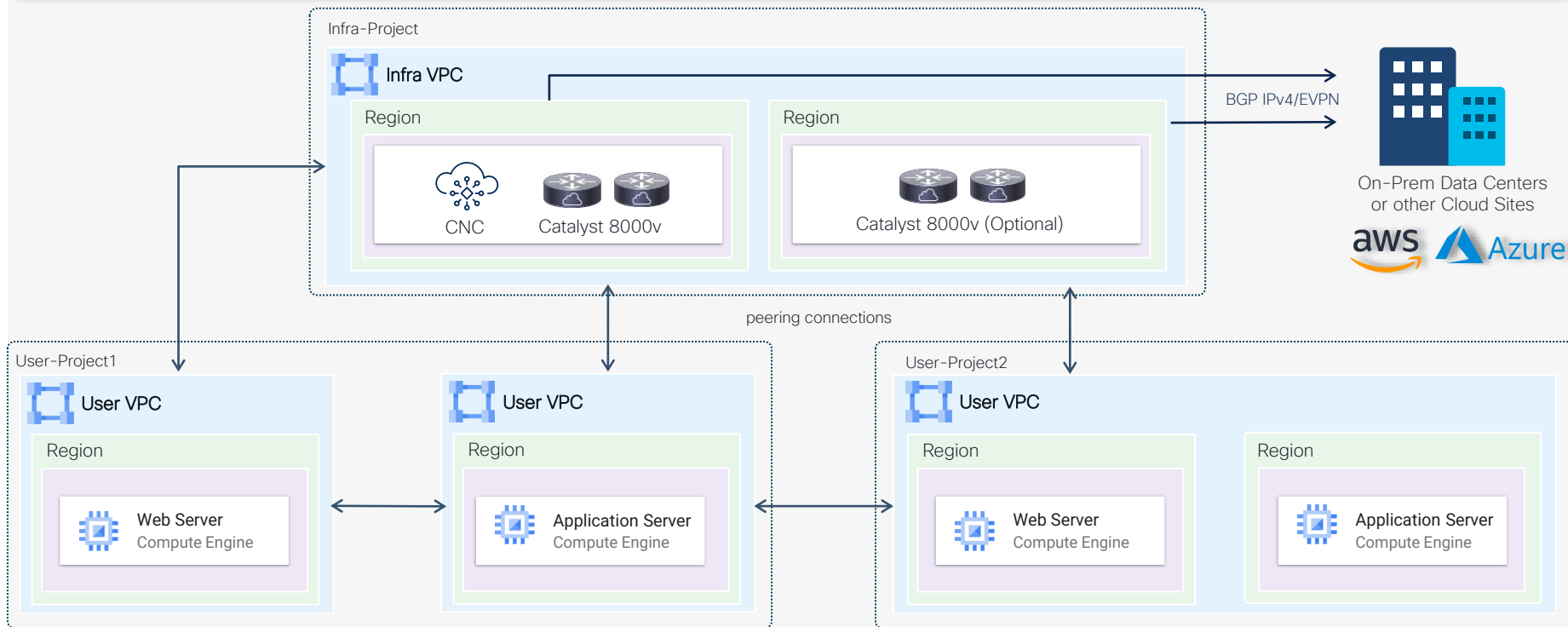


Architecture: Cloud Network Controller with Cisco Cloud Router



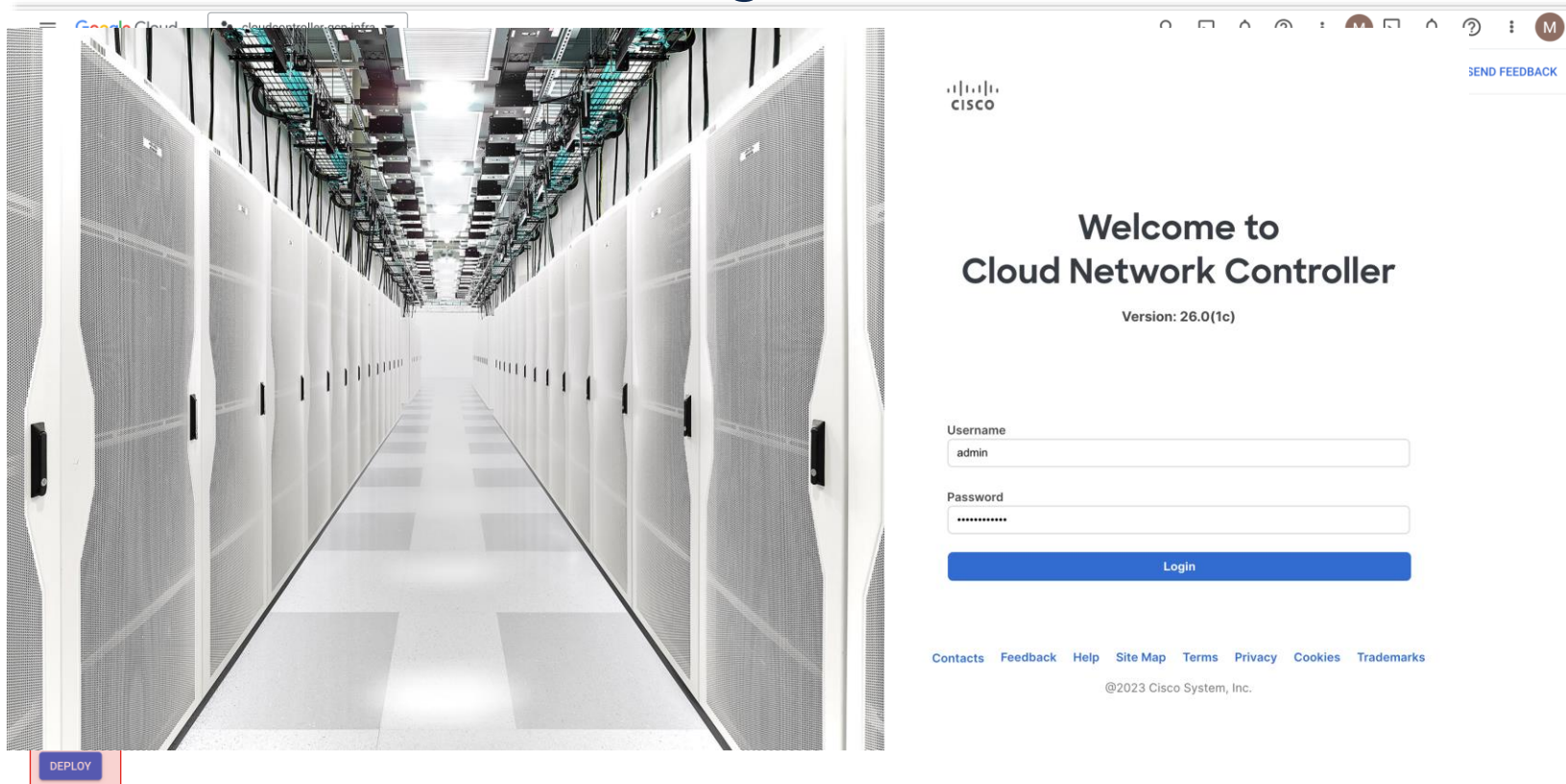
# Cloud Network Controller on GCP

Architecture: Multi-Project and Multi-Region with Cisco Cloud Router



# Deploying CNC on GCP

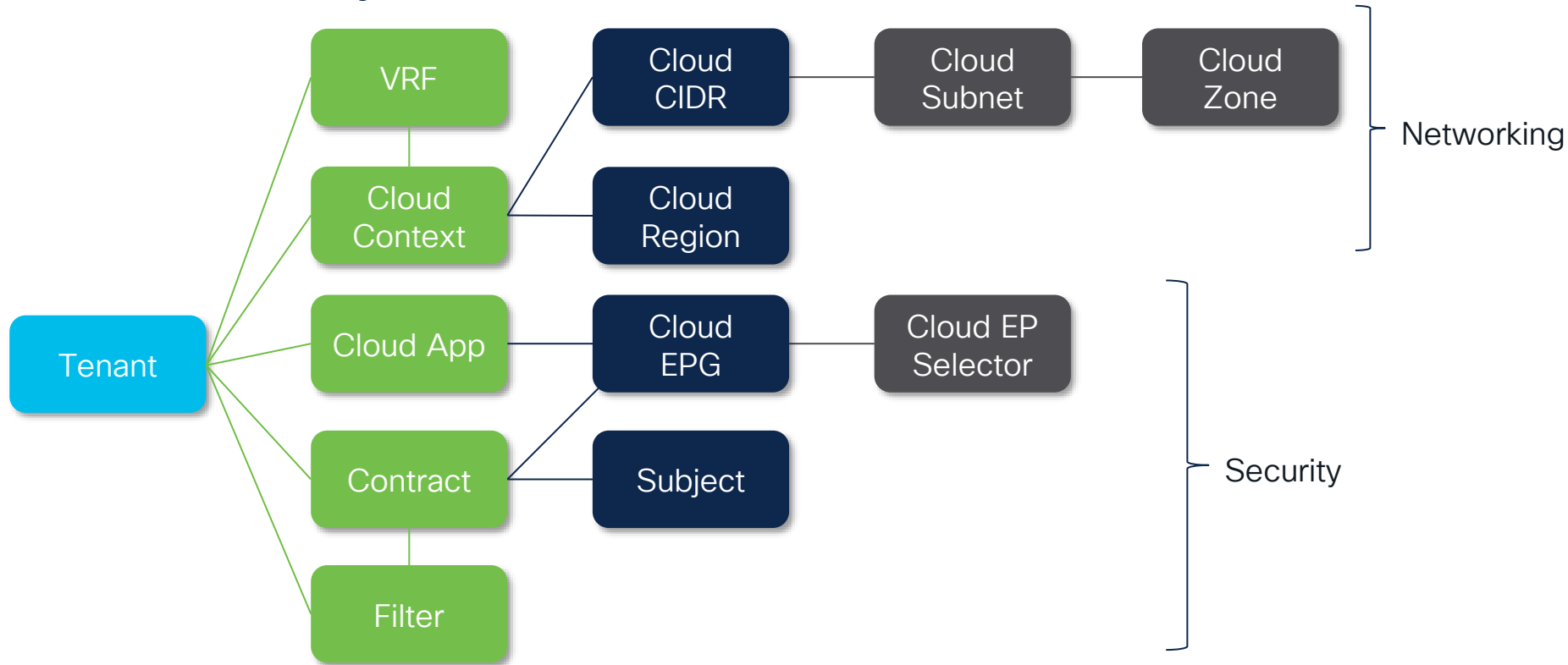
# CNC Initial Provisioning



DEPLOY

# DEMO: CNC Config and Operations using GUI

# CNC Policy Model in Action



Full Model: <https://developer.cisco.com/site/apic-mim-ref-api>



# Programmability Options

# CN REST API

## Interacting with REST API

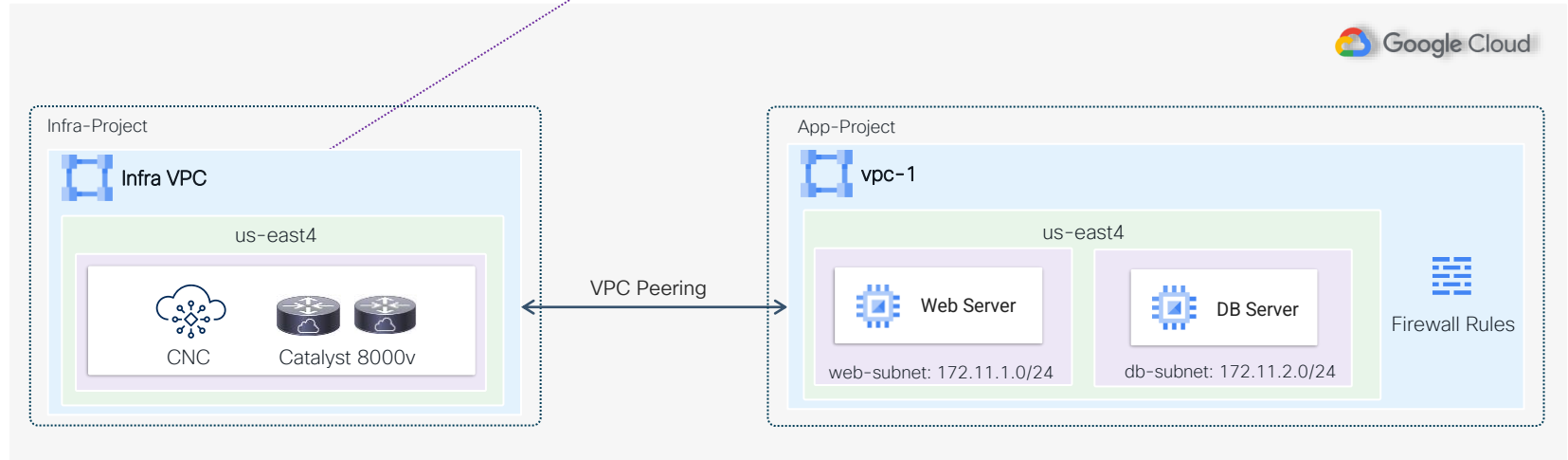
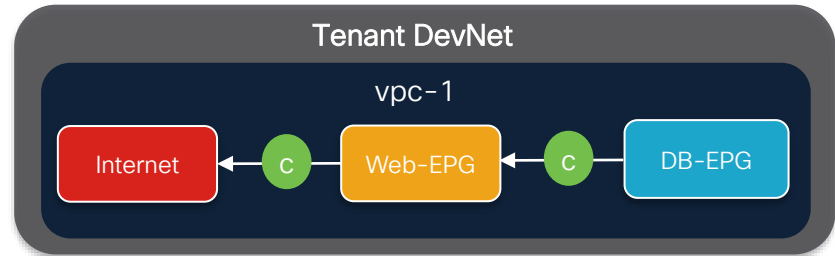
`https://{cnc-ip}/model-doc`

- There are several ways to interact with the CNC REST API
  - Graphical User Interface
  - “Raw” API requests (e.g., via Postman)
  - Any programming language (JavaScript, Python, ...)
  - Ansible
  - Terraform



# Demo: CNC Config and Operations using Terraform

# Demo Scenario



<https://github.com/marinalf/cnc-demo-terraform-gcp>

# Additional Resources

# Terraform Provider

## Documentation

+ TAC Support!

The screenshot shows the Terraform Registry interface for the CiscoDevNet aci provider. The top navigation bar includes the Terraform logo, a search bar, and links for Browse, Publish, and Sign-in. The breadcrumb trail indicates the path: Providers / CiscoDevNet / aci / Version 2.7.0 / Latest Version. The main header shows the provider name 'aci' with a blue icon, and tabs for Overview and Documentation. A 'USE PROVIDER' button is also present.

On the left, the 'ACI DOCUMENTATION' sidebar contains a search bar with the text 'cloud' and 43 matching results. A red box highlights the 'Resources' section, which lists several resources, with 'aci\_cloud\_account' selected and highlighted in blue.

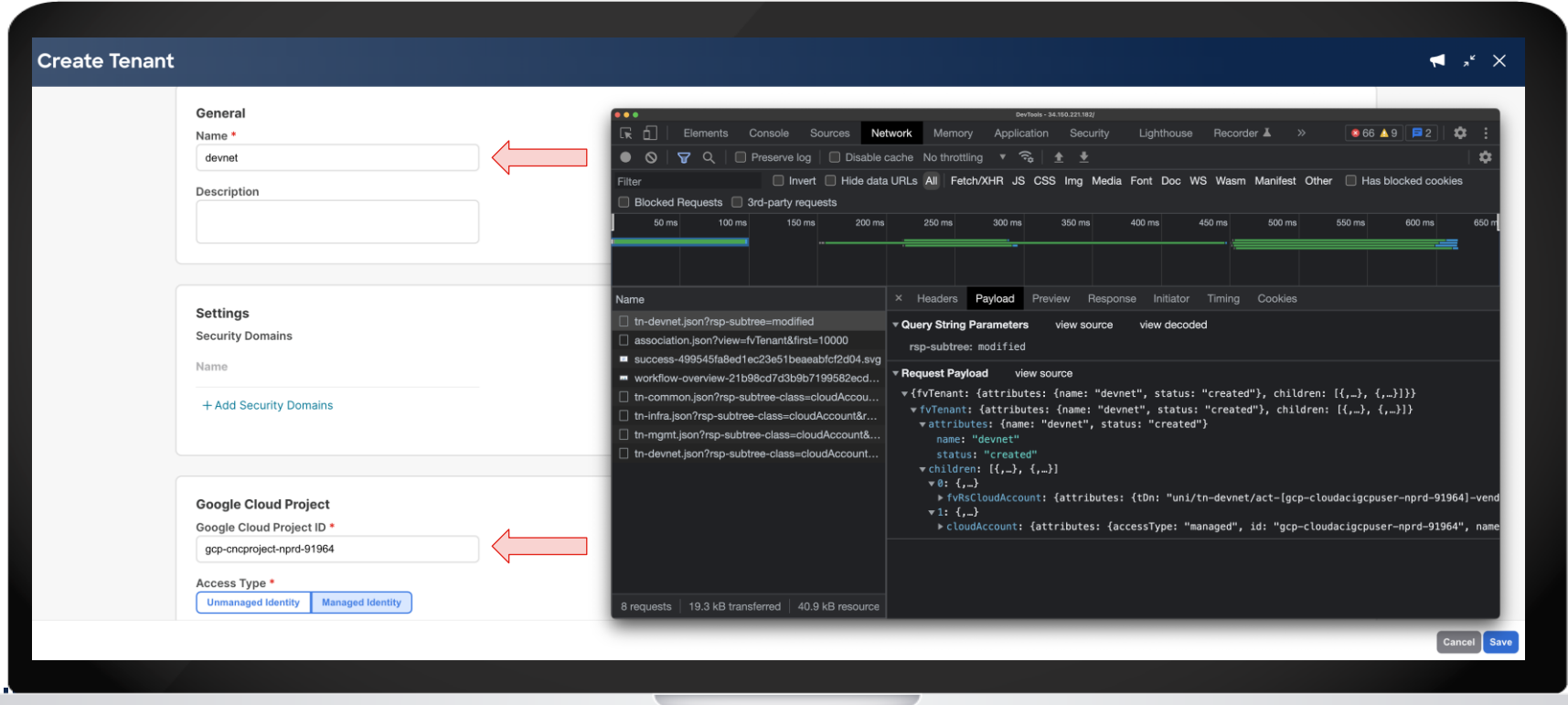
The main content area displays the 'aci\_cloud\_account' resource. It includes a description: 'Manages ACI Cloud Account Note: This resource is supported in Cloud APIC only.' Below this is the 'Example Usage' section, which contains a Terraform code snippet:

```
resource "aci_cloud_account" "example" {
  tenant_dn = aci_tenant.example.id
  access_type = "managed"
  account_id = "azure_account_id"
  vendor = "azure"
  cloud_rs_account_to_access_policy = "uni/tn-{tenant_name}/accesspolicy-rea
  cloud_rs_credentials = aci_cloud_credentials.example.id
}
```

On the right side, there is a 'ON THIS PAGE' section with links to API Information, GUI Information, Example Usage, Argument Reference, and Importing. A red box highlights the 'Report an issue' link at the bottom right.

# CNC REST API

## API Inspector



# Using Terraform

## Starting with standard modules

### provider.tf

```
terraform {
  required_providers {
    aci = {
      source = "cisco/devnet/aci"
      version = ">= 2.7.0"
    }
  }
  required_version = ">= 1.2"
}

provider "aci" {
  username = var.username
  password = var.password
  url      = var.url
  insecure = true
}

[...]
```

### main.tf

```
resource "aci_tenant" "terraform_ten" {
  name = var.tenant_name
}

resource "aci_cloud_account" "cloud_provider" {
  tenant_dn      = aci_tenant.terraform_ten.id
  access_type    = "managed"
  account_id     = var.project_id
  vendor         = var.cloud_vendor
}

resource "aci_tenant_to_cloud_account" "cloud_acct_ten" {
  tenant_dn      = aci_tenant.terraform_ten.id
  cloud_account_dn = aci_cloud_account.cloud_provider.id
}

[...]
```

### variables.tf

```
variable "username" {}
variable "password" {}
variable "url" {}
variable "project_id" {}

variable "tenant_name" {
  default = "devnet"
}

variable "vrf_name" {
  default = "vpc-1"
}

variable "cloud_vendor" {
  default = "gcp"
}

[...]
```

More Advanced Modules

<https://github.com/rjohnston6/terraform-aci-cloud-apic-tenant>



# Additional Resources



CNC



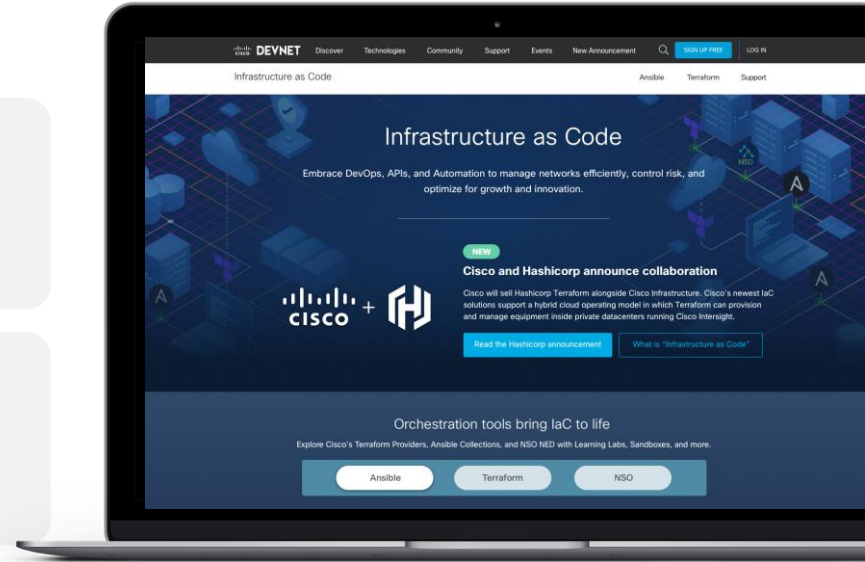
APIC



Orchestrator

450+ APIC & CNC resources/data sources available  
<https://github.com/CiscoDevNet/terraform-provider-aci>

90+ Orchestrator resources/data sources available  
<https://github.com/CiscoDevNet/terraform-provider-mso>



<https://developer.cisco.com/iac>

## Additional Readings:

Blog Series: [Introducing Cisco Cloud Network Controller on GCP](#)

Whitepaper: [Multi-Cloud Networking Solution With Google Cloud](#)

# Related Sessions

Architecting Hybrid Multi-Cloud Infrastructures -  
**BRKDCN-2616**

Cisco Cloud Network Controller - Hybrid Multi-Cloud Infrastructure and  
Policy Automation enabler - **BRKDCN-2653**

Building ACI Hybrid Multicloud from scratch with Demo (onPrem,  
ACI/AWS/Azure/GCP) - **BRKDCN-2989**

# Q&A

# Fill out your session surveys!



Attendees who fill out a minimum of four session surveys and the overall event survey will get **Cisco Live-branded socks** (while supplies last)!



Attendees will also earn 100 points in the **Cisco Live Challenge** for every survey completed.



**These points** help you get on the leaderboard and increase your chances of winning daily and grand prizes

# Continue your education



- Visit the Cisco Showcase for related demos
- Book your one-on-one Meet the Engineer meeting
- Attend the interactive education with DevNet, Capture the Flag, and Walk-in Labs
- Visit the On-Demand Library for more sessions at [www.CiscoLive.com/on-demand](https://www.CiscoLive.com/on-demand)

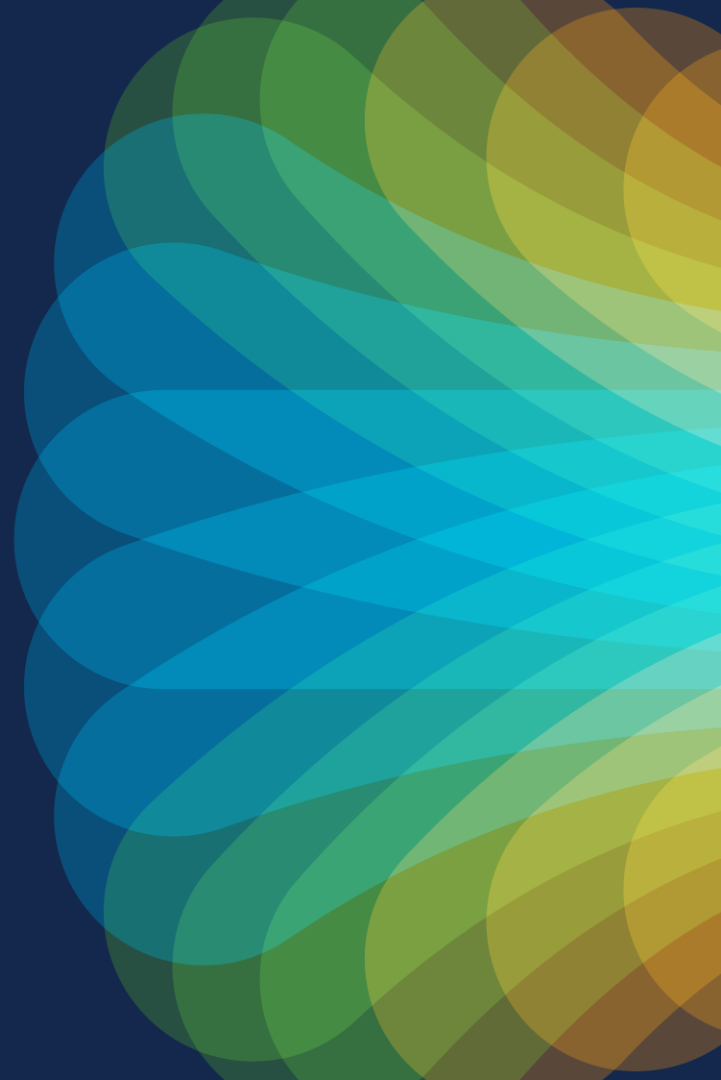


The bridge to possible

# Thank you

CISCO *Live!*

#CiscoLive

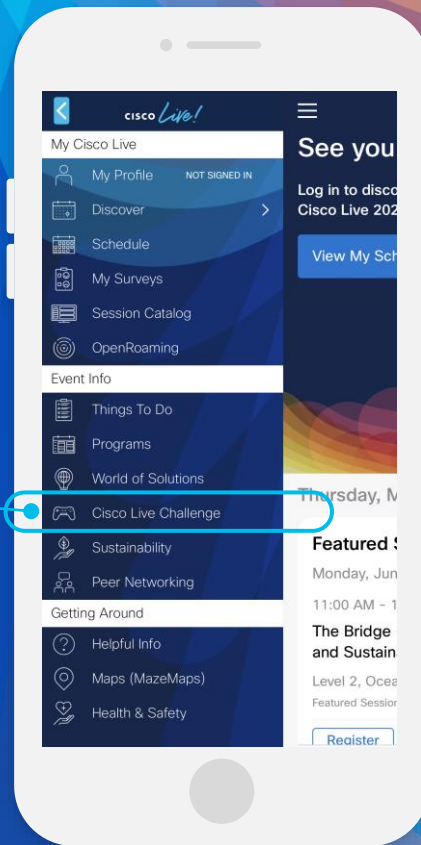
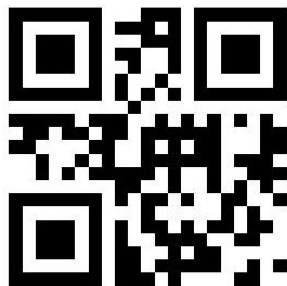


# Cisco Live Challenge

Gamify your Cisco Live experience!  
Get points for attending this session!

## How:

- 1 Open the Cisco Events App.
- 2 Click on 'Cisco Live Challenge' in the side menu.
- 3 Click on View Your Badges at the top.
- 4 Click the + at the bottom of the screen and scan the QR code:



The background of the slide is a vibrant, abstract graphic. It features a series of overlapping, wavy bands of color in shades of red, orange, yellow, green, and blue, creating a sense of movement and energy. On the right side, there is a bright, multi-colored sunburst or starburst effect that radiates outwards, adding to the dynamic feel of the design.

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Let's go

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# CNC Initial Provisioning

The screenshot shows the Google Cloud Marketplace interface. At the top, the Google Cloud logo and a dropdown menu for 'cloudcontroller-gcp-infra' are visible. A search bar at the top right contains the text 'Cisco Cloud Network Controller'. Below the search bar, the left sidebar shows 'Marketplace' with a shopping cart icon, and a list of links: 'Marketplace home', 'Your products', and 'Your orders'. A 'Filter' button is also present. The main content area displays '7 results' and the first result is 'Cisco Cloud Network Controller' by Cisco Systems. The description for this product states: 'Cisco Cloud Network Controller provides a holistic solution for Hybrid and Multi Cloud Networks. This solution automates connectivity and segmentation between Cisco Data Center fabrics and multiple Public Cloud providers (AWS, Azure, Google Cloud). The Cisco Cloud Network Controllers runs natively in GCP public cloud to provide automated connectivity, policy translation, day two operations and enhanced visibility of...'

Google Cloud

cloudcontroller-gcp-infra

Marketplace

Search: Cisco Cloud Network Controller

Marketplace > "Cisco Cloud Network Controller"

7 results

Marketplace home

Your products


Your orders






Filter Type to filter


**Cisco Cloud Network Controller**  
Cisco Systems


Cisco Cloud Network Controller provides a holistic solution for Hybrid and Multi Cloud Networks. This solution automates connectivity and segmentation between Cisco Data Center fabrics and multiple Public Cloud providers (AWS, Azure, Google Cloud). The Cisco Cloud Network Controllers runs natively in GCP public cloud to provide automated connectivity, policy translation, day two operations and enhanced visibility of...

# CNC Initial Provisioning

 cloudcontroller-gcp-infra



 Product details



## Cisco Cloud Network Controller

[Cisco Systems](#)

Automate connectivity and segmentation from On premises data center to Google Cloud

LAUNCH

VIEW PAST DEPLOYMENTS

OVERVIEW

PRICING

DOCUMENTATION

SUPPORT

RELATED PRODUCTS

### Overview

Cisco Cloud Network Controller provides a holistic solution for Hybrid and Multi Cloud Networks. This solution automates connectivity and segmentation between Cisco Data Center fabrics and multiple Public Cloud providers (AWS, Azure, Google Cloud). The Cisco Cloud Network Controller runs on Google Cloud to provide automated connectivity, policy translation, day two operations and enhanced visibility of workloads in the public cloud. This solution brings a suite of capabilities to extend your On-Premises data center into true multi cloud architectures, helping to drive policy and operational consistency, independent of where your applications or data reside. The solution uses the native Google Cloud constructs for policy translation and gives end-to-end visibility into the customer's multi cloud.

### Additional details

Runs on: Google Compute Engine  
Type: [Virtual machines](#), Single VM, BYOL  
Last updated: 4/19/23  
Category: [Networking](#), [Security](#)  
Version: 26.0(1c)  
Operating System: Centos 7.9  
Add to Service Catalog: [Deployment .zip file](#) ?

# CNC Initial Provisioning

Google Cloud

cloudcontroller-gcp-infra

🔍 📄 🔔 ? ⓘ M

## New Cisco Cloud Network Controller deployment

[SEND FEEDBACK](#)

**Deployment name \***  
cloud-network-controller

**Zone**  
us-east4-a

**Image-Version \***  
26.0(1c)

Choose the primary machine learning framework you will be using. If the library you would like to use is not listed, choose the base image.

### Machine type

☒ General purpose ☐ Compute optimized ☐ Memory optimized

Machine types for common workloads, optimized for cost and flexibility

**Series**  
N2

Powered by Intel Cascade Lake and Ice Lake CPU platforms

**Machine type**  
n2-standard-16 (16 vCPU, 64 GB memory)

vCPU  
16Memory  
64 GB

**SSH Public key \***  
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQGC3H+e9xk+BmSNL9Ku3j3a37

### Service Account ⓘ

Choose an existing or create a new service account for the Cloud Network Controller node

- ☒ Existing account
- ☐ New account

### Additional information



#### Cisco Cloud Network Controller overview

Product provided by Cisco Systems

### Launching a BYOL product

Cisco Cloud Network Controller is a BYOL (Bring Your Own License) product. Marketplace will deploy this product, but you are responsible for purchasing and managing the license directly from the provider

Cisco Cloud Network Controller Usage Fee

Cisco Systems does not charge a usage fee.

USD 0.00/mo

Price estimates based on 30-day, 24hrs per day usage of the listed resources in the selected region. The Monthly Infrastructure Fee is not included in the estimates and varies depending on all Google Cloud IaaS resources actually created or consumed by this product (or the fees charged for such consumption). Cisco Systems may be able to provide a more accurate estimate of monthly GCP IaaS consumption.

### Software

Operating System

Centos(7.9)

### Terms of Service

By deploying the software or accessing the service you are agreeing to comply with the [Cisco Systems terms of service](#), [GCP Marketplace terms of service](#) and the terms of applicable open source software licenses bundled with the software or service. Please review these terms and licenses carefully for details about any obligations you may have related to the software or service. To the limited extent an open source software license

# CNC Initial Provisioning

## New Cisco Cloud Network Controller deployment

SEND FEEDBACK

☒ Existing account

☐ New account

List of available Service Accounts that have the following roles:

- roles/compute.instanceAdmin.v1
- roles/compute.networkAdmin
- roles/compute.securityAdmin
- roles/compute.orgSecurityPolicyAdmin
- roles/compute.orgFirewallPolicyAdmin
- roles/storage.admin
- roles/pubsub.admin
- roles/logging.configWriter

Select a Service Account

cnc-serviceaccount (cnc-serviceaccount@gcp-cloudacigcp-nprd-57000.iam.gser...

### VPC subnet cidr

VPC subnet cidr \*  
10.10.10.0/24

### Admin user password

admin user password \*  
SpecifyAdminPassword123\$

### Remote Access

Remote access network prefix \*  
0.0.0.0/0

External network allowed to access Cloud APIC. Must be valid IP prefix in the form of x.x.x.x/nn. Configuring external subnet with 0.0.0.0/0 is a SECURITY RISK, it is advisable to use specific subnet.

DEPLOY

### Specify:

- Infra Subnet for (VPC)
- Credentials
- IP address for external access