

Building GCP with Terraform



Greg Horie

Overview

- What is IaC?
- Declarative vs. Procedural
- What is Terraform?
- Installation
- Basics Workflow
- HCL
- Providers (Plugins)
- State File - terraform.tfstate
- Resources, Inputs
- Terraform Cloud ?



What is IaC?

- IaC = Infrastructure-as-Code
- High-level coding languages used to automate IT infrastructure builds.
- **IaC Tool Adoption**

IaC Tool	Overall	Enterprise	SMB
Terraform	36%	36%	39%
Ansible	31%	33%	29%
Chef	29%	32%	21%
Puppet	27%	26%	18%
Salt	12%	14%	10%

* Taken from Flexera 2021 State of Cloud report.

- Not an apples-for-apples comparison.
- In practice, these tools are often used together to fully-automate builds.

Procedural vs. Declarative

- IaC tools can be categorized as Procedural or Declarative.
 - Based on how the tool applies changes to the underlying target systems.
- **Procedural**
 - Think script.
 - Step-by-step tasks to automate your build.
 - Ansible & Chef are procedural - Code step-by-step tasks to achieve a desired end state.
- **Declarative**
 - Think HTML.
 - Code says what is desired, not the steps.
 - Hides the process and reveals relationships.
 - Terraform & Puppet are declarative - Code specifies your desired end state.

What is Terraform?



- Terraform is an open source IaC tool.
- Enables you to build, change, and version cloud and on-prem resources.
- Original author - Mitchell Hashimoto.
 - Maintained by Hashicorp.
- Enabled through the use of "Providers".
 - Providers = plugins which are an abstraction over an API.
 - Many providers are available through the public Terraform Registry.
 - Support for all major cloud providers.
- Modules are also available to further abstract provider interactions.
 - Public modules are available and you can also build your own.

Terraform Installation

- <https://learn.hashicorp.com/tutorials/terraform/install-cli>

Basic Workflow

1. Code

- Write your infrastructure configuration.

2. Initialize

- Initialized providers and modules.
- `terraform init`

3. Plan

- Displays the difference between desired and current state.
- Creates a plan to reconcile this gap.
- `terraform plan`

4. Apply

- Apply the changes to achieve the desired state.
- `terraform apply`

Quick Demo

- Using Terraform's local provider:

<https://registry.terraform.io/providers/hashicorp/local>

- For command line notes, see:

<https://github.com/netserf/netsig-presentation-building-gcp-with-terraform/terraform-cheat-sheet.txt>

HCL

- HCL = Hashicorp Configuration Language
- Toolkit for creating structured configuration languages
- Goal is to be both human- and machine-friendly

Providers

- Provider = Terraform plugin that typically integrates with an external API.
- Acts as a translation layer that allows Terraform to communicate and build external resources - VMs, databases, services, etc.



State File - terraform.tfstate

- Terraform stores information about your infrastructure in a state file
 - File name: `terraform.tfstate`
 - State keeps track of resources modified by your IaC config
- During **terraform plan**:
 - Terraform compares config with state to plan changes to your infrastructure
- During **terraform apply**:
 - Terraform makes updates to resources and writes metadata to the state file to reflect changes
- Terraform supports a number of state file operations:
 - `terraform show`
 - `terraform state list`
 - `terraform state -help`

Resources

Variables

Modules

GCP Build Network

- For command line notes, see:

<https://github.com/netserf/netsig-presentation-building-gcp-with-terraform/terraform-cheat-sheet.txt>

GCP Build VMs

- For command line notes, see:

<https://github.com/netserf/netsig-presentation-building-gcp-with-terraform/terraform-cheat-sheet.txt>

Summary

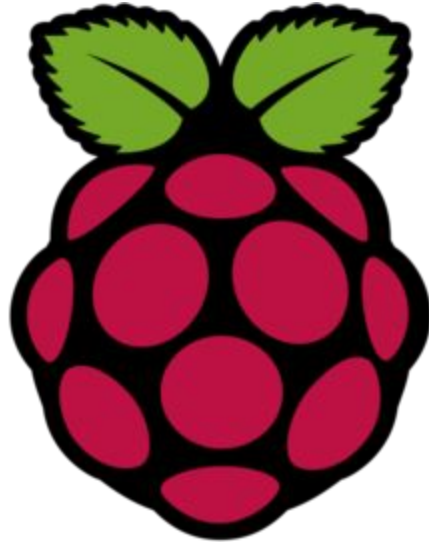
Possible Future Discussions

- Go deeper with GCP networking
 - IPv6, DNS, Load Balancing, VPNs, etc.
- Building AWS with Terraform
- Kubernetes / GKE
 - Service Mesh
- Monitoring / Log Management
 - e.g. Prometheus, Elastic Stack, etc.
- CI / CD
 - GitHub Actions
- PaaS Apps
 - e.g. GCP's AppEngine
- Other ideas welcome!



VicPiMakers and Others Slack

- Please let us know if you want an invite to this Slack group



Backup Slides

