

SNOWCAMP 2023



Let's dive into
Terraform provider creation

Aurélie Vache - Horacio Gonzalez
2023-01-26



@AurelieVache



@LostInBrittany

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« Etoile »



« Flocon »



SNOWCAMP 2023

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Aurélie Vache

@aurelievache

DevRel at  OVHcloud

Conferences organizer

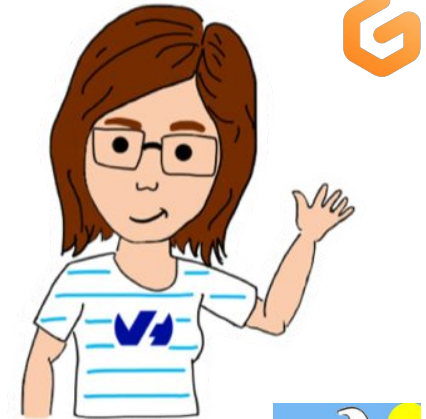
Tech visual articles & books

Sketchnoter

... & ♥ Retrogaming

 <https://www.youtube.com/c/AurelieVache>

 <https://dev.to/aurelievache/>



Les Productions de MOA

SNOWGAMP 2023

@AurelieVache 

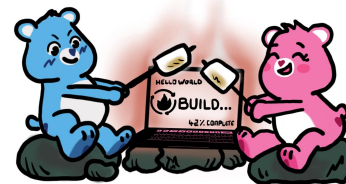
@LostInBrittany 

Horacio Gonzalez

@LostInBrittany

Spaniard lost in Brittany,
developer, dreamer and
all-around geek

 OVHcloud
DevRel Leader



SNOWGAMP 2023

@AurelieVache 

@LostInBrittany 

OVHcloud: A global leader



Web Cloud & Telecom



Private Cloud



Public Cloud



Storage



Network & Security



30 Data Centers
in 12 locations



34 Points of Presence
on a 20 TBPS Bandwidth Network



2200 Employees
worldwide



115K Private Cloud
VMS running



300K Public Cloud
instances running



380K Physical Servers
running in our data centers



1 Million+ Servers
produced since 1999



1.5 Million Customers
across 132 countries



3.8 Million Websites
hosting



1.5 Billion Euros Invested
since 2016



P.U.E. 1.09
Energy efficiency indicator

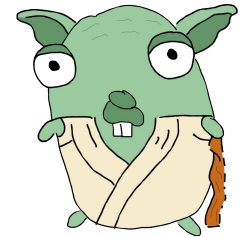
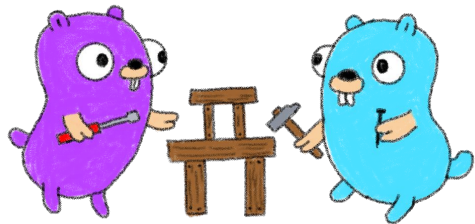


20+ Years in Business
Disrupting since 1999



Warning

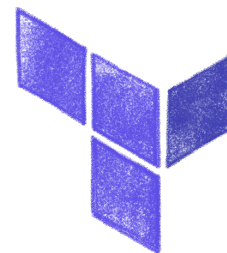
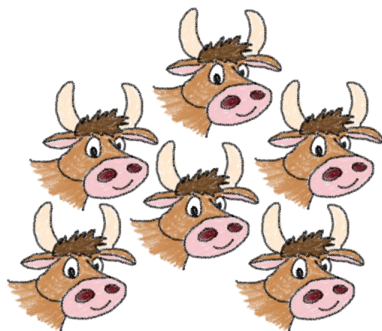
Gophers, gophers everywhere!





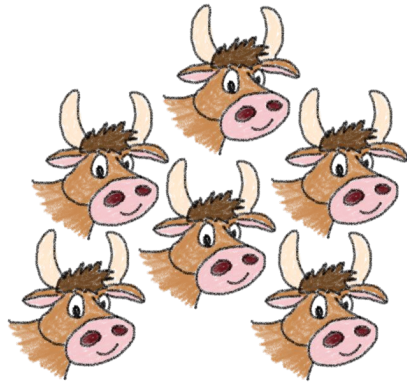
Terraform

De facto standard for IaC



HashiCorp
Terraform

Infrastructure as Code (IaC)



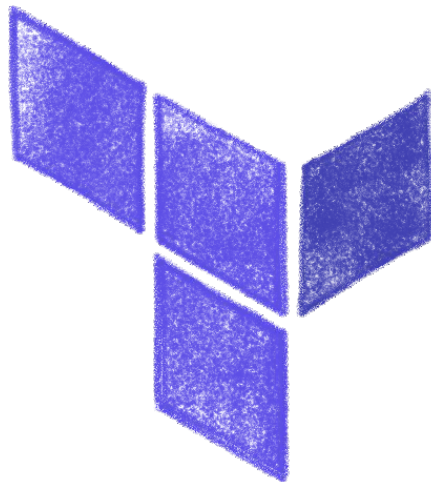
Types of IaC

- Imperative
- Declarative
- Environment Aware

Terraform becoming the de facto standard



ANSIBLE



HashiCorp




Terraform



HashiCorp Terraform



Terraform

- Build 
- Modify 
- Version 

your infrastructure



Menu ▾

Automate Infrastructure on Any Cloud

Provision, change, and version resources on any environment.

[View tutorials](#) →

[View documentation](#) →

Open Source

Self-managed | always
free

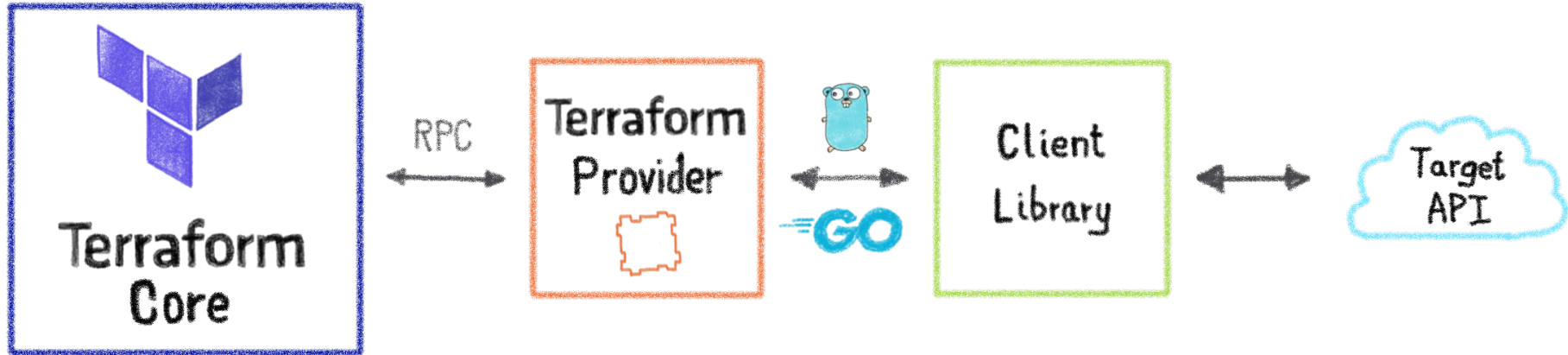
Download

Terraform Cloud

Managed Terraform

Try Terraform Cloud

Modular architecture: providers



Configuration packages: modules



Modules :
Collection of
configuration files



Terraform registry



Terraform Registry

Providers

&

Modules

A screenshot of the Terraform Registry homepage. The page has a dark blue background with a white search bar at the top. The search bar contains the text "Search Providers and Modules". Below the search bar, the heading "Terraform Registry" is displayed in white. Underneath, a paragraph reads: "Discover Terraform providers that power all of Terraform's resource types, or find modules for quickly deploying common infrastructure configurations." Below this text are four white buttons with blue icons and text: "Browse Providers", "Browse Modules", "Browse Policy Libraries", and "Browse Run Tasks". At the bottom of the page, it says "2595 providers, 11144 modules & counting".

Terraform | Registry

Search Providers and Modules

Terraform Registry

Discover Terraform providers that power all of Terraform's resource types, or find modules for quickly deploying common infrastructure configurations.

[Browse Providers](#) [Browse Modules](#) [Browse Policy Libraries](#)

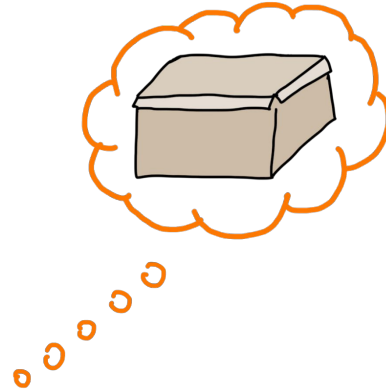
[Browse Run Tasks](#)

2595 providers, 11144 modules & counting



Writing Terraform providers

Defining new Terraform resources



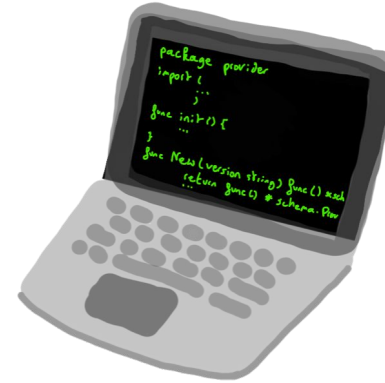
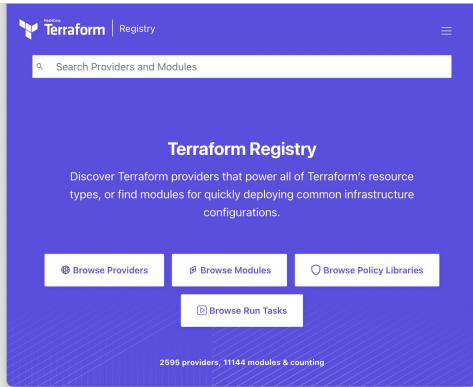
Provider SDK



<https://developer.hashicorp.com/terraform/plugin/sdkv2>



Installing Terraform providers



Or

```
$ terraform init

Initializing provider plugins...
- Finding terraform.local/local/myprovider versions matching
"0.0.1"...
- Installing terraform.local/local/myprovider v0.0.1...
```



Installing providers from registry



```
$ vi provider.tf

terraform {
  required_providers {
    thenamespace = {
      source = "thenamespace/myprovider"
    }
  }
}
}
```

If your provider is on the official registry at

<https://registry.terraform.io/providers/thenamespace/myprovider>



Installing providers locally



```
$ go build -o terraform-provider-myprovider
```

```
$ mkdir -p
```

```
~/terraform.d/plugins/terraform.local/local/myprovider/0.0.1/darwin_amd64
```

```
$ mv terraform-provider-myprovider
```

```
~/terraform.d/plugins/terraform.local/local/myprovider/0.0.1/darwin_amd64
```

Installing providers locally

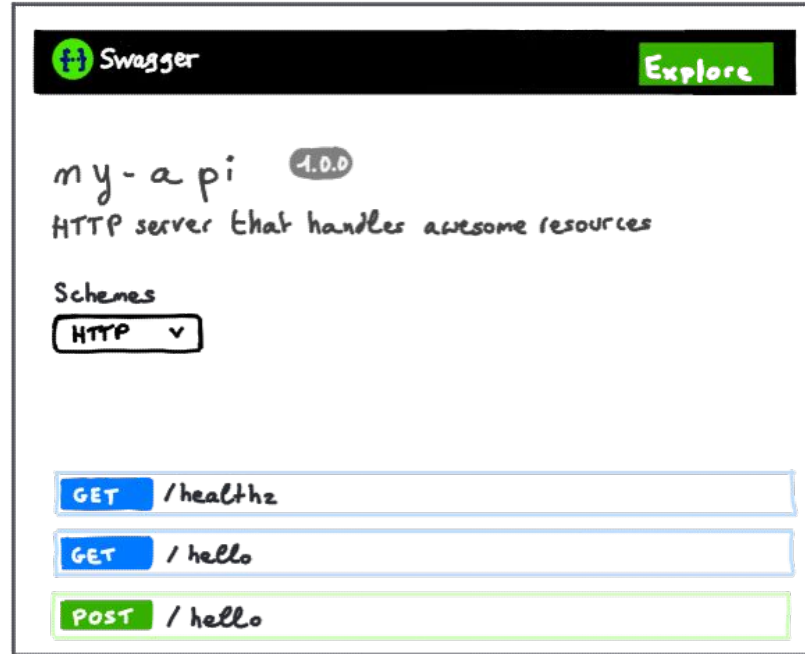


```
$ vi provider.tf

terraform {
  required_providers {
    thenamespace = {
      source  = "terraform.local/local/myprovider"
      version = "0.0.1"
    }
  }
}
}
```



Do I need a Terraform provider?

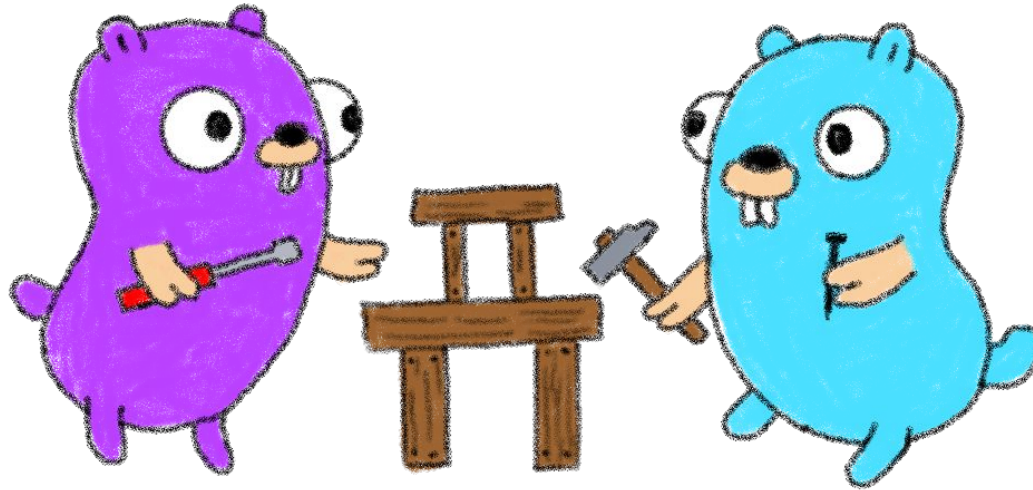


If you have an API,
you should have a Terraform provider



Let's create a provider!

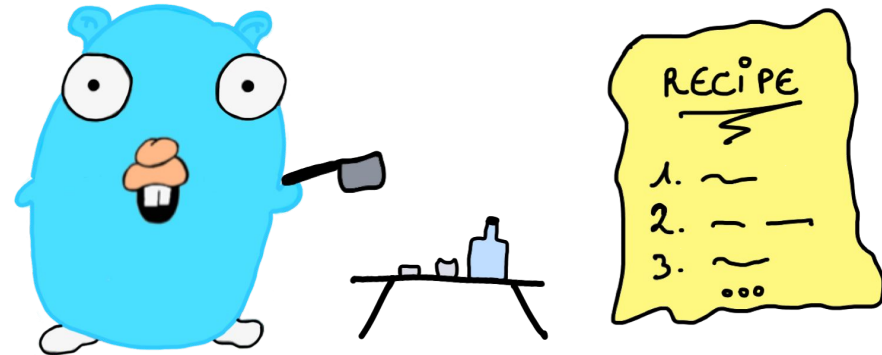
Step by step



What do we want?



- In a simple and easy Terraform provider
- Handle cute Gophers
- In **Go**, because providers are made in Go 😁



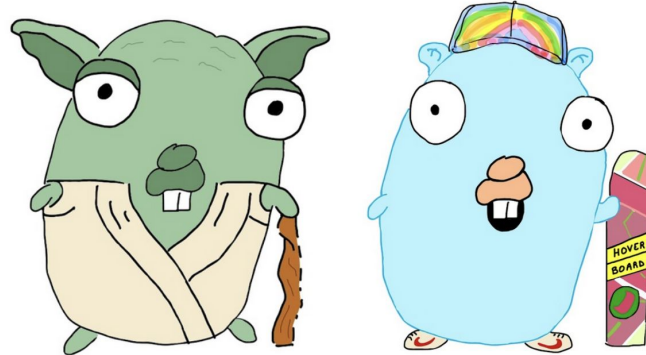
Everything begins with an API



gophers-api

This simple API handle a list of Gophers. It allows to:

- list the existing Gophers
- display the information about a Gopher
- create a new Gopher
- delete a Gopher
- update the path and the URL of a Gopher



<https://github.com/scraly/gophers-api>



For the demos we will use Gitpod



Gitpod

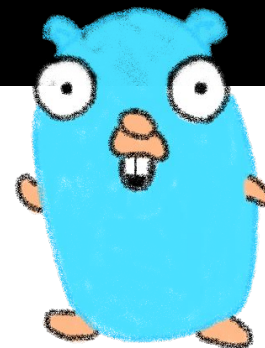


Automated, ephemeral developer environments
in the web

Everything begins with an API



```
$ task swagger.serve
task: [swagger.serve] swagger serve -F swagger ./pkg/swagger/swagger.yml
--no-open
2022/10/31 20:16:51 serving docs at http://localhost:38457/docs
```



Everything begins with an API



Swagger
Supported by SMARTBEAR

Explore

gophers-api ^{0.1.0}

HTTP server that handle cute Gophers.

Schemes
HTTP

default

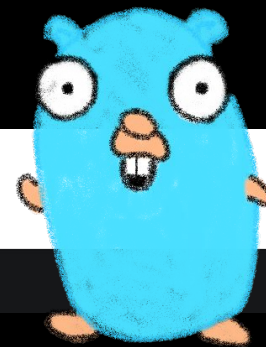
- GET /healthz
- GET /gophers
- POST /gopher Add a new Gopher
- GET /gopher
- DELETE /gopher
- PUT /gopher

A large, blue, cartoonish gopher character with large white eyes, a small orange nose, and a small orange mouth. It has small orange feet and is standing on a white background.

Everything begins with an API

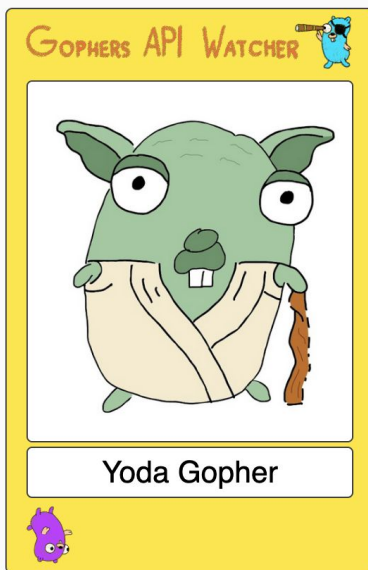
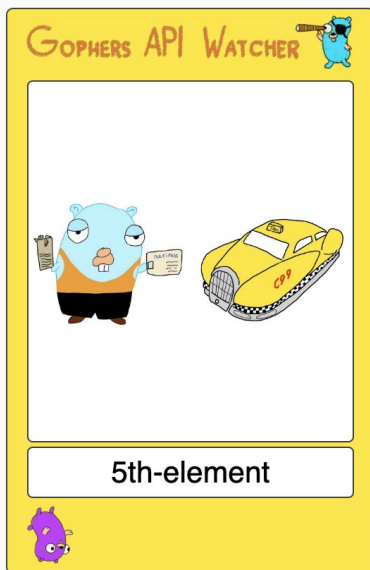


```
● ● ●  
$ task run  
task: [run] GOFLAGS=-mod=mod go run internal/main.go  
2022/10/30 20:22:05 Serving gophers API at http://[::]:8080
```



```
● ● ●  
$ curl localhost:8080/gophers  
[{"name": "5th-element", "displayname": "5th  
Element.png", "url": "https://raw.githubusercontent.com/scraly/gophers/main/5th-ele  
ment.png"}]
```

Gophers deserve to be seen



<https://github.com/LostInBrittany/gophers-api-watcher>

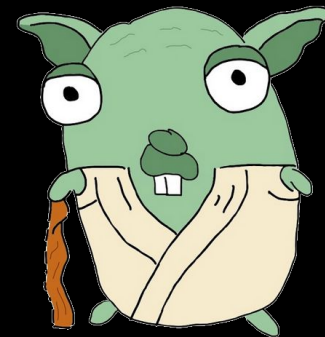
Everything begins with an API



```
$ curl -X POST localhost:8080/gopher -H "Content-Type: application/json" -d \  
'{"name":"yoda-gopher","displayname":"Yodada  
Gopher","url":"https://raw.githubusercontent.com/scraly/gophers/main/yoda-gopher.  
png"}'
```

```
$ curl -X DELETE localhost:8080/gopher?name=5th-element
```

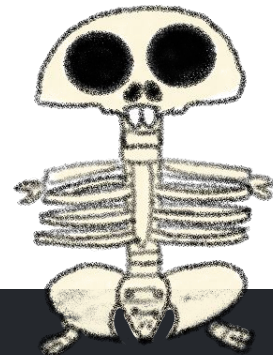
```
$ curl -X PUT localhost:8080/gopher \  
-H "Content-Type: application/json" -d \  
'{"name":"yoda-gopher","displayname":"Yoda  
Gopher","url":"https://raw.githubusercontent.com/scraly/gophers/main/yoda-gopher.  
png"}'
```



Let's create our provider!



1. Create the skeleton of our provider thanks to scaffolding



The screenshot shows the GitHub interface for the repository `hashicorp/terraform-provider-scaffolding`. At the top, there is a search bar and navigation links for Pull requests, Issues, Marketplace, and Explore. Below the repository name, there are tabs for Code, Issues (with 4 issues), Pull requests, Actions, Security, and Insights. At the bottom, there are buttons for 'main' branch, '1 branch', '0 tags', 'Go to file', 'Add file', 'Code', 'Use this template', and a green 'Gitpod' button.

<https://github.com/hashicorp/terraform-provider-scaffolding>


Let's create our provider!



Create a new repository from terraform-provider-scaffolding

The new repository will start with the same files and folders as [hashicorp/terraform-provider-scaffolding](#).

Owner *

 scraly ▾

Repository name *

terraform-provider-myprovider ✓

Great repository name: terraform-provider-myprovider is available. Suggestion: How about **miniature-bassoon**?

Description (optional)



Public

Anyone on the internet can see this repository. You choose who can commit.



Private

You choose who can see and commit to this repository.

Include all branches

Copy all branches from hashicorp/terraform-provider-scaffolding and not just main.

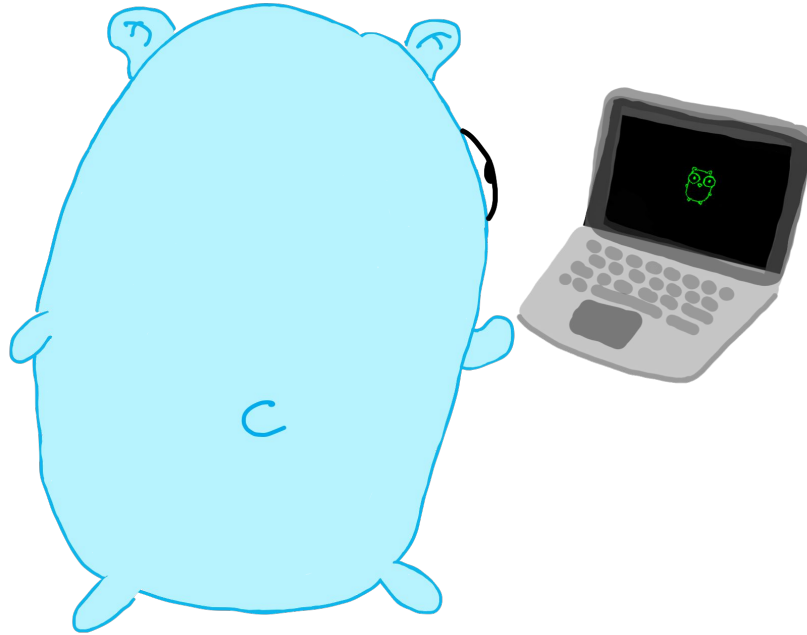
You are creating a public repository in your personal account.

Create repository from template



<https://github.com/scraly/terraform-provider-gophers>

Demo time!

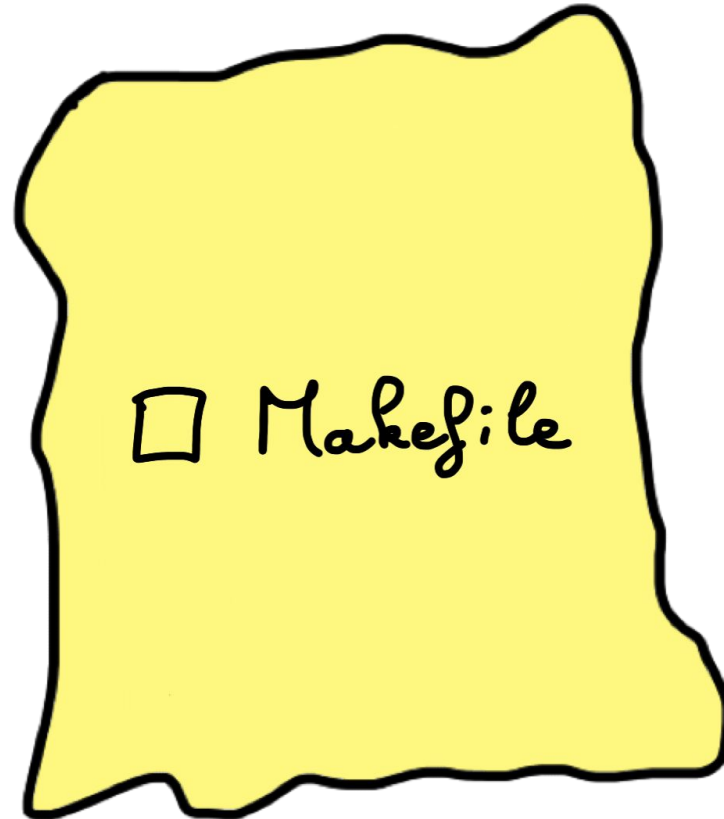


SNOWGAMP 2023

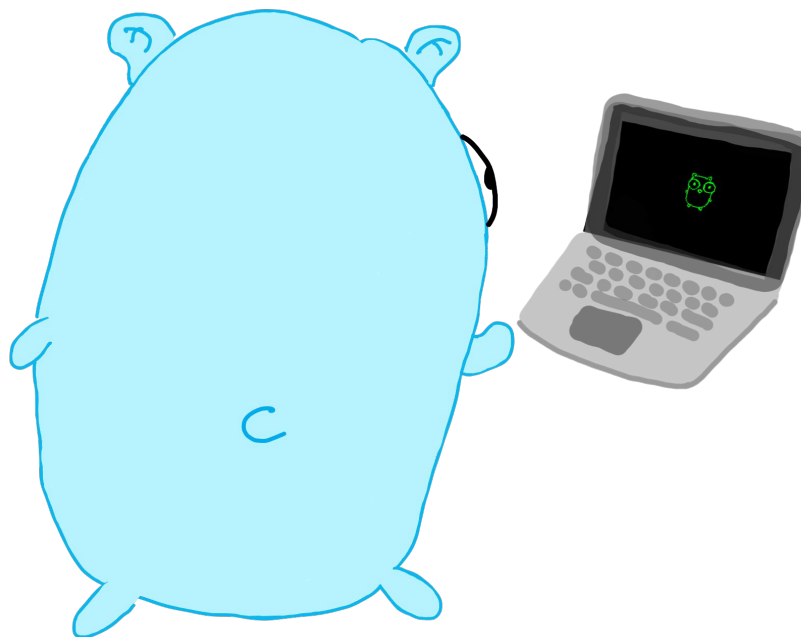
@AurelieVache 

@LostInBrittany 

Provider > Makefile



Demo time!



Some concepts to introduce...



Datasource → GET

Resource → {POST, PUT, DELETE} + GET



Customizing provider definition



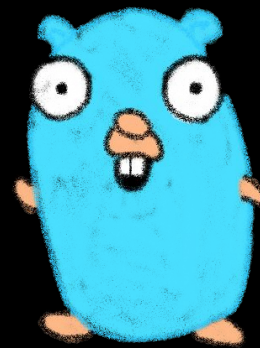
Customize
provider
definition

Test it!



```
$ vi provider.tf
terraform {
  required_providers {
    gophers = {
      source = "terraform.local/local/gophers"
      version = "0.0.1"
    }
  }
}

provider "gophers" {
  endpoint = "http://myawesomeurl.com"
}
```



Adding datasource: gophers



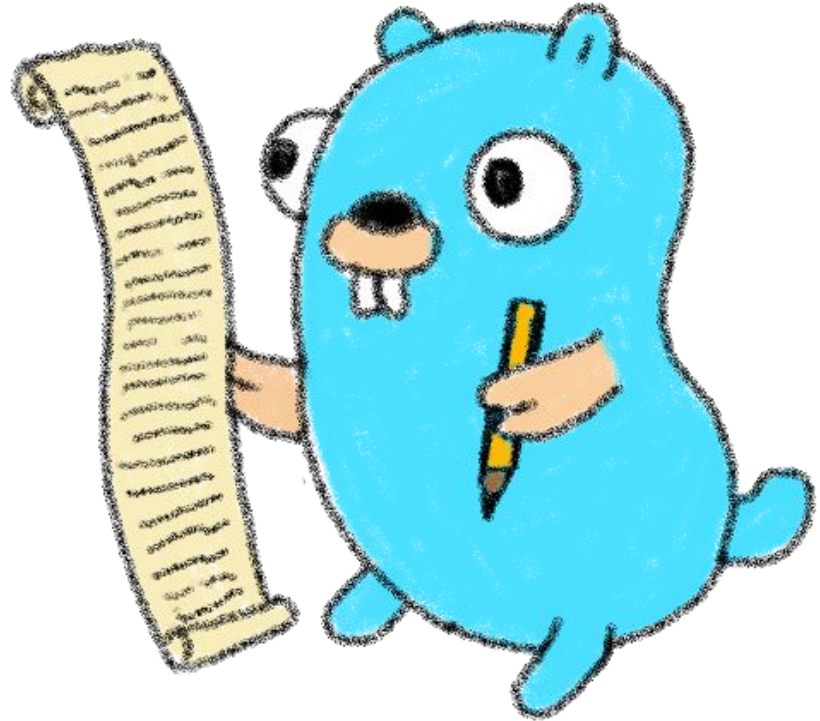
☐ Add the gophers datasource



Adding the schema



"Translating" the Swagger into a Go schema



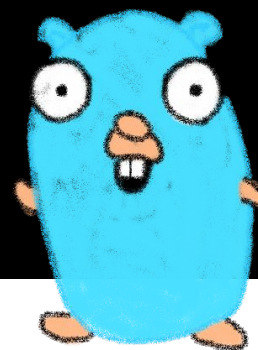
Test it!



```
$ vi gophers_data.tf

# List of available gophers
data "gophers" "my_gophers" {
}

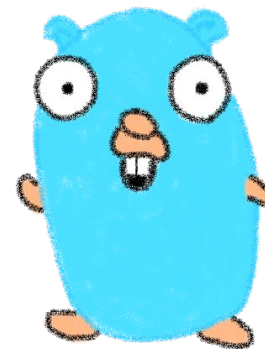
output "return_gophers" {
  value = length(data.gophers.my_gophers.gophers) >= 1
}
```



Adding datasource: gopher



Add the
gopher
datasource

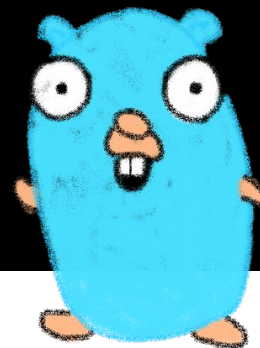


Test it!

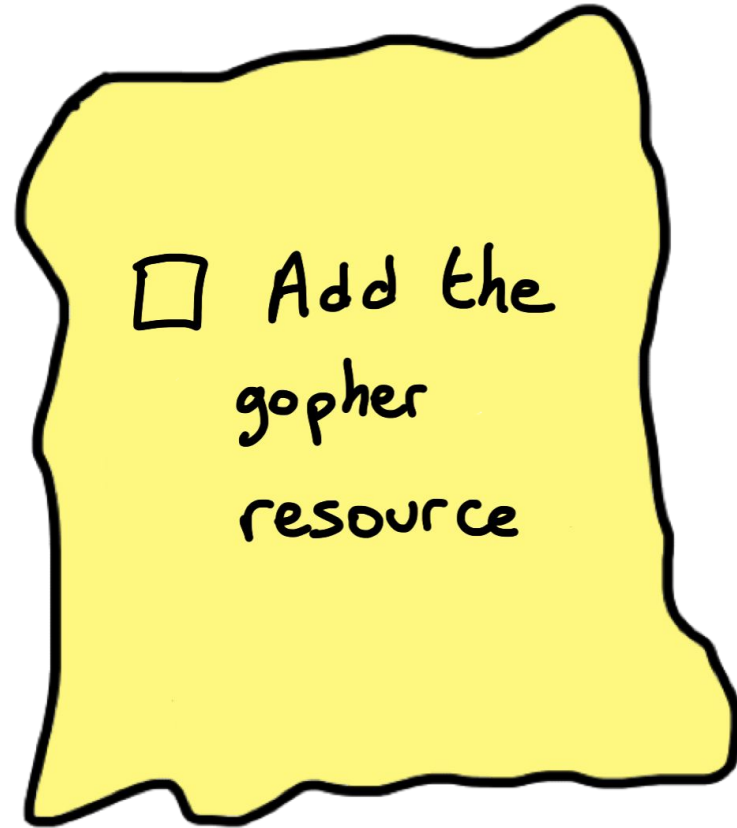


```
$ vi gopher_data.tf

# Display information about a Gopher
data "gophers_gopher" "moultipass" {
  name = "5th-element"
}
```

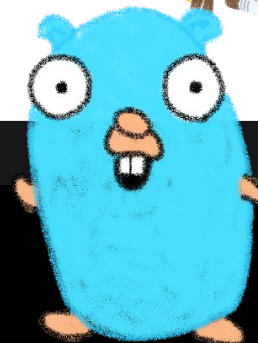


Adding resource: gopher



Create
Read
Update
Delete

Test it!



```
$ vi gopher_resource.tf

resource "gophers_gopher" "x-files" {
  name          = "x-files"
  displayname   = "X Files"
  url           = "https://raw.githubusercontent.com/scraly/gophers/main/x-files.png"
}
```

Testing the provider locally



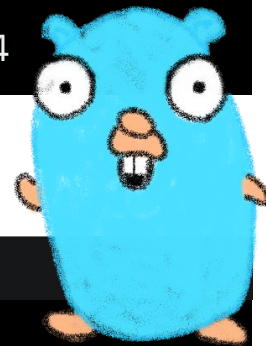
```
$ go build -o terraform-provider-gophers

$ mkdir -p
~/terraform.d/plugins/terraform.local/local/gophers/0.0.1/darwin_arm64

$ mv terraform-provider-gophers
~/terraform.d/plugins/terraform.local/local/gophers/0.0.1/darwin_arm64
```

Or

```
$ make install
```

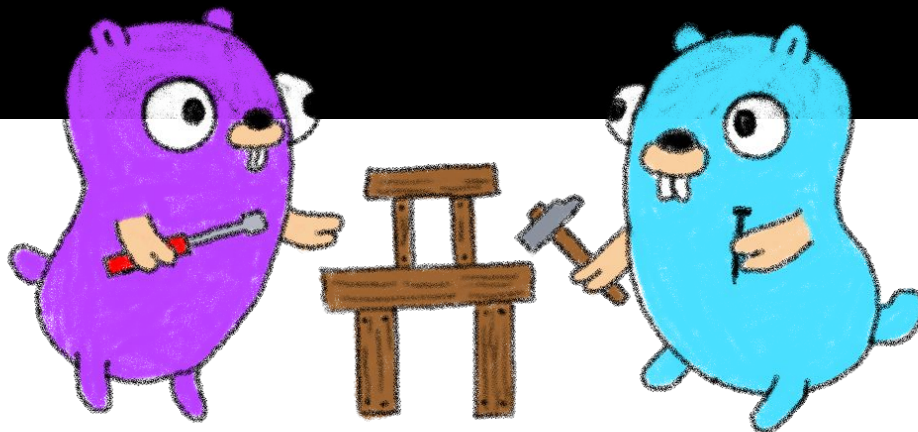


Testing the provider locally



```
$ rm .terraform.lock.hcl && terraform init
```

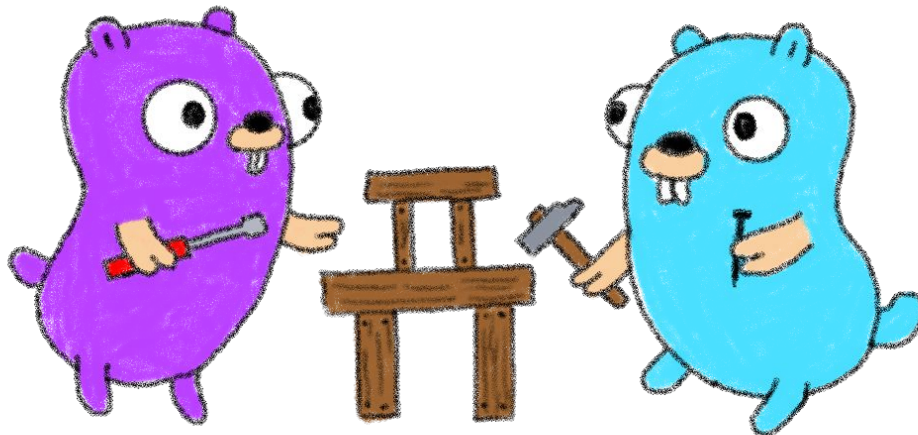
```
$ terraform apply
```



Testing the provider locally



```
$ terraform destroy
```

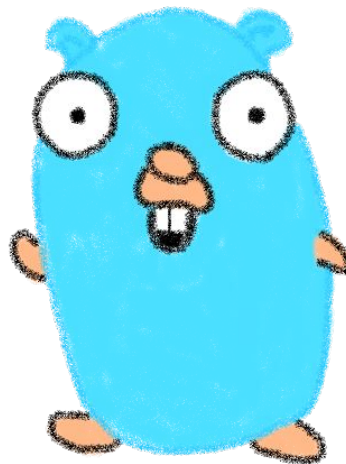




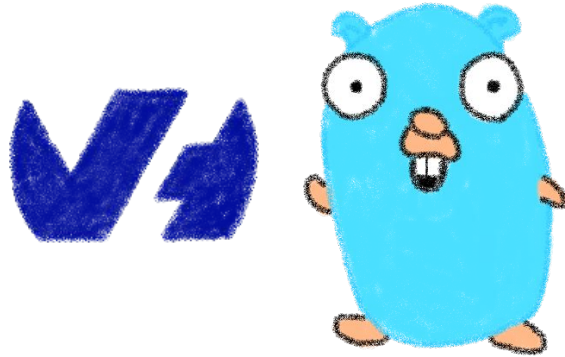


OVHcloud Terraform Provider

To easily manage OVHcloud products



OVHcloud Terraform Provider



ovh

Partner

by: [ovh](#)

Public Cloud

VERSION

0.26.0

PUBLISHED

15 days ago

SOURCE CODE

[ovh/terraform-provider](#)

Provider Downloads

All versions ▾

Downloads this week

11 805

Downloads this month

33 977

Downloads this year

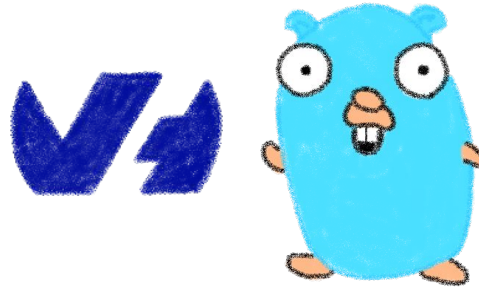
33 977

Downloads over all time

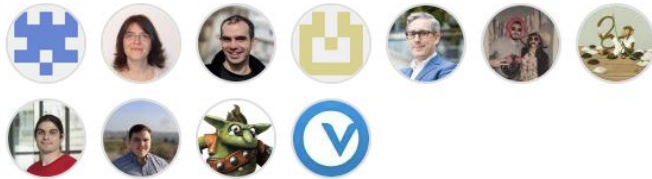
822 078

<https://registry.terraform.io/providers/ovh/ovh/latest/docs>

OVHcloud Terraform Provider



Contributors 59



+ 48 contributors

Releases 22

v0.26.0 **Latest**
2 weeks ago

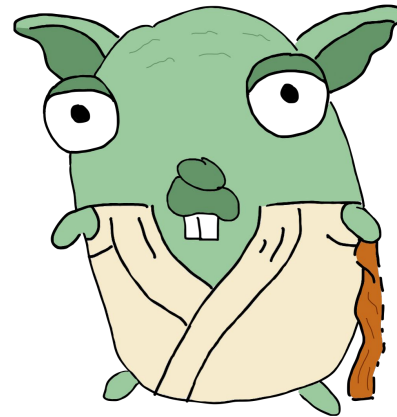
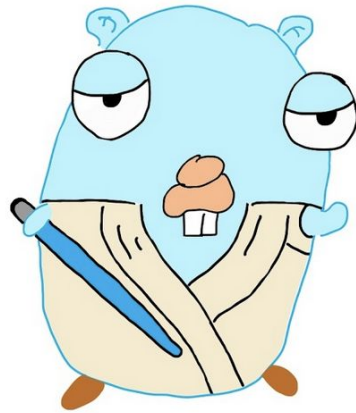
+ 21 releases

<https://github.com/ovh/terraform-provider-ovh>



Best practices

But we have learnt with our providers

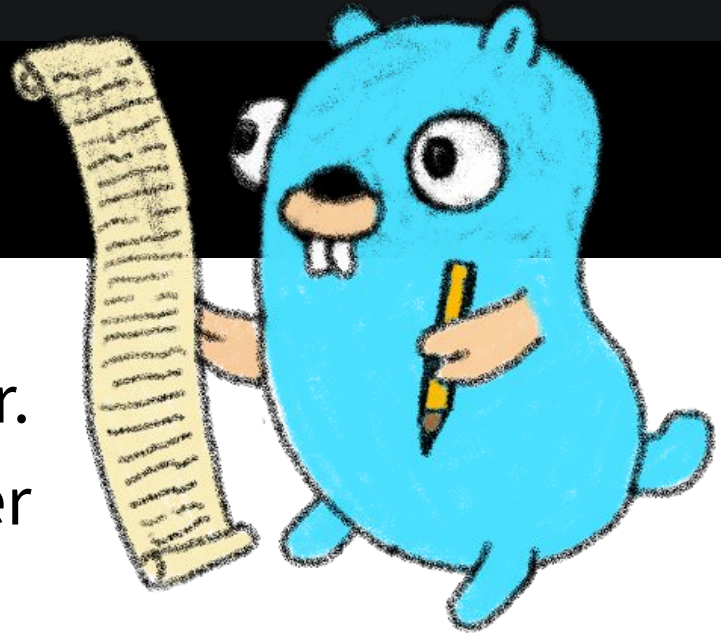


Doc is not optional



```
$ tfplugindocs generate
```

Generate the doc of your provider.
Based on the schema the provider
exposes.



<https://github.com/hashicorp/terraform-plugin-docs>

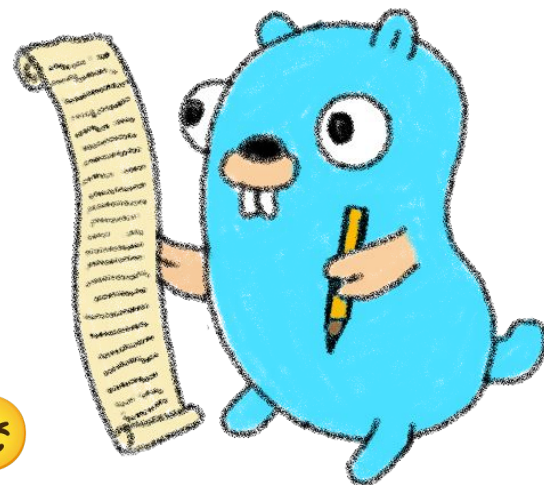
Write useful examples in your doc



Examples in your documentation should be:

- Useful
- Up-to-date
- Working

Users will copy paste your examples! 😊



And... test your doc!



```
# My awesome doc

-> This can be used to preview how provider docs will render on the
Terraform Registry.

**It's better to test your doc before to put it in production ;-)**
```

PREVIEW DOCUMENTATION

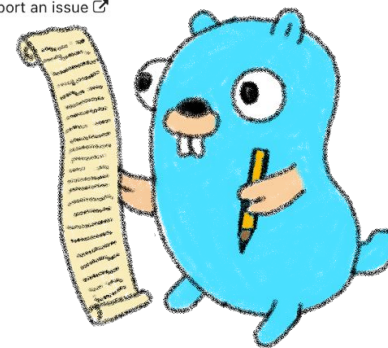
My awesome doc

Note

This can be used to preview how provider docs will render on the Terraform Registry.

It's better to test your doc before to put it in production ;-)

Report an issue



Use the doc preview tool

<https://registry.terraform.io/tools/doc-preview>

Acceptance tests



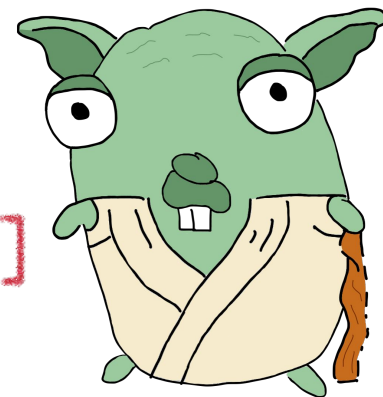
```
$ make testacc
```

```
$ make testacc TESTARGS="-run TestAccDataSourceGopher"
```

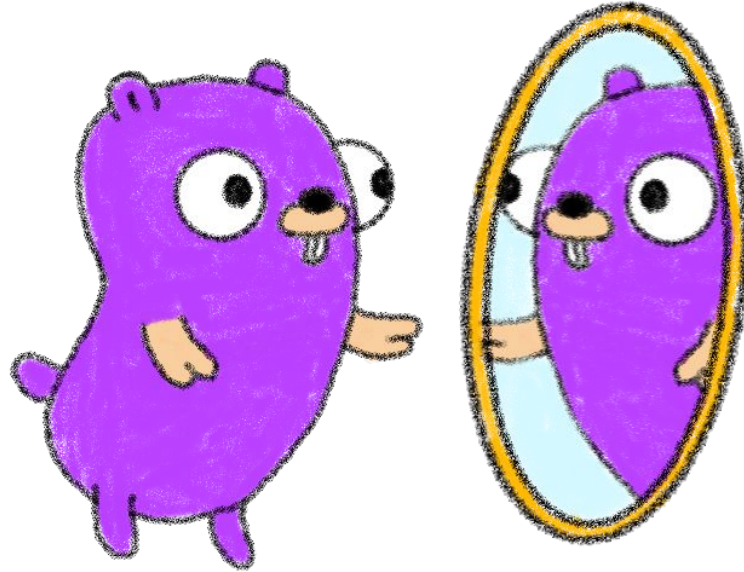

Have the simplest JSON structures



```
{  
  "message":  
    ["The", "simplest", "JSON", "structures", "you", "use"]  
}
```



Provider is a reflection of your API client



Think about API first design

Use the logs for debugging



```
$ TF_LOG=INFO terraform plan
```



Set timeouts / retry



```
Timeouts: &schema.ResourceTimeout{  
    Create: schema.DefaultTimeout(20 * time.Minute),  
    Update: schema.DefaultTimeout(20 * time.Minute),  
    Delete: schema.DefaultTimeout(20 * time.Minute),  
},
```



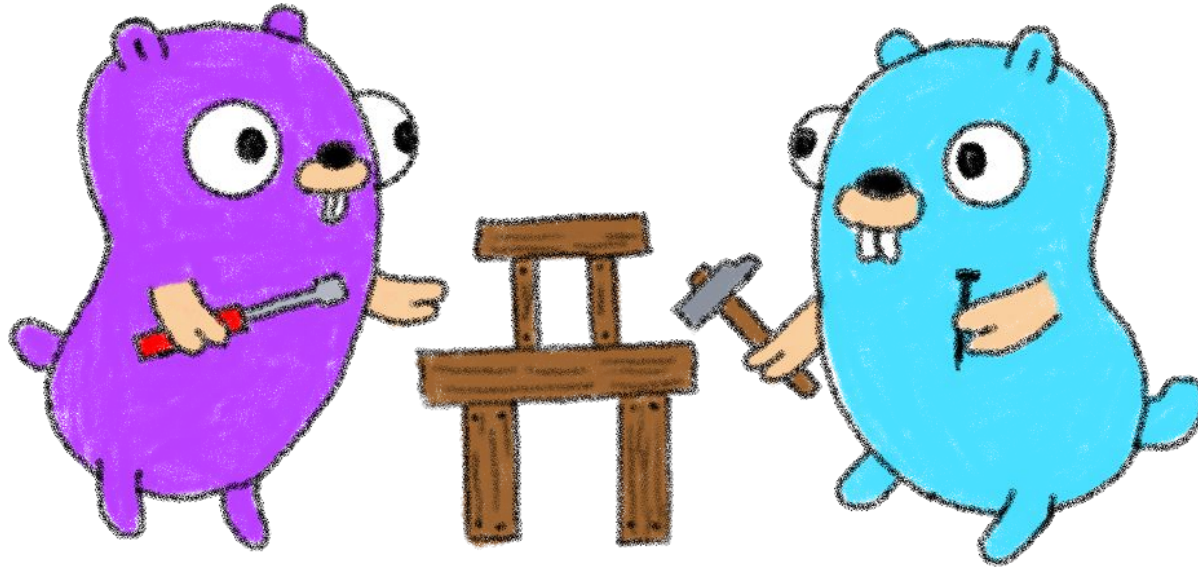
Timeout/retry par resource

Read the code



See how other open source providers are written

The “3 P” rule

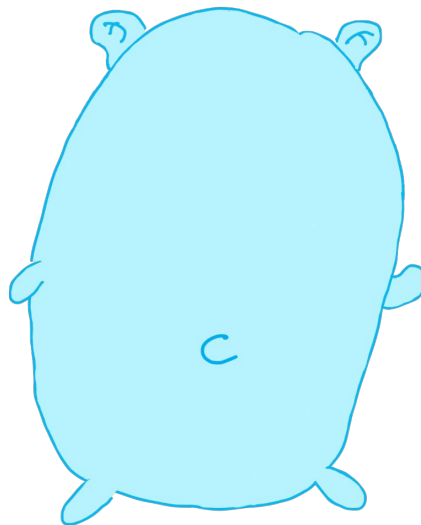


Practice, practice, practice



One more thing...

Or two or three



A handy cheat sheet



Terraform CLI Cheat Sheet

About Terraform CLI

Terraform, a tool created by Hashicorp in 2014, written in Go, aims to build, change and version control your infrastructure. This tool have a powerful and very intuitive Command Line Interface.

Installation

Install through curl

```
$ curl -O https://releases.hashicorp.com/terraform/0.11.10/terraform_0.11.10_linux_amd64.zip
$ sudo unzip terraform_0.11.10_linux_amd64.zip
-d /usr/local/bin/
$ rm terraform_0.11.10_linux_amd64.zip
```

OR install through tfenv: a Terraform version manager

```
First of all, download the tfenv binary and put it in your PATH.
$ git clone https://github.com/Zordrak/tfenv.git
- ./tfenv
$ echo 'export PATH="$HOME/.tfenv/bin:$PATH"'
>> $HOME/.bashrc
```

Then, you can install desired version of terraform:

```
$ tfenv install 0.11.10
```

Usage

Show version

```
$ terraform --version
Terraform v0.11.10
```

Init Terraform

```
$ terraform init
```

It's the first command you need to execute. Unless, terraform plan, apply, destroy and import will not work. The command terraform init will install:

- terraform modules
- eventually a backend
- and provider(s) plugins

Init Terraform and don't ask any input

```
$ terraform init -input=false
```

Change backend configuration during the init

```
$ terraform init -backend-config=cfg/s3.dev.tf -reconfigure
```

-reconfigure is used in order to tell terraform to not copy the existing state to the new remote state location.

Get

This command is useful when you have defined some modules. Modules are vendored so when you edit them, you need to get again modules content.

```
$ terraform get -update=true
```

When you use modules, the first thing you'll have to do is to do a terraform get. This pulls modules into the .terraform directory. Once you do that, unless you do another terraform get -update=true, you've essentially vendored those modules.

Plan

The plan step check configuration to execute and write a plan to apply to target infrastructure provider.

```
$ terraform plan -out plan.out
```

It's an important feature of Terraform that allows a user to see which actions Terraform will perform prior to making any changes, increasing confidence that a change will have the desired effect once applied.

When you execute terraform plan command, terraform will scan all *.tf files in your directory and create the plan.

Apply

Now you have the desired state so you can execute the plan.

```
$ terraform apply plan.out
```

Good to know: Since terraform v0.11+, in an interactive mode (non CI/CD/autonomous pipeline), you can just execute terraform apply command which will print out which actions TF will perform.

By generating the plan and applying it in the same command, Terraform can guarantee that the execution plan won't change, without needing to write it to disk. This reduces the risk of potentially-sensitive data being left behind, or accidentally checked into version control.

```
$ terraform apply
```

Apply and auto approve

```
$ terraform apply -auto-approve
```

Apply and define new variables value

```
$ terraform apply -auto-approve
-var tags-repository_url=${GIT_URL}
```

Apply only one module

```
$ terraform apply -target=module.s3
```

This -target option works with *terraform plan* too.

Destroy

```
$ terraform destroy
```

Delete all the resources!

A deletion plan can be created before:

```
$ terraform plan -destroy
```

-target option allow to destroy only one resource, for example a S3 bucket:

```
$ terraform destroy -target aws_s3_bucket.my_bucket
```

Debug

```
$ echo "aws_iam_user.notif.arn" | terraform console
arn:aws:iam::123456789:user/notif
```

Graph

```
$ terraform graph | dot -Tpng > graph.png
```

Visual dependency graph of terraform resources.

State

How to tell to Terraform you moved a resource in a module?

If you moved an existing resource in a module, you need to update the state:

```
$ terraform state mv aws_iam_role.role1 module.mymodule
```

How to import existing resource in Terraform?

If you have an existing resource in your infrastructure provider, you can import it in your Terraform state:

```
$ terraform import aws_iam_policy.elastic_post
arn:aws:iam::123456789:policy/elastic_post
```

Workspaces

To manage multiple distinct sets of infrastructure resources/environments.

Instead of create a directory for each environment to manage, we need to just create needed workspace and use them:

Create workspace

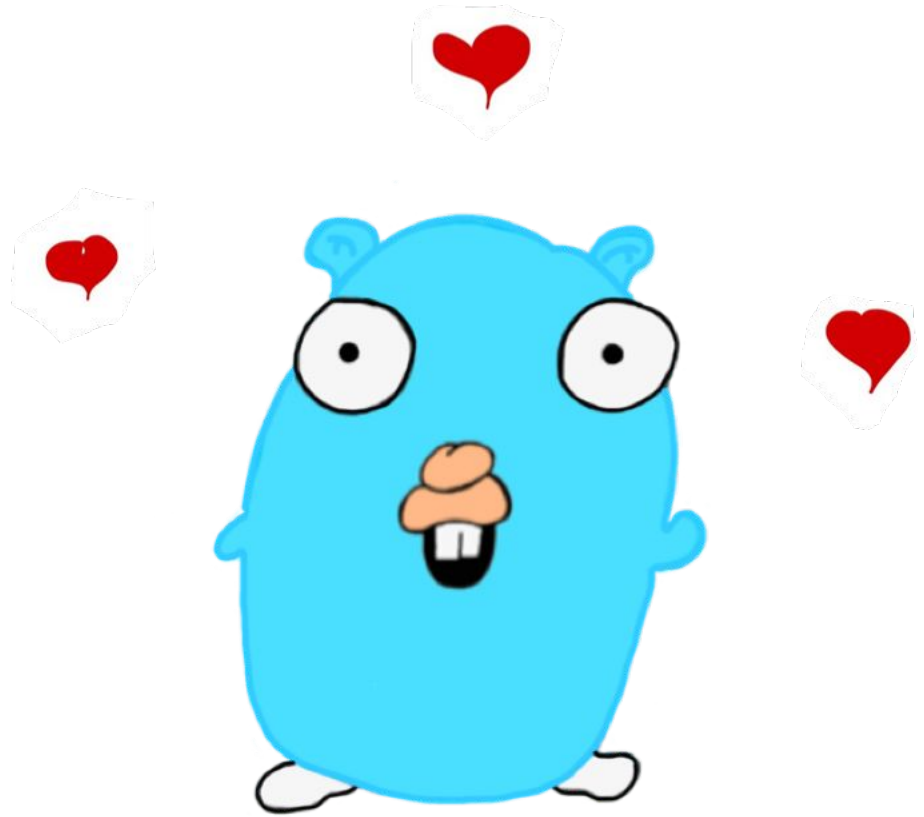


<https://github.com/scraly/terraform-cheat-sheet/>

SNOWGAMP 2023

@AurelieVache  @LostInBrittany 

Thank you!



<https://bit.ly/tf-provider-snowcamp>

We ❤️ feedbacks



SNOWCAMP

SnowCamp 2023



Plongeons dans la création d'un provider Terraform #Cloud & DevOps #Talk

jeudi 26 janvier / 15:00 - 15:45



Aurélie Vache



Horacio Gonzalez (lostinbrittany)

Drôle/original 😄

Très enrichissant 🧐

Super intéressant 👍

Très bon orateur 🙌

Pas clair 🙄

Trop technique 🤖

Pas assez de
démo/exemple 🙄

Trop complexe 🤔

<https://bit.ly/vote-tf-provider-snow>

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