

Kennissessie Terraform

Automating infra, all the way

Sprekers:
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Onderwerp:
Infra as Code met Terraform



Introductie

Dinant Paardenkooper

Rol: Hands-on Cloud Native Solution Architect (Azure, VMware)
Cloud Native | Kubernetes | Automation | IaC | Spreker

Drive: Innoveren, Business requirements omzetten naar
praktische technische oplossingen



Hobby's: Gitaar spelen, innoveren, hardlopen, squash

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Dimitri Schouten

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Terugblik...

Automation Roadmap

Gekozen producten

HashiCorp Packer

Gekozen producten

Image Building

Configuration management

Infrastructure as Code

Application Deployment

 Gobbler

 puppet

Scripting


 GitLab

 HashiCorp
Packer

 ANSIBLE

 HashiCorp
Terraform

 Azure
DevOps

 Microsoft Deployment
Toolkit (MDT)

 Microsoft
System Center

 PowerShell

 vRealize Automation 8.0

Recap Packer

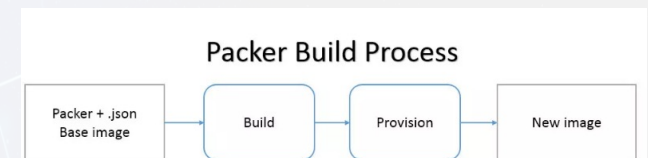
Waarom interessant

- Platform onafhankelijk
- Golden image in minuten
- Opensource en lage leercurve

<Zit in Azure Image Builder>

Usecases

- Up to date DevOps Werkplek
- Hardening met CIS Benchmarks
- Kubernetes Nodes
- Basis Image levering voor Automation tools



Demo Packer

Benodigheden:

- Variables.json
- Preseed.cfg
- Ubuntu.json
- Script.sh

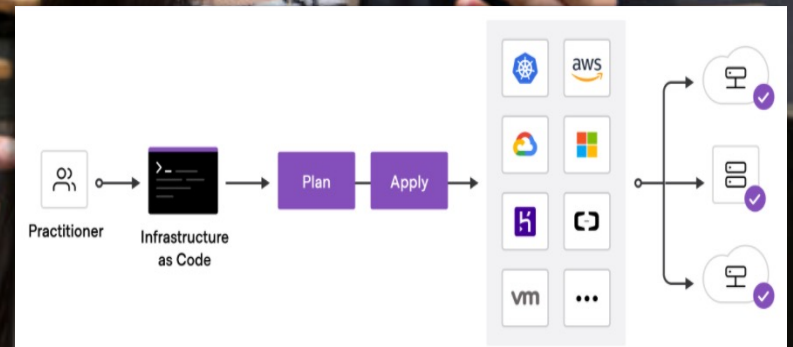


Waarom Terraform?

Platform onafhankelijk

Infra state management

Opensource en lage leercurve





Geautomatiseerde uitrol van infra (bouw)blokken

Use cases

Versiebeheer en audit trails

Gestandaardiseerde workflow



Proof of Concepts

A photograph of three people in a modern office environment. A woman with curly hair in a denim jacket is on the left, a woman with blonde hair in a black top is in the middle, and a man in a green shirt is on the right. They are gathered around a desk with a laptop and other devices, appearing to be in a collaborative work session. The background shows office desks with multiple monitors and large windows.

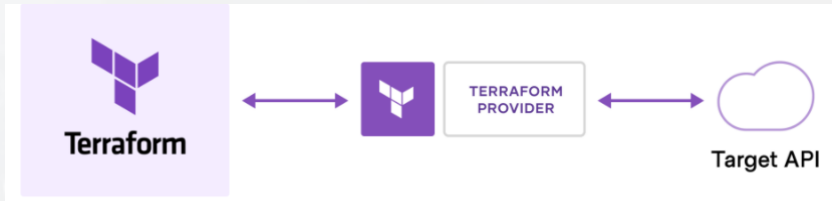
En nu de techniek

Definities en installatie

Waar moet ik beginnen?

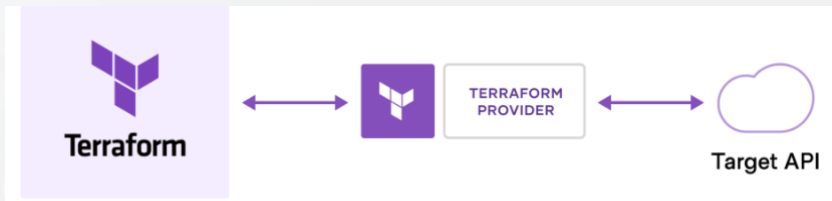
Demo

Definities



Resource	Resource die je wilt maken; bijv. VM, netwerk, DNS record
Terraform providers	3th party vendor API plugins; bijv. Azure, Vmware, AWS. Huidig 1700
Terraform state	Opslagfile van Terraform
Current State/Desired state	Werkwijze Terraform
Variablen	Eigen variabelen; bijv. naam
Terraform.tfvars	Overschrijfbaar variabelen door terraform zelf

Definities



Datasource

Inlezen van bestaande resources; bijv. bestaande loadbalancer, FW, netwerken

Modules

Herhalingstaken binnen terraform; bijv. aanmaken van 20 VMs

Local Provisioners

Uitvoeren van locale scripts na aanmaak van een resource (agent install)

Remote Provisioners

Uitvoeren van remote scripts na aanmaak van een resource (ssh, winrm)


Workspace

Werkruimtes om verschillende omgevingsvariabelen te kunnen werken

Meest gebruikte Terraform commandos

Terraform init	Initialiseert Terraform, de opslaglocatie en de providers
Terraform plan	Toont verschil aan tussen de huidige en gewenste state
Terraform apply	Voert de gewenste veranderingen door naar de gewenste staat
Terraform destroy	Vernietigt de gewenste veranderingen ten opzichte van de huidige staat
Terraform output	Geeft opgedragen output weer na doorvoer van gewenste veranderingen

installatie

 www.terraform.io/downloads

Download Terraform

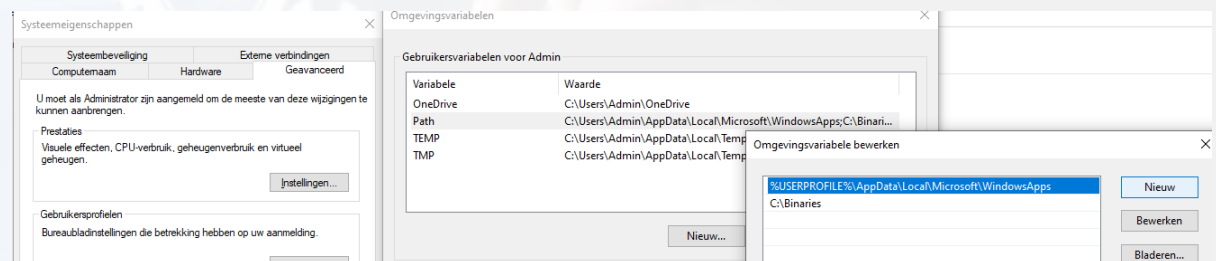
macOS Windows Linux FreeBSD OpenBSD Solaris

Linux

- Wget https://releases.hashicorp.com/terraform/1.1.4/terraform_1.1.4_linux_amd64.zip
- Unzip terraform_1.1.4_linux_amd64.zip
- mv terraform /usr/local/bin
- Terraform --version

Windows

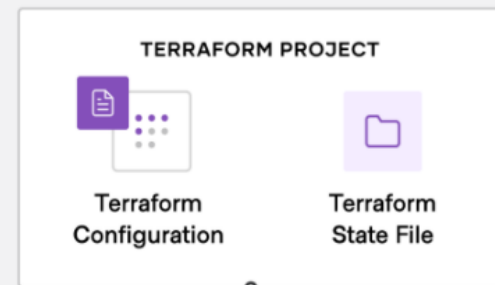
- Download de x64 binaries
- Unzip de executable
- Voeg packer toe als omgevings env
- Open admin powershell
- Terraform --version



Waar moet ik beginnen?

Write

Define infrastructure in configuration files



Plan

Review the changes Terraform will make to your infrastructure

```
$ terraform plan
...
Terraform will perform
the following actions
```

Apply

Terraform provisions your infrastructure and updates the state file.



Stap 1: Design



Usecase definiëren

Welke componenten zijn onderdeel van de automation

Terraform versie

Opensource versus Enterprise

Opslaglocatie state file

Lokaal, Postgress database, gitlab, elders...

Workflow en repo selectie

Repo en workflow vastleggen

Selectie Providers

Welke drivers zijn benodigd en moeten worden gedownload

Bepalen provisioners

Local, Remote, File ...

Variable gebruik

Variables.tf en terraform.tfvars

Stap 2 – Files maken

Main.tf

Terraform specs: bijv. version providers/terraform

Providers.tf

Provider instellingen: inlezen bestaande config, username en password

Variables.tf

Definieren variabelen: bijv. resource namen

Output.tf

Tonen eindresultaat: bijv. username + password

<resource>.tf

Resource: bijv. DNS record, VM, IP, APP

terraform.tfstate

Database: opslag en waarheid voor Terraform

terraform.tfvars

Variablen: prive variabelen niet opgeslagen in de state

Stap 3 – executie

Terraform init

```
[ec2-user@ip-172-31-19-255 demo]$ terraform init
Initializing modules...
- module.vpc

Initializing provider plugins...

The following providers do not have any version constraints in configuration,
so the latest version was installed.

To prevent automatic upgrades to new major versions that may contain breaking
changes, it is recommended to add version = "..." constraints to the
corresponding provider blocks in configuration, with the constraint strings
suggested below.

* provider.aws: version = "~> 1.14"

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.
```

Stap 3 – executie

Terraform plan

```
[ec2-user@ip-172-31-19-255 demo]$ terraform plan
Refreshing Terraform state in-memory prior to plan...
The refreshed state will be used to calculate this plan, but will not be
persisted to local or remote state storage.

-----

An execution plan has been generated and is shown below.
Resource actions are indicated with the following symbols:
+ create

Terraform will perform the following actions:

+ module.vpc.aws_vpc.demo_vpc
  id: <computed>
  assign_generated_ipv6_cidr_block: "false"
  cidr_block: "10.0.0.0/16"
  default_network_acl_id: <computed>
  default_route_table_id: <computed>
  default_security_group_id: <computed>
  dhcp_options_id: <computed>
  enable_classiclink: <computed>
  enable_classiclink_dns_support: <computed>
  enable_dns_hostnames: <computed>
  enable_dns_support: "true"
  instance_tenancy: <computed>
  ipv6_association_id: <computed>
  ipv6_cidr_block: <computed>
  main_route_table_id: <computed>
  tags.%: "1"
  tags.Name: "demo-vpc"
```

Stap 3 – executie

Terraform apply

```
module.vpc.aws_vpc.demo_vpc: Creating...
  assign_generated_ipv6_cidr_block: "" => "false"
  cidr_block:                        "" => "10.0.0.0/16"
  default_network_acl_id:            "" => "<computed>"
  default_route_table_id:           "" => "<computed>"
  default_security_group_id:        "" => "<computed>"
  dhcp_options_id:                  "" => "<computed>"
  enable_classiclink:                "" => "<computed>"
  enable_classiclink_dns_support:    "" => "<computed>"
  enable_dns_hostnames:             "" => "<computed>"
  enable_dns_support:               "" => "true"
  instance_tenancy:                 "" => "<computed>"
  ipv6_association_id:              "" => "<computed>"
  ipv6_cidr_block:                  "" => "<computed>"
  main_route_table_id:              "" => "<computed>"
  tags.%:                           "" => "1"
  tags.Name:                        "" => "demo-vpc"
module.vpc.aws_vpc.demo_vpc: Creation complete after 1s (ID: vpc-l6da896f)

Apply complete! Resources: 1 added, 0 changed, 0 destroyed.
```

Stap 4 – controle

Controleer je aanpassingen in de aangepaste infrastructuur

Bewaar je TF files in een versioning control systeem zoals Github

Demo Terraform

Usecase:

Azure IAAS schaalbare webserver op basis van een CIS benchmark bedrijfsimage.

Buildingbloks:

- Custom image (gemaakt door Packer)
- VM met scaleset
- LoadBalancer
- Network Security Group
- KeyVault



Lessons learned



1. Verwijder handmatige aanpassingen
2. Voorkom opslag gevoelige code in Terraform.tfstate
3. Vergeet de .gitignore file niet aan te maken
4. Probeer zo min mogelijk dubbele code toe te passen
5. Voorkom hard-coded credentials in de Terraform
6. Gebruik provisioners alleen voor infra provisioning.
7. Ken de volgorde waarop variabelen worden inlezen.
8. Maak gebruik van terraform "required_providers"
9. Maak gebruik van terraform "required_version"
10. Omgaan met grote infrastructures

Training Tips

Commando's Vele manieren



- HashiCorp Learn

<https://learn.hashicorp.com/terraform>

- Udemy Training – Zeal Vora

<https://www.udemy.com/course/ultimate-terraform-course-for-devops-beginner-to-advanced>

- Terraform Cheat sheet

<https://acg-wordpress-content-production.s3.us-west-2.amazonaws.com/app/uploads/2020/11/terraform-cheatsheet-from-ACG.pdf>

- Best Practice Guide

Available at Detron



Take aways

The background image shows two women in a modern office environment with large windows. One woman is holding a tablet, and both are looking at it with interest. The text is overlaid on this image in dark teal boxes.

Begin klein

Kies een usecase

Toegevoegde waarde zien

DRY-Principe

Herhaling? Automatiseer

Build & Test

Gewoon doen!

Blijf Innoveren

Next Time ...

Q2 2022

Kennissessie Powershell

Kennissessie Python

Kennissessie CI/CD

Q3 2022

Workshop Ansible part 1

Kennissessie Azure DevOps

Kennissessie Power Platform

Q4 2022

Workshop Ansible part 2

Cloud API's

Thanks for your attention

Be inspired, working together, innovate your IT