

Pulumi и CDK для Terraform

Программируем инфраструктуру на языках высокого уровня



Pulumi



Cloud Development Kit for



HashiCorp

Terraform

Speakers

Илья Феоктистов



Более 10 лет в IT.

Сейчас работает Head of Devops в компании Bling, Барселона.

До этого был: DBA, бэкенд-разработчиком, тимлидом.

Certified Kubernetes Administrator, преподаватель в Skillbox и Otus.

Speakers

Помогает выстраивать эффективные взаимоотношения между разработкой и системным администрированием.

Работает в Simplinic GmbH на позиции Lead DevOps Engineer.

СКА, преподает в Otus, пишет курсы для SkillFactory.

Состоит в кружках «Хочу все знать» и «С радостью поделюсь тем, что уже узнал».

Нравятся облака и облачные технологии.

Кирилл Казаков



What we'll talk about today

- What's Infrastructure As Code (IaC)
- Infrastructure As Code issues
- IAC frameworks && tools in our days

- What is CDK Terraform and how does it works
- A real example live demo

- What is Pulumi and how does it works
- A real example live demo

Infrastructure As Code

Code

```
MyEC2Instance:
  Type: AWS::EC2::Instance
  Properties:
    ImageId: YAML
    InstanceType: !Ref InstanceType
    Tags:
      - Key: Name
        Value: Simple Server
    NetworkInterfaces:
      - AssociatePublicIpAddress: true
        DeviceIndex: "0"
        GroupSet:
          - Ref: PublicSecurityGroup
        SubnetId:
          Ref: PublicSubnet1
    UserData:
      Fn::Base64:
        !Sub |
          #!/bin/bash -xe
          yum -y update
          sudo yum install -y httpd
          sudo systemctl start httpd

---
# Basic provisioning example
- name: Create AWS resources
  hosts: localhost
  connection: YAML
  gather_facts: no

  tasks:
    - name: Create a security group
      ec2_group: <8 keys>
      register: firewall

    - name: Create an EC2 instance
      ec2:
        aws_access_key: "{{aws_access_key}}"
        aws_secret_key: "{{aws_secret_key}}"
        key_name: "{{key_name}}"
        region: "{{aws_region}}"
        group_id: "{{firewall.group_id}}"
        instance_type: "{{instance_type}}"
        image: "{{ami_id}}"
        wait: yes
        volumes:

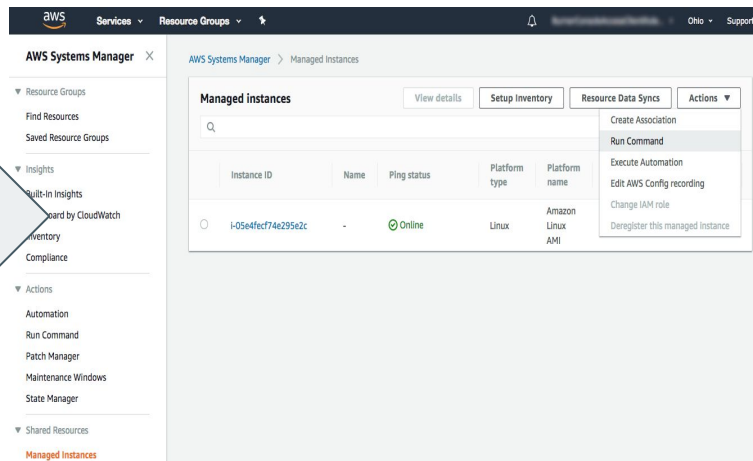
---
terraform {
  required_providers {
    aws = {
      source = "hashicorp/aws"
      version = "3.64.2"
    }
  }
}

provider "aws" {
  region = "eu-central-1"
}

data "local_file" "initScriptFile" {
  filename = "${path.module}/provision.sh"
}

resource "aws_security_group" "allow_web" {
  name = "allow-http-web"
  description = "Allow all incoming http traffic"
  ingress = [
    {
      from_port = 80
      to_port = 80
      protocol = "tcp"
      cidr_blocks = ["0.0.0.0/0"]
    }
  ]
}
```

Infrastructure



Infrastructure as code issues



Simpsons Against DevOps
@SimpsonsOps

...

When ops commit their YAML to a VCS for the first time.

mememe by [@davecheney](#)



Infrastructure as code issues

Usability

- **DSL**
- **Many environments/langs**
- **IDE**

Modern requirements

Speed of development of applications

Amount of apps

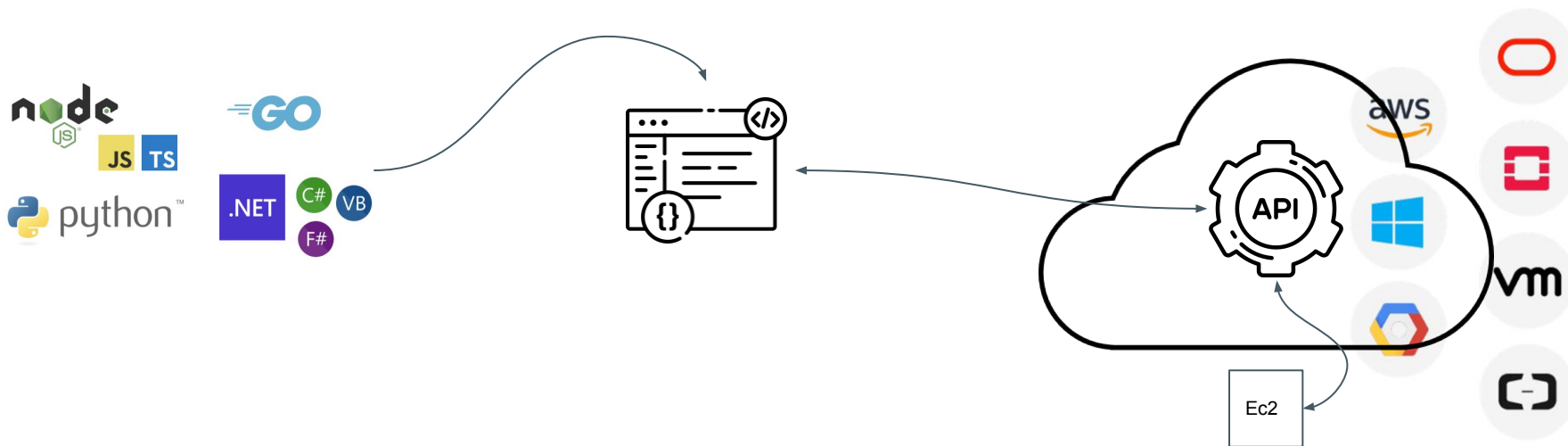
Lifetime apps\project

Infrastructure tools in our days

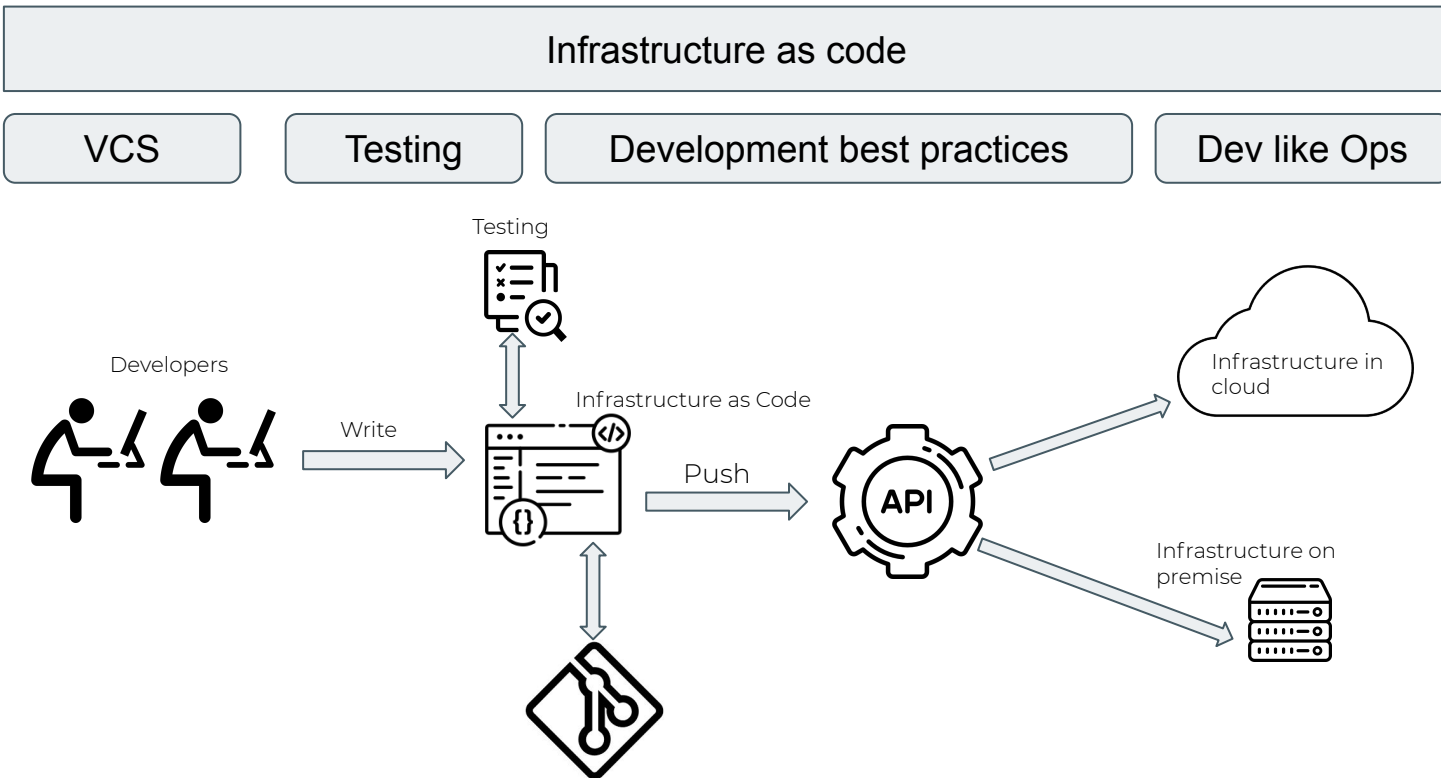
Use any Lang

Convert to API call

Create resource



Benefits



Tonight's plan

- What is it ?
- How it works?
- Demo
- Summary

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 **Cloud Development Kit for**



HashiCorp

Terraform



Pulumi



Cloud Development Kit for



HashiCorp

Terraform

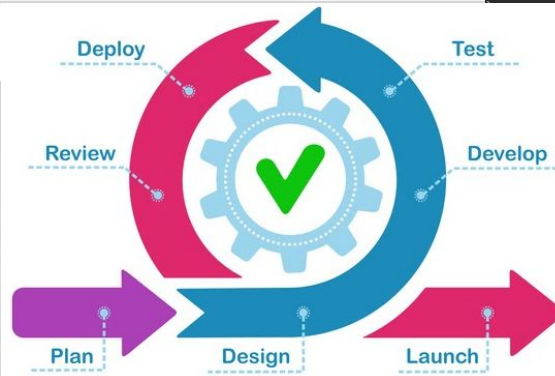
What's Terraform ?



Terraform provides a common configuration to launch infrastructure - from physical and virtual servers to email and DNS providers.

Terraform in our days

TypeScript | Python | Java | C# | Go



```
// Comm is some basic TCP communication
type Comm struct {
    connection net.Conn
}

// connection gets a new comm to a tcp address
func (c *Comm) connection(address string, timelimit ...time.Duration) (c *Comm, err error) {
    c = &Comm{}
    c = 30 * time.Second
    timelimit := timelimit[0]
    if timelimit > 0 {
        c.timelimit = timelimit[0]
    }

    connection net.Conn
    socks5Proxy := "" && !utils.IsLocalIP(address) {
        dialer proxy.Dialer
        // prepend schema if no schema is given
        if !strings.Contains(Socks5Proxy, "://") {
            Socks5Proxy = "socks5://" + Socks5Proxy
        }
        socks5ProxyURL, urlParseError := url.Parse(Socks5Proxy)
        if urlParseError != nil {
            err = fmt.Errorf("Unable to parse socks proxy url: %s", urlParseError)
            log.Debug(err)
            return
        }
        dialer, err = proxy.FromURL(socks5ProxyURL, proxy.Direct)
        if err != nil {
            err = fmt.Errorf("proxy failed: %w", err)
            log.Debug(err)
            return
        }
        log.Debug("dialing with dialer.Dial")
        connection, err = dialer.Dial("tcp", address)
    } else {

```



now

1000+ providers



HashiCorp is an AWS Partner



Cloud Development Kit for



HashiCorp

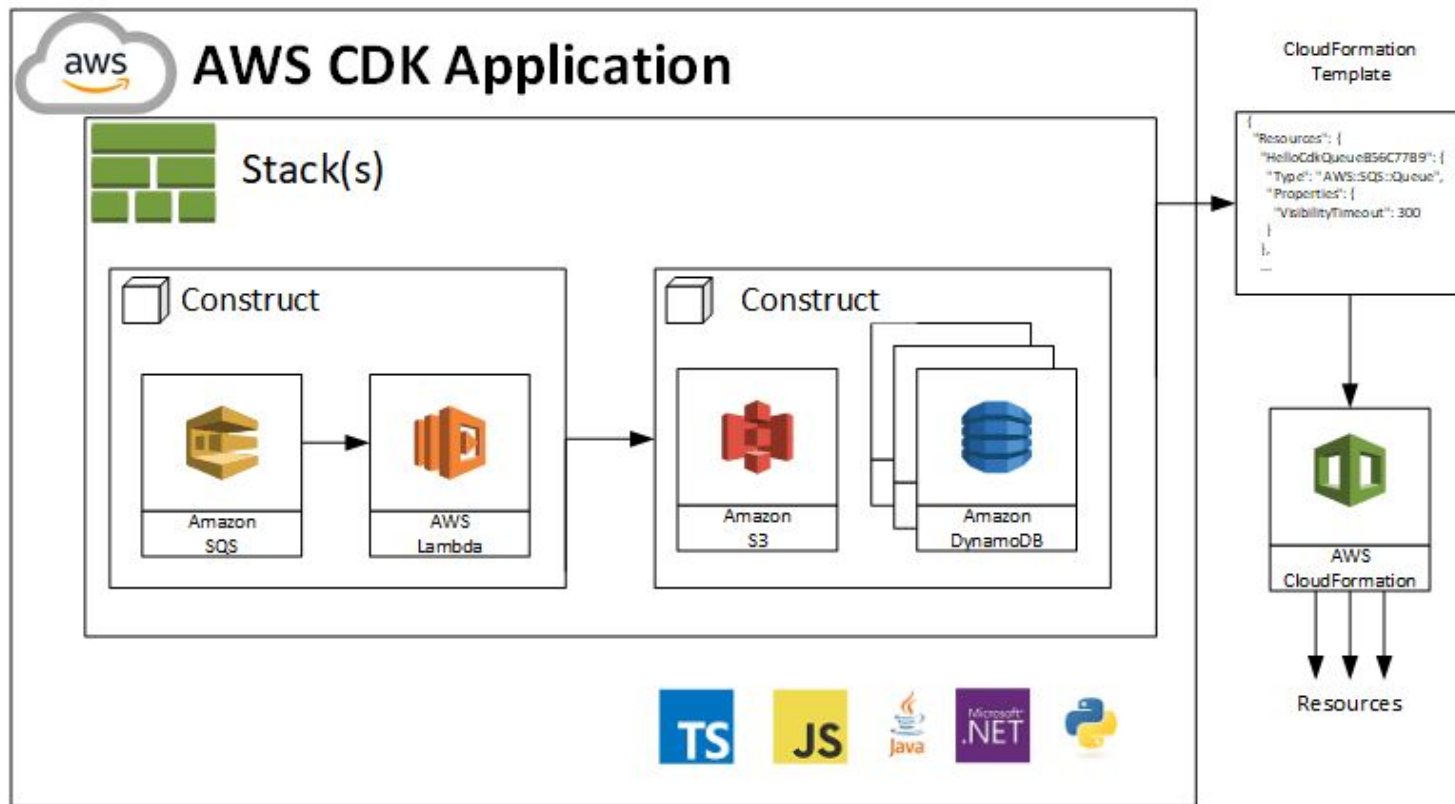
Terraform



aws

**Cloud
Development
Kit**

Cloud Development Kit for ... ?



Any language to naturally interact with JavaScript classes



```
/**
 * A simple greeter, hello world style.
 */
export class Greeter {
    /**
     * Greets the designated person.
     *
     * @param name the person to greet.
     *
     * @returns a greeting.
     */
    public greet(name: string) {
        return `Hello, ${name}!`;
    }
}
```

C#

Go

Java

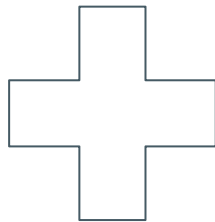
JavaScript

Python

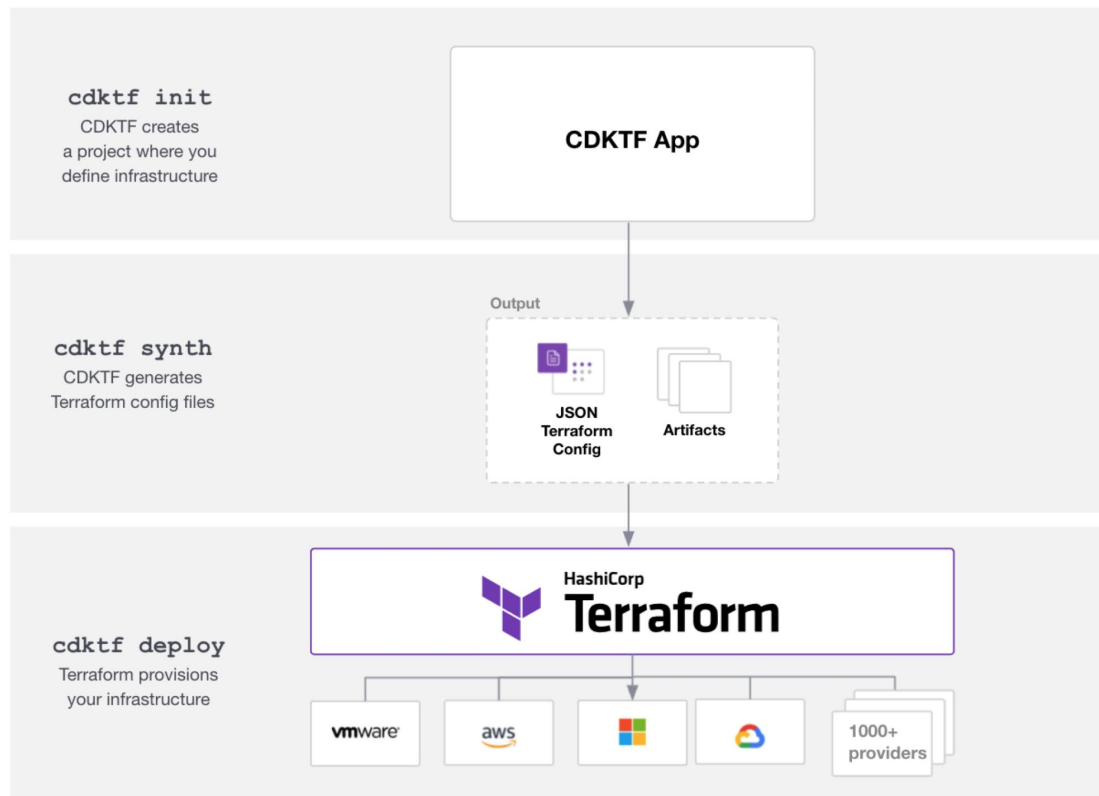
```
greeter = Greeter()
greeter.greet("World") # => Hello, World!
```

Cloud Development Kit for Terraform

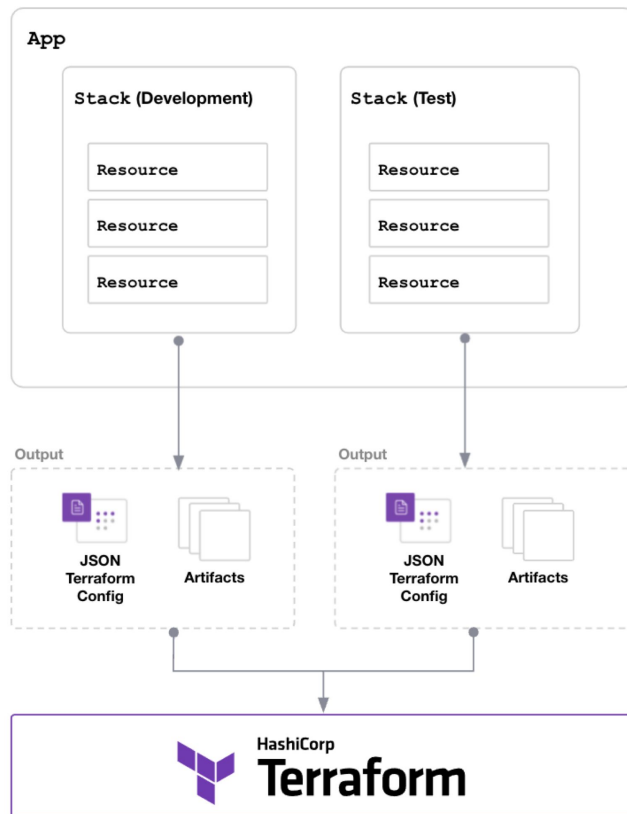
Cloud Development Kit for Terraform allows you to define infrastructure using a familiar programming language such as TypeScript, Python, Java, C# or Go, while leveraging the hundreds of providers and thousands of module definitions provided by Terraform and the Terraform ecosystem.



What 's under the hood ?



Terraform Application Architecture



Quick start

Install requirements :

- Terraform core
- CDK for Terraform
- Node.js v16

1. Initialize Project from a Template

```
cdktf init --template="templateName"
```

2. Configuration File

```
Cdktf.json
```

3.

```
cdktf get
```

4.

```
cdktf deploy
```

Demo



Summary

Pros

- Approach Infrastructure as Software OOP, Modules and Libs, Tools
- Increase your OPS competence by developers
- Convert an HCL Project to a CDKTF
- Use native terraform functions in CDKTF
- Almost 199 official providers and 1355 unofficial supported
- You can also use Terraform modules
- You can combine CDKTF + TF
- A strong AWS partner
- Use AWS CDK + CDKTF together

Cons

- CDK for Terraform is under a deep beta
- Slower than Terraform core
- Not ready to use in production
- CDK docs not in good fit
- Two additional layers of abstraction that can change at any time



Pulumi

Programming infrastructure in high-level languages

November 2021

Plan

- Введение
- Архитектура
- Демо
- Итог



Fast facts



Появилась в 2018 году



Доступны JS, TS, .Net, Go, Python



TechRadar ❤️ Pulumi



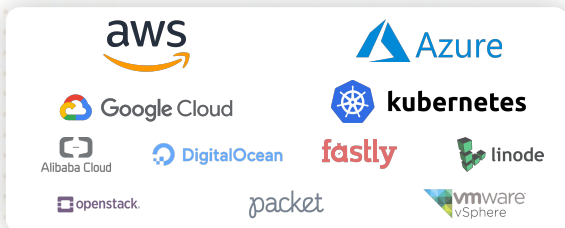
Infrastructure as ~~Code~~ Software

Open Source

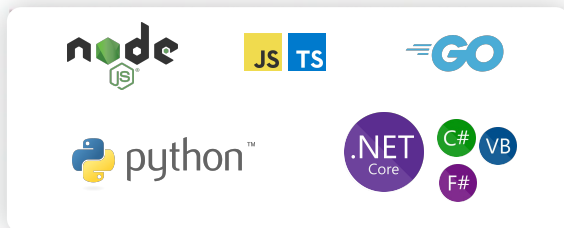
☆ 10k GitHub

Works with most DevOps tools & platforms

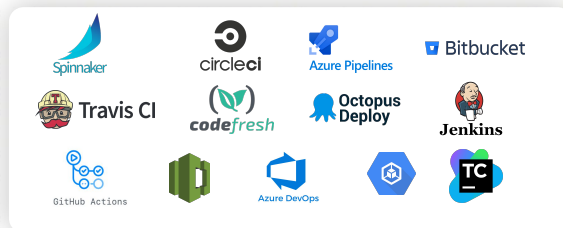
Your Cloud



Your Language



Your Workflow



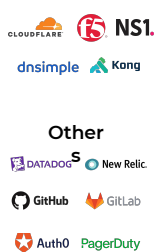
Foundation



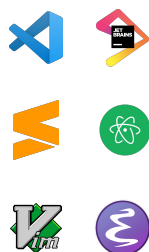
Data



Network



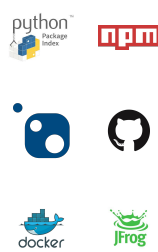
IDEs



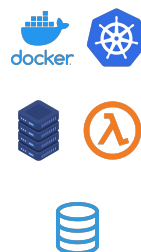
Tools



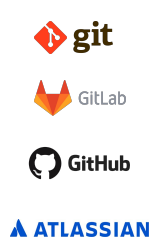
Packages



Architecture



SCM



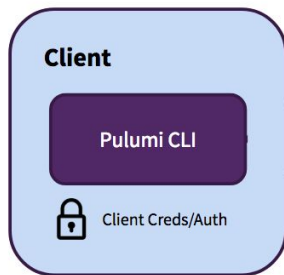
Team



Pulumi Service Architecture

Client

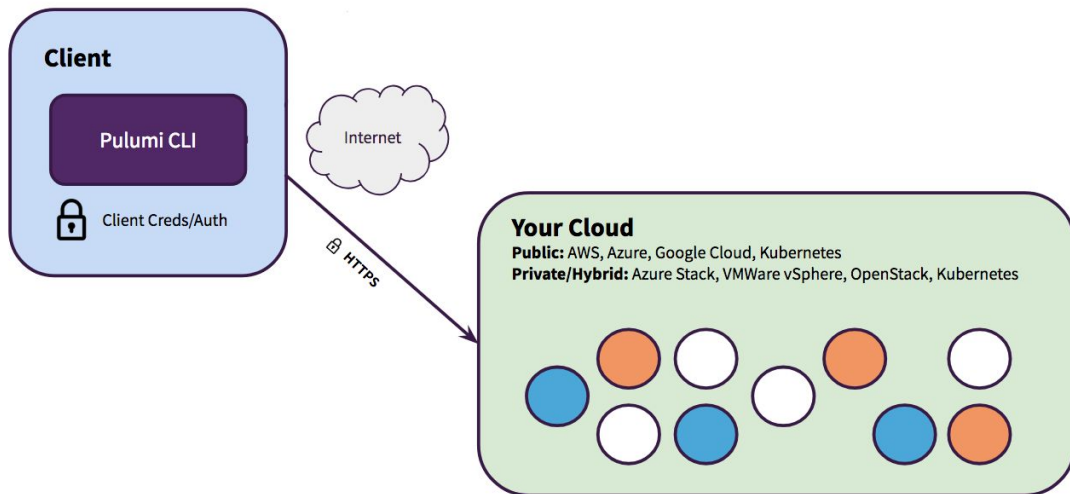
- Go бинарник
- Управляет инфраструктурой



Pulumi Service Architecture

Providers

- Существуют почти под все облака
- Реестр провайдеров <https://www.pulumi.com/registry/>
- Можно переиспользовать провайдеры Terraform'a



Pulumi Service Architecture

State

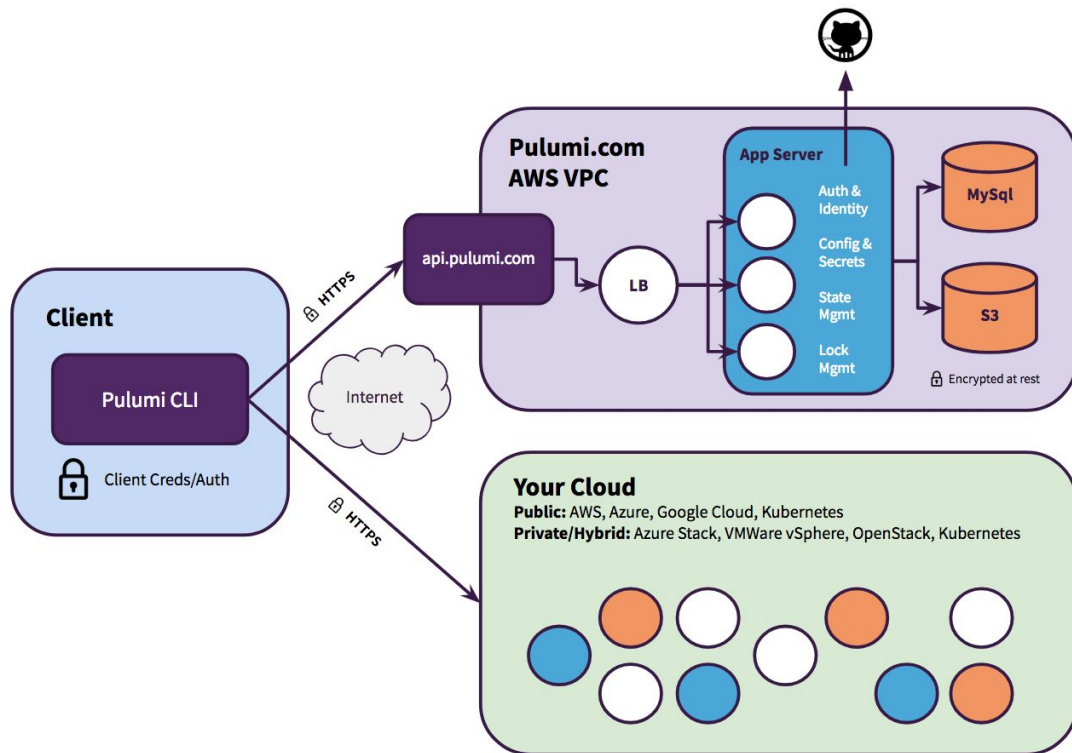


Pulumi service app.pulumi.com

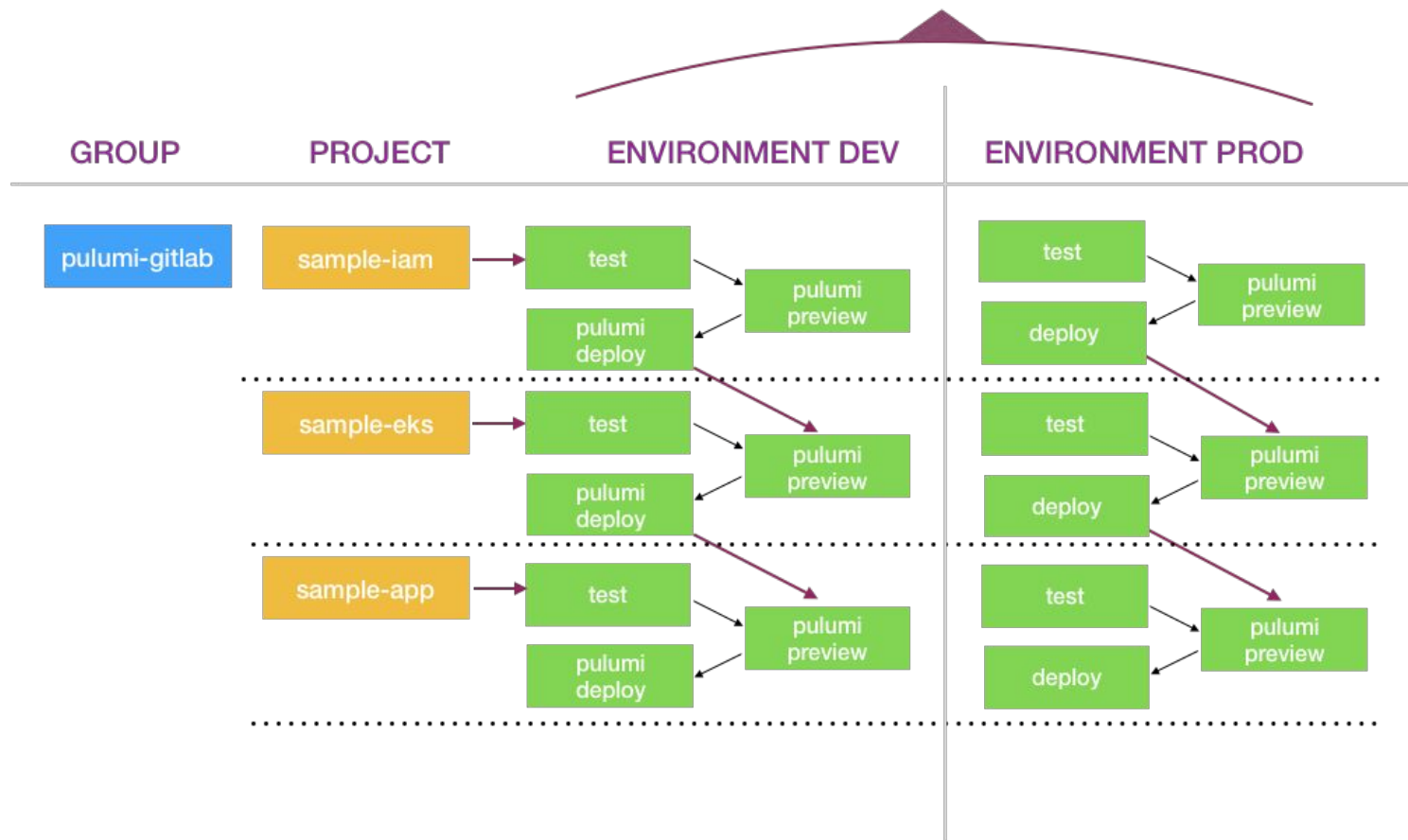


Self-managed:

- AWS S3
- Azure Blob Storage
- Google Cloud Storage
- Ceph
- local filesystem
- ...



Stacks and Environments



Resource Definitions

Pulumi приложения это обычные приложения и поэтому могут быть упакованы в стандартные пакетные модули.

Декларативно описываем, что хотим получить в итоге.

```
package main

import (
    "github.com/pulumi/pulumi-aws/sdk/v4/go/aws/s3"
    "github.com/pulumi/pulumi/sdk/v3/go/pulumi"
)

func main() {
    pulumi.Run(func(ctx *pulumi.Context) error {
        // Create an AWS resource (S3 Bucket)
        bucket, err := s3.NewBucket(ctx, "my-bucket", args: nil)
        if err != nil {
            return err
        }

        ctx.Export(name: "bucketName", bucket.ID())
        return nil
    })
}
```

Using language features

Можно использовать всю мощь
языков высокого уровня

```
fileSizeKB := fileStat.Size() / 1024
if fileSizeKB < 512 {
    for i := 0; i ≤ 30; i++ {
        name := fmt.Sprintf(format: "report-%v", i)
        _, err := yandex.NewStorageObject(ctx, name, &yandex.StorageObjectArgs{
            Bucket:    bucket.ID(),
            Key:       pulumi.String(name),
            Source:    pulumi.String(filePath),
            AccessKey: pulumi.String(key),
            SecretKey: pulumi.String(secret),
        })
        if err ≠ nil {
            log.Fatal(err)
        }
    }
}
```

Demo

Let's Program the Cloud

Summary

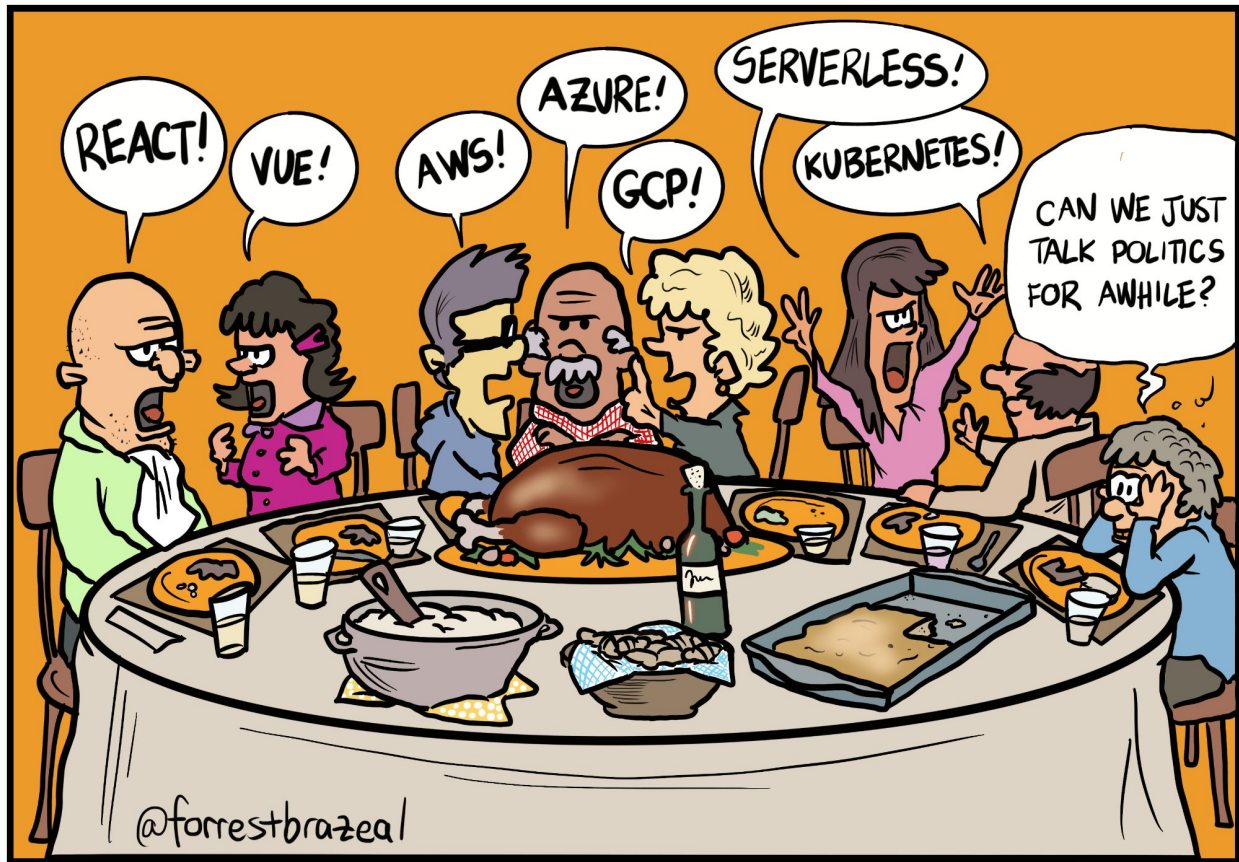
Pros

- Знакомые языки и среды разработки
- Быстро набирает популярность
- Стабилен
- Имеет подробную документацию на официальном сайте

Cons

- Нужно программировать
- Не так популярен, как Terraform

One tool for many



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Всем спасибо!

November 2021