ADDO
ALL DAY DEVOPS
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OCTOBER 26, 2023

Getting started with Continuous Delivery pipelines for cloud infrastructure

Waldemar Kindler & Michael Lihs, Thoughtworks

Tools like Terraform are well established

Pipelines for infrastructure automation

Infrastructure changes take ages until applied to production

Often more of a “prey-and-hope” approach

How can we deliver infrastructure faster and safer...

... by making changes in small batches

... by making the process dead simple & easily reproducible

... providing a proper audit trail

Three principles of Continuous Delivery for Infrastructure

There's more to it than writing Infrastructure code!

1. Everything as code and in version control

- Infrastructure code
- Configuration
- Compliance
- Tests
- Pipeline
- Automation scripts

2. Continuously test and deliver all work in progress

- Build quality in
- Test as you work
- Integrate at least daily

3. Small, simple pieces that you can change independently

- Reduce complexity
- Shorten feedback cycles
- Reduce blast radius
- Apply proper permission boundaries

How?

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Everything as Code

```
.
├── do.sh
├── pipeline.yaml
├── config.yaml
├── tests/
├── policies/
├── README.md
├── backend.tf
├── terraform-dev.tfvars
├── main.tf
└── ...
```

Auditability made easy
Every change is done via a commit to the repository.

Branching strategy
If you us branches merge at least daily!

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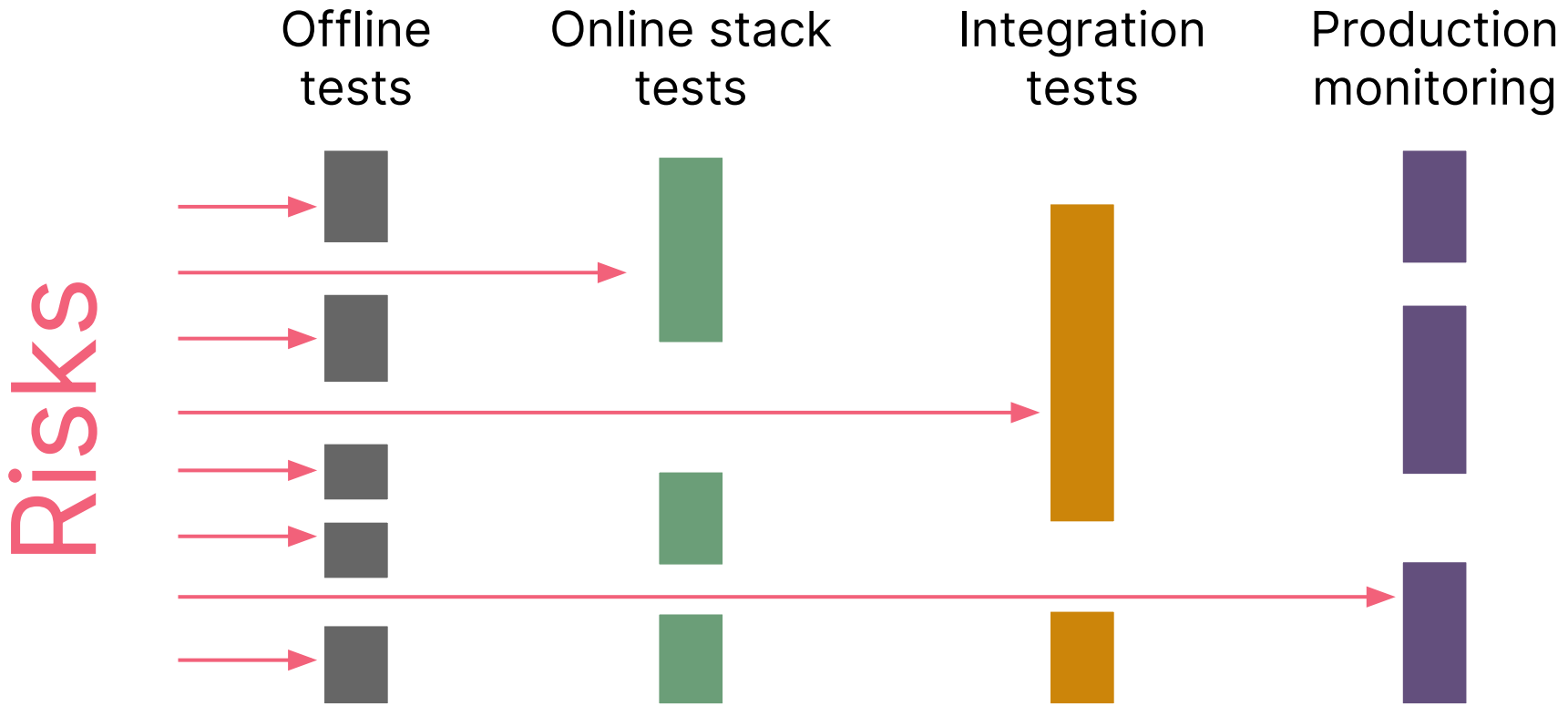
Swiss cheese testing model



Offline testing

```
.
├── backend.tf
├── config.dev.tfbackend
├── config.test.tfbackend
├── config.prod.tfbackend
├── main.tf
├── provider.tf
├── terraform.tfvars
├── variables.tf
├── terraform-dev.tfvars
├── terraform-test.tfvars
├── terraform-prod.tfvars
├── policies
├── .tflint.hcl
└── ...
```

```
# dev environment

terraform init -backend=false
terraform validate
tflint
trivy config --policy ./policies .
```

Shift left on
- **... quality**
- **... security**
- **... compliance**

Online testing

```
.
├── backend.tf
├── config.dev.tfbackend
├── config.test.tfbackend
├── config.prod.tfbackend
├── main.tf
├── provider.tf
├── terraform.tfvars
├── variables.tf
├── terraform-dev.tfvars
├── terraform-test.tfvars
├── terraform-prod.tfvars
├── tests
│   └── module-test.go
└── ...
```

```
cd test
go test -v .
```

Don’t test the framework, but the behaviour

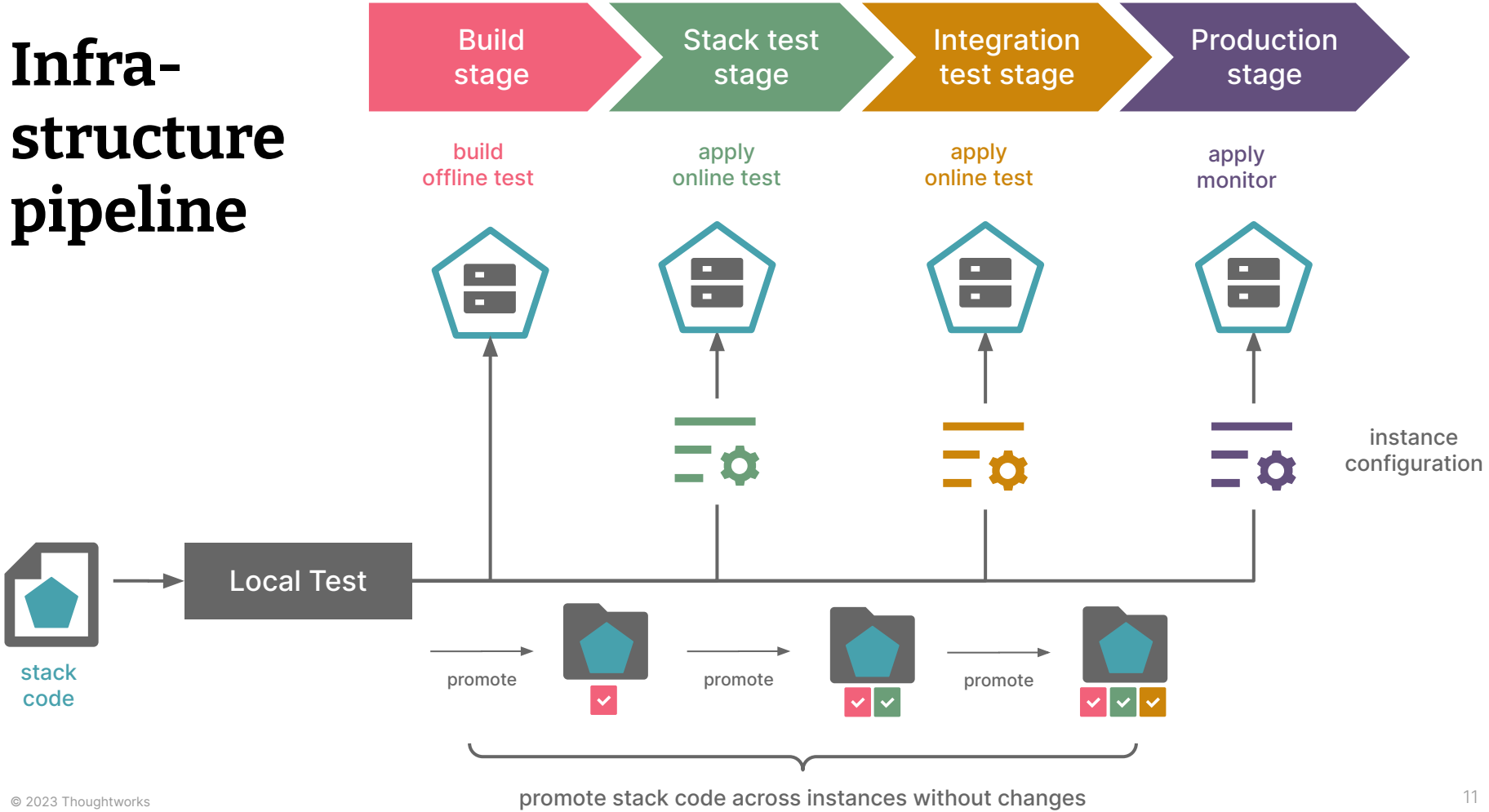
https://terratest.gruntwork.io/docs/getting-started/quick-start/

Reuse tested code across all environments

```
.
├── backend.tf
├── config.dev.tfbackend
├── config.test.tfbackend
├── config.prod.tfbackend
├── main.tf
├── provider.tf
├── terraform.tfvars
├── variables.tf
├── terraform-dev.tfvars
├── terraform-test.tfvars
├── terraform-prod.tfvars
└── ...
```


```
# dev environment

terraform init -backend-config= config.dev.tfbackend
terraform plan -var-file= terraform-dev.tfvars
terraform apply -var-file= terraform-dev.tfvars

# test environment

terraform init -backend-config= config.test.tfbackend
terraform plan -var-file= terraform-test.tfvars
terraform apply -var-file= terraform-test.tfvars

# prod environment
 ...
```

Infra-structure pipeline



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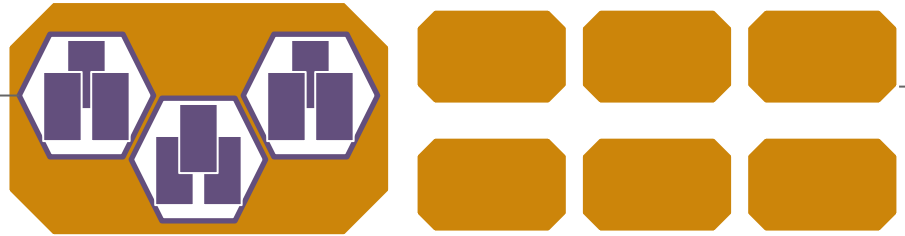
Key units of infrastructure architecture

Small units can be deployed quicker!

Products, applications, and business capabilities

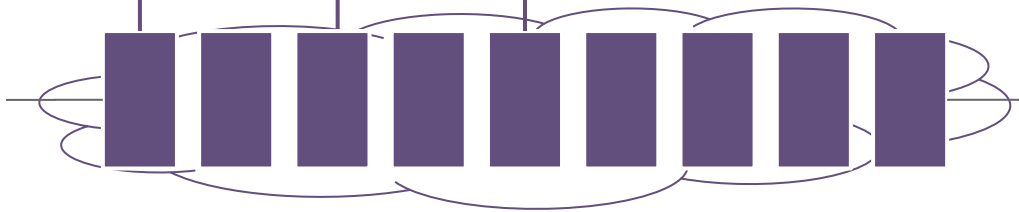
infrastructure stacks



Technology capabilities

These are the small simple things that you can change independently

An infrastructure stack is a collection of cloud **infrastructure resources** managed as a group



Infrastructure resources

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Challenges

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Blast Radius

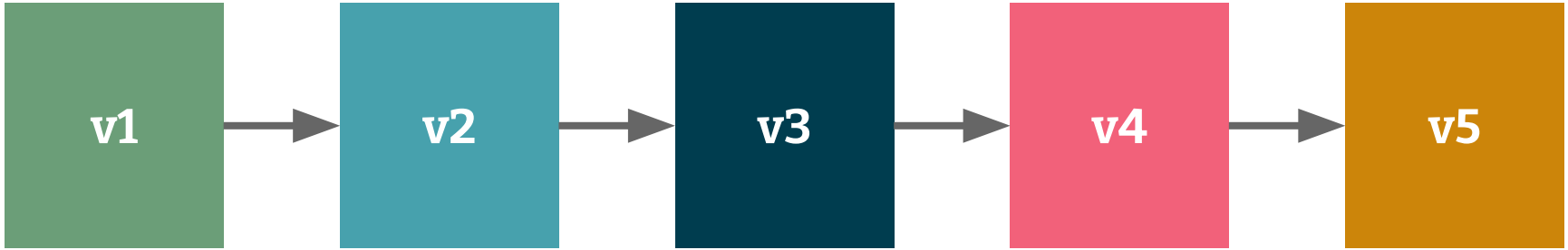
The term *blast radius* describes the potential damage a given change could make to a system. It's usually based on the elements of the system you're changing, what other elements depend on them, and what elements are shared.

Kief Morris, Infrastructure as Code 2nd Edition

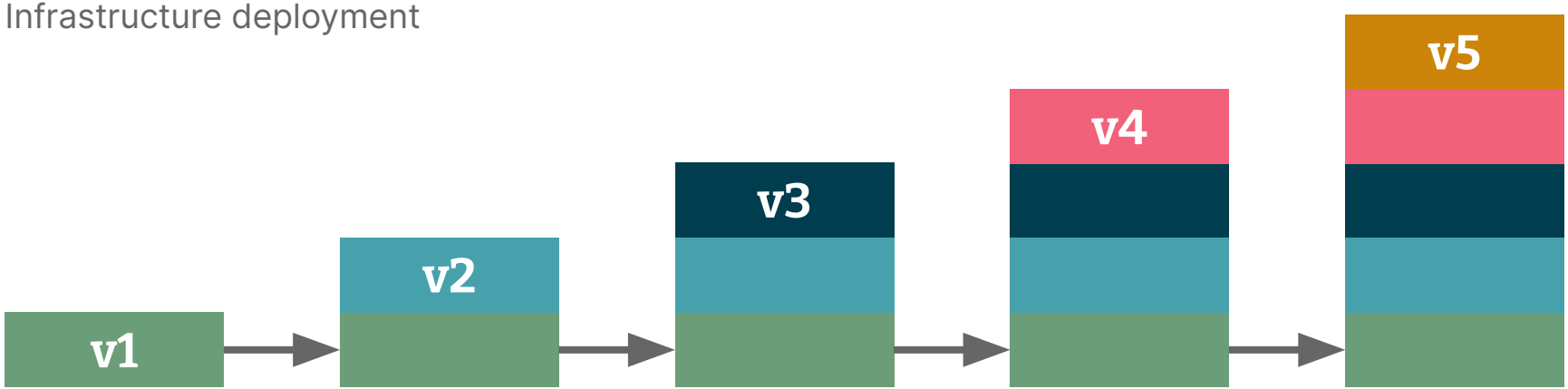
Image Source: commons.wikimedia.org

(Im)mutable deployment

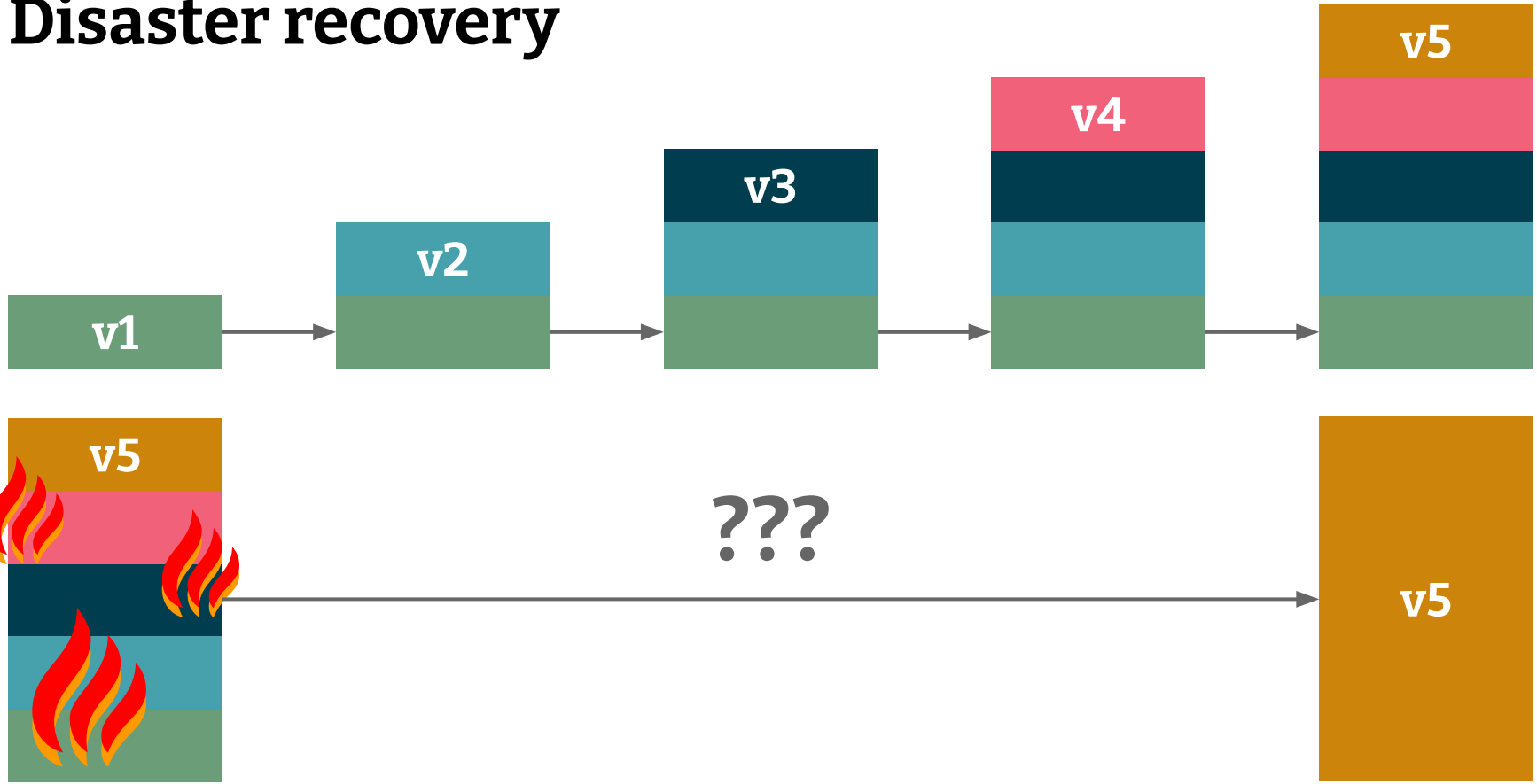
(Modern) application deployment



Infrastructure deployment



Disaster recovery



Summary

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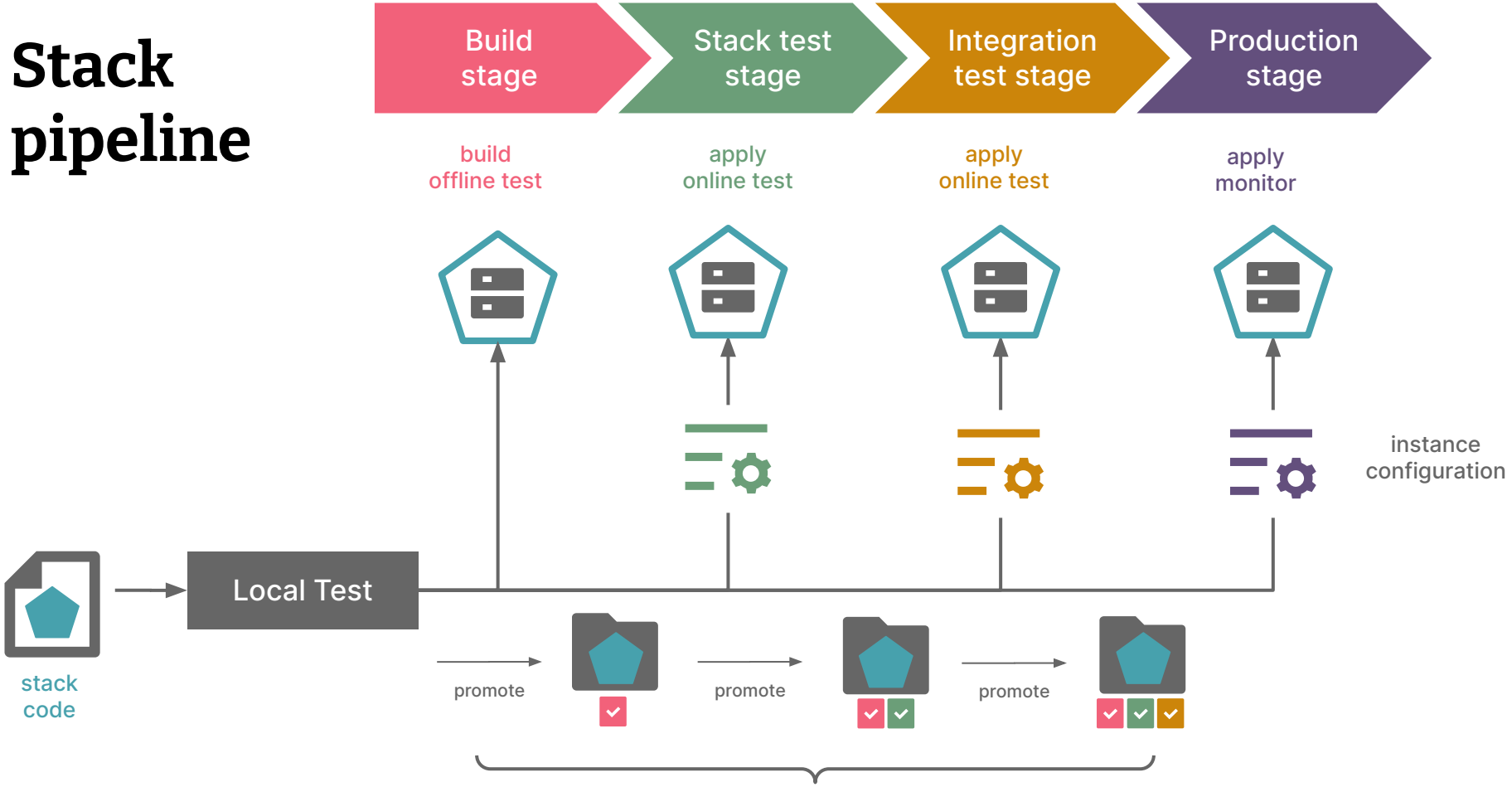
Stack pipeline



Thank you for your attention 👍

We will be around if you have any questions!

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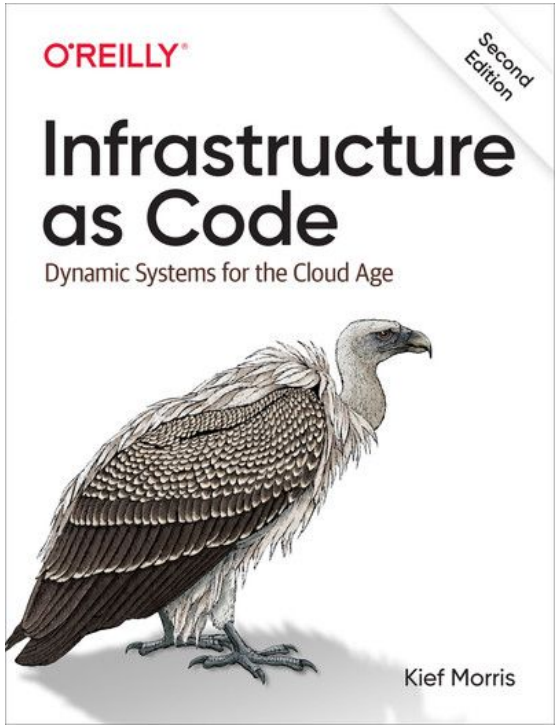
References



Kief Morris, Infrastructure as Code - 2nd Edition

References

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- Structuring Hashicorp Terraform Configuration for Production
- Running Terraform in Automation
- Test-Driven Development for Infrastructure
- Demo Repository: Handling Environment Variables
- What if Infrastructure-as-Code never existed