

PART 5: DESIGN

Infrastructure as Code

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WORKSHOP CONTENTS

FOUNDATIONS

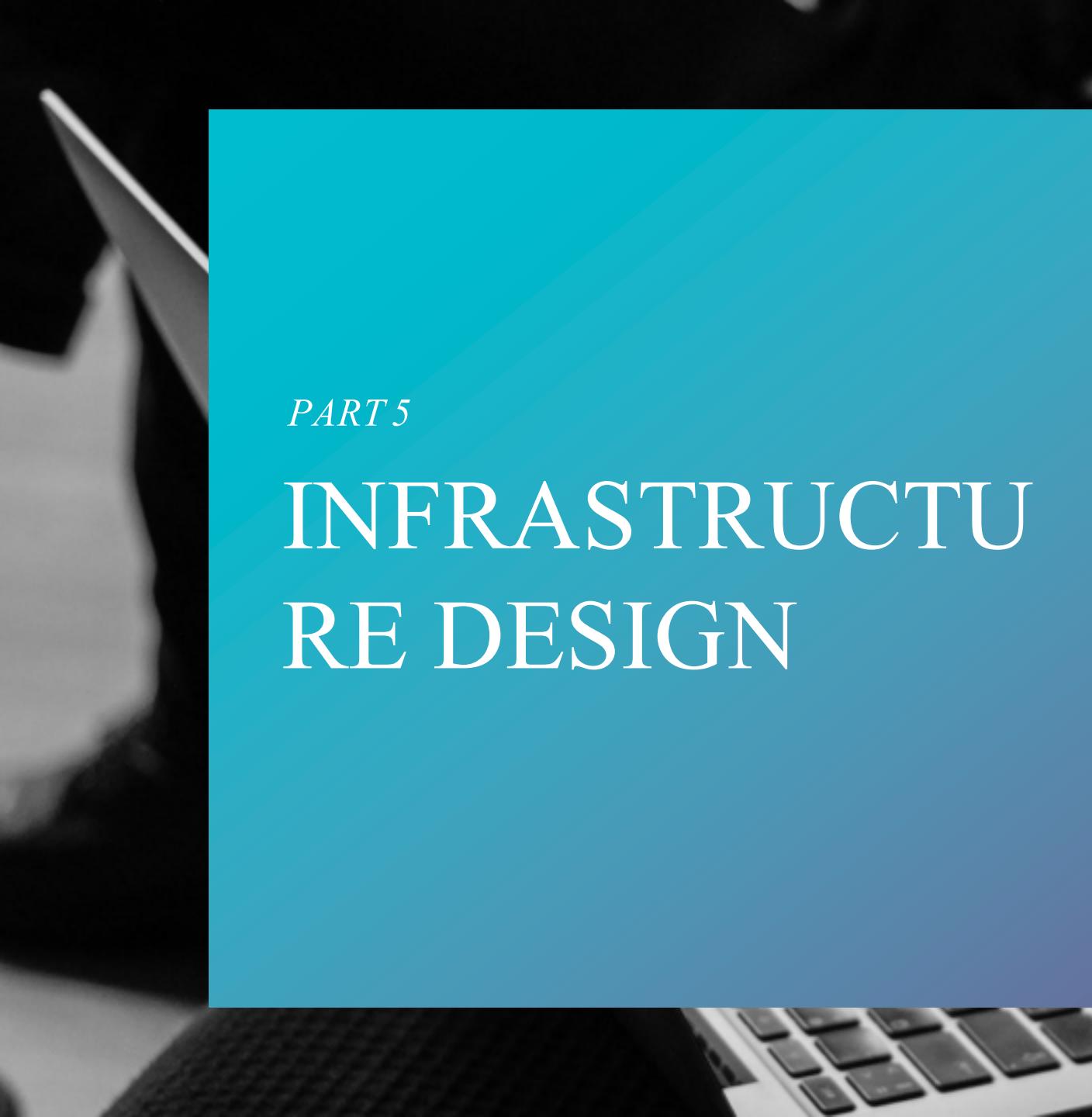
STACKS

TESTING

RUNTIMES

DESIGN

WORKFLOW



PART 5

INFRASTRUCTURE DESIGN

GOOD DESIGN

LIBRARIES &
MODULES

STACKS AS
COMPONENTS

DEPENDENCIES

BOUNDARIES

CHANGING SAFELY

A wide-angle landscape photograph of a rugged mountain range. The mountains are covered in dark, rocky terrain with sparse vegetation. The sky is filled with heavy, grey clouds. In the foreground, there's a field of low-lying, dry grass.

GOOD DESIGN

GOALS

Optimize for change

- Easy to understand
- Easy to change
- Safe to change



DESIGN CHARACTERISTICS

A well-designed component has:

- Low coupling
- High cohesion



DESIGN PRINCIPLES

- DRY (Don't Repeat Yourself)
- Rule of Composition
- Single Responsibility Principle
- Design Components Around Domain Concepts
- Law of Demeter



BUILDING STACKS FROM COMPONENTS

PROJECT SHAPES

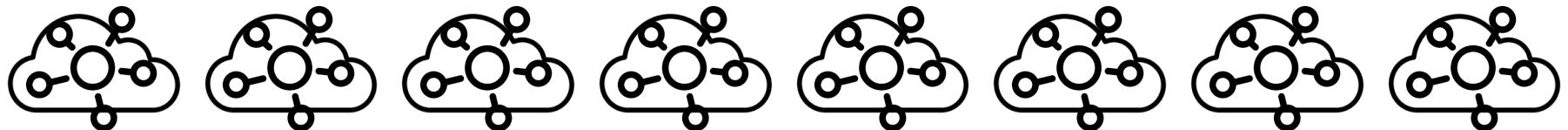
- Low-level stacks
- High-level stacks



LOW-LEVEL Stack Definition

The project defines the
shape of the
environment

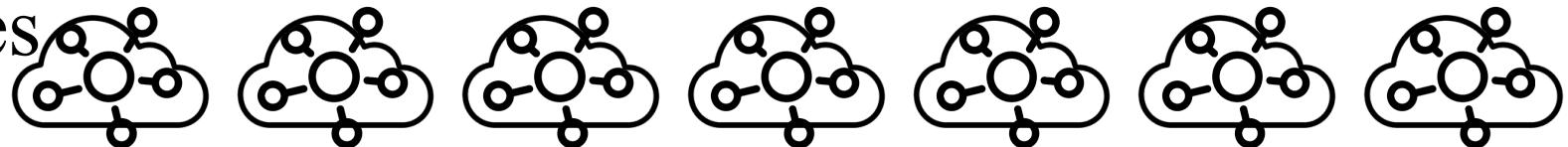
Code maps directly
to platform
resources



HIGH-LEVEL Stack Definition

Project defines environment
using higher-level abstractions

Libraries and
components



FACADE MODULE

PATTERN

- Reduces the configurable surface area of an underlying resource
- Goal is to simplify and standardize how a resource is used

```
simple_db:  
  application: "shopping"  
  environment: "staging"  
  ram: 4GB  
  storage: 500GB
```

◦ STACK CODE

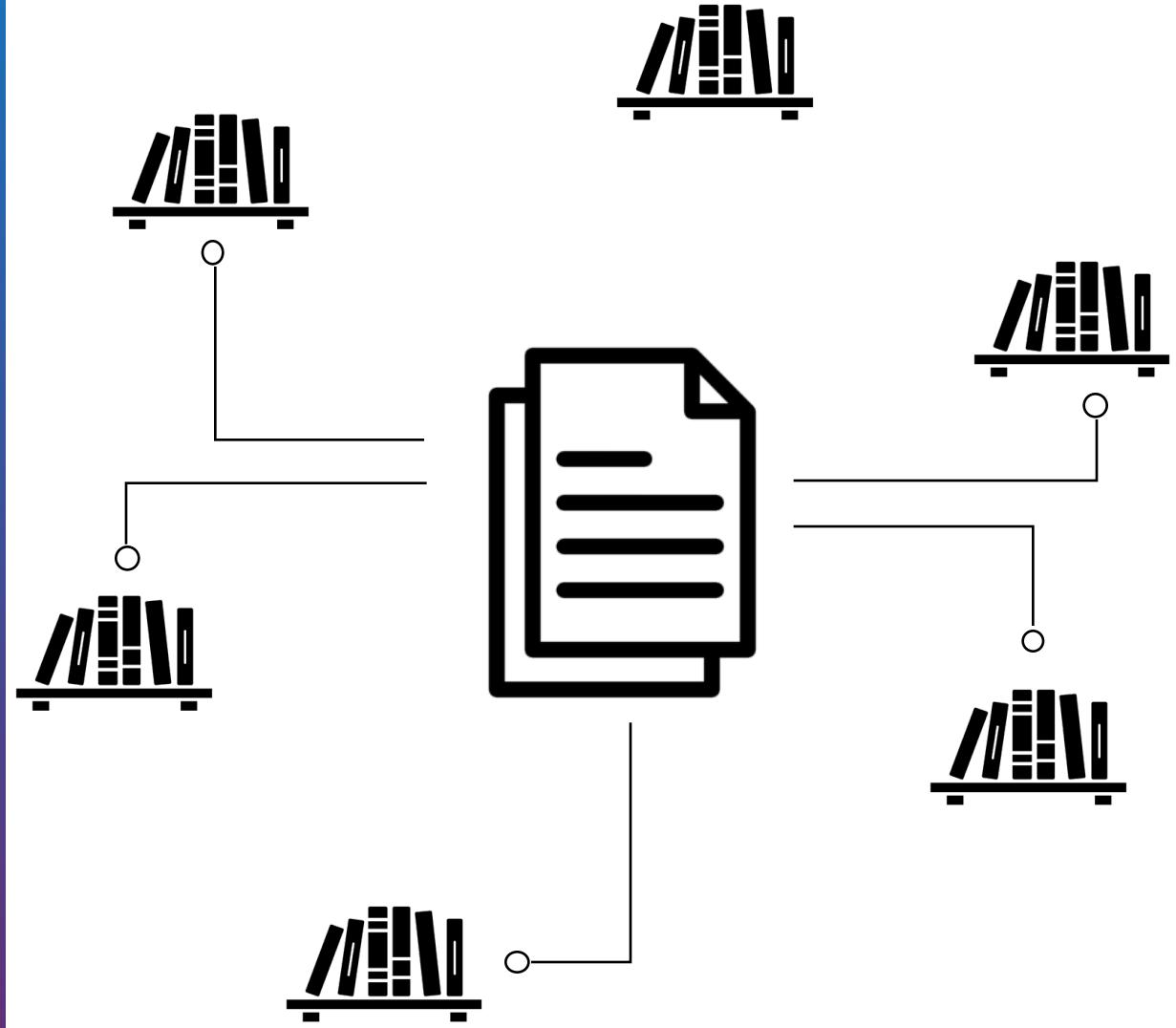
```
module: simple_db  
  database_instance:  
    id: db_${application}-${environment}  
    engine: "mysql"  
    engine_version: 5.7  
    nodes:  
      ram: ${var.ram}  
      disk_size: ${var.storage}
```

◦ MODULE CODE

UNSHARED MODULE

ANTIPATTERN

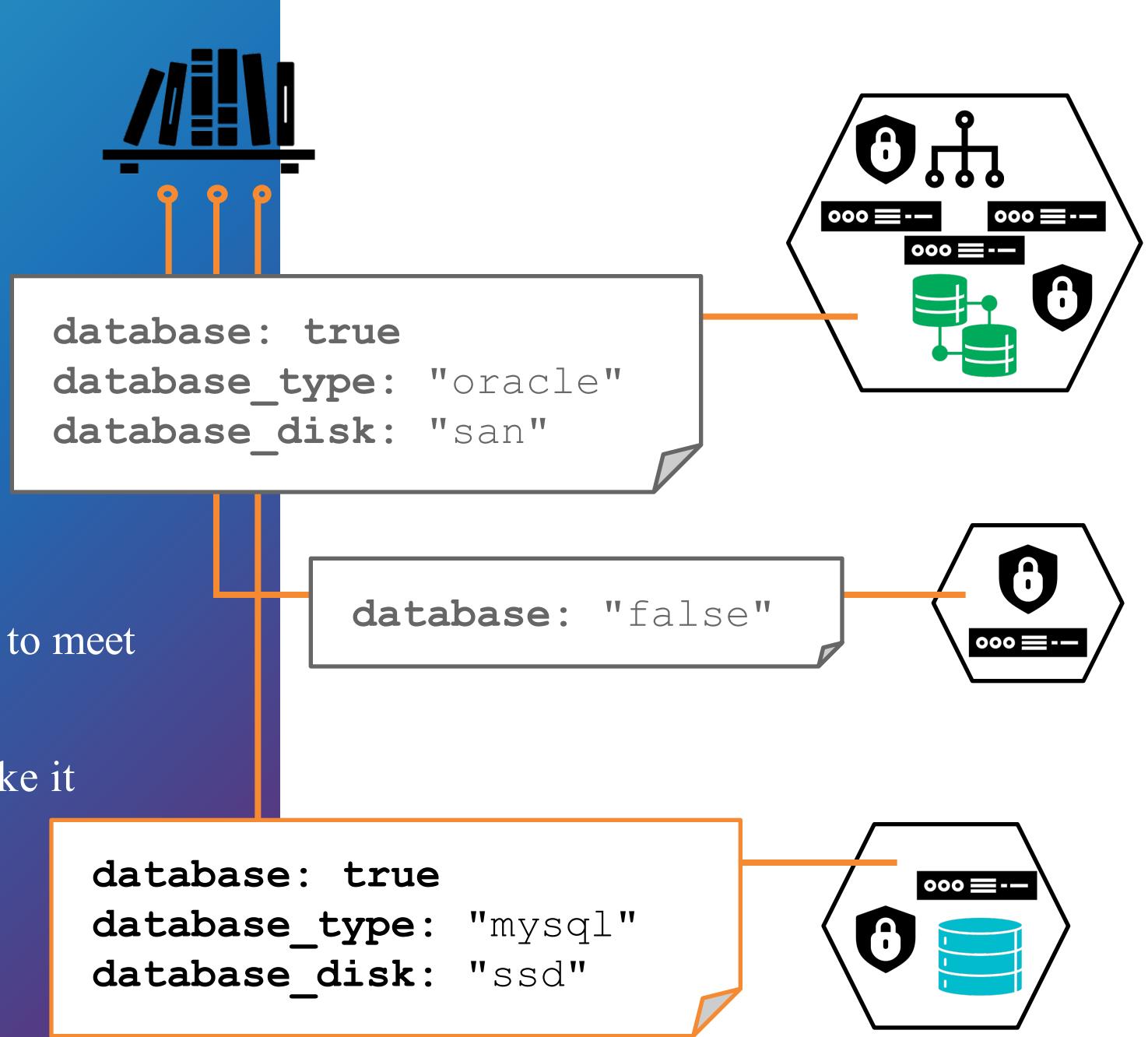
- A module is only used in one stack
- Adds maintenance overhead for apparent tidiness



SPAGHETTI MODULE

ANTIPATTERN

- Module is highly configurable to meet diverse but specific use cases
- Drastically variable results make it difficult to test and maintain



DATABASE MODULE



Shopping Service Stack



Search Service Stack



Customer Service Stack



TIGHTLY COUPLED MODULE

ANTIPATTERN

- Module code is too specific, changes likely to break stacks that use it

◦STACK CODE

```
java_application_infrastructure:
```

```
  name: "shopping_app_cluster"  
  application: "shopping_app"  
  application_version: "4.20"  
  network_access: "public"
```

◦ LIBRARY



Auto-scaling pool of
virtual machines

Database instance

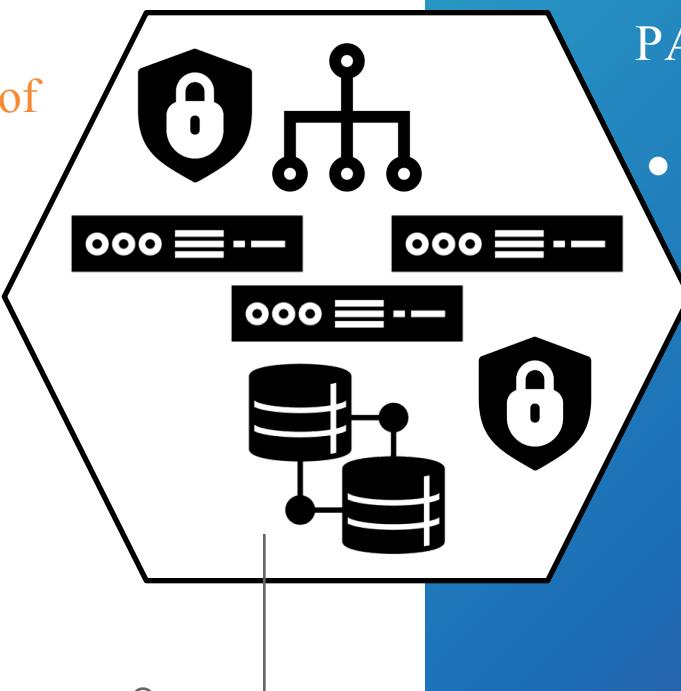
Network routes

Load balancer VIP

Network security rules

Platform security roles

STACK
INSTANCE

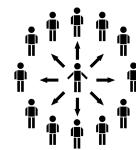


DOMAIN ENTITY LIBRARY

PATTERN

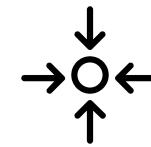
- Wraps multiple resources to present a single entity

RECOMMENDATIONS FOR CODE REUSE



Minimize Variability

If you need a module to do two or more different things, maybe you need two or more modules



One Concern Per Module

The purpose of each module should be clear, with limited scope

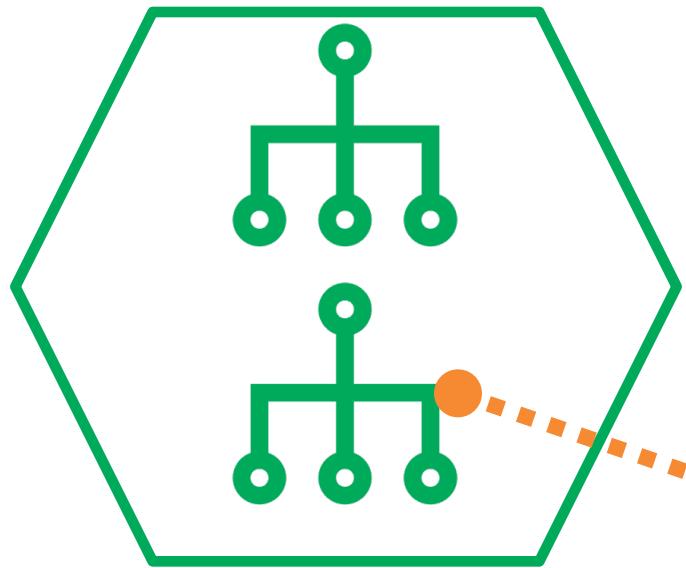


Don't Fear Duplication

Reuse code when it's being used for the same purpose, not because it involves similar resources

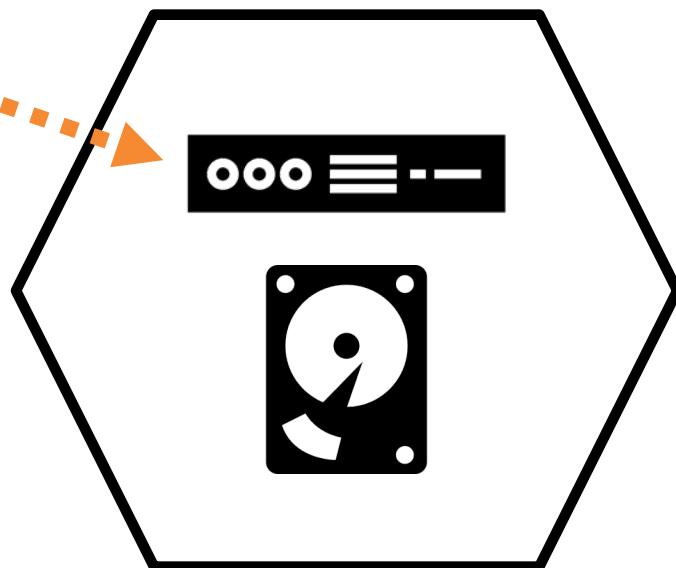
A wide-angle photograph of a rugged mountain range under a cloudy sky. In the foreground, there's a grassy, rocky hillside. The middle ground shows a valley with more hills and what appears to be a small body of water or a clearing. The background features several peaks, with one prominent peak on the right side.

STACKS AS COMPONENTS

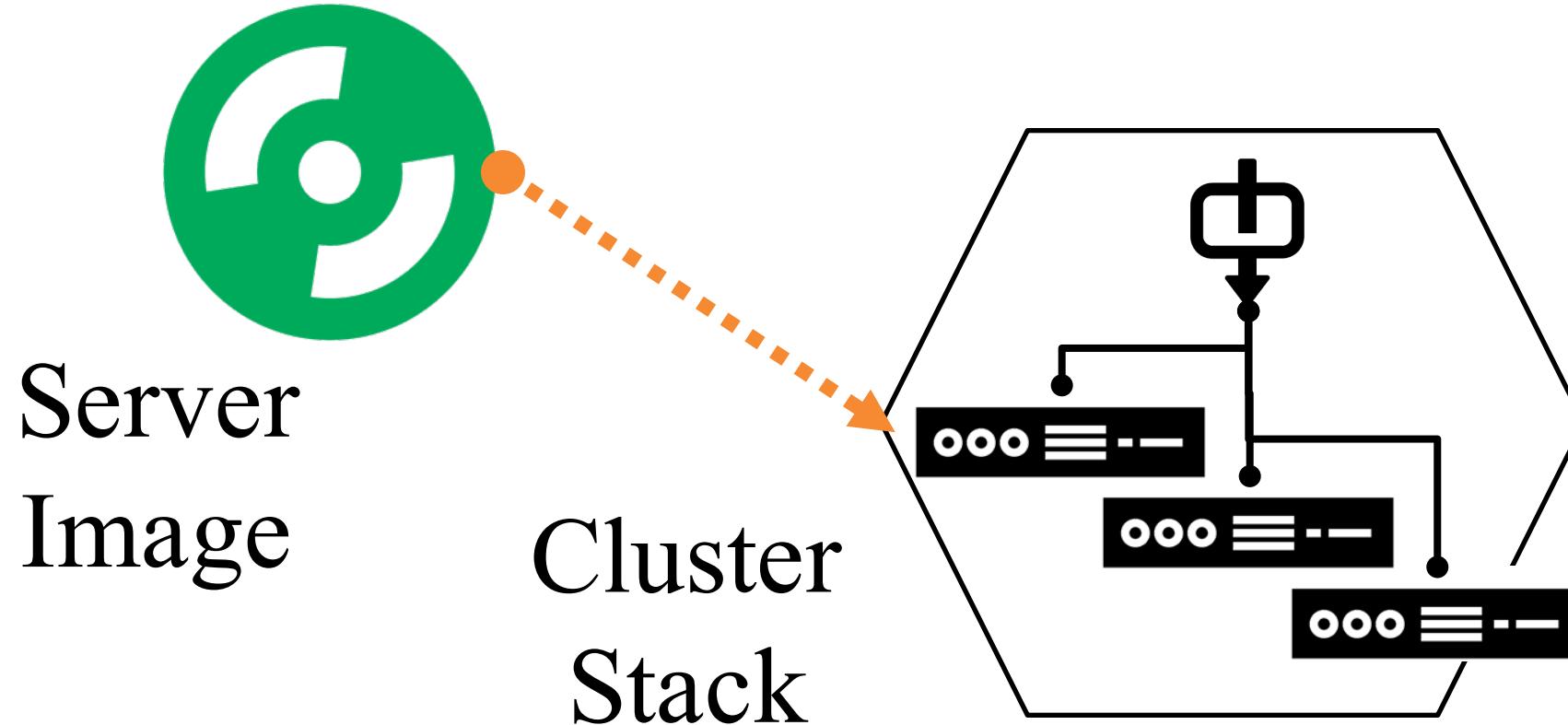


PROVIDER
STACK

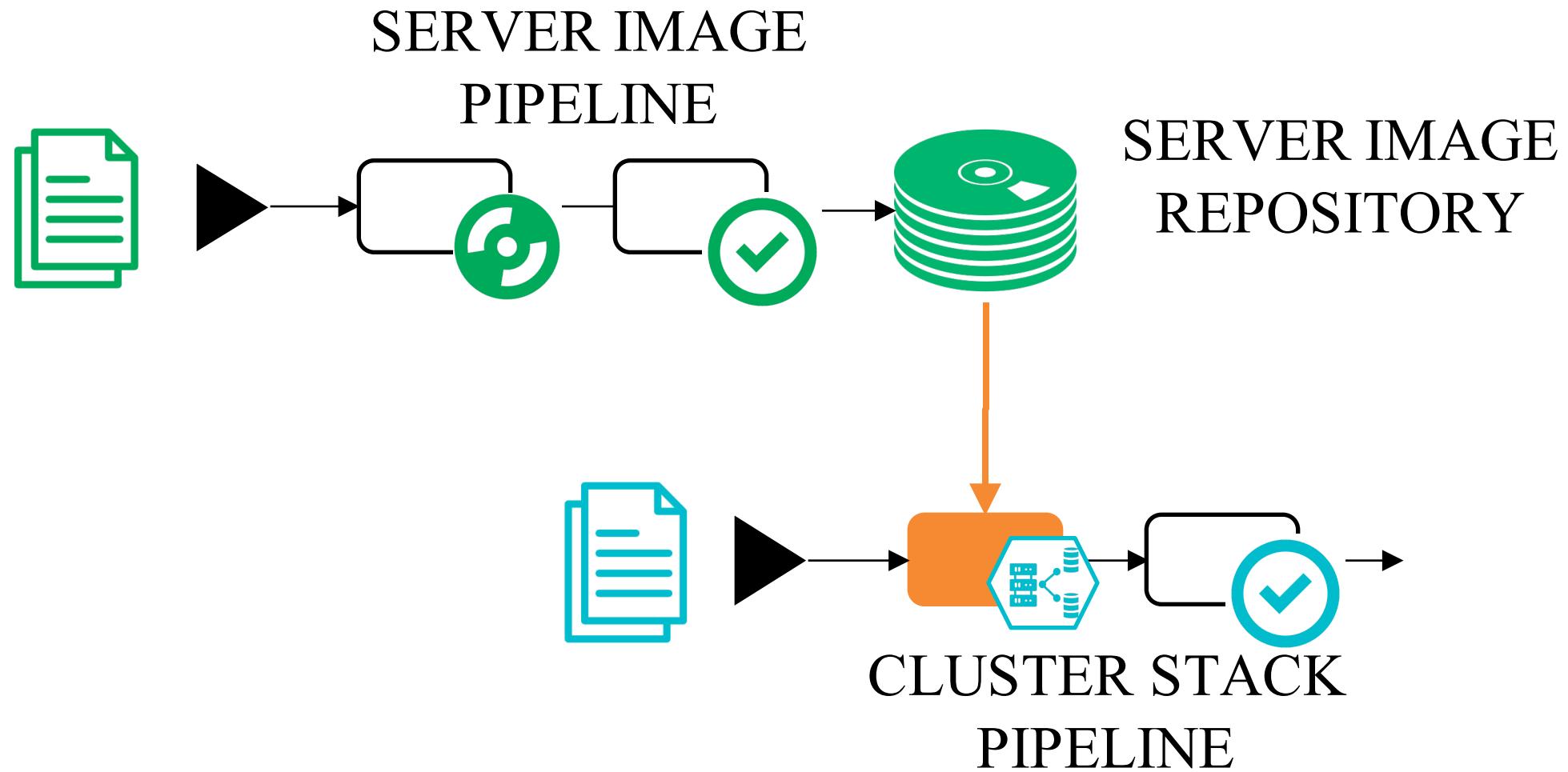
CONSUMER
STACK



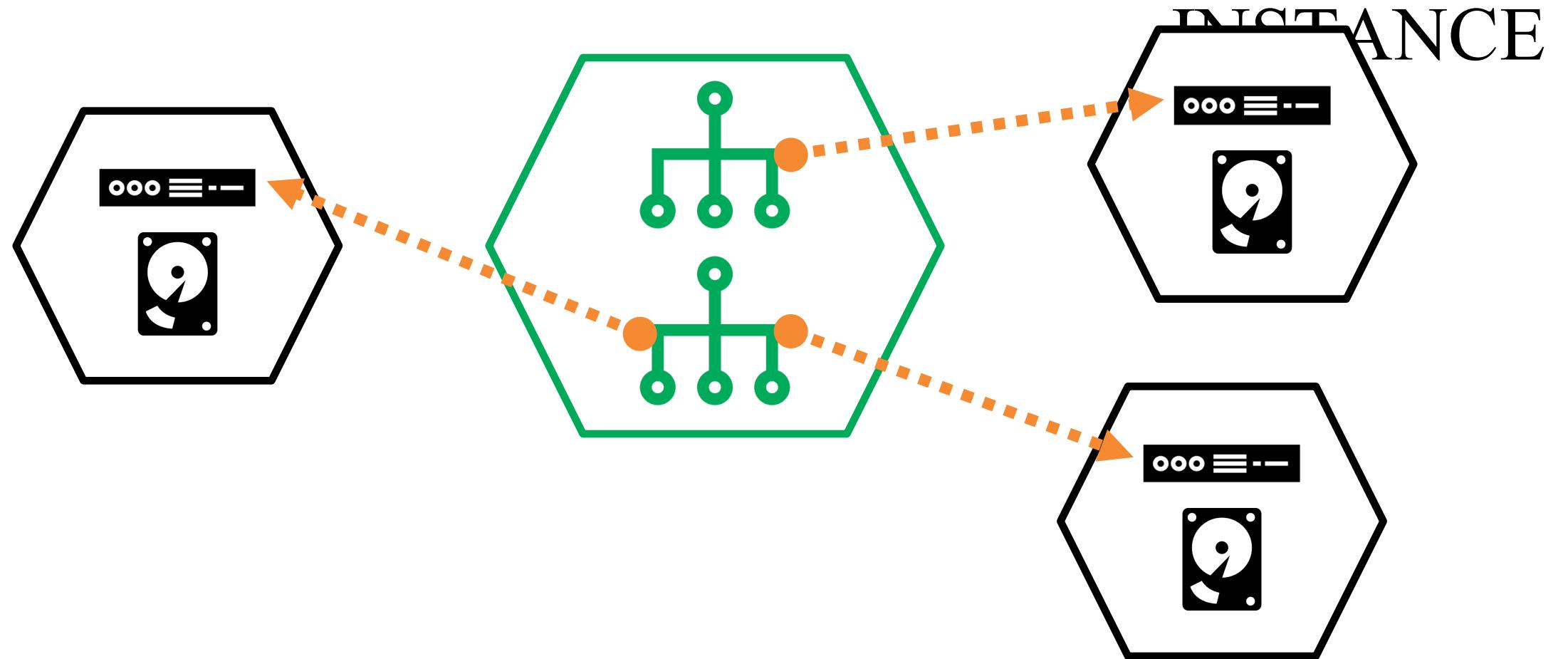
PROVIDING INFRASTRUCTURE AS A LIBRARY



PROVIDING INFRASTRUCTURE AS A LIBRARY



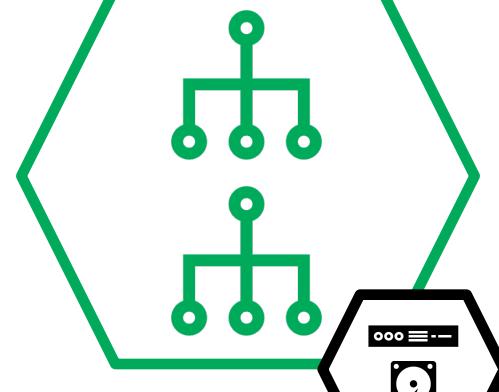
PROVIDING A SHARED INFRASTRUCTURE



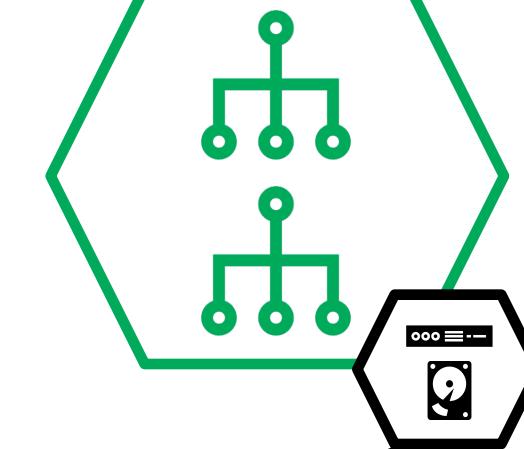
NETWORKING STACK PIPELINE



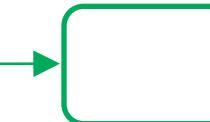
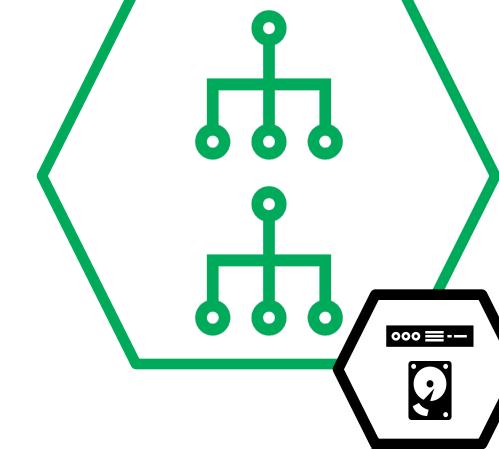
TEST



STAGING

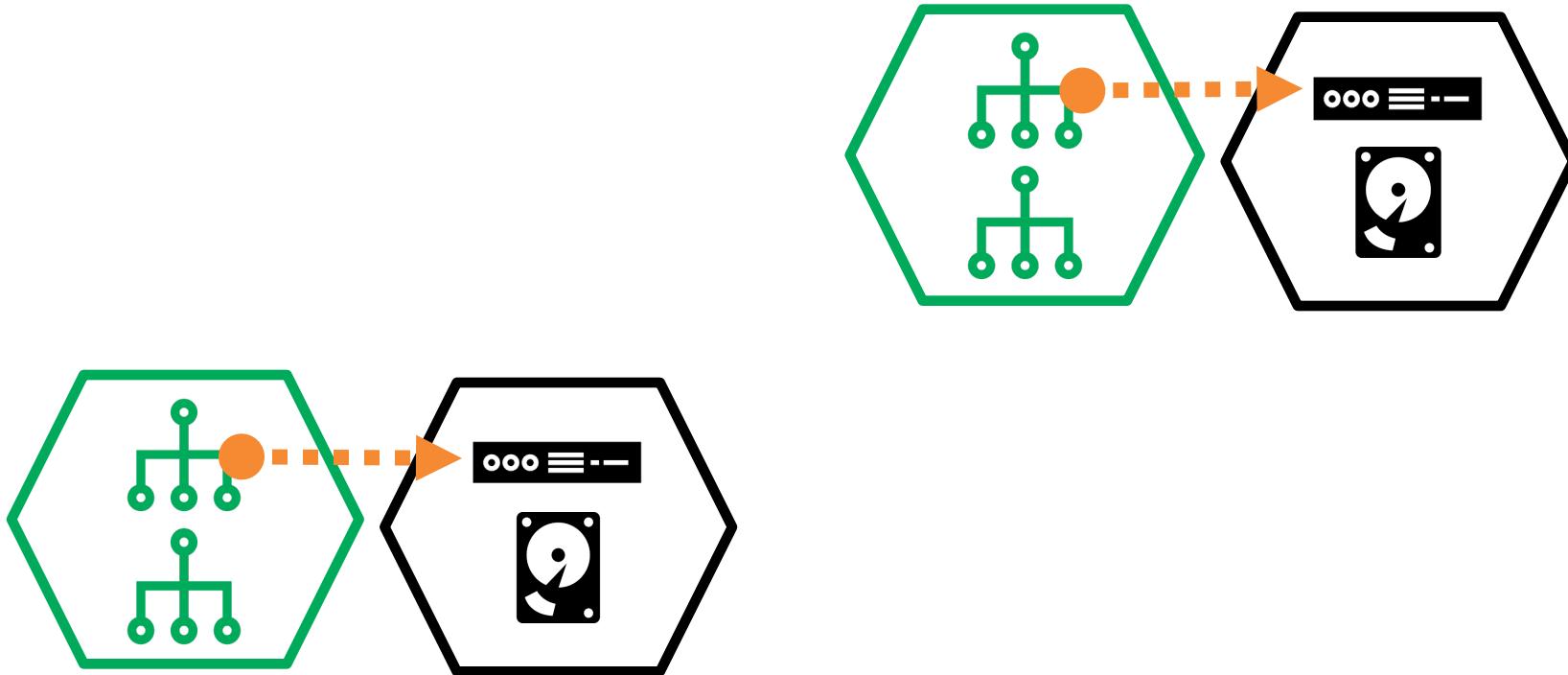


PRODUCTION

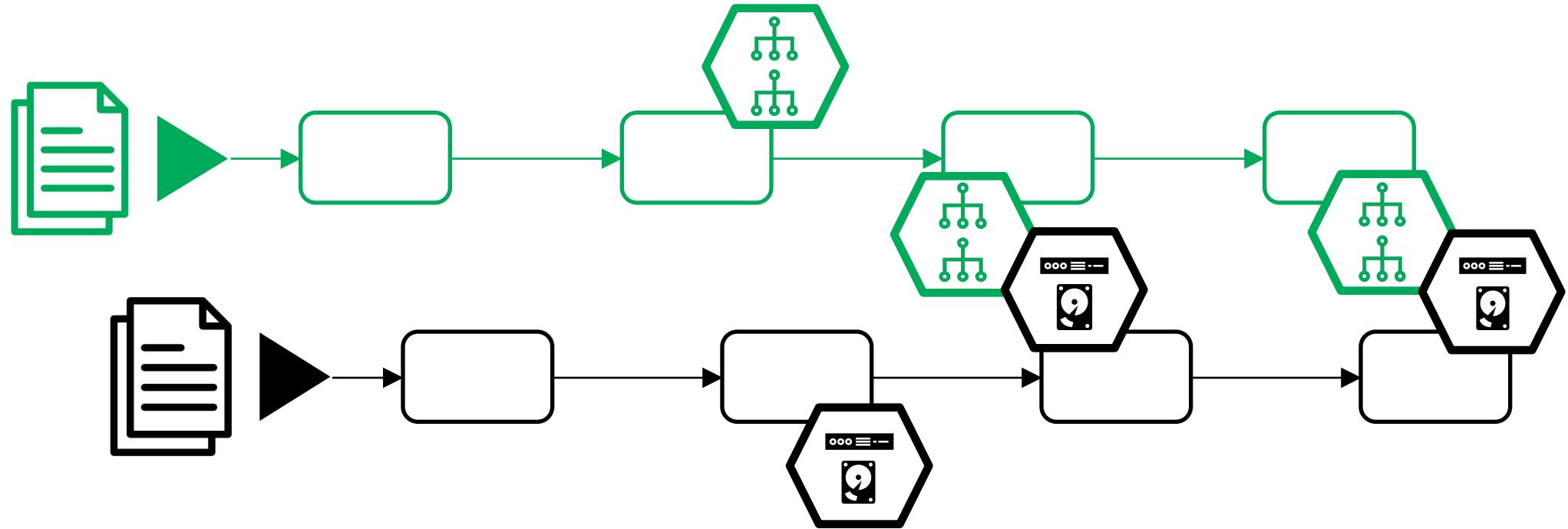


APPLICATION STACK PIPELINE

SHARED NOTHING STACKS



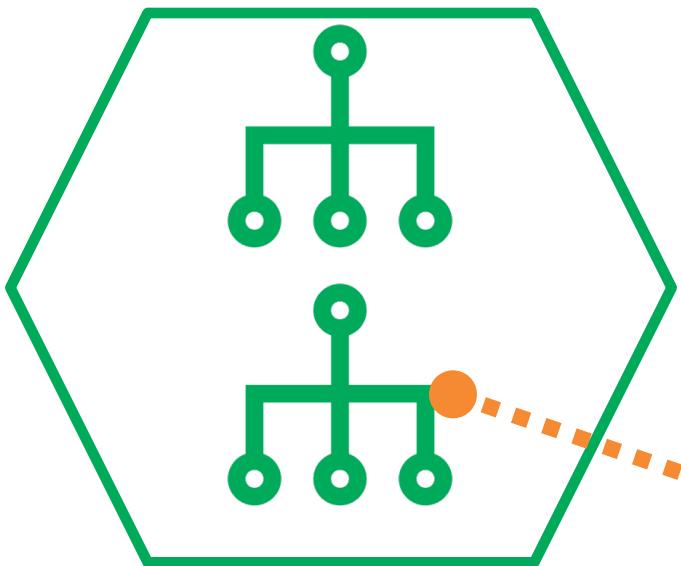
Use testing and pipelines to enforce clean boundaries



A wide-angle photograph of a rural landscape. In the foreground, there's a field of tall, dry grass. Beyond it, a valley opens up with more fields and a small cluster of buildings. The middle ground is dominated by a range of hills and mountains. One prominent peak on the right side has a rugged, rocky top. The sky is filled with soft, greyish-blue clouds.

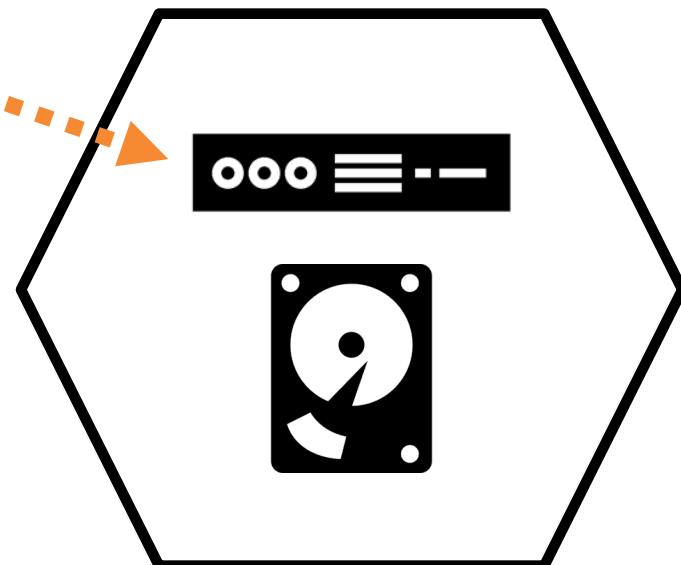
DISCOVERING DEPENDENCIES

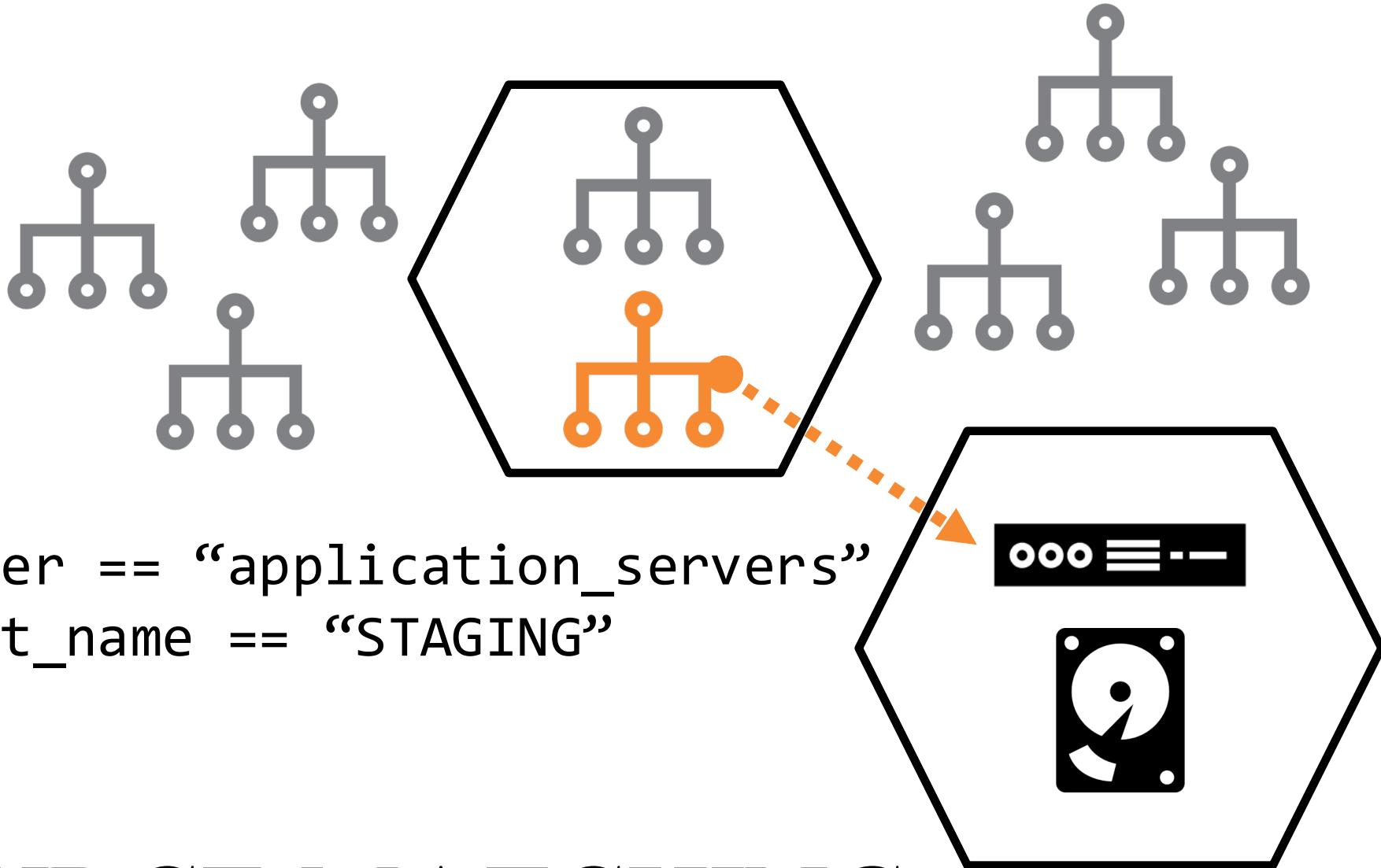
vlan-appserver-staging = vlan1234ab



PROVIDER
STACK

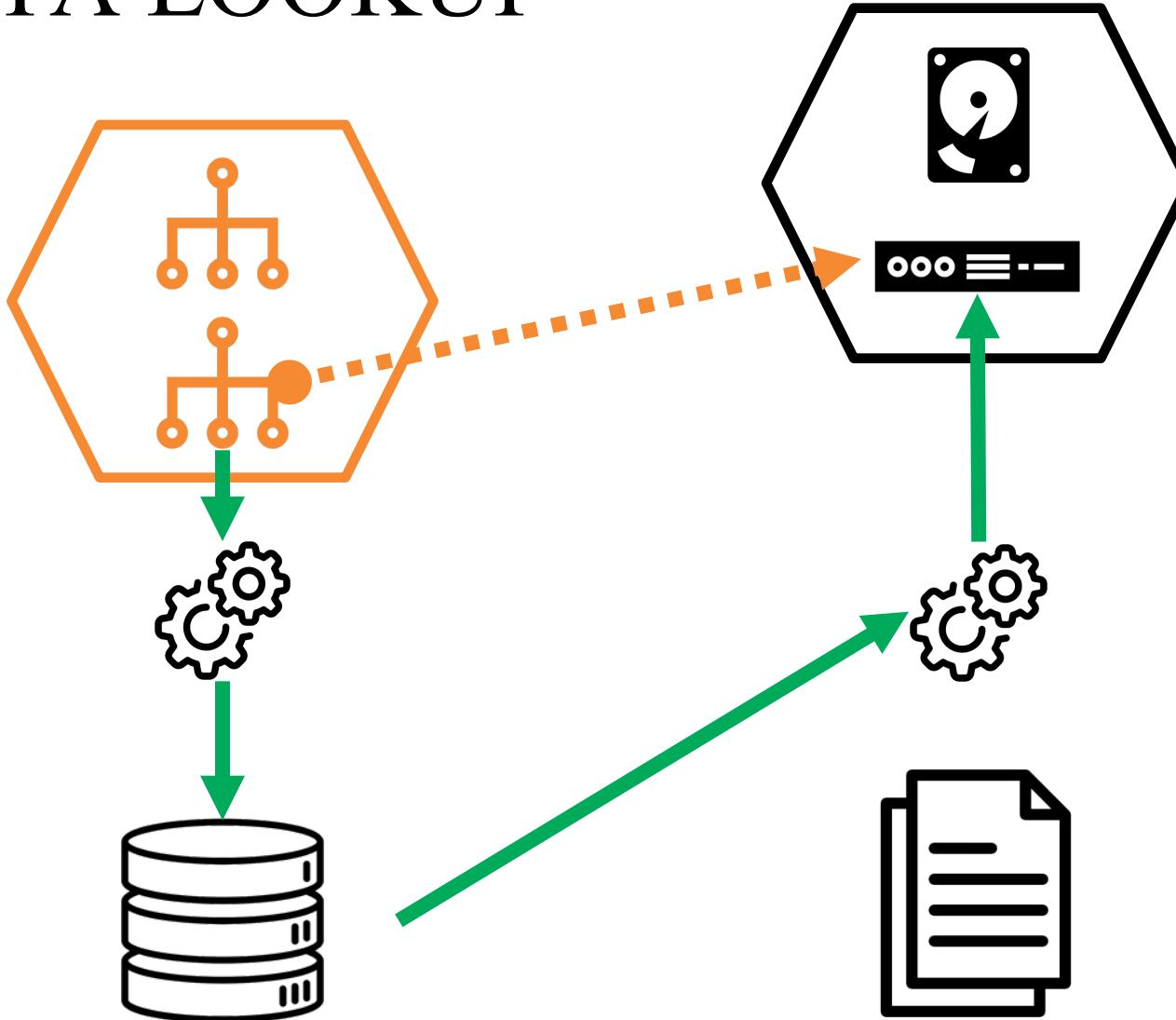
CONSUMER
STACK



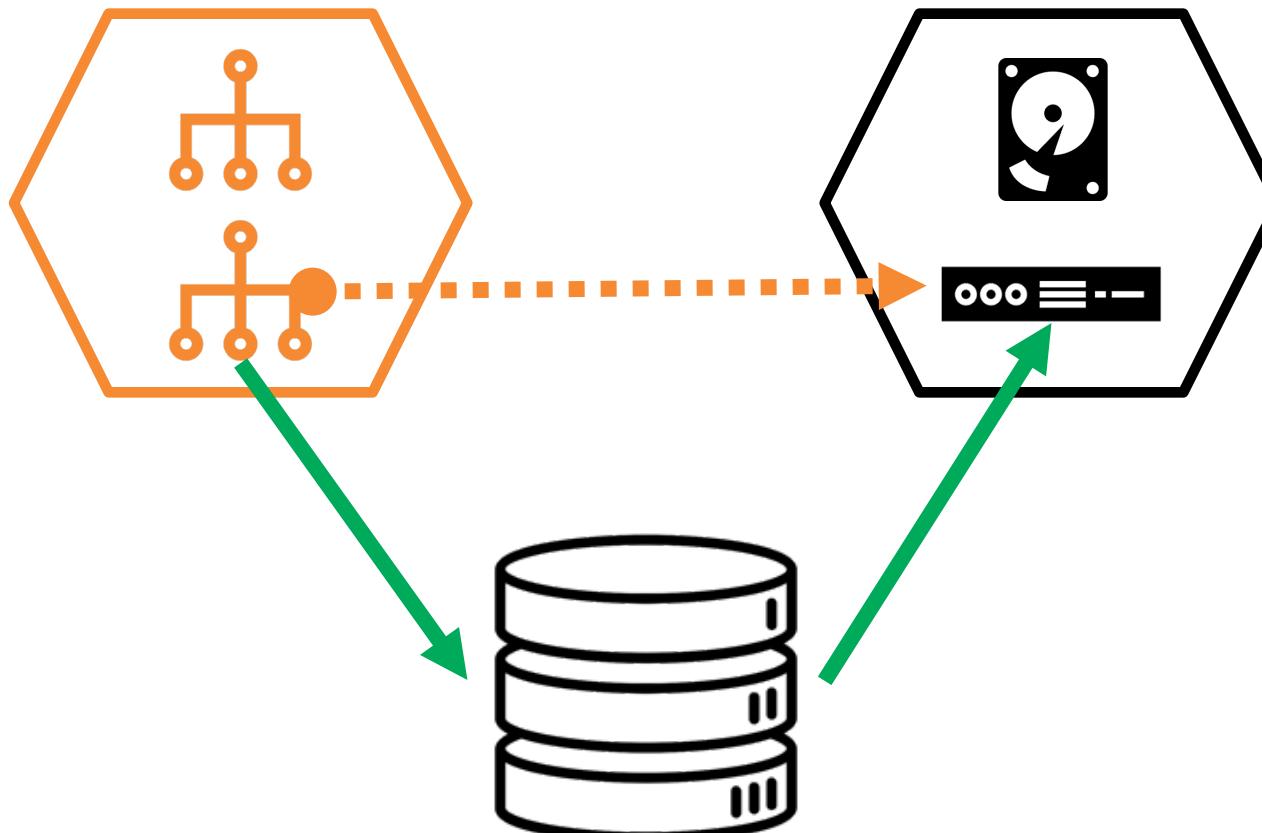


RESOURCE MATCHING

STACK DATA LOOKUP

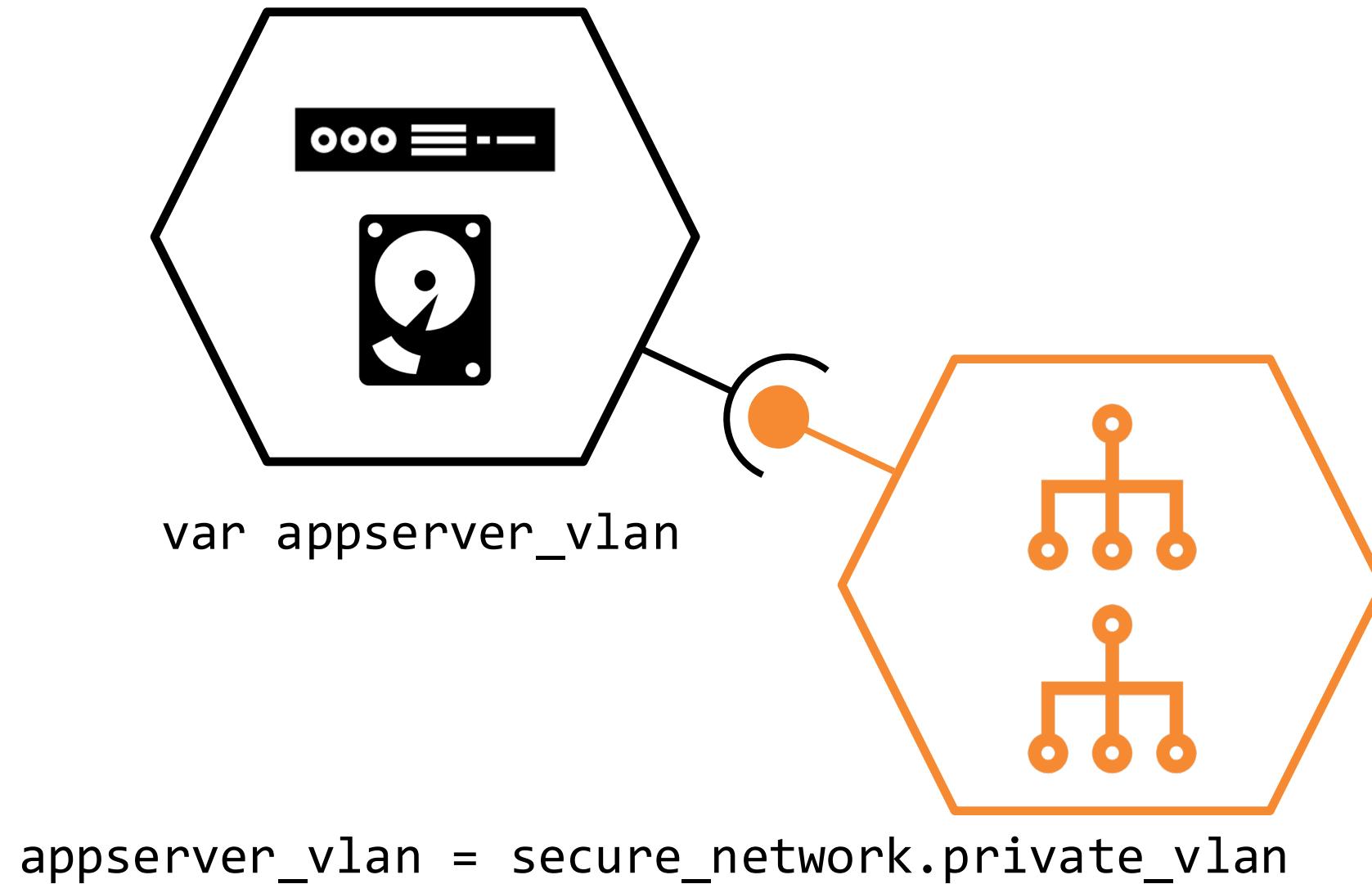


INTEGRATION REGISTRY LOOKUP

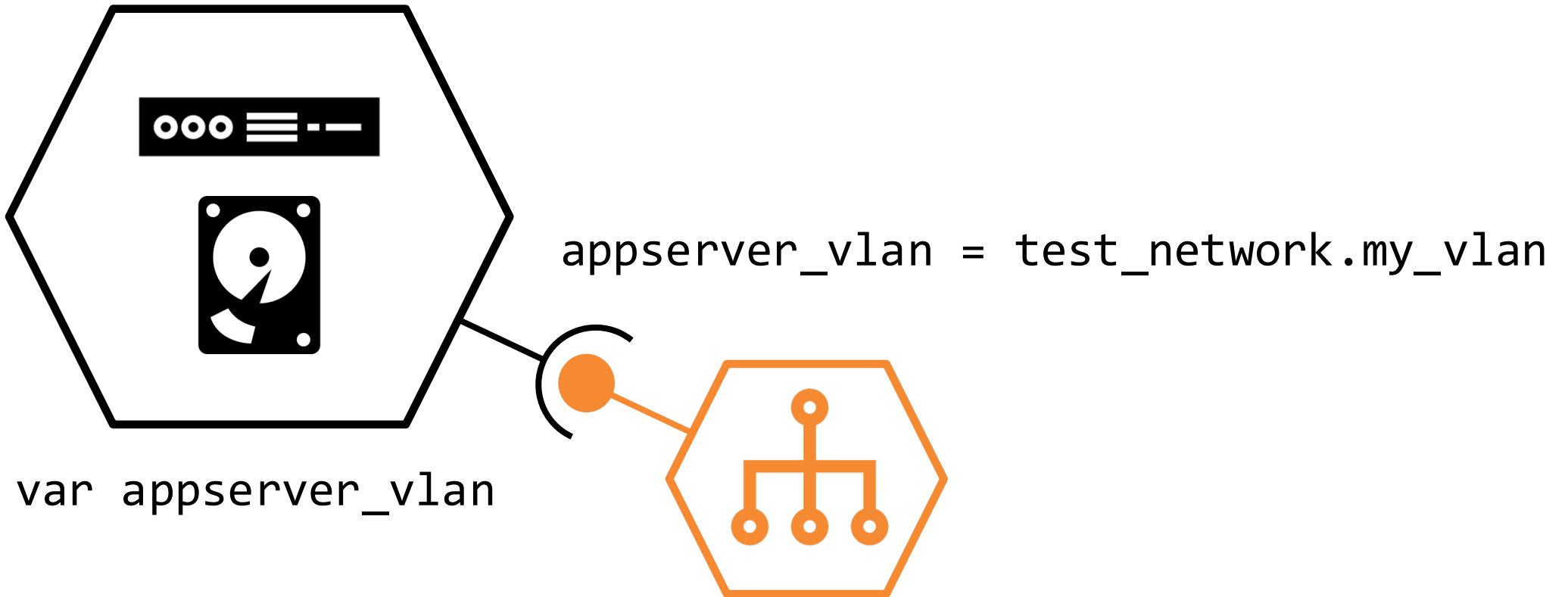


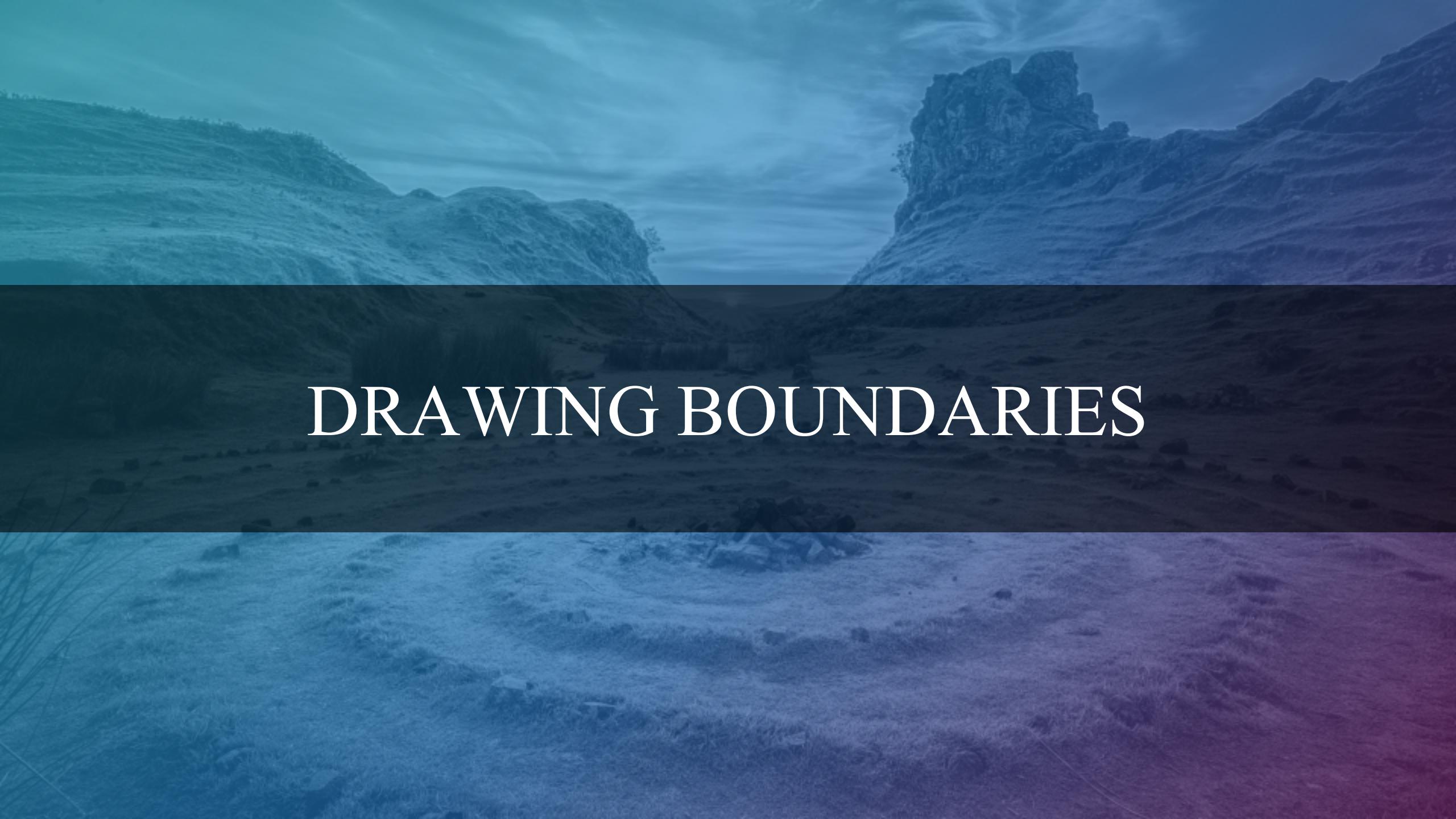
/staging/shared-networking/appserver_vlan = v1234ab

DEPENDENCY INJECTION



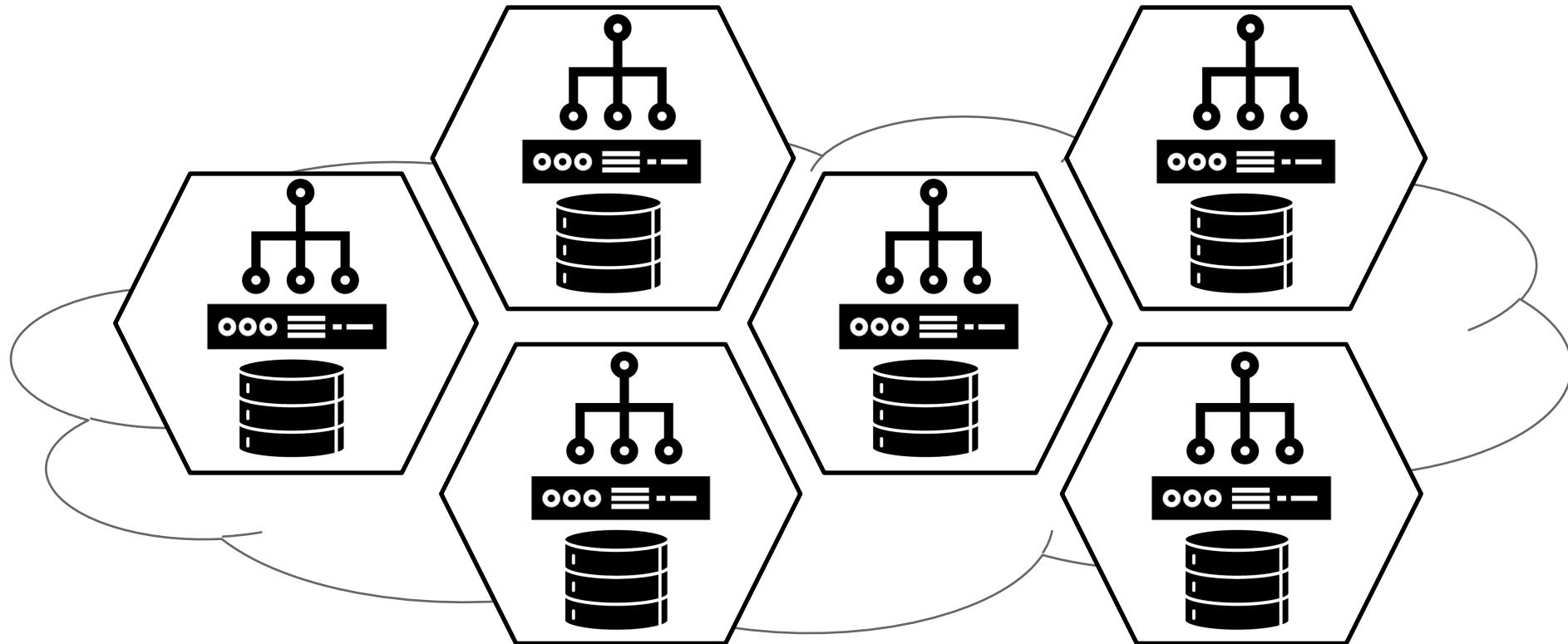
DEPENDENCY INJECTION



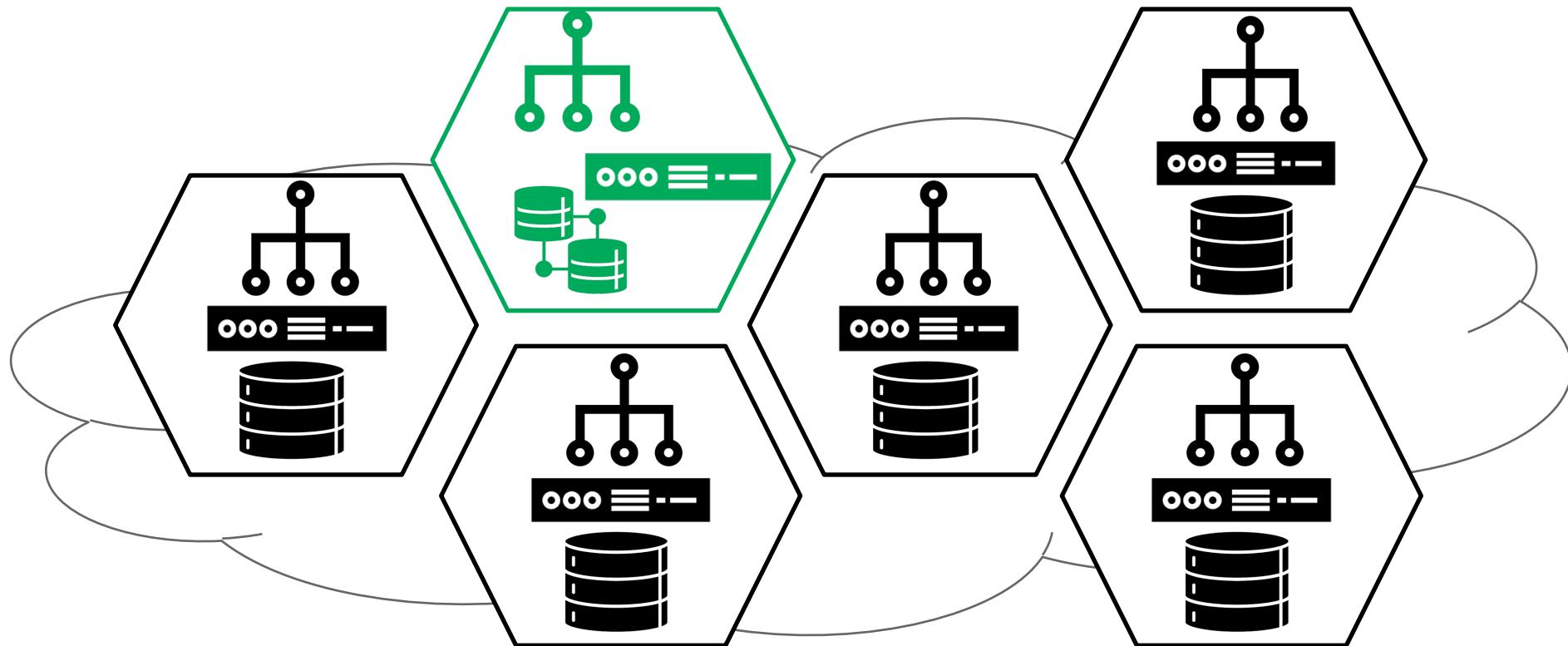
The background image is a wide-angle photograph of a rugged mountain range under a dramatic, cloudy sky. The foreground is a dark, grassy field. The mountains in the background are partially obscured by clouds, creating a sense of depth and mystery.

DRAWING BOUNDARIES

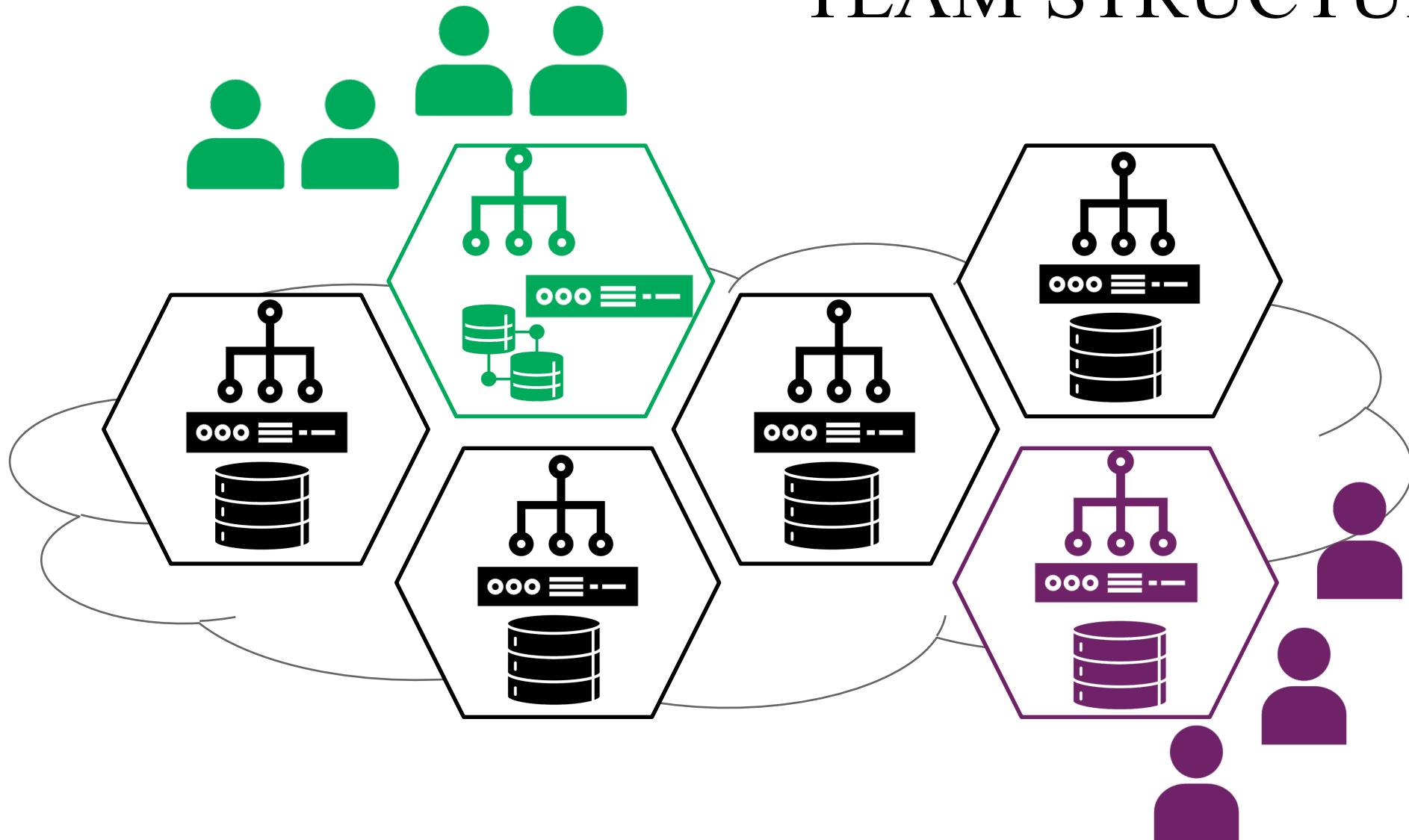
DRAWING BOUNDARIES

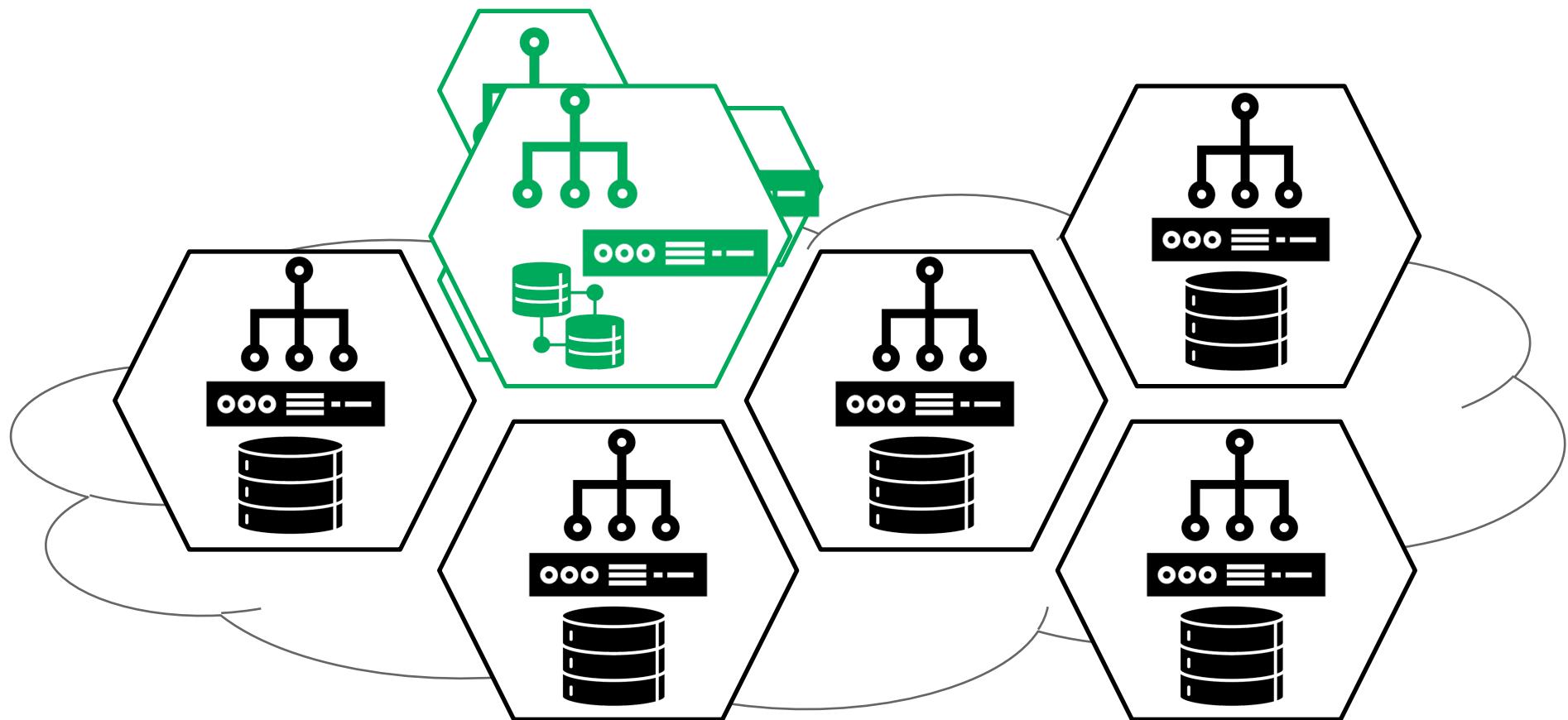


NATURAL PATTERNS OF CHANGE



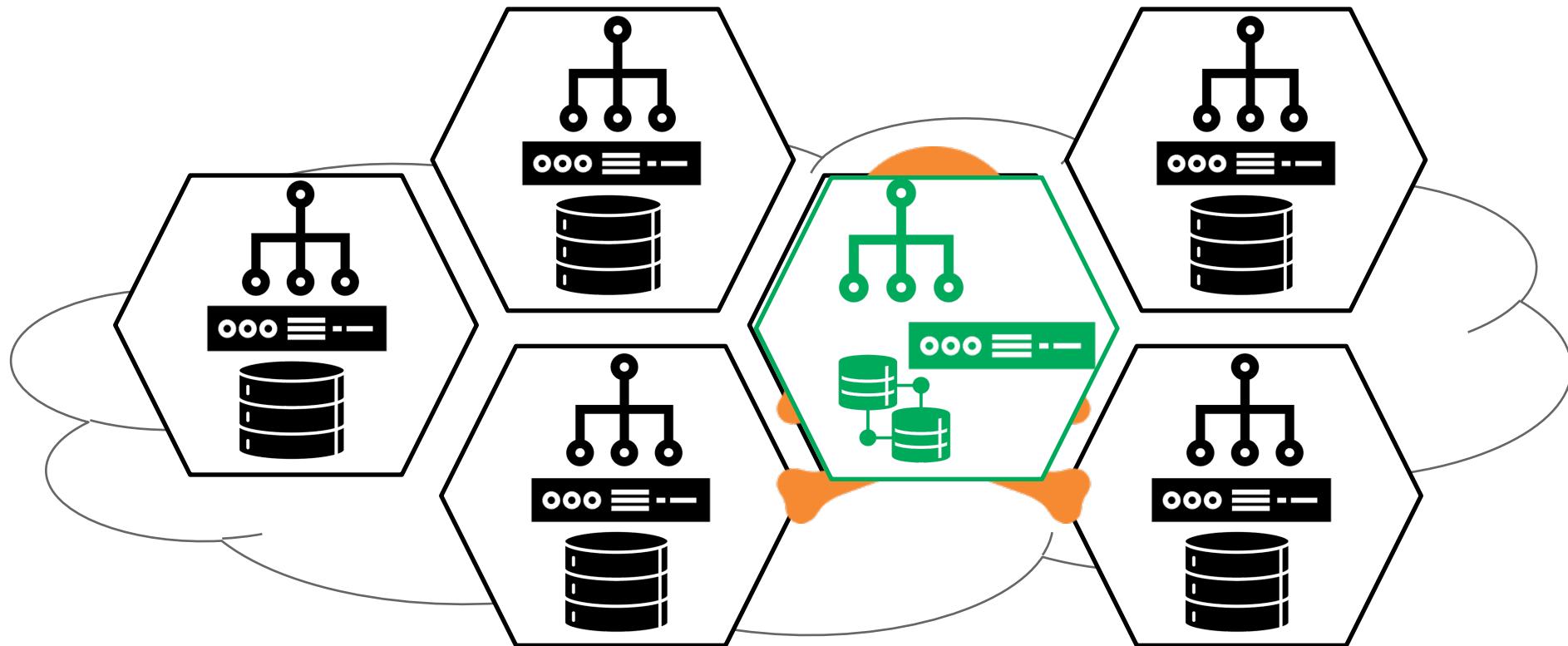
TEAM STRUCTURES



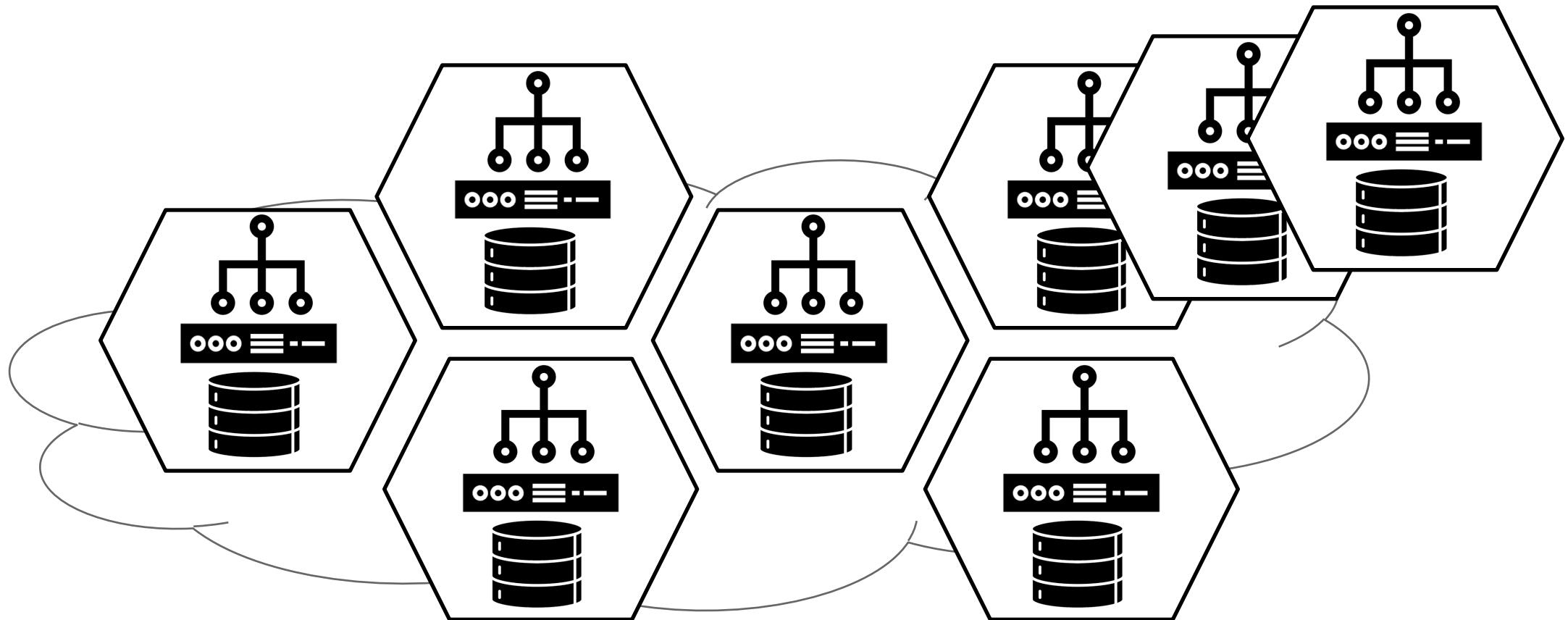


RESOURCE LIFECYCLES

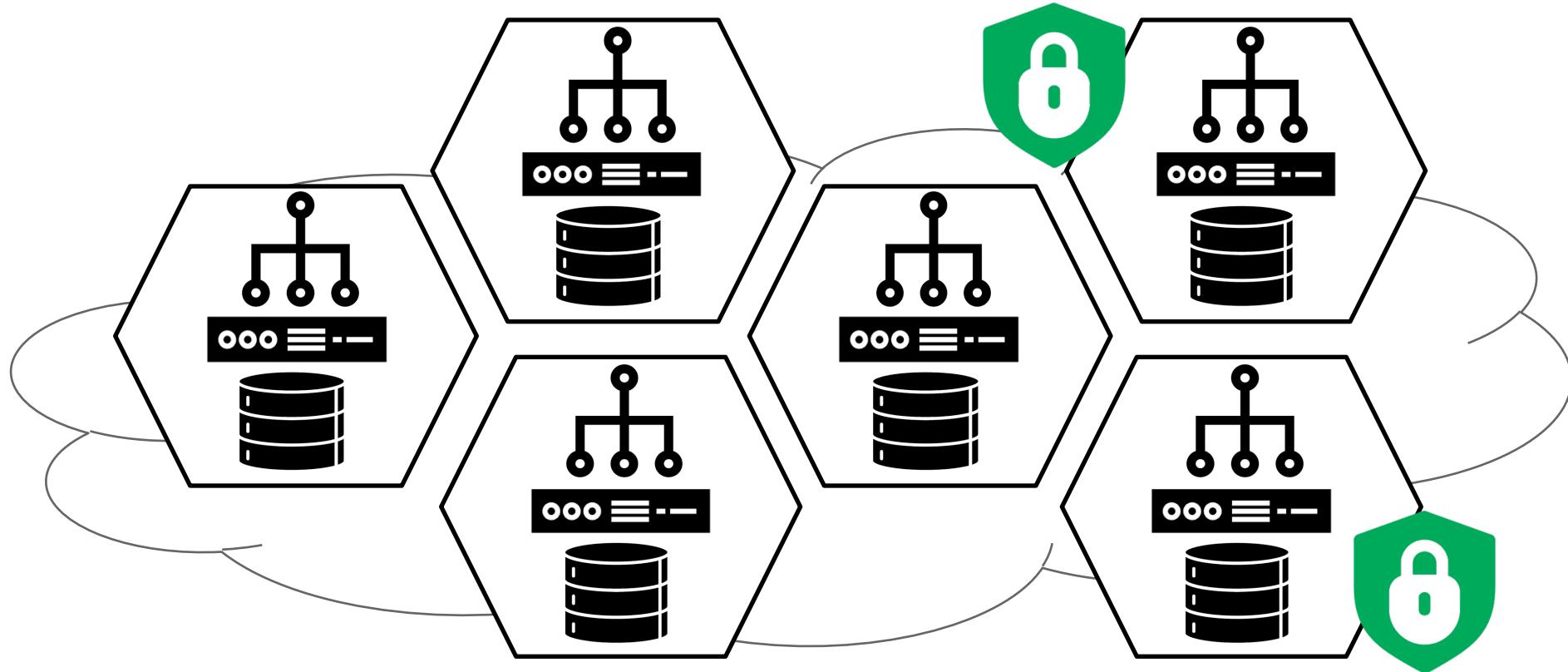
RESILIENCE



SCALING



GOVERNANCE

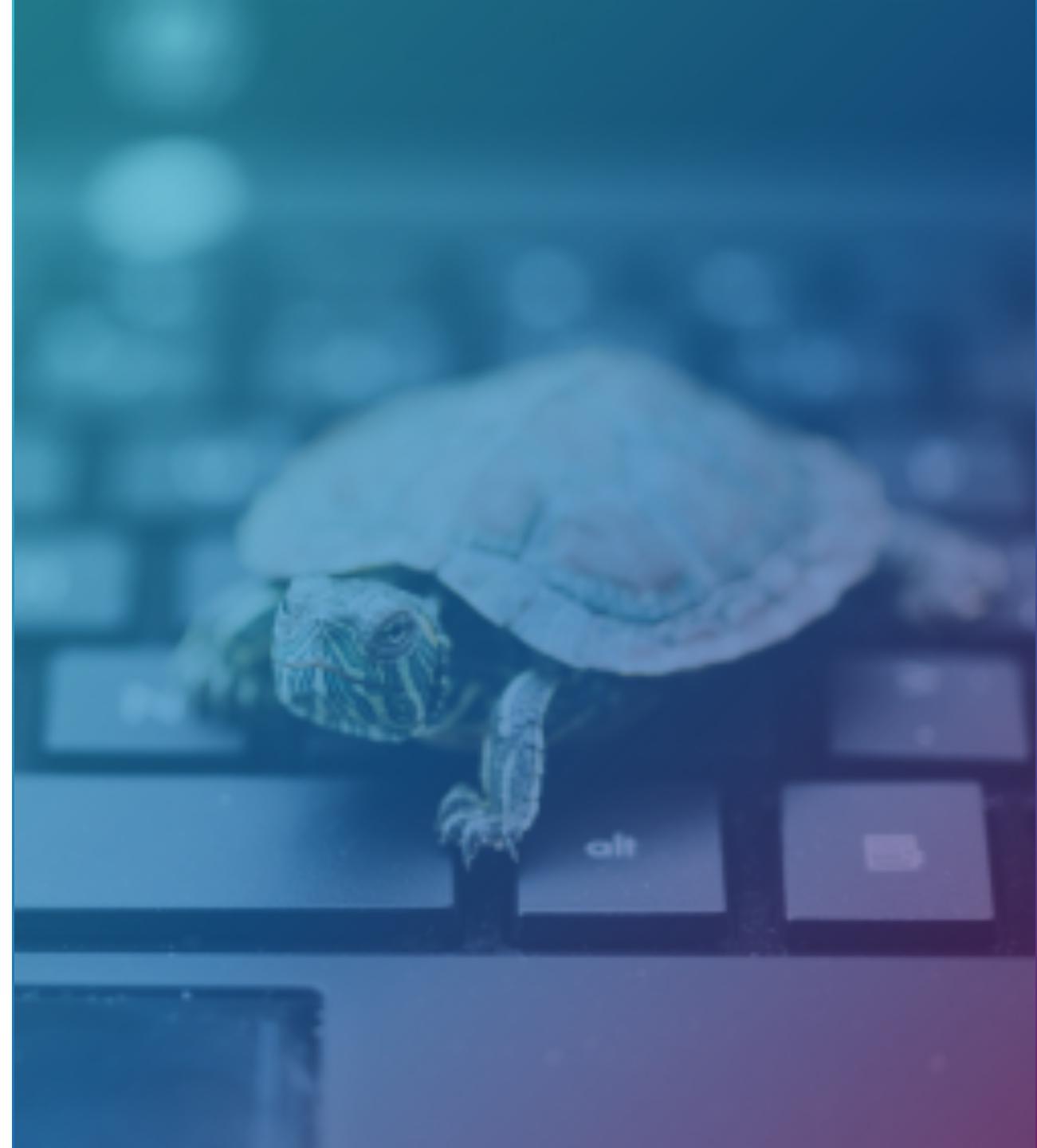


A wide-angle photograph of a rural landscape. In the foreground, there's a field of tall, dry grass. Beyond it, a valley opens up with more fields and a small cluster of buildings. The background features several large, rounded hills and a range of mountains with rugged peaks. The sky is filled with soft, grey clouds.

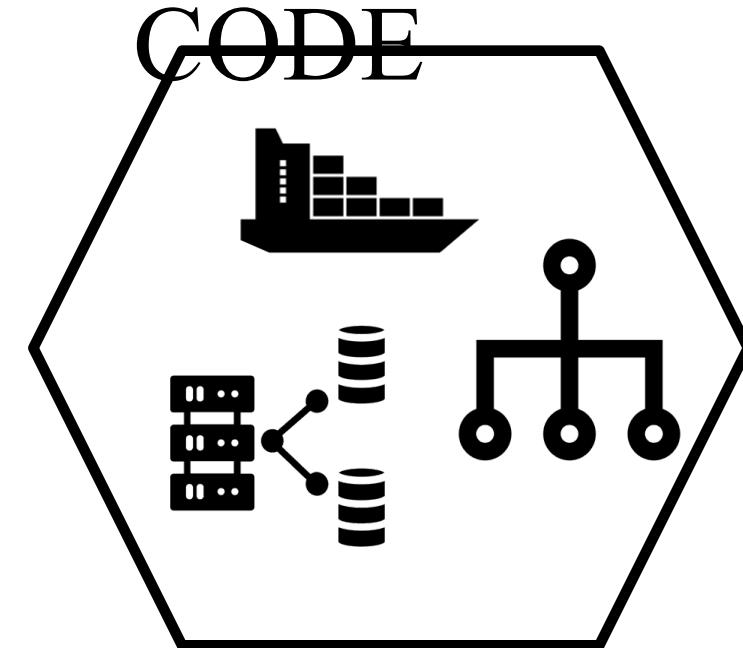
CHANGING SAFELY

Zero-downtime changes

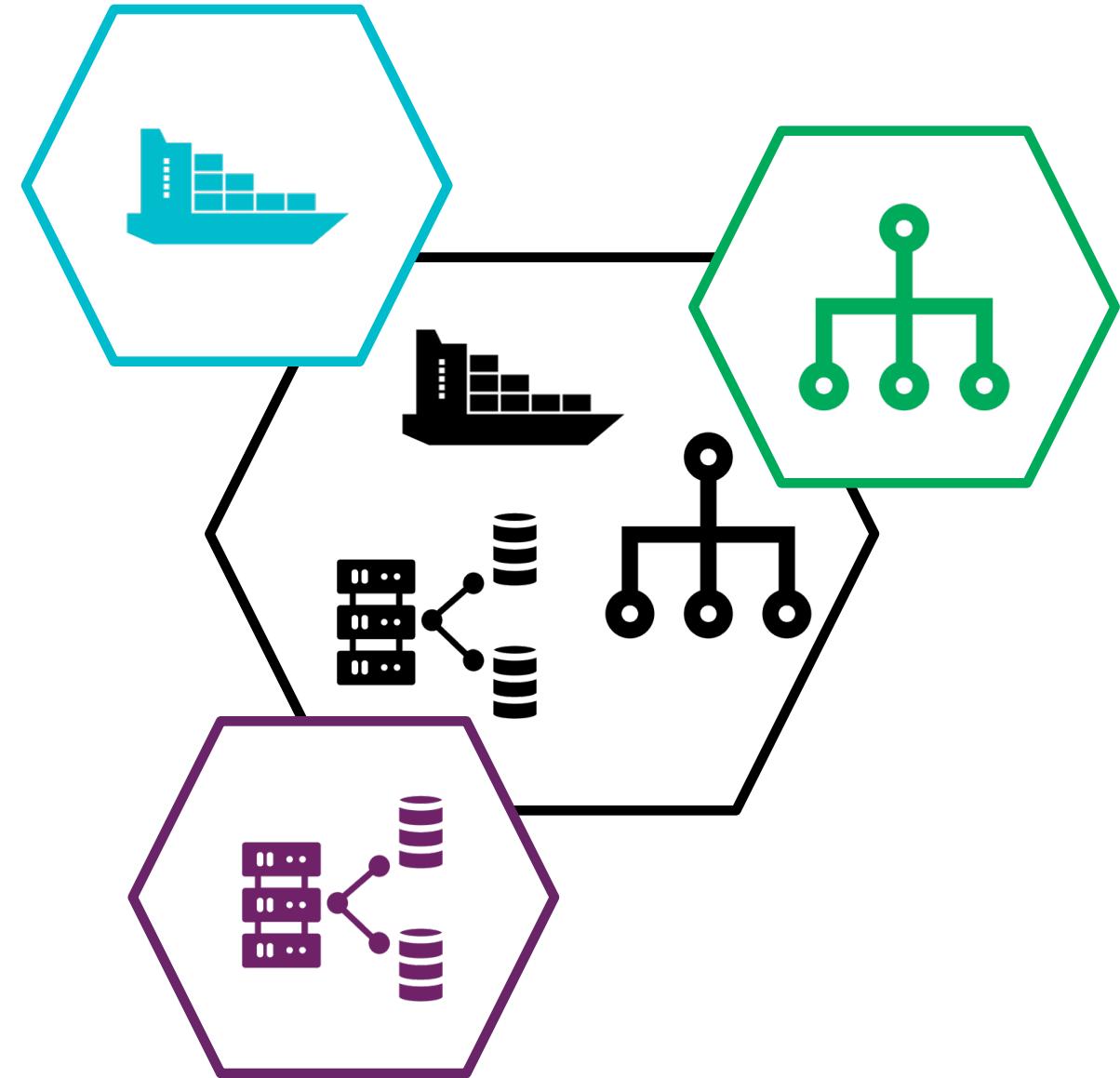
- Feature toggles
- Blue-green
- Dark launching



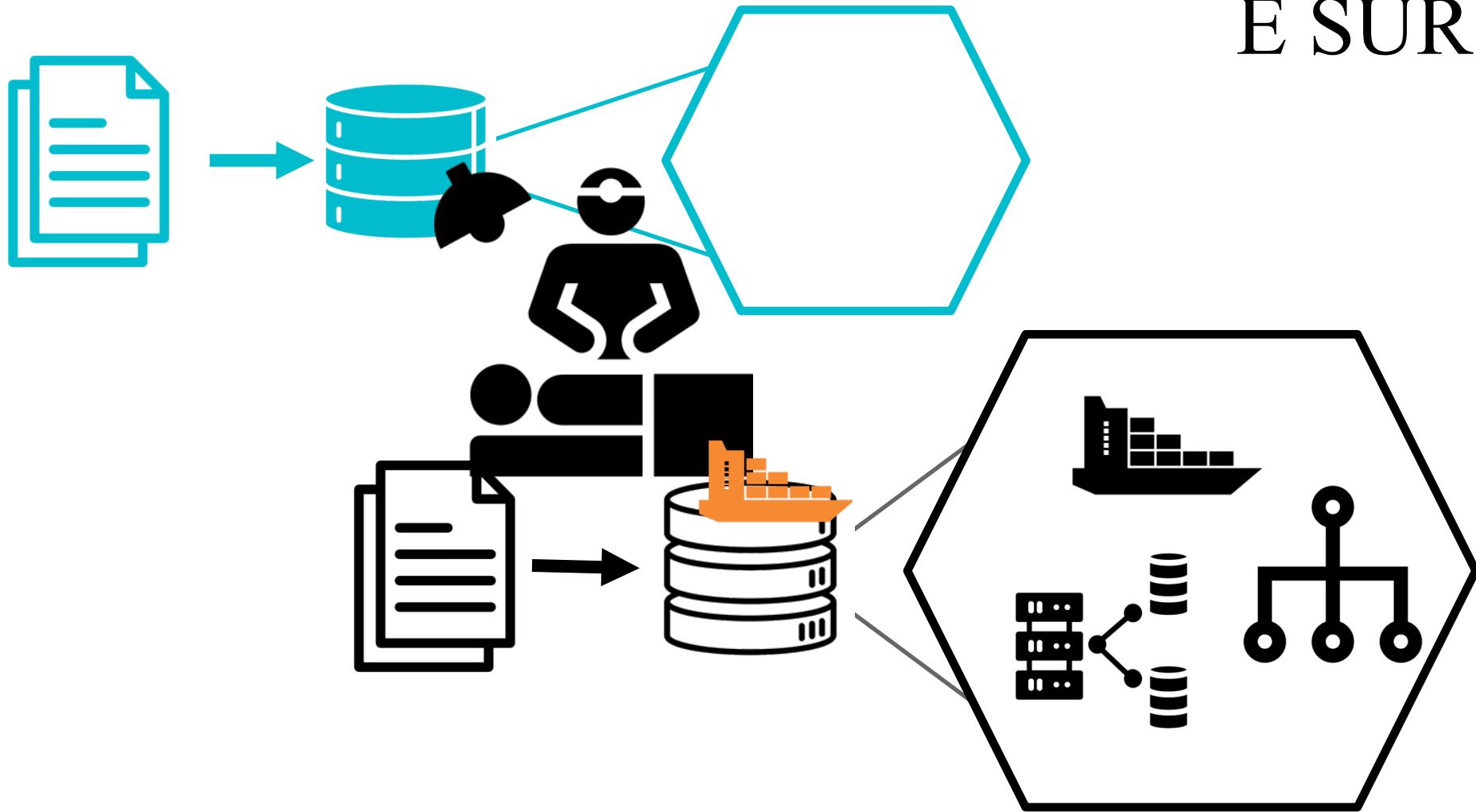
REFACTOR INFRASTRUCTURE



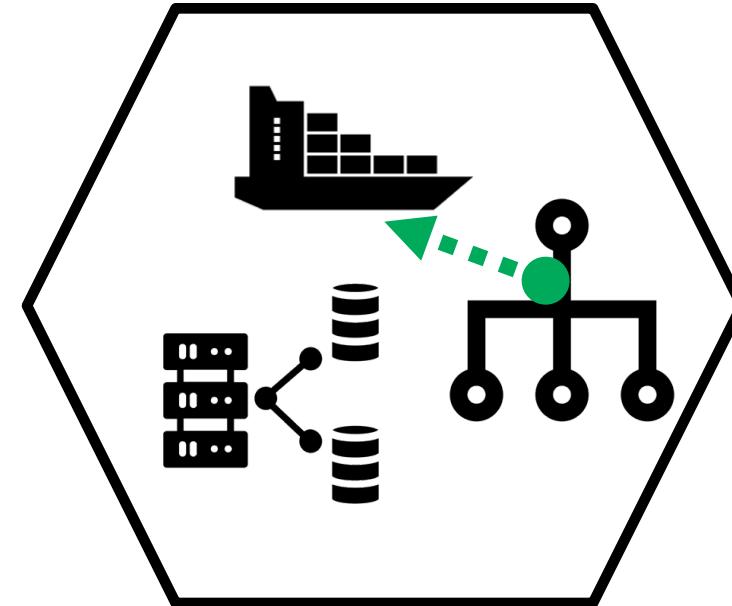
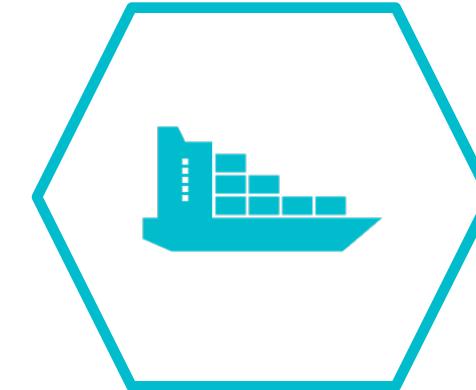
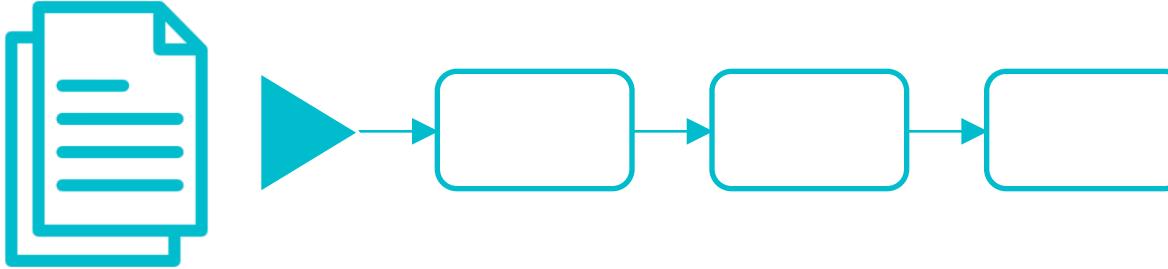
REFACTOR INFRASTRUCTURE INSTANCE



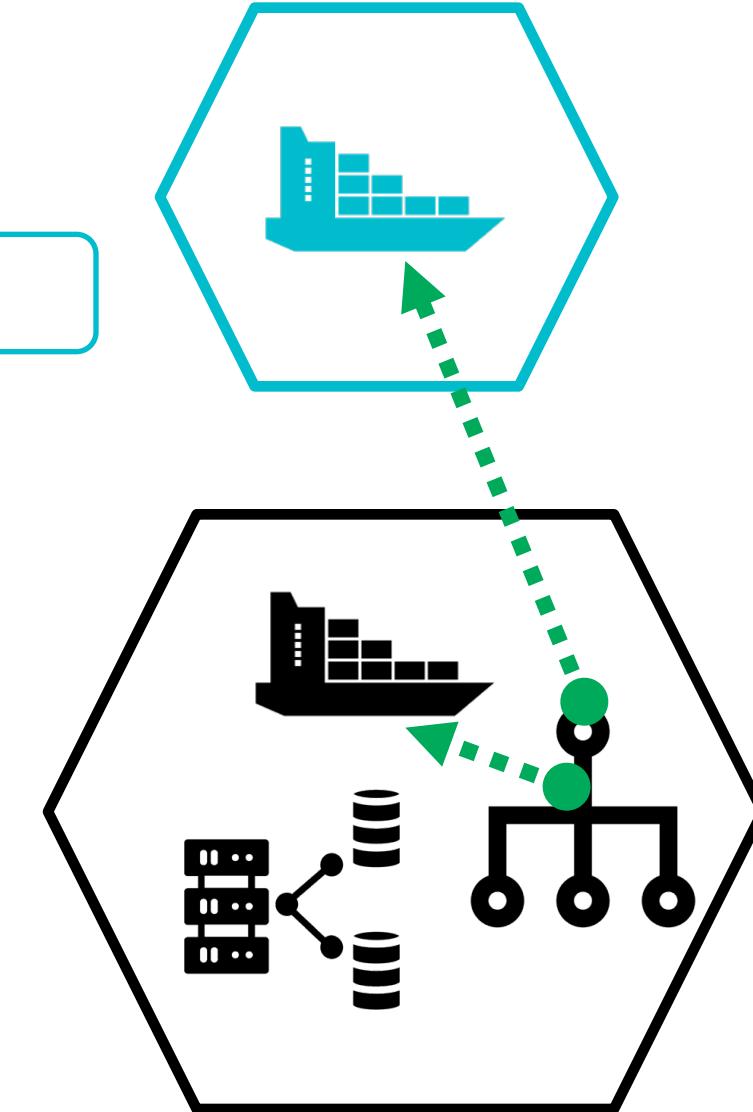
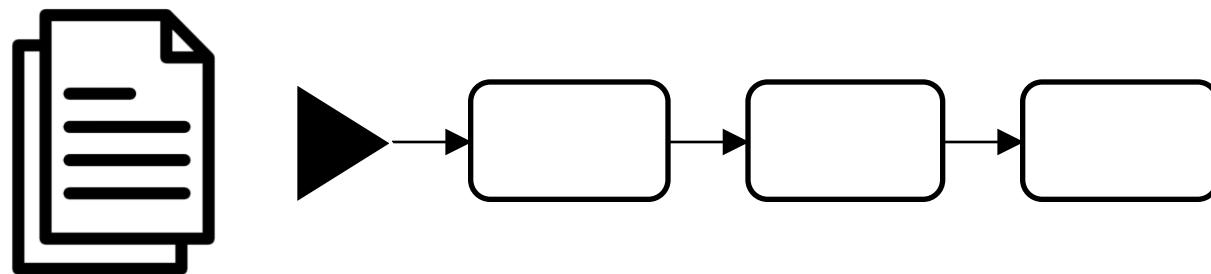
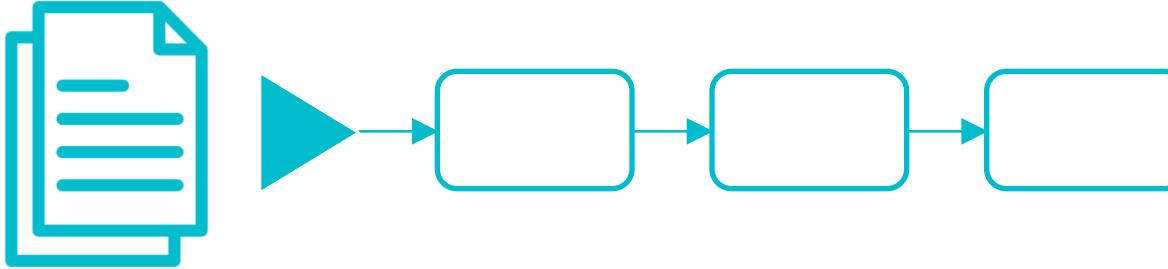
INFRASTRUCTUR E SURGERY



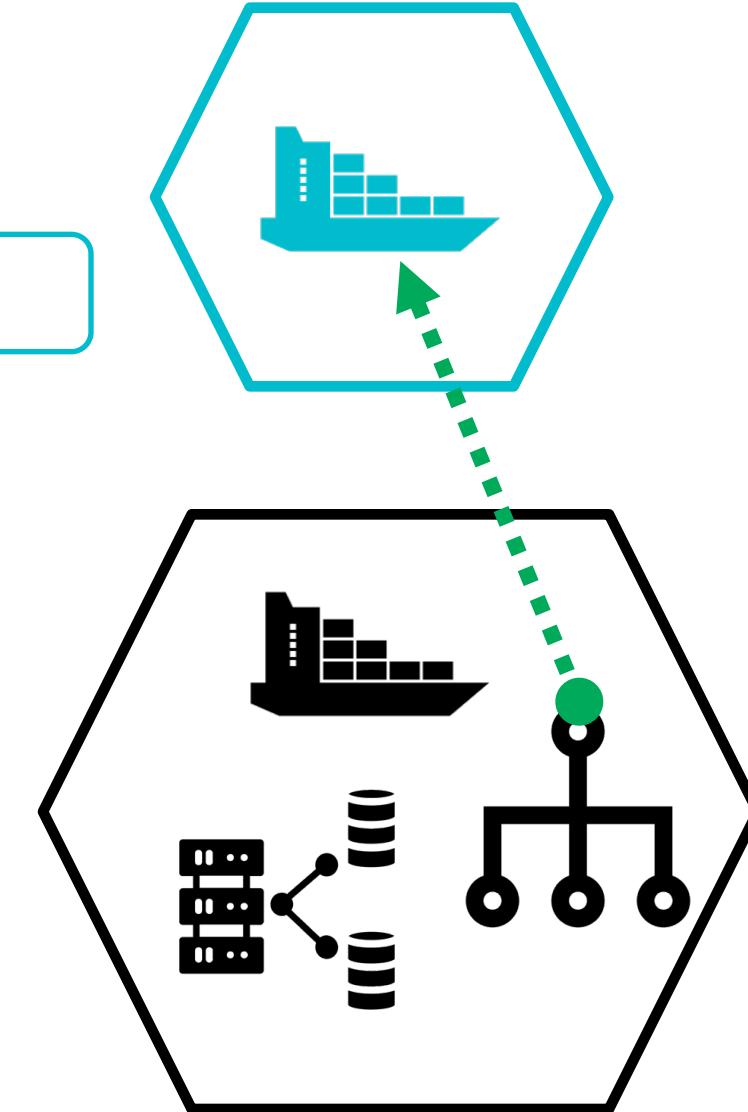
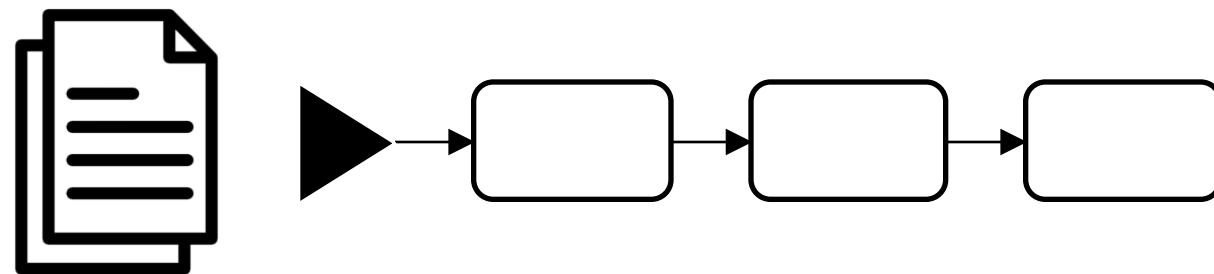
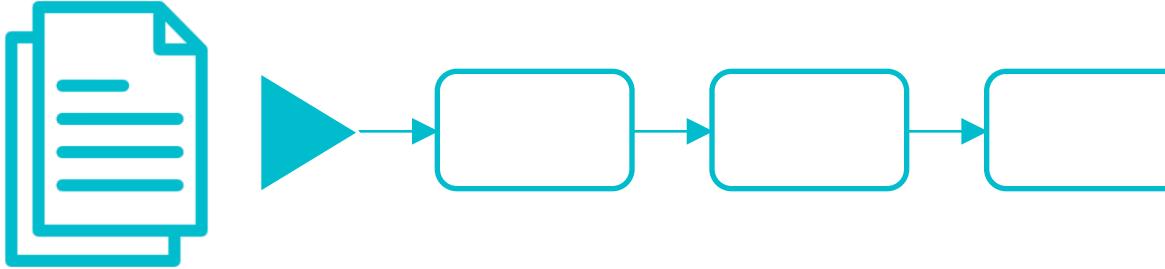
EXPAND AND CONTRACT

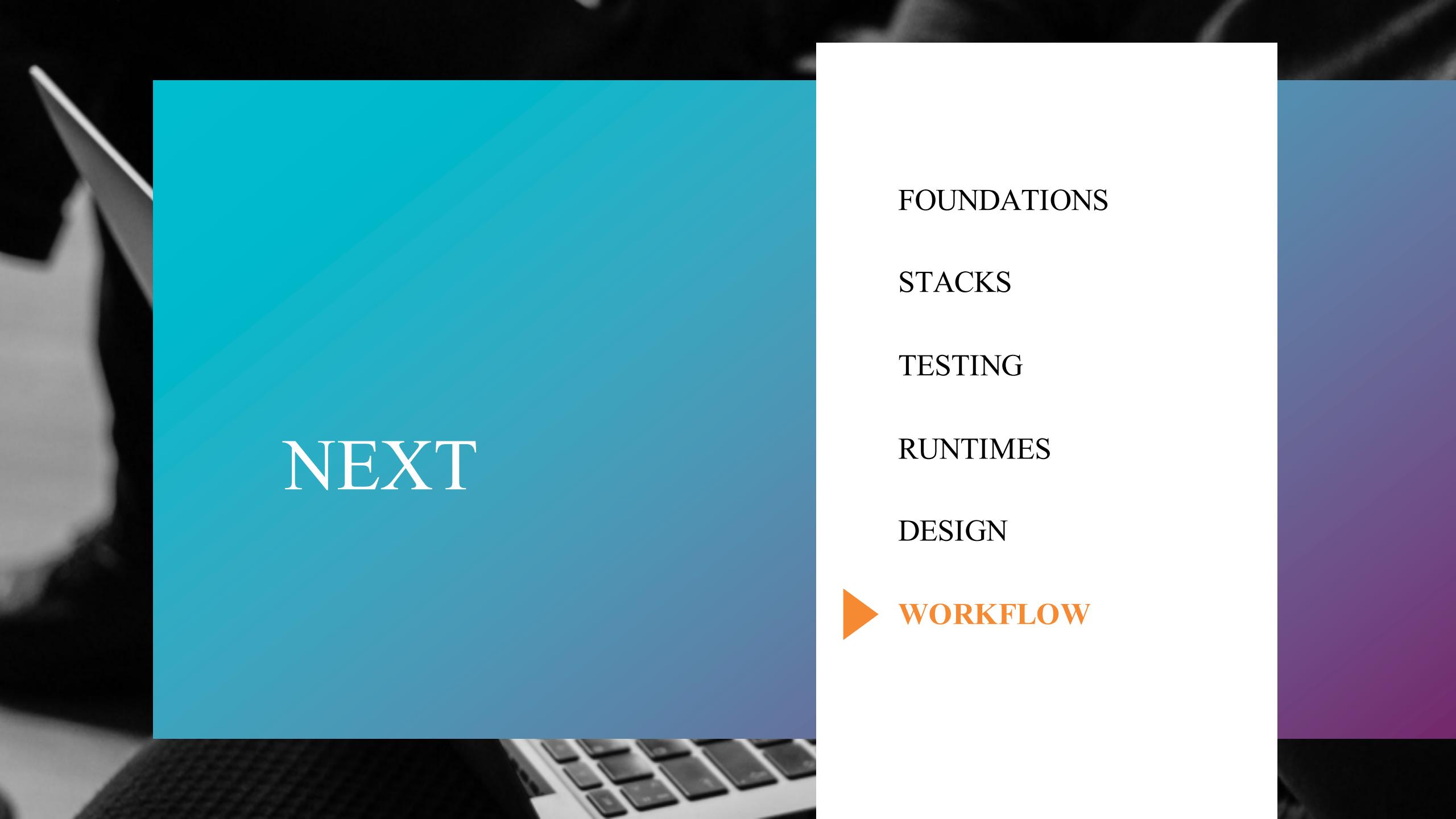


EXPAND AND CONTRACT



EXPAND AND CONTRACT





NEXT

FOUNDATIONS

STACKS

TESTING

RUNTIMES

DESIGN

► WORKFLOW