



# Automated Testing in CI/CD

April 2022


# Agenda

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- Safety Message
- Introductions
- What is DevOps?
- Tools
- Workflow
- Demo

# Safety Message

## Downed Power Lines



**STAYING SAFE**

### When Power Lines Come Down

Stay at least **35 feet** from downed lines. Don't touch anything they might be touching. Live power lines can energize the ground around them.

If you're too close, "**shuffle**" away to safety — take tiny steps with both feet on the ground and touching each other. This can prevent a dangerous situation known as "step potential."

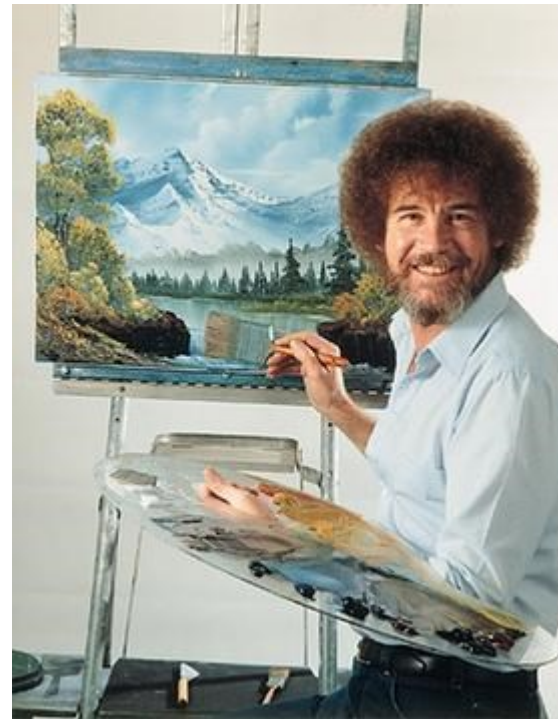
Keep children and pets **away**.

**Never drive over** a downed line.

Assume any downed line is live and dangerous. Report it to your utility, or call 911 if there's an immediate danger.

Duquesne Light Emergency number: (412) 393-7000

Dave Evans  
Principle Architect



A decorative teal dotted line graphic that starts as a semi-circle on the left, then transitions into a horizontal line, and finally drops down to a lower horizontal line on the right.

## Duquesne Light

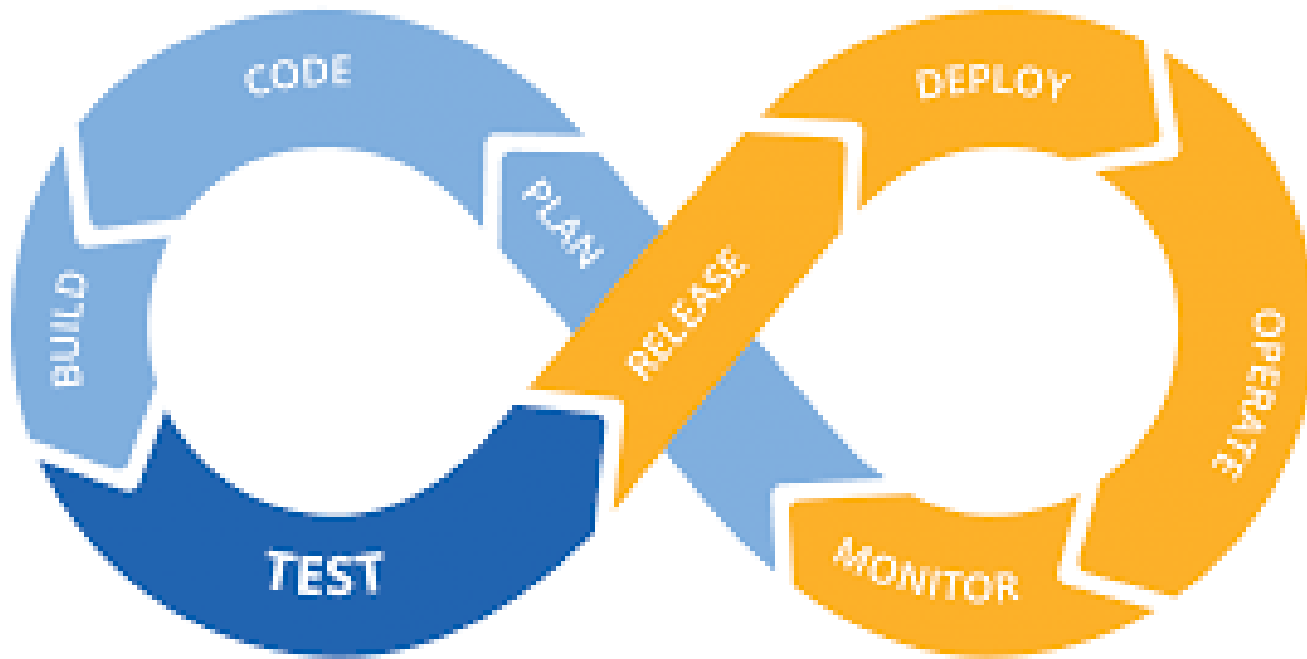
- Mid-size Electric Utility for Allegheny and Beaver counties
- 600,000+ customers
- 1,800 employees
  - 200 in IT
- DQE Communications
- TEN (The Efficiency Network)

# What is DevOps?



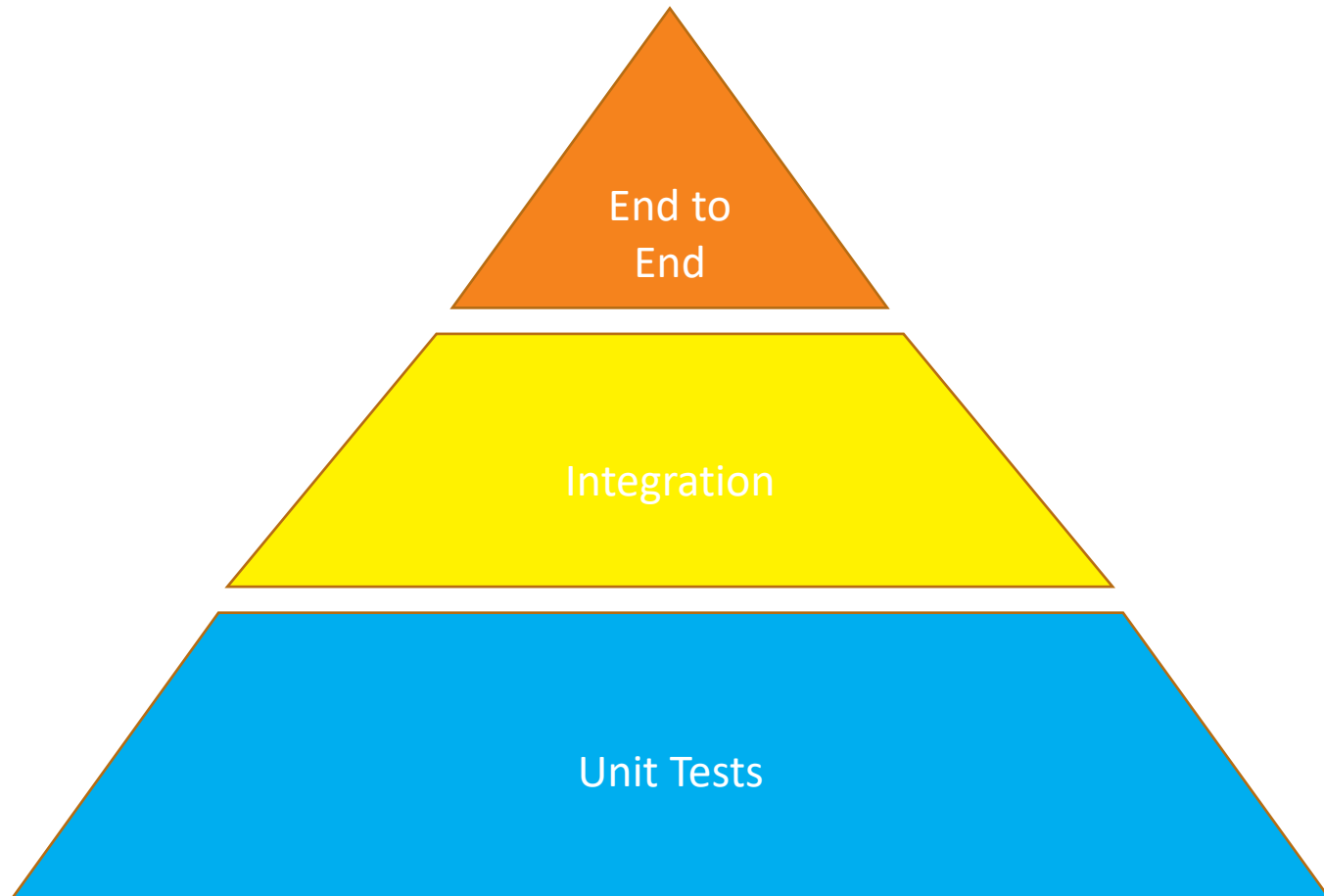
# Continuous Integration/Continuous Delivery

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# Testing Pyramid

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# Tools

## So many tools...

The image displays a vast collection of logos for cloud-native technologies, organized into several functional categories:

- App Definitions and Development:** Includes logos for various development frameworks and tools.
- Database:** Features logos for different database systems.
- Streaming & Messaging:** Shows logos for message brokers and streaming platforms.
- Application Definition & Image Build:** Includes logos for container management and image building tools.
- Continuous Integration & Delivery:** Displays logos for CI/CD pipelines.
- Platform:** A large section containing logos for various platform providers and services.
- Observability and Analysis:** Includes logos for monitoring, logging, and tracing tools.
- Automation & Configuration:** Shows logos for configuration management and automation tools.
- Container Registry:** Features logos for container image registries.
- Security & Compliance:** Includes logos for security and compliance tools.
- Key Management:** Displays logos for key management services.
- Cloud Native Storage:** Shows logos for cloud storage solutions.
- Container Runtime:** Includes logos for container runtimes.
- Cloud Native Network:** Features logos for network services.
- Scheduling & Orchestration:** Displays logos for task scheduling and orchestration tools.
- Coordination & Service Discovery:** Includes logos for service discovery and coordination tools.
- Remote Procedure Call:** Shows logos for RPC frameworks.
- Service Proxy:** Features logos for service proxies.
- API Gateway:** Includes logos for API gateways.
- Service Mesh:** Displays logos for service mesh technologies.
- Cloud Native Network:** (Repeated) Shows logos for network services.
- Container Runtime:** (Repeated) Includes logos for container runtimes.
- Cloud Native Storage:** (Repeated) Features logos for cloud storage solutions.
- Automation & Configuration:** (Repeated) Shows logos for configuration management and automation tools.
- Container Registry:** (Repeated) Includes logos for container image registries.
- Security & Compliance:** (Repeated) Displays logos for security and compliance tools.
- Key Management:** (Repeated) Features logos for key management services.
- Cloud Native Network:** (Repeated) Shows logos for network services.
- Container Runtime:** (Repeated) Includes logos for container runtimes.
- Cloud Native Storage:** (Repeated) Features logos for cloud storage solutions.
- Automation & Configuration:** (Repeated) Shows logos for configuration management and automation tools.
- Container Registry:** (Repeated) Includes logos for container image registries.
- Security & Compliance:** (Repeated) Displays logos for security and compliance tools.
- Key Management:** (Repeated) Features logos for key management services.

**Cloud Native Landscape**  
 This landscape is intended as a map through the previously undifferentiated series of cloud native technologies. There are many routes to deploying a cloud native application, with CNCF Projects representing a particularly well-trodden path.  
 l.cncf.io

**Special**

**Kubernetes Certified Service Provider**

**Kubernetes Training Partner**

**Members**

# Pipeline Tools

## Continuous Integration

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# CI Configuration

## YAML

```
# azure-pipelines.yml
trigger:
- main

pool: ubuntu-latest

steps:
- script: echo Hello, world!
  displayName: 'Run Script'
```

```
# .github/workflows/build.yml
on:
  push:
    - main

jobs:
  build:
    runs-on: ubuntu-latest
    steps:
      - name: Run Script
        run: echo Hello, world!
```

```
# .gitlab-ci.yml
stages:
- build

build-job:
  stage: build
  script:
    - echo Hello, world!
```

# Tools Set

## Configuration Management

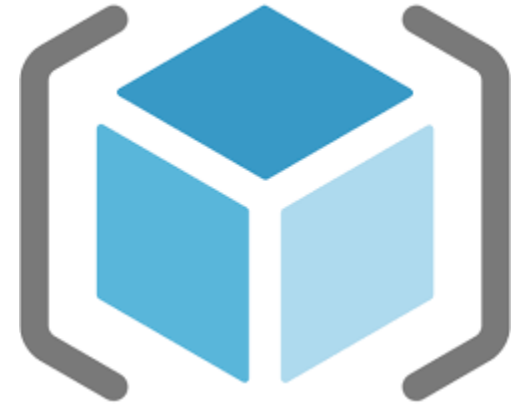
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- VS Code – Editor/IDE
- Github – Code Repository
- Python/PyTest – Language/Unit Testing
- Terraform – Infrastructure as Code
- Snyk – Security Scanning
- K6 – Performance Testing
- SonarCloud/SonarQube – Code Quality
- CI/CD Pipeline – Github Actions

# Infrastructure as Code

## Terraform

- Infrastructure as Code(IaC) is the managing and provisioning of infrastructure through code instead of through manual processes.
- Provides a declarative language for infrastructure
- Allows us to create replica test environments quickly
- Version our Infrastructure
- Tools
  - Hashicorp Terraform
  - AWS CloudFormation
  - Azure ARM Templates



# Terraform

## Hashicorp

- Cross Platform IaC tool
- Open Source
- Tracks the state of deployed infrastructure
  - Detects drift
  - Ability to destroy
- Terraform Cloud
  - Remote State
  - Provides Runners
- <https://learn.hashicorp.com/terraform>



```
terraform {  
  required_providers {  
    aws = {  
      source  = "hashicorp/aws"  
      version = "~> 3.27"  
    }  
  }  
  
  required_version = ">= 0.14.9"  
}  
  
provider "aws" {  
  profile = "default"  
  region  = "us-west-2"  
}  
  
resource "aws_instance" "app_server" {  
  ami           = "ami-830c94e3"  
  instance_type = "t2.micro"  
  
  tags = {  
    Name = "ExampleAppServerInstance"  
  }  
}
```

# Scanning Tools

## Snyk and SonarCloud

- Static Analysis tools
- SonarQube/SonarCloud
  - Code Quality
  - Test Coverage
  - <https://sonarcloud.io>
- Snyk
  - Security Scanning
  - <https://snyk.io>



# Performance Testing

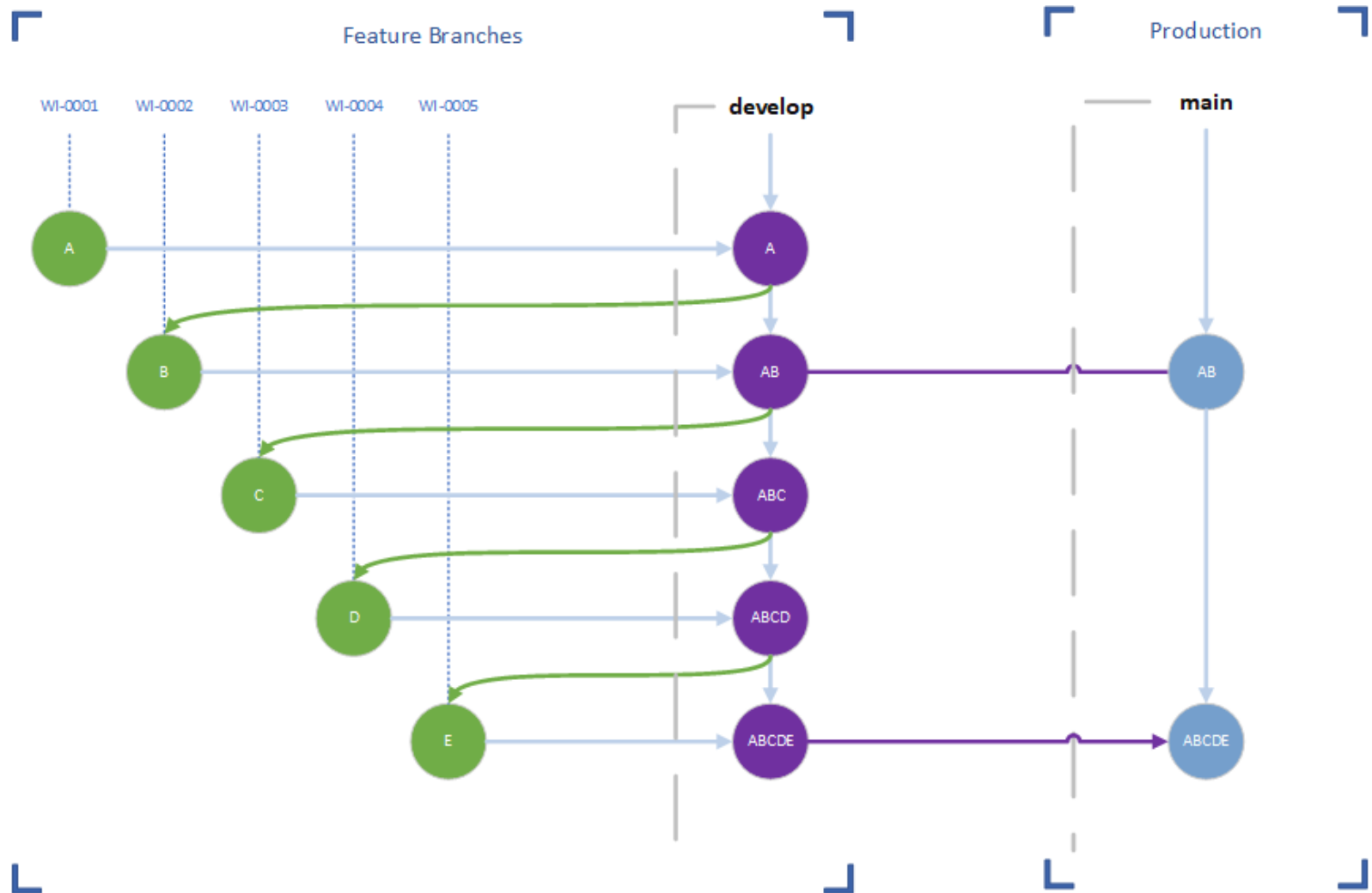
## K6

- K6
  - Open-source performance testing tool
  - JavaScript based
  - Allow collaboration on test scripts
- Performance testing method
  - Execute a standard workload
  - Compare results
- <https://k6.io>
  - K6 Cloud
    - Not Free (Free Trial offered)

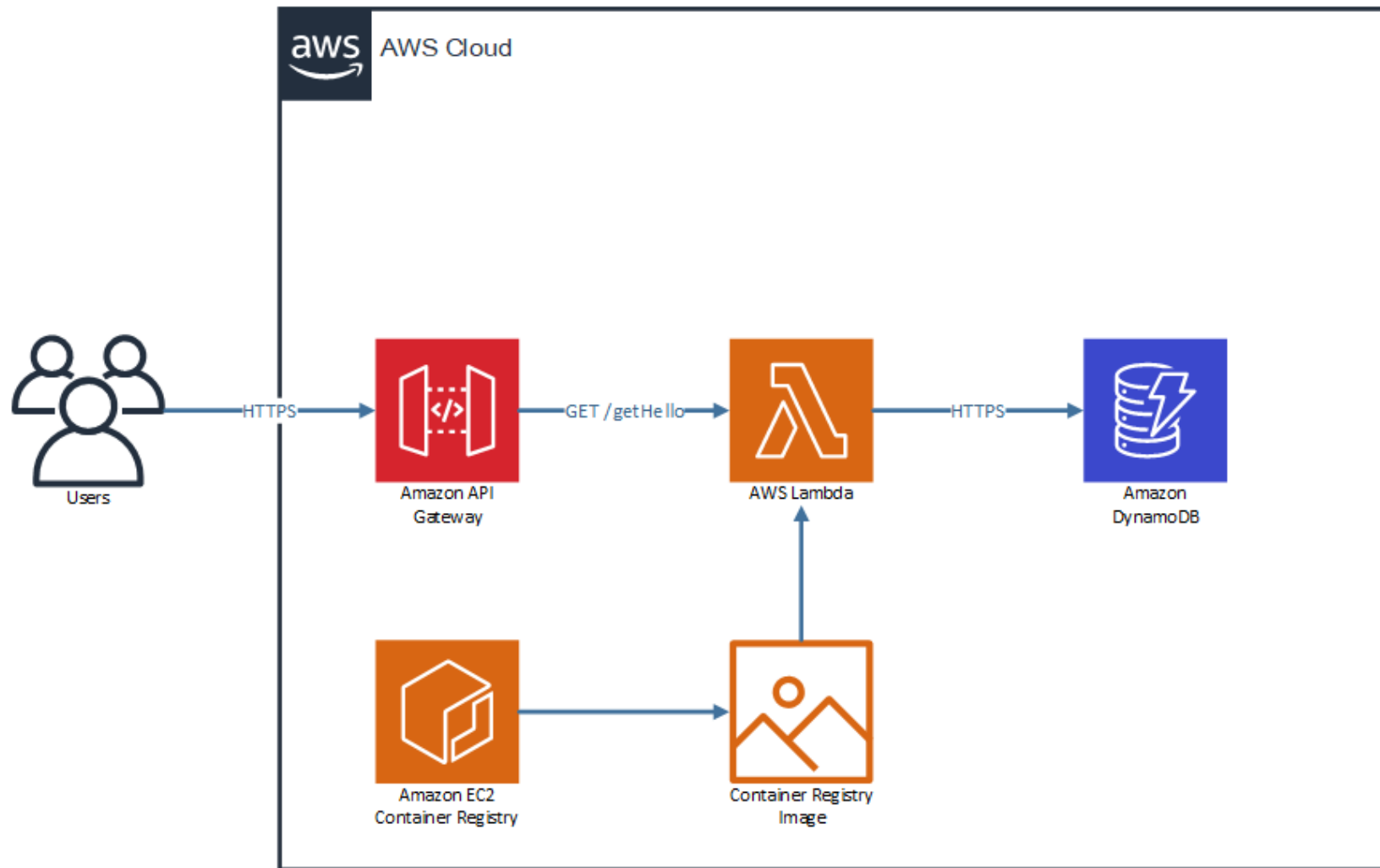




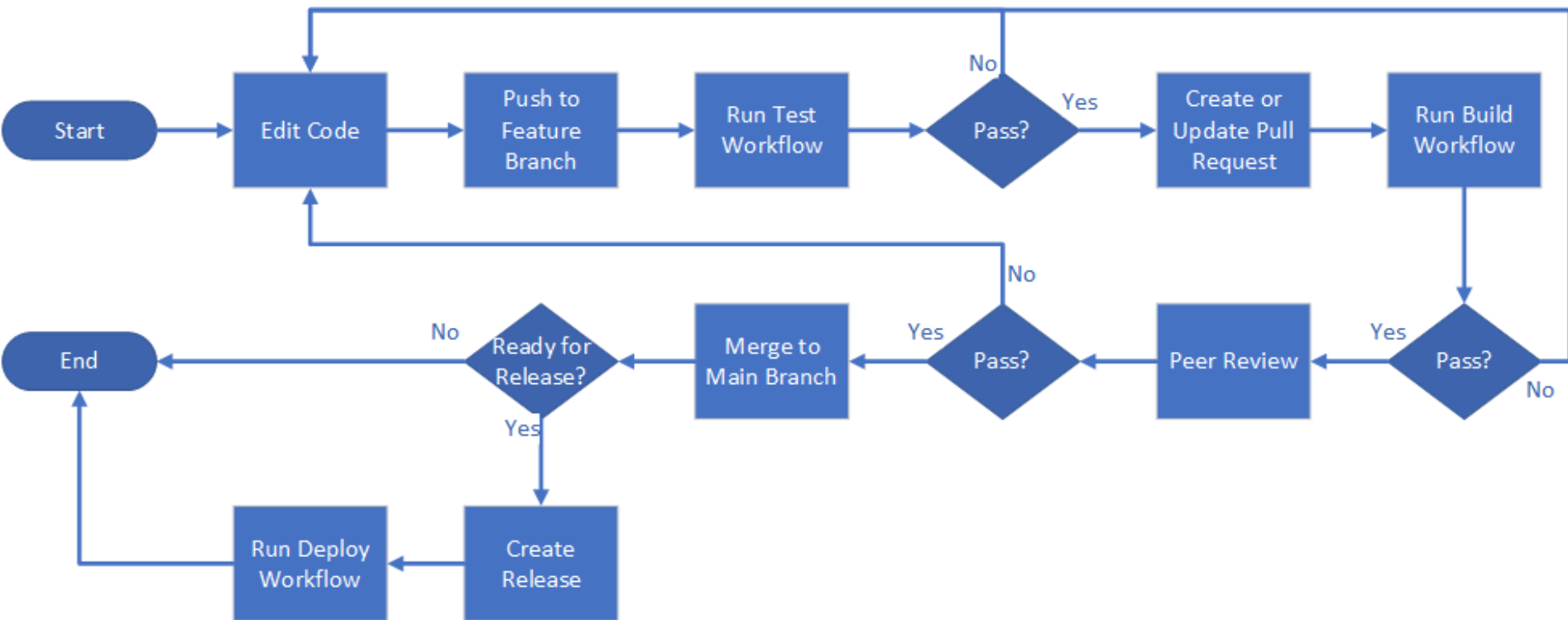
# Branching



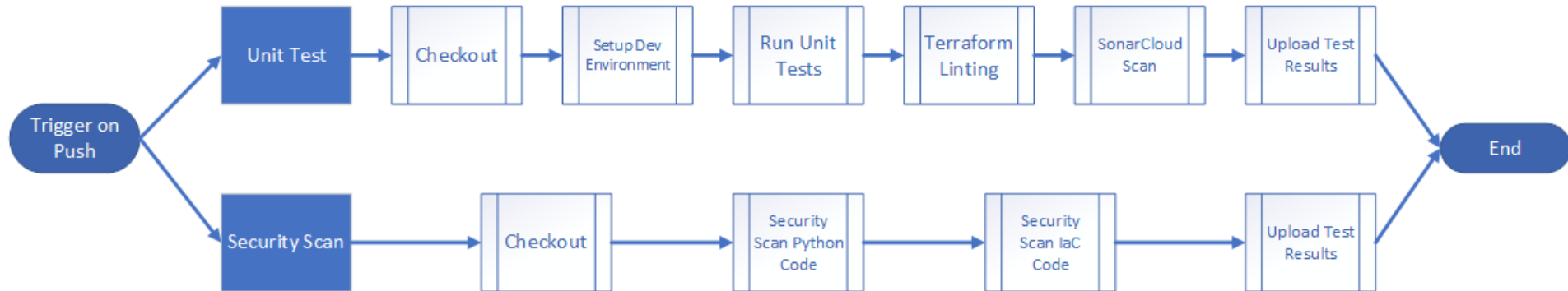
# Our Application



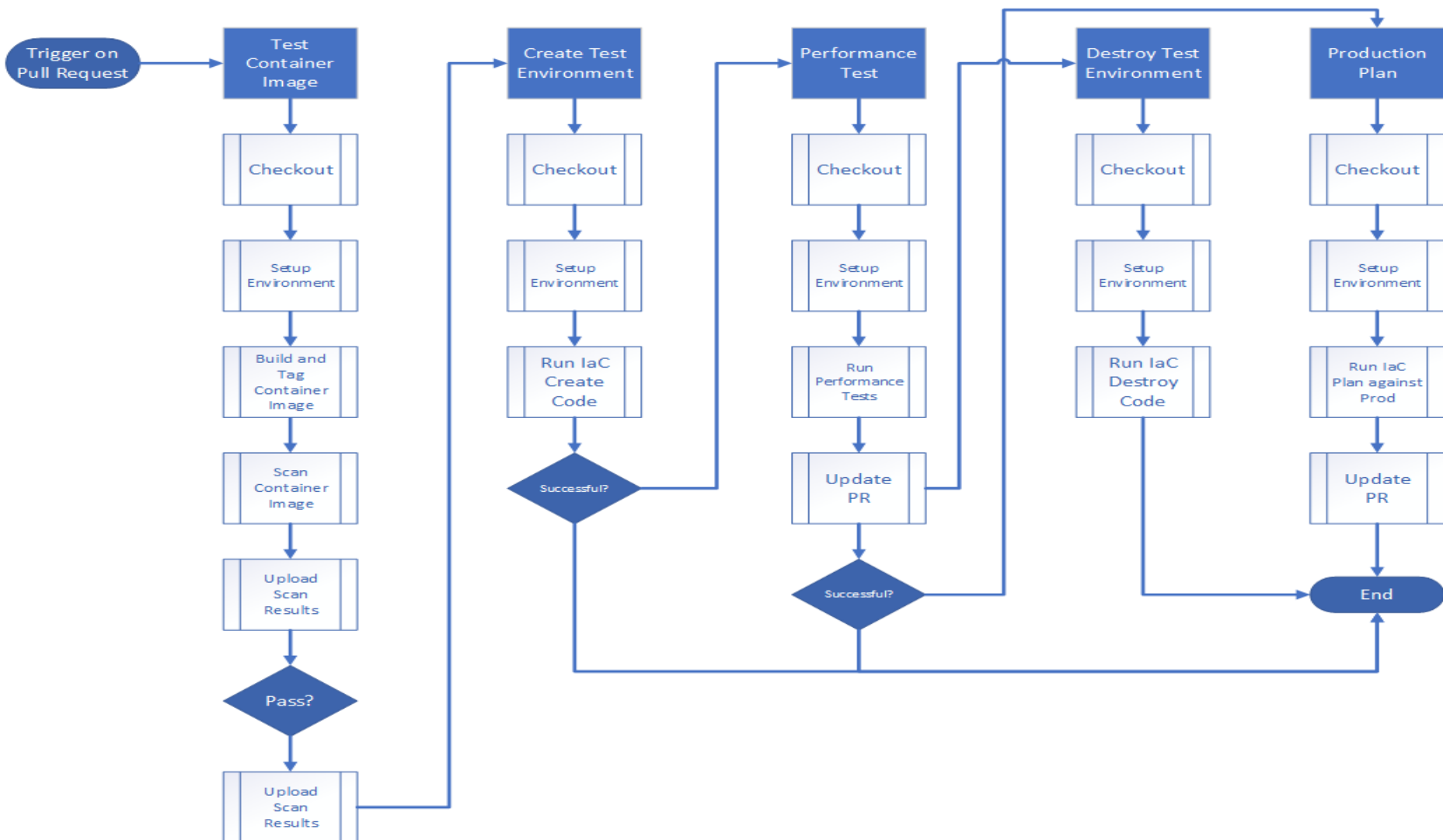
# Workflow



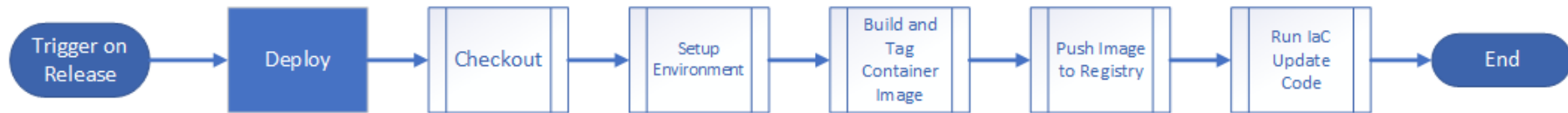
# Test Workflow



# Build Workflow



# Deploy Workflow



# Demo



A teal circle is positioned in the top-left corner. A horizontal teal line extends from its right edge, then drops vertically and continues horizontally to the right edge of the slide.

# Questions?



An orange circle in the top-left corner with a horizontal line extending to the right, which then turns 90 degrees downward.

## Contact Info

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Two overlapping teal circles in the bottom-right corner, with the larger one in front of the smaller one.