Automated Testing in CI/CD

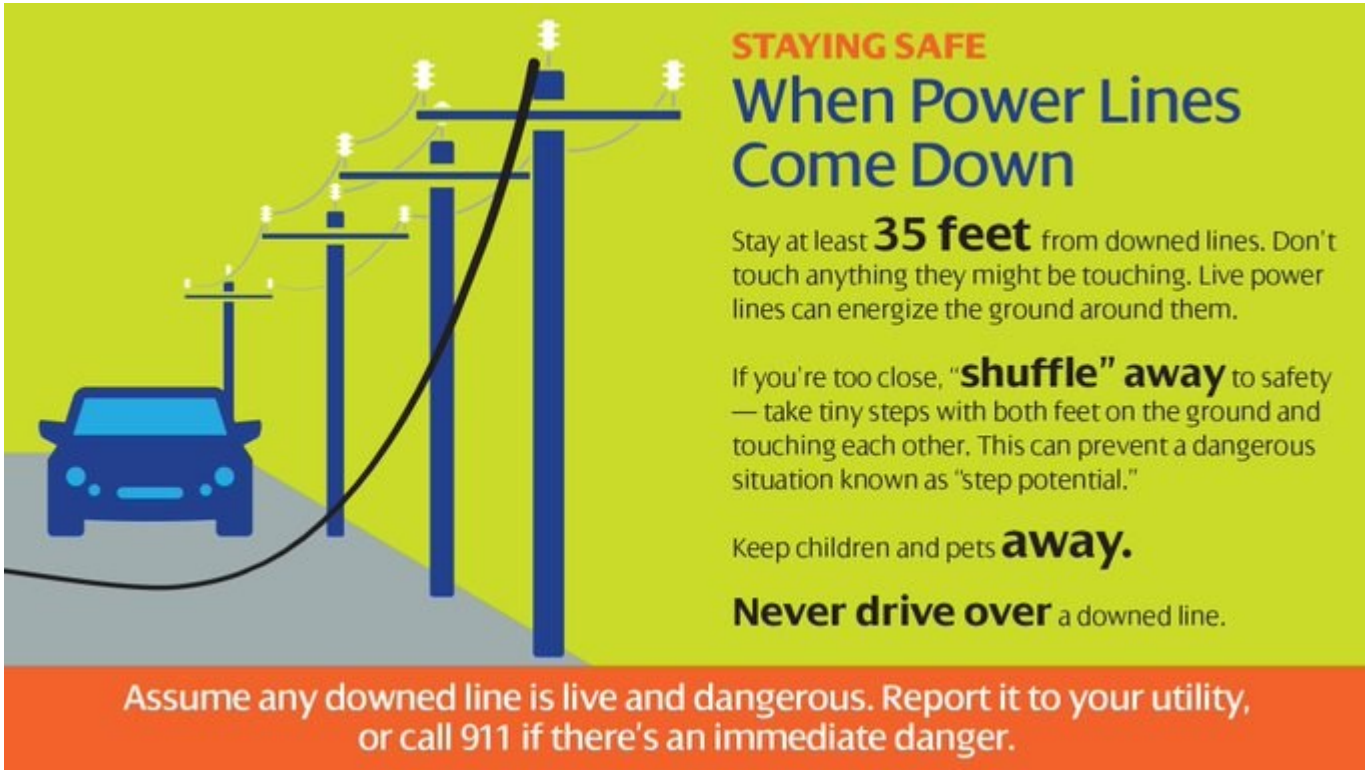
April 2022

Agenda

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

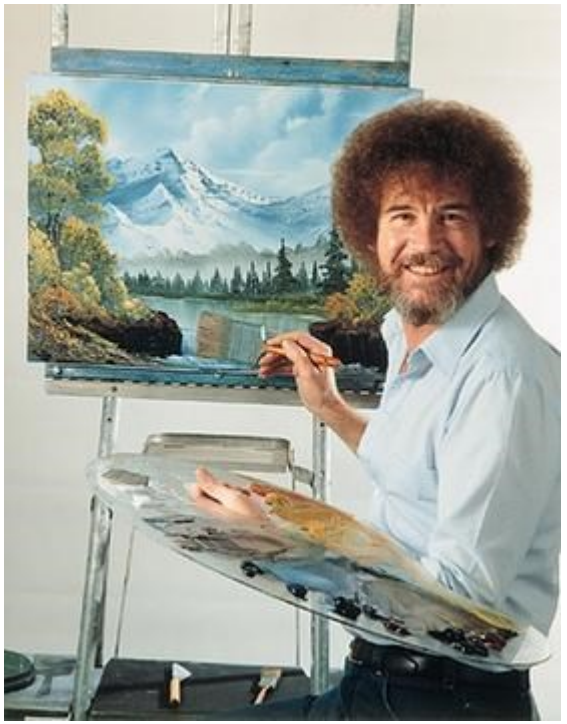
Safety Message

Downed Power Lines



Duquesne Light Emergency number: (412) 393-7000

Dave Evans
Principle Architect

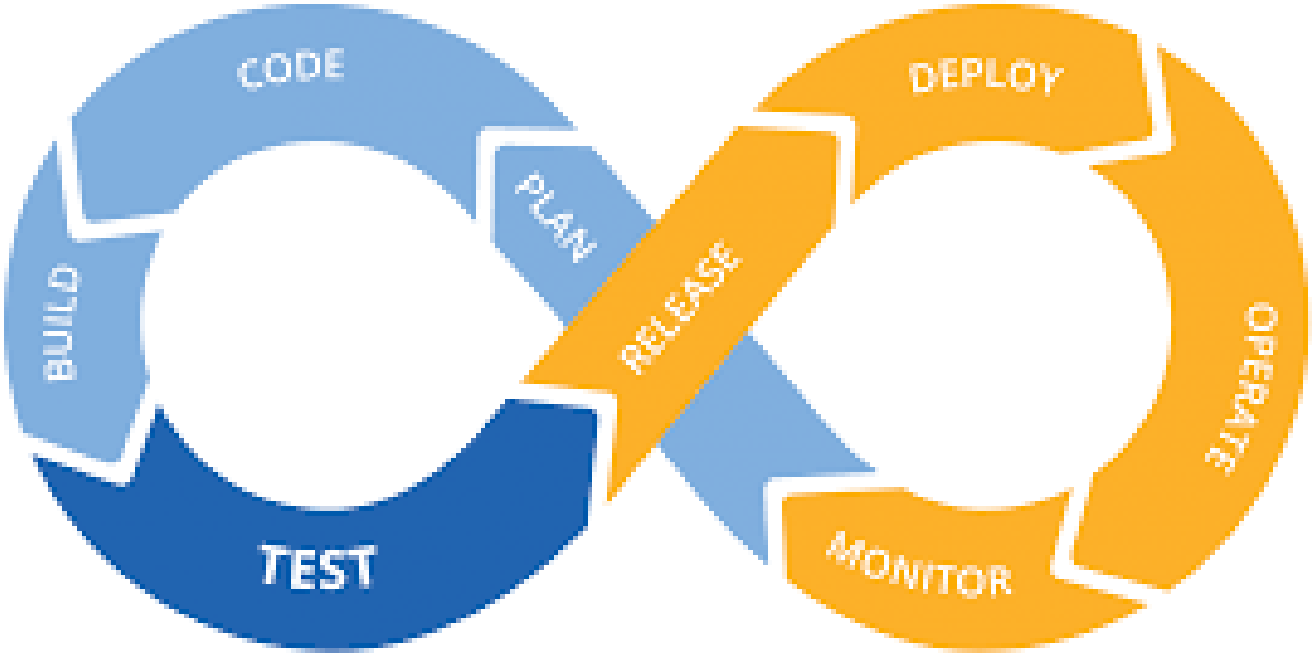


Duquesne Light

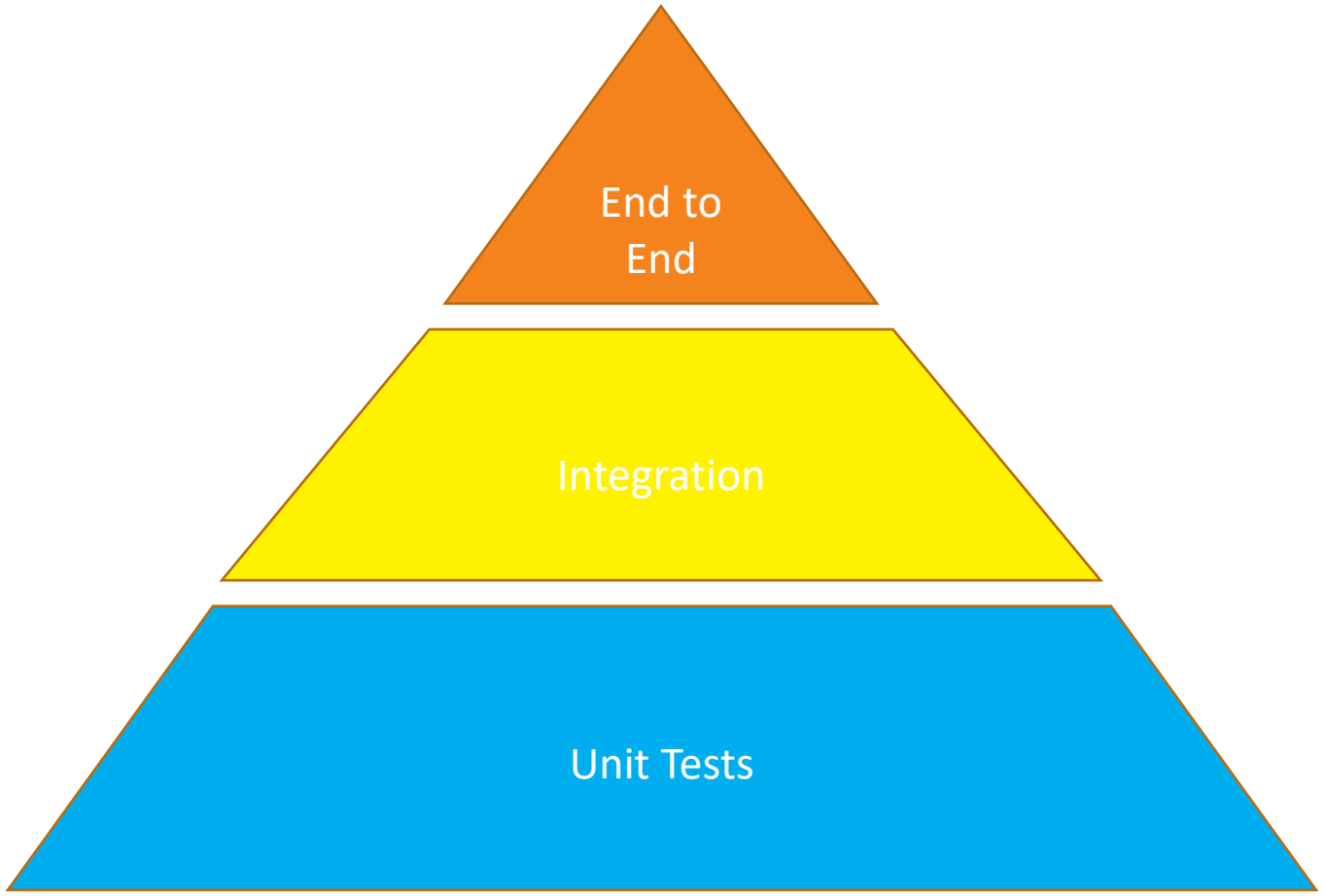
- Mid-size Electric Utility for Allegheny and Beaver counties
- 600,000+ customers
- 1,800 employees
  - 200 in IT
- DQE Communications
- TEN (The Efficiency Network)

What is DevOps?

Continuous Integration/Continuous Delivery

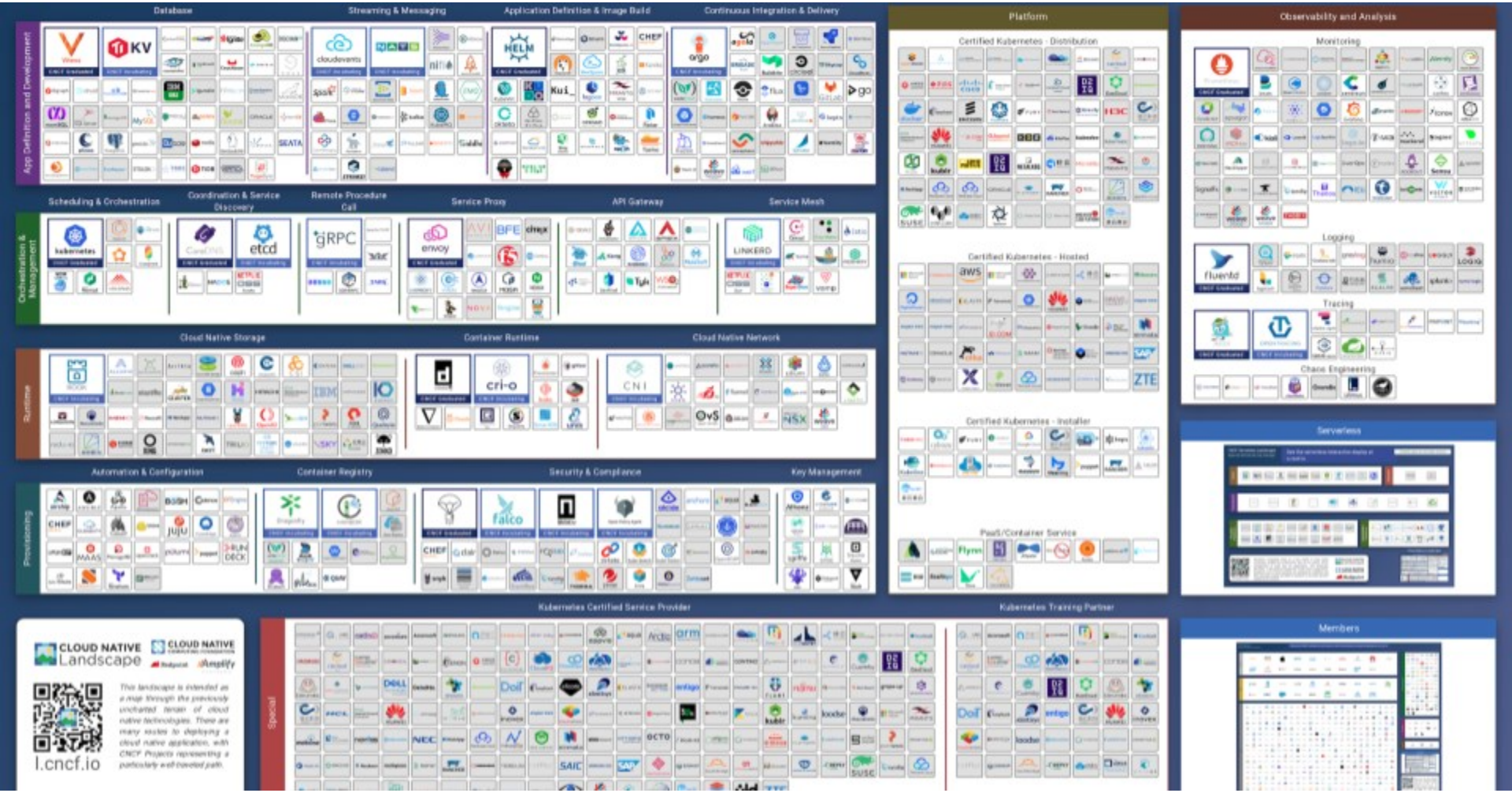


Testing Pyramid



Tools

So many tools…



Pipeline Tools

Continuous Integration

Jenkins

GitLab

CI Configuration

YAML

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

pool: ubuntu-latest

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

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

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

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

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

Tools Set

Configuration Management

- 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

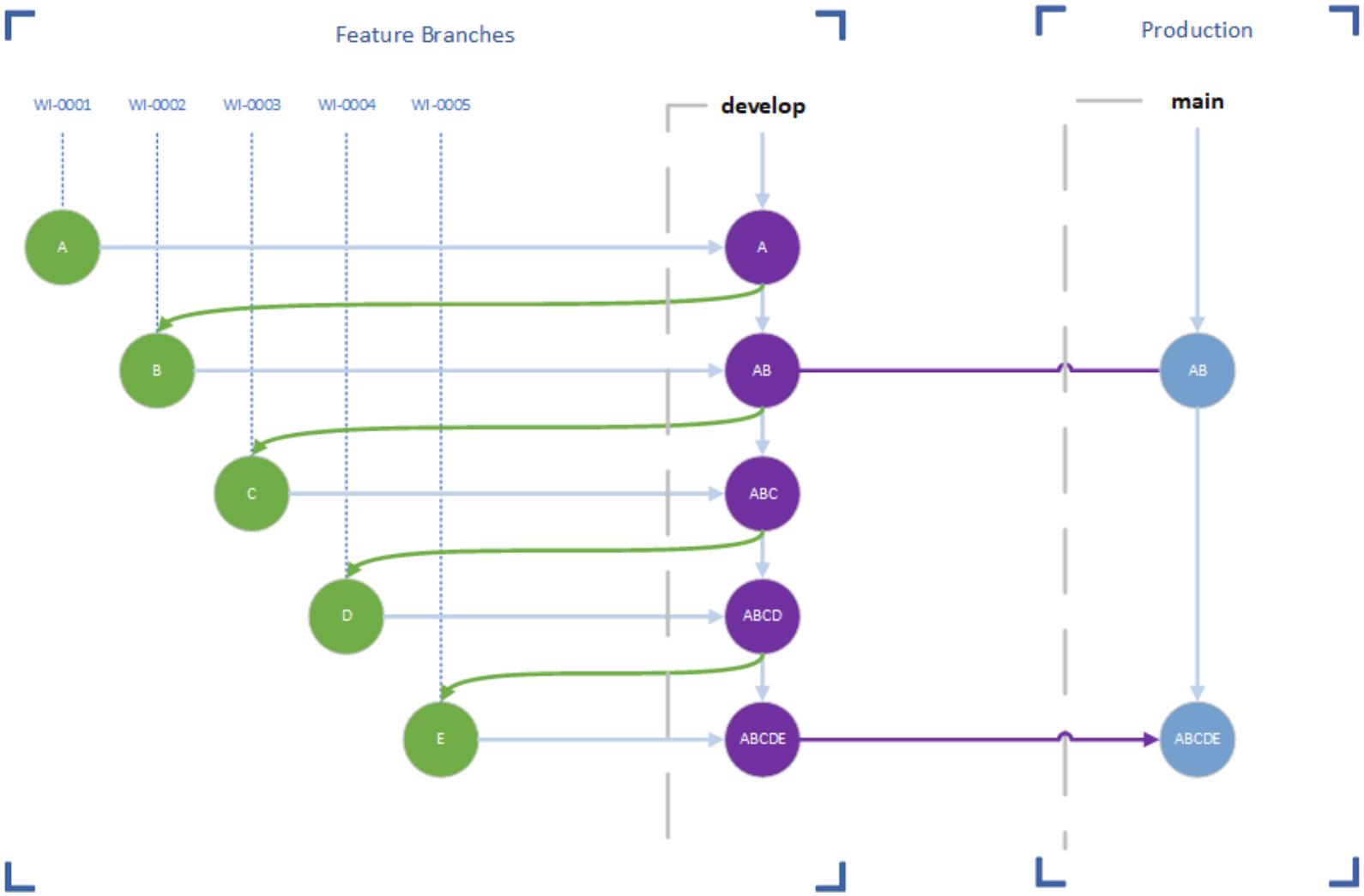
- Static Analysis tools
- SonarQube/SonarCloud
  - Code Quality
  - Test Coverage
  - https://sonarcloud.io
- Snyk
  - Security Scanning
  - https://snyk.io

Performance Testing

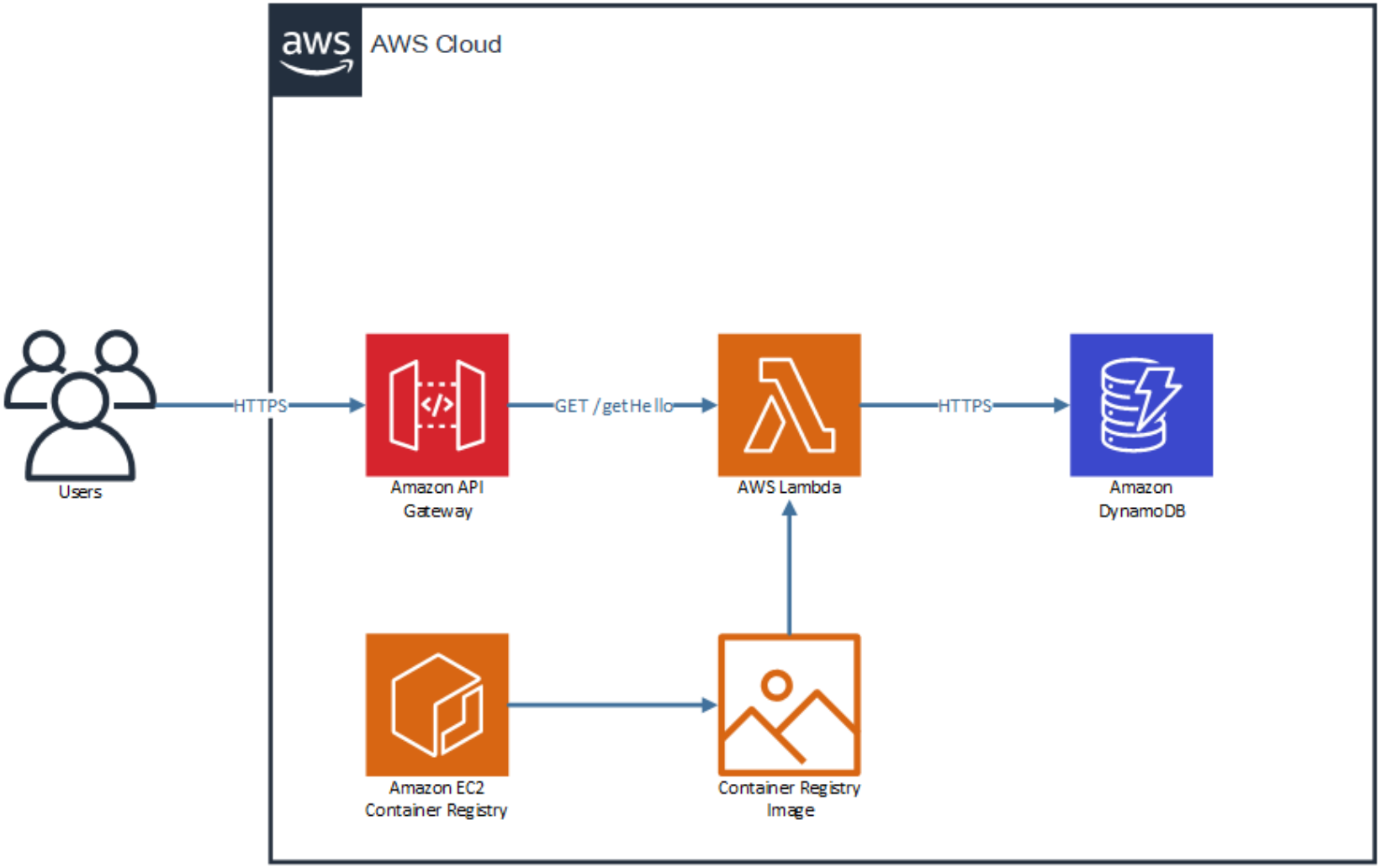
K6

- 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)

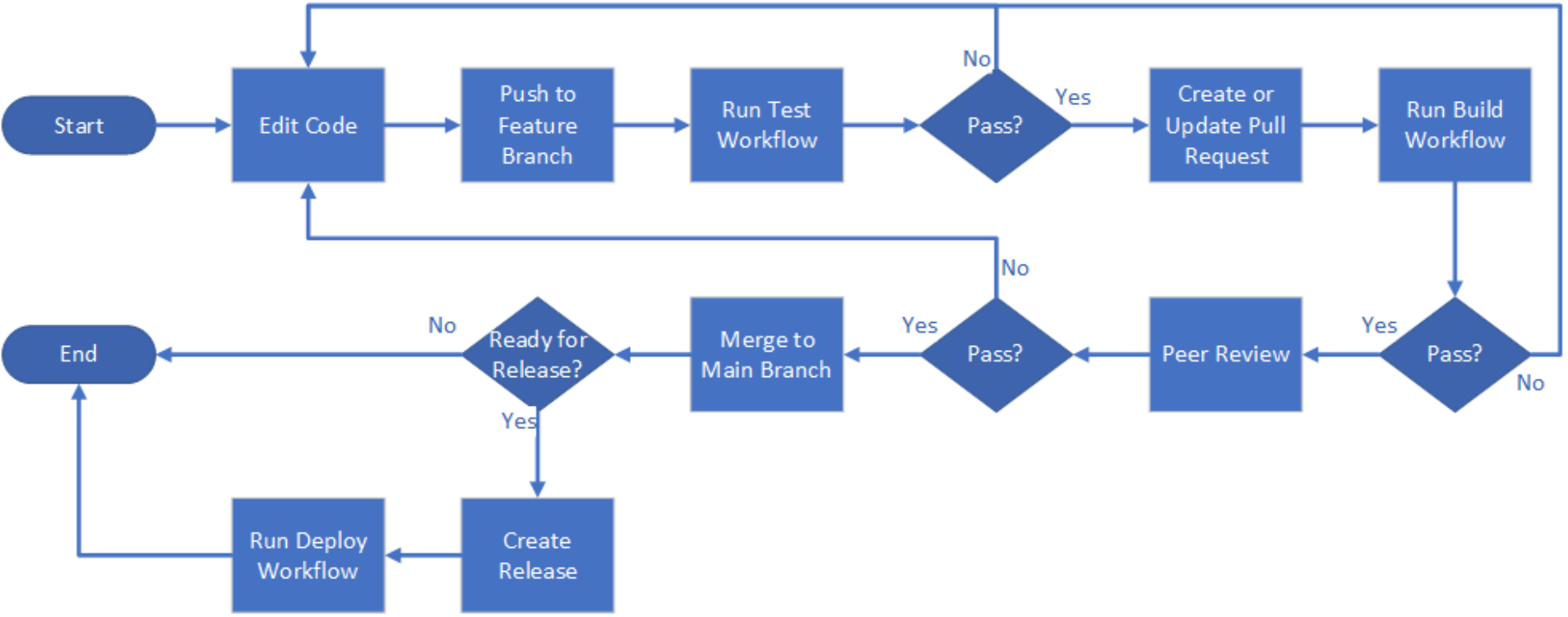
Branching


Feature Branches
Production
WI-0001
WI-0002
WI-0003
WI-0004
WI-0005
develop
main
A
B
C
D
E
A
AB
ABC
ABCD
ABCDE
AB
ABCDE

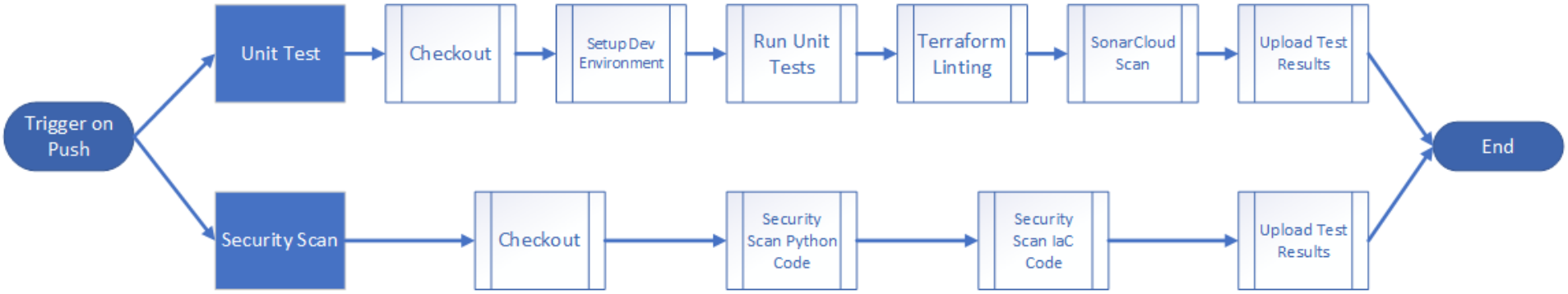
Our Application



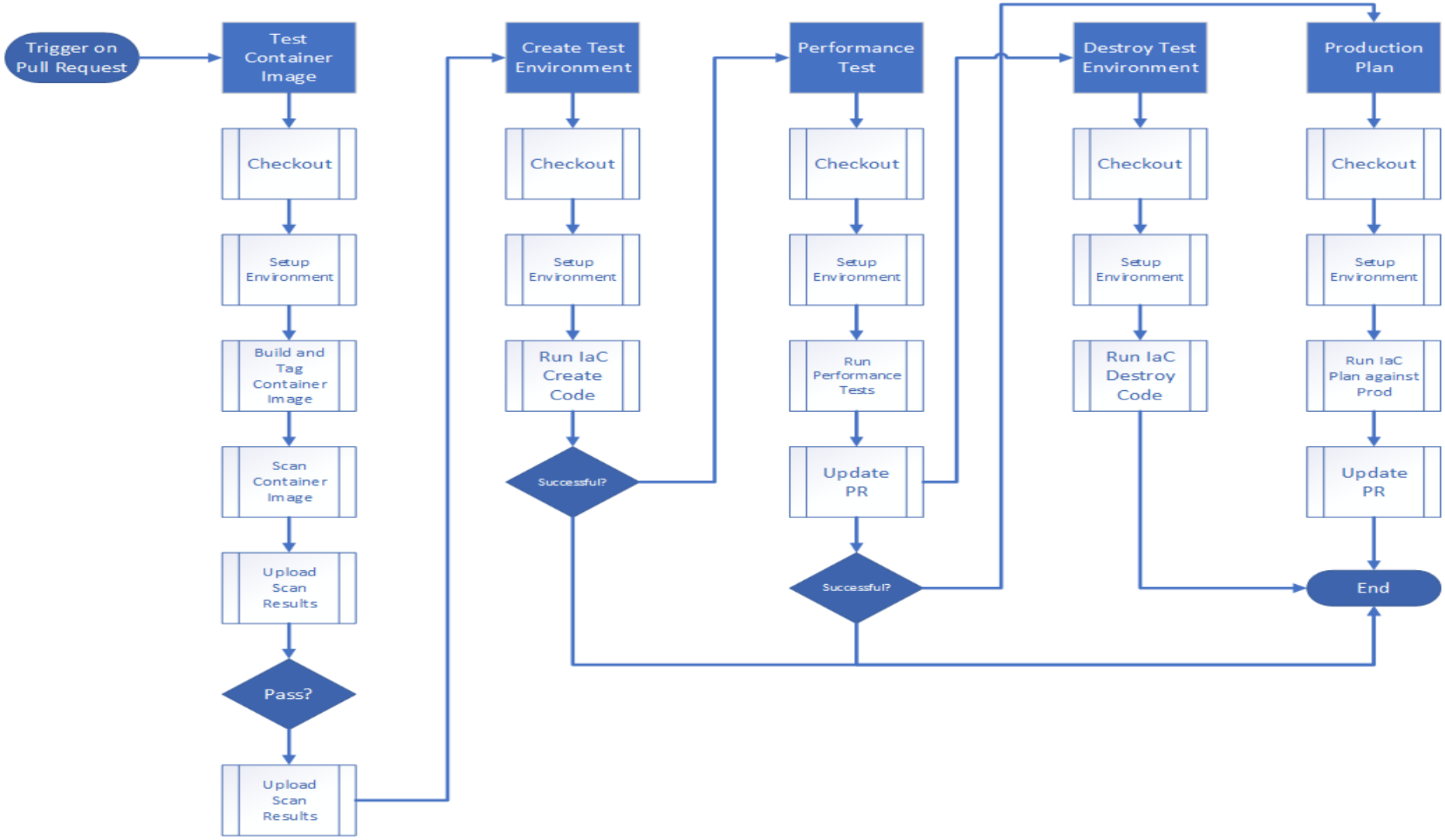
Workflow


Start
Edit Code
Push to Feature Branch
Run Test Workflow
Pass?
No
Yes
Create or Update Pull Request
Run Build Workflow
Pass?
Yes
No
Peer Review
Pass?
Yes
No
Merge to Main Branch
Ready for Release?
No
Yes
End
Create Release
Run Deploy Workflow

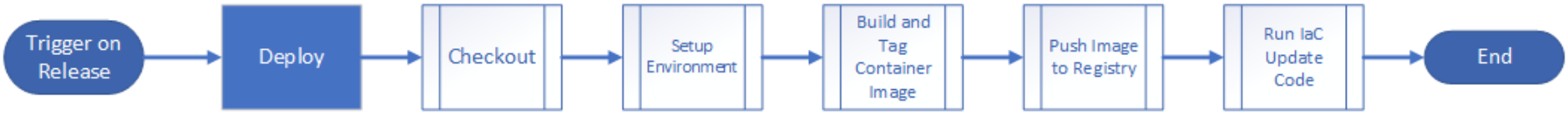
Test Workflow



Build Workflow



Deploy Workflow



Demo

Questions?

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