Code-to-Cloud

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Insight DevOps Fellowship, New York

Wen Gong

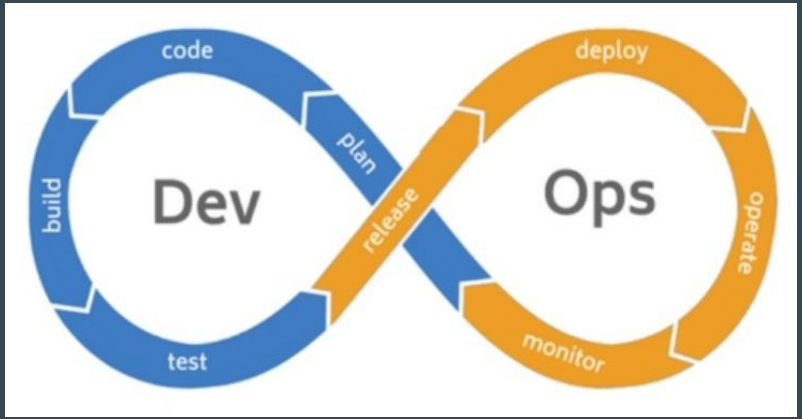
Motivation

Problems

- monolithic app
- non test-driven dev
- build not automated
- slow approval

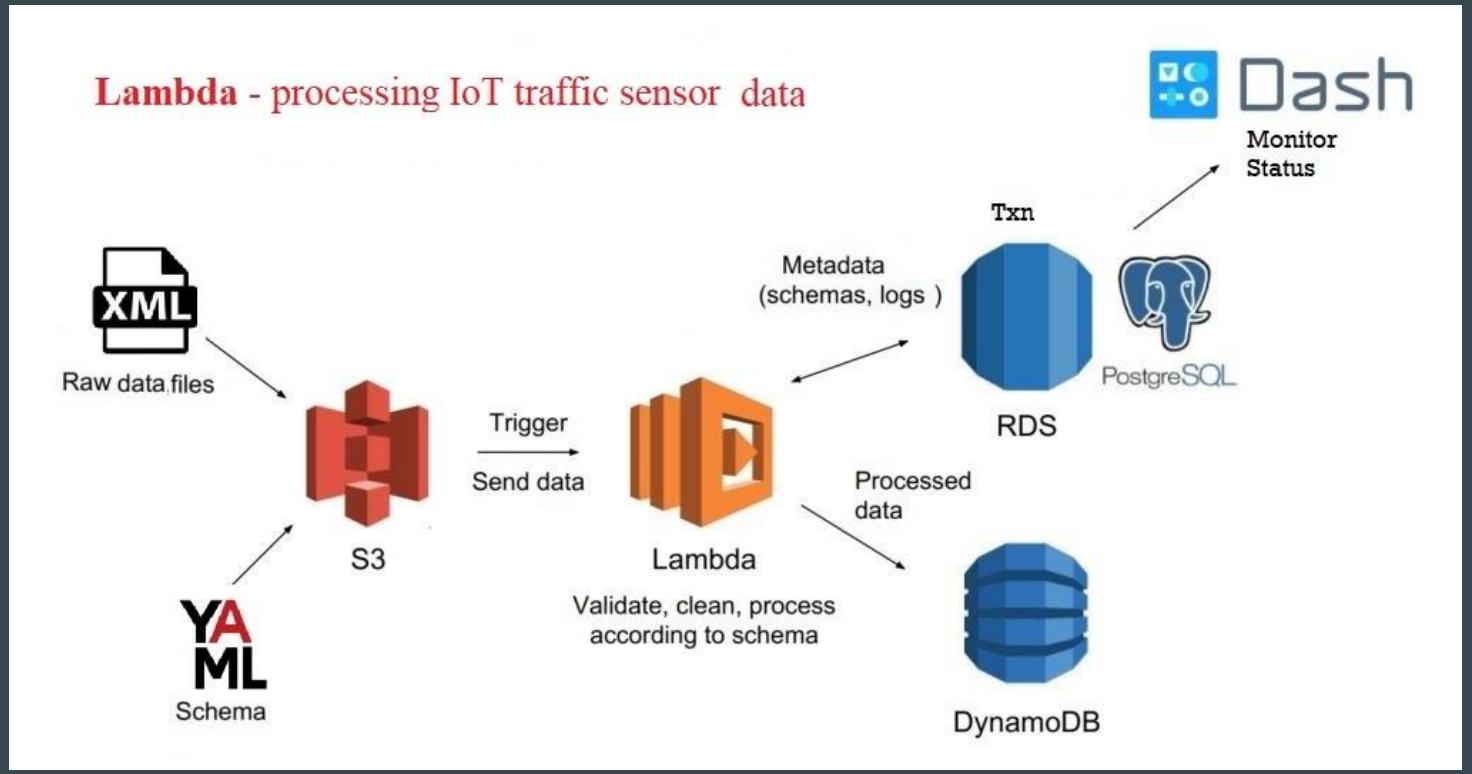
Promise

- business agility
- productivity gain
- cost savings

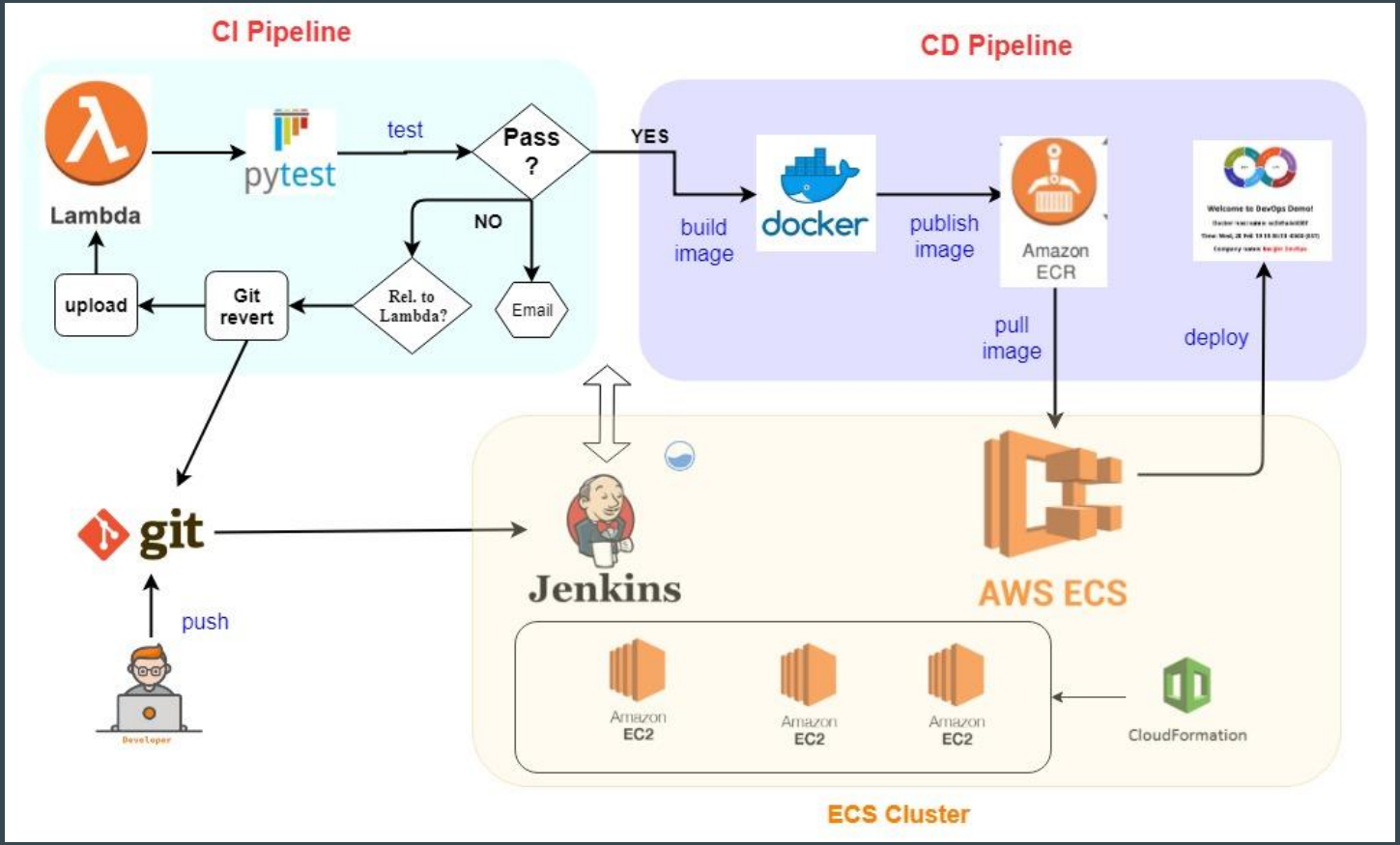


Data Eng. Pipeline

1) enhanced logging
2) added E2E test
3) included in CI



DevOps Pipeline: CI + CD



Challenge - Improved DE pipeline

- added new table: xml_txns
- added E2E pytest: test_lambda_function_xml.py
- made XML parsing robust and enhanced logging
- fixed contention when uploading 2 files < 1 min.

Challenge - Worked around Jenkins plugin error

```
# login
$(aws ecr get-login --no-include-email --region=us-east-1)

#Store the repositoryUri as a variable
REPOSITORY_URI=`aws ecr describe-repositories --repository-names ${RE

# workaround to fix Docker build and publish plugin issue
TAG_NAME=${REPOSITORY_NAME}:v_${BUILD_NUMBER}
IMG_NAME=${REPOSITORY_URI}:v_${BUILD_NUMBER}
docker build --tag=${TAG_NAME} .
docker tag ${TAG_NAME} ${IMG_NAME}
docker push ${IMG_NAME}

#Replace the build number and respository URI placeholders with the c
sed -e "s;%BUILD_NUMBER%;${BUILD_NUMBER};g" -e "s;%REPOSITORY_URI%;${
#Register the task definition in the repository
aws ecs register-task-definition --family ${FAMILY} --cli-input-json
SERVICES=`aws ecs describe-services --services ${SERVICE_NAME} --clus
#Get latest revision
REVISION=`aws ecs describe-task-definition --task-definition ${NAME}
```

https://issues.jenkins-ci.org/browse/JENKINS-41020

Challenge - Handled secrets in Lambda/Docker

- used python client for Vault (hvac)

```
import hvac   # python client for Vault
client = hvac.Client(url='http://127.0.0.1:8200/',\
    token='s.1gXcsuHjPZKH3qecpqc6QtTd')
db_secrets = client.read('kv/postgresql_dev')
db_host,db_port,table_name,db_user,db_pwd = \
    db_secrets['data']['hostname'], \
    db_secrets['data']['port'], \
    db_secrets['data']['db_name'], \
    db_secrets['data']['user'], \
    db_secrets['data']['pwd']
```

Demo

CD	walk through from git push to service deployed in AWS (https://youtu.be/dxnUyEwXZhw)
CI	walk through from git push to docker build ready (https://youtu.be/rKY6u4Z6AzM)
DE	walk through DE pipeline (https://youtu.be/qpPLTKGVnkc)

Wen Gong

- Ph.D. in nuclear physics
- 20 years of experience as Software Engineer & Consultant
    - CRM & master data mgmt
    - data quality: cleanse, dedup, match
    - app. integration
    - data conversion / ETL
- Passionate about STEM
    - teach py4kids

ORACLE

Questions

Links

- https://github.com/wgong/code2cloud
- http://jenkins.s8s.cloud/

PyTest

README.md | test_lambda_function_xml.py

```python
    db_connection_string = f"dbname='{db_name}' user='{db_user}' host='{db_host}' password='{password}'"
    connection = psycopg2.connect(db_connection_string)

    # download traffic data
    tmpfile="/tmp/trafficspeed.xml.gz"
    cmd = f"wget -O {tmpfile} http://opendata.ndw.nu/trafficspeed.xml.gz"
    wget=subprocess.run(cmd.split(), stdout=subprocess.PIPE).stdout.decode('utf-8')

    cmd = f"env TZ=Europe/Amsterdam date +%Y-%m-%d:%H%M"
    dt=subprocess.run(cmd.split(), stdout=subprocess.PIPE).stdout.decode('utf-8')

    s3_filename = f"Traffic/{dt[:10]}/{dt[11:15]}_Trafficspeed.gz"
    cmd = f"aws s3 cp {tmpfile} s3://{s3bucket}/{s3_filename}"
    aws_s3_cp=subprocess.run(cmd.split(), stdout=subprocess.PIPE).stdout.decode('utf-8')

    cd,msg = get_txn_status(connection, s3_filename, poll_freq, poll_timeout)
    connection.close()

    return cd,msg

def test_lambda_xml():
    status_cd, status_msg = lambda_xml()
    print(status_cd, status_msg)

    if BREAK_BUILD and status_cd != 0:
        cmd = f"git revert HEAD --no-edit"
        git_revert=subprocess.run(cmd.split(), stdout=subprocess.PIPE).stdout.decode('utf-8')

        cmd = f"git push origin HEAD:master"
        git_revert=subprocess.run(cmd.split(), stdout=subprocess.PIPE).stdout.decode('utf-8')

    assert status_cd == 0
```

Jenkins: Pipeline/Jenkinsfile

File Edit Selection View Go Debug Terminal Help — Jenkinsfile - vscode-ws (Workspace) - Visual Studio Code

EXPLORER

OPEN EDITORS
- aws-cli.README.md README
- aws-setup.README.md REA...
- TODO.README.md README
- INSTALL.md insight-proj... 9+
- Jenkinsfile insight-project M
- app.py insight-project • src/dash
- lambda_function_xml.py... 1
- logs.py insight-project • sr... 1
- retrieve-realtime-data.sh ins...

VSCODE-WS (WORKSPACE)
- go
- hello-aws-docker
- insight-project
  - images
  - jenkins
  - src
  - test
    - sample_Trafficspeed.xml.gz
    - Traffic.yml
  - .gitignore
  - INSTALL.md 9+
  - Jenkinsfile M

OUTLINE

Jenkinsfile × | app.py | lambda_function_xml.py | logs.py | retrieve-realtime-data.sh

```
pipeline {
    agent any
    stages {
        stage('Build') {
            steps {
                sh 'echo "upload Lambda function"'
                sh '''
                    ./upload-lambda-xml.sh
                '''
            }
        }
        stage('Test') {
            steps {
                sh 'echo "run integration test"'
                sh '''
                    source ~/.aws/env_var
                    echo ${AWS_S3_BUCKET}
                    echo ${AWS_PG_DB_HOST}
                    echo "activate py3"
                    source ~/py36/bin/activate
                    which python3
                    which pytest
                    echo "run pytest"
                    cd src/lambda_xml
                    pytest -q test_lambda_function_xml.py
                '''
            }
        }
```

master* | Python 3.6.5 64-bit ('base': conda) | 1 | 177 | Ln 8, Col 43 | Spaces: 4 | UTF-8

Jenkins: Build Config

Not secure | ec2-52-3-227-246.compute-1.amazonaws.com/job/insight-project/configure

Jenkins ▸ insight-project ▸

General | Branch Sources | **Build Configuration** | Scan Repository Triggers | Orphaned Item Strategy

Health metrics | Properties | JIRA | Pipeline Libraries | Vault Plugin | Pipeline Model Definition

Build Configuration

Mode: by Jenkinsfile

Script Path: Jenkinsfile

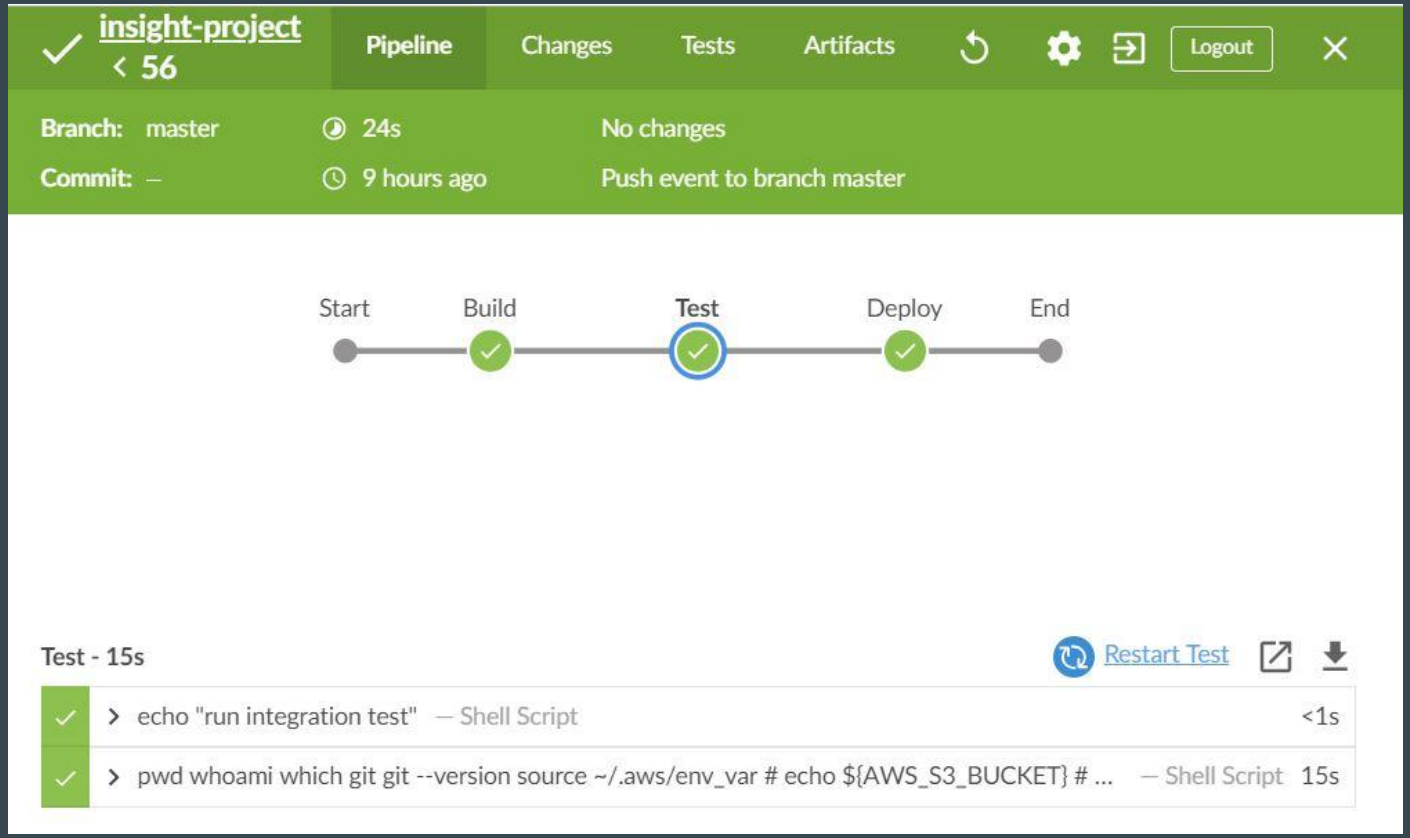
Scan Repository Triggers

☐ Monitor Docker Hub/Registry for image changes

☑ Periodically if not otherwise run

Interval: 2 hours

Jenkins: Dashboard



Docker-build-and-publish

```
29    https://docs.docker.com/engine/reference/commandline/login/#credentials-store
30
31    Login Succeeded
32    Sending build context to Docker daemon  2.107MB
33    Step 1/7 : FROM alpine:3.4
34     ---> b955fa398a69
35    Step 2/7 : RUN apk --update add nginx php5-fpm &&     mkdir -p /var/log/nginx &&     touch
      /var/log/nginx/access.log &&     mkdir -p /src &&     mkdir -p /run/nginx
36     ---> Using cache
37     ---> 17a108601ae9
38    Step 3/7 : ADD www /www
39     ---> d4e48ae60670
40    Step 4/7 : ADD nginx.conf /etc/nginx/
41     ---> defe512ec041
42    Step 5/7 : ADD php-fpm.conf /etc/php5/php-fpm.conf
43     ---> a469f6ae4d54
44    Step 6/7 : EXPOSE 80
45     ---> Running in e10388e9c253
46    Removing intermediate container e10388e9c253
47     ---> 367b6cf55307
48    Step 7/7 : CMD (php-fpm -d variables_order="EGPCS") && (tail -F /var/log/nginx/access.log &) && exec nginx -
      g "daemon off;"
49     ---> Running in 2972b4bab732
50    Removing intermediate container 2972b4bab732
51     ---> 787b8c9ef055
52    Successfully built 787b8c9ef055
53    Successfully tagged hello-aws-docker:v_44
54    The push refers to repository [629309645488.dkr.ecr.us-east-1.amazonaws.com/hello-aws-docker]
55    28d322e53d2b: Preparing
```

Deploy to Kubernetes (not ECS)

jenkins-build-k8s.sh

```
#!/bin/bash
REGION=us-east-1
REPOSITORY_NAME=hello_docker
REPOSITORY_URI=`aws ecr describe-repositories --repository-names ${REPOSITORY_NAME}
 --region ${REGION} | jq .repositories[].repositoryUri | tr -d '"'`
## 629309645488.dkr.ecr.us-east-1.amazonaws.com/hello_docker
## login
# docker login -u w3gong -p ${DOCKER_HUB}
$(aws ecr get-login --no-include-email --region=us-east-1)
## build and publish image
TAG_NAME=${REPOSITORY_NAME}:v_${BUILD_NUMBER}
IMG_NAME=${REPOSITORY_URI}:v_${BUILD_NUMBER}
docker build --tag=${TAG_NAME} .
docker tag ${TAG_NAME} ${IMG_NAME}
docker push ${IMG_NAME}
## deploy to Kubernetes
kubectl set image deployment/hello_docker hello_docker=${IMG_NAME}
```