[all the] CodeBuild [you can stomach] in 45 minutes

Why?

- CodeBuild felt a bit mysterious and odd to me upon first use
- Not all of the information is easy to find
- It helps to see a few working examples

Who am I?

About Ken Rimple (@techcast)

- Director of Training and Mentoring, Chariot Solutions
- Present about emerging / emergent tech topics
- Mentor clients in AWS, Docker, Angular, React, Spring, other techs
- Host TechChat Tuesdays on YouTube, Chariot TechCast podcast

So, what is AWS CodeBuild?

A cloud-based application builder

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- `Build Run` - An execution of a CodeBuild project with associated logs, artifacts and reports

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Don’t need access to AWS resources or the CLI during a build cycle? CircleCI or Jenkins could be a better selection…

Elements of a CodeBuild Project

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  - live within the project (easiest to test), *or*
  - within an S3 bucket
- Default filename is `/buildspec.yml`

A Simple BuildSpec (YAML)

```yaml
version: 0.2

phases:
  build:
    commands:
      - ./run-tests.sh
      - ./run-build.sh
```

1. Version 0.2 is the latest version and is recommended
2. Phases include install, pre_build, build, and post_build
3. Each command is executed in sequence, and any command returning a non-zero return code causes the build to fail

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GitLab, GitHub, CodeCommit are typical SCMs for CodeBuild

CodeBuild Mechanics - The Build Lifecycle

- All builds go through several phases
  - Install
  - Pre-build
  - Build
  - Post-build

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- Reports can be generated after a successful *or* failed build
  - Reports can be in several formats, with JUNITXML being the most common

CodeBuild Mechanics - Notifications

- CodeBuild can use SES to notify about build lifecycle events
- CodeBuild can also report build success/failure to your SCM
- These topics are not covered here

Running a BuildSpec

Run BuildSpecs locally using a Docker image

- One time setup:
  - Download the CodeBuild script and selected CodeBuild Image to your local machine
  - Uses `codebuild_build.sh` from https://tinyurl.com/yxosr3uo
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This lets you diagnose CodeBuild problems locally!

Scripting a codebuild run

```
/bin/bash codebuild_build.sh \
  -i aws/codebuild/amazon-linux-2-v-3:latest \
  -a /tmp/cb \
  -s `pwd` -c -m
```

1. -i Docker image you built / tagged (AL 2, v3 is suggested)
2. -a Location for artifact downloads
3. -s Source files location (current dir here)
4. -c Use local credentials in ~/.aws/credentials
5. -m Mount the source directory directly in Docker

Assumes a `buildspec.yml` in the root directory of the project

Demo: Running CodeBuild on local machine

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Always use CloudFormation to configure projects so you can tear down and set up again easily

Run BuildSpecs in the CodeBuild console

- Install the BuildSpec as as part of a CodeBuild project
  - Configure the source repository
  - Configure the IAM Role
  - Configure the BuildSpec from S3 or a project file/directory
  - Configure other aspects (report/artifact locations, alerts, triggers, etc)

You can configure CodeBuild as a CloudFormation stack.

Examples on my Git repo.

Demo: Running a CodeBuild project from the AWS Console

CloudFormation configuration example

Some BuildSpec Tips

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- CodeBuild expects your statements to execute with a zero return code!
- Any command (even shell commands) that return a non-zero fail the build
- This can be *hard* to debug
  - Check `$?` with an echo to see the return of the last command

Even the lowly `ls` command can fail you

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The return value of `ls` when not finding a dir is > 0

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Smaller, more modular builds are easier to orchestrate

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See https://tinyurl.com/y3ufegga for details...

Setting Java, NodeJS versions in INSTALL phase

```
1  phases:
2    install:
3      runtime-versions:
4        java: corretto11          (1)
5        nodejs: 12
6    build:
7      commands:
8        - npm install             (2)
9        - gradle test             (3)
```

1. Corretto is the available JVM from Amazon. It does **not** support Java 14
2. NodeJS includes npm and related tools
3. Java includes Maven and Gradle out of the box

Pre and post build steps

- Add a `pre_build` section to run before the build
  - Triggering AWS CLI commands to create or reset resources
  - Downloading external images or support files
- Add a `post_build` section to run after the build completes
  - Generate documentation from source code
  - Collect items to deliver as an archive with `tar`, `gz`
- Add a `finally` section to run regardless of pass/fail (for test reports)

Example `finally`: creating reports for Cypress

```
build:
  commands:
    - cd cypress-tests
    - npm install
    - NO_COLOR=1 cypress --chromium                    (1)
  finally:
    - npm run merge-report; npm run generate-report

artifacts:
  files:
    - '*/'
  base-directory:
    - 'cypress-tests/cypress'
```

(1) Important - Cypress outputs ANSI escape codes that make a mess of logs

Install software in the Build Image

- You can install utilities with `wget`, `tar`, `gunzip` etc...
- No permissions required if you are running it in userspace
- You can run as `root` if needed to install packages via the package manager of the OS

This slows down build times. It may be better to create and use your own custom build image

Installing Software Example: pandoc

```
...
phases:
  pre_build:
    commands:
      - yum update -y
      - yum install -y pandoc
  build:
    commands:
      - pandoc src/content/simpledoc.markdown -o src/content/simpledoc.html
artifacts:
  files:
    - src/content/simpledoc.html
```

- To do this you must run as "root" in the container

Don’t pick huge utilities, customize the image instead

Running Docker in CodeBuild

- Run builds with `docker build` and publish to AWS ECR

```
phases:
  install:
    runtime-versions:
      docker: 19
  pre-build:
    commands:
      - $(aws ecr get-login --no-include-email --region us-east-1)
  build:
    commands:
      - docker build -t foo/bar build .
      - docker tag ...
      - docker push ...
```

You must configure the job to run as `root`

Wrap-up

- CodeBuild is a huge tool, with lots of settings
  - It is AWS-native
  - It can access your applications and run behind a VPC
  - It can run customized containers
- You can test the Build Specs locally
- You can install CodeBuild projects via CloudFormation
- You can use CodeBuild projects as part of a full build pipeline with CodePipeline or do the uploads yourself in CodeBuild

Questions?

- Resources
  - link:
  - Github sample project and slides
  - AWS CloudFormation for CodeBuild Projects
  - Specification for BuildSpec syntax
  - How to build your own Docker images
  - Reach me via Twitter on @Techcast