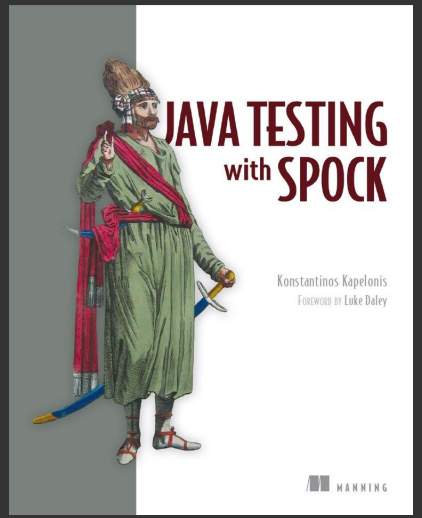
# Docker-based Pipelines

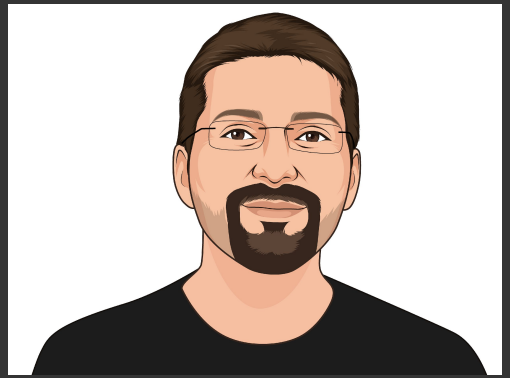
## with Codefresh

KOSTIS KAPELONIS

# About Kostis Kapelonis

- Software engineer
- Technical writer
- Manning author

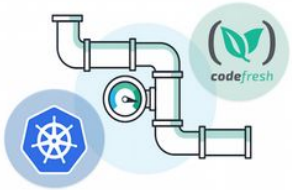



# About Kostis Kapelonis


Continuous Integration | July 12, 2018

**Codefresh vs. GitlabCI**

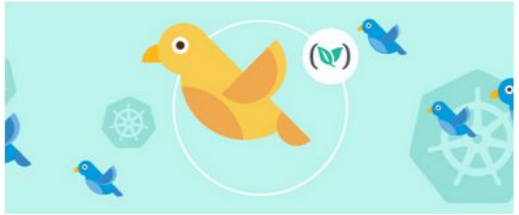
Kostis Kapelonis




Continuous Integration | September 11, 2018

**Programmatic Creation of Codefresh Pipelines – Part1**

Kostis Kapelonis



Continuous Deployment/Delivery | August 30, 2018

**Fully automated canary deployments in Kubernetes**

Kostis Kapelonis

# Agenda

1. Docker usage in Continuous Integration
2. Dockerizing build tools as pipeline steps
3. Upgrading build tools to new versions
4. Mixing multiple versions of the same tool in the same pipeline
5. Creating new pipeline steps on the fly

- Demos for everything using Codefresh

https://github.com/containers101/docker-based-pipelines-webinar/

# Theory: Docker-based Pipelines

# “Docker-based” means 2 different things:

**Using Docker as a deployment package**

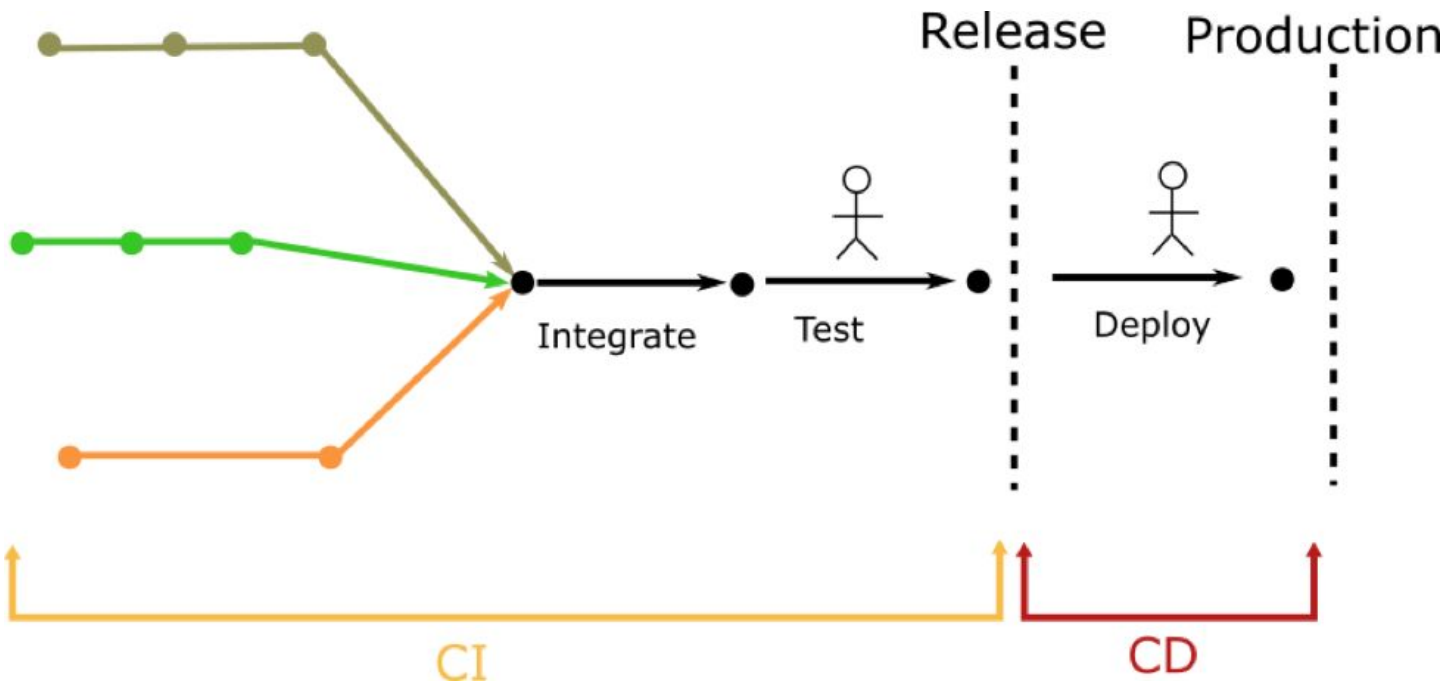
(this is what most people think)

*90% of cases: “We have migrated to Docker in production”*

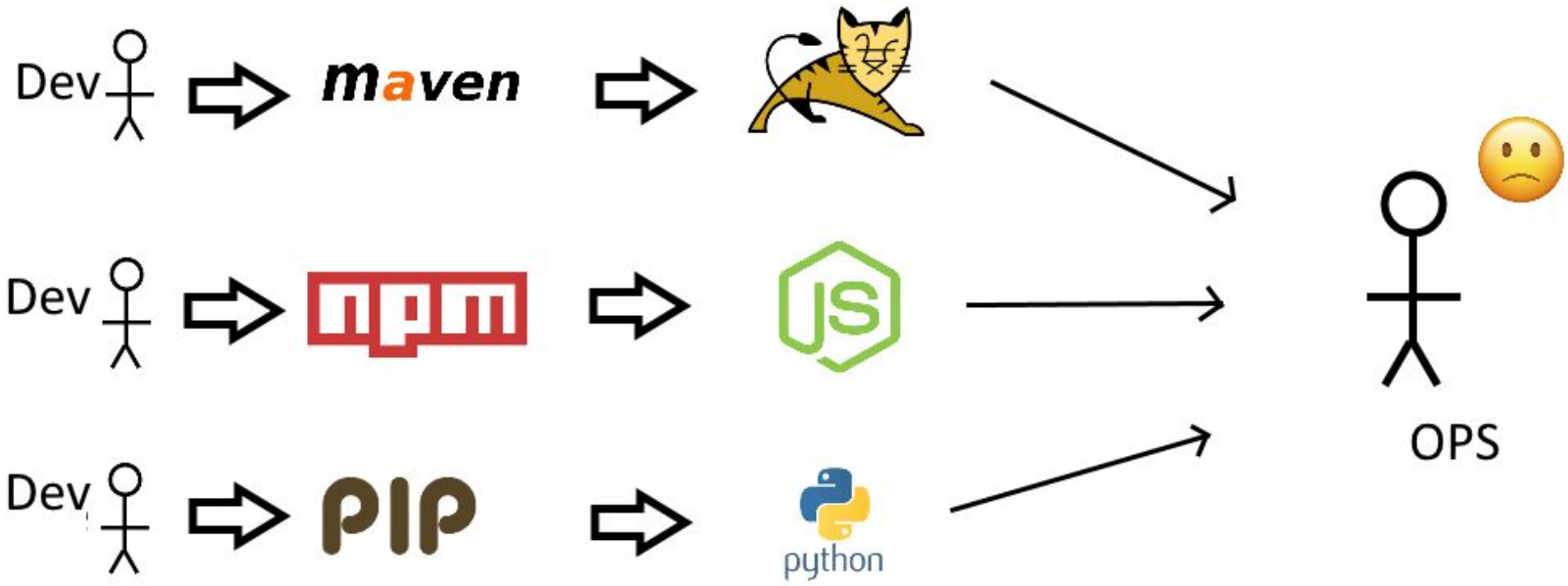
**Using Docker for build Tooling**

(this is not what most people think)

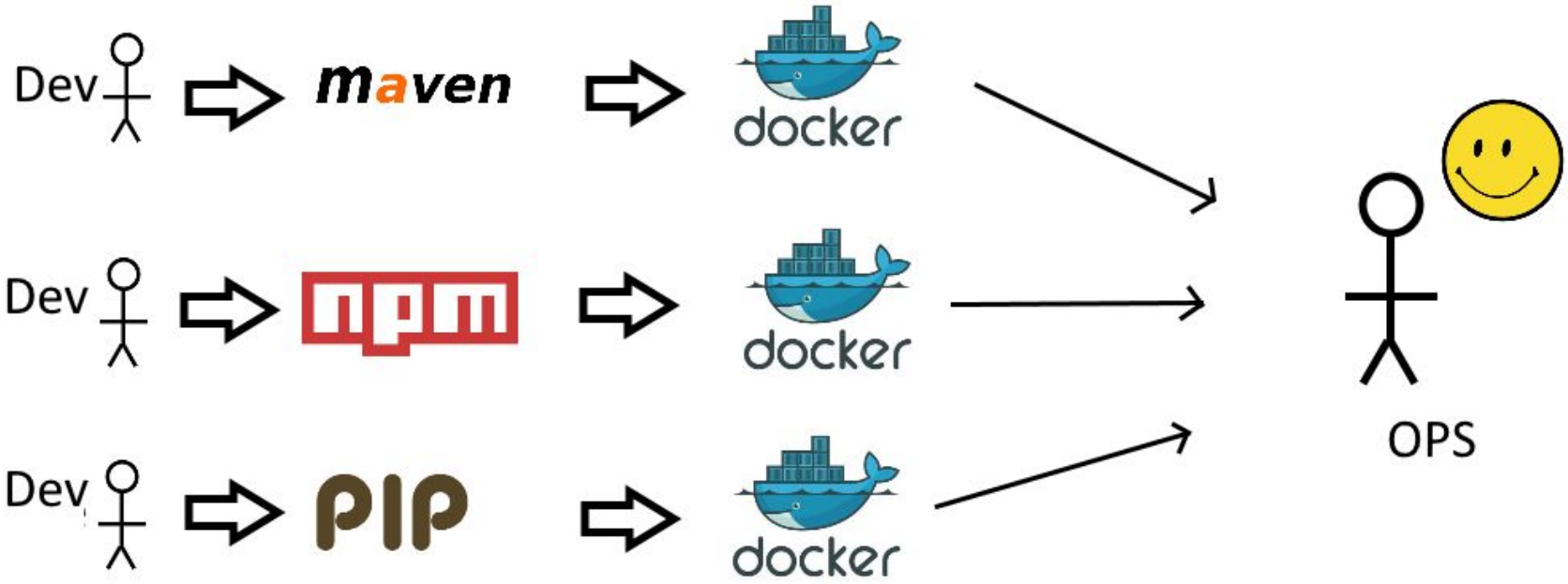
# The Basic Software Lifecycle



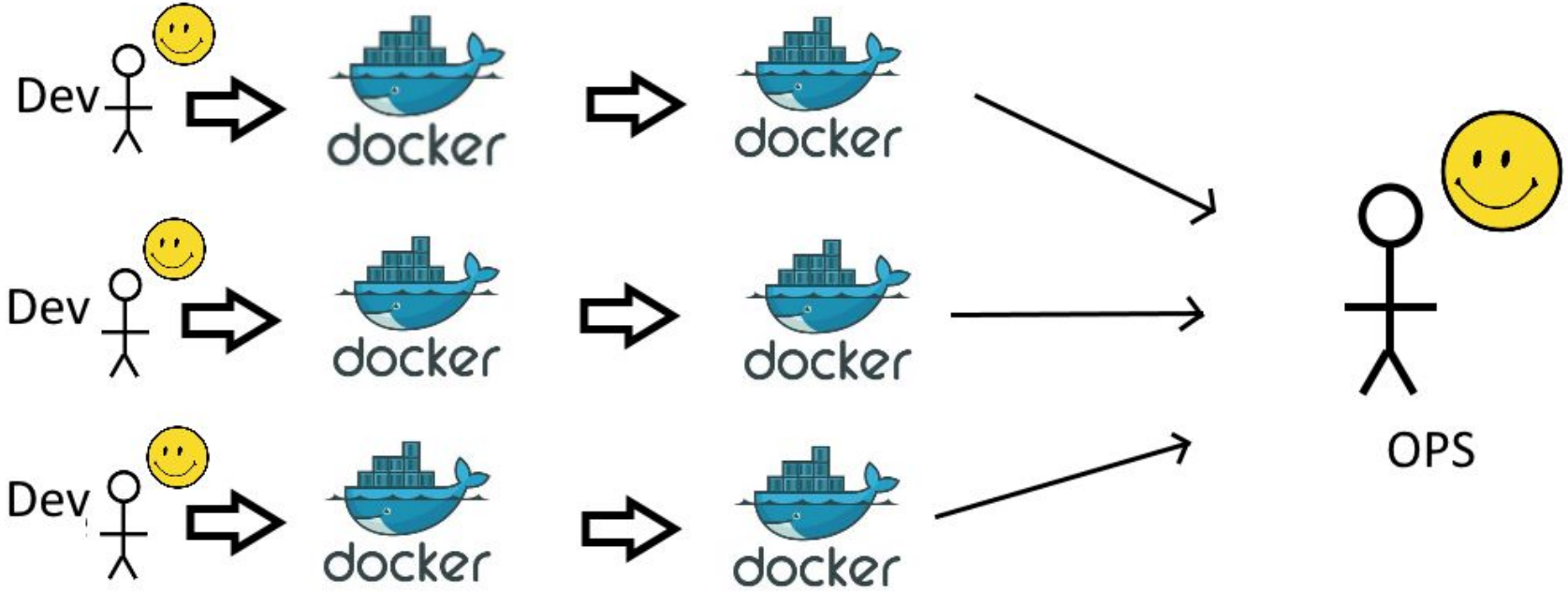
# Before Docker – The Dark Ages



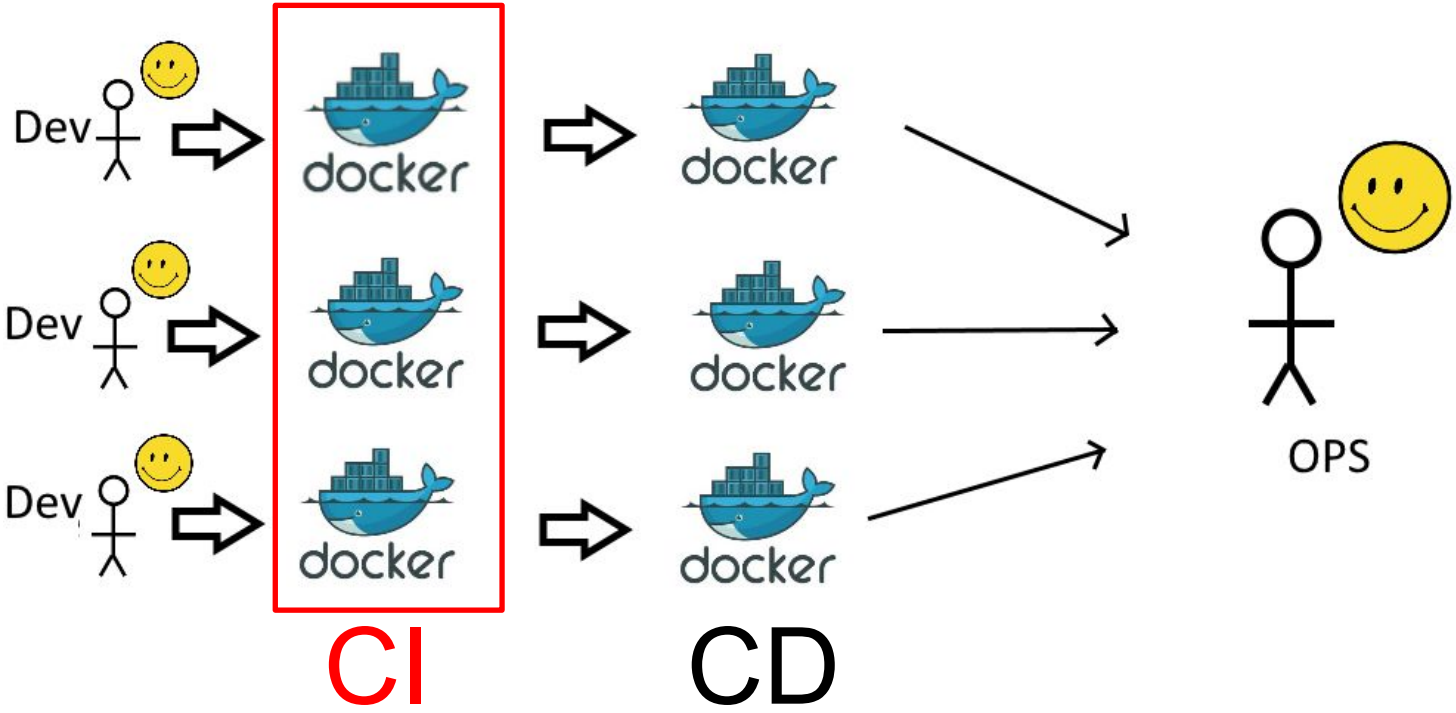
# Docker-based Deployments - Better



# Adding Docker-based Build Pipelines



# Today's Webinar



# Resources for Docker as Deployment artifact

Webinars | July 13, 2018

**Skip Staging! Test Docker, Helm, and Kubernetes Apps like a Pro**

Taryn Jones

Webinars | June 27, 2018

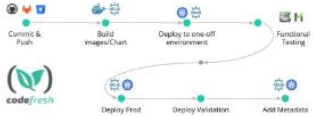
**Canary Deployment with Helm, Istio, and Codefresh**

Dan Garfield


Webinars | May 27, 2018

**Selenium Testing your Kubernetes apps with Machine Learning and Testim**

Dan Garfield




Webinars | May 24, 2018

**Selenium Testing your Kubernetes apps with Machine Learning and Testim**

Taryn Jones


Webinars | May 10, 2018

**Continuous Delivery for Kubernetes Apps with Helm & ChartMuseum**

Taryn Jones

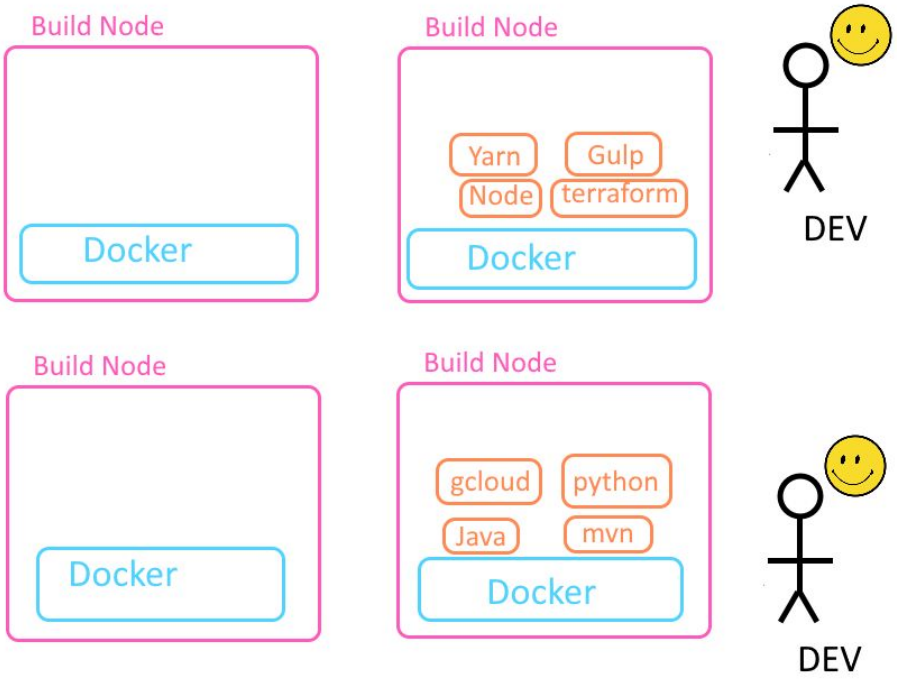

Webinars | May 2, 2018

**New in Codefresh: Single-Sign-On, Custom Triggers, Cron Jobs, and More!**

Taryn Jones

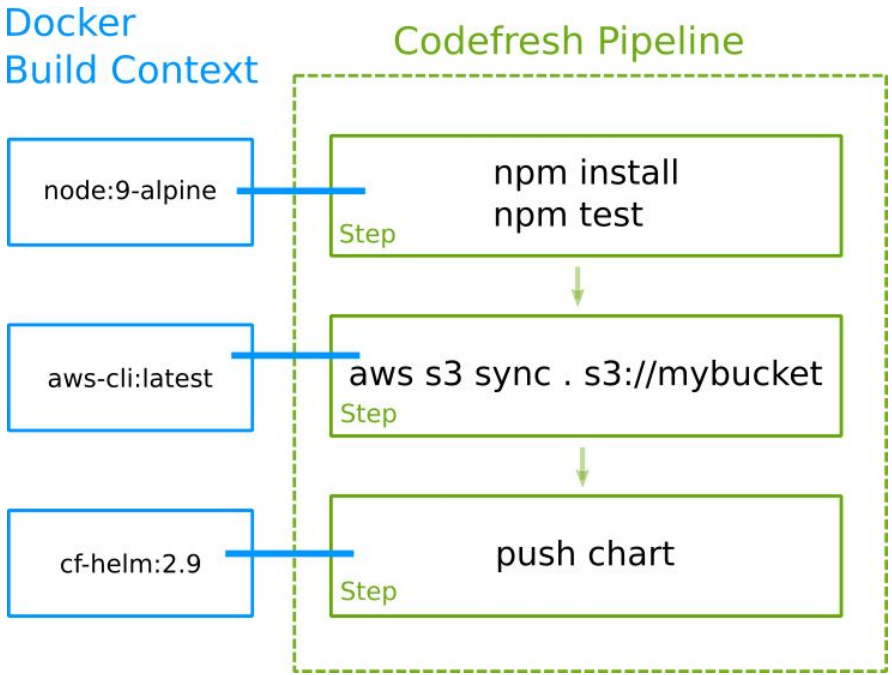
# Using Docker in Continuous Integration

- EVERY build tool is placed in a Docker container
- The build node has only Docker installed and nothing else
- A pipeline is a series of commands that run inside a Docker context
- After each build the node reverts back to its original state



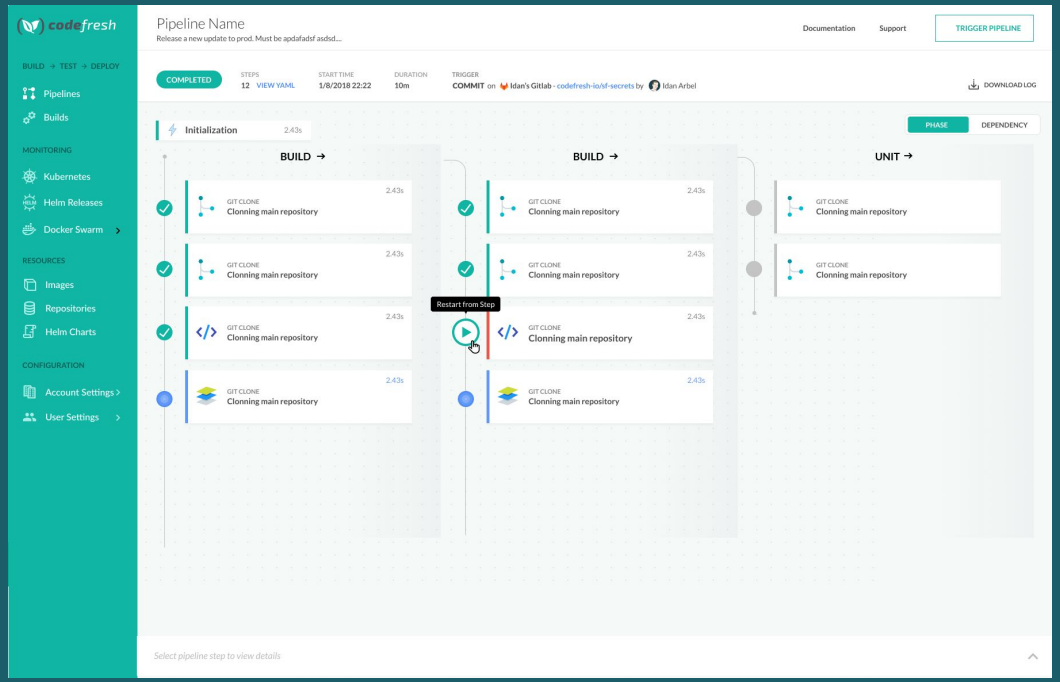
# Container per build step

- Codefresh requires ALL tools to be dockerized
- You can use any public or private Docker image as tooling
- Each build step has a Docker image as context
- Pipelines are described in declarative YAML



# About Codefresh

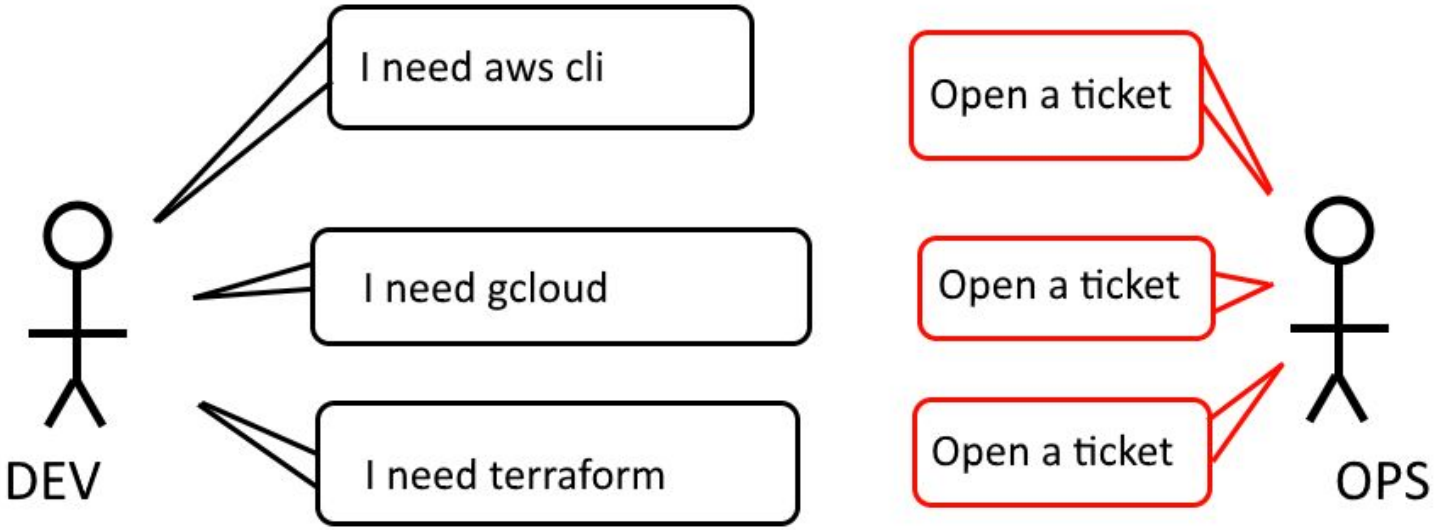
- Docker based CI/CD solution
- Each build step is a Docker image
- Native support for Docker, Helm, Kubernetes deployments
- Includes built-in Docker registry and Helm repository
- 20,000+ users



# Demo 1:
# Python/Node application

https://github.com/containers101/docker-based-pipelines-webinar/tree/master/01_simple_pipeline

# Traditional VM based problems



# Traditional CI Platform Questions:

- Do you support my favorite version of Node/Java/Go/Ruby/Python?
- Do you support maven, yarn, gulp, sbt, gradle, rake?
- Can I run Ansible? Terraform? GCloud? AWS CLI?
- Can I run Kubectl? Helm? Draft?

# Traditional CI/CD Platforms

## Use PHP with updated curl version #9924

Open **Nyholm** opened this issue on Jul 29 · 1 comment

## Add Python 3.7 option #9815

Open **Harmon758** opened this issue on Jun 28 · 73 comments

## scala / sbt 1.x support #9816

Open **aryairani** opened this issue on Jun 28 · 9 comments

## Upgrades

Ansible gets an update with version 2.6.1.

ChromeDriver is now update to version 2.40.

Docker Compose has been updated to version 1.22.0.

Elixir gets a version update with 1.6.6.

Gecko dirver is now on version 0.21.0.

Google Chrome is updated to version 67.0.3396.99.

Go receives two updates with 1.9.7 and 1.10.3.

Git has been updated to version 2.18.0.

Java gets three updates with 7u181, 8u181 and 10.0.2.

Maven gets an update with version 3.5.4.

MongoDB has been updated to version 3.4.16.

NodeJS receives an update with version 8.11.3.

PHP gets two updates with 7.1.19, 7.2.5.

OBSOLETE

# Demo 2:
# Adding Go and AWS CLI

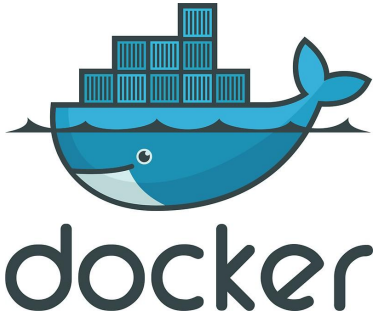
https://github.com/containers101/docker-based-pipelines-webinar/tree/master/02_aws_cli


# Does Codefresh Support…

- Node 10?
- Perl 6?
- Python2?
- Gradle?
- Vault?
- AWS cli?
- Sonar?
- Findbugs?
- Selenium?
- Snyk?
- Clair?

# YES!

Because there is a Docker image for it




## Does Codefresh Support…

- Node 10?
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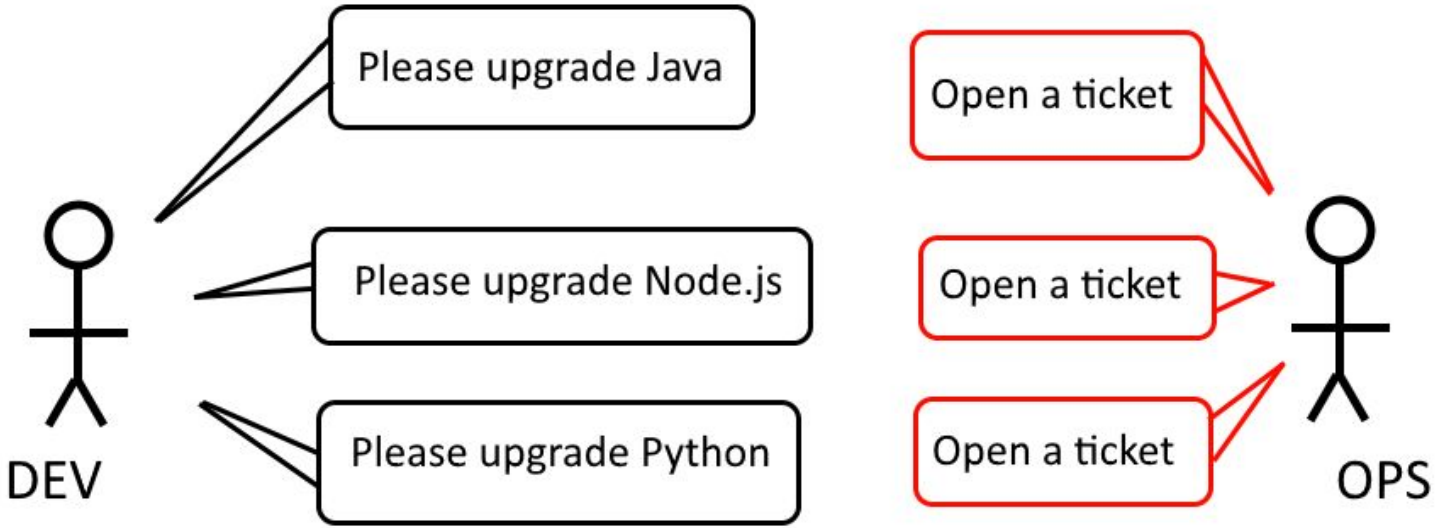
- Sonar?
- Findbugs?
- Selenium?
- Snyk?
- Clair?

# Codefresh Pipelines are Future Proof

- You can use ANY existing Docker image from Dockerhub or any other Registry
- Every time a new tool comes out, it can be used right away if packaged in a Docker image

# Tool Upgrades and Version Clashes

# Updating a Tool in a Traditional VM Pipeline



# Traditional CI Solutions

Support for pypy/pypy3 v6.0+ python #9542

Open webknjaz opened this issue on Apr 26 · 4 comments

Please add PHP 7.3 images #9717

Open Majkl578 opened this issue on Jun 8 · 47 comments

older versions of R no longer available? #9751

Open achubaty opened this issue on Jun 15 · 4 comments

Upgrade to Maven 3.5.3 #9366

Open vincent-zurczak opened this issue on Mar 19 · 7 comments

Update Git #6328

Open joepvd opened this issue on Jul 18, 2016 · 31 comments

C++14, Qt5.7 #6503

Open mrdeveloperdude opened this issue on Aug 19, 2016 · 12 comments

How can I upgrade Python to the latest 2 version? (2.7.15) #10273

Open lipis opened this issue 21 days ago · 3 comments

OBSOLETE

# Demo:
# Updating Python to 3.7

https://github.com/containers101/docker-based-pipelines-webinar/tree/master/02_aws_cli

# Using Tools from Different Versions

- Version clashes are a huge pain for both developers and operators
- Legacy projects need to still use old version
- Using different versions in the same pipeline is almost impossible
- Developers want to use latest version of tool, traditional CI/CD platforms may not be able to keep up

# Wasting Effort on “Version Managers”

## Ruby Version Manager (RVM)

RVM is a command-line tool which allows you to easily install, manage, and work with multiple ruby environments from interpreters to sets of gems.


## Node Version Manager

build passing | version v0.33.11 | cii best practices passing

### Table of Contents



## Simple Python Version Management: pyenv

gitter join chat

build passing

pyenv lets you easily switch between multiple versions of Python. It's simple, unobtrusive, and follows the UNIX tradition of single-purpose tools that do one thing well.

This project was forked from rbenv and ruby-build, and modified for Python.

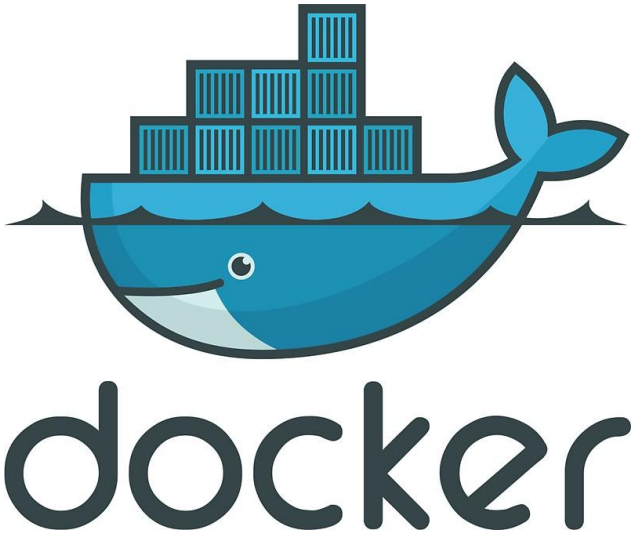
# Wasting Effort on “Version Managers”

- They allow developers to switch between different versions
- Tied to a specific technology/programming language
- Require they own installation/ maintenance
- Must be upgraded for new versions

```yaml
language: python
python:
  - "2.6"
  - "2.7"
  - "3.3"
  - "3.4"
  - "3.5"
  - "3.5-dev"  # 3.5 development branch
  - "3.6"
  - "3.6-dev"  # 3.6 development branch
  - "3.7-dev"  # 3.7 development branch
# command to install dependencies
install:
  - pip install -r requirements.txt
# command to run tests
script:
  - pytest
```

# The Problem with Python

- Different python versions are a notorious problem
- Until recently you needed dedicated support from your CI platform
- What happens if I want to test Python 2.5?




# Replacing “version managers” with Docker

- Works for any language/framework
- Already installed on the build node
- Its own version is independent from the tools
- Can use any public and private image

# Codefresh “Python Support”

- We support EVERY container ever made
- We support EVERY container that you can make in the future

- `3.5.6-alpine3.8`, `3.5-alpine3.8`, `3.5.6-alpine`, `3.5-alpine` (*3.5/alpine3.8/Dockerfile*)
- `3.5.6-alpine3.7`, `3.5-alpine3.7` (*3.5/alpine3.7/Dockerfile*)
- `3.4.9-stretch`, `3.4-stretch` (*3.4/stretch/Dockerfile*)
- `3.4.9-slim-stretch`, `3.4-slim-stretch`, `3.4.9-slim`, `3.4-slim` (*3.4/stretch/slim/Dockerfile*)
- `3.4.9-jessie`, `3.4-jessie` (*3.4/jessie/Dockerfile*)
- `3.4.9-slim-jessie`, `3.4-slim-jessie` (*3.4/jessie/slim/Dockerfile*)
- `3.4.9-wheezy`, `3.4-wheezy` (*3.4/wheezy/Dockerfile*)
- `3.4.9-alpine3.8`, `3.4-alpine3.8`, `3.4.9-alpine`, `3.4-alpine` (*3.4/alpine3.8/Dockerfile*)
- `3.4.9-alpine3.7`, `3.4-alpine3.7` (*3.4/alpine3.7/Dockerfile*)
- `2.7.15-stretch`, `2.7-stretch`, `2-stretch` (*2.7/stretch/Dockerfile*)
- `2.7.15-slim-stretch`, `2.7-slim-stretch`, `2-slim-stretch`, `2.7.15-slim`, `2.7-slim`, `2-slim` (*2.7/stretch/slim/Dockerfile*)
- `2.7.15-jessie`, `2.7-jessie`, `2-jessie` (*2.7/jessie/Dockerfile*)
- `2.7.15-slim-jessie`, `2.7-slim-jessie`, `2-slim-jessie` (*2.7/jessie/slim/Dockerfile*)
- `2.7.15-wheezy`, `2.7-wheezy`, `2-wheezy` (*2.7/wheezy/Dockerfile*)
- `2.7.15-alpine3.8`, `2.7-alpine3.8`, `2-alpine3.8`, `2.7.15-alpine`, `2.7-alpine`, `2-alpine` (*2.7/alpine3.8/Dockerfile*)
- `2.7.15-alpine3.7`, `2.7-alpine3.7`, `2-alpine3.7` (*2.7/alpine3.7/Dockerfile*)
- `2.7.15-alpine3.6`, `2.7-alpine3.6`, `2-alpine3.6` (*2.7/alpine3.6/Dockerfile*)
- `2.7.15-windowsservercore-ltsc2016`, `2.7-windowsservercore-ltsc2016`, `2-windowsservercore-ltsc2016` (*2.7/windows/windowsservercore-ltsc2016/Dockerfile*)
- `2.7.15-windowsservercore-1709`, `2.7-windowsservercore-1709`, `2-windowsservercore-1709` (*2.7/windows/windowsservercore-1709/Dockerfile*)

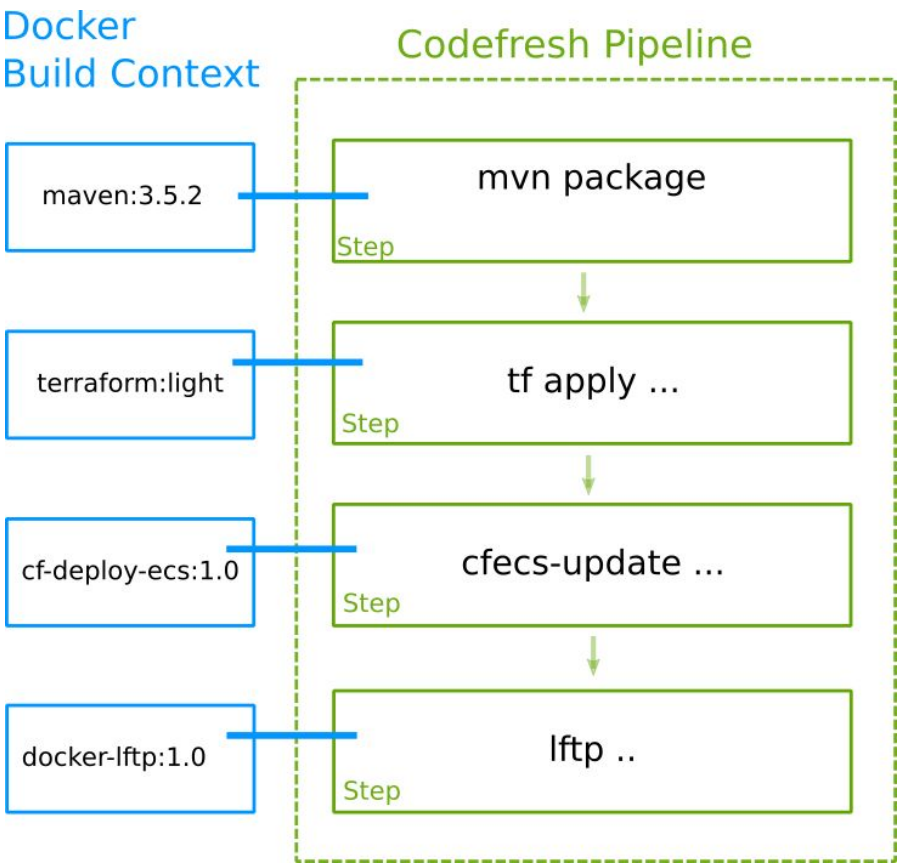
# Demo 3:
# Multiple Python/Node versions

https://github.com/containers101/docker-based-pipelines-webinar/tree/master/03_multiple_versions

# Data Sharing Between Pipeline Steps

# Data Sharing

- Steps need to communicate
- Output of one step is input for the next
- Artifacts (node modules, ruby gems, maven caches) need to persist
- Test reports/Coverage statistics

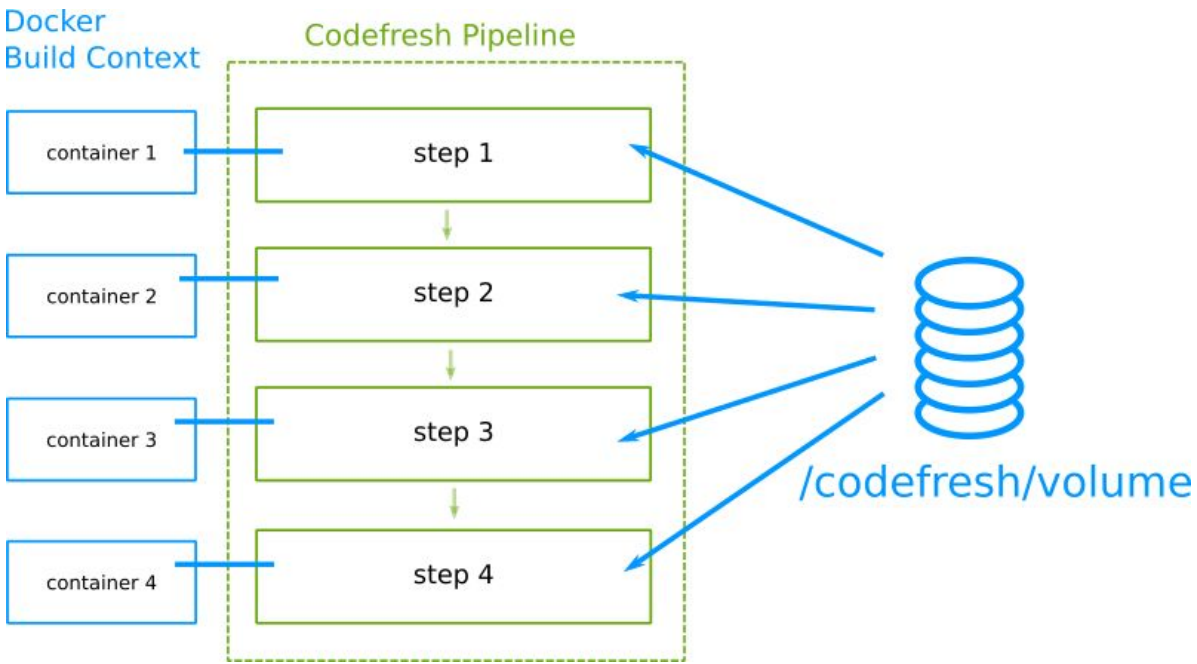


# Caches and Artifacts (Traditional CI solutions)

- “Cache” directive
- Need to be setup explicitly
- Different for each build tool

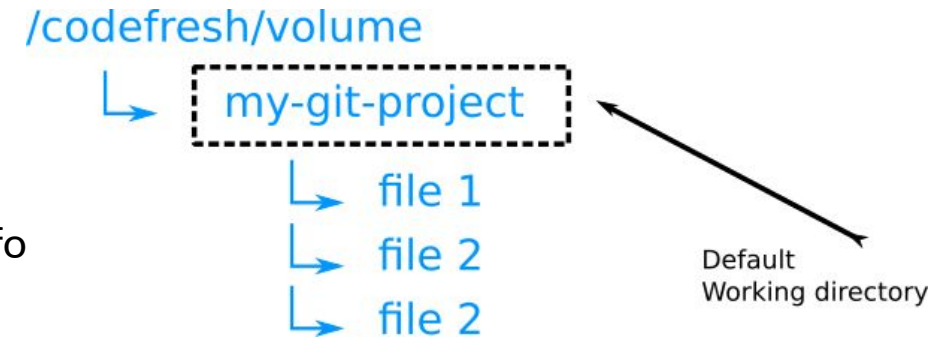
- “Artifact” directive
- Developers defines exact path of what needs to be archived
- Used for the result of the whole build or as shared data between steps

# All Steps Share a Volume in Codefresh

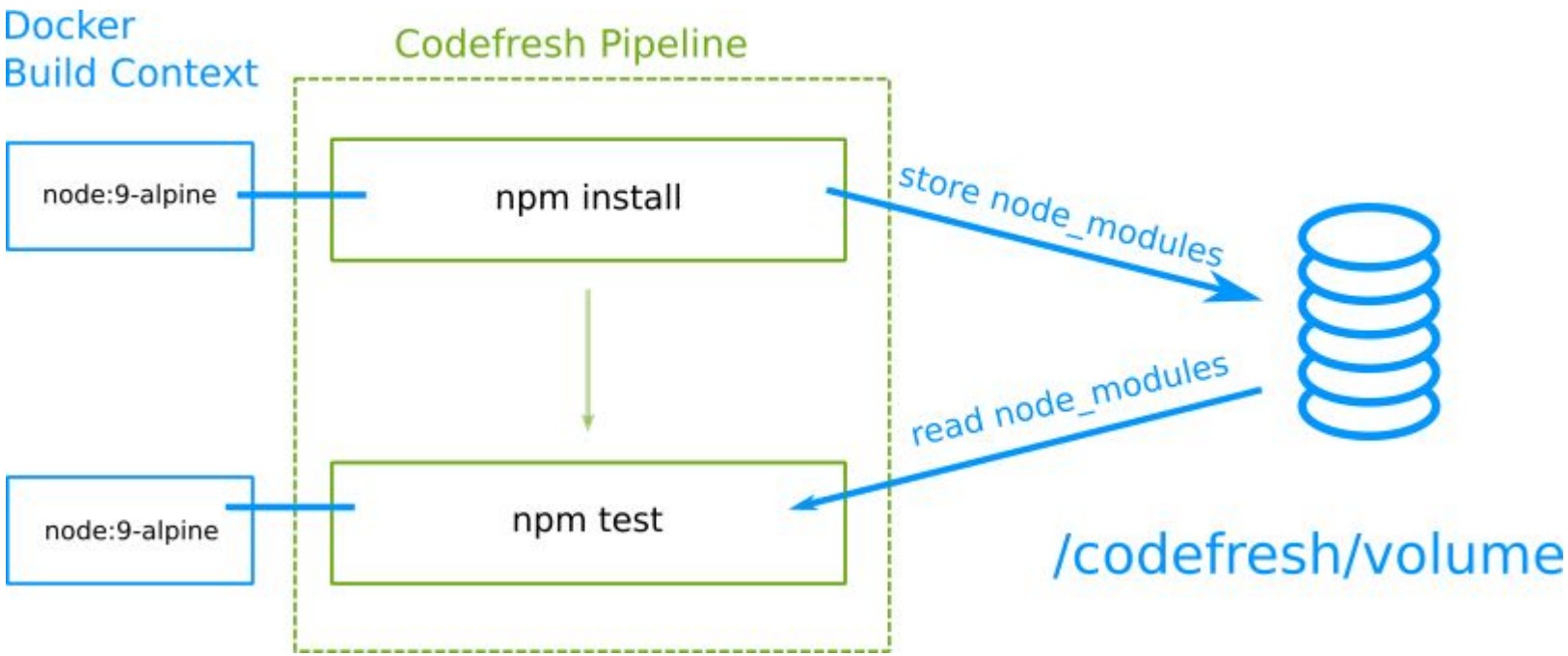


# Project is on the Volume

- Project is checked out in the volume
- Volume is also persisted between builds
- Any build tools that use the project folder fo artifacts will gain automatic caching
- For other tools you just need to point their cache to /codefresh/volume
- There is no need for special “artifact settings”. Just place files in /codefresh/volume



# Demo 4 – Node Modules



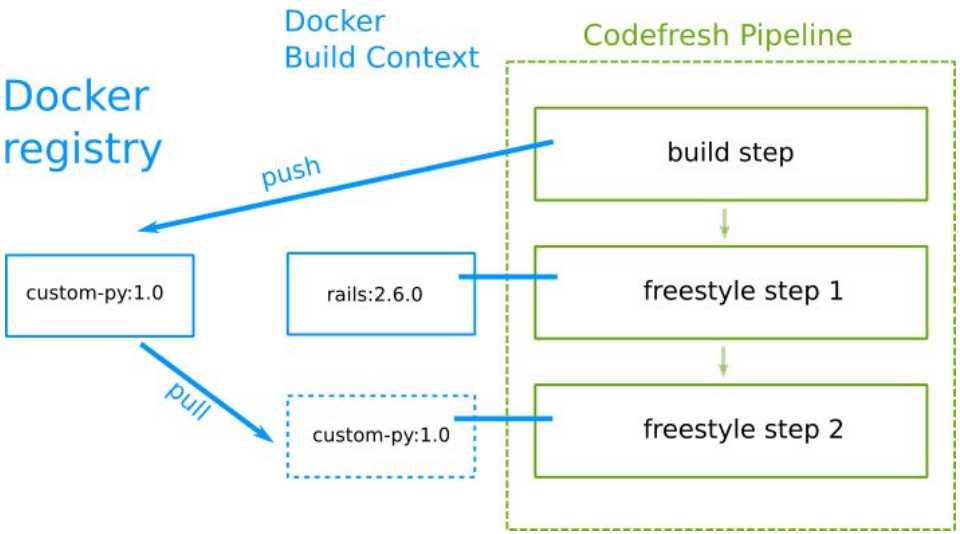

https://github.com/containers101/docker-based-pipelines-webinar/tree/master/04_volume

# Dynamic Docker Images

Docker Tooling on Demand – A Unique Feature

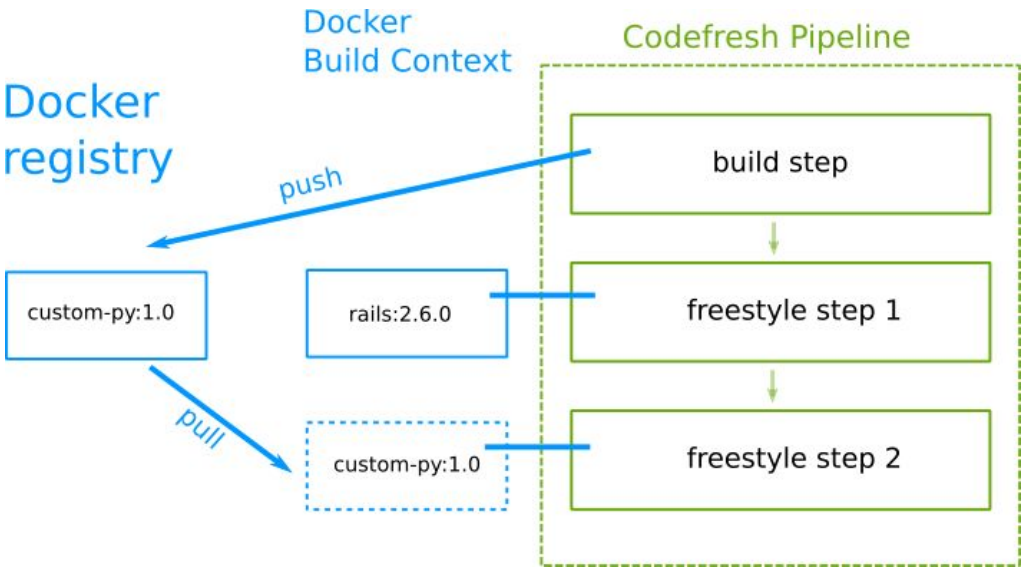
# Creating Docker Images On-demand

- Create a Docker image as a step
- Use image in a later step
- Maximum flexibility for build context
- Image contents are not known in advance
- Codefresh is the only platform at the moment that offers this capability



# Creating Docker Images On-demand

- No need for multiple Docker images
- “Create and forget” build steps
- Useful for integration tests
- Keep your Docker registry small and tidy



# Demo 5:
# Dynamic Docker Images

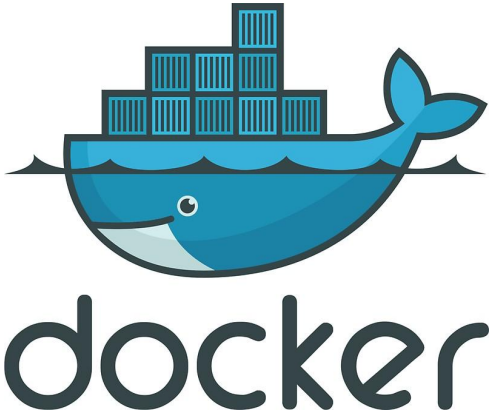
https://github.com/containers101/docker-based-pipelines-webinar/tree/master/05_dynamic

# Codefresh Plugins

# Plugins in Traditional CI/CD Platforms

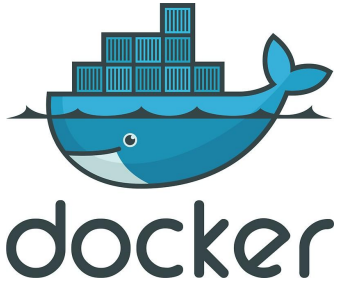
- Specific to the platform (vendor lock-in)
- Tied to a specific language (e.g. Groovy)
- Developer needs to learn proprietary API
- Testing and installing them is difficult

# Codefresh Plugins = Docker Images

# Codefresh Plugins

- Not tied to any programming language
- Require only Docker knowledge
- Easy to test, easy to search, easy to store
- Several plugins for Codefresh already available

# Case study: bintray

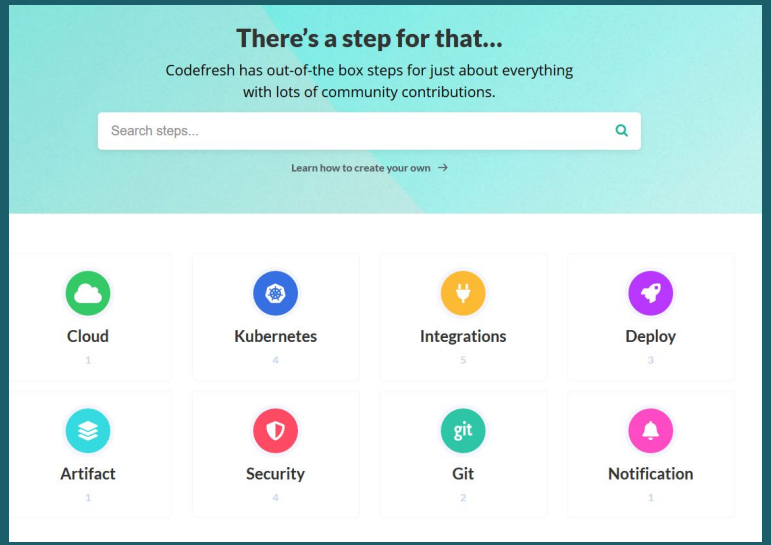
- JFrog bintray integration
- There is no official docker image
- A Codefresh plugin with wrap the CLI
- Plugin will be used to query Bintray

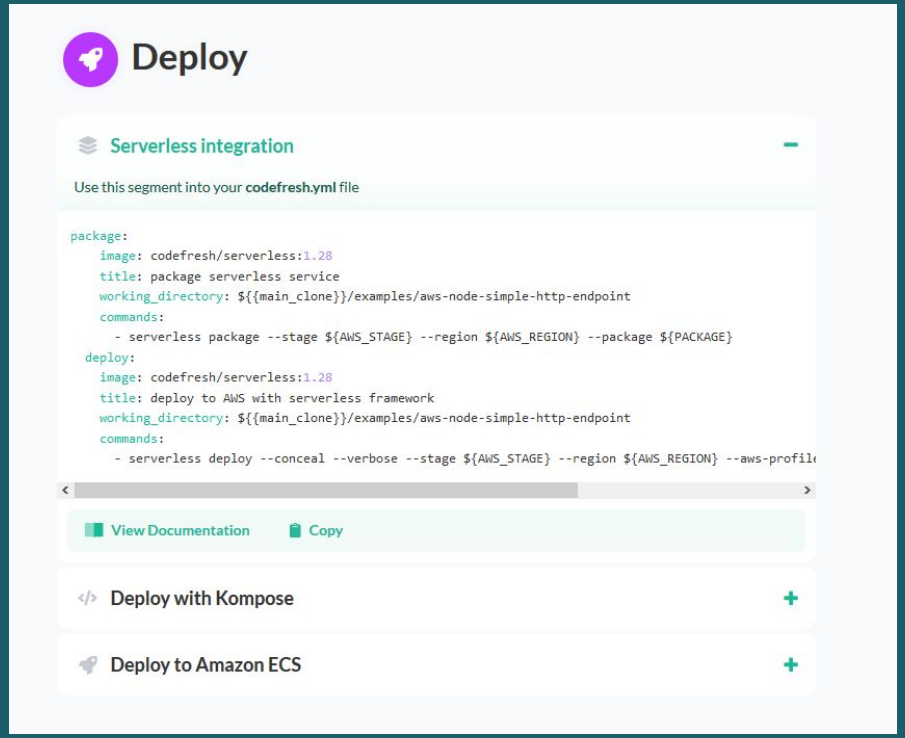

# Demo 6:
# Codefresh Plugins

https://github.com/containers101/docker-based-pipelines-webinar/tree/master/06_plugin

# Plugin Directory

https://codefresh.io/codefresh-plugins/



# Summary

- Docker-based pipelines use Docker images as build steps
- Upgrading tools is easy
- Using multiple versions of the same tool is trivial
- Can dynamically create build steps
- Codefresh plugins are Docker images