Container-based Pipelines

with Codefresh

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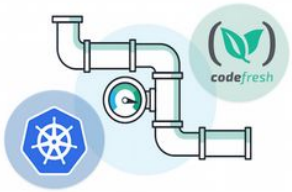
@TodayWasAwesome

About Kostis Kapelonis

Continuous Integration | July 12, 2018

Codefresh vs. GitlabCI

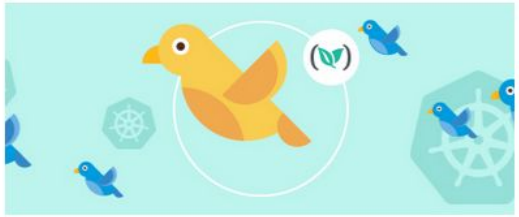
Kostis Kapelonis



Continuous Integration | September 11, 2018

Programmatic Creation of Codefresh Pipelines – Part1

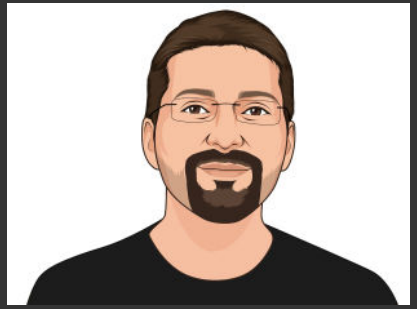
Kostis Kapelonis



Continuous Deployment/Delivery | August 30, 2018

Fully automated canary deployments in Kubernetes

Kostis Kapelonis



Agenda

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

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

Applies equally to any OCI compliant containers.

Theory: Docker-based Pipelines

“Docker-based” means 2 different things:

Using Docker as a deployment package

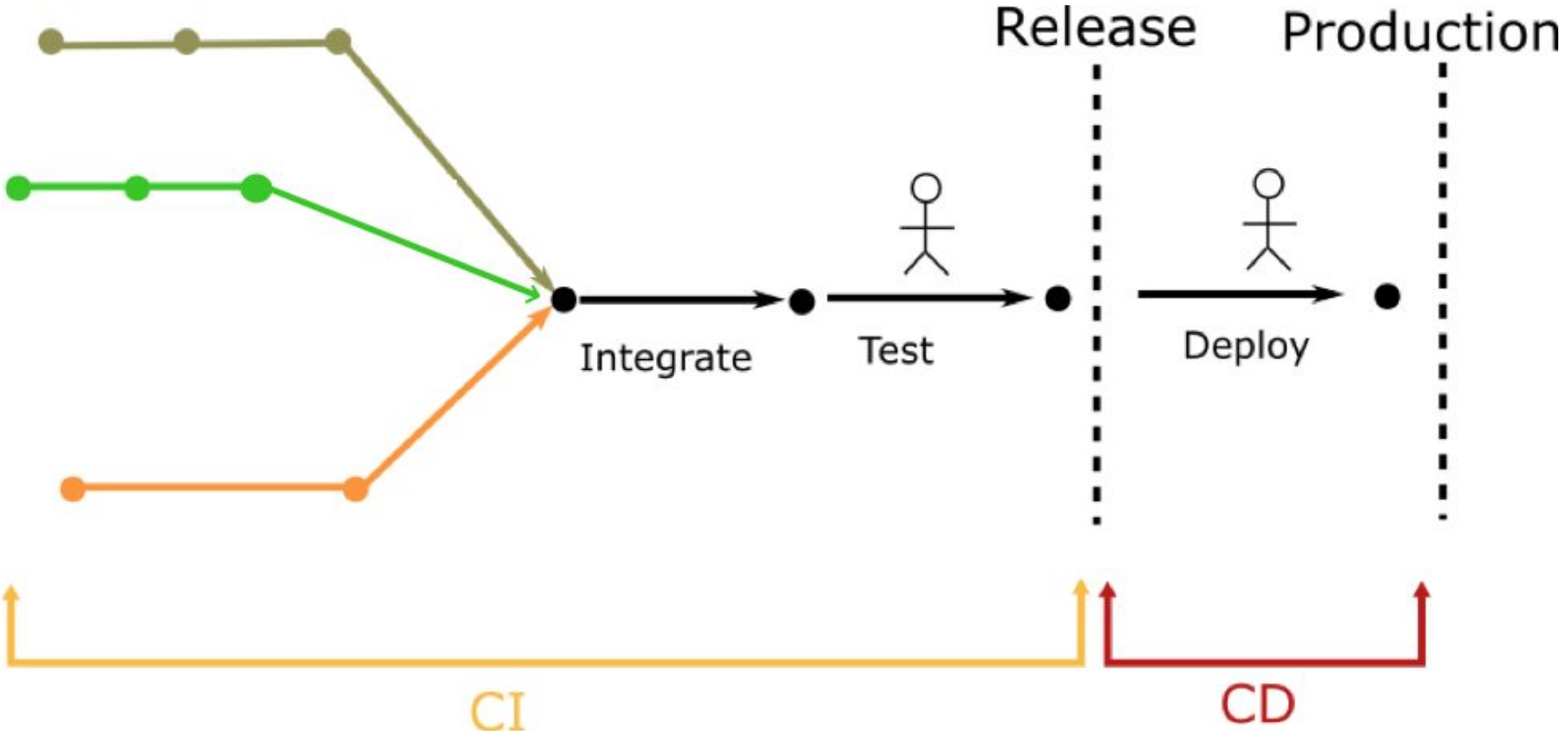
(this is what most people think)

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

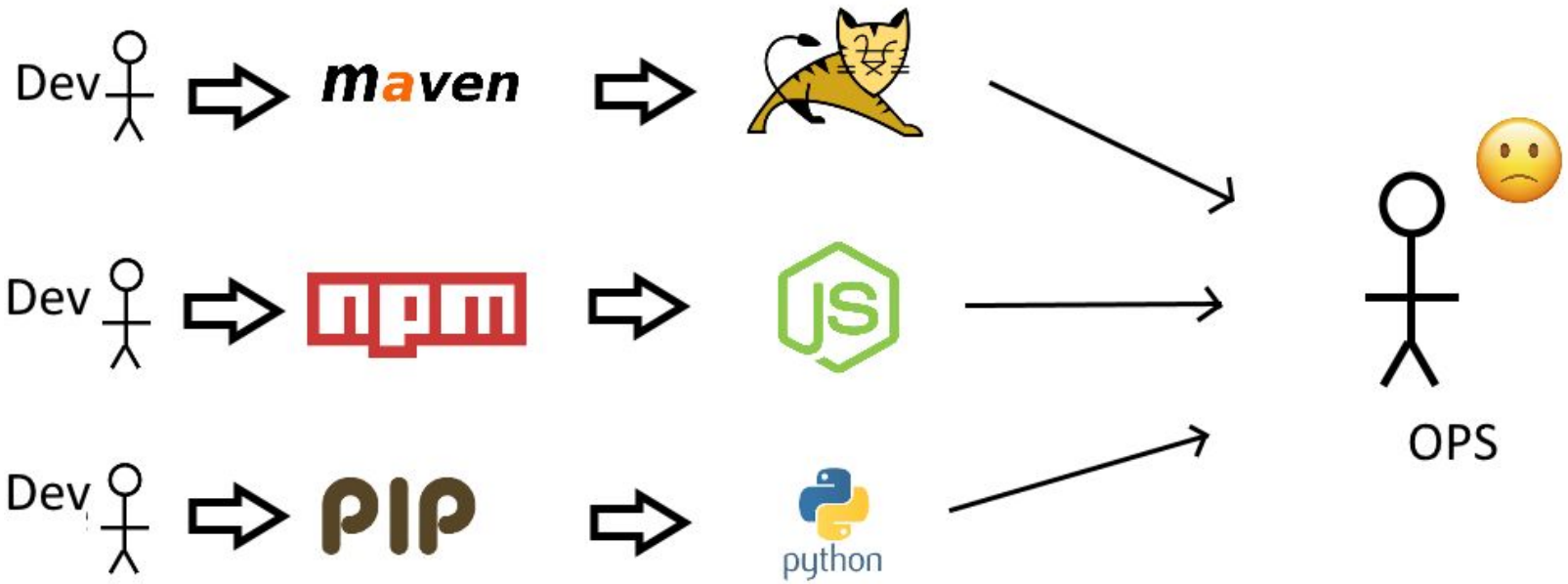
Using Docker for build Tooling

(this is not what most people think)

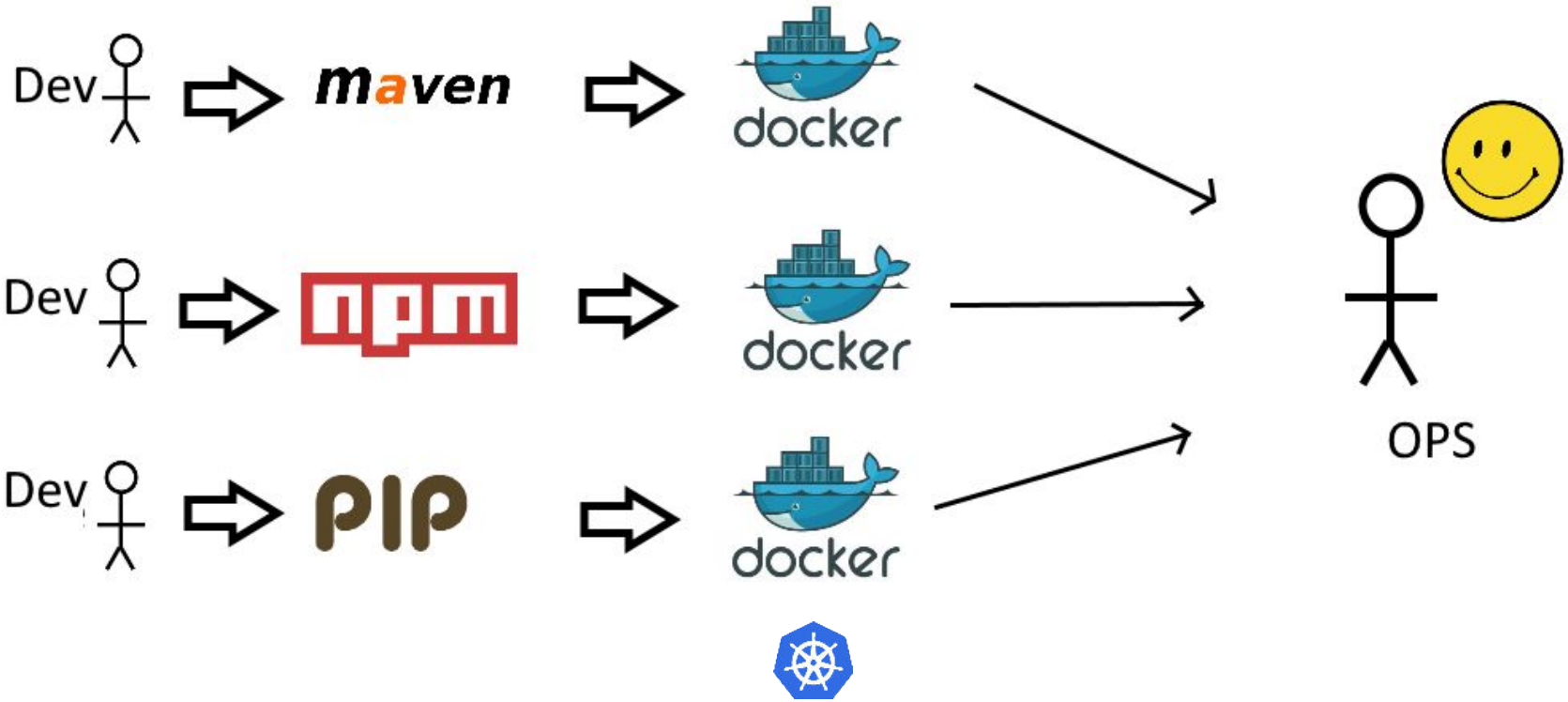
The Basic Software Lifecycle



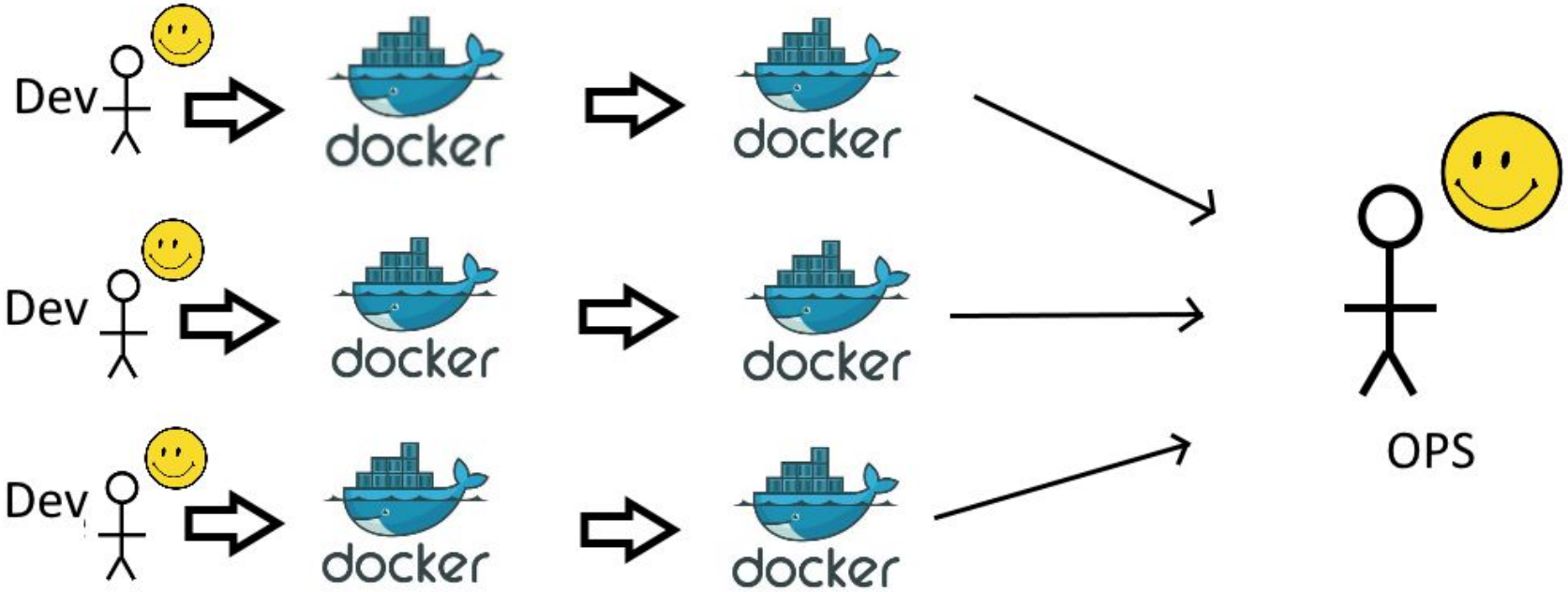
Before Docker – The Dark Ages



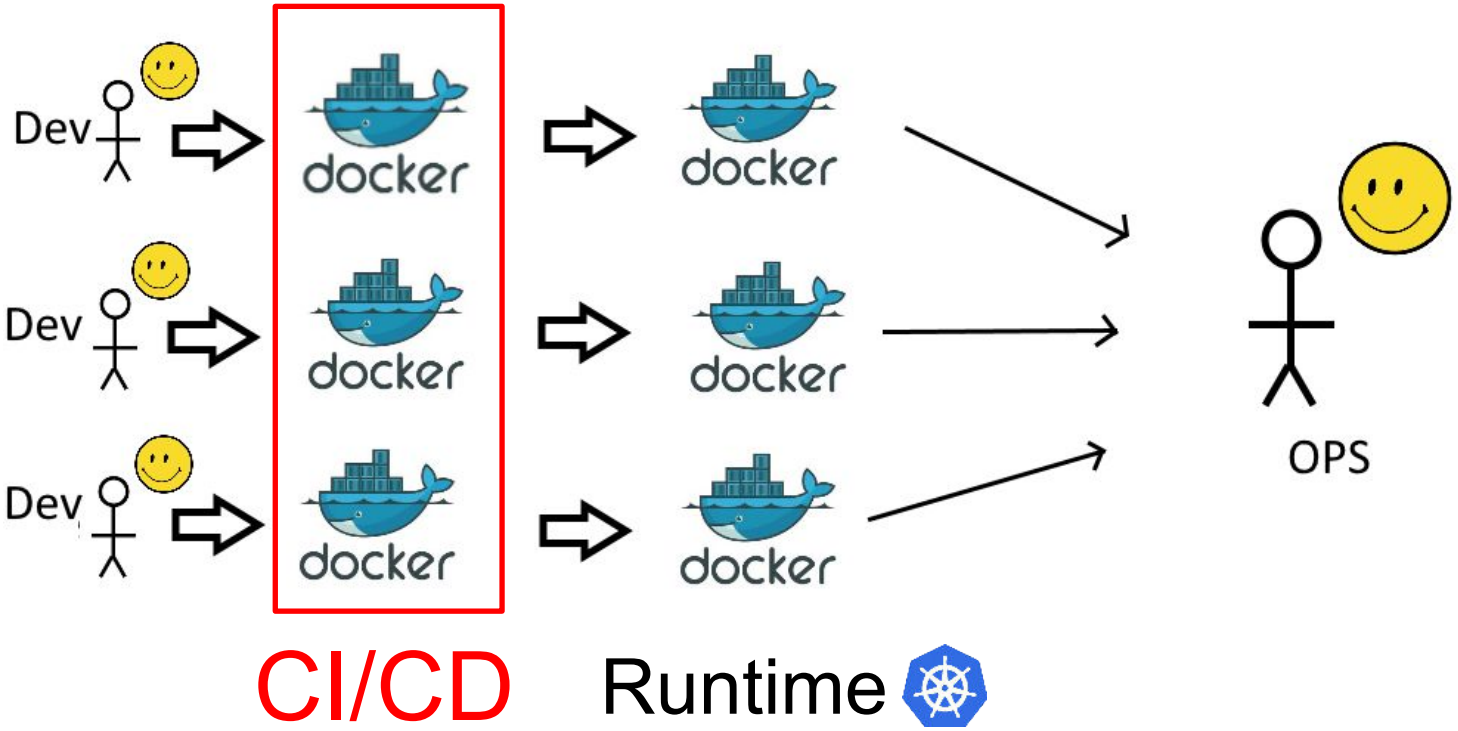
Docker-based Deployments - Better



Adding Docker-based Build Pipelines



Today's Webinar



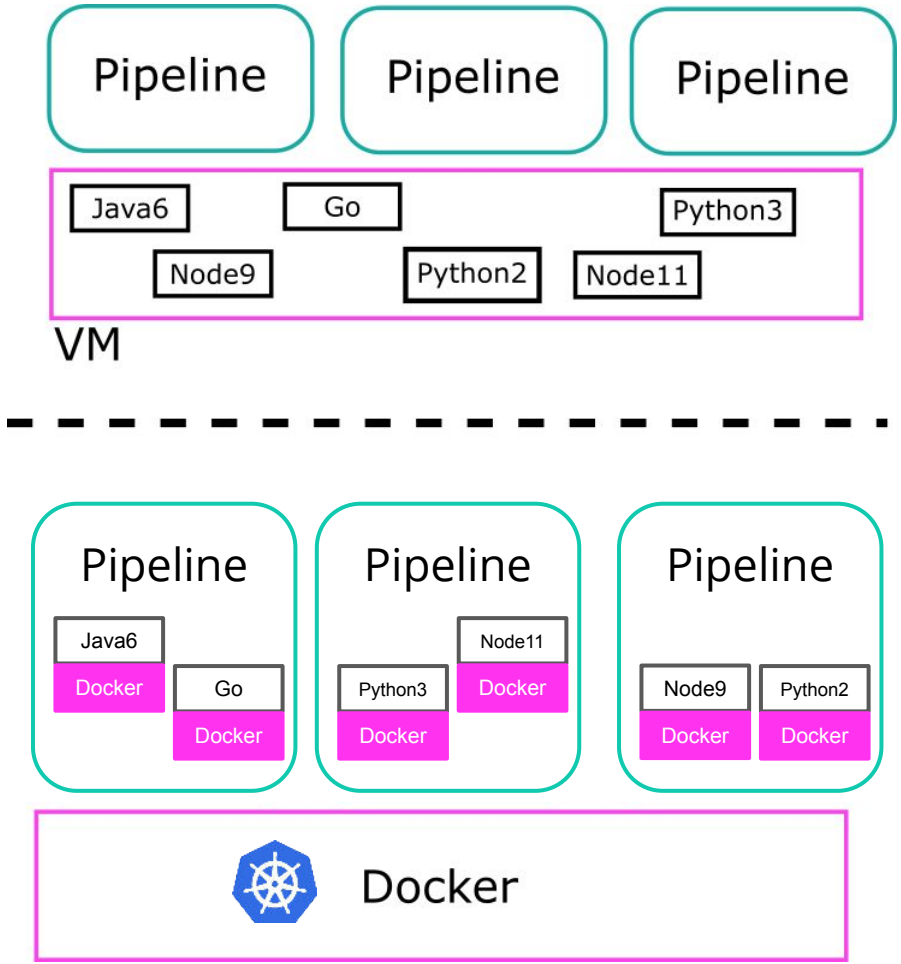
Old versus new

Before:

- Tools are static
- Used for all pipelines

After:

- Tools are dynamic
- Isolated to each pipeline



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

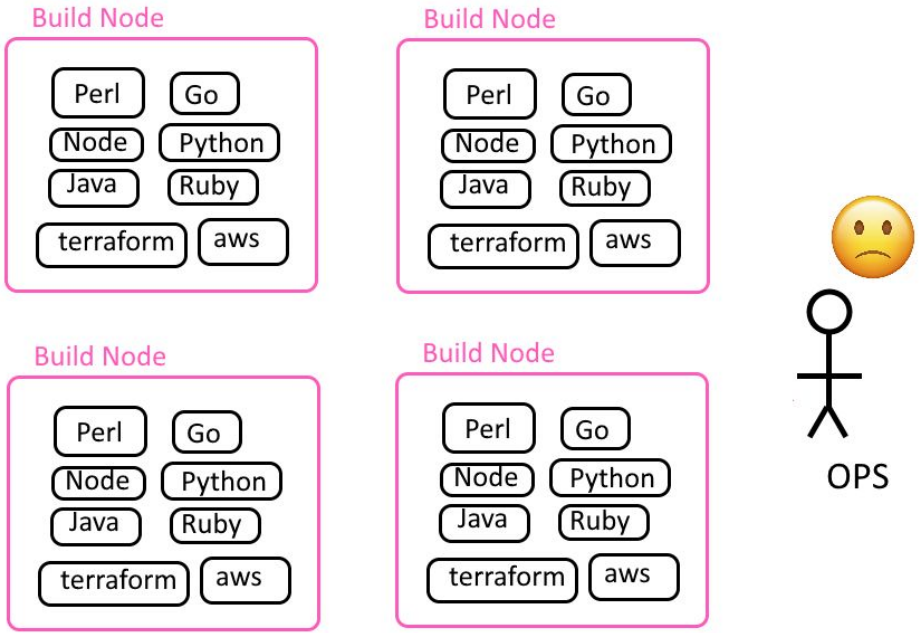
New in Codefresh: Single-Sign-On, Custom Triggers, Cron Jobs, and More!

Taryn Jones

Docker CI/CD - benefits

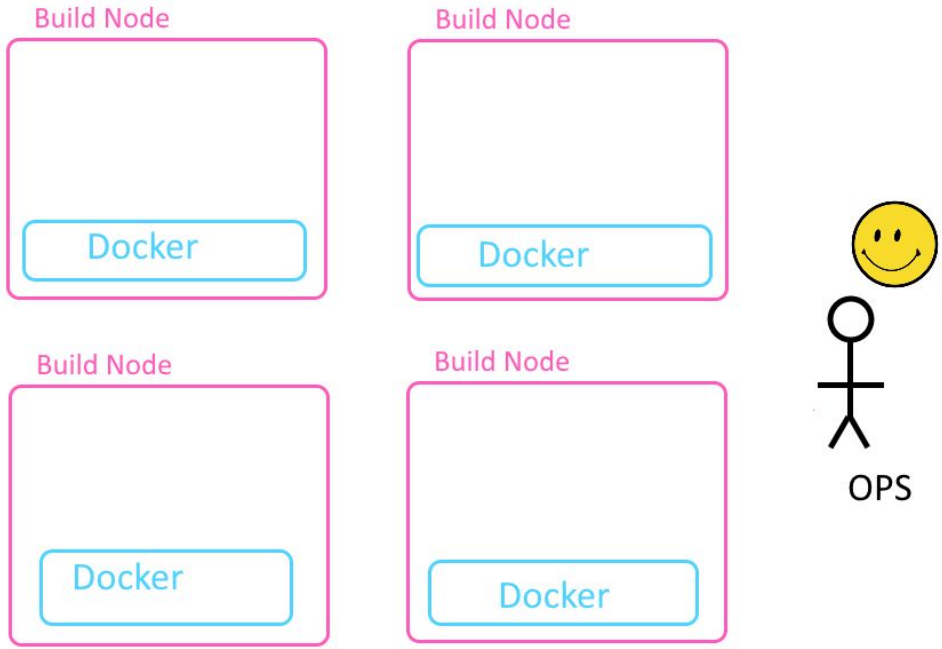
Build farm before Docker

- Multiple tools on each node
- Very hard to manage
- Often nodes had different versions of the same tool
- Developers had to choose the correct machine for their build



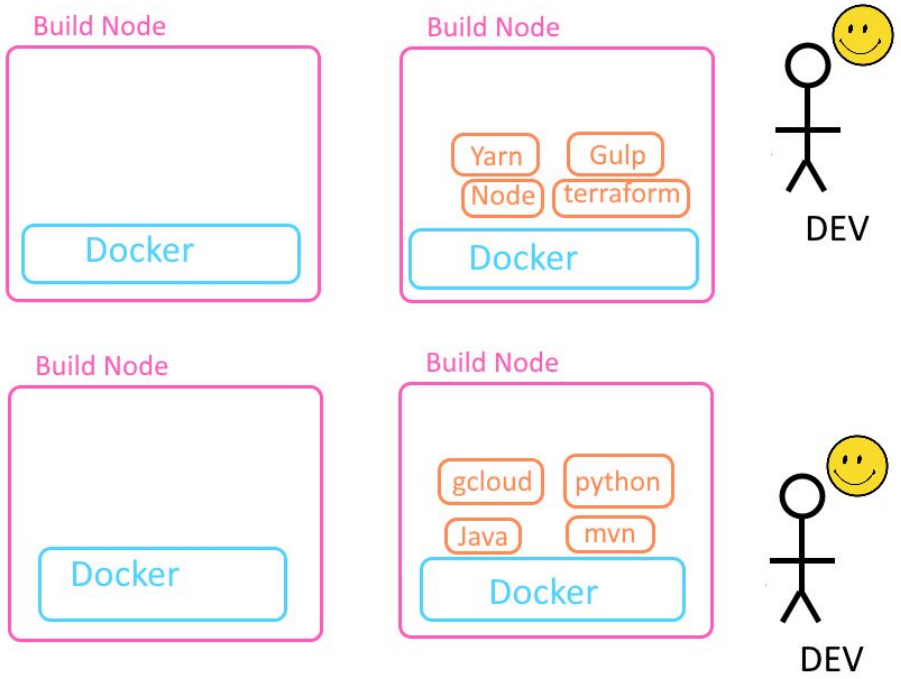
Build farm after Docker

- Only Docker is installed
- Very easy to manage
- All nodes are exactly the same
- These nodes are often a Kubernetes cluster



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
- Developers don't care about nodes

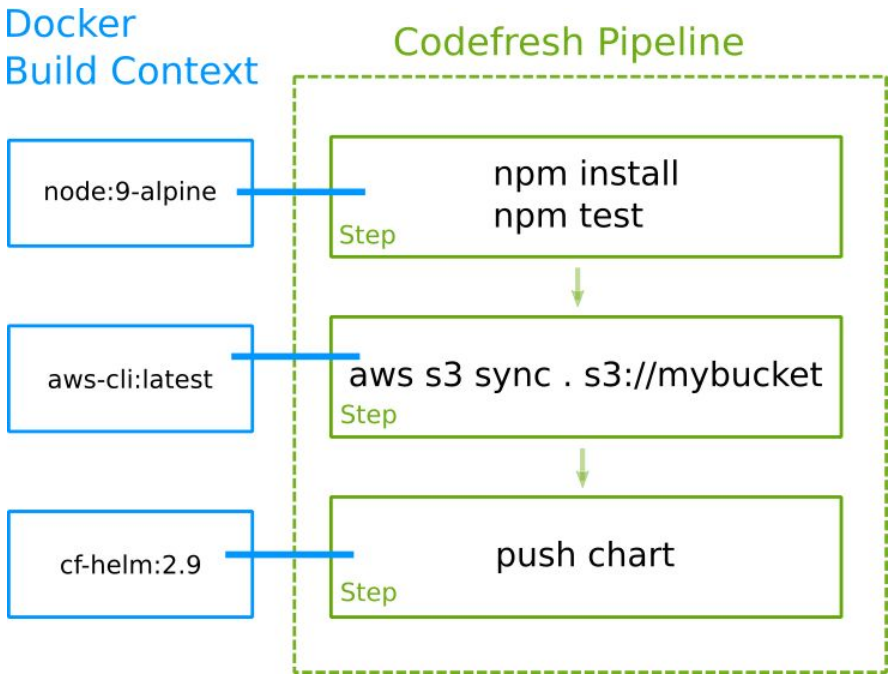


Docker images are everywhere

- They are reusable and shareable
- No need to re-invent the week (e.g. Terraform in Docker)
- Private docker images can be created with your team in mind

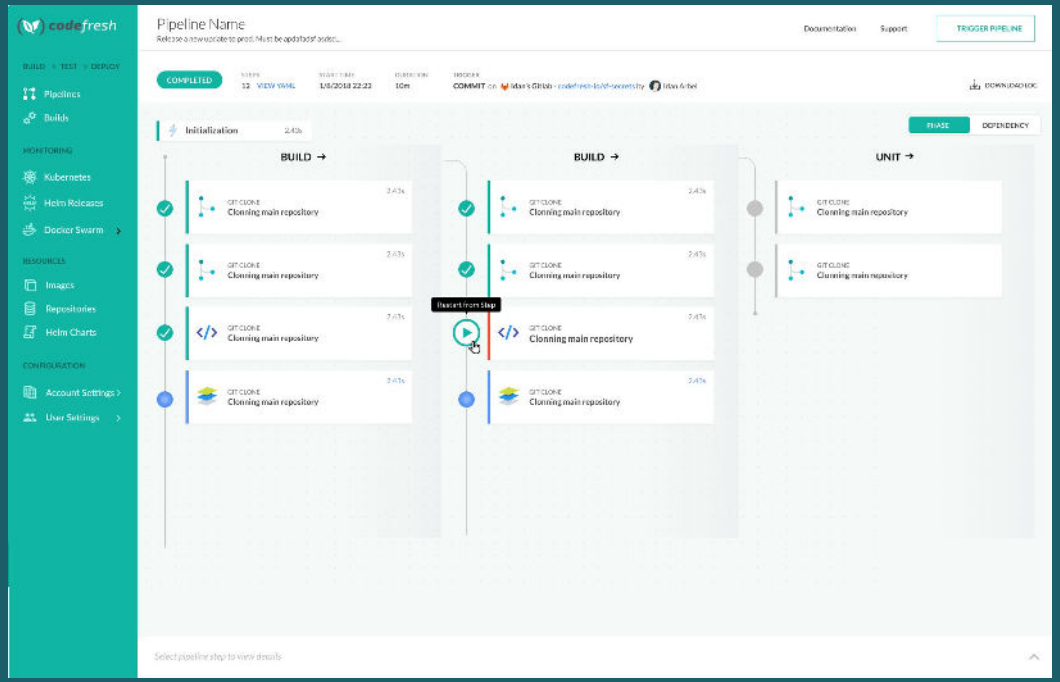
Container per build step

- 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

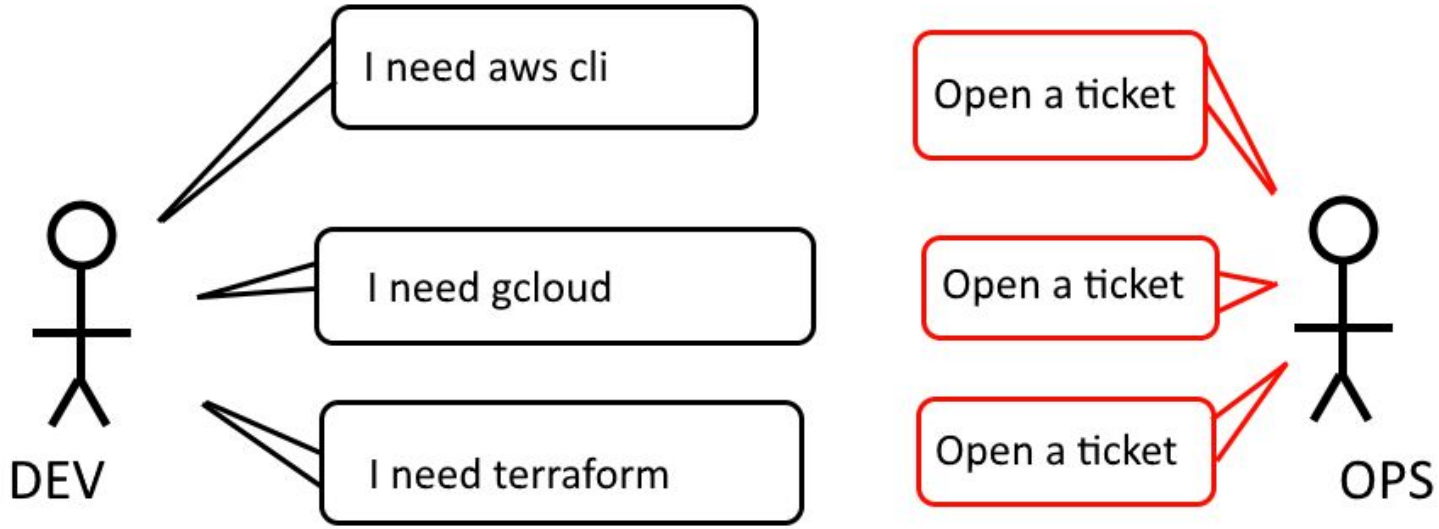
- Docker based CI/CD solution
- Each build step is a Docker image
- Native support for Docker, Helm, Kubernetes deployments
- Includes built-in Docker registry and Helm repository
- 20,000+ users



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 3.6.

NodeJS receives an update with version 8.11.3.

PHP gets two updates with 7.2.9, 7.2.5.

OBSOLETE

Demo 2:
Adding Go and AWS CLI

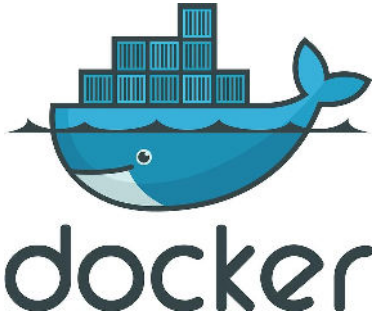
https://github.com/containers101/docker-based-pipelines-webinar/tree/master/02_aws_cli

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?
- Perl 6?
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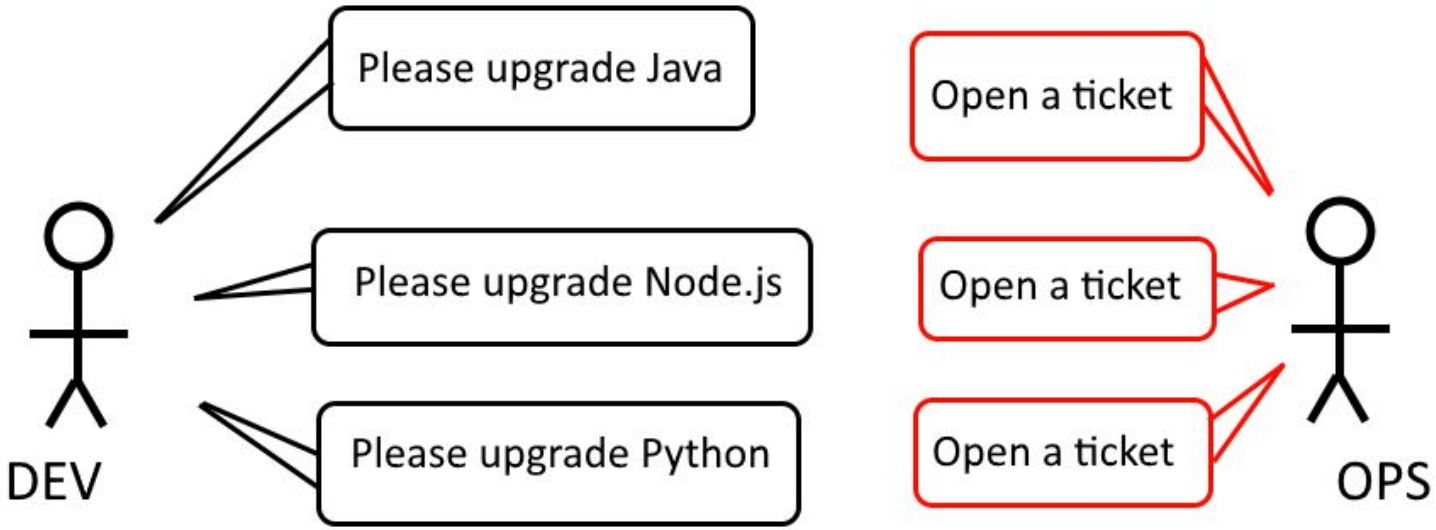
- Sonar?
- Findbugs?
- Selenium?
- Snyk?
- Clair?

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

Please add PHP 7.3 images #9717

Open **Majkl578** opened this issue on Jun 8 · 47 comments

Upgrade to Maven 3.5.3 #9366

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

C++14, Qt5.7 #6503

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

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

Open **webknjaz** opened this issue on Apr 26 · 4 comments

older versions of R no longer available? #9751

Open **achubaty** opened this issue on Jun 15 · 4 comments

Update Git #6328

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

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

- Installation
  - Install script
  - Verify installation
  - Important Notes
  - Git install
  - Manual Install
  - Manual upgrade

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.

OBSOLETE

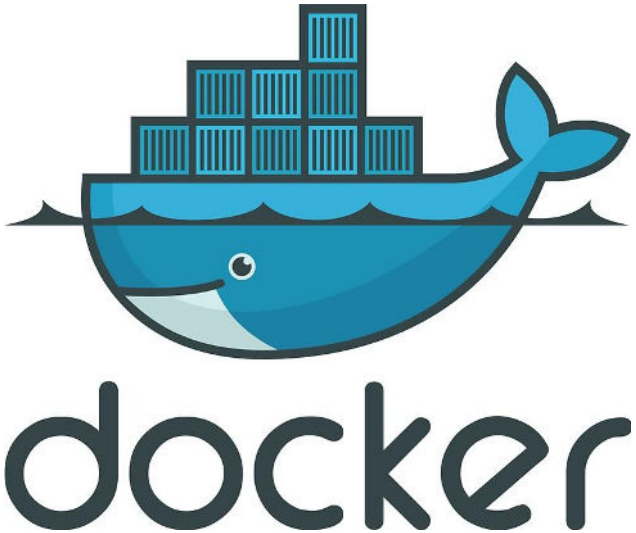
Wasting Effort on “Version Managers”

- 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)*

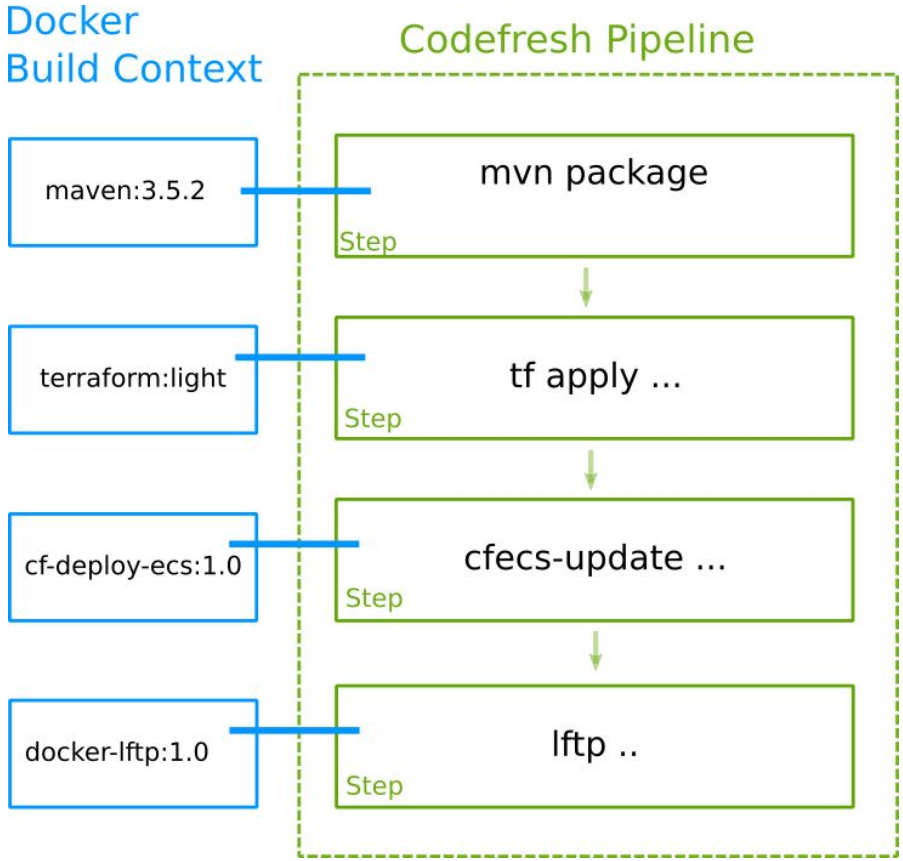
Demo 3:
Multiple Python/Node versions

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

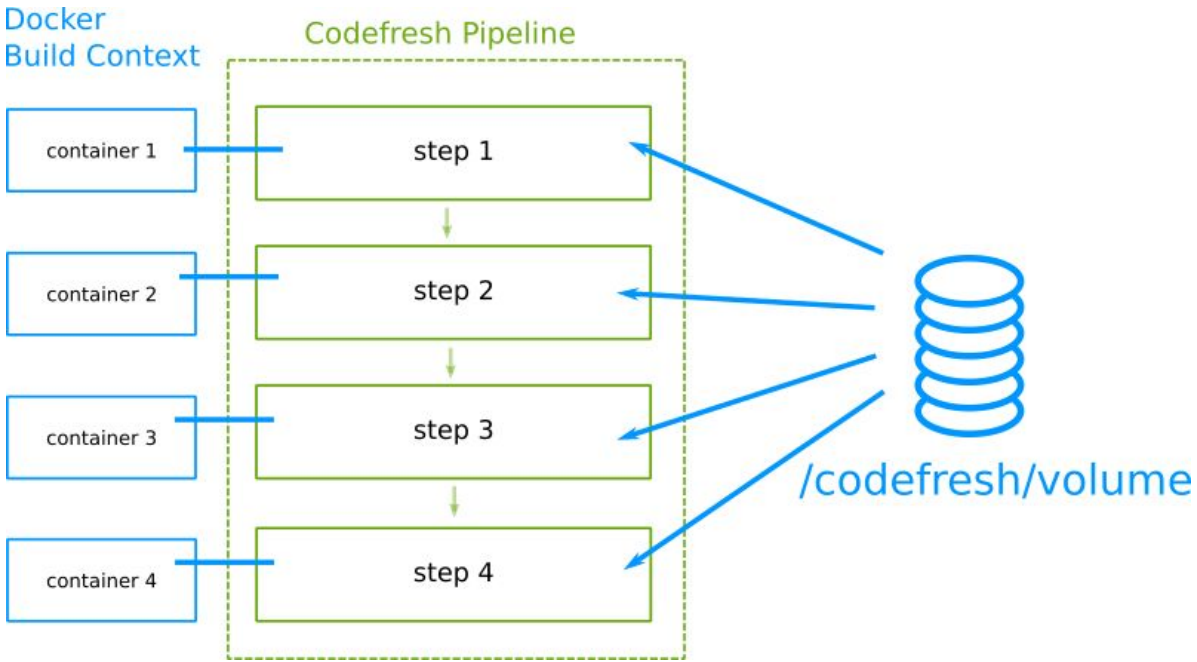


Caches and Artifacts (Traditional CI solutions)

- “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

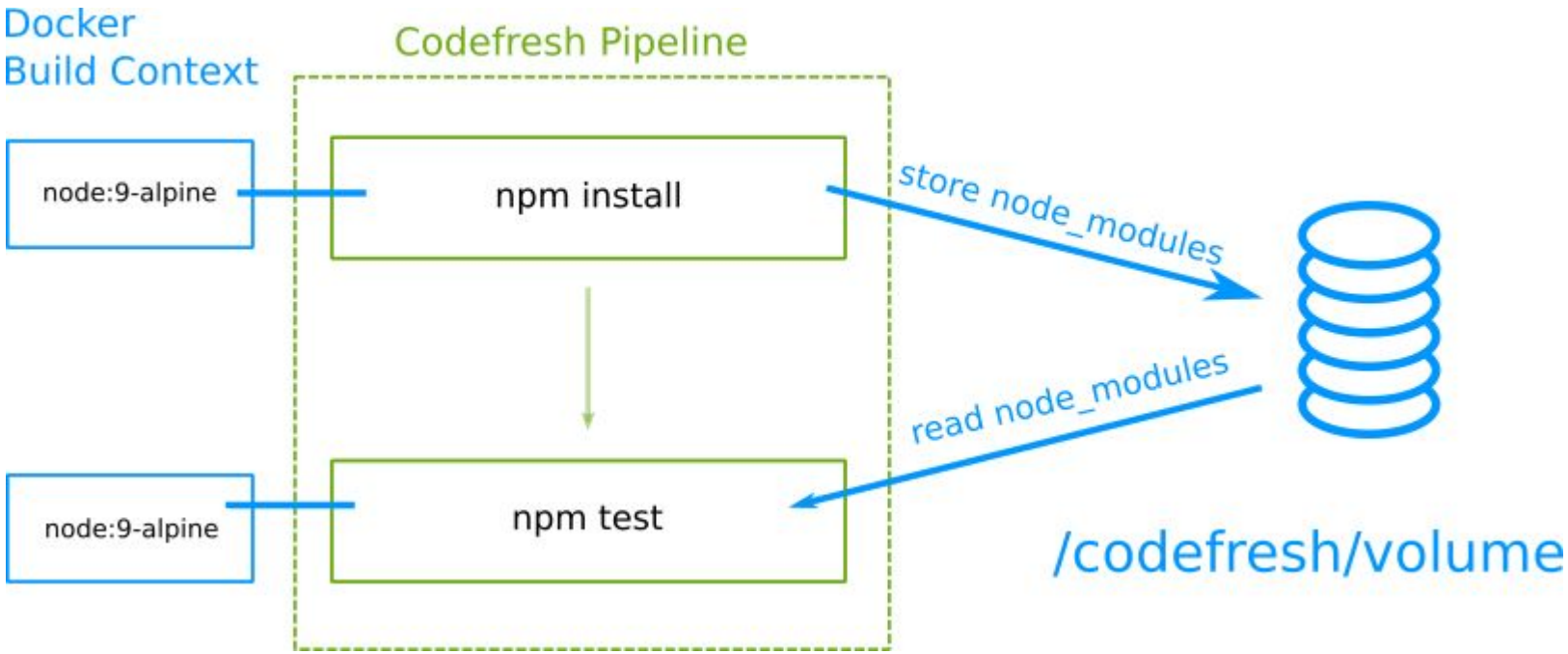
All Steps Share a Volume in Codefresh



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



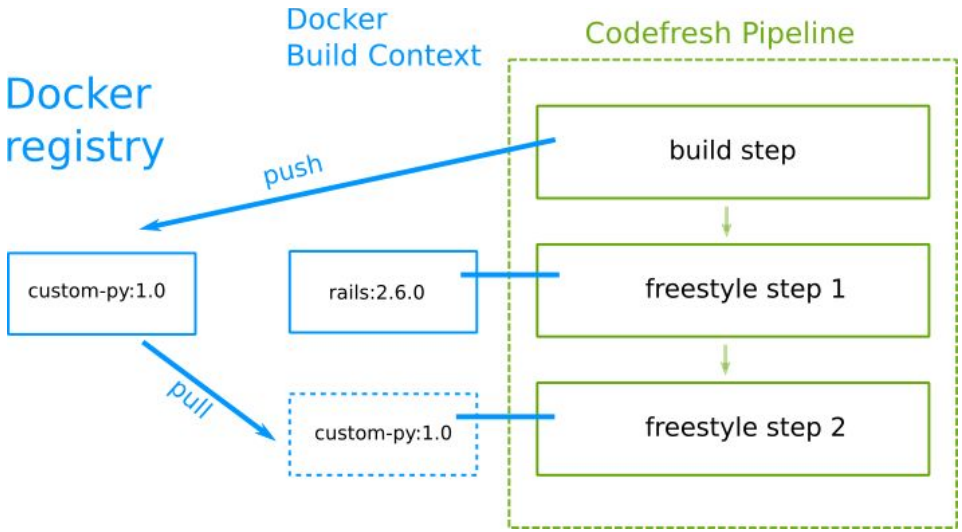
https://github.com/containers101/docker-based-pipelines-webinar/tree/master/04_volume

Dynamic Docker Images

Docker Tooling on Demand – A Unique Feature

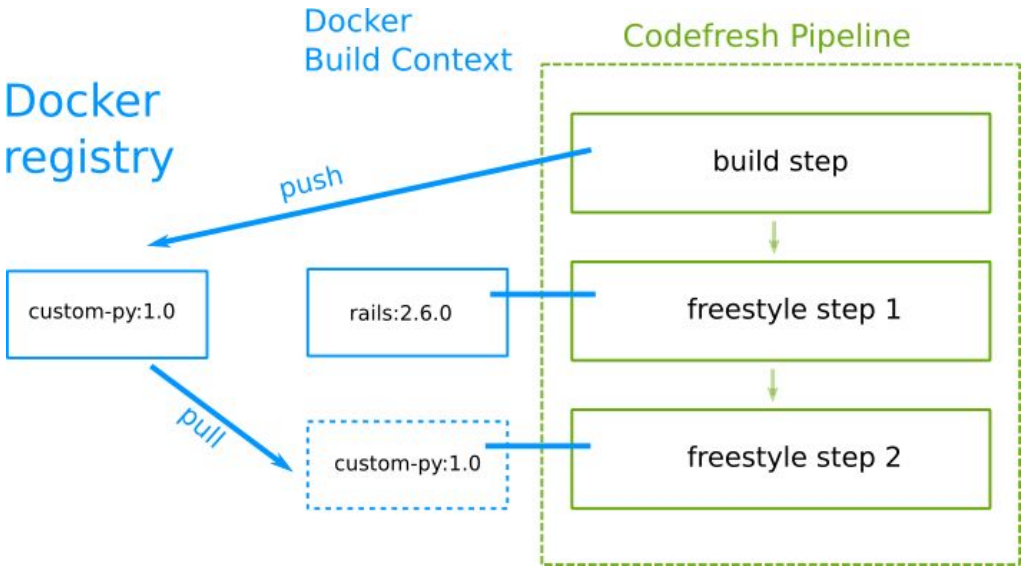
Creating Docker Images On-demand

- 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

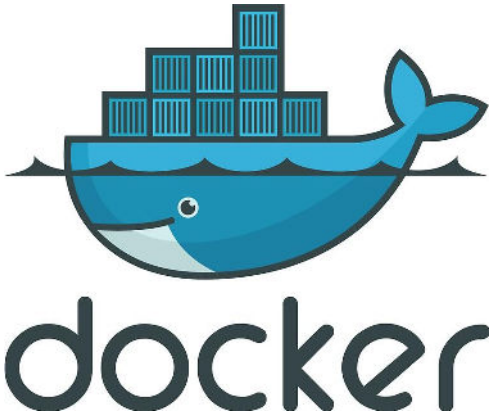
https://github.com/containers101/docker-based-pipelines-webinar/tree/master/05_dynamic

Codefresh Plugins

Plugins in Traditional CI/CD Platforms

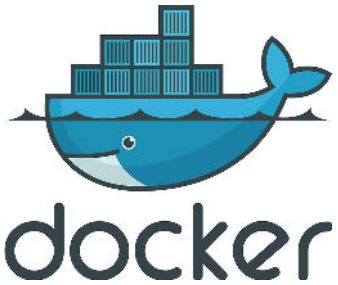
- Specific to the platform (vendor lock-in)
- Tied to a specific language (e.g. Groovy)
- Developer needs to learn proprietary API
- Testing and installing them is difficult

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

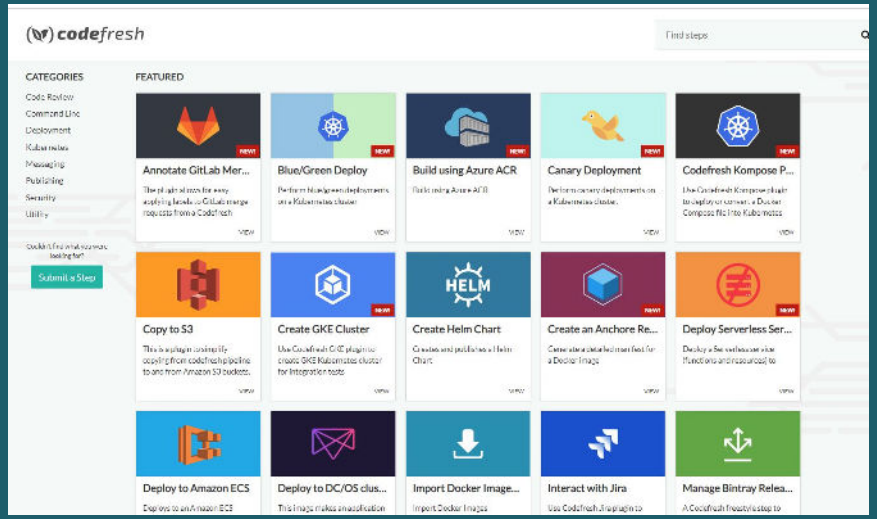
- JFrog bintray integration
- There is no official docker image
- A Codefresh plugin with wrap the CLI
- Plugin will be used to query Bintray

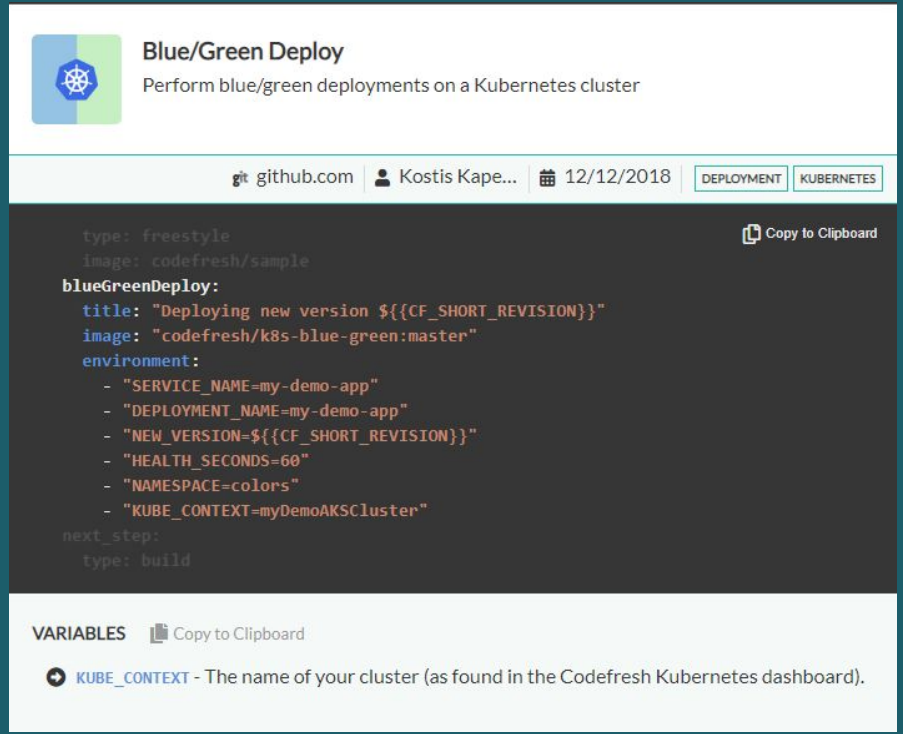
Demo 6:
Codefresh Plugins

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

Plugin Directory

http://steps.codefresh.io/





Learn how to build your own!

Workshop

github.com/todaywasawesome/containers-as-steps

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

Questions?

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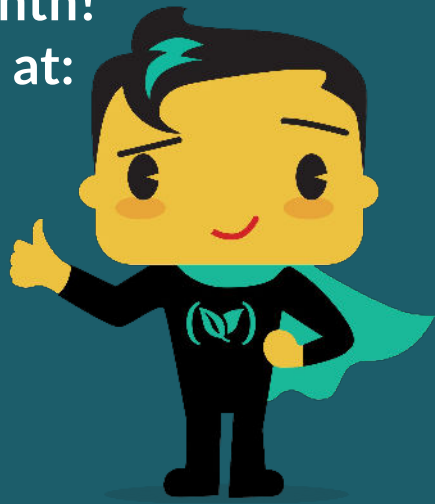

Upcoming Events

Codefresh.io/events