The Difference between VM & Docker-based Pipelines

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Agenda

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

1. Docker usage in Continuous Integration
2. Pre-install vs 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 and Jenkins**

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Theory: Docker-based Pipelines

“Docker-based” means 2 different things:

Using Docker as a deployment package

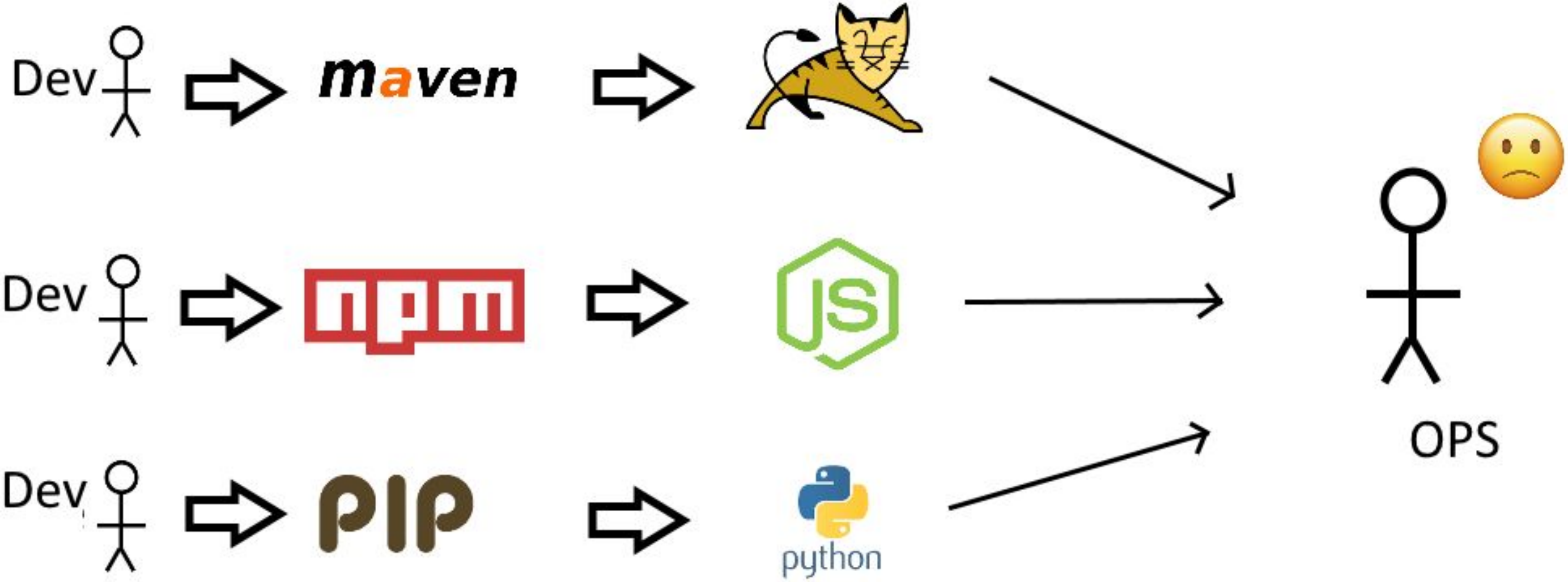
(this is what most people think)

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

Using Docker for build Tooling

(this is not what most people think)

Before Docker – The Dark Ages



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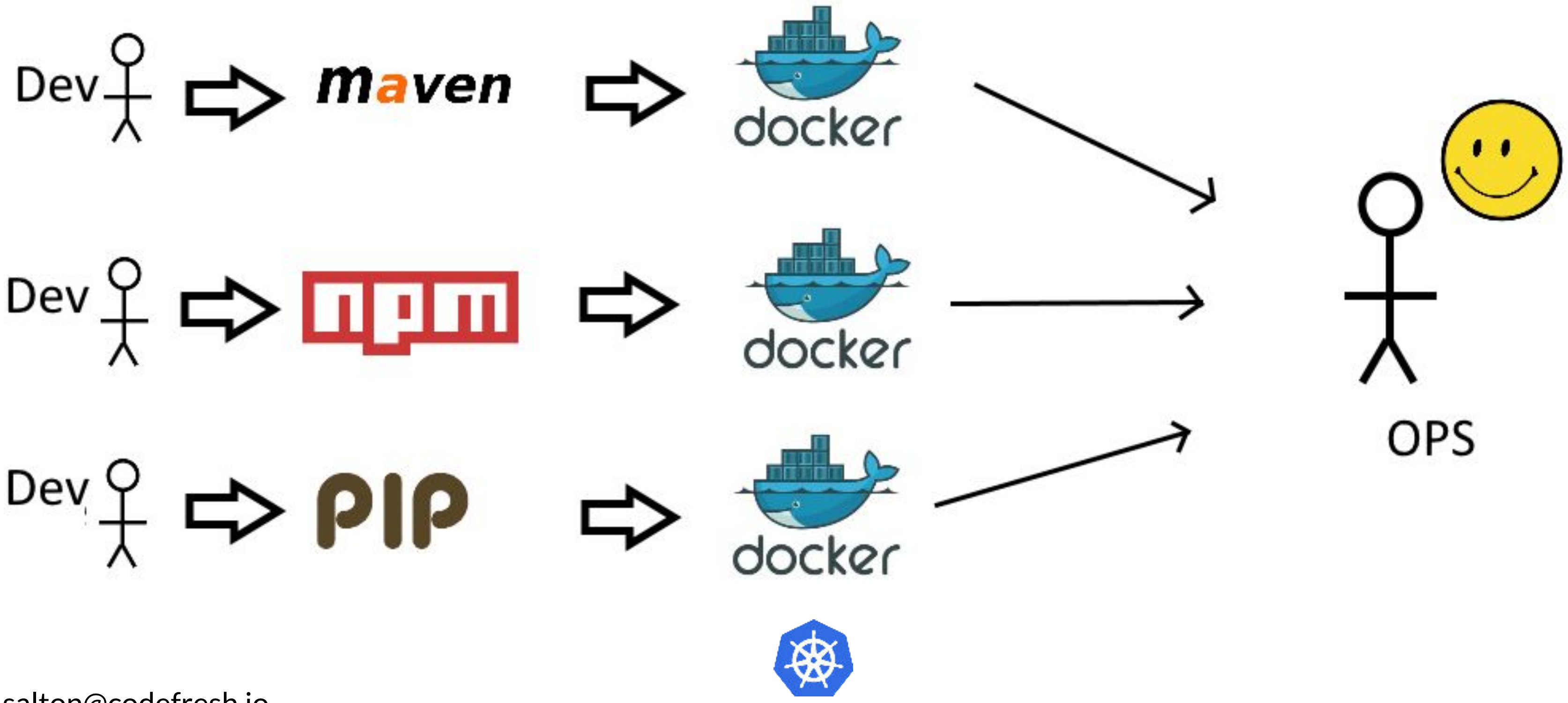
Docker-based Deployments - Better



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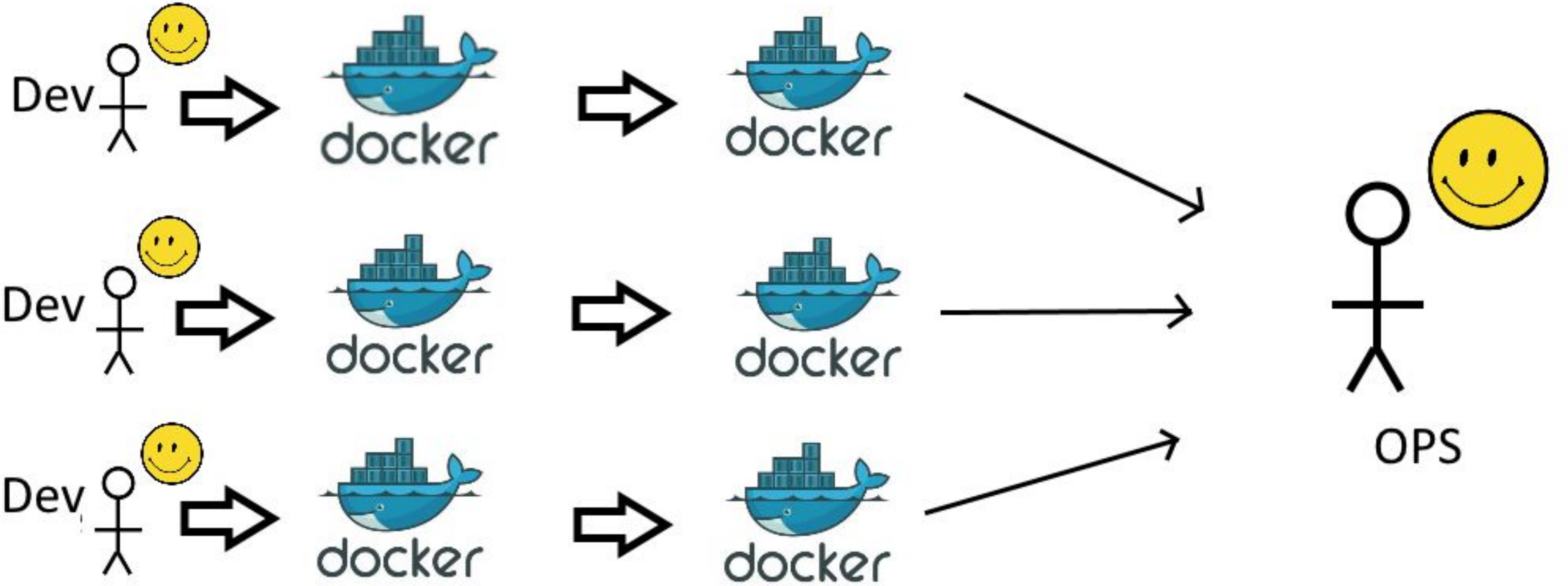
Adding Docker-based Build Pipelines



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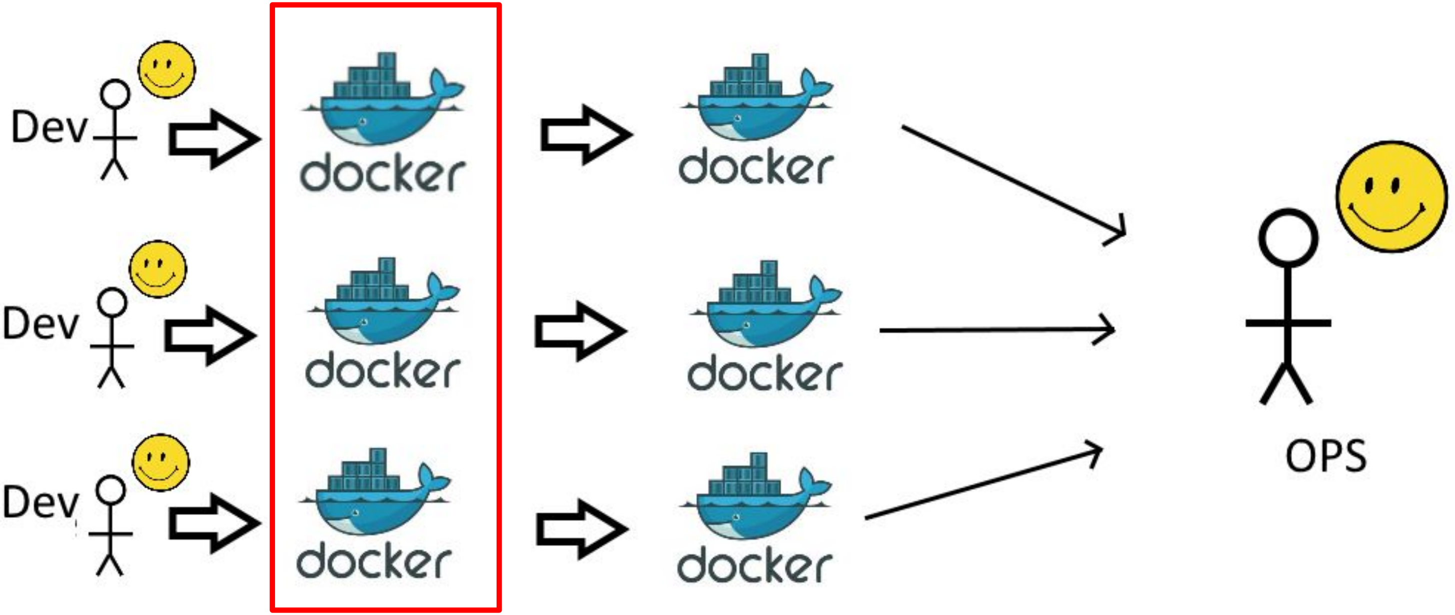
Today’s Talk



Dev

Dev

Dev

OPS

CI/CD

Runtime

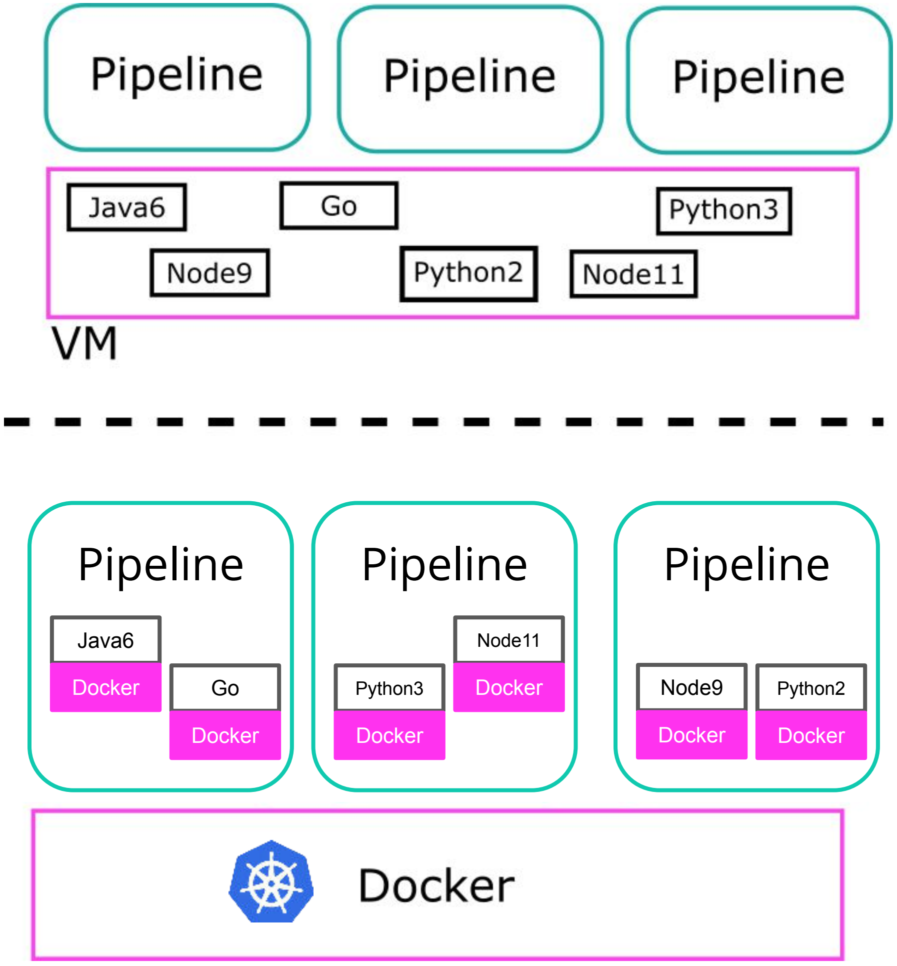
VM versus Docker

Before:

- Tools are static
- Used for all pipelines

After:

- Tools are dynamic
- Isolated to each pipeline



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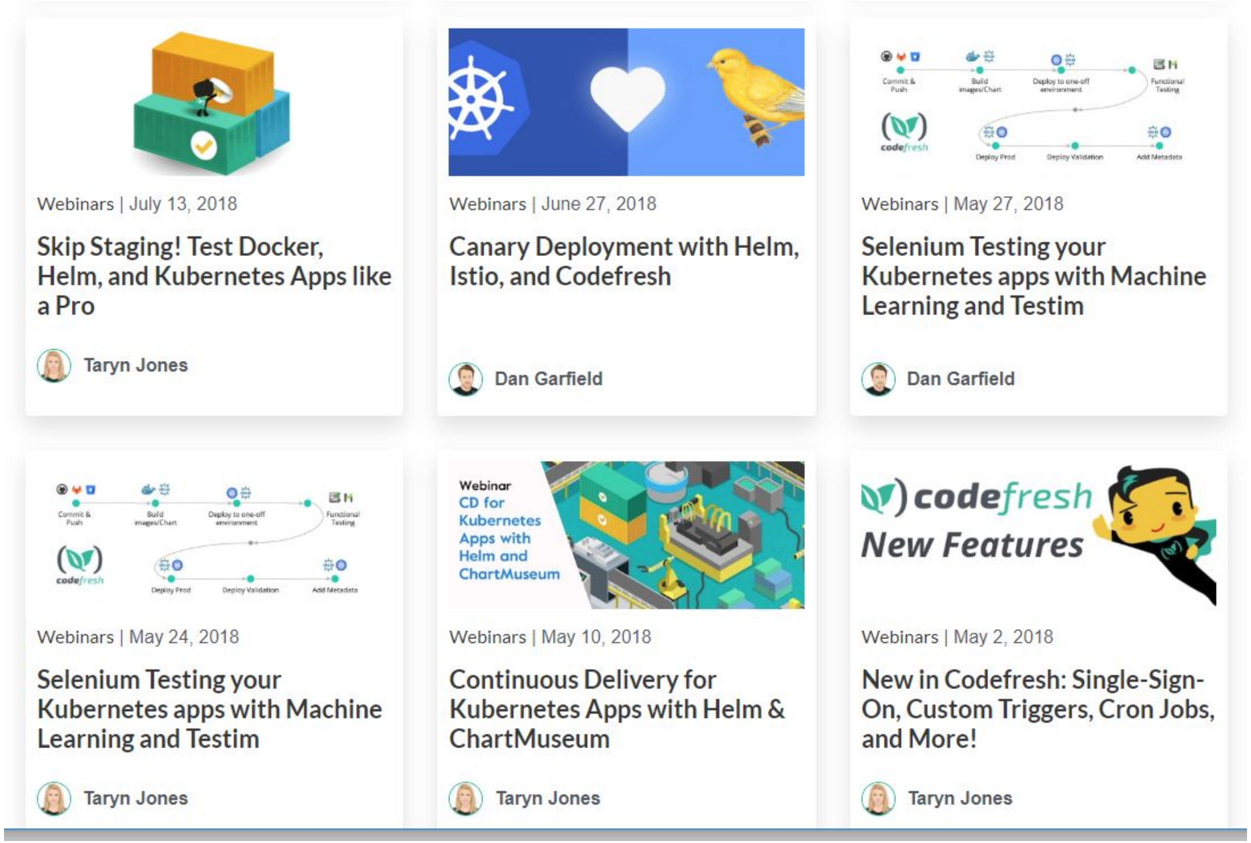
Resources for Docker as Deployment artifact



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

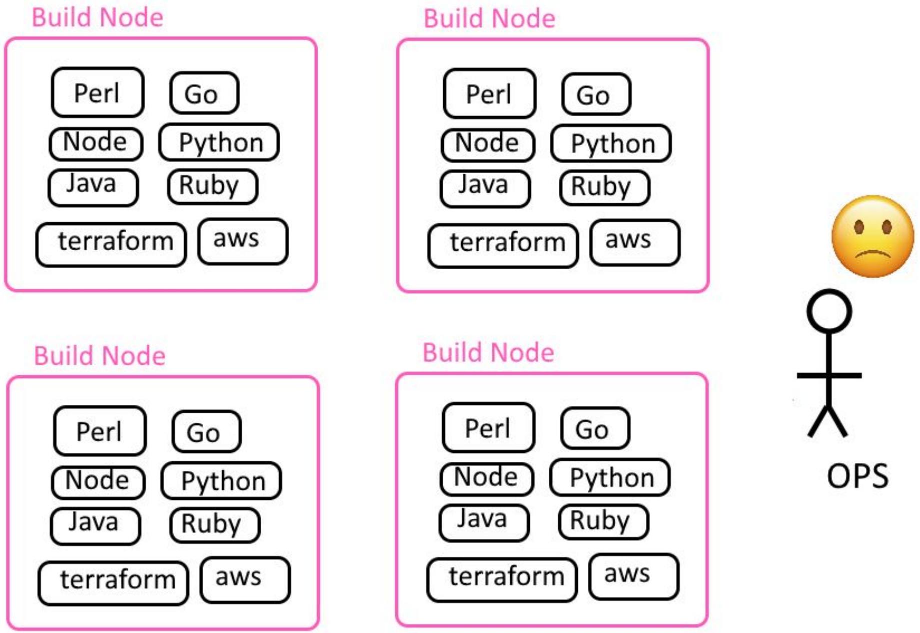
New in Codefresh: Single-Sign-On, Custom Triggers, Cron Jobs, and More!

Taryn Jones

Docker CI/CD - Benefits

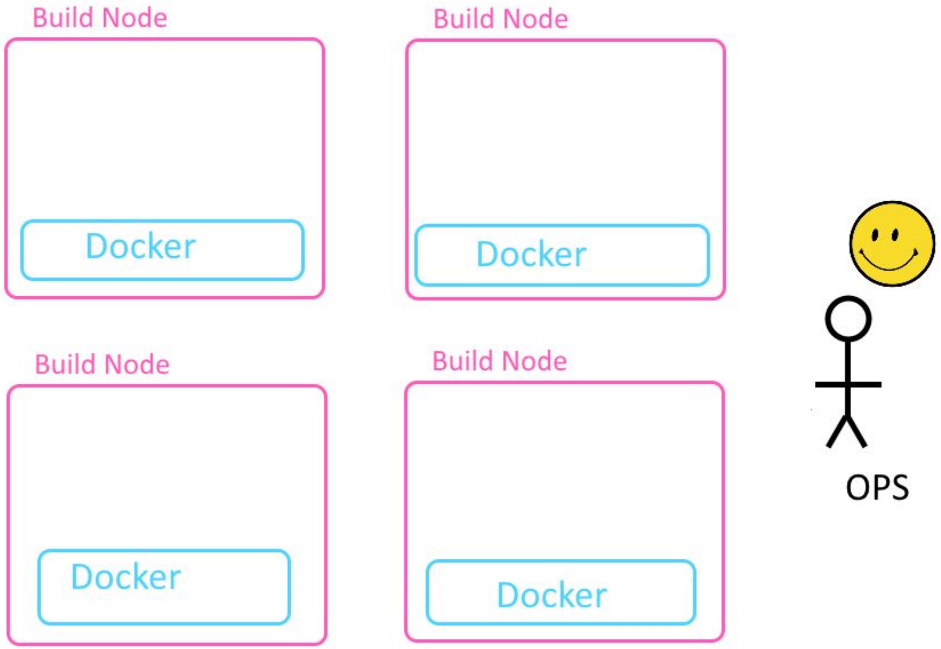
VM-Based Pipelines

- Multiple tools on each node
- Very hard to manage
- Often nodes had different versions of the sam tool
- Developers had to choose the correct machin 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

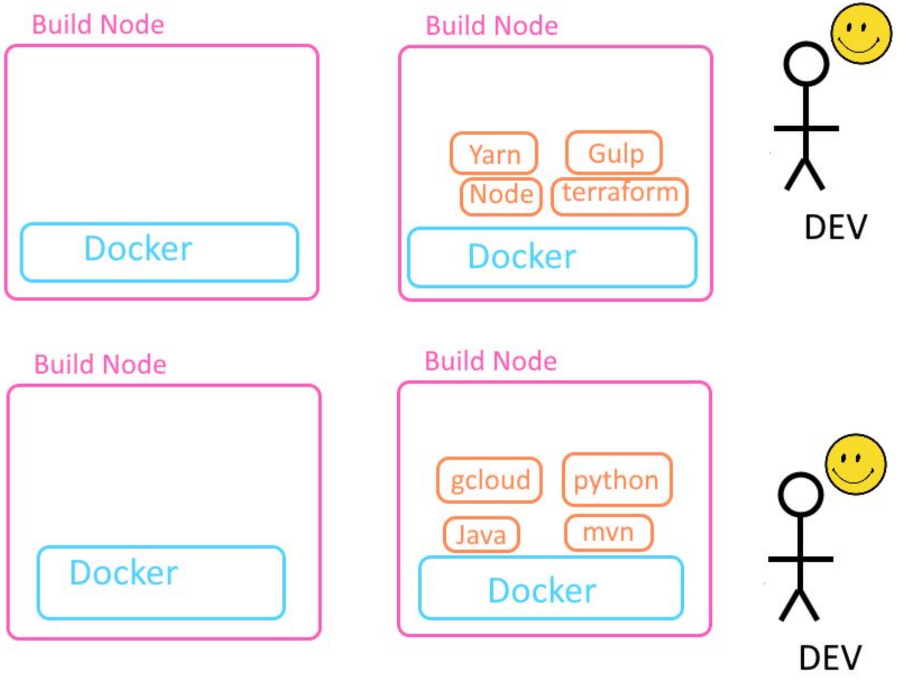
- EVERY build tool is placed in a Docker container

- 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

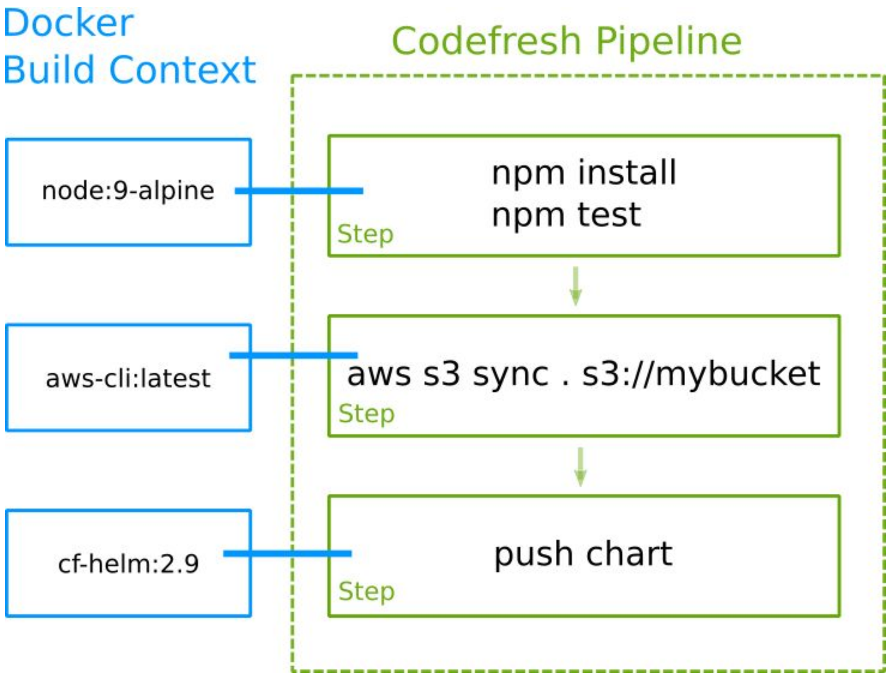


Docker images are everywhere

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

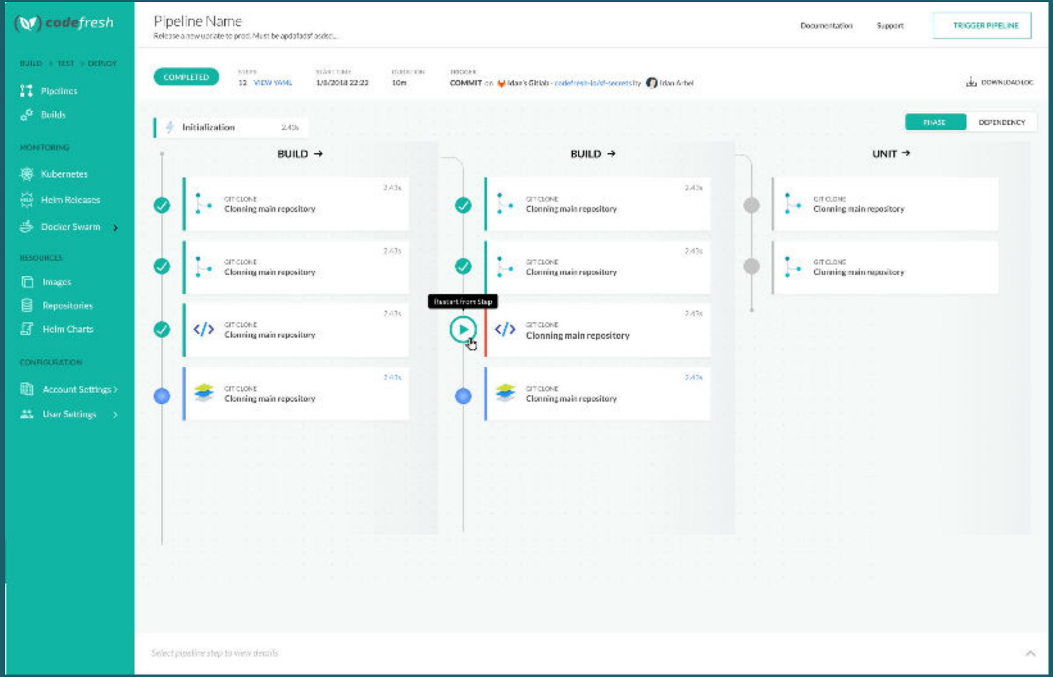
Container per build step

- 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

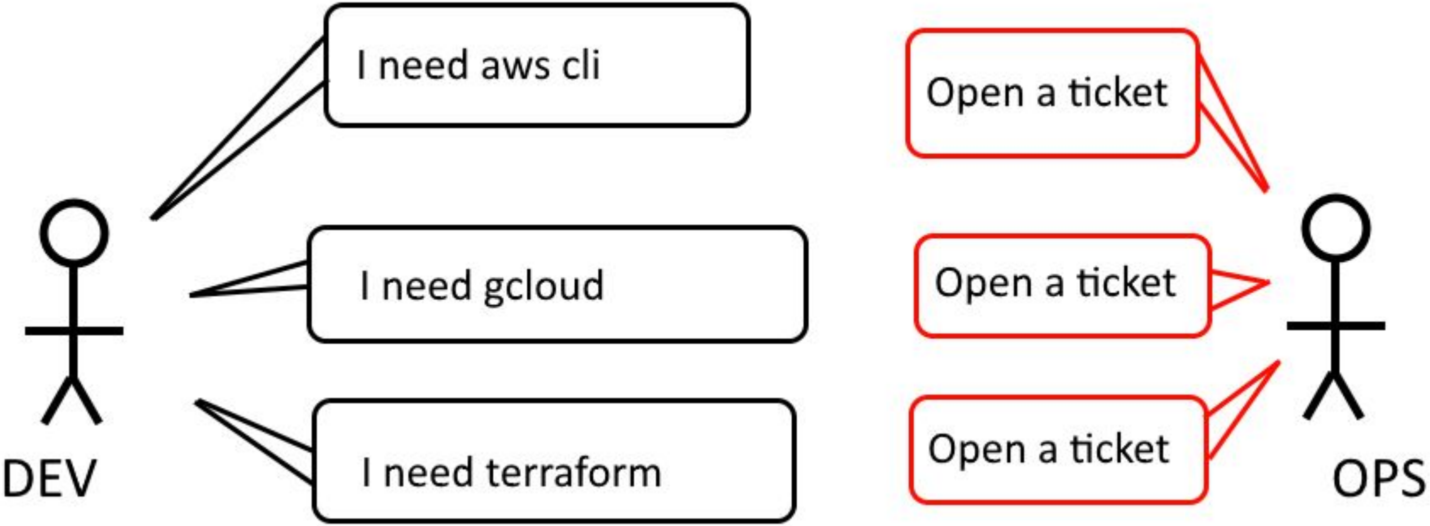
- Docker based CI/CD solution
- Each build step is a Docker image
- Native support for Docker, Helm, Kubernetes deployments
- Includes built-in Docker registry and Helm repository
- 30,000+ users



Demo 1:
Python/Node application

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

Traditional VM based problems



VM based 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?

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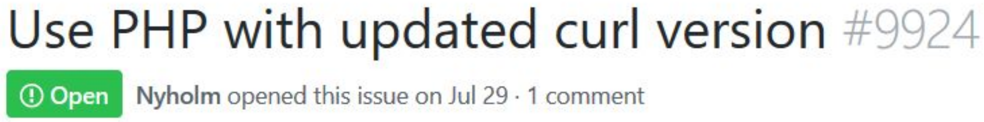
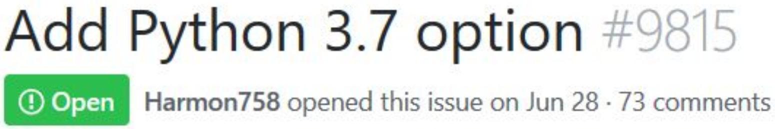
VM based CI/CD Platforms



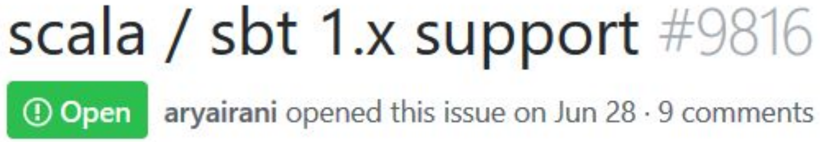
Use PHP with updated curl version #9924

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



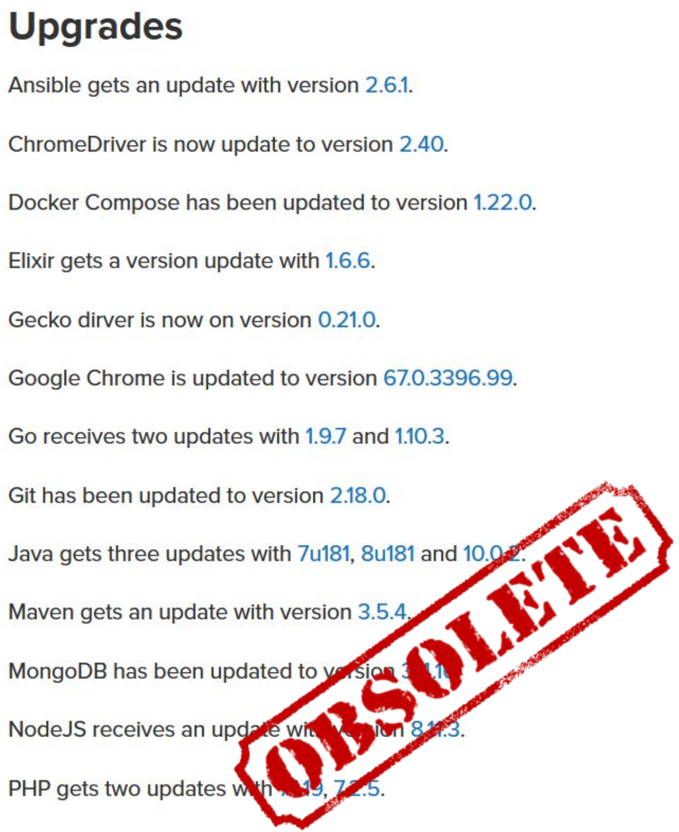
Add Python 3.7 option #9815

ⓘ 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.

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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?

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Does Codefresh Support...

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

YES!

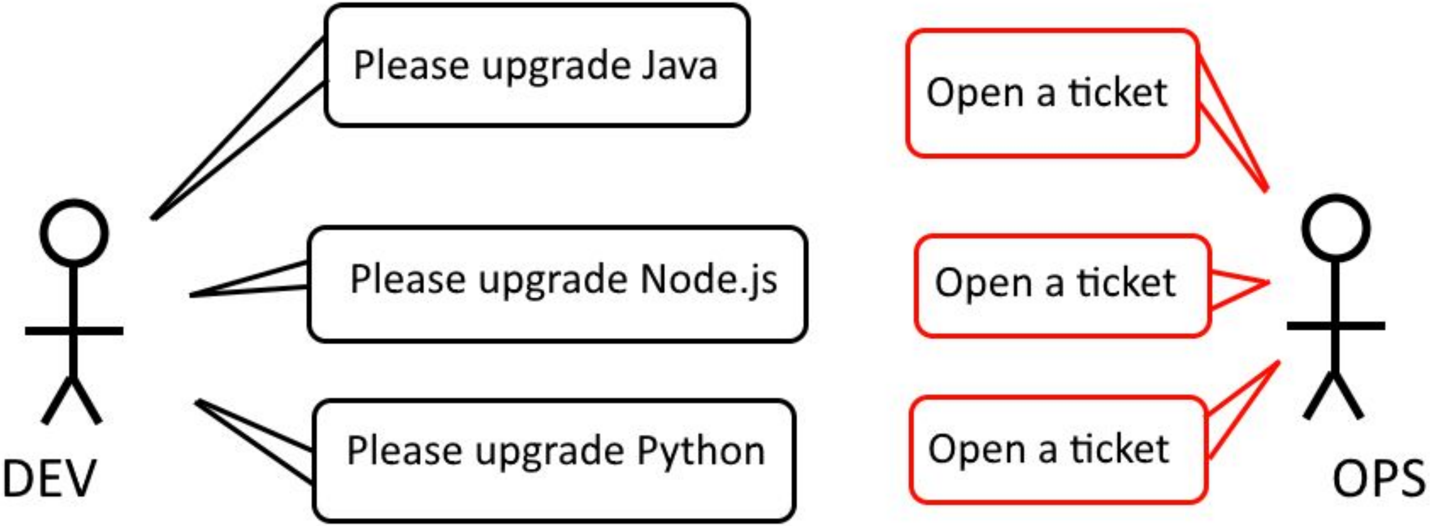
Because there is a Docker image for it

Codefresh Pipelines are Future Proof

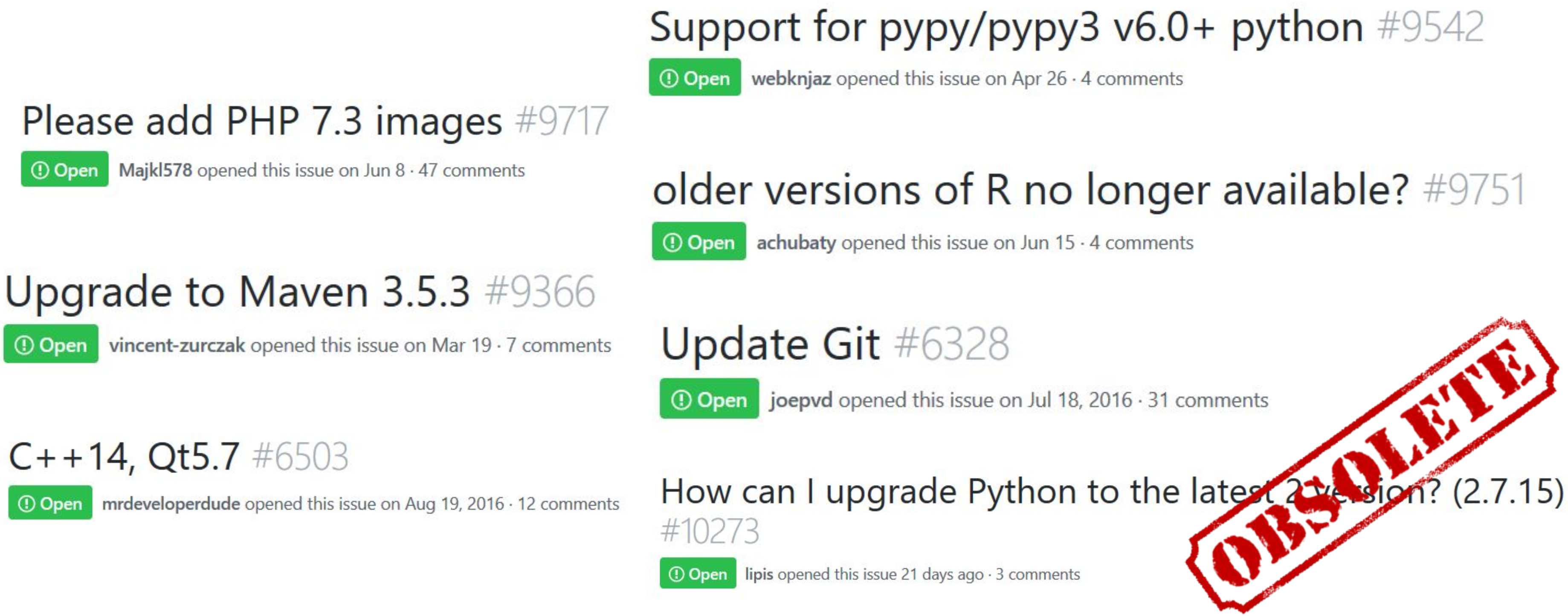
- You can use ANY existing Docker image from Dockerhub or any other Registry
- Every time a new tool comes out, it can be used right away if packaged in a Docker image

Tool Upgrades and Version Clashes

Updating a Tool in a VM based Pipeline



VM based 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

OBSOLETE

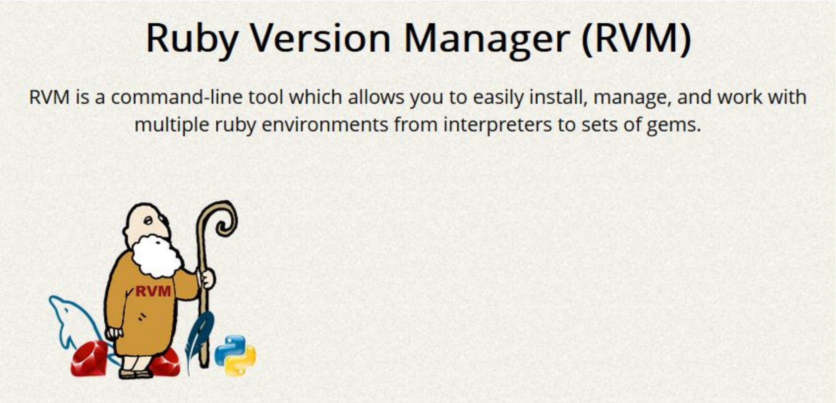
Demo:
Updating Python to 3.7

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

Using Tools from Different Versions

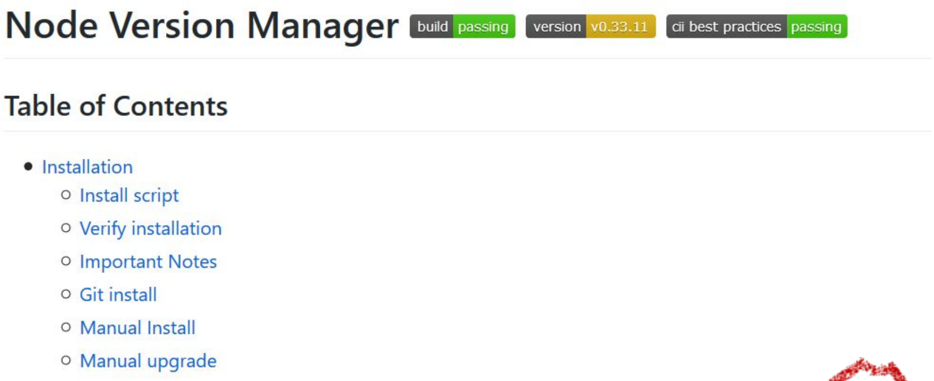
- Version clashes are a huge pain for both developers and operators
- Legacy projects need to still use old version
- Using different versions in the same pipeline is almost impossible
- Developers want to use latest version of tool, traditional CI/CD platforms may not be able to keep up

Wasting Effort on “Version Managers”



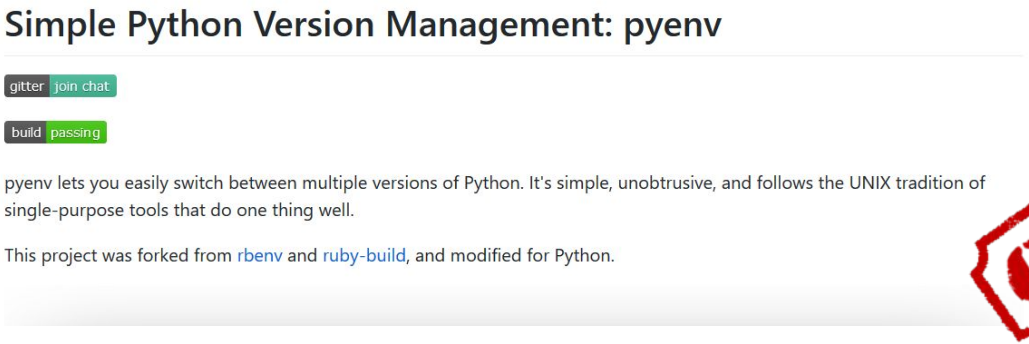
Ruby Version Manager (RVM)

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.

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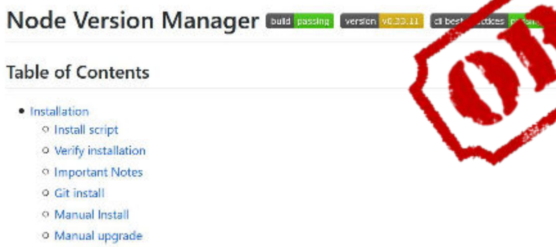
Wasting Effort on “Version Managers”

- 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



Node Version Manager

Table of Contents

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

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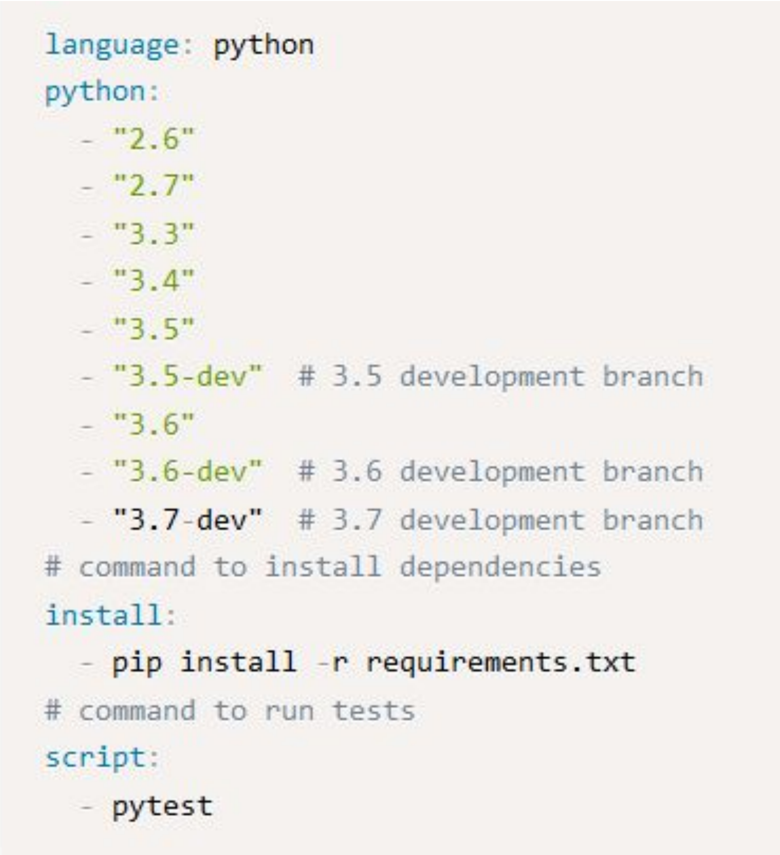


```
language: python
python:
  - "2.6"
  - "2.7"
  - "3.3"
  - "3.4"
  - "3.5"
  - "3.5-dev"  # 3.5 development branch
  - "3.6"
  - "3.6-dev"  # 3.6 development branch
  - "3.7-dev"  # 3.7 development branch
# command to install dependencies
install:
  - pip install -r requirements.txt
# command to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

The Problem with Python

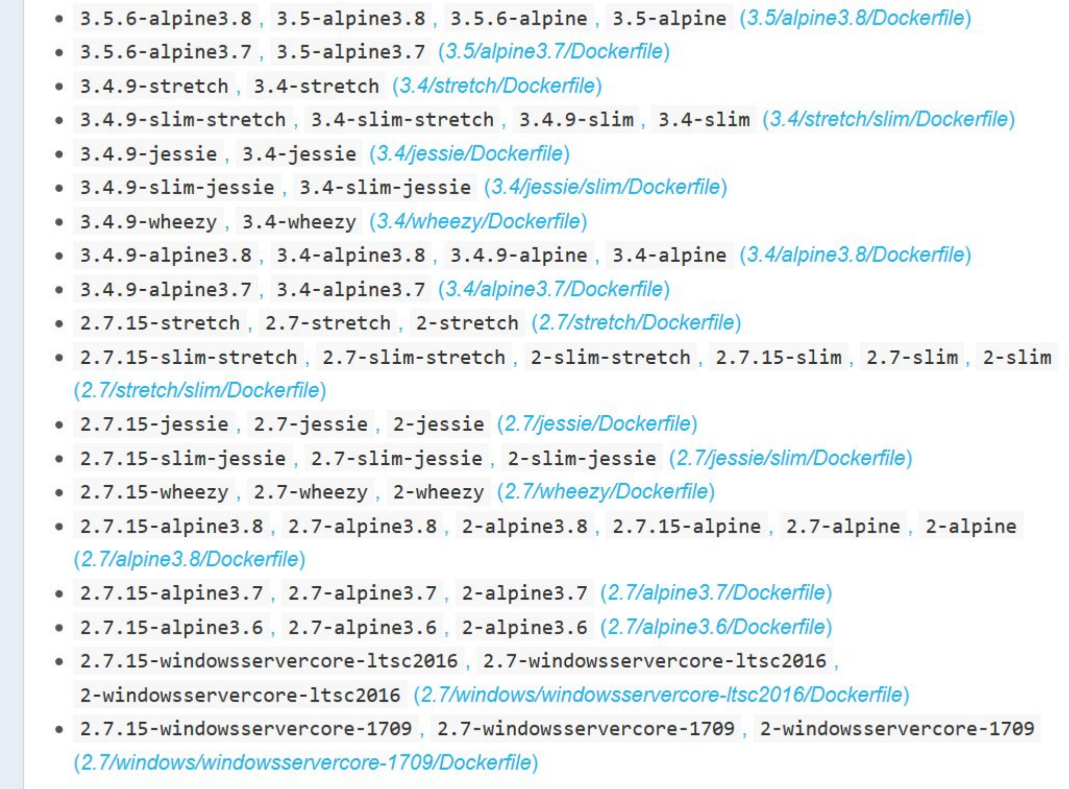
- Different python versions are a notorious problem
- Until recently you needed dedicated support from your CI platform
- What happens if I want to test Python 2.5?

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)

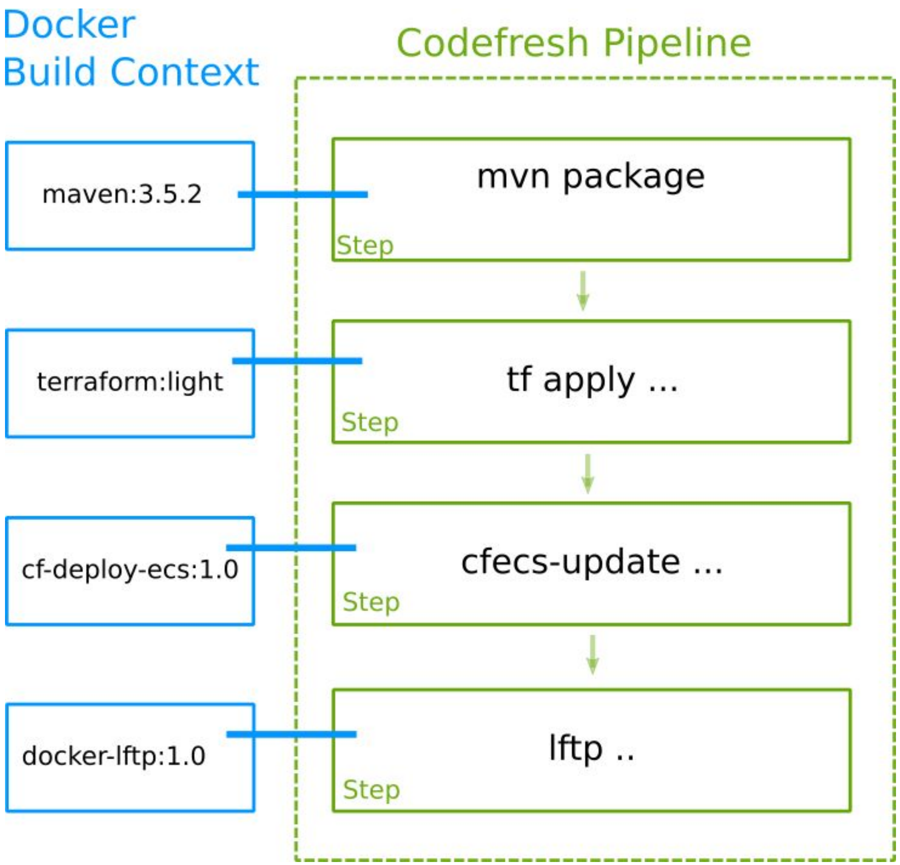
Demo 3:
Multiple Python/Node versions

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



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Caches and Artifacts (VM based 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

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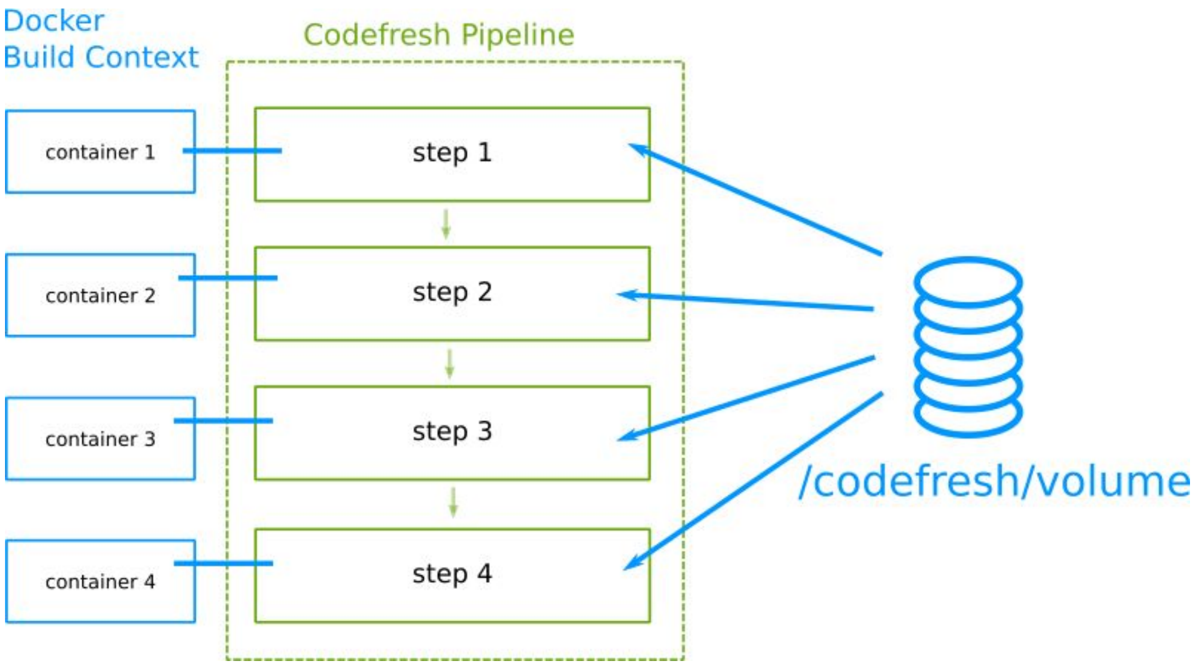
All Steps Share a Volume in Codefresh



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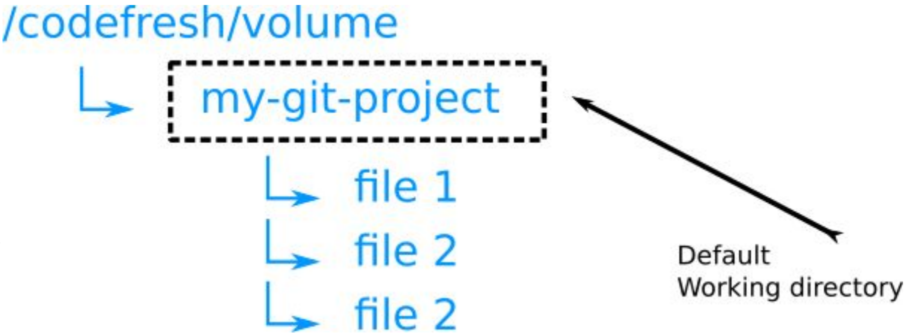
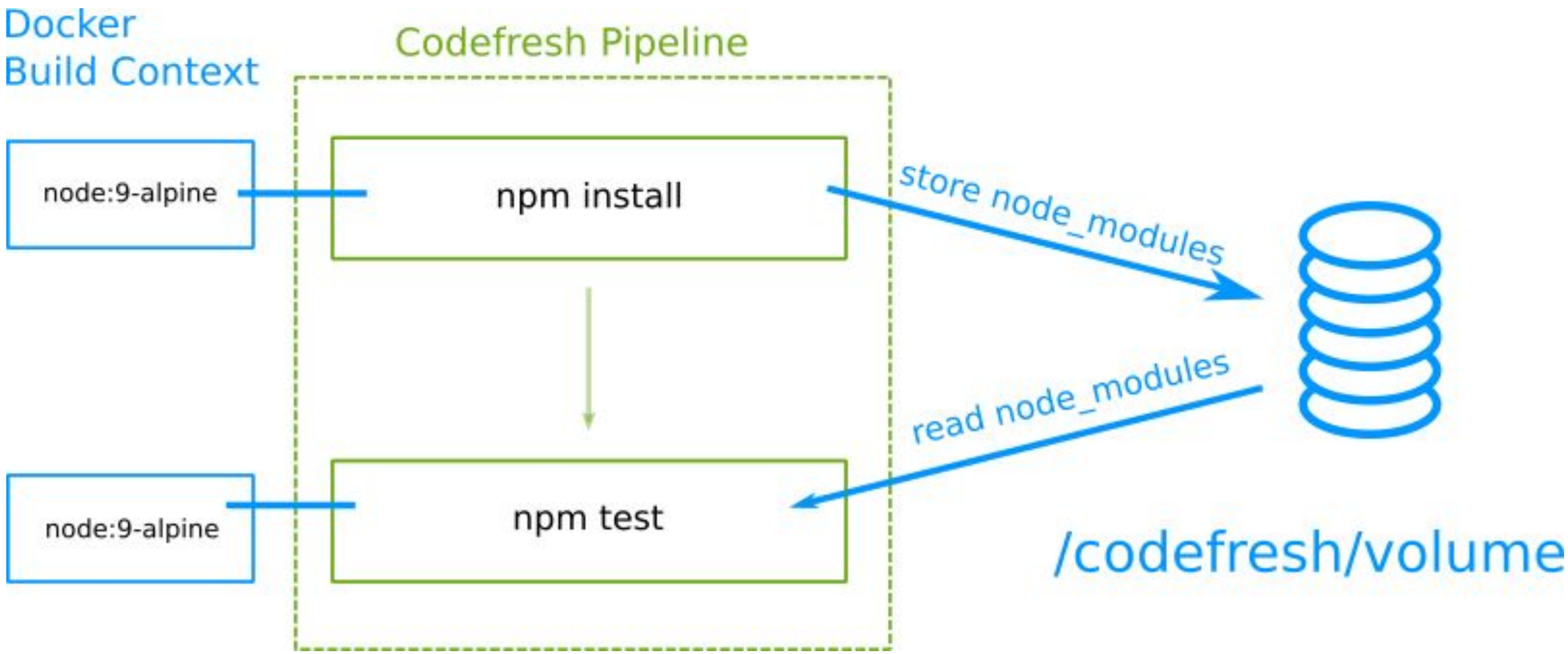
Project is on the Volume

- 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

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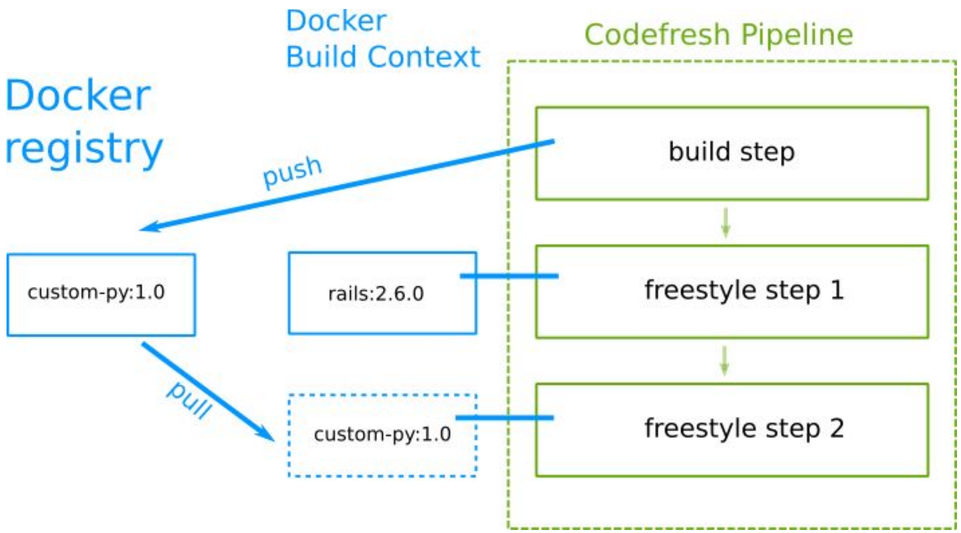
Creating Docker Images On-demand

- 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



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Codefresh Plugins

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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

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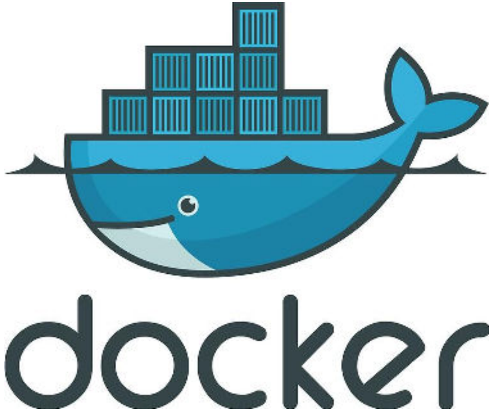
Codefresh Plugins = Docker Images



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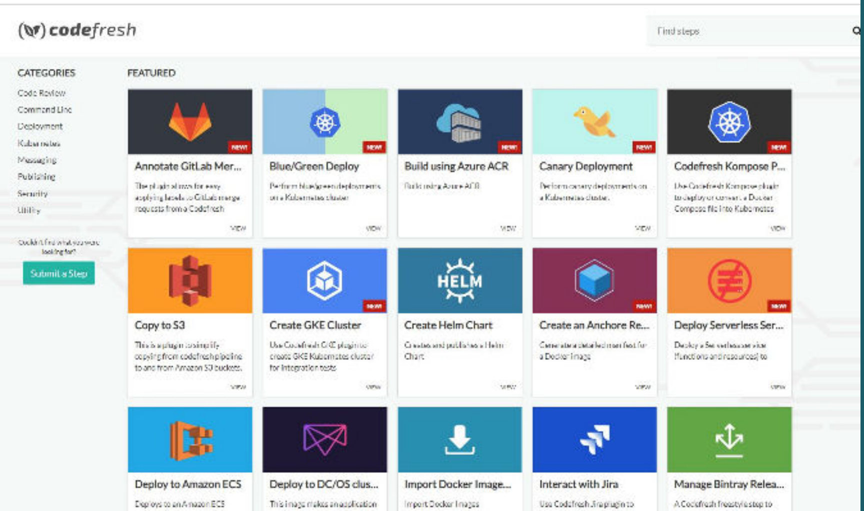
Codefresh Plugins

- 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

Plugin Directory

http://steps.codefresh.io/



codefresh

Find steps

CATEGORIES

Code Review
Command Line
Deployment
Kubernetes
Messaging
Publishing
Security
Utility

Couldn't find what you were looking for?

Submit a Step

FEATURED

NEW! Annotate GitLab Mer...
The plugin allows for easy applying labels to GitLab merge requests from a Codefresh
VIEW

NEW! Blue/Green Deploy
Perform blue/green deployments on a Kubernetes cluster
VIEW

NEW! Build using Azure ACR
Build using Azure ACR
VIEW

NEW! Canary Deployment
Perform canary deployments on a Kubernetes cluster.
VIEW

NEW! Codefresh Kompose P...
Use Codefresh Kompose plugin to deploy or convert a Docker Compose file into Kubernetes
VIEW

Copy to S3
This is a plugin to simplify copying from codefresh pipeline to and from Amazon S3 buckets.
VIEW

NEW! Create GKE Cluster
Use Codefresh GKE plugin to create GKE Kubernetes cluster for Integration tests
VIEW

Create Helm Chart
Creates and publishes a Helm Chart
VIEW

NEW! Create an Anchore Re...
Generate a detailed report for a Docker Image
VIEW

NEW! Deploy Serverless Ser...
Deploy a Serverless service (functions and resources) to
VIEW

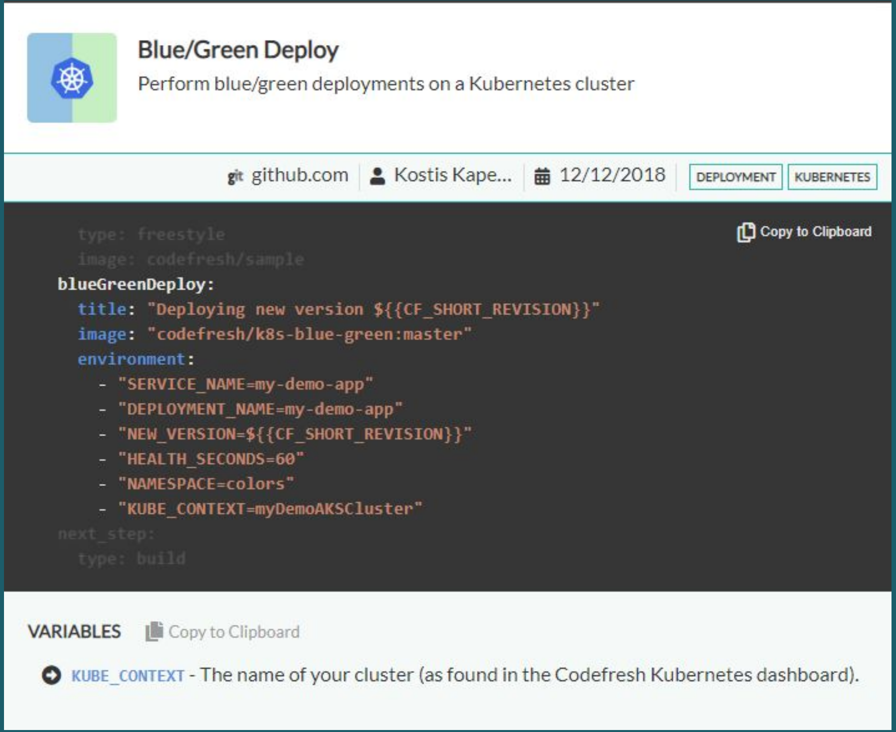
Deploy to Amazon ECS
Deploys to an Amazon ECS

Deploy to DC/OS clus...
This image makes an application

Import Docker Image...
Import Docker Images

Interact with Jira
Use Codefresh Jira plugin to

Manage Bintray Relea...
A Codefresh freestyle step to



Blue/Green Deploy

Perform blue/green deployments on a Kubernetes cluster

git github.com | Kostis Kape... | 12/12/2018 | DEPLOYMENT | KUBERNETES

Copy to Clipboard

```
  type: freestyle
  image: codefresh/sample
blueGreenDeploy:
  title: "Deploying new version ${{CF_SHORT_REVISION}}"
  image: "codefresh/k8s-blue-green:master"
  environment:
    - "SERVICE_NAME=my-demo-app"
    - "DEPLOYMENT_NAME=my-demo-app"
    - "NEW_VERSION=${{CF_SHORT_REVISION}}"
    - "HEALTH_SECONDS=60"
    - "NAMESPACE=colors"
    - "KUBE_CONTEXT=myDemoAKSCluster"
next_step:
  type: build
```

VARIABLES Copy to Clipboard

- KUBE_CONTEXT - The name of your cluster (as found in the Codefresh Kubernetes dashboard).

Learn how to build your own!

Workshop

github.com/todaywasawesome/containers-as-steps

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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

Thank You!

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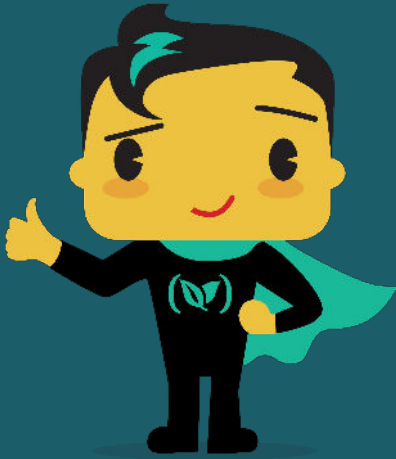

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