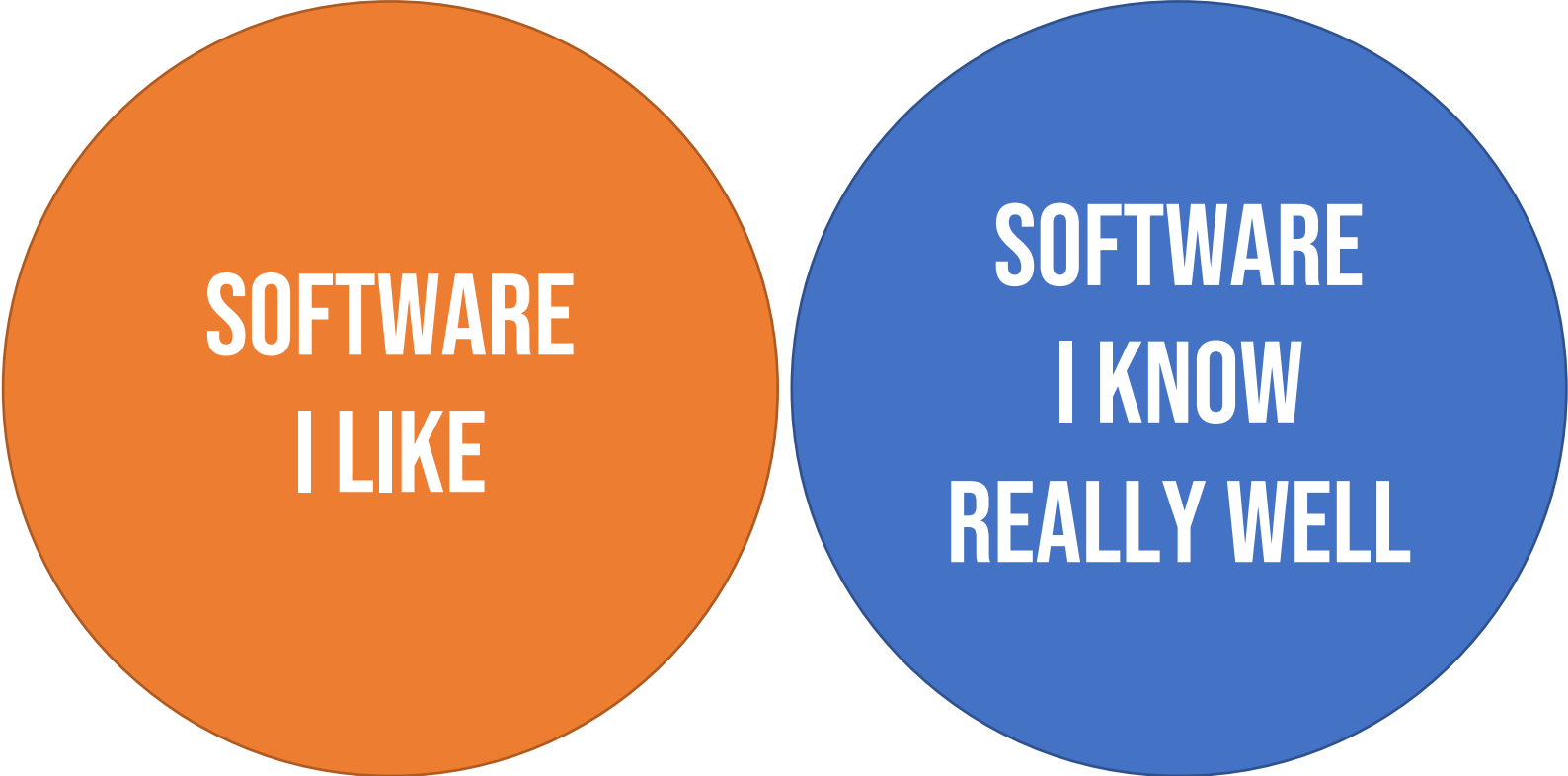


BEST PRACTICES IN IMPLEMENTING CONTAINER IMAGE PROMOTION PIPELINES

A still from the movie "The Happening" featuring M. Night Shyamalan. He is wearing a grey jumpsuit and has a large, black, cylindrical nuclear device strapped to his back. He is making peace signs with both hands and has a surprised or intense expression on his face. The background is a dark, industrial-looking interior with some red machinery visible on the left and some control panels on the right.

CONTAINERS



**SOFTWARE
I LIKE**

**SOFTWARE
I KNOW
REALLY WELL**

I LIKE YOU



BUT I DON'T TRUST YOU

BARUCH SADOGURSKY

CHIEF STICKER OFFICER

(ALSO 🎩 OF DEVELOPER ADVOCACY)



JBARUCH@JFROG.COM

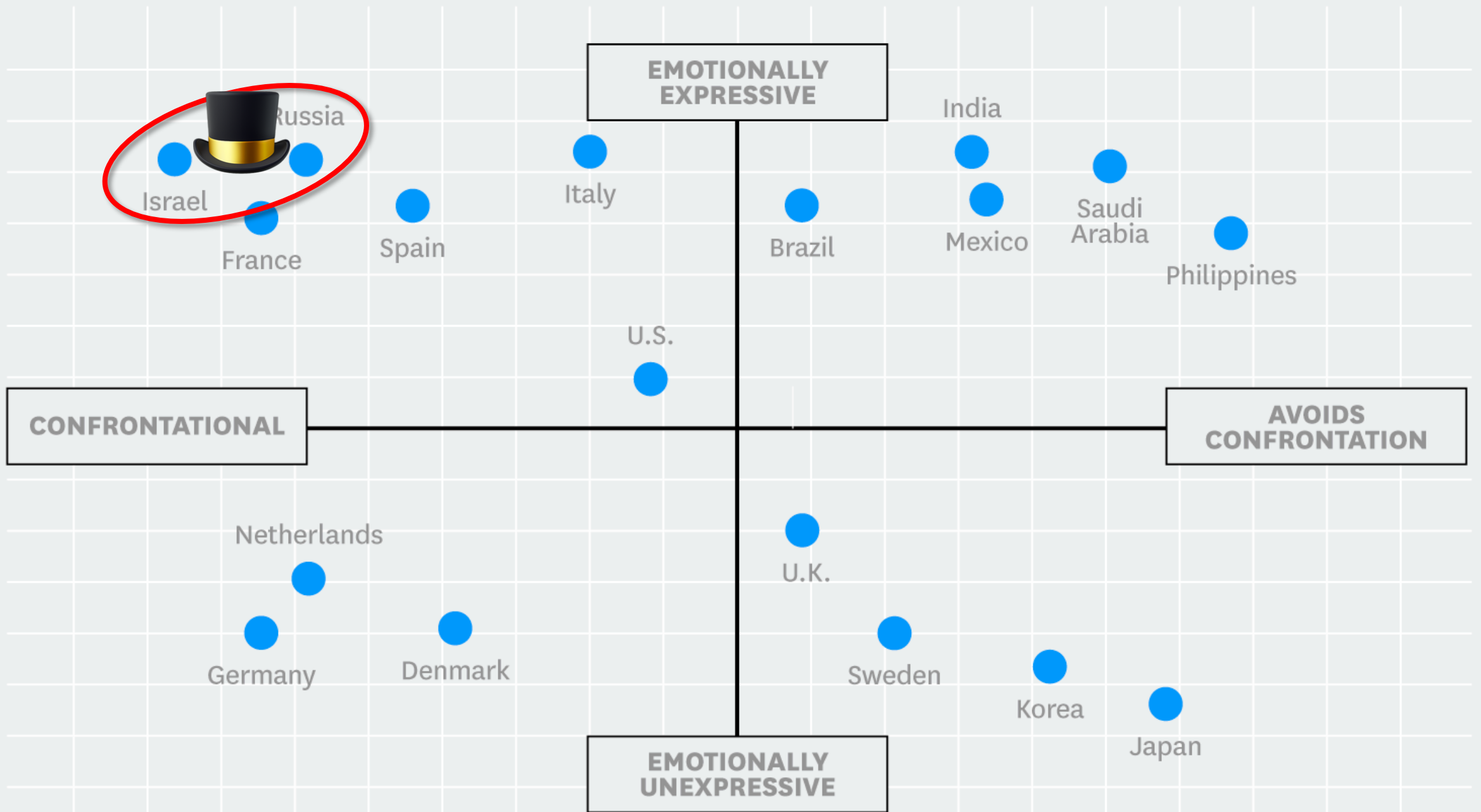


@JBARUCH



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SHOWNOTES

➤ <http://jfrog.com/shownotes>

➤ Slides

➤ Video

➤ Links

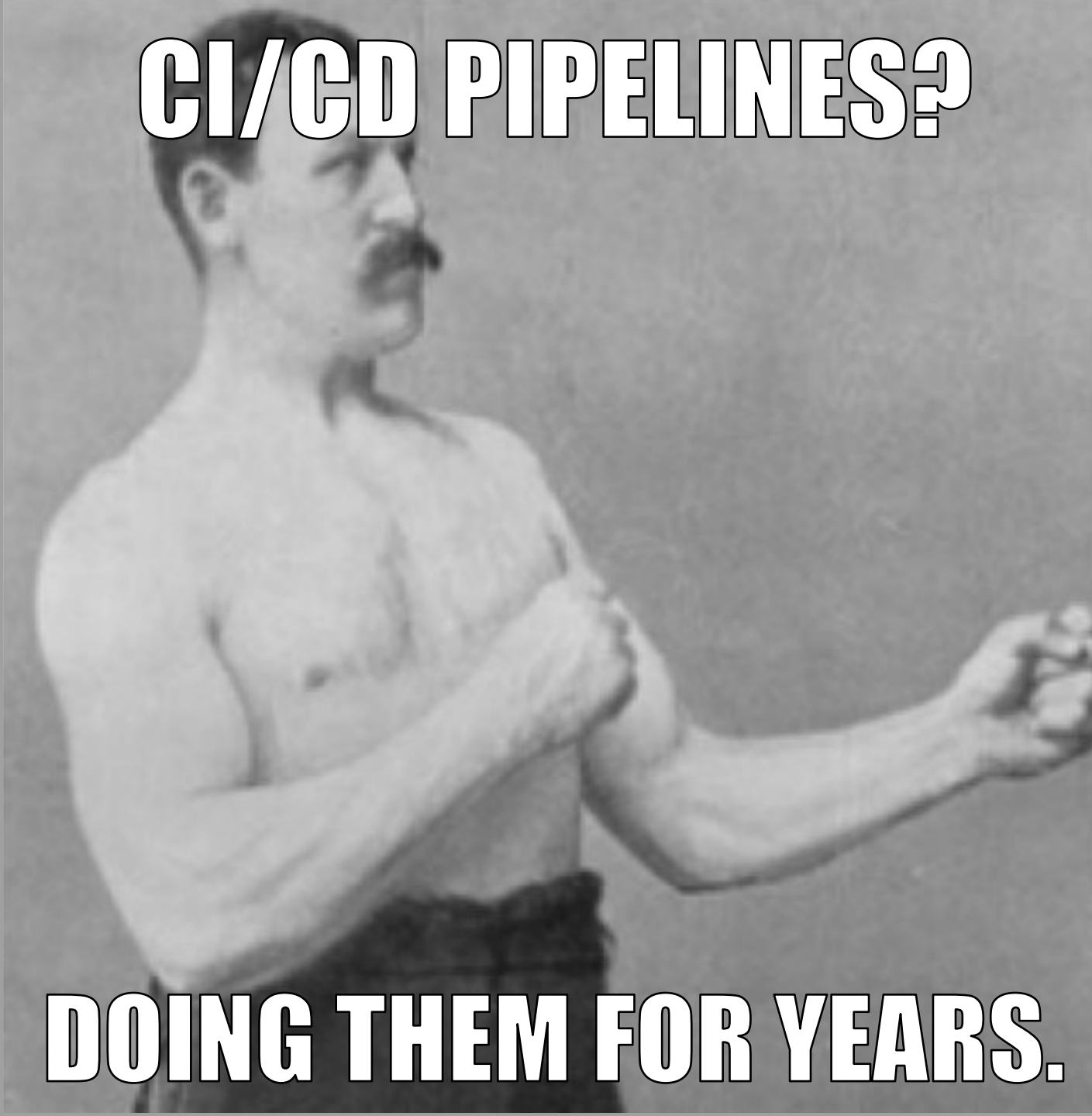
➤ Comments, Ratings

➤ Raffle

DO WE HAVE AN EXISTING PATTERN?

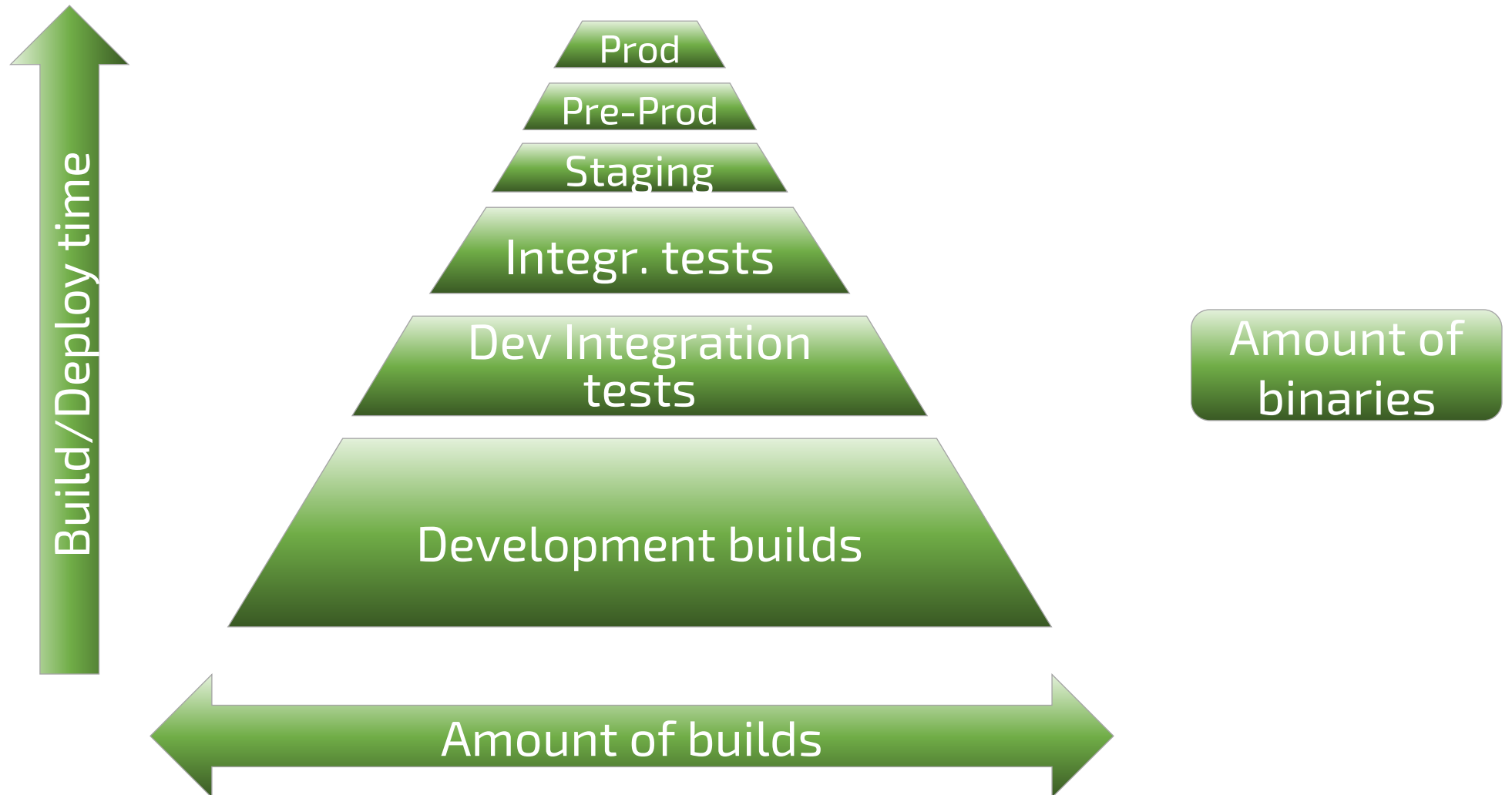
DO WE NEED TO ADAPT IT?

CI/CD PIPELINES?

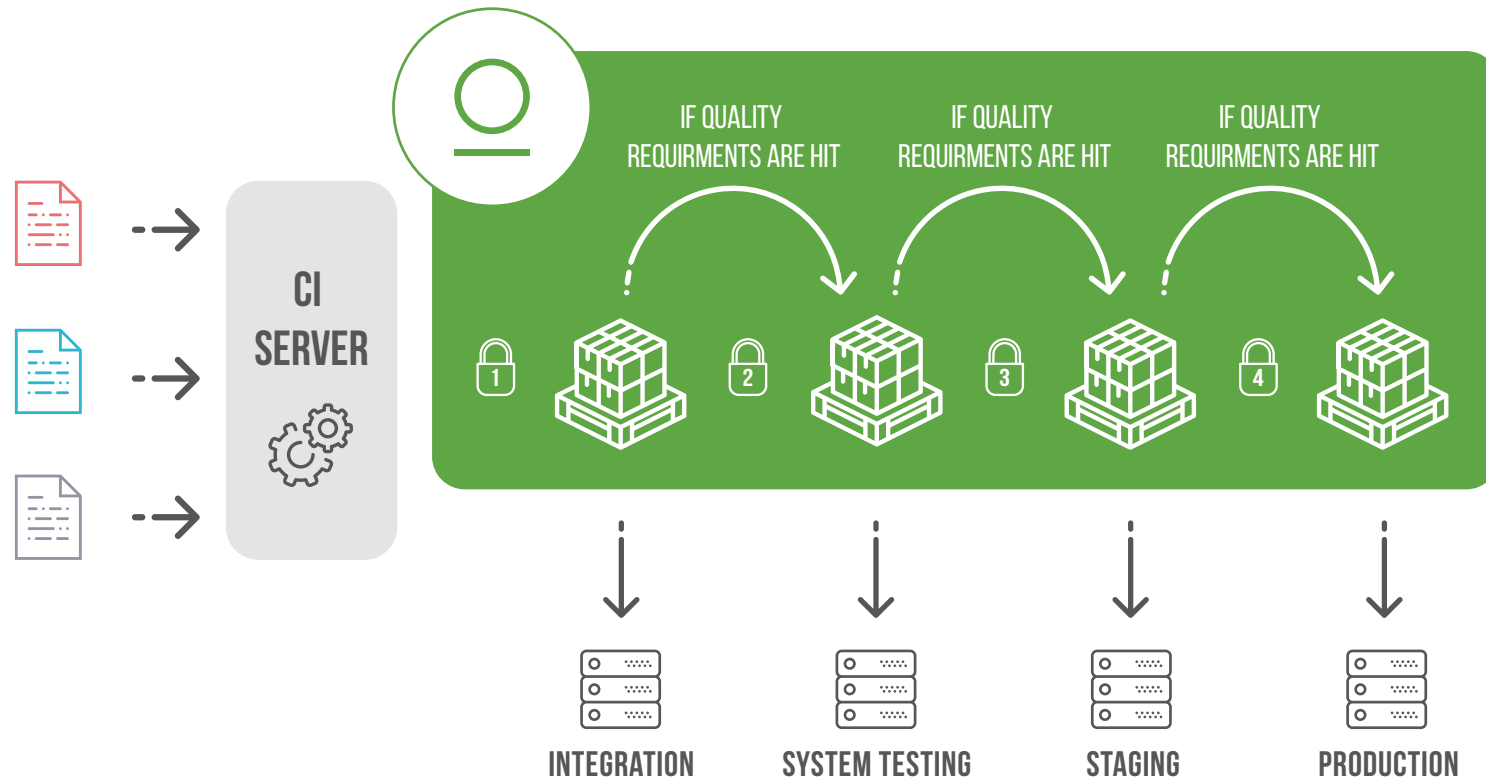


DOING THEM FOR YEARS.

THE PROMOTION PYRAMID



PIPELINE: QUALITY GATES AND VISIBILITY



\$docker build

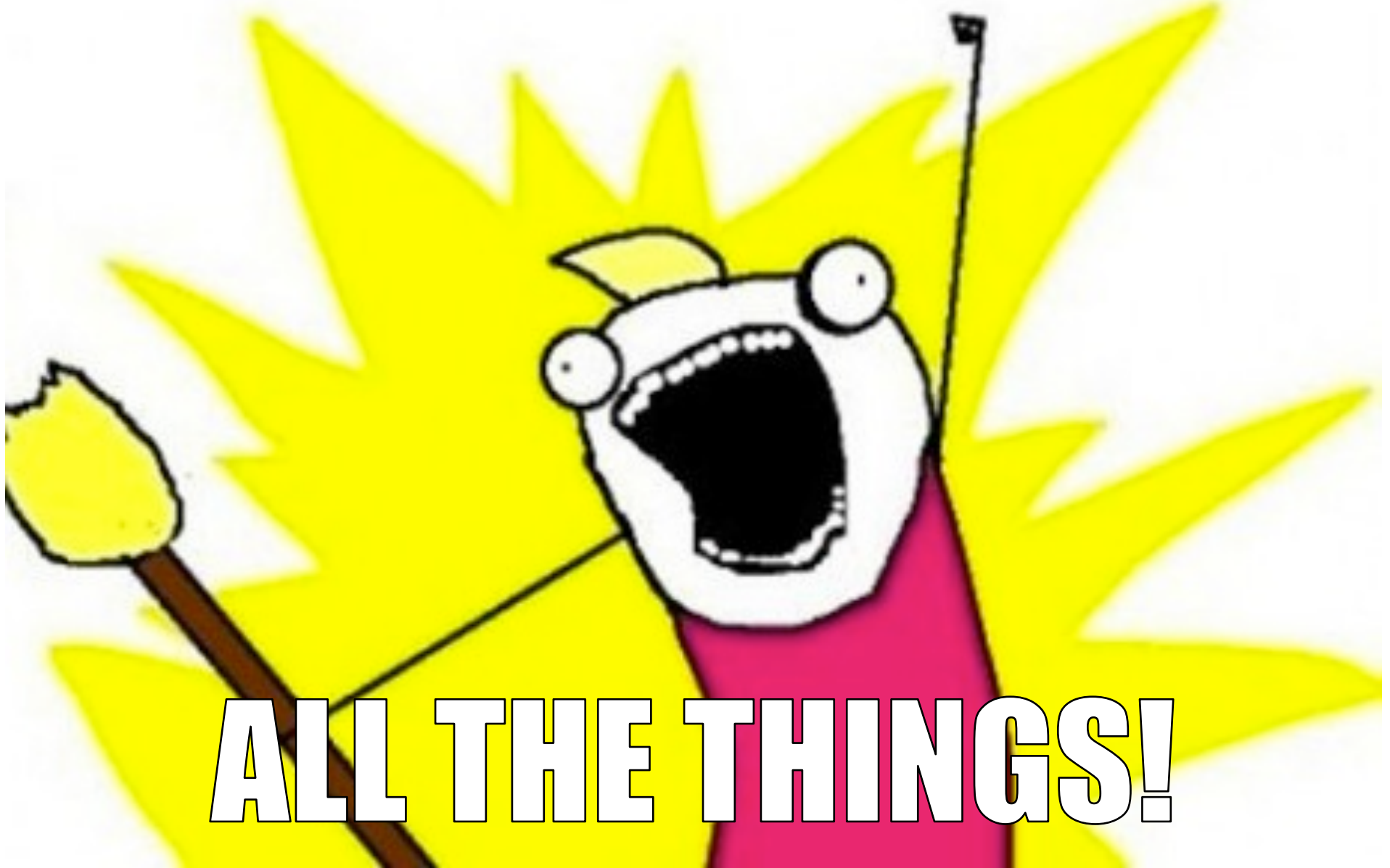


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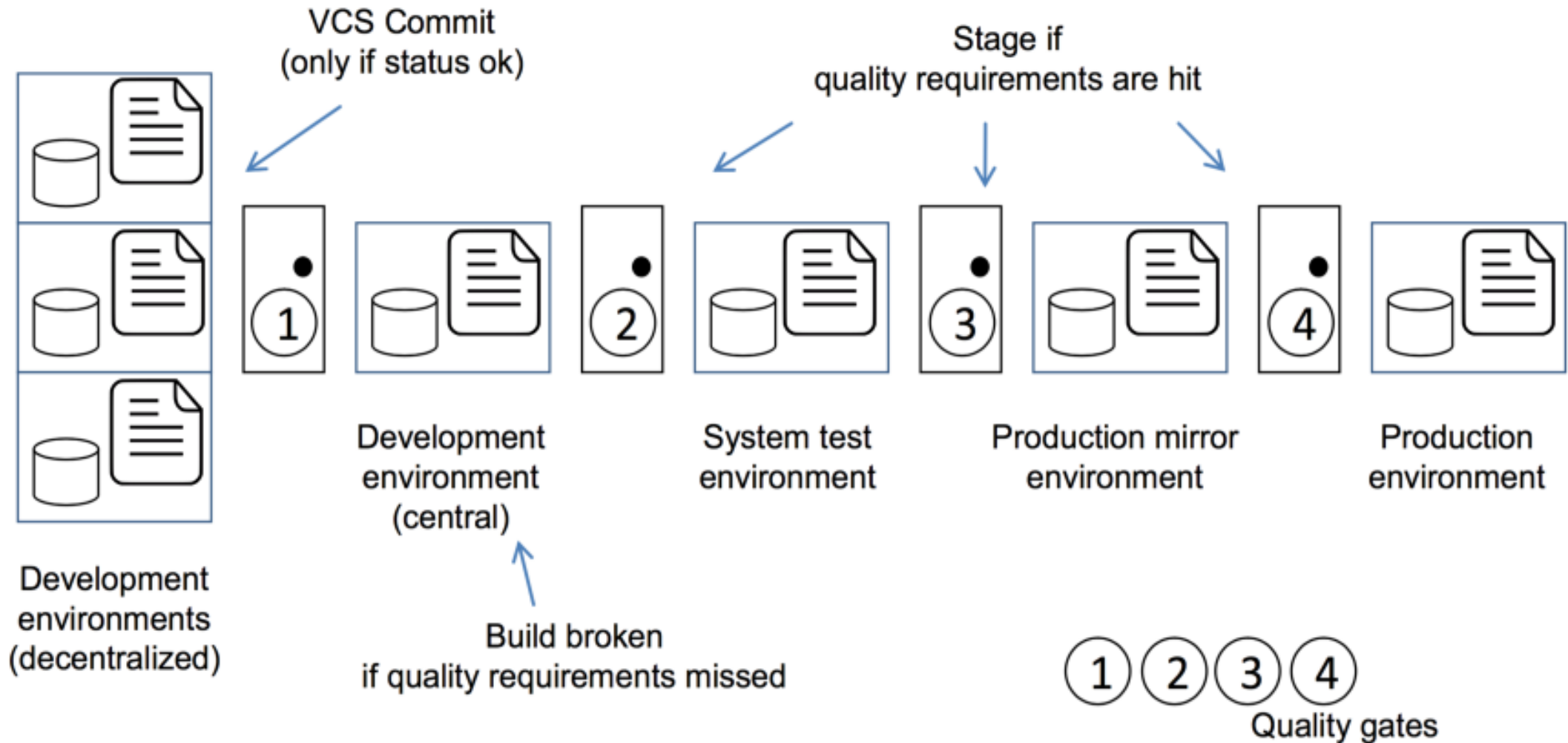
<http://jfrog.com/shownotes>

DOCKER BUILD



ALL THE THINGS!

LET'S docker build **IN EVERY ENV!**



FAST AND CHEAP BUILDS

NOT ALWAYS THE WAY TO GO



THAT'S WHY.

FROM ubuntu  Latest version

RUN apt-get install -y software-properties-common python

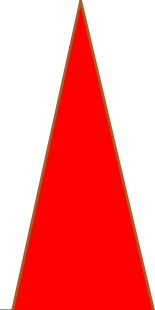
RUN apt-get install -y nodejs

RUN mkdir /var/www

 Latest version

ADD app.js /var/www/app.js

 Latest version

 Latest version

CMD `["/usr/bin/node", "/var/www/app.js"]`

THAT'S WHY.

FROM ubuntu:19.04



Better now?

RUN apt-get install -y software-properties-common python

RUN apt-get install -y nodejs

RUN mkdir /var/www

ADD app.js /var/www/app.js

CMD ["/usr/bin/node", "/var/www/app.js"]

THAT'S WHY.

FROM ubuntu:4033353383af19ec179c01dda7f355a246c6adcafaf93c8f98

And now?

RUN apt-get install -y software-properties-common python

RUN apt-get install -y nodejs

RUN mkdir /var/www

ADD app.js /var/www/app.js

CMD ["/usr/bin/node", "/var/www/app.js"]

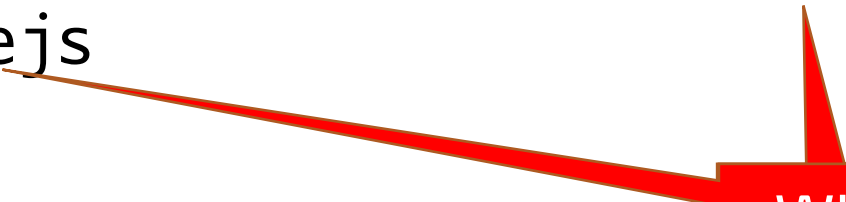
THAT'S WHY.

FROM ubuntu:4033353383af19ec179c01dda7f355a246c6adcafaf93c8f98

RUN apt-get install -y software-properties-common python

RUN apt-get install -y nodejs

RUN mkdir /var/www



What about those?

ADD app.js /var/www/app.js

CMD ["/usr/bin/node", "/var/www/app.js"]

THAT'S WHY.

FROM `ubuntu:4033353383af19ec179c01dda7f355a246c6adcafaf93c8f98`

RUN `mvn clean install`

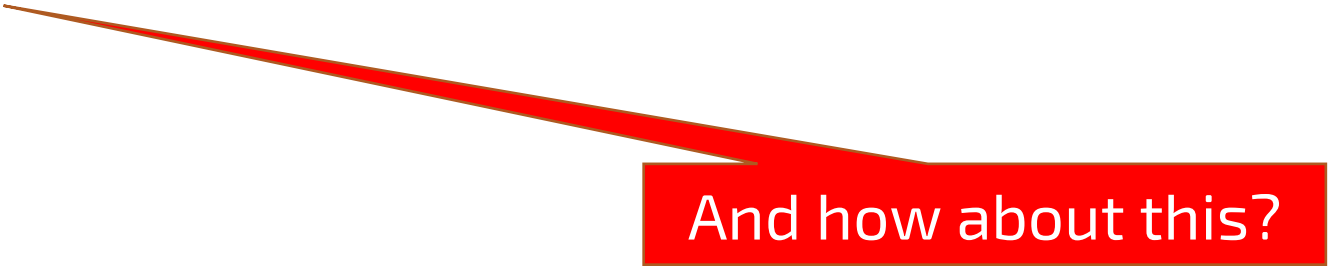
What about this?

CMD `"java -jar Main.class"`

THAT'S WHY.

FROM ubuntu:4033353383af19ec179c01dda7f355a246c6adcafaf93c8f98

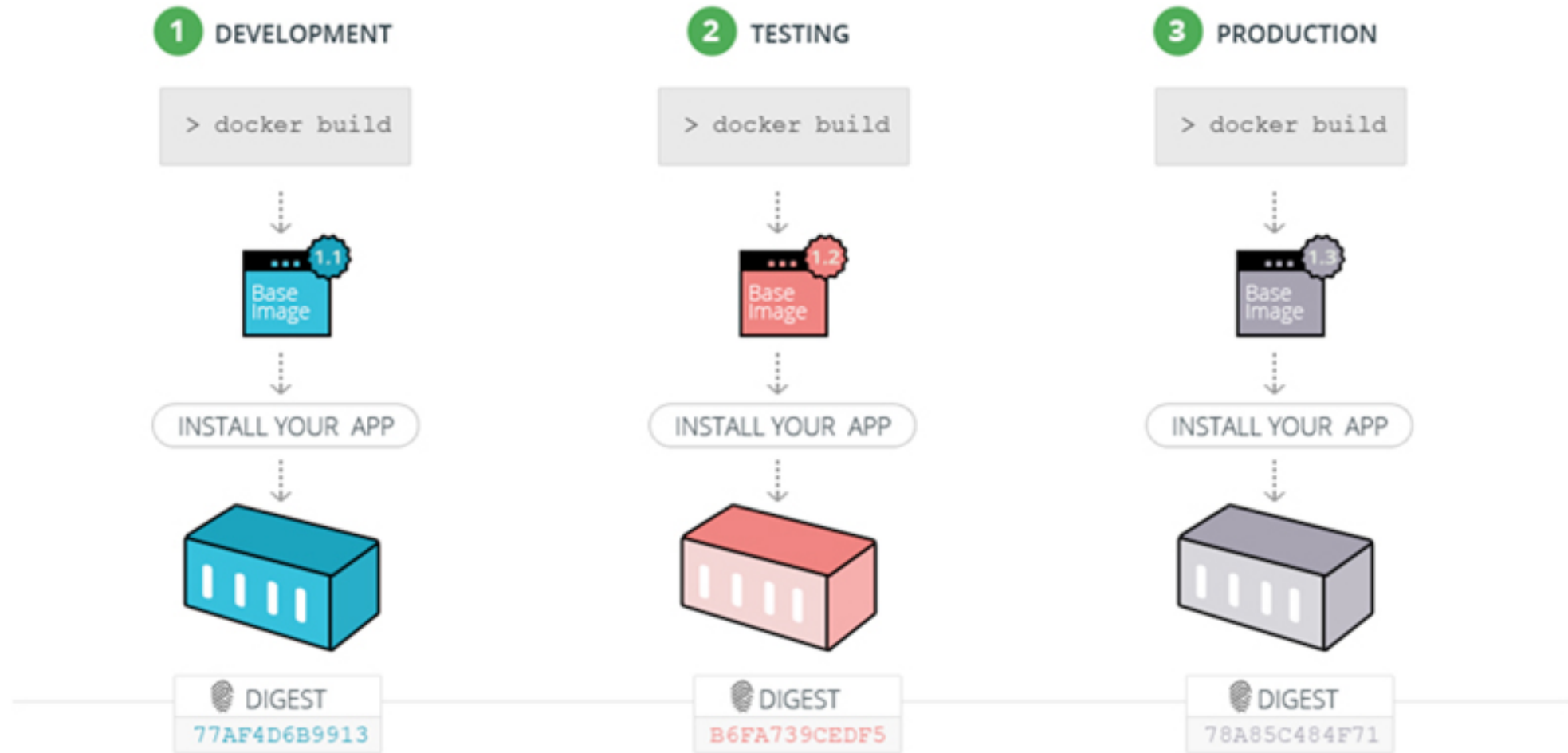
RUN download_random_sh*t_from_the_internet.sh



And how about this?

CMD ["/usr/bin/node", "/var/www/app.js"]

THAT'S WHY YOU DON'T TRUST DOCKER



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I DON'T ALWAYS BUILD PROMOTION PIPELINES



**BUT WHEN I DO, IT'S WITH
IMMUTABLE AND STABLE BINARIES**

1 DEVELOPMENT

```
> docker build
```



INSTALL YOUR APP



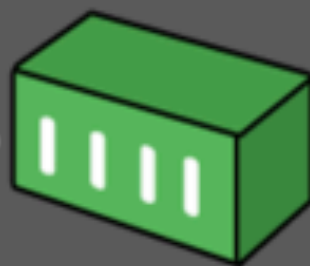
DIGEST

77AF4D6B9913

2 TESTING

```
> build once
```

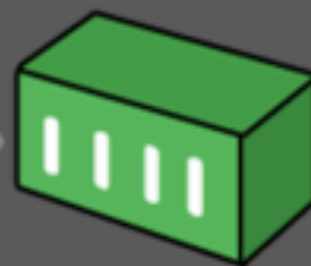
```
> automatically promote the same image  
through the pipeline to production
```



DIGEST

77AF4D6B9913

3 PRODUCTION



DIGEST

77AF4D6B9913

WHAT'S UP WITH THE GATES?!

- QA SHOULDN'T TEST DEV IMAGES
- NON-TESTED IMAGES SHOULDN'T BE STAGED
- NON-STAGED, NON-TESTED OR DEV IMAGES SHOULDN'T END UP IN PRODUCTION!!!

LET'S BUILD ROCK-SOLID PIPELINE!





HOW DO I SEPARATE DEV FROM PROD?!

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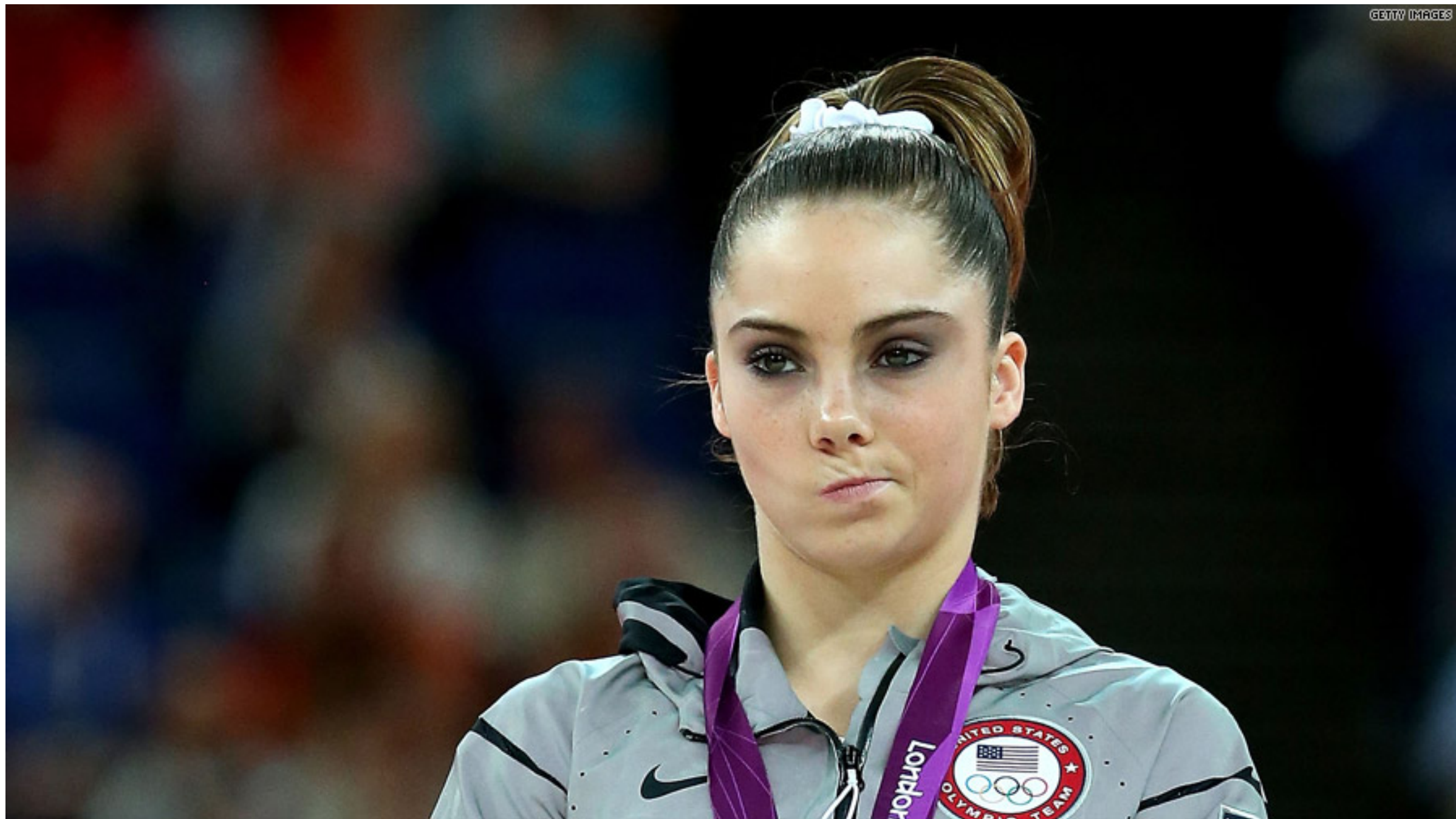
OPTION 1: METADATA TAGS

LABEL

```
LABEL <key>=<value> <key>=<value> <key>=<value> ...
```

The `LABEL` instruction adds metadata to an image. A `LABEL` is a key-value pair. To include spaces within a `LABEL` value, use quotes and backslashes as you would in command-line parsing. A few usage examples:

```
LABEL "com.example.vendor"="ACME Incorporated"  
LABEL com.example.label-with-value="foo"  
LABEL version="1.0"  
LABEL description="This text illustrates \  
that label-values can span multiple lines."
```



OPTION 2: DOCKER REPOSITORIES

Repositories

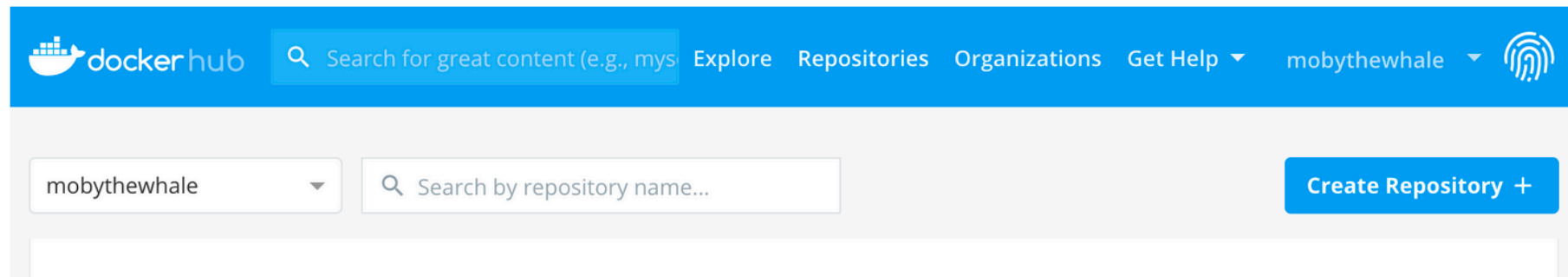
Estimated reading time: 5 minutes

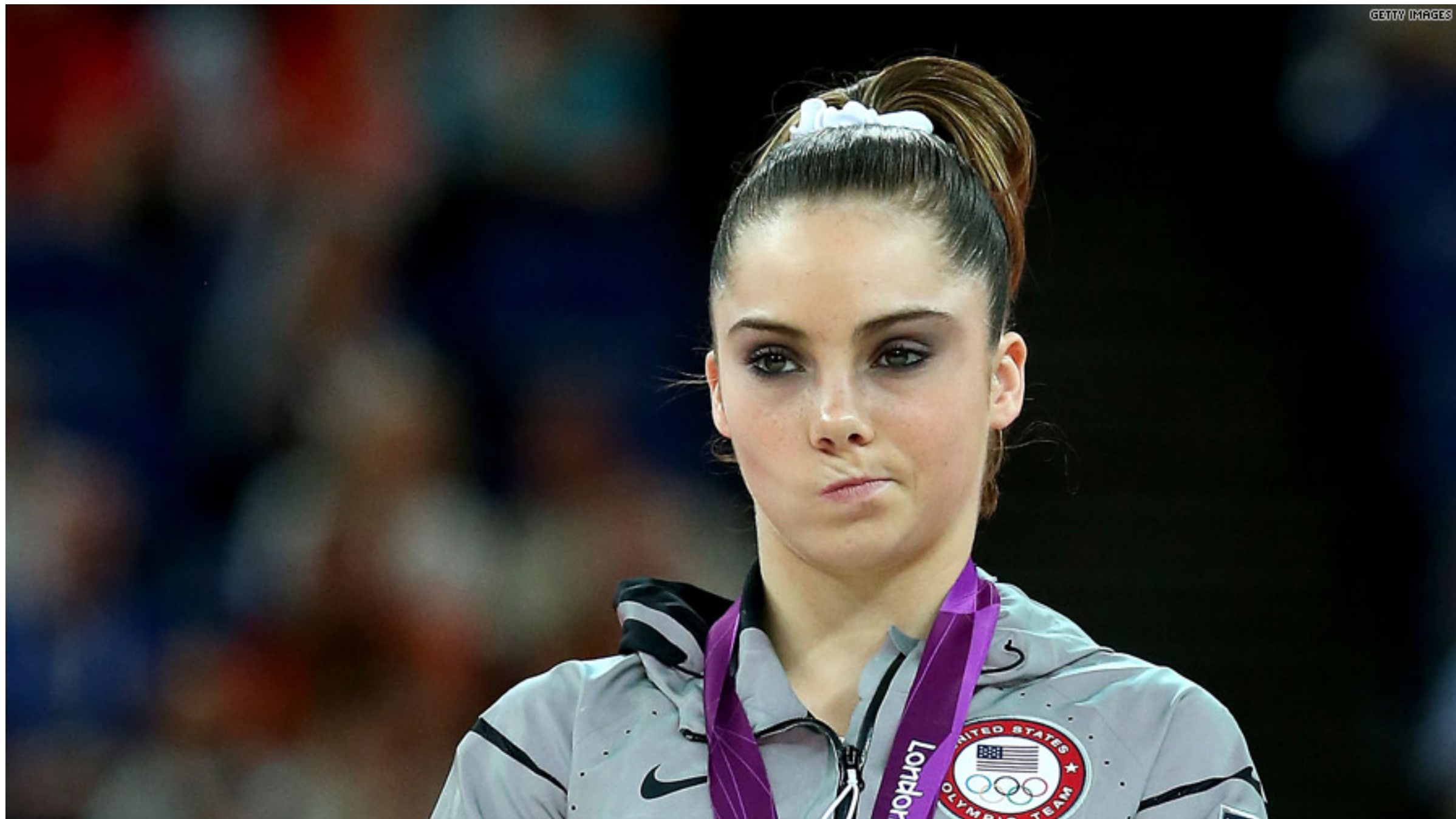
Docker Hub repositories allow you share container images with your team, customers, or the Docker community at large.

Docker images are pushed to Docker Hub through the `docker push` command. A single Docker Hub repository can hold many Docker images (stored as **tags**).

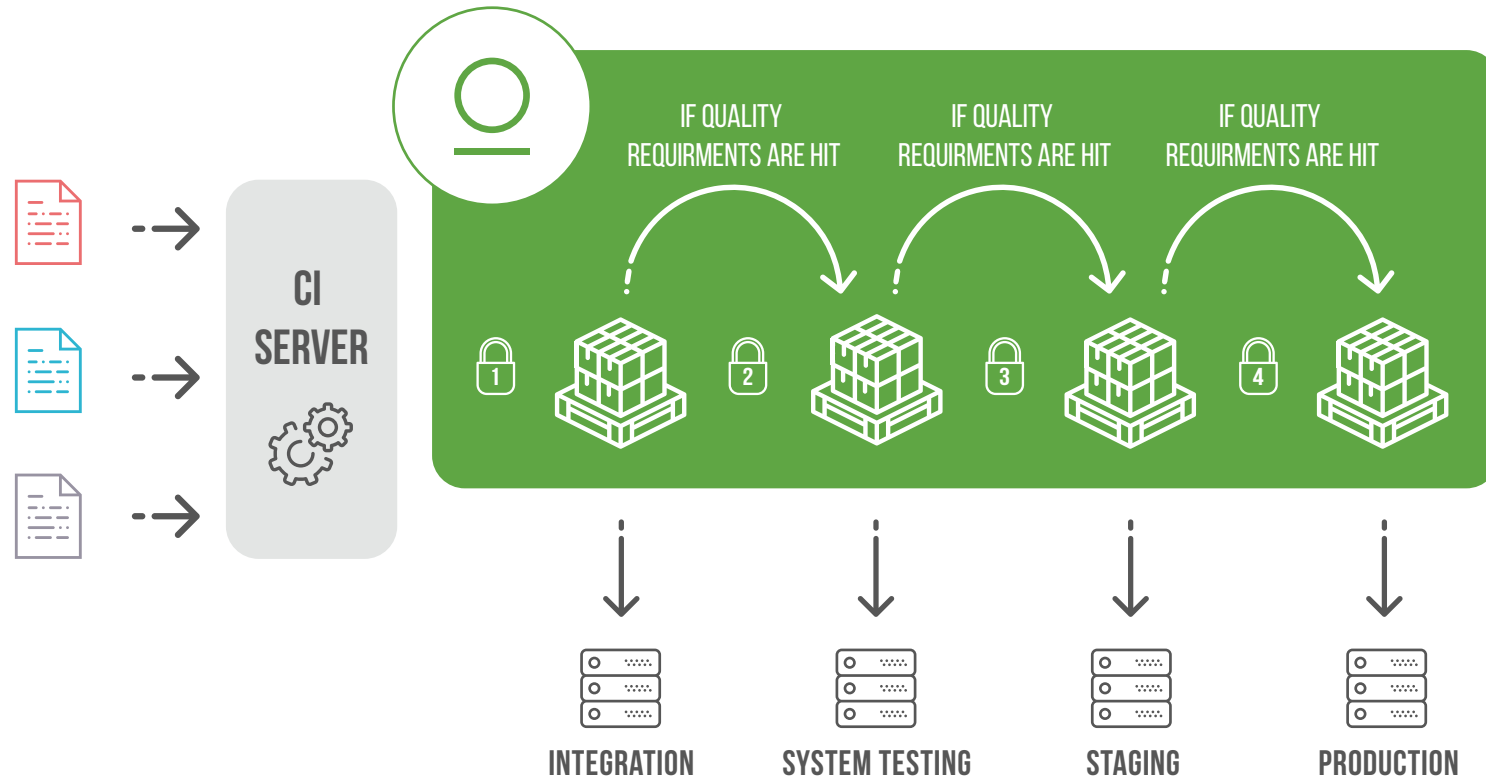
Creating repositories

To create a repository, sign into Docker Hub, click on **Repositories** then **Create Repository**:





SEPARATE REGISTRIES PER ENVIRONMENT



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- QUALITY GATES -



TRUMPED-UP LIMITATIONS



“640K OUGHT TO BE ENOUGH FOR ANYBODY.”

BILL GATES

© Lifehack Quotes

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THE ANATOMY OF DOCKER TAG

Tag an image for a private repository

To push an image to a private registry and not the central Docker registry you must tag it with the registry hostname and port (if needed).

```
$ docker tag 0e5574283393 myregistryhost:5000/fedora/httpd:version1.0
```

Wait a second, how can I
have more than one
registry per host now?!



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HOW CAN WE SUPPORT THIS?

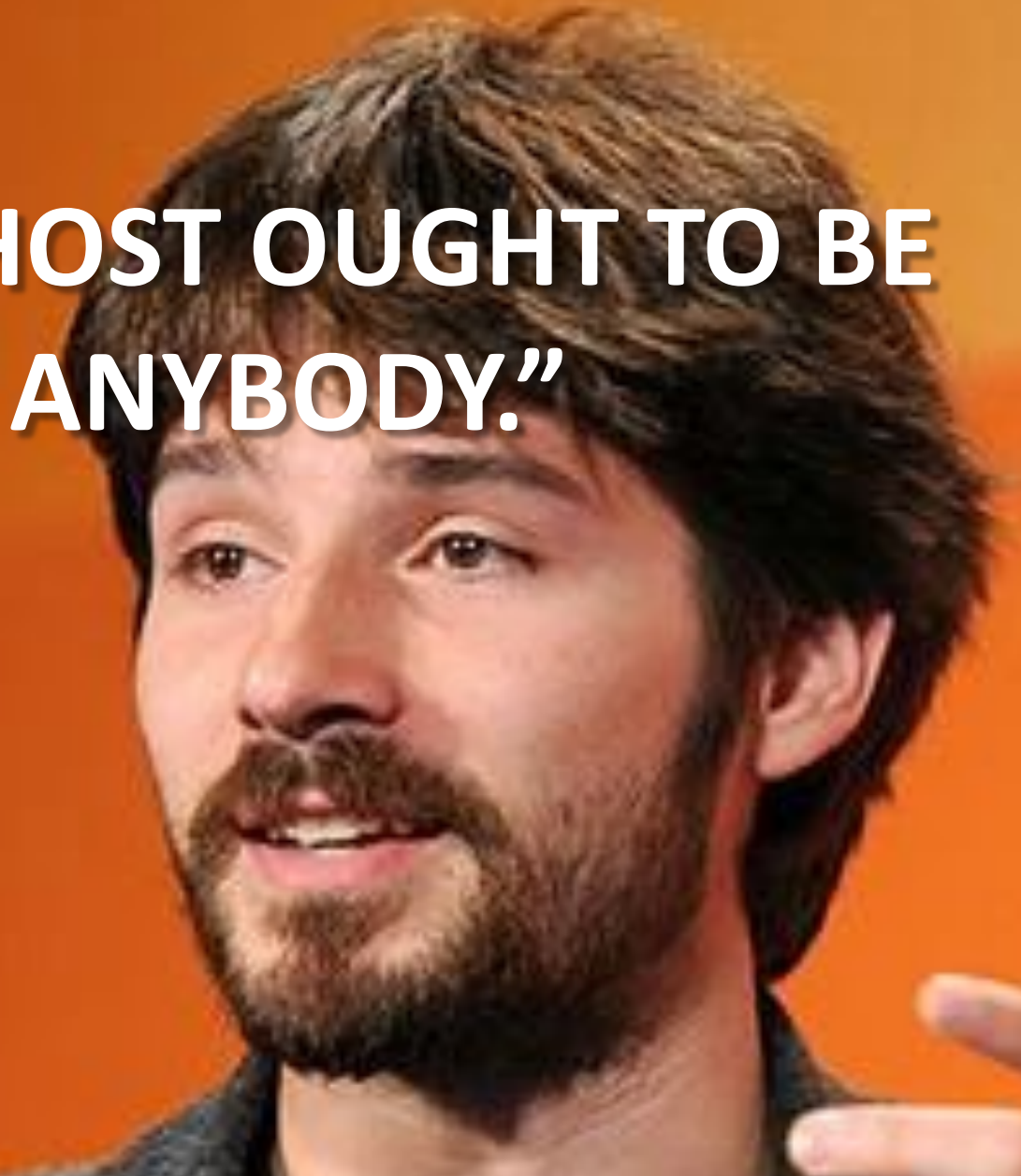
`https://host:8081/registry/docker-dev/busybox`

`https://host:8081/registry/docker-qa/busybox`

`https://host:8081/registry/docker-staging/busybox`

`https://host:8081/registry/docker-prod/busybox`

**“ONE REGISTRY PER HOST OUGHT TO BE
ENOUGH FOR ANYBODY.”**



PANIC!



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VIRTUAL HOSTS/PORTS TO THE RESCUE

`docker tag host:port/busybox`

Registry host

Tag name

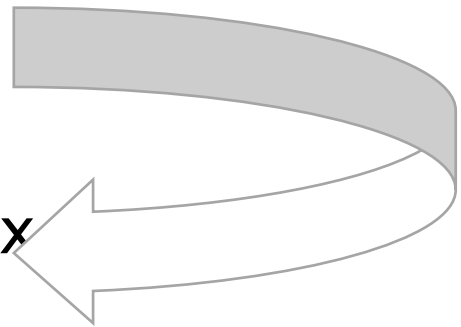
`https://host:port/v2/busybox`

`https://host:8081/registry/docker-dev/busybox`

Context name

Registry name

Tag name



```
server {  
    listen 5001;  
  
    server_name 192.168.99.100;  
    if ($http_x_forwarded_proto = '') {  
        set $http_x_forwarded_proto $scheme;  
    }  
    rewrite ^/(v1|v2)/(.*) /artifactory/api/docker/docker-dev/$1/$2;  
    ...  
}
```

BUT THEN YOU REALIZE...

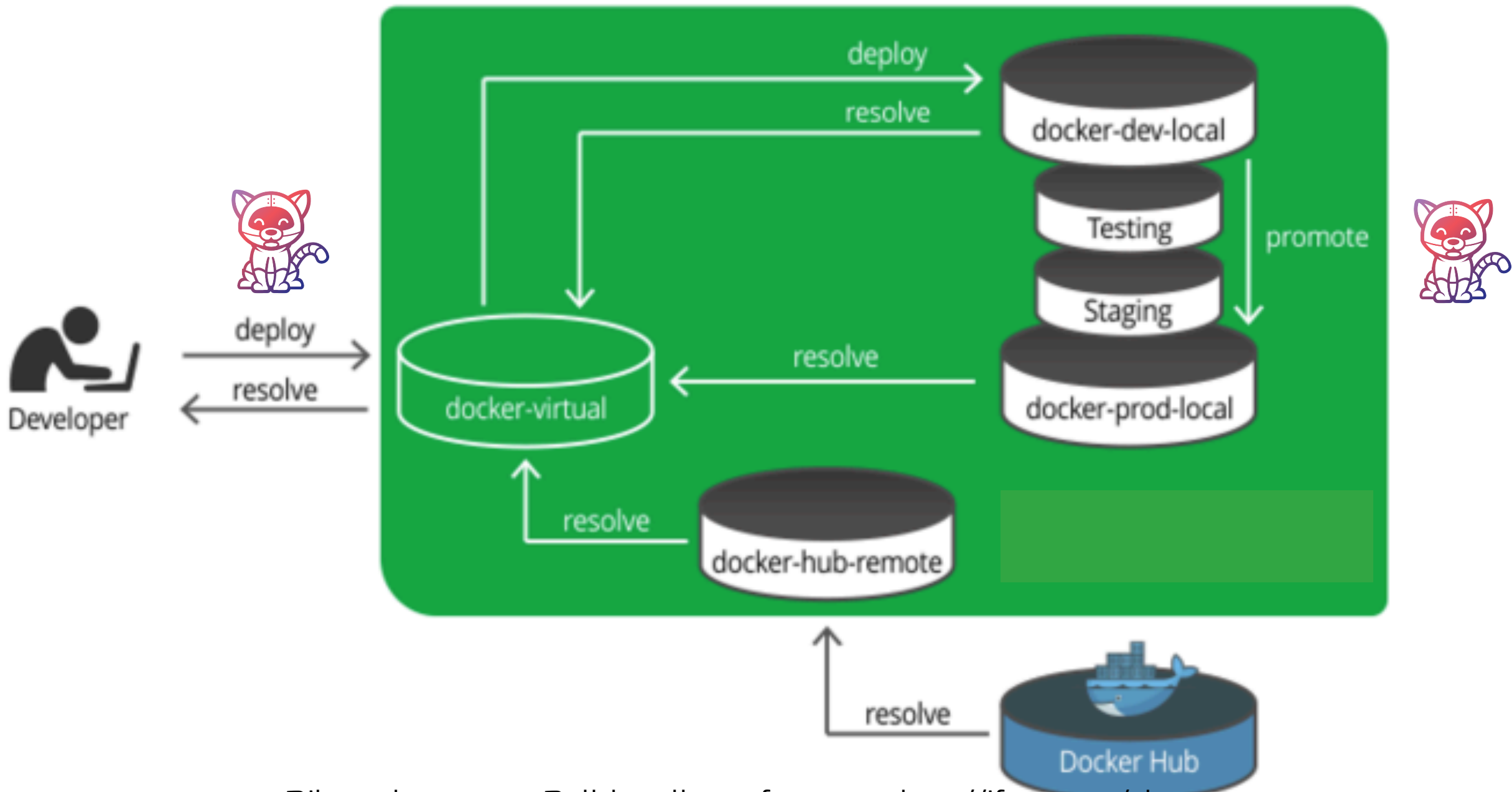
Wait a second, now I need to pull, retag and push for every step?!



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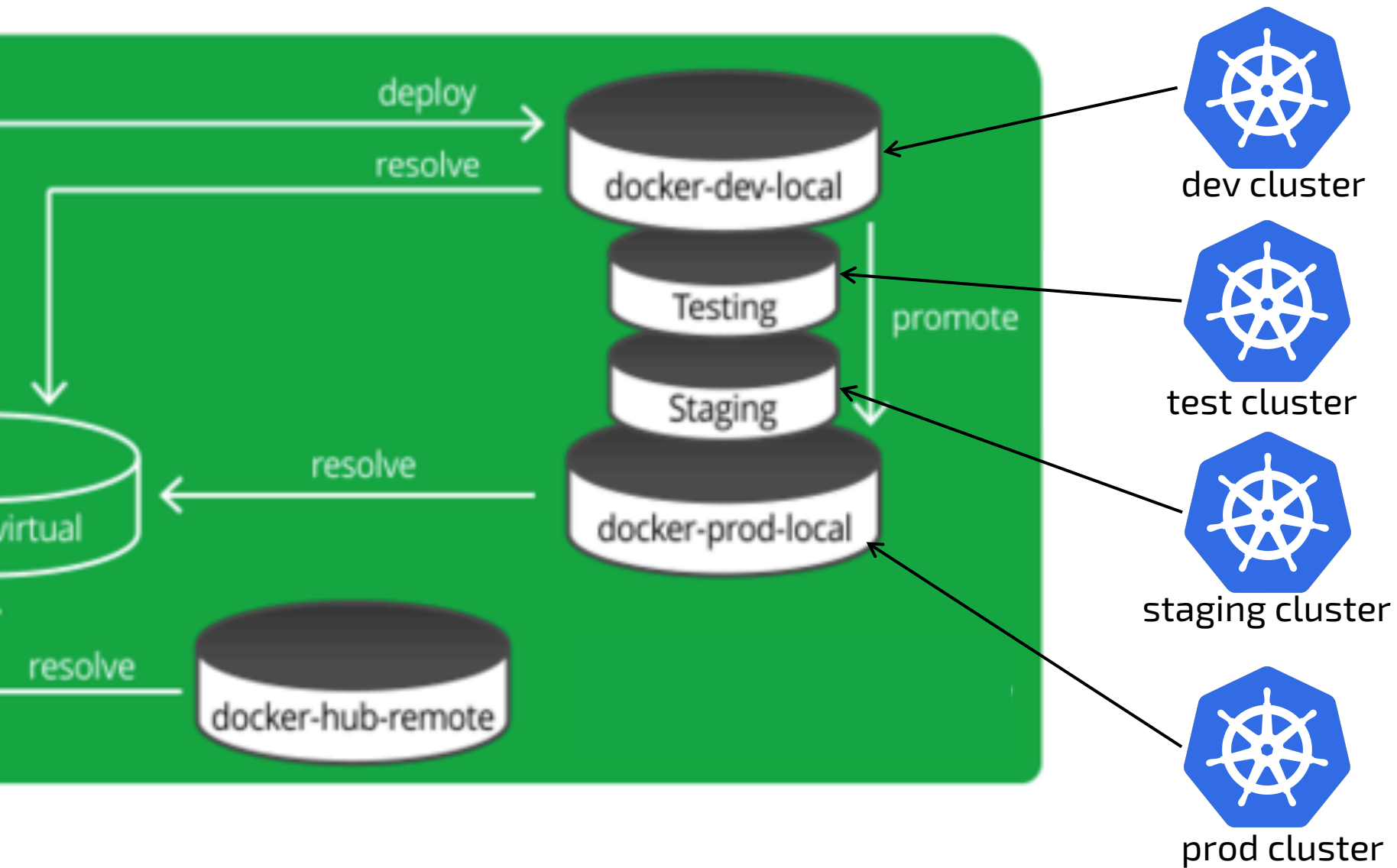
<http://jfrog.com/shownotes>



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REPOSITORY (DOCKER): Top level directory in a registry

REPOSITORY (THE REST OF THE WORLD): A registry

WIN-WIN-WIN

- SINGLE POINT OF ACCESS TO MULTIPLE REGISTRIES WHEN NEEDED
- COMPLETELY ISOLATED ENVIRONMENTS
- IMMEDIATE AND FREE PROMOTIONS



BUT I LOVE MY LATEST!



Artifact Repository Browser

Set Me Up Deploy

Tree Simple

- docker-prod-local
 - jfrog-docker-app
 - 11
 - 14
 - 15
 - 16
 - 17
 - 18
 - 19
 - 20
 - 21
 - 23
 - 25
 - 26
 - latest
 - manifest.json
 - sha256_0ce121b6a2ffae7f0fc0b7c20d3a0a46f62762dd7c1f14e...
 - sha256_2fbb74461eb3d3e7d2e0c730359e88c1fd89e6b2d69d...
 - sha256_5c0d6befd531e53b8f0d96dce9e3418f9b9531f903a42...
 - sha256_6cb6319b1c7f389d3b74928b1a346b7573d4351a69da...
 - sha256_6ef14aff1139e1065ec0928ae1c07f2cff8c2b35e760f4b...
 - sha256_85a73a180fcd5ded2e134a9e9dca93c09068d1b4d529...
 - sha256_90e9442097e7396b610beada64696692f066b6e66d2e...
 - sha256_962785d3b7f9bd4442aa6df1862d8ad64e0ee1d57ec0...
 - sha256_976199b2ac17369bb93597d858f5d7c4e52d6dfd3f358...
 - sha256_9a0b0ce99936ce4861d44ce1f193e881e5b40b5bf1847...

Trash Can

latest

manifest.json

Download View Actions ▾

General Effective Permissions **Properties** Watchers Builds Xray

Add: **Property** | Property Set

Name * Value Add

☐ Recursive ?

9 Properties

Filter by Property Delete

Property	Value(s)
sha256	d002e5eafe3c4e2e1d69830342f7cf1d2150e3735bd17ee13e2258e0ad99f3dc
docker.repoName	jfrog-docker-app
build.timestamp	1575339511425
docker.manifest.digest	sha256:d002e5eafe3c4e2e1d69830342f7cf1d2150e3735bd17ee13e2258e0ad9...
build.name	demo_kubecon
docker.manifest	latest
build.number	26
docker.manifest.type	application/vnd.docker.distribution.manifest.v2+json
docker.refersTo	26

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WIN-WIN

- SIMPLICITY OF LATEST
- ALWAYS KNOW WHAT IT REALLY MEANS
- AS LONG AS YOU PROMOTED IMMUTABLE ARTIFACT



But what about the rest
of the dependencies?



Package Viewer

 Docker

[Back to list of images](#)

	Image Name	Downloads	Last Modified
	library/ubuntu	5	Nov 7, 2019 10:50:20 AM

Details ☒

Xray ☐

2 Items

Tag Name	Repository	Digest	Last Modified 	Downloads	Xray Status
sha256:2feffff9eeca4e7...	docker-remote-cache	 2feffff9eeca4e736f9f8e57	Nov 7, 2019 10:50:20 AM	 3 Downloads	N/A
sha256:134c7fe821b9d...	docker-remote-cache	 134c7fe821b9d359490cd	(Nov 7, 2019 9:38:29 AM	 2 Downloads	N/A

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Artifact Repository Browser

Tree Simple 🔍

- > 📦 docker
- > 📦 helmhub
- > 📦 artifactory-build-info
- > 📦 docker-dev-local
- > 📦 docker-local
- > 📦 docker-prod-local
- ✓ 📦 generic-local
 - └─ ✓ 📁 java
 - > 📄 jdk-8u91-linux-x64.tar.gz
 - > 📁 org
 - └─ ✓ 📁 tomcat
 - > 📄 apache-tomcat-8.tar.gz
- > 📦 helm-local
- > 📦 bintray-docker-remote

OWN YOUR DEPENDENCIES

- YOUR BASE IMAGE
- YOUR INFRA
- YOUR APPLICATION FILES

CONCLUSIONS

- BUILD ONLY ONCE
- SEPARATE ENVIRONMENTS
- PROMOTE WHAT YOU'VE BUILT
- OWN YOUR DEPENDENCIES

Q&A AND LINKS

- @jbaruch
- @allthetalksconf
- <http://jfrog.com/shownotes>

