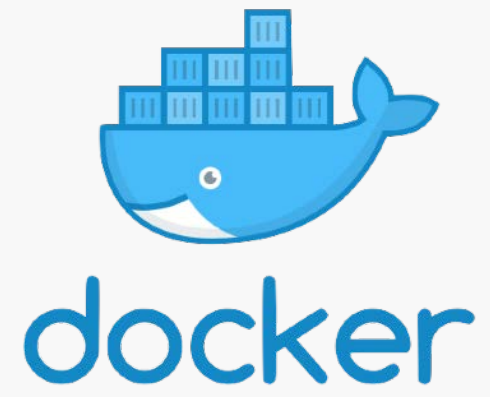
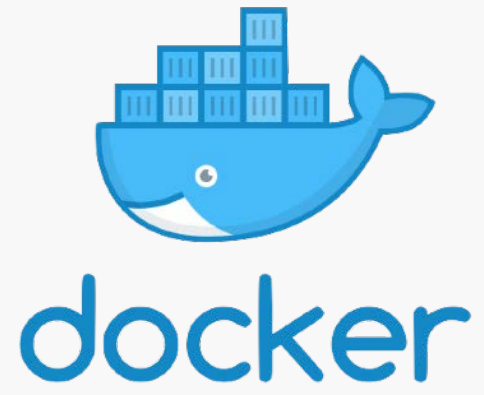




BUILD AND DEPLOY MULTIARCH LINUX AND WINDOWS CONTAINER IMAGES

STEFAN SCHERER
@stefscherer





Agenda

Docker journey to Multi Arch + Multi OS

Create a multi-arch Docker image

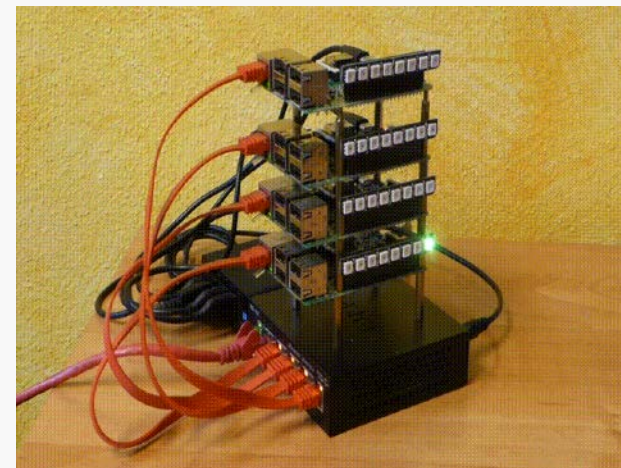
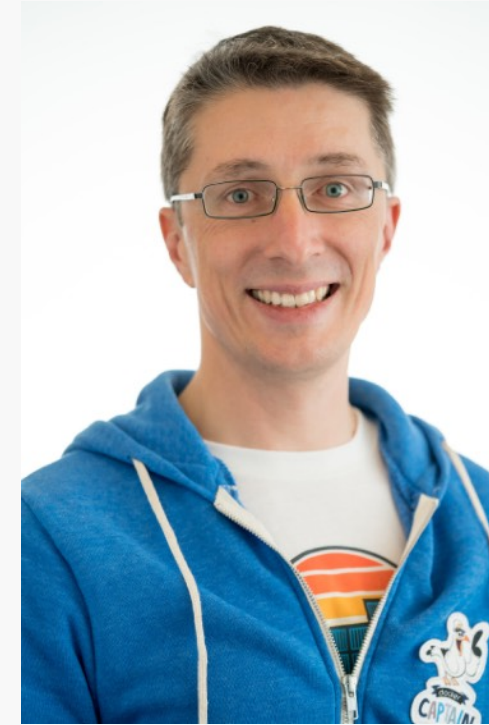
Build a CI pipeline

Tips & Tricks

whoami

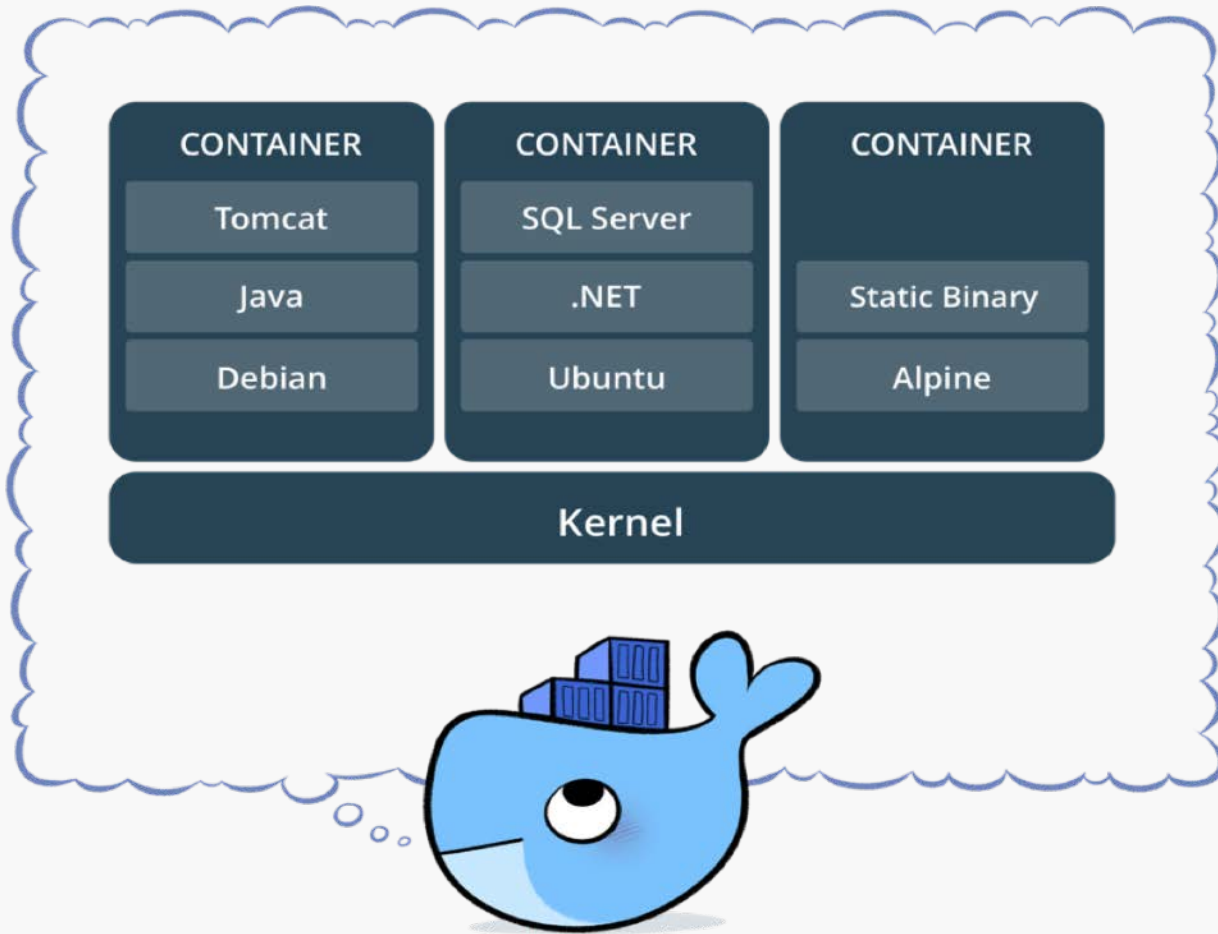
Stefan Scherer
Sr. Software Engineer
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Blog at stefanscherer.github.io
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What is a container?

What is a container?



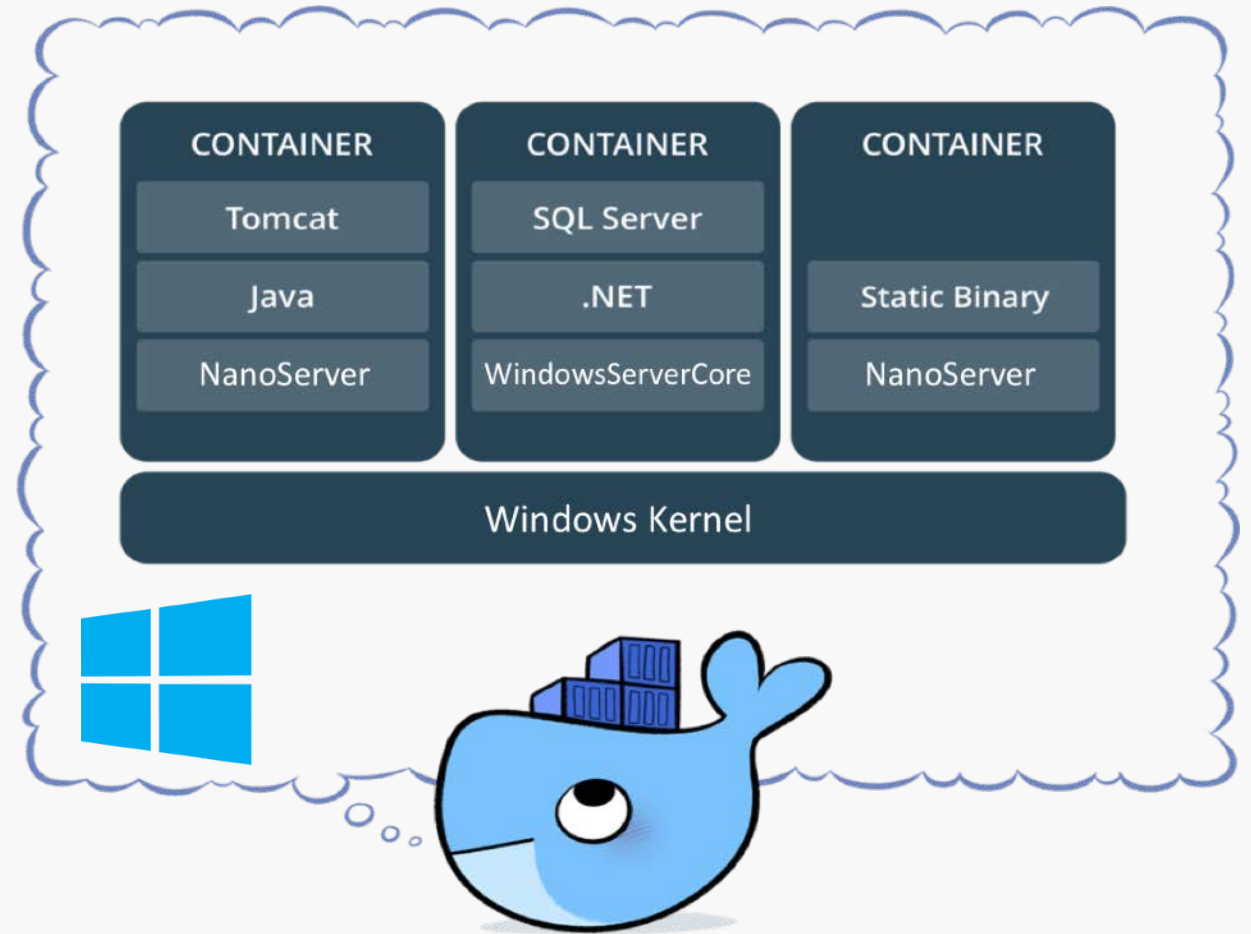
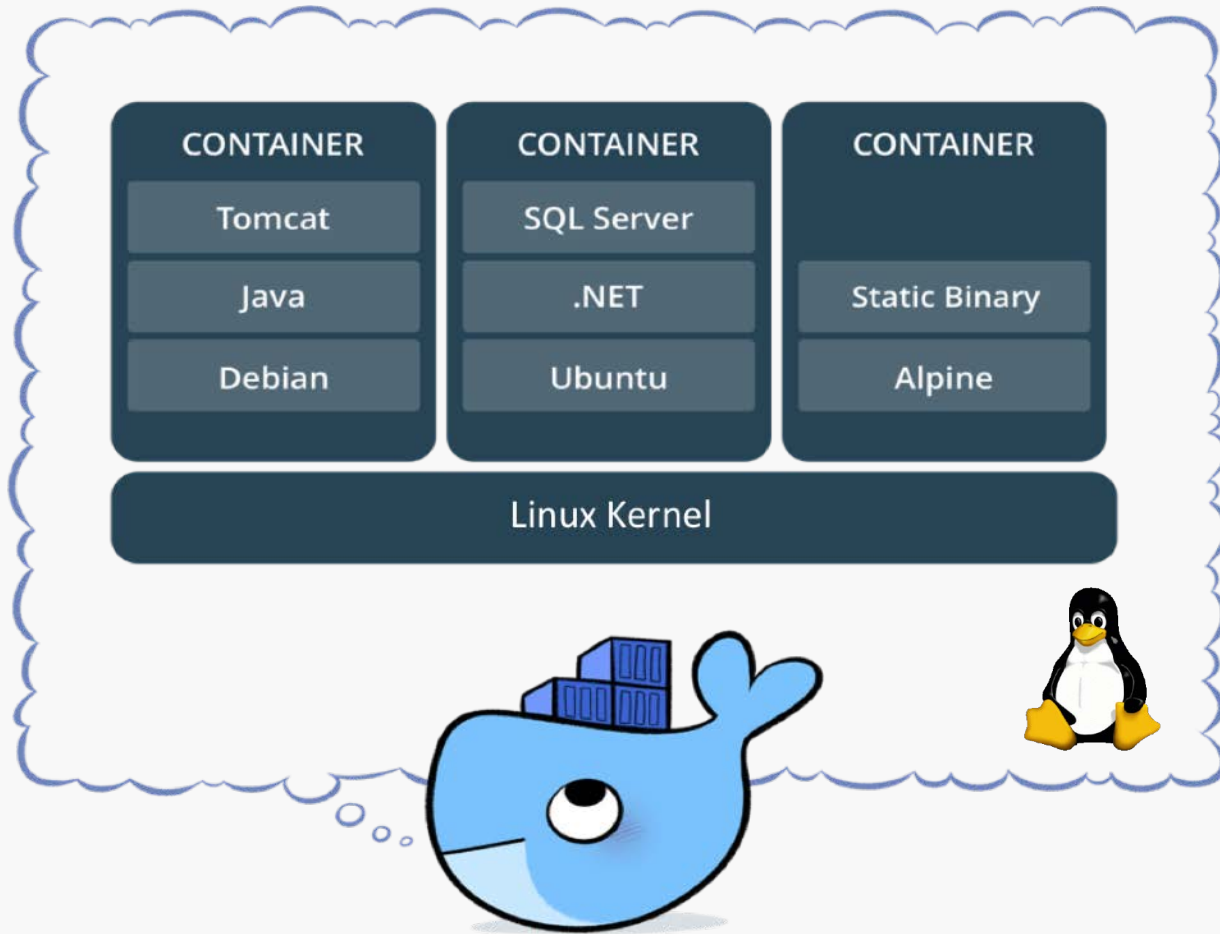
Standardized packaging for software and dependencies

Isolate apps from each other

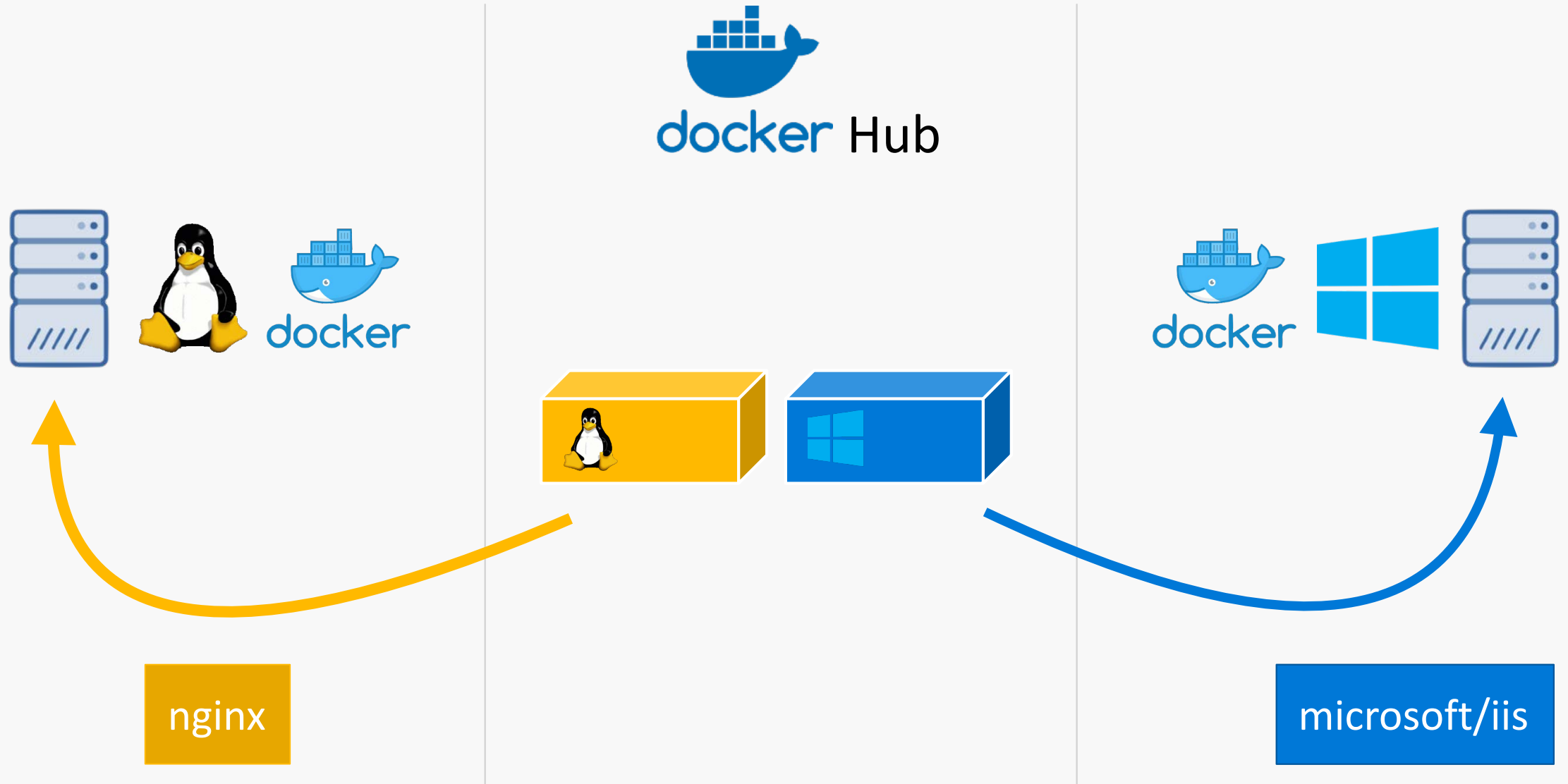
Share the same OS kernel

Works for all major Linux distributions

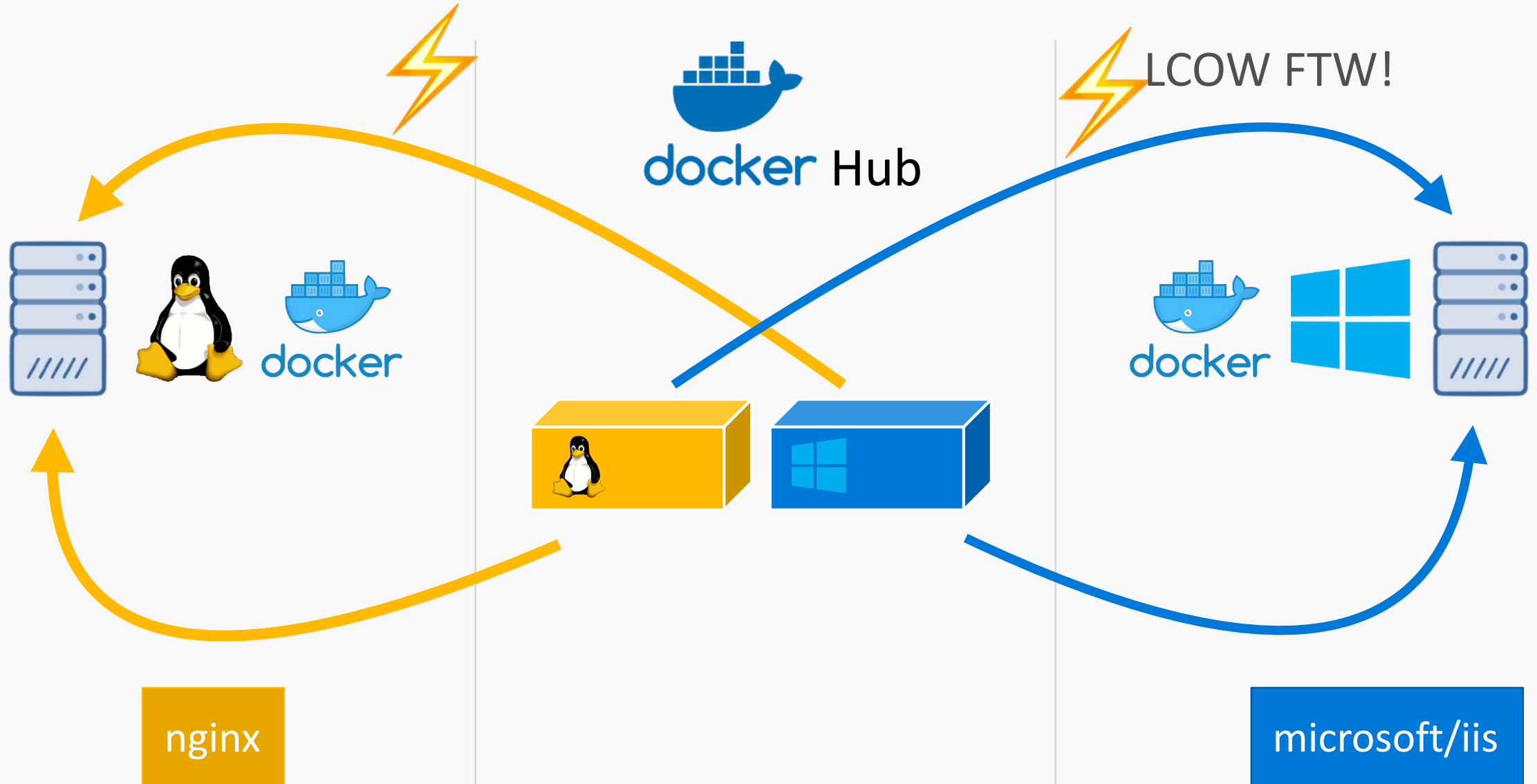
Containers on all major platforms



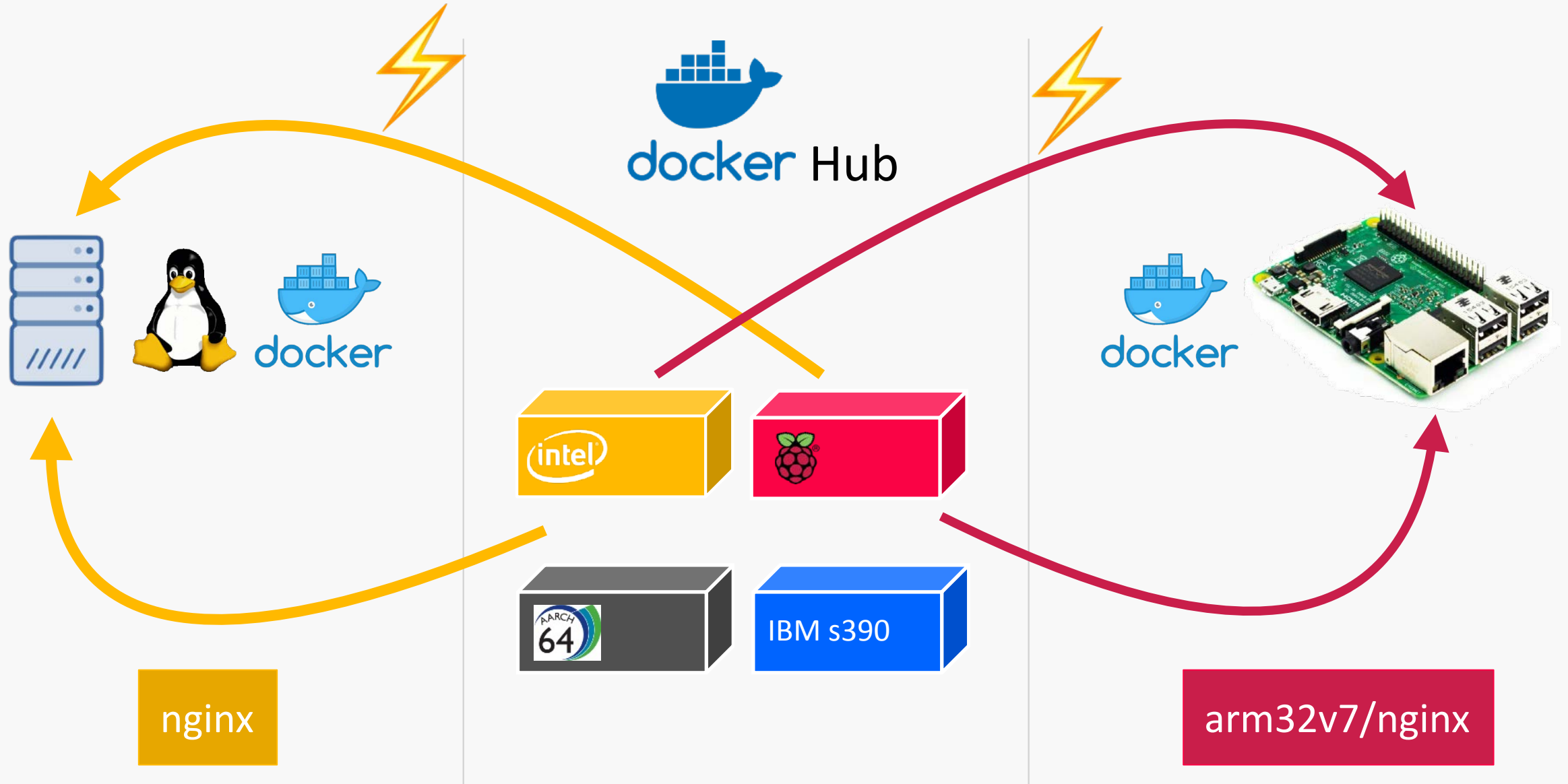
docker container run



docker container run - different OS

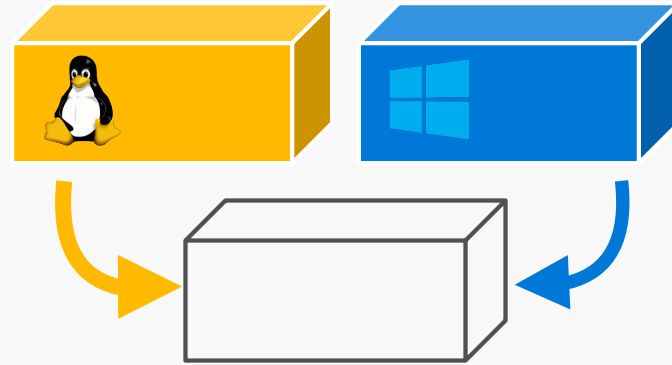
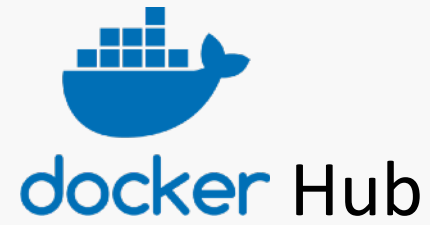


docker container run - different CPU architecture

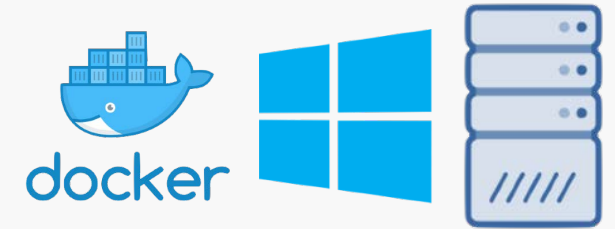


Manifest lists

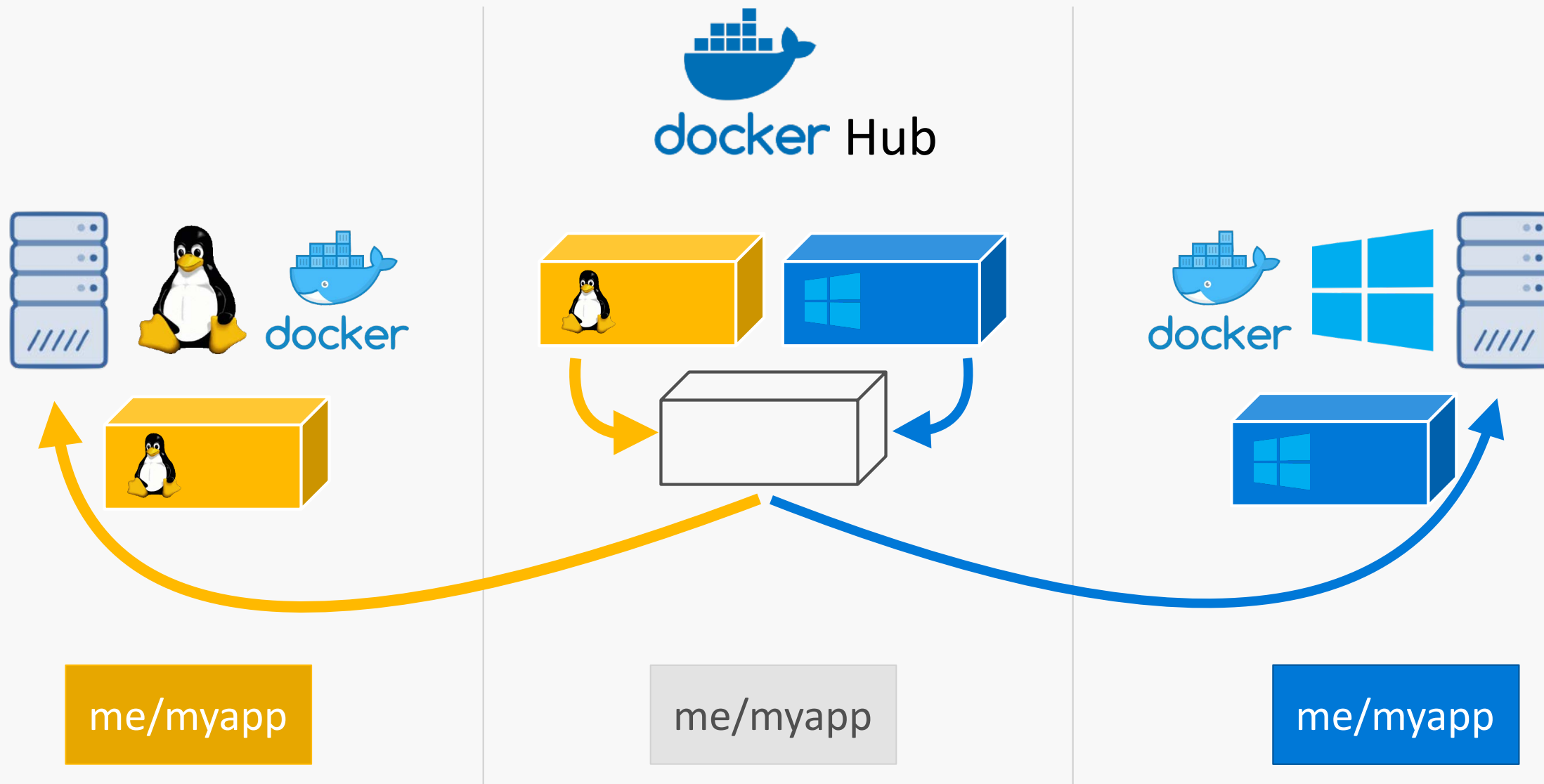
Manifest list



me/myapp



Manifest list: docker container run



Use cases

docker run portainer/portainer

The screenshot shows the Portainer web interface in a browser window. The browser's address bar displays 'localhost'. The interface is divided into a dark blue sidebar on the left and a main content area on the right.

Sidebar (Left):

- Logo: portainer.io
- ACTIVE ENDPOINT: local
- ENDPOINT ACTIONS
- Dashboard
- App Templates
- Containers
- Images
- Networks
- Volumes
- Portainer 1.14.3

Main Content Area (Right):

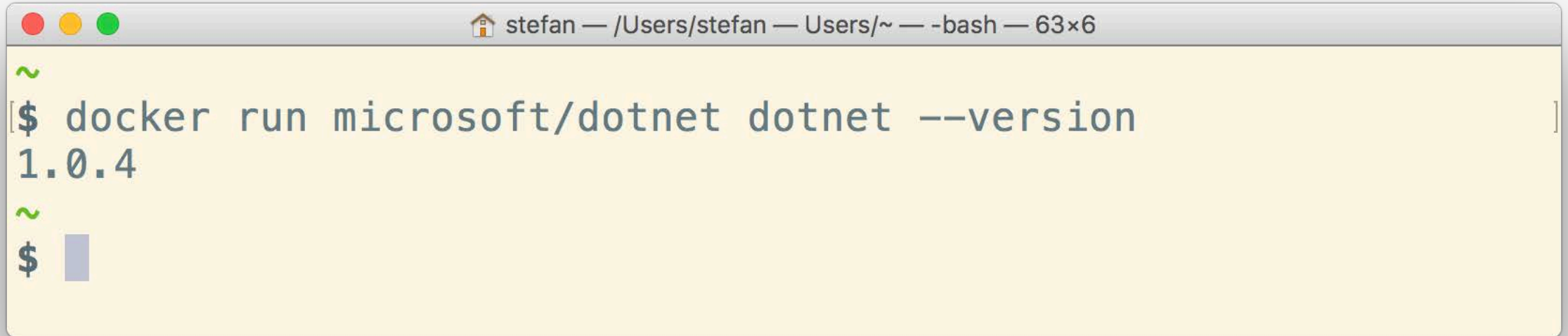
Node info

Name	moby
Docker version	17.09.0-ce
CPU	4
Memory	2.1 GB

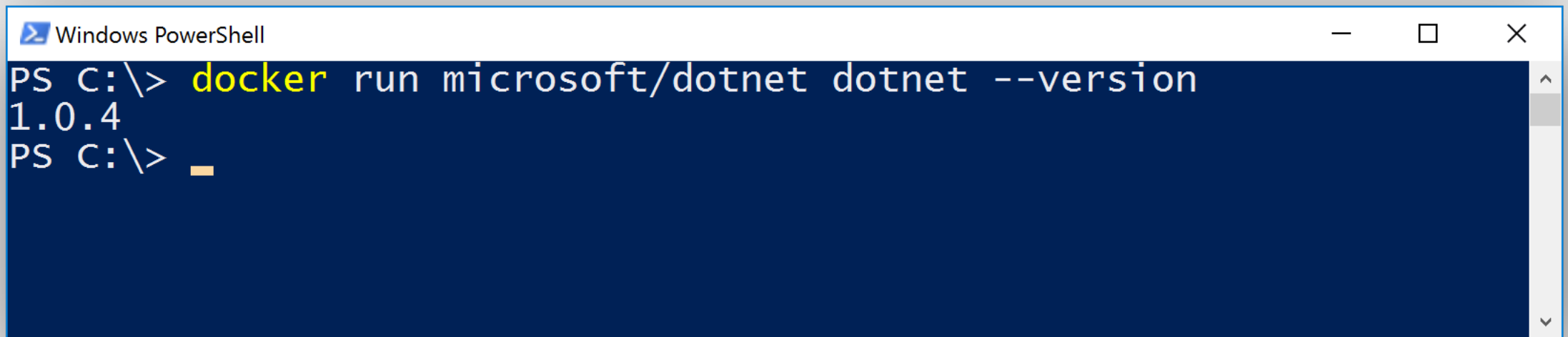
Containers Summary: 3 Containers (1 running, 2 stopped)

Images Summary: 8 Images (3.8 GB)

docker run microsoft/dotnet



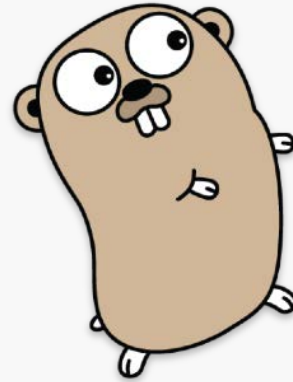
```
stefan — /Users/stefan — Users/~ — -bash — 63x6  
~  
[$ docker run microsoft/dotnet dotnet --version  
1.0.4  
~  
$
```



```
Windows PowerShell  
PS C:\> docker run microsoft/dotnet dotnet --version  
1.0.4  
PS C:\> _
```


Many official images are multi-arch now

OpenJDK



 mongoDB

ubuntu 

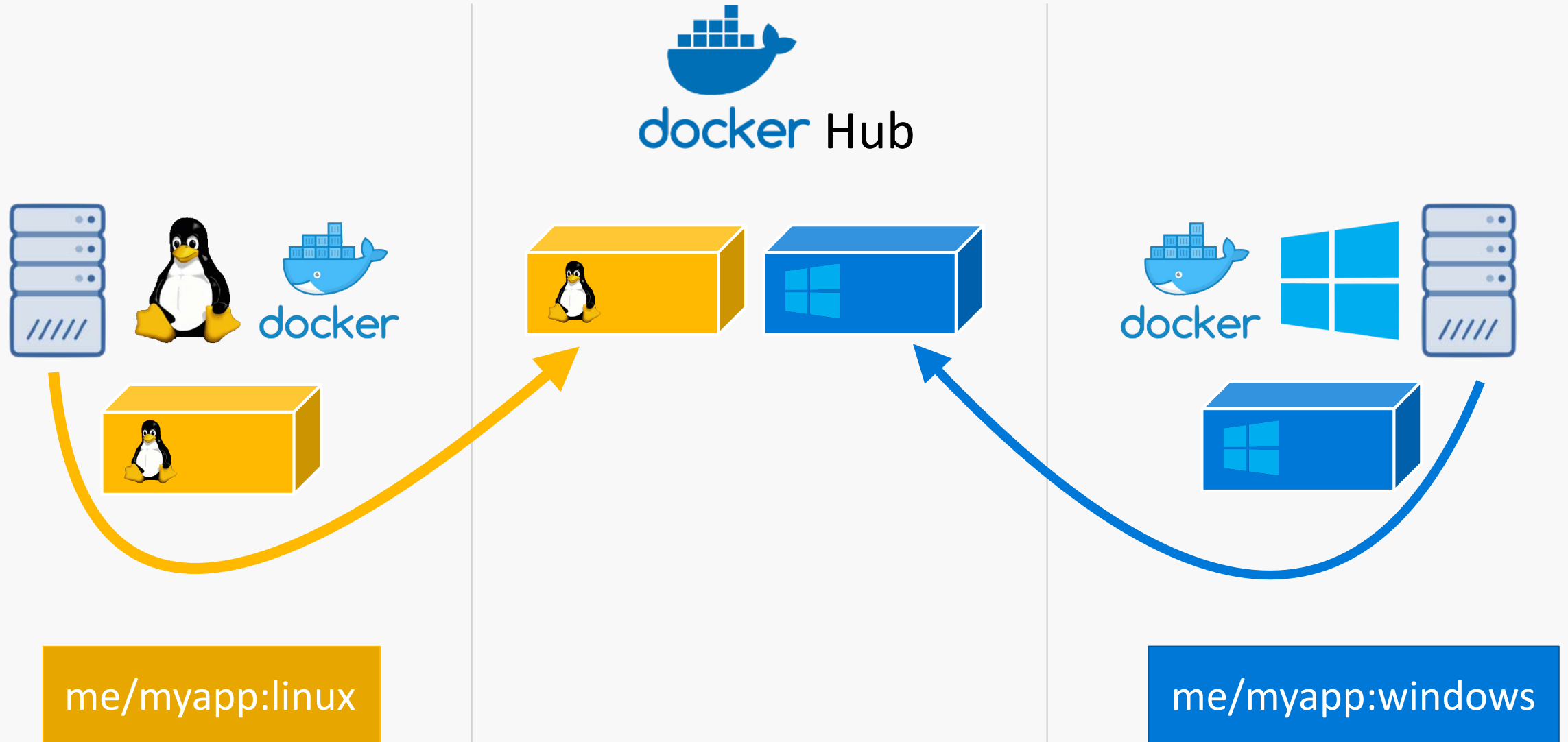
 redis

node 

... Windows work in progress

How to build container images?

docker image build / docker image push



How to build the manifest list?

Availability

docker manifest command

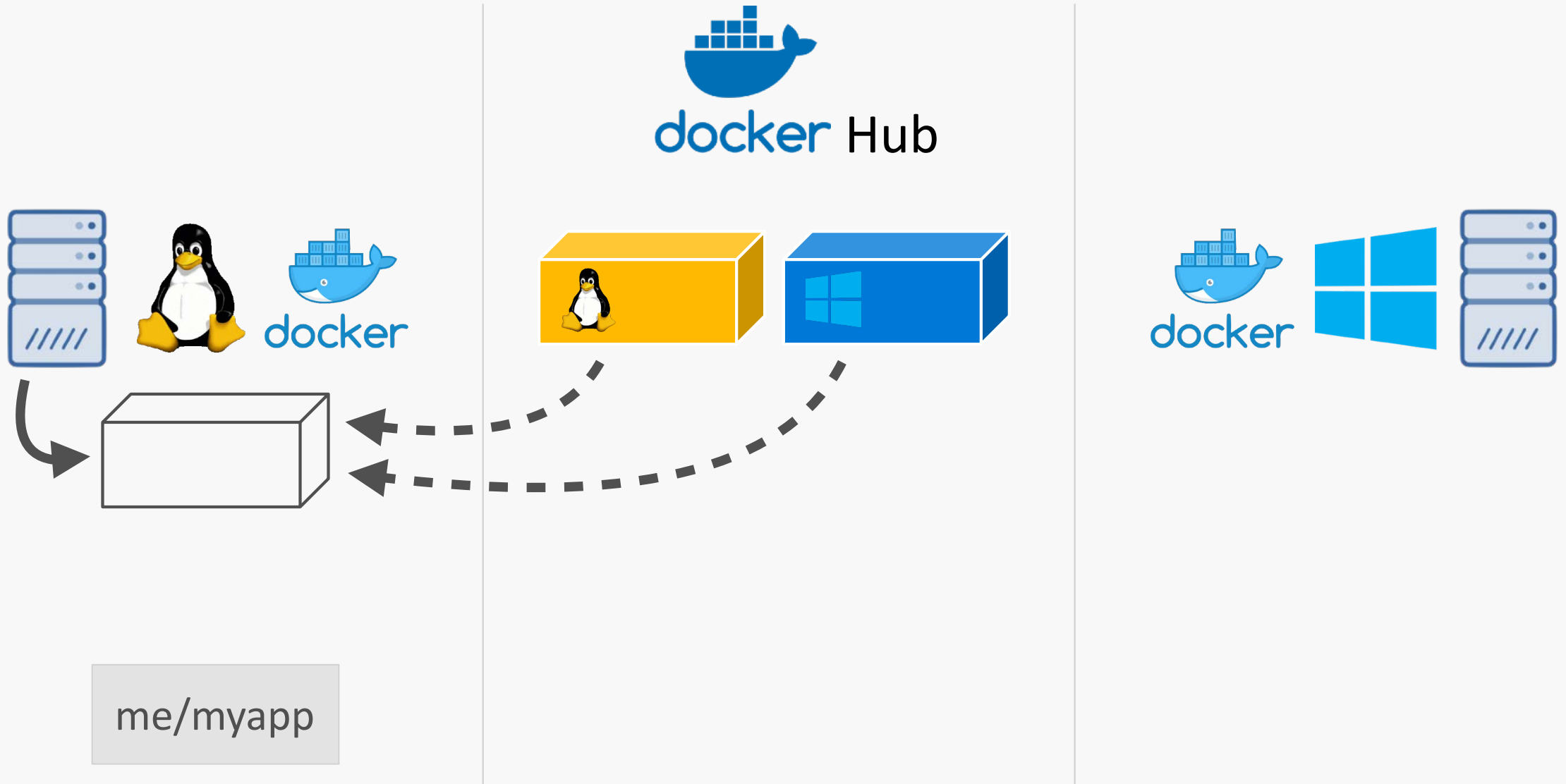
Pull request <https://github.com/docker/cli/pull/138>

Docker 17.12 ?

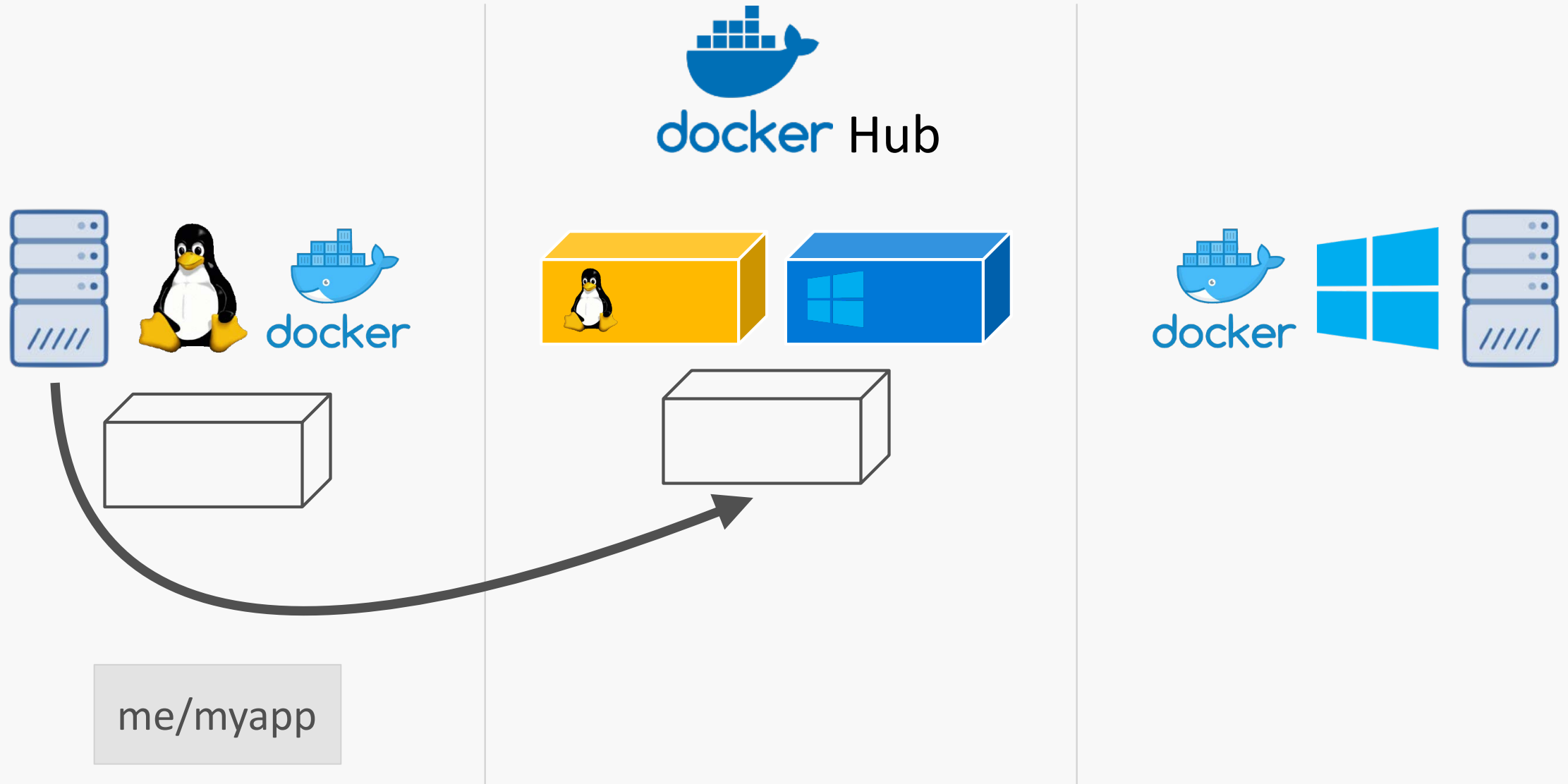
manifest-tool from Phil Estes 

Binaries at <https://github.com/estesp/manifest-tool/releases>

docker manifest create



docker manifest push



Demo

building a multi-arch container image

Demo: Build Linux amd64 + cross for arm (Raspberry)

```
hello — /Users/stefan — Users/hello — -bash — 72x10
~/code/hello
[$ docker build -t stefanscherer/hello-dresden:0.0.3-linux .
~/code/hello
[$ docker build -t stefanscherer/hello-dresden:0.0.3-linux-arm \
> --build-arg target=arm32v6/node:alpine .
~/code/hello
$
```

Demo: Build Windows 2016 + 1709 (with two VM's)

```
hello — /Users/stefan — Users/hello — -bash — 72x10
~/code/hello
$ docker build -t stefanscherer/hello-dresden:0.0.3-windows \
> --build-arg node=stefanscherer/node-windows \
> --build-arg target=stefanscherer/node-windows .
~/code/hello
$ docker build -t stefanscherer/hello-dresden:0.0.3-windows-1709 \
> --build-arg node=stefanscherer/node-windows \
> --build-arg target=stefanscherer/node-windows .
~/code/hello
$
```


Demo: Create manifest list

```
hello — /Users/stefan — Users/hello — -bash — 72x10
~/code/hello
[$] docker manifest create stefanscherer/hello-dresden:0.0.3 \
[>   stefanscherer/hello-dresden:0.0.3-linux \
[>   stefanscherer/hello-dresden:0.0.3-linux-arm \
[>   stefanscherer/hello-dresden:0.0.3-windows \
[> stefanscherer/hello-dresden:0.0.3-windows-1709
~/code/hello
$
```

Demo: Fix cross build arch + variant

```
hello — /Users/stefan — Users/hello — -bash — 72x10
~/code/hello
[$ docker manifest annotate stefanscherer/hello-dresden:0.0.3 \
]
[>   stefanscherer/hello-dresden:0.0.3-linux-arm \
]
[>   --arch arm --variant v6
]
~/code/hello
$ █
```


Demo: Push manifest list



```
hello — /Users/stefan — Users/hello — -bash — 72x10
~/code/hello
[$ docker manifest push stefanscherer/hello-dresden:0.0.3 ]
~/code/hello
$
```

Demo: Enjoy on Linux (amd64 or Raspberry Pi)

```
hello — /Users/stefan — Users/hello — -bash — 72x10
~/code/hello
[$ docker run -d -p 3000:3000 stefanscherer/hello-dresden:0.0.3
a9c91bf3752c0f376d34062d79d20a7e7
~/code/hello
[$ open http://localhost:3000
~/code/hello
[$
~/code/hello
[$
~/code/hello
```

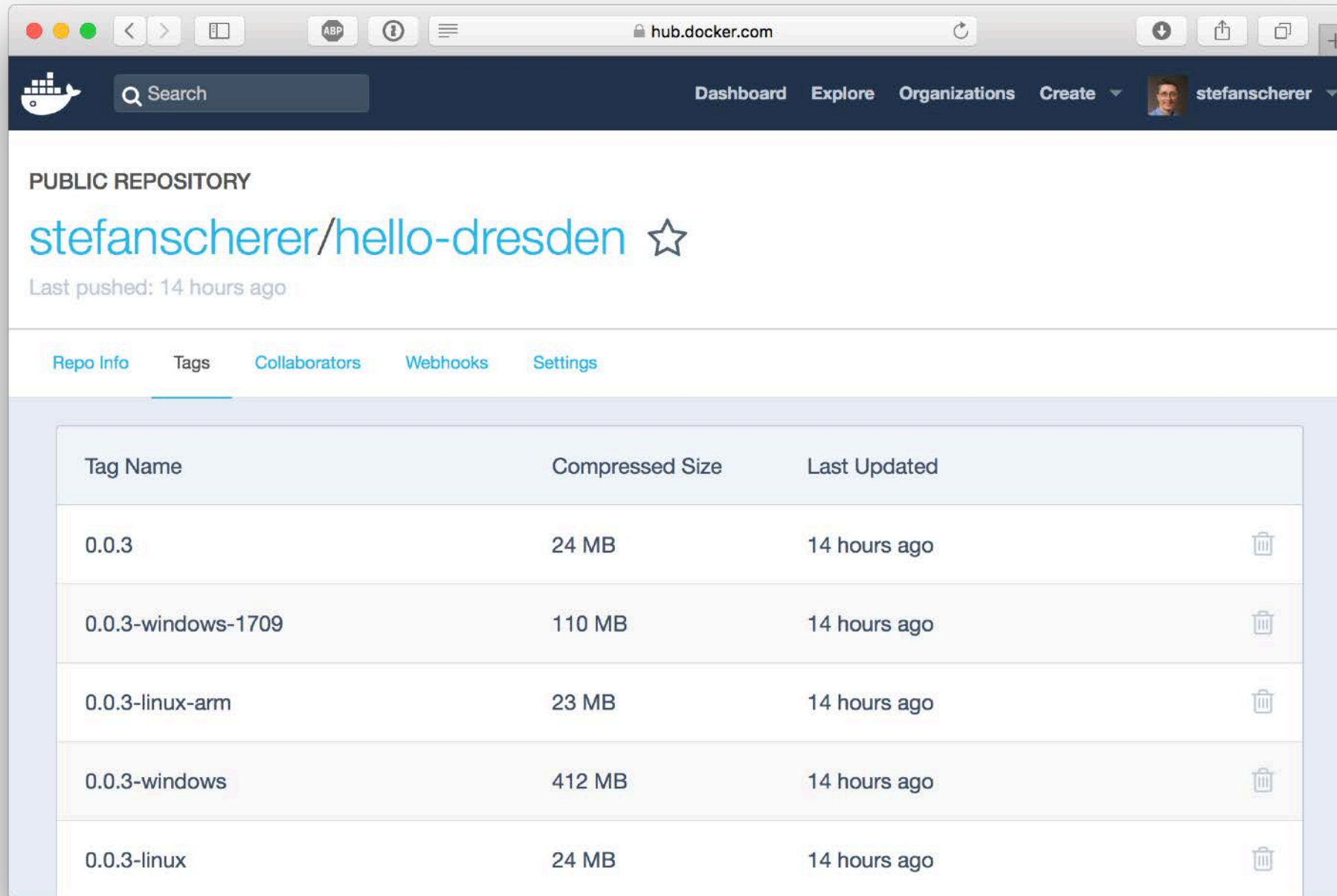


Demo: Enjoy on Windows 10, 2016 or 1709






```
hello — /Users/stefan — Users/hello — -bash — 72x10
~/code/hello
$ docker run -d -p 3000:3000 stefanscherer/hello-dresden:0.0.3
4dc01c526d412754529b4e36cd6e1cc4
~/code/hello
$ open http://$(docker-machine ip
~/code/hello
$
```



Demo: Images and Manifest list on Docker Hub

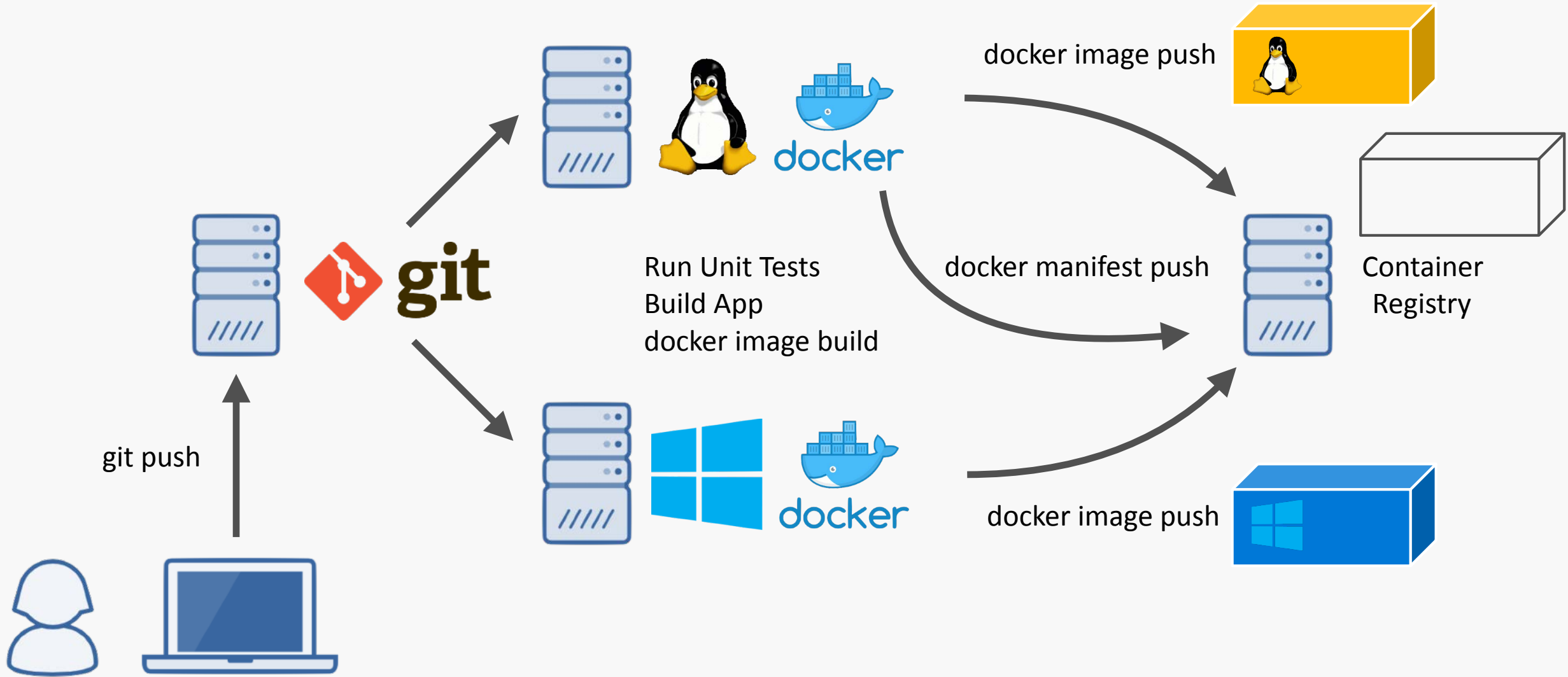


The screenshot shows a web browser window displaying the Docker Hub repository page for 'stefanscherer/hello-dresden'. The browser's address bar shows 'hub.docker.com'. The page header includes a search bar, navigation links for 'Dashboard', 'Explore', 'Organizations', and 'Create', and a user profile for 'stefanscherer'. The repository is identified as a 'PUBLIC REPOSITORY' and shows it was 'Last pushed: 14 hours ago'. Below the repository name are tabs for 'Repo Info', 'Tags', 'Collaborators', 'Webhooks', and 'Settings'. The 'Tags' tab is active, displaying a table of image tags with their compressed sizes and update times. Each tag has a trash icon for deletion.

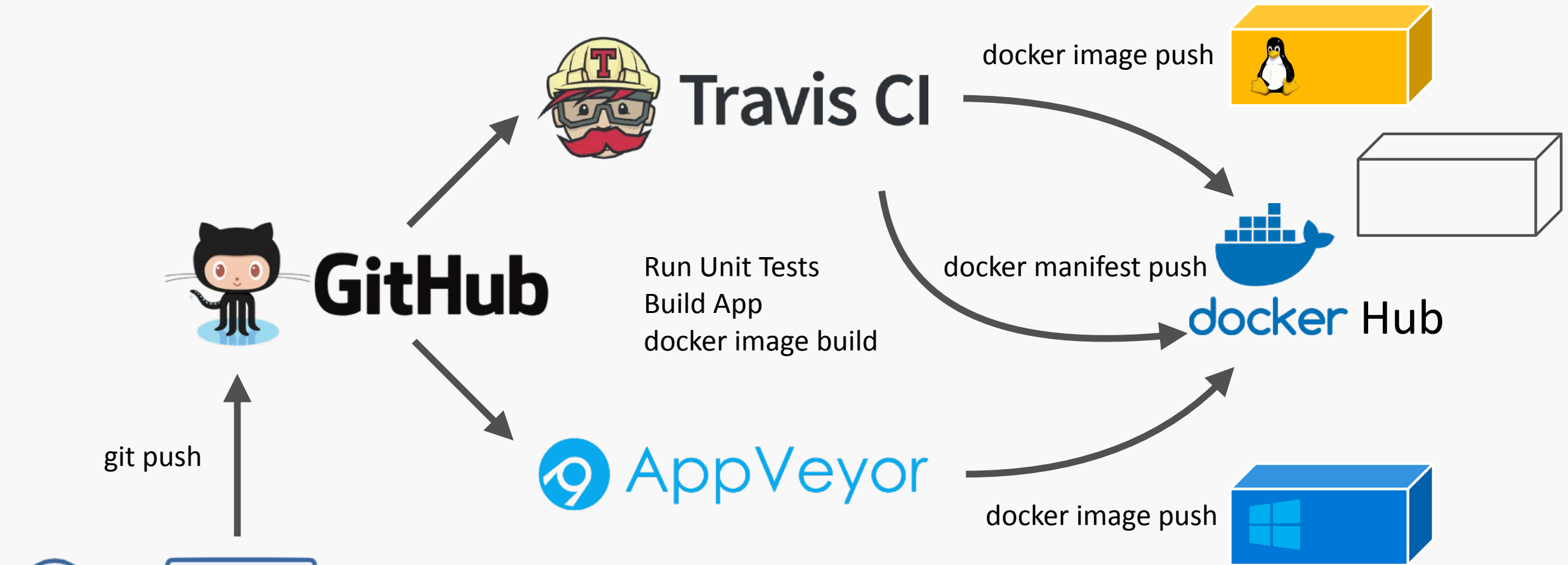
Tag Name	Compressed Size	Last Updated	
0.0.3	24 MB	14 hours ago	
0.0.3-windows-1709	110 MB	14 hours ago	
0.0.3-linux-arm	23 MB	14 hours ago	
0.0.3-windows	412 MB	14 hours ago	
0.0.3-linux	24 MB	14 hours ago	

How to build a CI pipeline for that?

Docker CI Pipeline for Linux and Windows



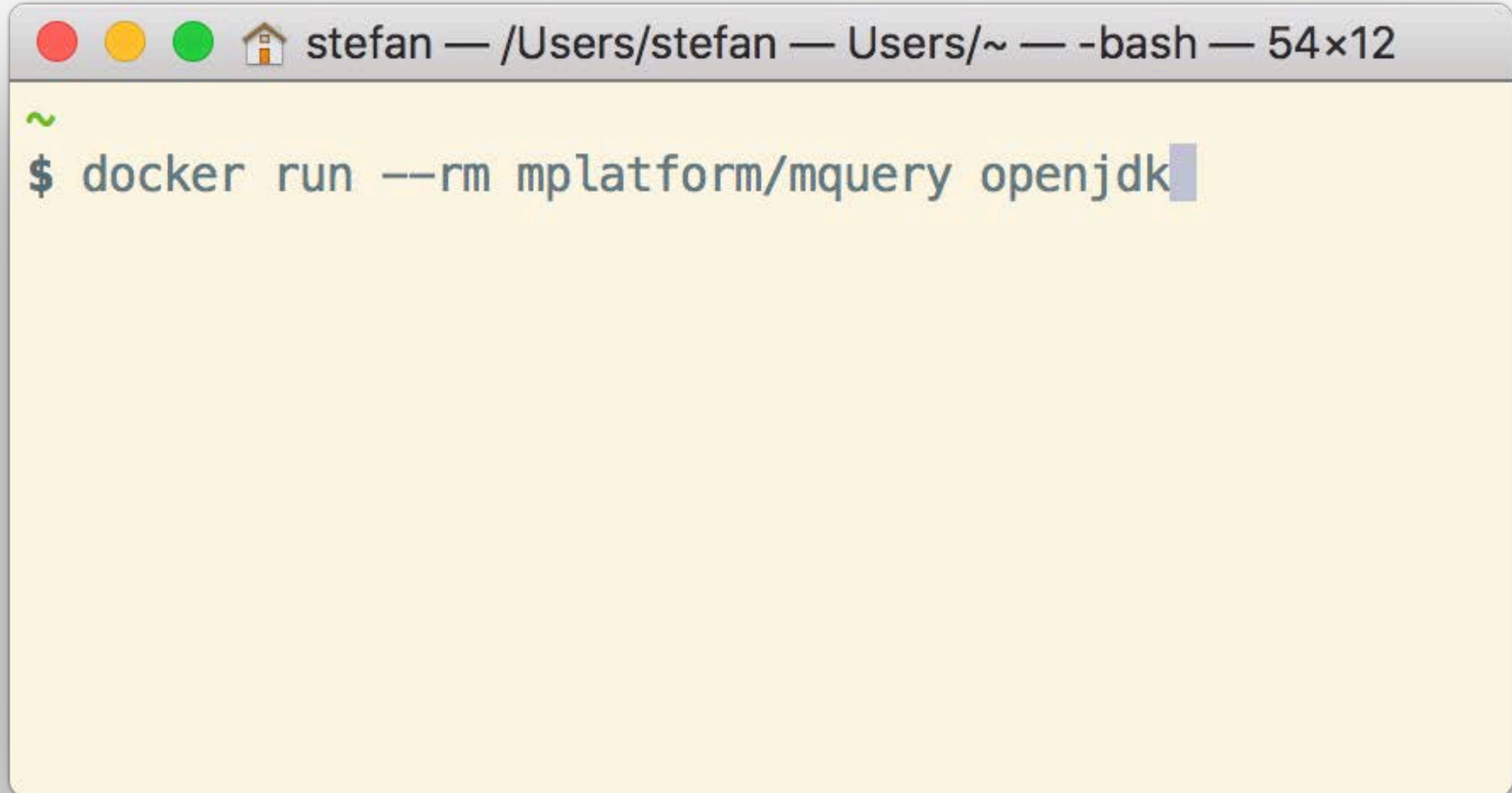
Docker CI Pipeline for Linux and Windows



Example: github.com/StefanScherer/whoami

Tips & Tricks

Show the platforms of a Docker Hub image

A terminal window with a light yellow background. The title bar shows a red, yellow, and green window control button, a home icon, and the text 'stefan — /Users/stefan — Users/~ — -bash — 54x12'. The terminal content shows a green tilde '~' on the first line, followed by a prompt '\$' and the command 'docker run --rm mplatform/mquery openjdk' on the second line. A blue cursor is positioned at the end of the command.

```
~  
$ docker run --rm mplatform/mquery openjdk
```

Show the platforms of a Docker Hub image

```
stefan — /Users/stefan — Users/~ — -bash — 54x12

~
[$ docker run --rm mplatform/mquery openjdk ]
Image: openjdk
* Manifest List: Yes
* Supported platforms:
  - linux/amd64
  - linux/arm/v5
  - linux/arm/v7
  - linux/arm64/v8
  - linux/386
  - linux/ppc64le
  - linux/s390x
```

Show the platforms of a Docker Hub image



```
stefan — /Users/stefan — Users/~ — -bash — 54x12  
~  
$ docker run --rm mplatform/mquery microsoft/dotnet
```

Show the platforms of a Docker Hub image

```
stefan — /Users/stefan — Users/~ — -bash — 54x12
~
[$ docker run --rm mplatform/mquery microsoft/dotnet ]
Image: microsoft/dotnet
* Manifest List: Yes
* Supported platforms:
  - linux/amd64
  - windows/amd64:10.0.14393.1770
  - windows/amd64:10.0.16299.19
~
$
```

Windows Server 2016

Windows Server 1709

Use node constraints in a hybrid cluster

services:

web:

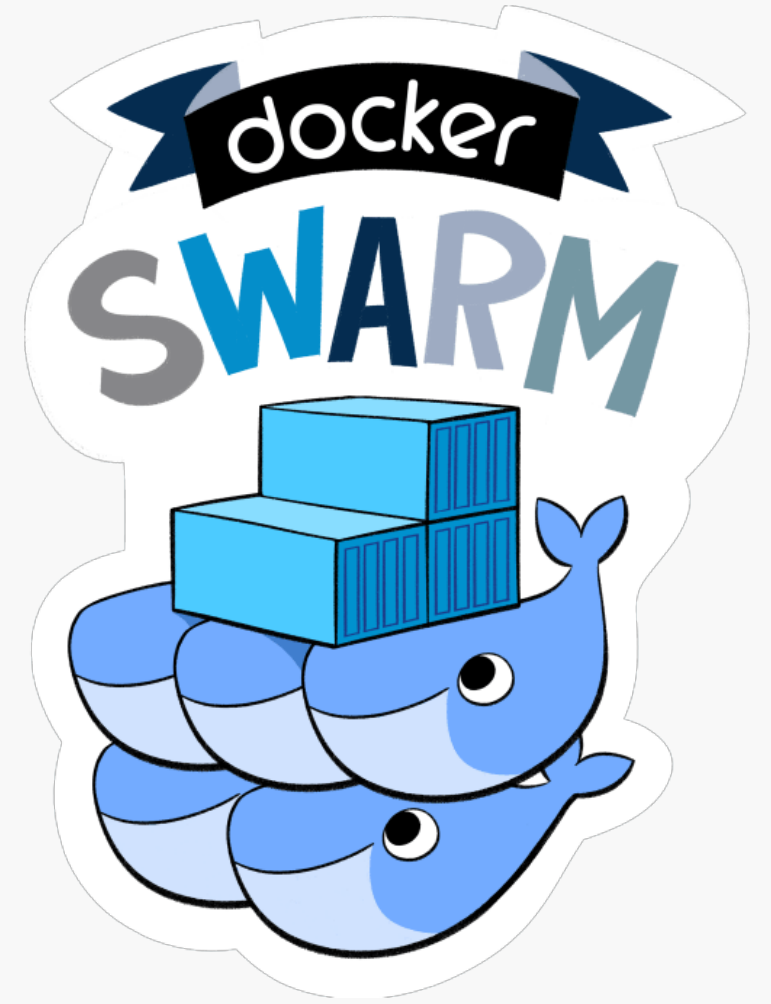
image: `microsoft/iis`

deploy:

placement:

constraints:

`- node.platform.os == windows`



Use node constraints in a hybrid cluster

services:

web:

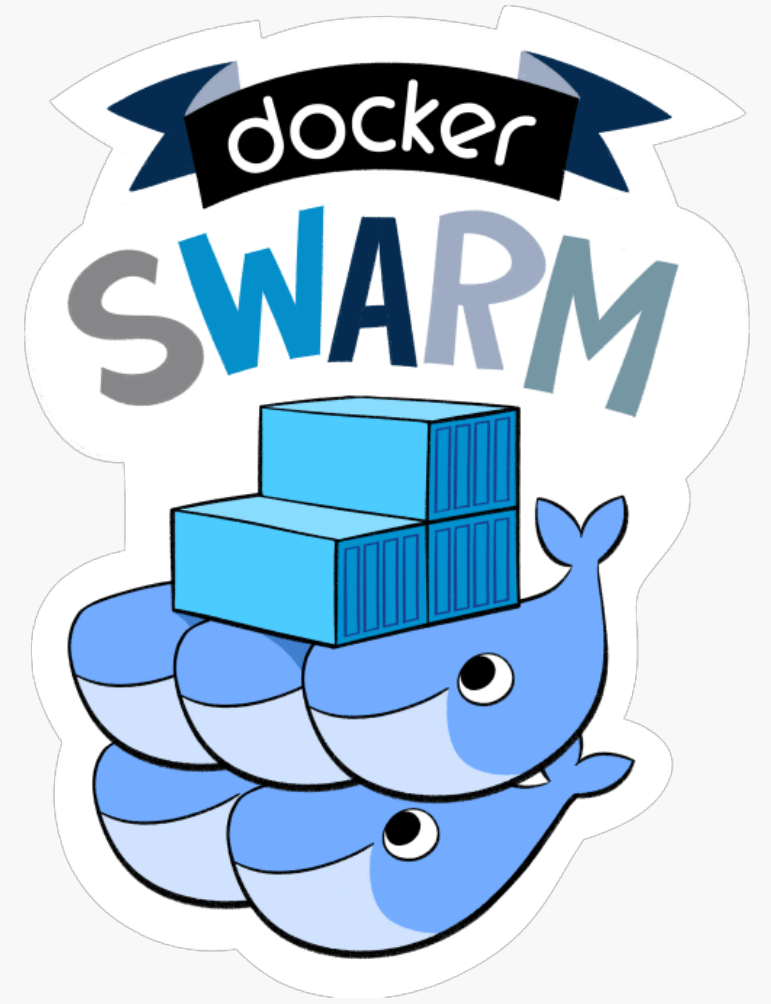
image: `nginx`

deploy:

placement:

constraints:

`- node.platform.os == linux`



Use node constraints in a hybrid cluster

```
"spec": {  
  "containers": [ {  
    "name": "iis",  
    "image": "microsoft/iis",  
    ...  
  } ],  
  "nodeSelector": {  
    "beta.kubernetes.io/os": "windows"  
  }  
}
```



Availability

docker manifest command

Pull request <https://github.com/docker/cli/pull/138>

Docker 17.12 ?

manifest-tool from Phil Estes 

Binaries at <https://github.com/estesp/manifest-tool/releases>

Recap

docker image build
docker image push



me/myapp:linux

docker image build
docker image push



me/myapp:windows

docker manifest create
docker manifest push



me/myapp

A scenic view of the Golden Gate Bridge in San Francisco, California, during the golden hour. The bridge's iconic orange-red towers and suspension cables are prominent on the left side of the frame. A large container ship, heavily loaded with colorful shipping containers, is sailing through the water beneath the bridge. The background shows the San Francisco cityscape and hills under a clear blue sky. In the foreground, there are some green and brown plants.

THANK YOU!
QUESTIONS?

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