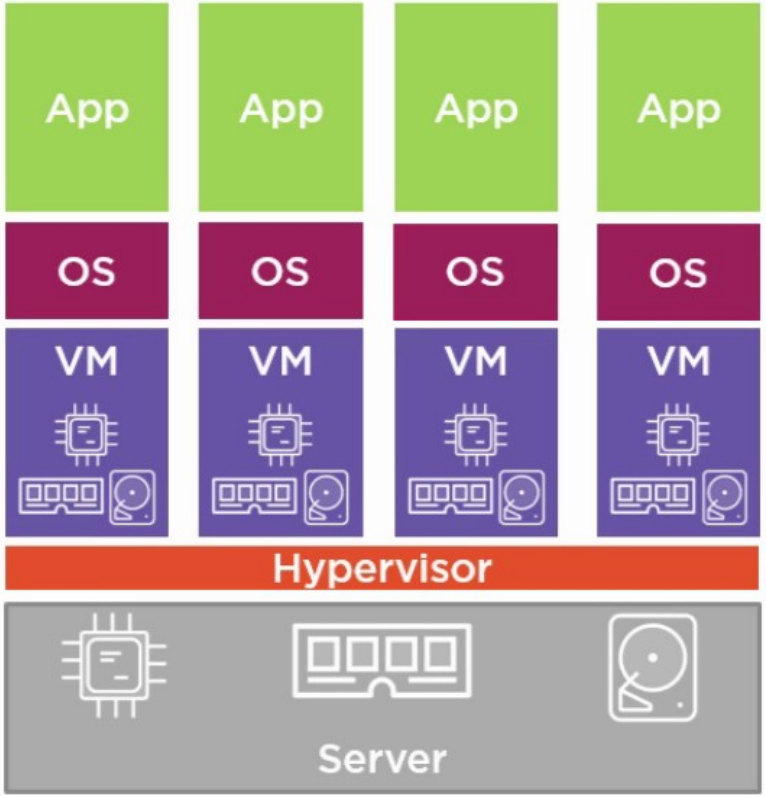
Введение в Docker

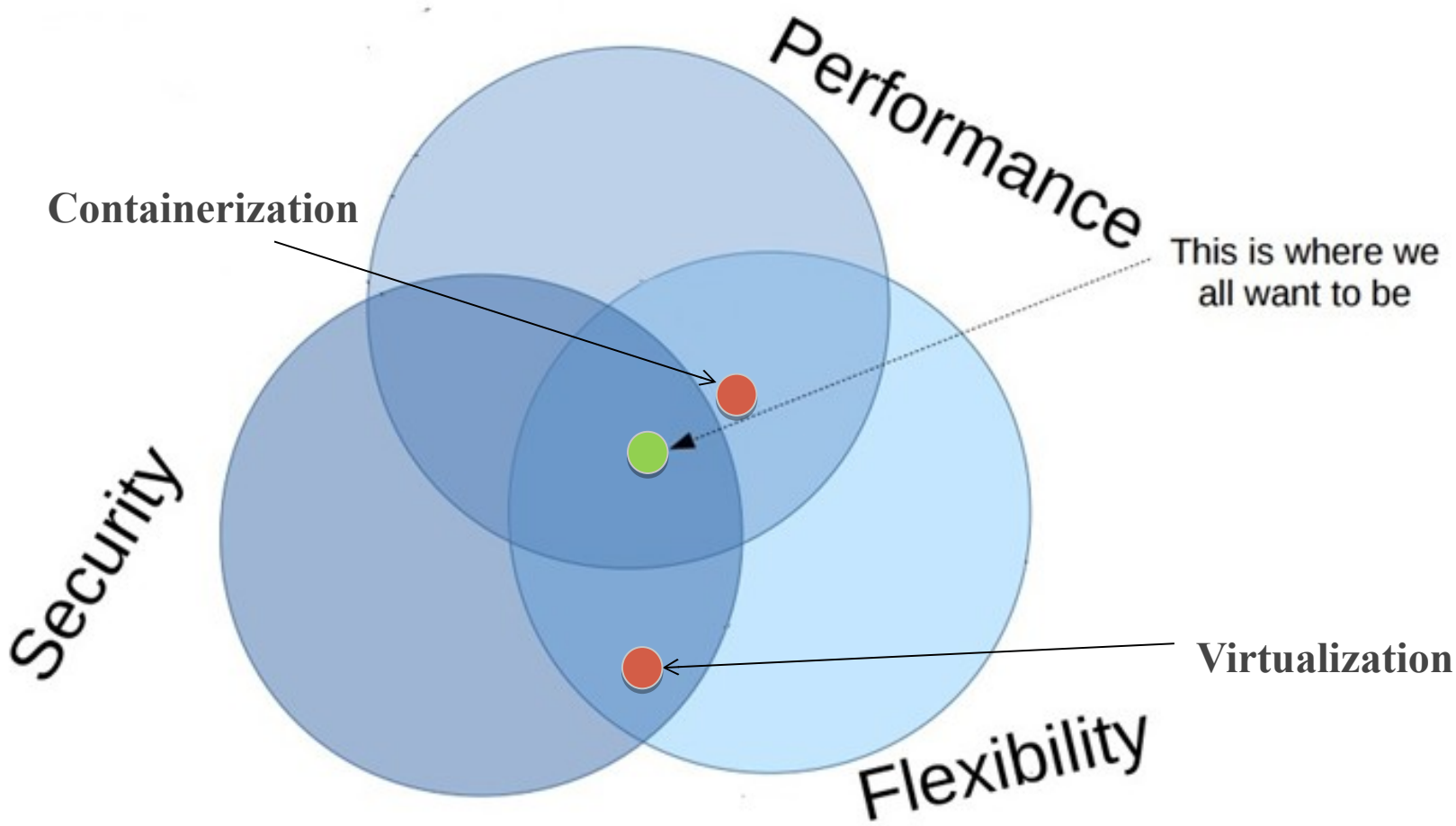
СОДЕРЖАНИЕ

ВИРТУАЛИЗАЦИЯ

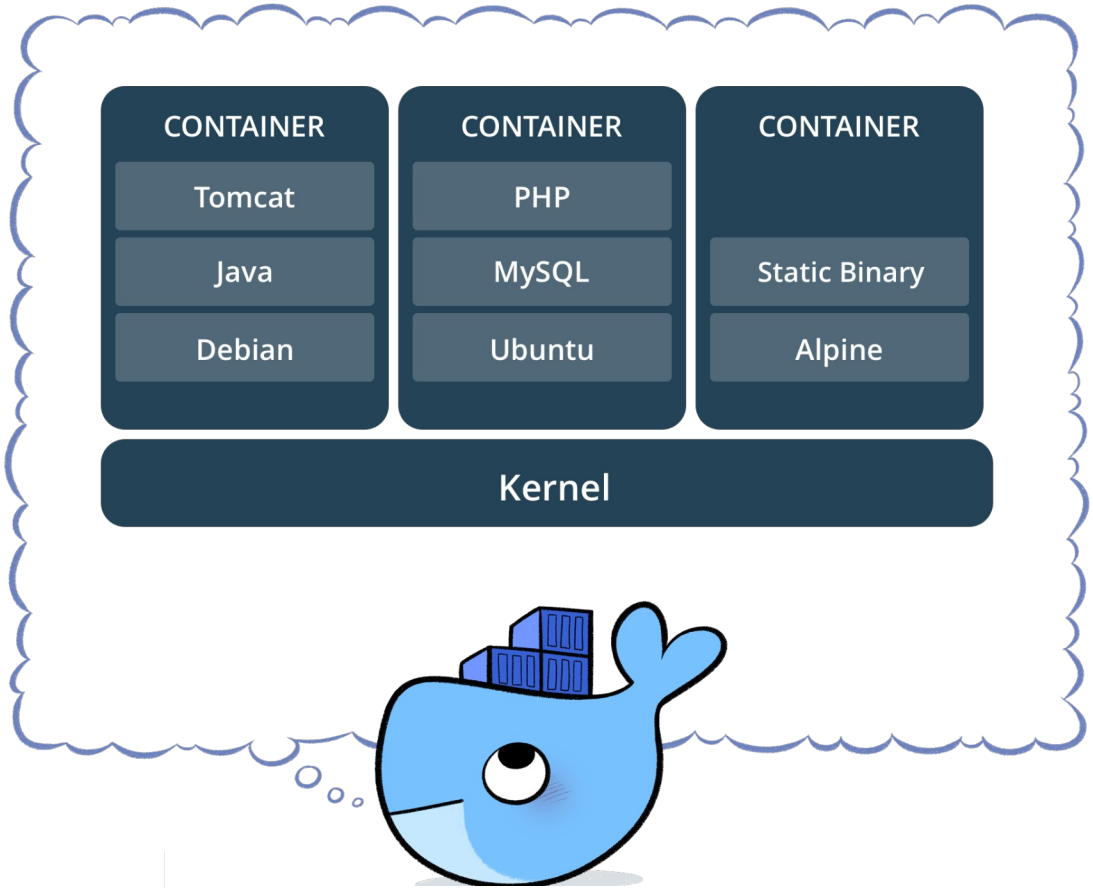
Каждая операционная система:

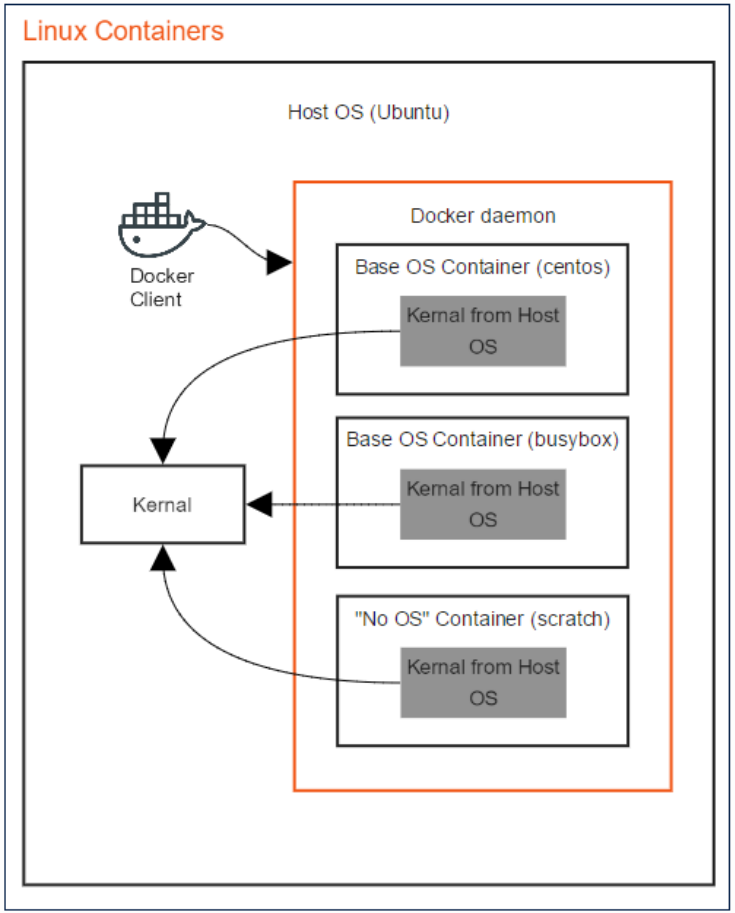
1. Использует процессор
2. Испольщует ОЗУ
3. Использует диск
4. Требует лицензии
5. Нуждается в обслуживании




Performance
Containerization
This is where we all want to be
Security
Virtualization
Flexibility

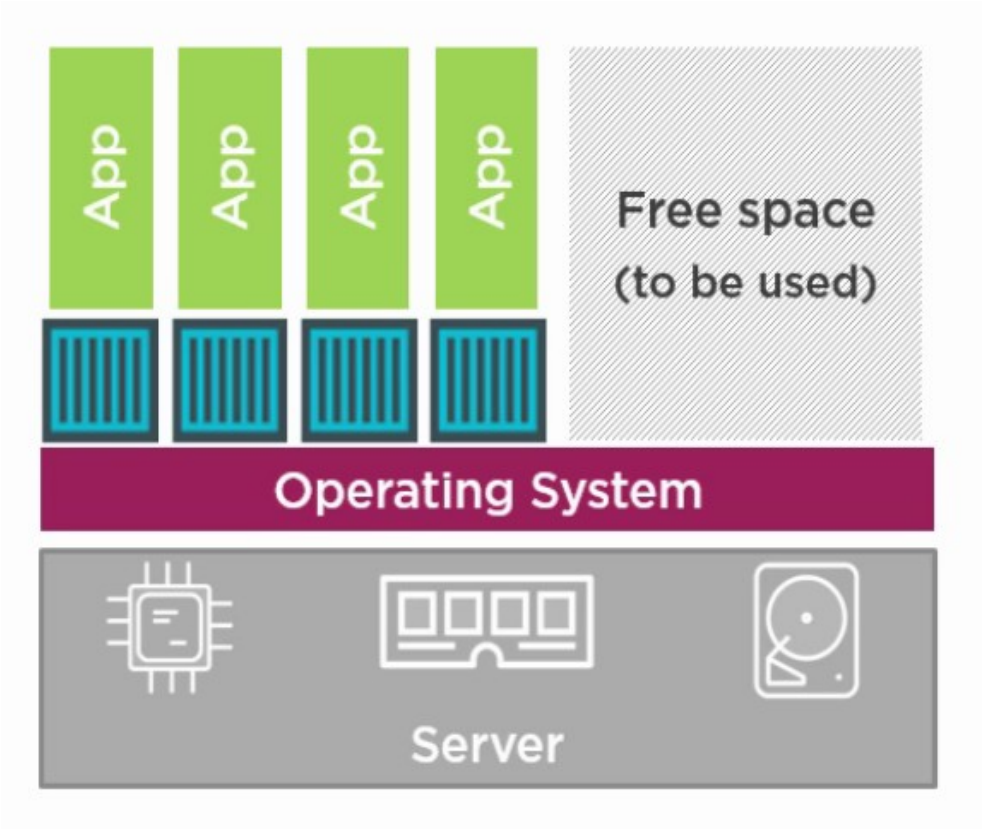
ЧТО ТАКОЕ КОНТЕЙНЕР?



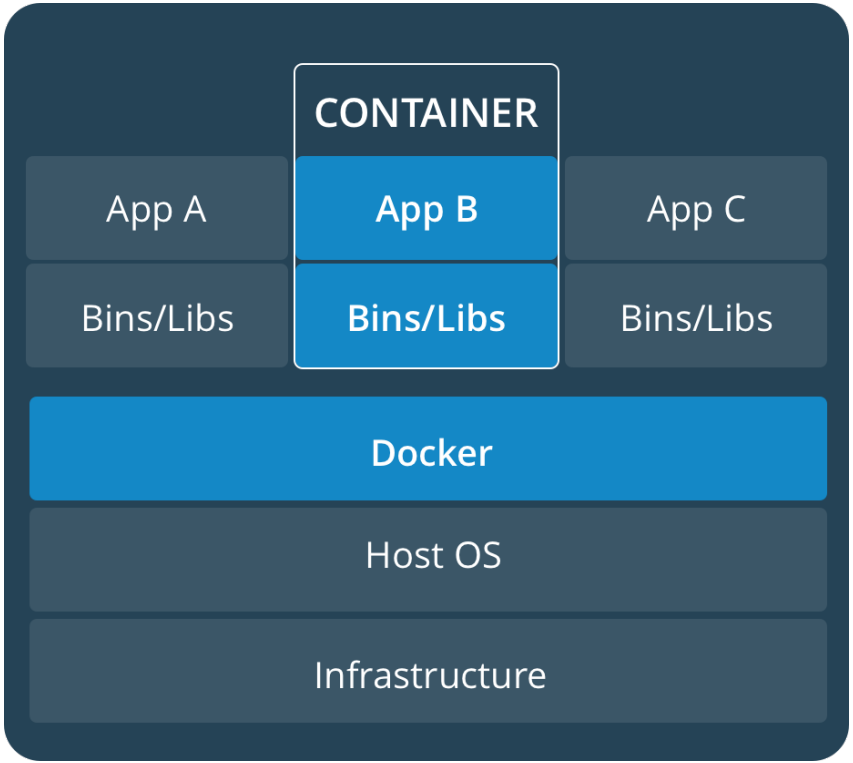


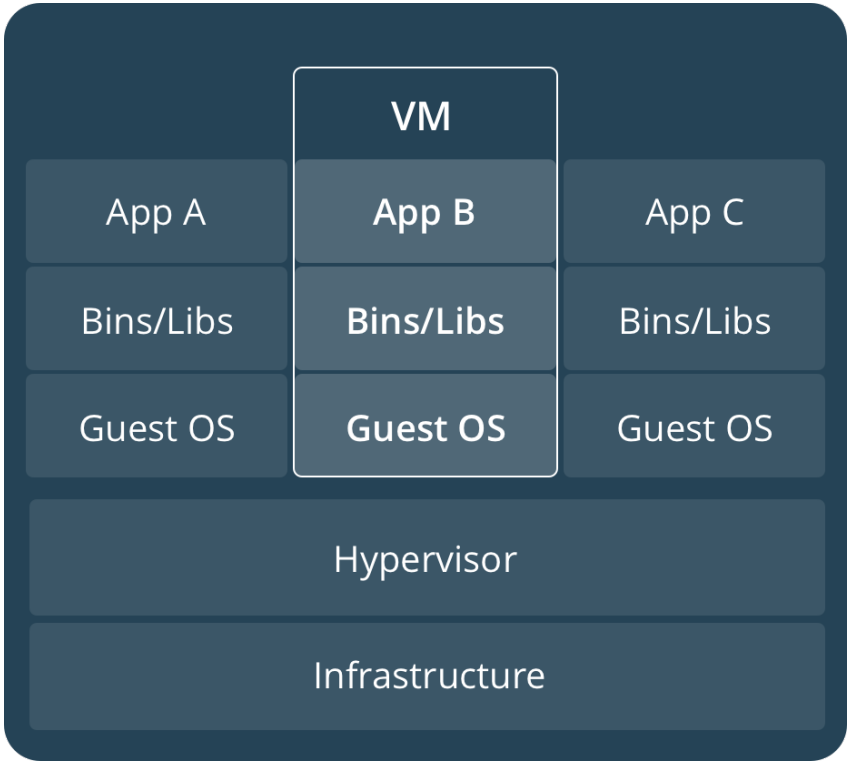
КОНТЕЙНЕРЫ

1. Используют одно ядро
2. Не требуют лицензий
3. Просто масштабировать
4. Консолидируют ресурсы



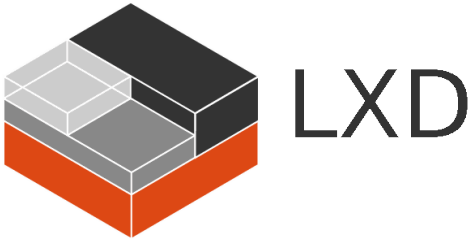
ВИРТУАЛЬНЫЕ МАШИНЫ И КОНТЕЙНЕРЫ





ВИДЫ КОНТЕЙНЕРОВ

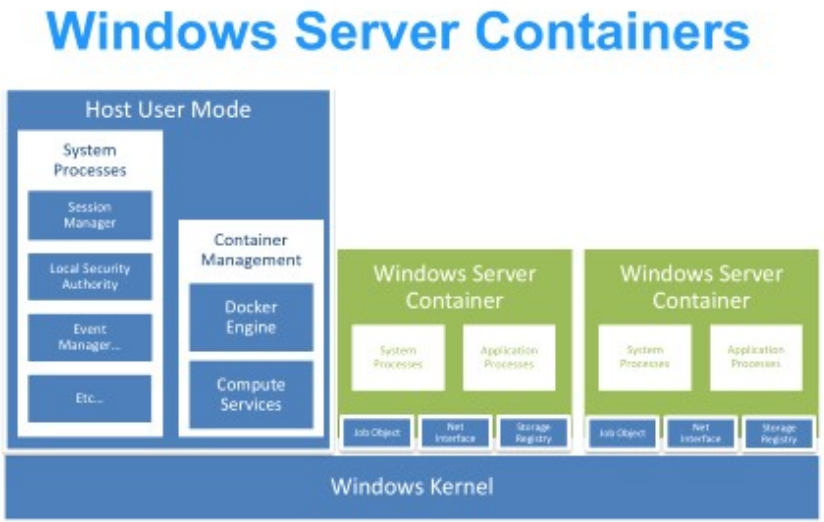
- Introduced in December 2014
- Production-ready release in February 2016
- Focuses on compatibility
- Supports multiple container formats, including Docker like Docker, it is optimized for application containers

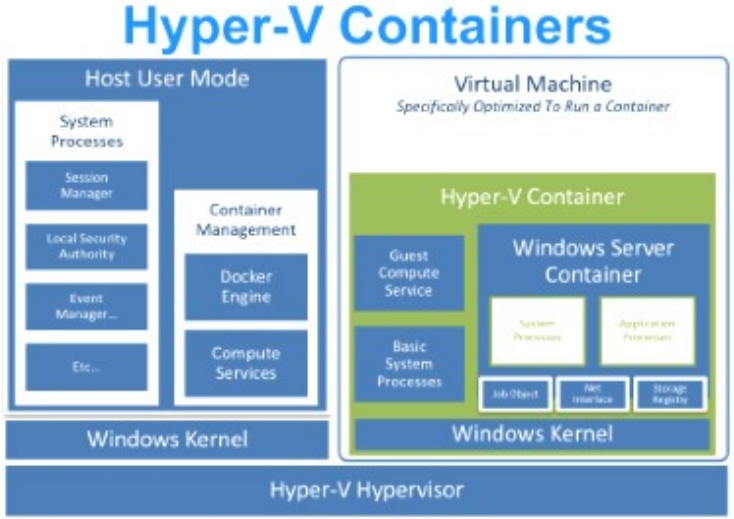


- Introduced in November 2014
- Container hypervisor
- Operating System centric

- An extension of the Linux kernel
- Uses containers for entire operating systems

WINDOWS КОНТЕЙНЕРЫ

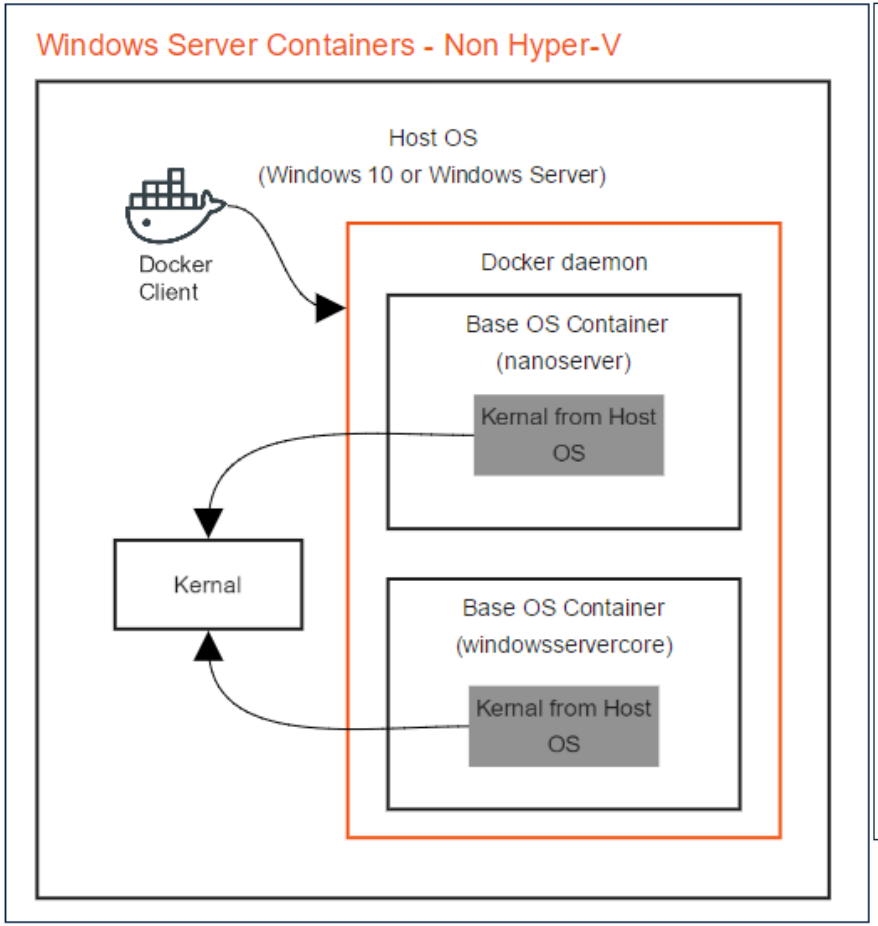


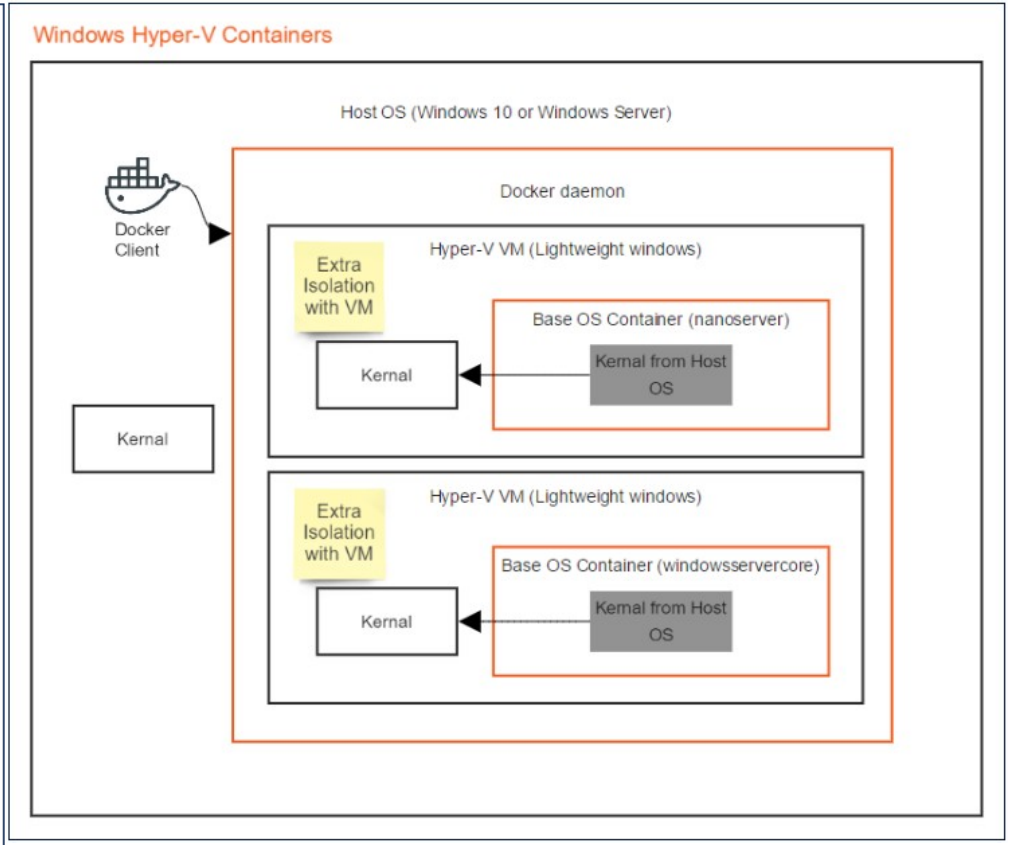


Windows Server Containers – provide application isolation through process and namespace isolation technology.

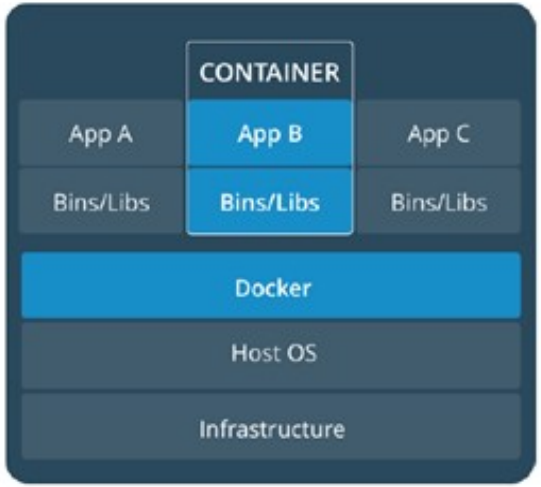
Hyper-V Isolation – expands on the isolation provided by Windows Server Containers by running each container in a highly optimized virtual machine.

WINDOWS КОНТЕЙНЕРЫ





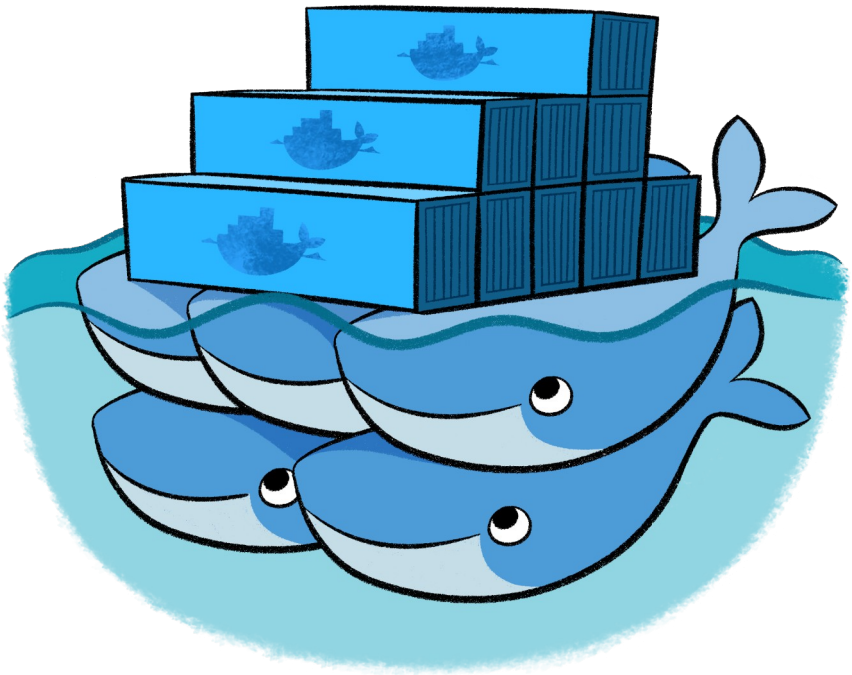
DOCKER КОНТЕЙНЕРЫ



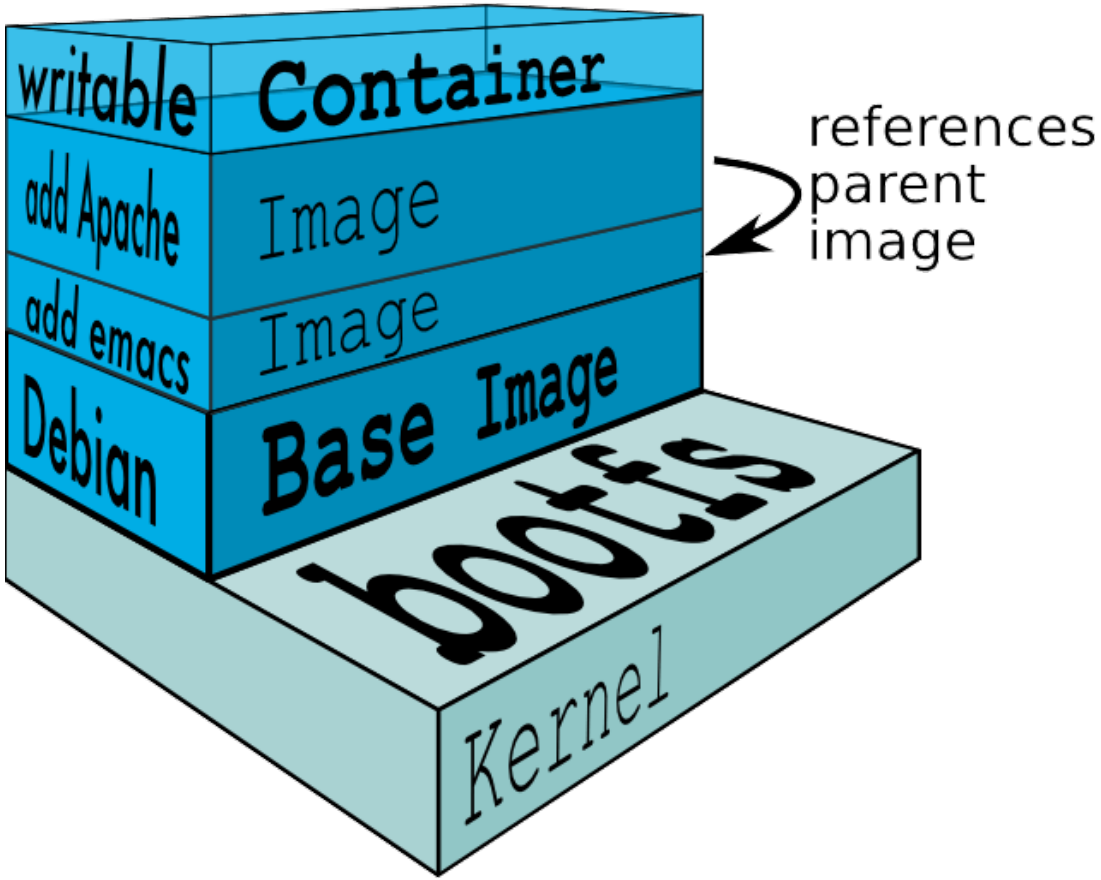
What	
A process in the container shouldn't see other processes running in the system and should feel itself as the only process in the system	PROCESS ISOLATION
We should have facility to manage systems resources – (for example) to provide necessary amount of RAM, CPU shares and so on to the Container	COMPUTE RESOURCES
A process in the container should see/use the only that part of the filesystems which is required by it	FS ISOLATION
A process in the container should have enough permissions to manage/use kernel	KERNEL
A process in the container should have access to ethernet device	VENTH
A few containers can expose the same ports, but is shouldn't cause any problem	PORT MAPPING
A service should have facility to keep data, even it goes down accidently	VOLUMES
Service should be able to communicate with other services by IP/names	NETWORK

КОМПОНЕНТЫ DOCKER

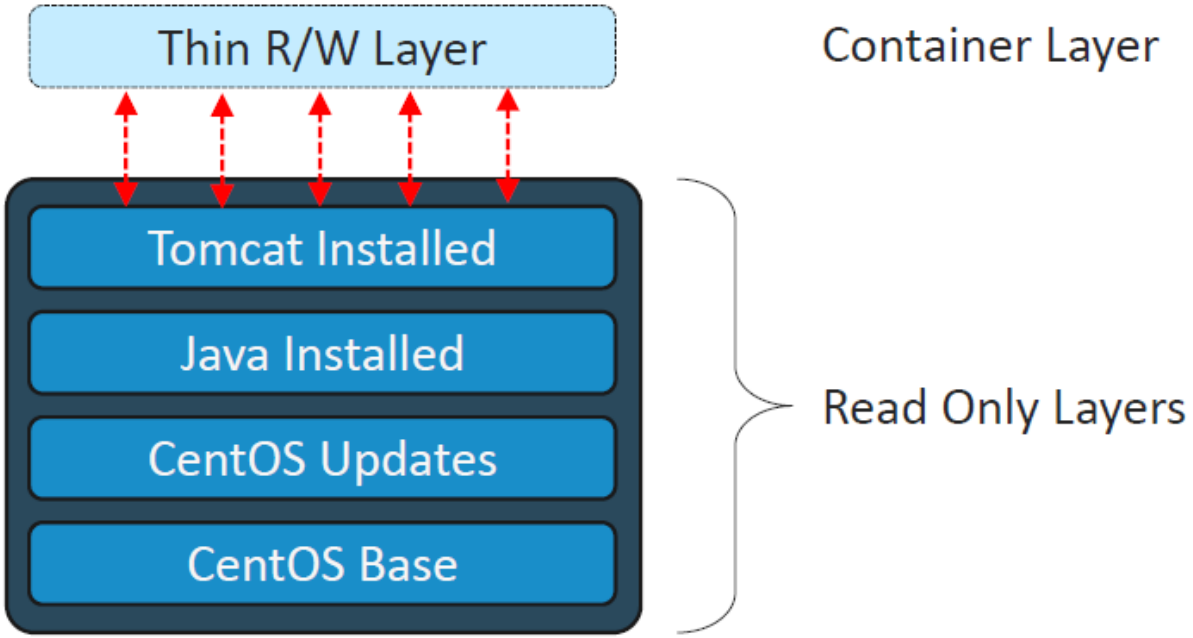
1. Docker images
2. Docker engine
3. Docker containers
4. Docker registry



ОБРАЗЫ И КОНТЕЙНЕРЫ



ОБРАЗЫ И КОНТЕЙНЕРЫ



СБОРКА DOCKER ОБРАЗОВ

Dockerfile

```
FROM python:2.7

RUN pip install Flask
COPY . /

ENV FLASK_APP=hello.py
EXPOSE 5000
CMD flask run --host=0.0.0.0
```

Each instruction creates one layer:

- **FROM** creates a layer from the python:2.7 Docker image.
- **RUN** performs necessary commands
- **COPY** adds files from your Docker client's current directory
- **ENV** sets environment variable
- **EXPOSE** defines which ports will be exposed by container
- **CMD** specifies what command to run within the container

МУЛЬТИФАЗОВАЯ СБОРКА

`Dockerfile.build` :

```
FROM golang:1.7.3
WORKDIR /go/src/github.com/alexellis/href-counter/
COPY app.go .
RUN go get -d -v golang.org/x/net/html \
  && CGO_ENABLED=0 GOOS=linux go build -a -installsuffix cgo -o app .
```

`Dockerfile` :

```
FROM alpine:latest
RUN apk --no-cache add ca-certificates
WORKDIR /root/
COPY app .
CMD ["./app"]
```

МУЛЬТИФАЗОВАЯ СБОРКА

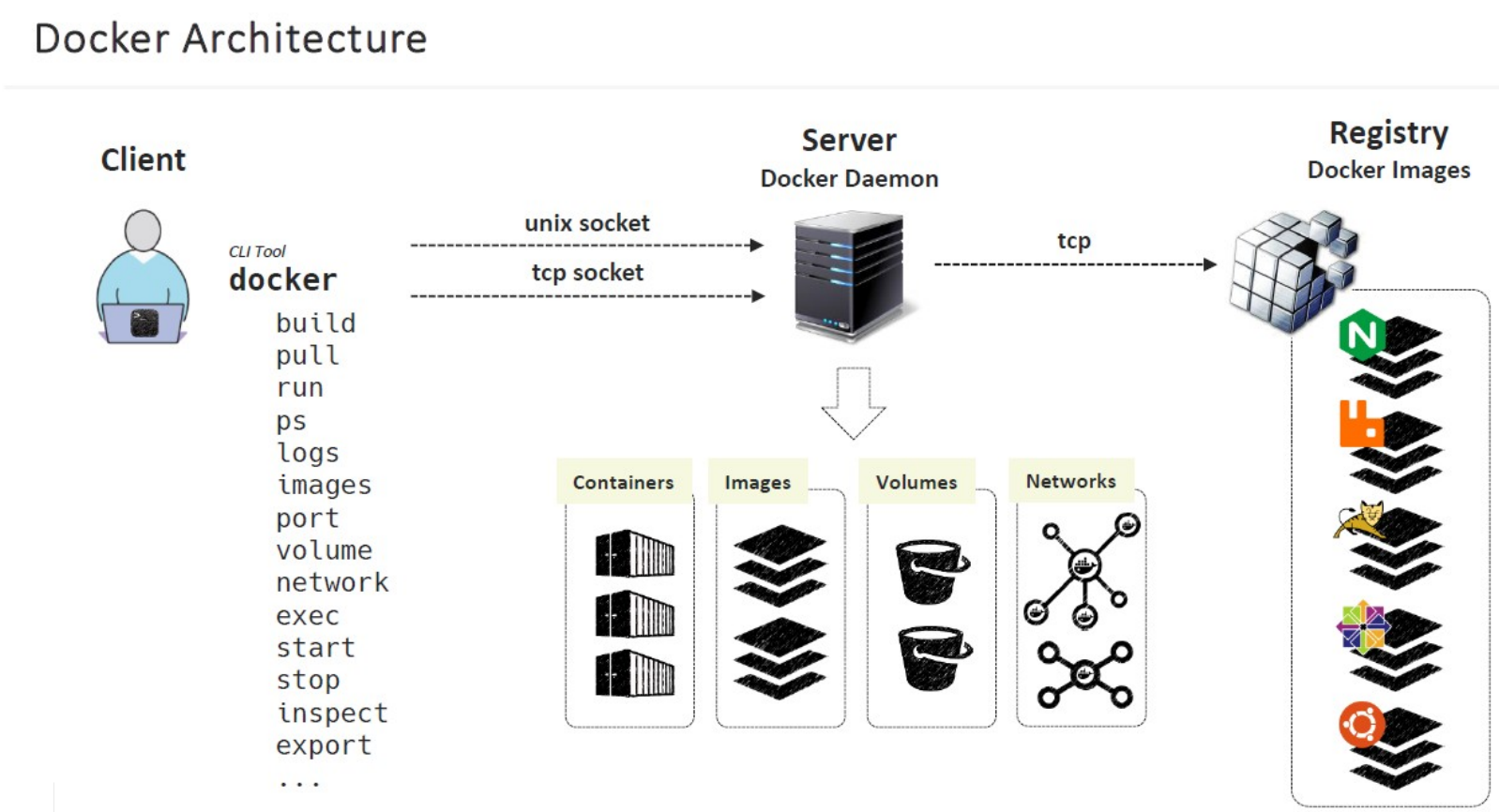
```
FROM golang:1.7.3 as builder
WORKDIR /go/src/github.com/alexellis/href-counter/
RUN go get -d -v golang.org/x/net/html
COPY app.go    .
RUN CGO_ENABLED=0 GOOS=linux go build -a -installsuffix cgo -o app .

FROM alpine:latest
RUN apk --no-cache add ca-certificates
WORKDIR /root/
COPY --from=builder /go/src/github.com/alexellis/href-counter/app .
CMD ["./app"]
```

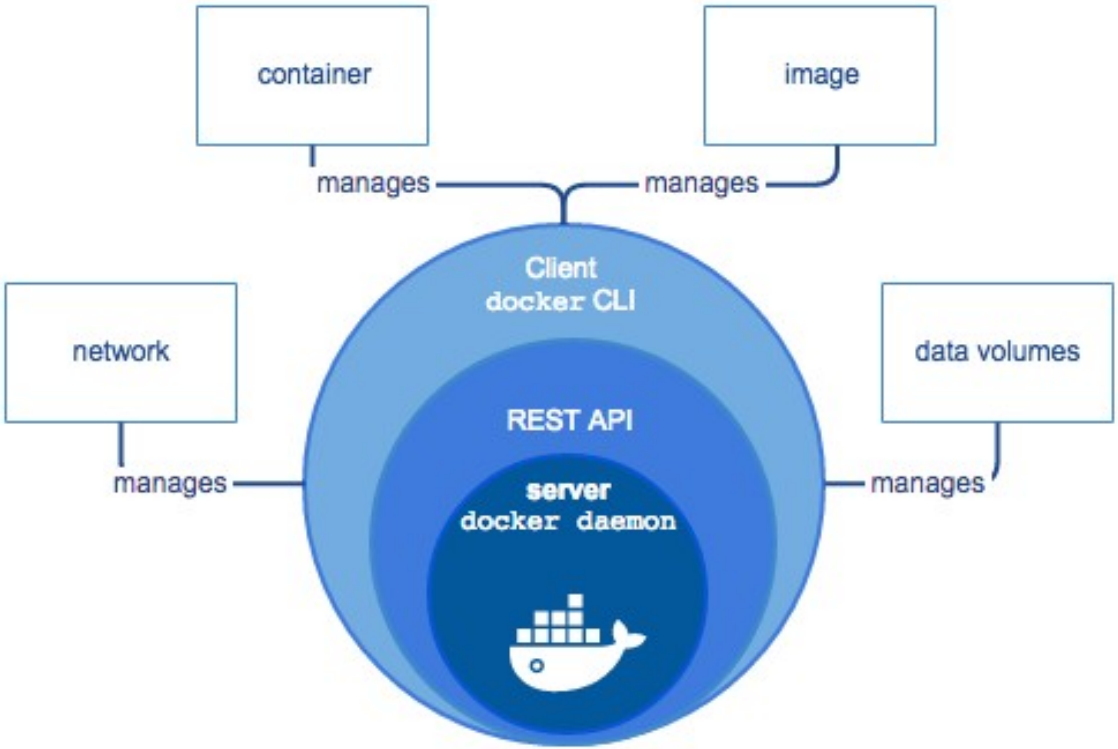
```
$ docker build --target builder -t alexellis2/href-counter:latest .
```

```
COPY --from=nginx:latest /etc/nginx/nginx.conf /nginx.conf
```

АРХИТЕКТУРА DOCKER



КОМПОНЕНТЫ DOCKER ENGINE



ЗАПУСК КОНТЕЙНЕРОВ

```
# docker run 50a986f614d5 # myhttpd:1.0
^C
```

```
# docker run -d myhttpd:1.0
9f761335efe268e9a82c4828d8f4be67b5824eb3266e8ba311343a7da45c67ff
```

```
# docker ps
CONTAINER ID  IMAGE         COMMAND                  CREATED        STATUS         PORTS                  NAMES
9f761335efe2  50a986f614d5  "/bin/sh -c 'httpd -…"  5 seconds ago  Up 4 seconds   80/tcp                 trusting_kilby
```

```
# docker run -P -d myhttpd:1.0
74954ff14ec5e53ac9925bfd2873c654fe8978657764b4162ac494fc9afaab9f
```

```
# docker ps
CONTAINER ID  IMAGE         COMMAND                  CREATED        STATUS         PORTS                     NAMES
74954ff14ec5  myhttpd:1.0   "/bin/sh -c 'httpd -…"  9 seconds ago  Up 18 seconds  0.0.0.0:32768->80/tcp     fervent_noyce
9f761335efe2  myhttpd:1.0   "/bin/sh -c 'httpd -…"  3 minutes ago  Up 3 minutes   80/tcp                    trusting_kilby
```

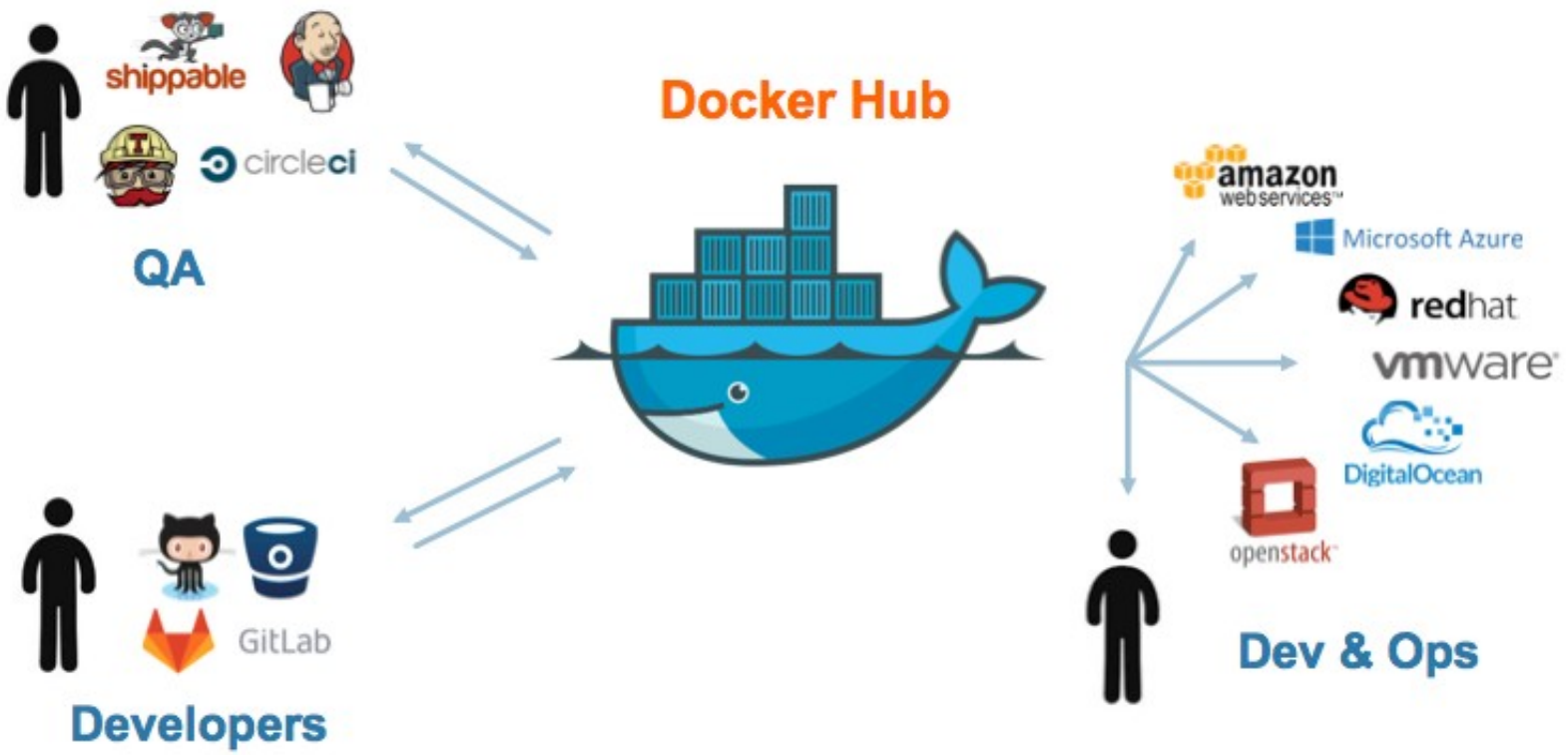
```
# curl localhost:32768 # or curl <<VM_external_ip>>:32768
my httpd container
```

```
# docker run -d -p 8081:80 --name h8081  myhttpd:1.0
fca7f4525bc618e7c503b73bfa680c055300e8b5c767d48e33669831e0bc5bec
# docker run -d -p 127.0.0.1:8082:80 --name h8082 myhttpd:1.0
014e5efa5ca90d9b7e50eebef3c7f020f08f0b5238f98420681ee348a4097829
```

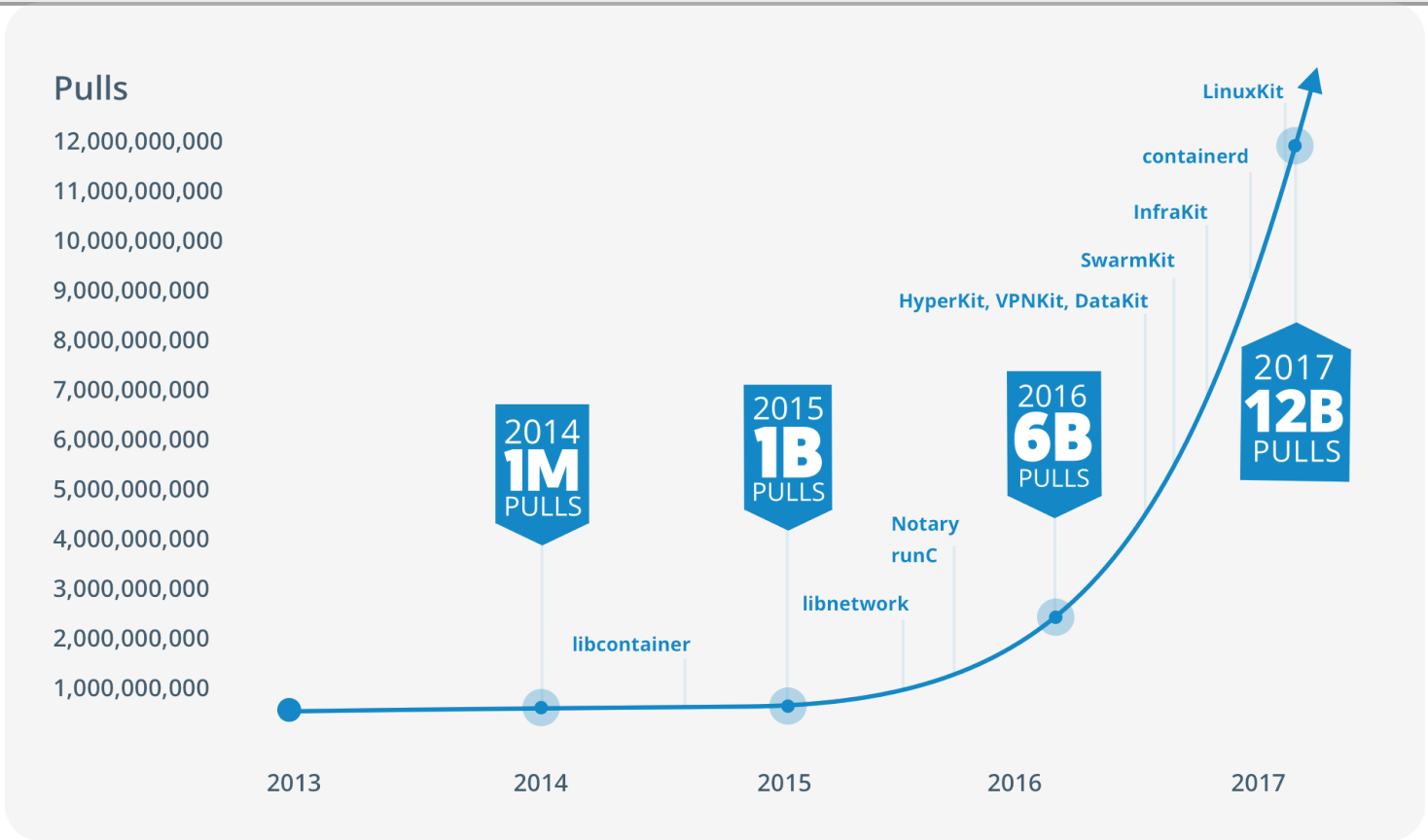
```
# docker ps --format "table {{.Names}}\t{{.Image}}\t{{.ID}}\t{{.Ports}}" -n2
NAMES               IMAGE               CONTAINER ID        PORTS
h8081               myhttpd:1.0         fca7f4525bc6        0.0.0.0:8081->80/tcp
h8082               myhttpd:1.0         014e5efa5ca9        127.0.0.1:8082->80/tcp
```

formatting

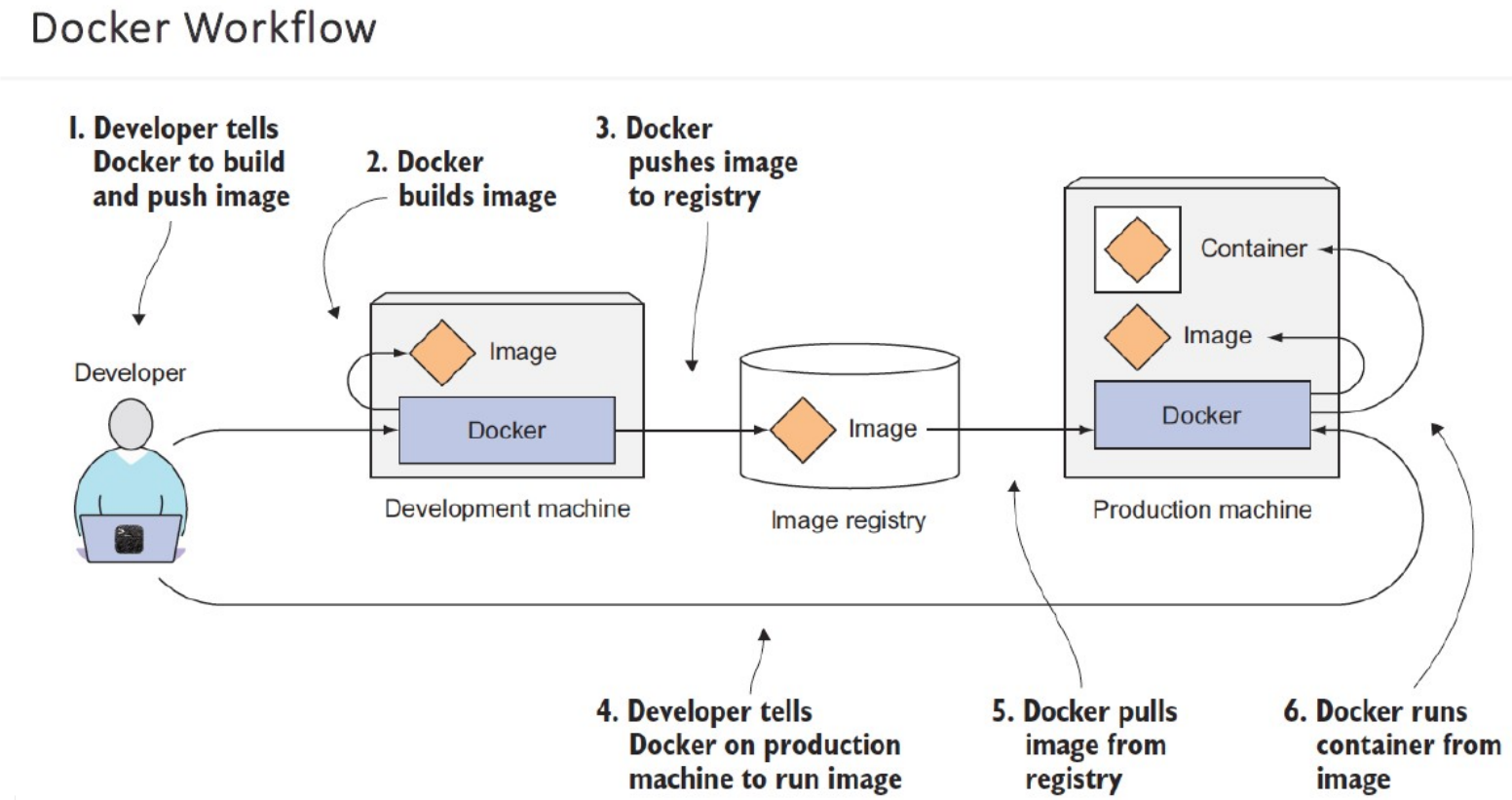
DOCKER REGISTRY – DOCKER HUB



ДИНАМИКА КОЛИЧЕСТВА СКАЧИВАНИЯ ОБРАЗОВ

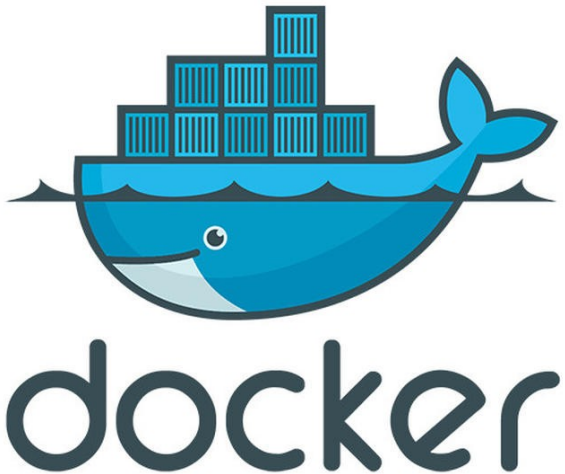


DOCKER WORKFLOW

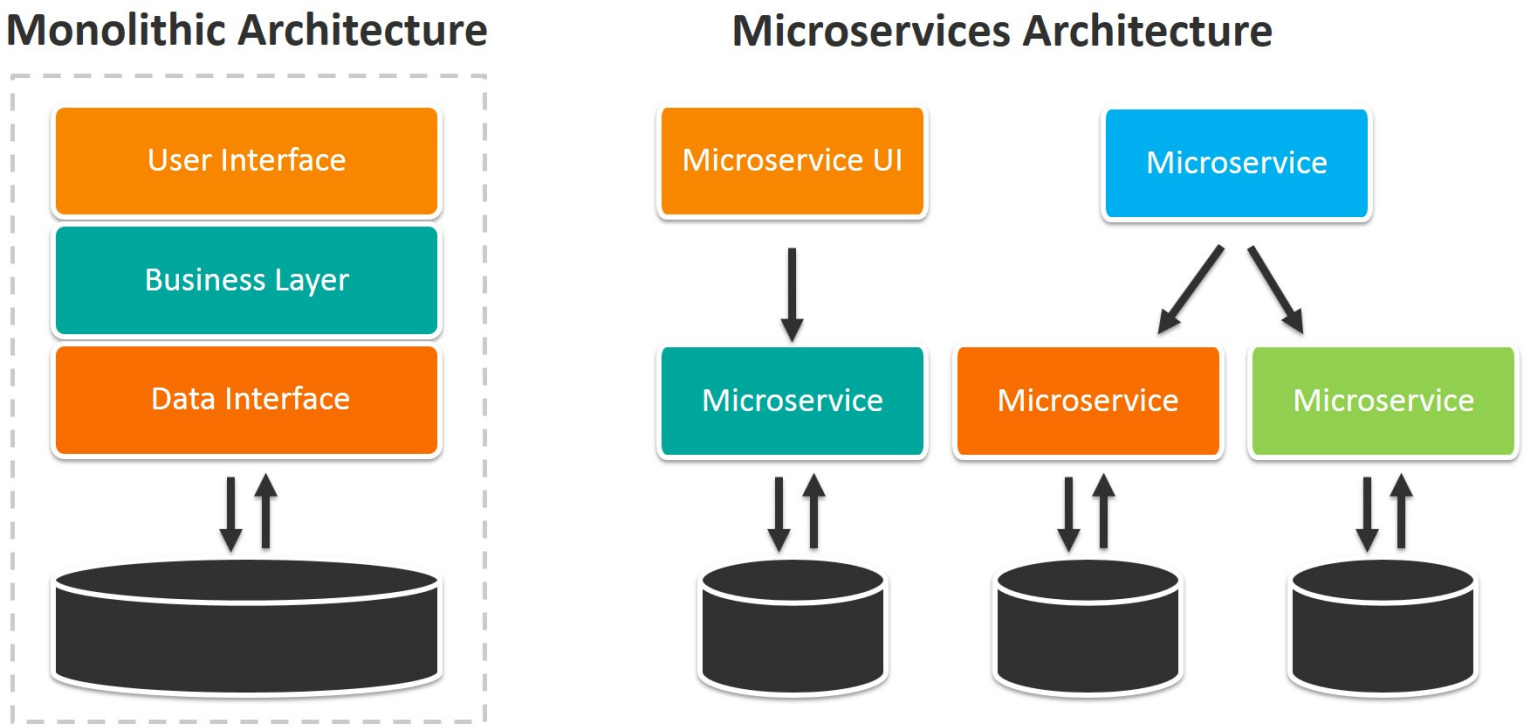


ДЛЯ ЧЕГО ИСПОЛЬЗОВАТЬ DOCKER?

1. Быстрая доставка приложений
2. Простое развертывание и масштабирование приложений
3. Абстрагирование приложение от хоста
4. Унифицированный деплой

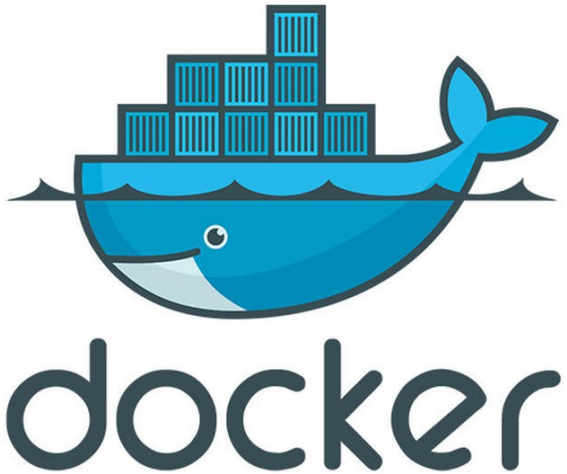


ДЛЯ ЧЕГО ИСПОЛЬЗОВАТЬ DOCKER?



НЕДОСТАТКИ DOCKER

1. Легкость использования
2. Сложность конфигурации
3. Сложность управления и поддержки
4. Незрелость



РЕАЛЬНЫЙ ПРИМЕР ИСПОЛЬЗОВАНИЯ DOCKER

CI/CD Platform
an orchestrated combination of enterprise delivery methodologies, architectural frameworks and development tools.

Open Shift
Red Hat® OpenShift is a container application platform that brings Docker and Kubernetes to the enterprise.

Kubernetes
Open-source system for automating deployment, scaling, and management of containerized applications.

Docker
Open-source containers technology which enables independence between applications and infrastructure in across the hybrid cloud.

AWS ✓ | Azure ✓ | Google ✓ | OpenStack ✓