shaun
20190823

docker

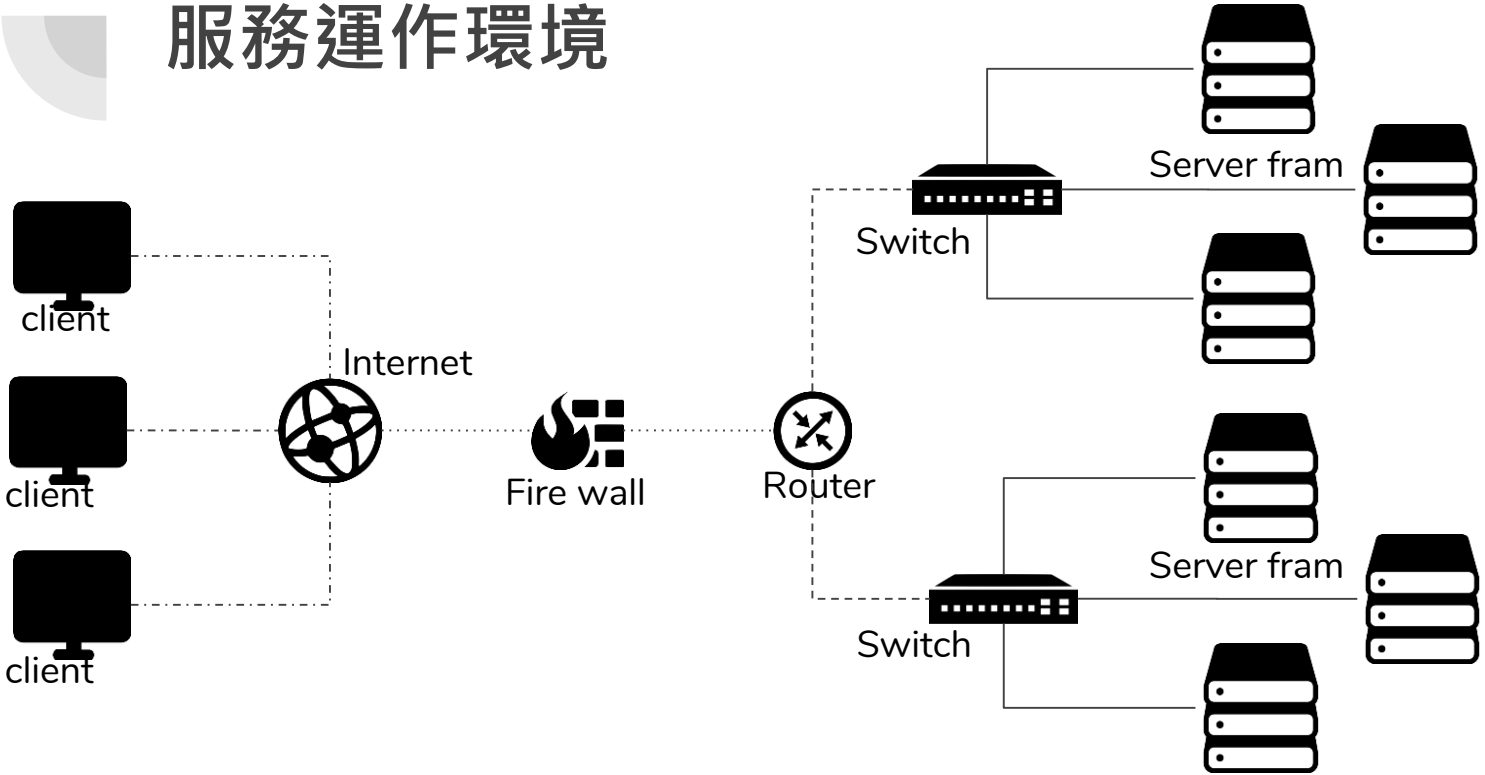
你好 Docker

行前須知

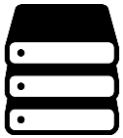
1. 服務運作環境

1. 虛擬化技術

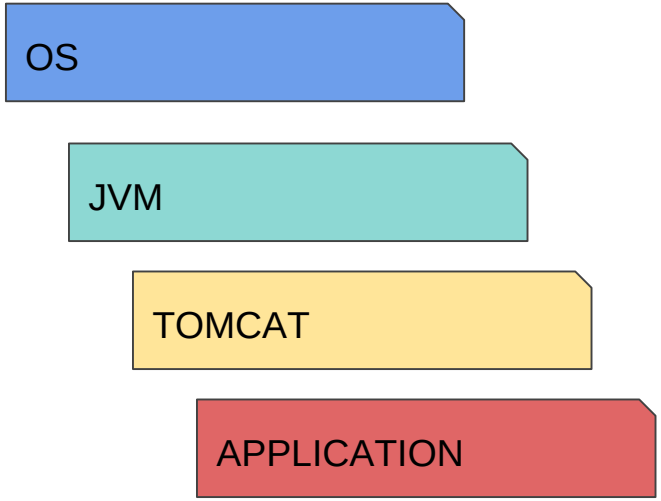
服務運作環境



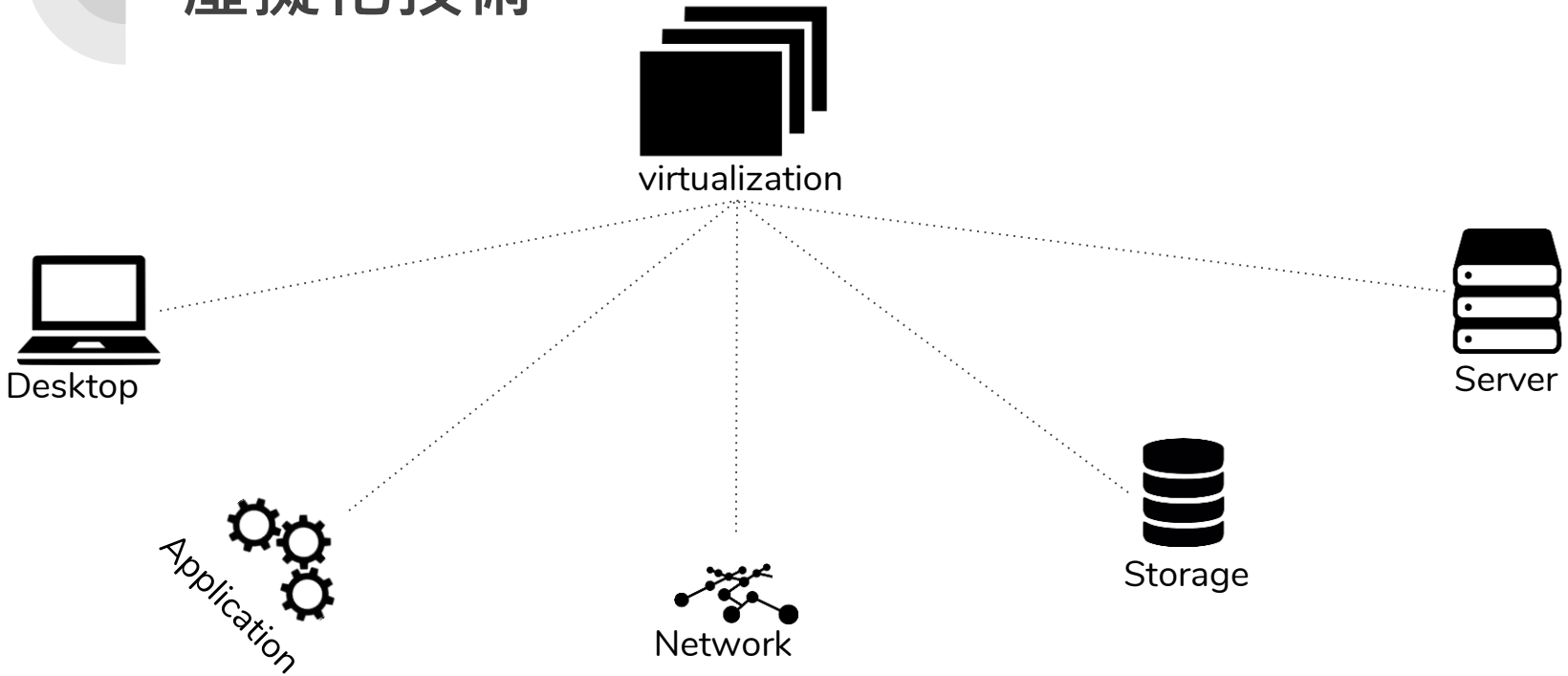
服務運作環境



Server fram



虛擬化技術



虛擬化帶來的好處 - vmware舉例

		With VMWare	Without VMWare
建置成本	Server採購的數量	3	23
	VMWare License	Yes	No
	Cluster Ware License	No	Yes
	機櫃空間	12U	46U
	Total費用	約240萬 (含VMWare License)	約435萬 (含VCS License)
維護成本	Server維護合約	約40萬	約60萬
	耗電量(W)	1589x3=4767	707x23=16261 年差異(NT$410,000)
	熱能產生	5457x3=16371 BTU/HR	2508x23=60192 BTU/HR 年差異(NT$350,000)
管理成本	管理Server數量	少	多
	管理介面	簡單、有彈性	複雜
	容錯能力	Yes	No(須建置HA Solution)
擴充彈性		Yes 視情況可再增加5部以虛擬主機	No

某IC設計公司導入虛擬化伺服器後所獲得之效益

https://www.gss.com.tw/eis/55-eis52/226-2019-03-13-02-09-54

虛擬化帶來的好處

成本降低

彈性建置

易於管理

節能減碳

什麼是 Docker ？

Docker 特性

LXC

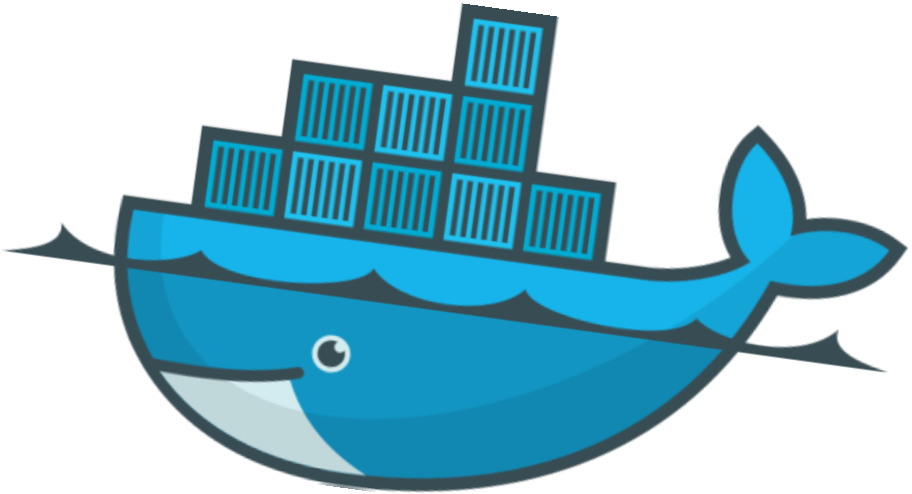
Encapsulation

Not VM

Lightweight

Portability

作業系統虛擬化解決方案



Docker 的雛形 LXC

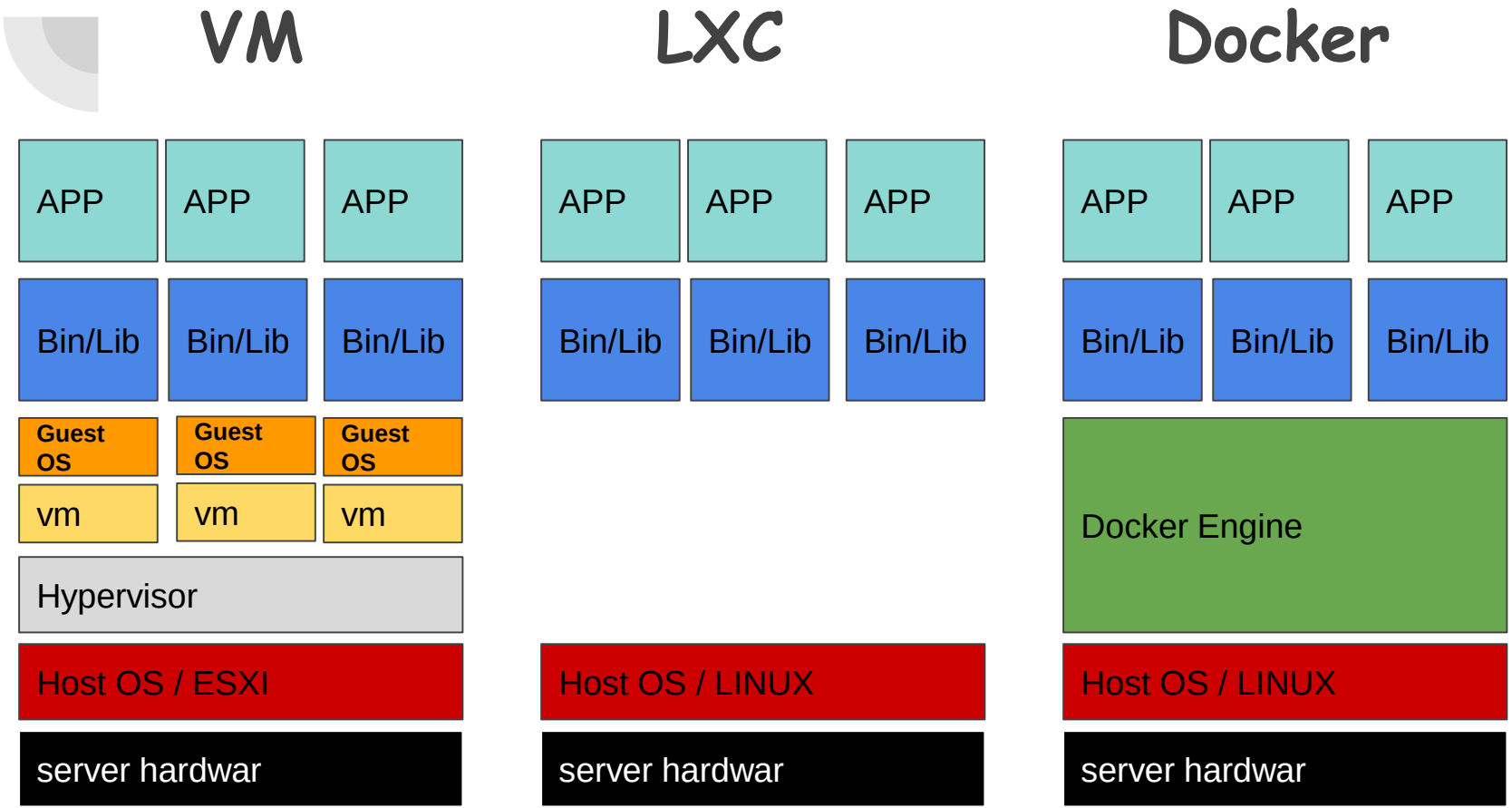
LXC 重要概念

- cgroups
- namespace

LXC

LXC is the well-known and heavily tested low-level Linux container runtime. It is in active development since 2008 and has proven itself in critical production environments world-wide. Some of its core contributors are the same people that helped to implement various well-known containerization features inside the Linux kernel.

https://github.com/lxc/lxc



Docker 帶來了什麼優點?

1. 省去建立新環境相關設定
2. 資源更有效利用
3. 快速建立、快速部屬

Docker支援平台

Supported platforms

Docker Engine - Community is available on multiple platforms. Use the following tables to choose the best installation path for you.

DESKTOP

Platform	x86_64
Docker Desktop for Mac (macOS)	✓
Docker Desktop for Windows (Microsoft Windows 10)	✓

SERVER

Platform	x86_64 / amd64	ARM	ARM64 / AARCH64	IBM Power (ppc64le)	IBM Z (s390x)
CentOS	✓		✓		
Debian	✓	✓	✓		
Fedora	✓		✓		
Ubuntu	✓	✓	✓	✓	✓

https://docs.docker.com/install/

Hello World

docker run --name hello alpine:latest echo “hello world”

What mean command ?

docker run --name hello alpine:latest echo “hello world”

Docker 基本概念 - Image

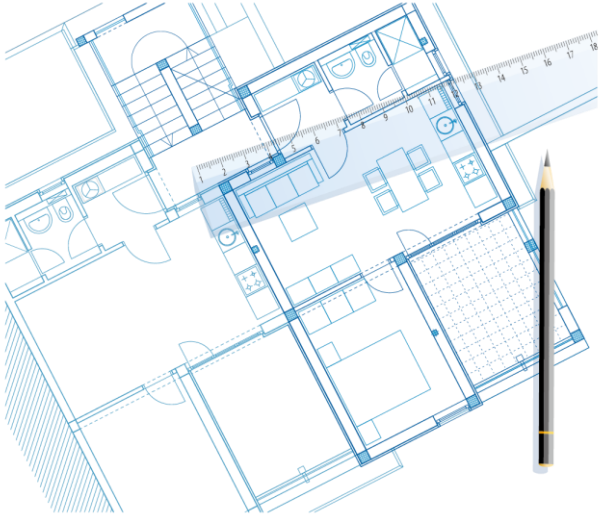
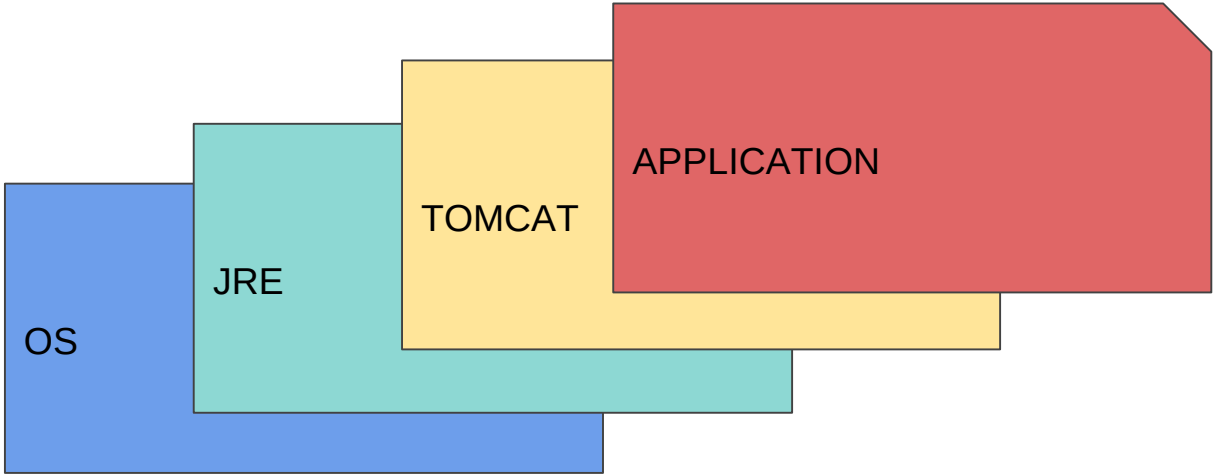


Image layer

思考一下如果要跑一個TOMCAT服務，我們會需要什麼樣的環境?

Image layer



Image記錄著環境描述的過程
每一個描述皆代表著一個layer

How build image ?

畫設計圖也是要工具，而建立Image的工具就是Dockerfile

撰寫 Dockerfile

```
FROM centos:7

RUN cd /

COPY jre1.8.0_74.tar /
COPY apache-tomcat-8.0.32.tar /

RUN tar xf jre1.8.0_74.tar
RUN tar xf apache-tomcat-8.0.32.tar

RUN rm jre1.8.0_74.tar
RUN rm apache-tomcat-8.0.32.tar

ENV JAVA_HOME=/jre1.8.0_74
ENV PATH=$PATH:/jre1.8.0_74/bin

CMD ["/apache-tomcat-8.0.32/bin/catalina.sh", "run"]
```

建立 image - docker build .

```
core@sit-common-docker ~/werptom $ docker build -t werptom:1 .
Sending build context to Docker daemon  208.1MB
Step 1/11 : FROM centos:7
7: Pulling from library/centos
d8d02d457314: Pull complete
Digest: sha256:307835c385f656ec2e2fec602cf093224173c51119bbebd602c53c3653a3d6eb
Status: Downloaded newer image for centos:7
 ---> 67fa590cfc1c
Step 2/11 : RUN cd /
 ---> Running in 62305cac5721
Removing intermediate container 62305cac5721
 ---> 341e588cd82f
Step 3/11 : COPY jre1.8.0_74.tar /
 ---> 9f7097b2844d
Step 4/11 : COPY apache-tomcat-8.0.32.tar /
 ---> d7f9bddc711b
Step 5/11 : RUN tar xf jre1.8.0_74.tar
 ---> Running in 1849ba6c9594
Removing intermediate container 1849ba6c9594
 ---> 4747328a290e
Step 6/11 : RUN tar xf apache-tomcat-8.0.32.tar
 ---> Running in 553deb561320
Removing intermediate container 553deb561320
 ---> c223dec74f4f
Step 7/11 : RUN rm jre1.8.0_74.tar
 ---> Running in ac6edee86b33
Removing intermediate container ac6edee86b33
 ---> 8c5195ea8fba
Step 8/11 : RUN rm apache-tomcat-8.0.32.tar
 ---> Running in 16b95bcea2a7
Removing intermediate container 16b95bcea2a7
 ---> 1801807c60d2
Step 9/11 : ENV JAVA_HOME=/jre1.8.0_74
 ---> Running in 18a3c3e53a67
Removing intermediate container 18a3c3e53a67
 ---> a47da9734cf2
Step 10/11 : ENV PATH=$PATH:/jre1.8.0_74/bin
 ---> Running in 1de377a2f985
Removing intermediate container 1de377a2f985
 ---> 58aa0e6a91cb
Step 11/11 : CMD ["/apache-tomcat-8.0.32/bin/catalina.sh", "run"]
 ---> Running in 60b953ded661
Removing intermediate container 60b953ded661
 ---> 962d8f87629e
Successfully built 962d8f87629e
Successfully tagged werptom:1
```

檢查 image 描述的過程 image history

```
core@sit-common-docker ~/werptom $ docker image history werptom:1
IMAGE               CREATED             CREATED BY                                      SIZE
962d8f87629e        About a minute ago  /bin/sh -c #(nop)  CMD ["/apache-tomcat-8.0.…   0B
58aa0e6a91cb        About a minute ago  /bin/sh -c #(nop)  ENV PATH=/usr/local/sbin:…   0B
a47da9734cf2        About a minute ago  /bin/sh -c #(nop)  ENV JAVA_HOME=/jre1.8.0_74   0B
1801807c60d2        About a minute ago  /bin/sh -c rm apache-tomcat-8.0.32.tar          0B
8c5195ea8fba        About a minute ago  /bin/sh -c rm jre1.8.0_74.tar                   0B
c223dec74f4f        About a minute ago  /bin/sh -c tar xf apache-tomcat-8.0.32.tar      13MB
4747328a290e        About a minute ago  /bin/sh -c tar xf jre1.8.0_74.tar               194MB
d7f9bddc711b        2 minutes ago       /bin/sh -c #(nop) COPY file:a95a5c564e3b38ee…   13.6MB
9f7097b2844d        2 minutes ago       /bin/sh -c #(nop) COPY file:d046ff89589906f5…   194MB
341e588cd82f        2 minutes ago       /bin/sh -c cd /                                 0B
67fa590cfc1c        13 hours ago        /bin/sh -c #(nop)  CMD ["/bin/bash"]            0B
<missing>           13 hours ago        /bin/sh -c #(nop)  LABEL org.label-schema.sc…   0B
<missing>           13 hours ago        /bin/sh -c #(nop) ADD file:4e7247c06de9ad117…   202MB
core@sit-common-docker ~/werptom $
```

Hello World

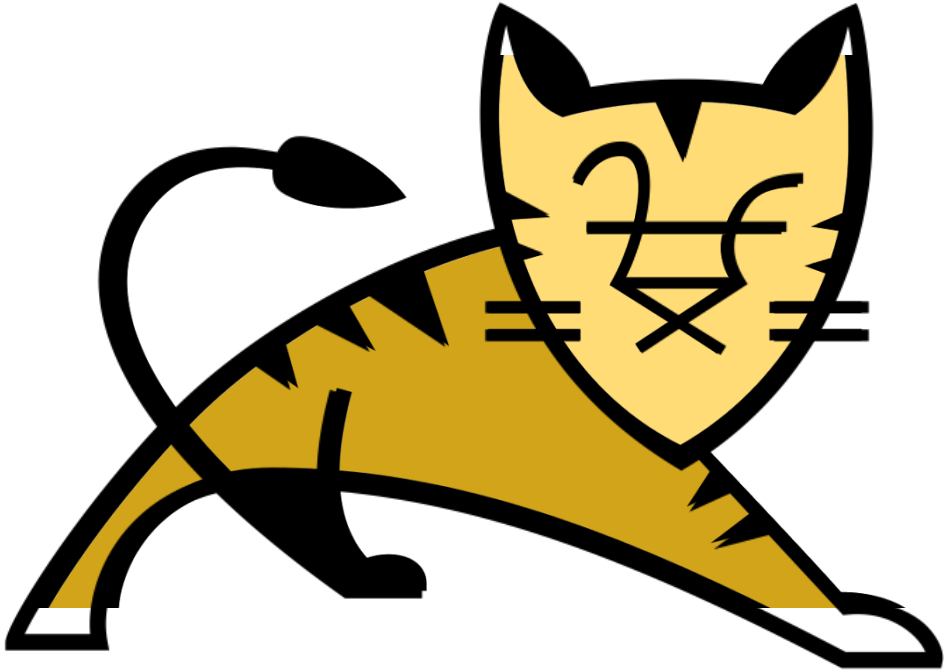
docker run --name hello alpine:latest echo “hello world”

docker run -d --name werptom -p 8080:8080 werptom:1

奔跑吧!!湯姆喵

```
core@sittest-hr ~/werptom $ docker logs -f werptom
21-Aug-2019 08:55:45.656 INFO [main] org.apache.catalina.startup.VersionLoggerListener.log Server version:        Apache Tomcat/8.0.32
21-Aug-2019 08:55:45.658 INFO [main] org.apache.catalina.startup.VersionLoggerListener.log Server built:          Feb 2 2016 19:34:53 UTC
21-Aug-2019 08:55:45.658 INFO [main] org.apache.catalina.startup.VersionLoggerListener.log Server number:        8.0.32.0
21-Aug-2019 08:55:45.658 INFO [main] org.apache.catalina.startup.VersionLoggerListener.log OS Name:              Linux
21-Aug-2019 08:55:45.658 INFO [main] org.apache.catalina.startup.VersionLoggerListener.log OS Version:           4.11.9-coreos
21-Aug-2019 08:55:45.658 INFO [main] org.apache.catalina.startup.VersionLoggerListener.log Architecture:         amd64
21-Aug-2019 08:55:45.658 INFO [main] org.apache.catalina.startup.VersionLoggerListener.log Java Home:            /jre1.8.0_74
21-Aug-2019 08:55:45.658 INFO [main] org.apache.catalina.startup.VersionLoggerListener.log JVM Version:          1.8.0_74-b02
21-Aug-2019 08:55:45.658 INFO [main] org.apache.catalina.startup.VersionLoggerListener.log JVM Vendor:           Oracle Corporation
21-Aug-2019 08:55:45.659 INFO [main] org.apache.catalina.startup.VersionLoggerListener.log CATALINA_BASE:       /apache-tomcat-8.0.32
21-Aug-2019 08:55:45.659 INFO [main] org.apache.catalina.startup.VersionLoggerListener.log CATALINA_HOME:       /apache-tomcat-8.0.32
21-Aug-2019 08:55:45.659 INFO [main] org.apache.catalina.startup.VersionLoggerListener.log Command line argument: -Djava.util.logging.config.file=/apache-tomcat-8.0.32/conf/l
ogging.properties
21-Aug-2019 08:55:45.659 INFO [main] org.apache.catalina.startup.VersionLoggerListener.log Command line argument: -Djava.util.logging.manager=org.apache.juli.ClassLoaderLogMa
nager
21-Aug-2019 08:55:45.659 INFO [main] org.apache.catalina.startup.VersionLoggerListener.log Command line argument: -Djava.endorsed.dirs=/apache-tomcat-8.0.32/endorsed
21-Aug-2019 08:55:45.659 INFO [main] org.apache.catalina.startup.VersionLoggerListener.log Command line argument: -Dcatalina.base=/apache-tomcat-8.0.32
21-Aug-2019 08:55:45.660 INFO [main] org.apache.catalina.startup.VersionLoggerListener.log Command line argument: -Dcatalina.home=/apache-tomcat-8.0.32
21-Aug-2019 08:55:45.660 INFO [main] org.apache.catalina.startup.VersionLoggerListener.log Command line argument: -Djava.io.tmpdir=/apache-tomcat-8.0.32/temp
21-Aug-2019 08:55:45.660 INFO [main] org.apache.catalina.core.AprLifecycleListener.lifecycleEvent The APR based Apache Tomcat Native library which allows optimal performance
in production environments was not found on the java.library.path: /usr/java/packages/lib/amd64:/usr/lib64:/lib64:/lib:/usr/lib
21-Aug-2019 08:55:45.832 INFO [main] org.apache.coyote.AbstractProtocol.init Initializing ProtocolHandler ["http-nio-8080"]
21-Aug-2019 08:55:45.849 INFO [main] org.apache.tomcat.util.net.NioSelectorPool.getSharedSelector Using a shared selector for servlet write/read
21-Aug-2019 08:55:45.852 INFO [main] org.apache.coyote.AbstractProtocol.init Initializing ProtocolHandler ["ajp-nio-8009"]
21-Aug-2019 08:55:45.855 INFO [main] org.apache.tomcat.util.net.NioSelectorPool.getSharedSelector Using a shared selector for servlet write/read
21-Aug-2019 08:55:45.855 INFO [main] org.apache.catalina.startup.Catalina.load Initialization processed in 690 ms
21-Aug-2019 08:55:45.881 INFO [main] org.apache.catalina.core.StandardService.startInternal Starting service Catalina
21-Aug-2019 08:55:45.881 INFO [main] org.apache.catalina.core.StandardEngine.startInternal Starting Servlet Engine: Apache Tomcat/8.0.32
21-Aug-2019 08:55:45.892 INFO [localhost-startStop-1] org.apache.catalina.startup.HostConfig.deployDirectory Deploying web application directory /apache-tomcat-8.0.32/webapps
/manager
21-Aug-2019 08:55:46.205 INFO [localhost-startStop-1] org.apache.catalina.startup.HostConfig.deployDirectory Deployment of web application directory /apache-tomcat-8.0.32/web
apps/manager has finished in 313 ms
21-Aug-2019 08:55:46.205 INFO [localhost-startStop-1] org.apache.catalina.startup.HostConfig.deployDirectory Deploying web application directory /apache-tomcat-8.0.32/webapps
/ROOT
21-Aug-2019 08:55:46.224 INFO [localhost-startStop-1] org.apache.catalina.startup.HostConfig.deployDirectory Deployment of web application directory /apache-tomcat-8.0.32/web
apps/ROOT has finished in 19 ms
21-Aug-2019 08:55:46.225 INFO [localhost-startStop-1] org.apache.catalina.startup.HostConfig.deployDirectory Deploying web application directory /apache-tomcat-8.0.32/webapps
/examples
21-Aug-2019 08:55:46.493 INFO [localhost-startStop-1] org.apache.catalina.startup.HostConfig.deployDirectory Deployment of web application directory /apache-tomcat-8.0.32/web
apps/examples has finished in 269 ms
21-Aug-2019 08:55:46.494 INFO [localhost-startStop-1] org.apache.catalina.startup.HostConfig.deployDirectory Deploying web application directory /apache-tomcat-8.0.32/webapps
/docs
21-Aug-2019 08:55:46.511 INFO [localhost-startStop-1] org.apache.catalina.startup.HostConfig.deployDirectory Deployment of web application directory /apache-tomcat-8.0.32/web
apps/docs has finished in 17 ms
21-Aug-2019 08:55:46.511 INFO [localhost-startStop-1] org.apache.catalina.startup.HostConfig.deployDirectory Deploying web application directory /apache-tomcat-8.0.32/webapps
/host-manager
21-Aug-2019 08:55:46.530 INFO [localhost-startStop-1] org.apache.catalina.startup.HostConfig.deployDirectory Deployment of web application directory /apache-tomcat-8.0.32/web
apps/host-manager has finished in 19 ms
21-Aug-2019 08:55:46.534 INFO [main] org.apache.coyote.AbstractProtocol.start Starting ProtocolHandler ["http-nio-8080"]
21-Aug-2019 08:55:46.542 INFO [main] org.apache.coyote.AbstractProtocol.start Starting ProtocolHandler ["ajp-nio-8009"]
21-Aug-2019 08:55:46.544 INFO [main] org.apache.catalina.startup.Catalina.start Server startup in 688 ms
```

奔跑吧!!湯姆喵



put my image - repository

docker hub

docker registry

nexus

other ...

常用指令

docker build = 建立 **image**
docker run = 建立 **container** 並運行
docker logs -f = 檢視 **container** 運行過程中產生出來的**log**資訊
docker start = 啟動 **container**
docker stop = 停止 **container**
docker rm = 移除 **container**
docker ps = 檢視活動中的**container**
docker ps -a = 檢視全部的**container**
docker images = 檢視全部的**image**
docker image hisotry = 檢視**image**歷程

END

Thinking

How create
clean image ?