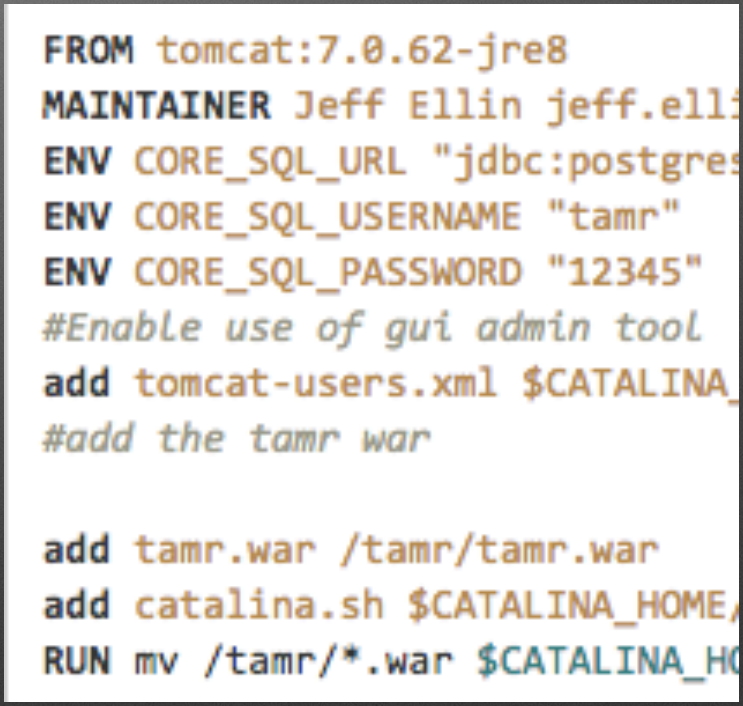
Docker Deep Dive

Creating Images with Dockerfiles

Dockerfile Basics

- Docker Images are built from a base image.
- Base Images are built up using simple instructions such as
  - Run a command.
  - Add a file or directory.
  - Create an environment variable.
  - What process to run when launching a container from this image.

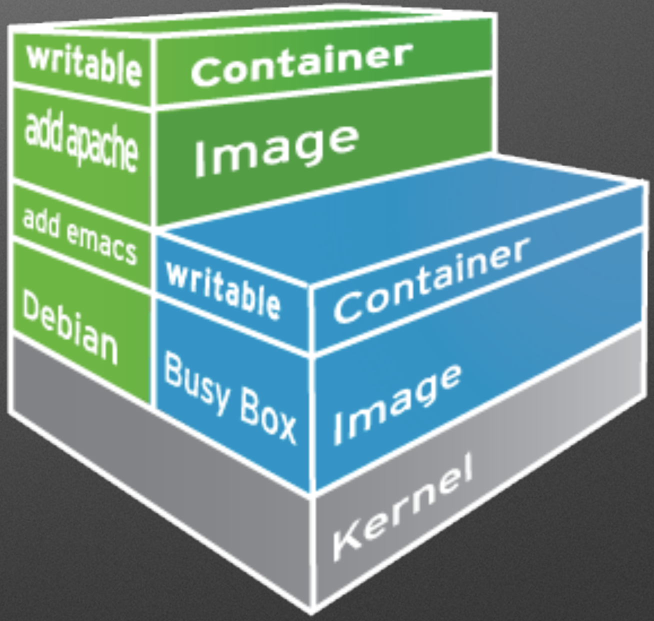


```
FROM tomcat:7.0.62-jre8
MAINTAINER Jeff Ellin jeff.elli
ENV CORE_SQL_URL "jdbc:postgres
ENV CORE_SQL_USERNAME "tamr"
ENV CORE_SQL_PASSWORD "12345"
#Enable use of gui admin tool
add tomcat-users.xml $CATALINA_
#add the tamr war

add tamr.war /tamr/tamr.war
add catalina.sh $CATALINA_HOME/
RUN mv /tamr/*.war $CATALINA_HO
```

Docker Images

- Docker images are read only templates from which containers are launched from
- Each image consists of a series of layers using the union file system
- When you change an image a new layer is created.



FROM

the FROM instruction sets the Base Image for subsequent instructions. As such, a valid Dockerfile must have FROM as its first instruction. The image can be any valid image – it is especially easy to start by pulling an image from the Public Repositories.

```
FROM java:8-jre
```

ENV

The ENV instruction is also useful for providing required environment variables specific to services you wish to containerize, such as Postgres's PGDATA.

```
ENV TOMCAT_MAJOR 8
ENV TOMCAT_VERSION 8.0.26
```

RUN

The RUN instruction will execute any commands in a new layer on top of the current image and commit the results. The resulting committed image will be used for the next step in the Dockerfile.

```
RUN apt-get update && apt-get install -y \
bzr \
cvs \
git \
mercurial \
subversion
```

ADD and Copy

The Add and Copy commands can be used to add files to the container.

- For Add if source file is a tar file the file will be extracted.
- Add allows source file to be a URL
- Use a trailing slash to indicate a directory vs a file.

```
COPY hom* /mydir/        # adds all files starting with "hom"
COPY hom?.txt /mydir/    # ? is replaced with any single character
```

EXPOSE

The EXPOSE instructions informs Docker that the container will listen on the specified network ports at runtime. Docker uses this information to interconnect containers using links (see the Docker User Guide) and to determine which ports to expose to the host when using the -P flag.

```
EXPOSE 8080
```

WORKDIR

The WORKDIR instruction sets the working directory for any RUN, CMD, ENTRYPOINT, COPY and ADD instructions that follow it in the Dockerfile.

It can be used multiple times in the one Dockerfile. If a relative path is provided, it will be relative to the path of the previous WORKDIR instruction.

```
WORKDIR $CATALINA_HOME
```

CMD

The main purpose of a CMD is to provide defaults for an executing container.

Can be overridden with arguments to docker run

```
CMD ["catalina.sh", "run"]
```

Building an Image

A Dockerfile that contains a set of instructions that tell Docker how to build our image. The Dockerfile can be used to generate an image stored on your local system.

Docker daemon does actual build process. Contents of current context (folder) is sent to the daemon. Reduce build overhead by using .dockerignore files.

Each Instruction creates a new layer in the image. The cache from previous builds is used as much as possible.

```
docker build -t jellin/tamr:v2 .
```

Deploying an Image

In order to share your image you can push it to a Docker Repository. Images can then be pulled from another host.

- Use the internal docker registry for private images.
- Use Docker Hub for public images.

```
docker tag jellin/tamr:v2 fe-build.tamrfield.com:jellin/tamr:v2

docker push fe-build:jellin/tamr:v2

docker pull fe-build:jellin/tamr:v2
```

Show some Examples

A Word on Volumes

- Docker volumes are containers for data.
    - Can be shared between containers
    - Can be mapped to specific directories on the host.
    - By Default removing the container does not remove the volume. (can lead to disk wastage due to orphaning volumes)
    - Data outside of a volume is kept in the union file system and is lost when the container is deleted.

Dockerfile Best Practices

- use .dockerignore to avoid adding unnecessary files to your image
- Don’t run apt-update on a single line. This will cause caching issues if the referenced archive gets updated, which will make your subsequent apt-get install fail without comment.
- Avoid installing unecessary packages

- Always use version tags in FROM statements. Avoid :latest
- Avoid run + commit, use a Dockerfile instead
- Installing ssh into a container is not clever
- One Process per container
- Leverage and understand the cache

References

- Dockerfile Best Practices
  https://docs.docker.com/articles/dockerfile_best-practices/