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and Configure Custom Docker Images with Dockerfile – Part 3

by Matei Cezar | Published: February 3, 2016 | Last Updated: February 3, 2016

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This tutorial will concentrate on how to build a custom Docker image based on **Ubuntu** with **Apache** service installed. The whole the process will be automated using a **Dockerfile**.

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Build Configure Docker Images with Dockerfile – Part 3

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Docker images can be automatically build form text files, named **Dockerfiles**. A Docker file contains step-by-step ordered instructions or commands used to create and configure a Docker image.

Requirements

- Install Docker and Learn Docker Container Manipulation – Part 1
- Deploy and Run Applications under Docker Containers – Part 2

Basically, a Docker file contains various instructions in order to build and configure a specific container based on your requirements. The following instructions are the most used, some of them being mandatory:

- `FROM` = Mandatory as first instruction in a Docker file. Instructs Docker to pull the base image from which you are building the new

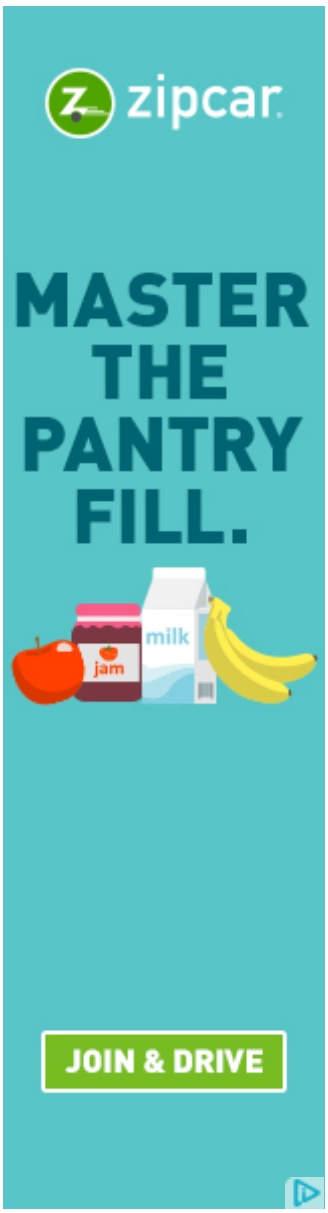

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image. Use a tag to specify the exact image from which you are building:

```
Ex: FROM ubuntu:14.04
```

- `MAINTAINER` = Author of the build image
- `RUN` = This instruction can be used on multiple lines and runs any commands after Docker image has been created.
- `CMD` = Run any command when Docker image is started. Use only one CMD instruction in a Dockerfile.
- `ENTRYPOINT` = Same as CMD but used as the main command for the image.
- `EXPOSE` = Instructs the container to listen on network ports when running. The container ports are not reachable from the host by default.
- `ENV` = Set container environment

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- **ADD** = Copy resources (files, directories or files from URLs).

Step 1: Creating or Writing Dockerfile Repository

1. First, let's create some kind of **Dockerfile**

```
# mkdir -p /var/docker/
# touch /var/docker/ubu
```

Create Dockerfile Repository

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2. Next, start editing the file with the following instructions:

```
# vi /var/docker/ubuntu
```

Dokerfile excerpt:

```
FROM ubuntu
MAINTAINER  your_name
RUN apt-get -y install
RUN echo “Hello Apache
EXPOSE 80
CMD /usr/sbin/apache2ct
```

Dockerfile Repository

Now, let’s go through the file instructions:

The first line tells us that we are building from an **Ubuntu** image. If no tag is submitted, say **14:10** for example, the latest image from **Docker Hub** is used.

On the second line we’ve added the **name** and **email** of the image creator. Next

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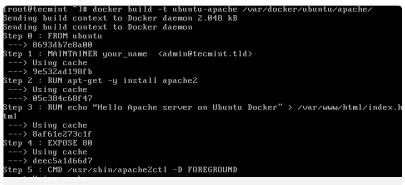
two **RUN** lines will be executed in the container when building the image and will install **Apache** daemon and **echo** some text into default apache web page.

The **EXPOSE** line will instruct **Docker** container to listen on port **80**, but the port will be not available to outside. The last line instructs the container to run Apache service in foreground after the container is started.

3. The last thing we need to do is to start creating the image by issuing the below command, which will locally create a new Docker image named `ubuntu-apache` based on the Dockerfile created earlier, as shown in this example:

```
# docker build -t ubunt
```



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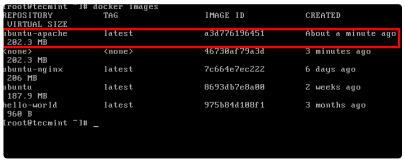
Create Docker Image

4. After the image has been created by **Docker**, you can list all available images and identify your image by issuing the following command:

```
# docker images
```



List All Docker Images

Step 2: Run the Container and Access Apache from LAN

5. In order to run the container continuously (in background) and access the container exposed services (ports) from the host or other remote machine in your LAN, run the below command on your host terminal prompt:

```
# docker run -d -p 81:8
```

Run Docker Container Image

Here, the `-d` option runs the `ubuntu-apache` container in background (as a daemon) and the `-p` option maps the container port **80** to your localhost port **81**. Outside LAN access to Apache service can be reached through port **81** only.

Netstat command will give you an idea about what ports the host is listening to.

After the container has been started, you can also run `docker ps` command to view the status of the running container.

6. The webpage can be displayed on your host from command line using **curl** utility against your machine IP Address, localhost or

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docker net interface on port 81. Use ip command line to show network interface IP addresses.

```
# ip addr
# curl ip-address:81
# curl localhost:81
```

Check Docker Network Interface and IP Address

Check Docker Apache Webpage

7. To visit the container webpage from your network, open a browser at remote location and use HTTP protocol, the IP Address of

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the machine where the container is running, followed by port 81 as illustrated on below image.

```
http://ip-address:81
```

Check Docker Container Apache Page

8. To get an inside of what processes are running inside the container issue the following command:

```
# docker ps
# docker top <name or I
```

Check Running Docker Processes

9. To stop the container issue `docker stop` command followed by the container ID or name.

```
# docker stop <name or
# docker ps
```

10. In case you want to assign a descriptive name for the container use the `--name` option as shown in the below example:

```
# docker run --name my-
# docker ps
```

Give Docker Container Name

Now you can reference the container for manipulation (start, stop, top, stats etc) only by using the assigned name.

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```
# docker stats my-www
```

Monitor Docker Container Utilization

Step 3: Create a System-wide Configuration File for Docker Container

11. On **CentOS/RHEL 7** you can create a **systemd** configuration file and manage the container as you normally do for any other local service.

For instance, create a new systemd file named, let's say, `apache-docker.service` using the following command:

```
# vi /etc/systemd/syste
```

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apache-docker.service file excerpt:

```
[Unit]
Description=apache cont
Requires=docker.service
After=docker.service
[Service]
Restart=always
ExecStart=/usr/bin/dock
ExecStop=/usr/bin/docke
[Install]
WantedBy=local.target
```

12. After you finish editing the file, close it, reload the systemd daemon to reflect changes and start the container by issuing the following commands:

```
# systemctl daemon-relo
# systemctl start apach
# systemctl status apac
```

This was just a simple example on what you can do with a simple **Dockerfile** but you can pre-build some pretty sophisticated applications that you can fire-up in just a matter of seconds with minimal resources and effort.

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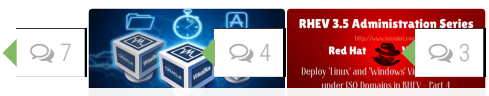

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February 13, 2016 at 3:19 pm

Thank you for the great article Matei Cezar

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vignesh.s February 4, 2016 at 12:25 pm

Can you please share the docker image script of centos image?

Reply

Matei Cezar

February 4, 2016 at 8:33 pm

Replace the following variables:
FROM centos
RUN yum -y install httpd
CMD /usr/sbin/apachectl -D FOREGROUND

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