Red Hat

Automating Container Management with Ansible

Building Container Images

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Objectives

This module demonstrates how to:

- Create container images with a Dockerfile.
- Automate creation of container images with Docker modules in Ansible.

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Writing Dockerfiles

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Dockerfile

- A Dockerfile is a text file used by Docker to automate the building of container images.
- Specifies a base image with which to start.
- Uses a set of steps called instructions to modify the base image to create a final image.
- Each instruction creates a new layer on the image that is used to build the final container image. Instructions in a Dockerfile are executed in the order they appear.
- Using a Dockerfile is the suggested approach to building Docker images because it controls which files are added to each layer.

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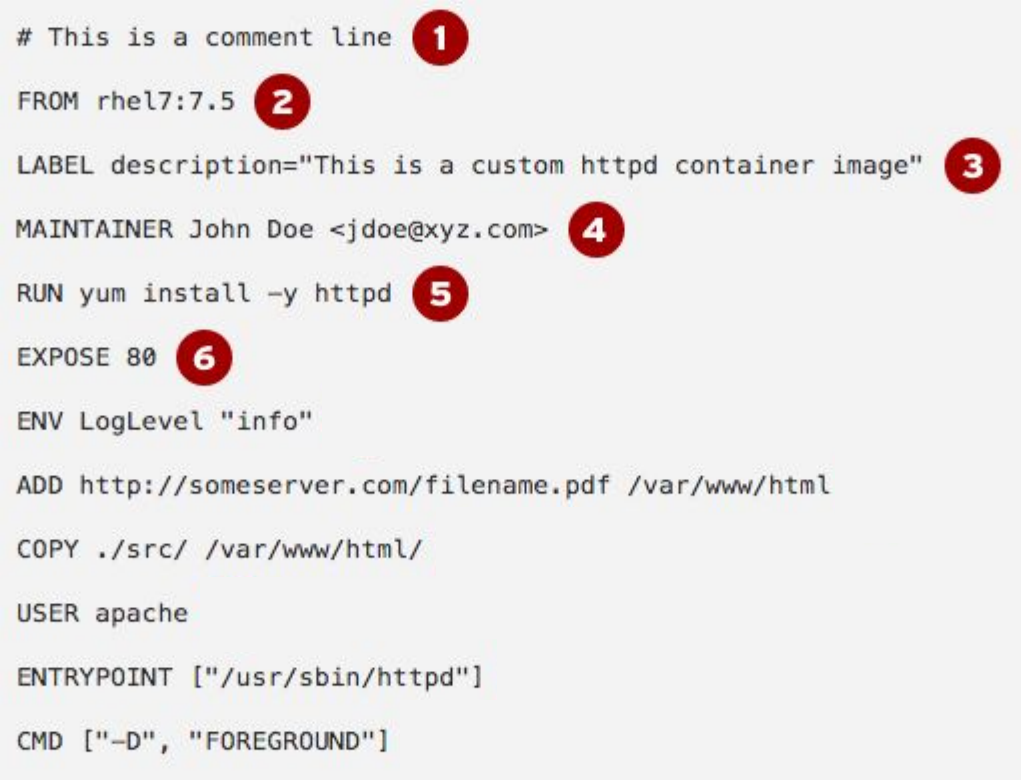
Dockerfile Example

1. Lines that begin with a pound sign (**#**) are comments.
2. The new container image will be constructed using **rhel7:7.5** container base image. Dockerfiles must begin with the **FROM** instruction.
3. **LABEL** is responsible for adding generic metadata to an image. A **LABEL** is a simple key/value pair.
4. **MAINTAINER** is responsible for setting the Author field of the generated container image.
5. **RUN** executes commands in a new layer on top of the current image, then commits the results.
6. **EXPOSE** indicates that the container listens on the specified network port at runtime. The **EXPOSE** instruction defines metadata only; it does not make ports accessible from the host.



```
# This is a comment line 1
FROM rhel7:7.5 2
LABEL description="This is a custom httpd container image" 3
MAINTAINER John Doe <jdoe@xyz.com> 4
RUN yum install -y httpd 5
EXPOSE 80 6
ENV LogLevel "info"
ADD http://someserver.com/filename.pdf /var/www/html
COPY ./src/ /var/www/html/
USER apache
ENTRYPOINT ["/usr/sbin/httpd"]
CMD ["-D", "FOREGROUND"]
```

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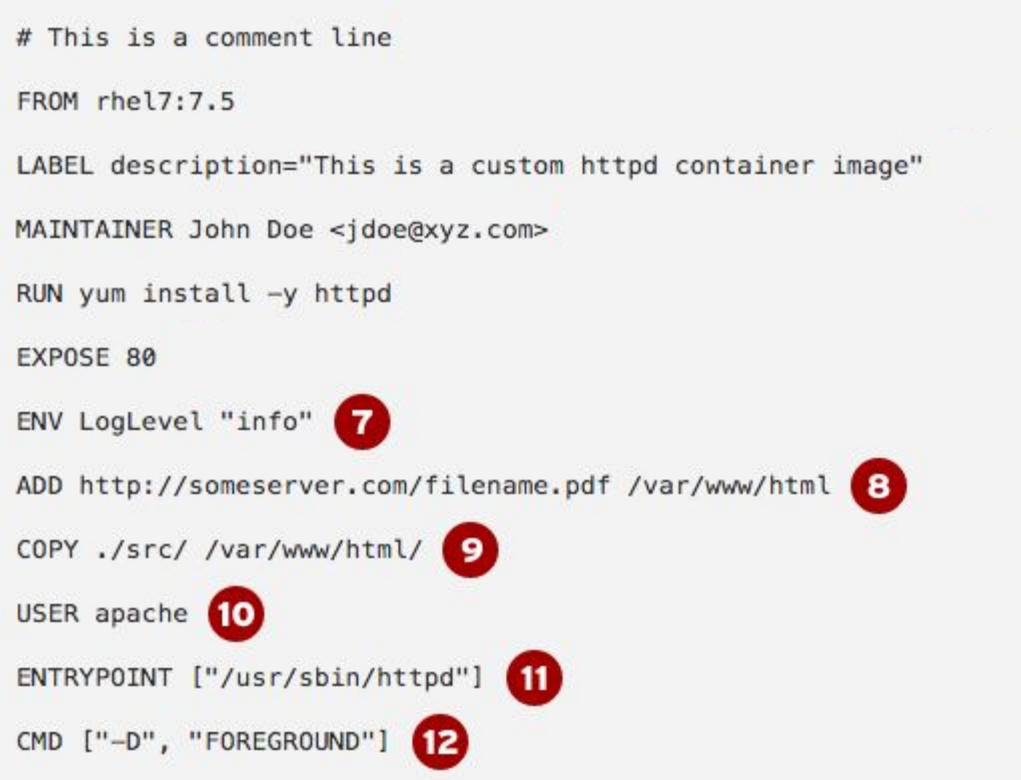
Dockerfile Example, Continued

7. **ENV** is responsible for defining environment variables that will be available to the container.
8. **ADD** copies files from local or remote source and adds them to the container's file system.
9. **COPY** only copies files from local source and adds them to the container's file system.
10. **USER** specifies the username or the UID to use when running the container image for the **RUN**, **CMD**, and **ENTRYPOINT** instructions.
11. **ENTRYPOINT** specifies the default command to execute when the container is created.
12. **CMD** provides the default arguments for the **ENTRYPOINT** instruction.



```
# This is a comment line
FROM rhel7:7.5
LABEL description="This is a custom httpd container image"
MAINTAINER John Doe <jdoe@xyz.com>
RUN yum install -y httpd
EXPOSE 80
ENV LogLevel "info"
ADD http://someserver.com/filename.pdf /var/www/html
COPY ./src/ /var/www/html/
USER apache
ENTRYPOINT ["/usr/sbin/httpd"]
CMD ["-D", "FOREGROUND"]
```

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Docker Build

- The **`docker build`** command processes the `Dockerfile` and builds a new image based on the instructions it contains.

- The syntax for this command is as follows:

```
$ docker build -t NAME:TAG DIR
```

  - *`DIR`* is the path to the working directory. It can be the current directory (.).
  - *`NAME:TAG`* is a name with a tag that is assigned to the new image. It is specified with the **`-t`** option. If the *`TAG`* is not specified, then the image is automatically tagged as **`latest`**.

  - Note that the build is run by the Docker daemon, not by the **`docker`** CLI command.

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Creating Container Images with Ansible

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Docker Modules

The Ansible modules for Docker require the Docker Engine API Python library. To install run the following inside a virtualenv:

```
    # pip install docker
```

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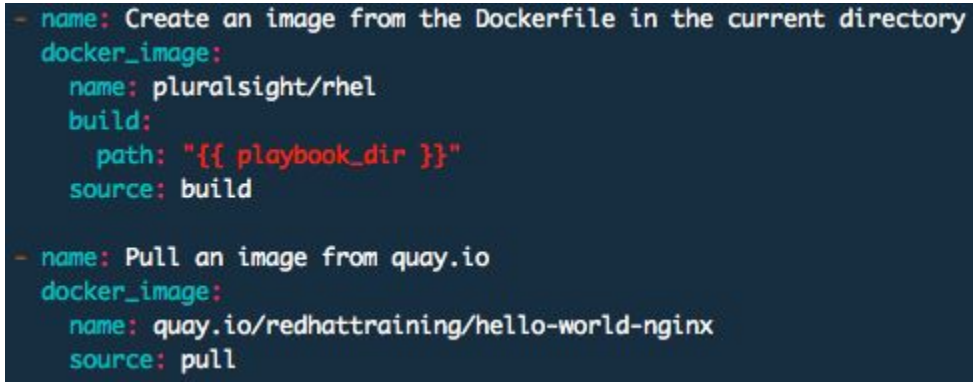
Docker Image Module

The `docker_image` Ansible module can be used to automate image creation from a Dockerfile.

It can also be used to retrieve an existing image from a container registry (such as docker.io or quay.io), tag an image into a repository, and archive an image to a tar file.



```yaml
- name: Create an image from the Dockerfile in the current directory
  docker_image:
    name: pluralsight/rhel
    build:
      path: "{{ playbook_dir }}"
    source: build

- name: Pull an image from quay.io
  docker_image:
    name: quay.io/redhattraining/hello-world-nginx
    source: pull
```

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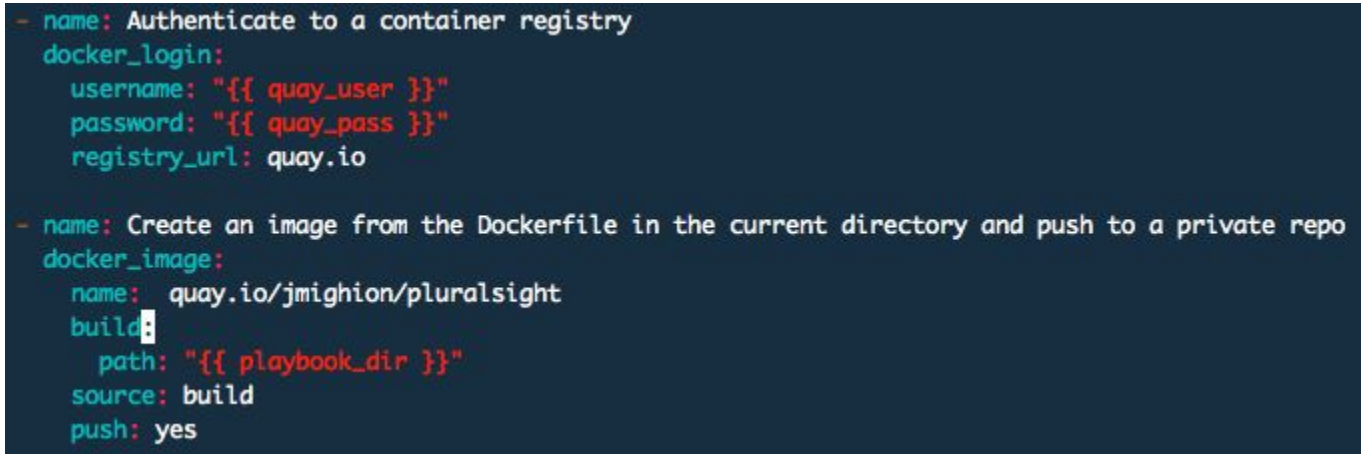
Docker Login Module

The `docker_login` Ansible module can be used to authenticate to a container registry and add credentials to your local configuration file. The module provides functionality similar to the **`docker login`** command.



```
- name: Authenticate to a container registry
  docker_login:
    username: "{{ quay_user }}"
    password: "{{ quay_pass }}"
    registry_url: quay.io

- name: Create an image from the Dockerfile in the current directory and push to a private repo
  docker_image:
    name:  quay.io/jmighion/pluralsight
    build:
      path: "{{ playbook_dir }}"
    source: build
    push: yes
```

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