CONTAINERS AND KUBERNETES , TIPS & TRICKS

How to Create a Docker Image From a Container

by Amit Sharma

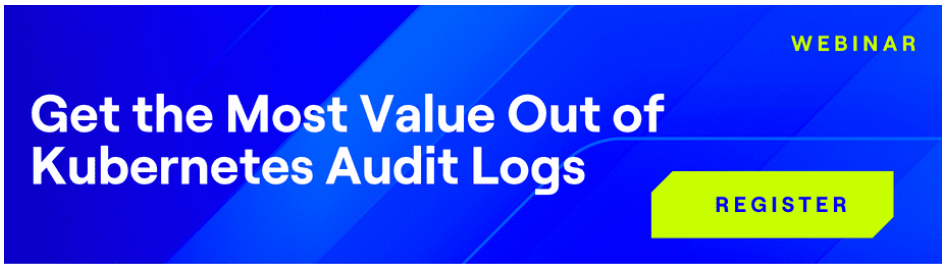
Published May 7, 2022 | 14 min read

In this article, I'll provide step-by-step instructions on how to create a Docker container, modify its internal state, and then save the container as an image.

This is really handy when you're working out how an image should be constructed because you can just keep tweaking a running container until it works as you want it to. When you're done, just save it as an image. You can use the following guide to customize and deploy the DataSet agent for common tasks such as adding parsers for your log files, adding

redaction/sampling rules, running custom plugins, or mounting volumes for application log files.

Before we jump right into it, we'd like to invite you to a relevant webinar on how to get the most value out of your Kubernetes Audit logs. If you run Docker containers in K8s environments, we will cover the best practices to implement comprehensive, secure, and efficient audit logs in production Kubernetes clusters. We look forward to seeing in the webinar.



Step 1: Create a Base Container

Let's get started by creating a running container. So that we don't get bogged down in the details of any particular container, we can use nginx.

The Docker create command will create a new container for us from the command line:

```
~ docker create --name nginx_base -p 80:80 nginx:alpine
```

Here we have requested a new container named nginx_base with port 80 exposed to localhost. We

are using nginx:alpine as a base image for the container.

If you don't have the nginx:alpine image in your local docker image repository, it will download automatically. When this happens, you will see something like this:

```
Unable to find image 'nginx:alpine' locally
alpine: Pulling from library/nginx
df9b9388f04a: Pull complete
5867cba5fcbd: Pull complete
4b639e65cb3b: Pull complete
061ed9e2b976: Pull complete
bc19f3e8eeb1: Pull complete
4071be97c256: Pull complete
Digest: sha256:5a0df7fb7c8c03e4158ae9974bfbd6a15da2bdfde
Status: Downloaded newer image for nginx:alpine
85b13f4d8a9bcdab4fbae540cf7bf3704eab13b57c5f44a2d3529d86
```

Step 2: Inspect Images

If you look at the list of images on your system, you will now see the nginx:alpine image:

```
➜  ~ docker images -a
REPOSITORY                          TAG       IMAGE ID
amitsharma/nginx-reverse-proxy      v1        1037dc5f8db4
nginx-reverse-proxy                 latest    1037dc5f8db4
amitsharma/web-server-app           v1        09a0abf08e08
web-server-app                      latest    09a0abf08e08
nginx                               alpine    51696c87e77e
```

Step 3: Inspect Containers

Note here that the container is not running, so you won't see it in the container list unless you use the -a flag (-a is for all).

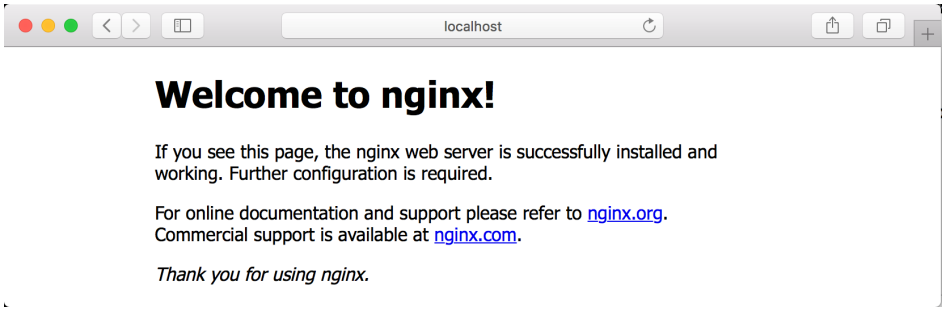
```
➜  ~ docker ps -a
CONTAINER ID    IMAGE          COMMAND                  C
c365af6303e4    nginx:alpine   "/docker-entrypoint.…"   6
```

Step 4: Start the Container

Let's start the container and see what happens.

```
➜  ~ docker start nginx_base
nginx_base
```

Now visit http://localhost with your browser. You will see the default "Welcome to nginx!" page. We are now running an nginx container.



Step 5: Modify the Running Container

So if you wanted to modify this running container so that it behaves in a specific way, there are a variety

of ways to do that.

In order to keep things as simple as possible, we are just going to copy a new index.html file onto the server. You could do practically anything you wanted here.

Let's create a new index.html file and copy it onto the running container. Using an editor on your machine, create an index.html file in the same directory that you have been running Docker commands from.

Then paste the following HTML into it:

```
<html>
<head>
<title>Hello World</title>
</head>
<body>
<h1>Hello World!</h1>
</body>
```

Then save the file and return to the command line. We will use the docker cp command to copy this file onto the running container.

```
➜  ~ docker cp index.html nginx_base:/usr/share/nginx/ht
```

Now reload your browser or revisit http://localhost. You will see the message "Hello World!" in place of the default nginx welcome page.

Step 6: Create an Image From a Container

So at this point, we've updated the contents of a running container and as long as we keep that container around, we don't need to do anything.

However, we want to know how to save this container as an image so we can make other containers based on this one. The Docker commands to do this are quite simple.

To save a Docker container, we just need to use the docker commit command like this:

```
➜  ~ docker commit nginx_base
sha256:0c17f0798823c7febc5a67d5432b48f525320d671beb2e6f0
```

Now look at the docker images list:

```
➜  ~ docker images -a
REPOSITORY                      TAG       IMAGE ID
<none>                          <none>    0c17f0798823
amitsharma/nginx-reverse-proxy  v1        1037dc5f8db4
nginx-reverse-proxy             latest    1037dc5f8db4
amitsharma/web-server-app       v1        09a0abf08e08
web-server-app                  latest    09a0abf08e08
nginx                           alpine    51696c87e77e
```

You can see there is a new image there. It does not have a repository or tag, but it exists. This is an image created from the running container. Let's tag it so it will be easier to find later.

Step 7: Tag the Image

Using docker tag, we can name the image we just created. We need the image ID for the command, so given that the image ID listed above is 0c17f0798823, our command will be:

```
➜  ~ docker tag 0c17f0798823 hello_world_nginx
```

And if we look at the index of images again, we can see that the <None>s were replaced:
We can actually use complicated tags here with version numbers and all the other fixings of a tag command, but for our example, we'll just create an image with a meaningful name.

Step 8: Create Images With Tags

You can also tag the image as it is created by adding another argument to the end of the command like this:

```
➜  ~ docker commit nginx_base hello_world_nginx
```

This command effectively commits and tags at the same time, which is helpful but not required.

Step 9: Delete the Original Container

Earlier we started a Docker container. We can see that it is still running using the docker ps command.

```
➜  ~ docker ps
CONTAINER ID   IMAGE          COMMAND                  C
c365af6303e4   nginx:alpine   "/docker-entrypoint.…"   3
```

Let's stop and remove the Docker container that is currently running and delete it.

```
➜  ~ docker stop nginx_base
nginx_base
➜  ~ docker rm nginx_base
nginx_base
```

If we list all of the Docker containers, we should have none:

```
➜  ~ docker ps -a
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    P
```

Now, let's create a new container based on the image we just created and start it.

```
➜  ~ docker run --name hello_world -d -p 80:80 hello_wor
7ca08e03862dcdaba754718be2fef18b8f9c57291fe25da239bd615a
```

Note that docker run is the equivalent of executing docker create followed by docker start; we are just saving a step here.

The -d option tells Docker to run the container detached so we get our command prompt back.

Step 10: Look at Running Containers

If you look at the running containers now, you will see we have one called hello_world:

```
➜ ~ docker ps
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
7ca08e03862d hello_world_nginx "/docker-entrypoint.…" 2
```

Now go look at http://localhost.

As you can see, the index.html page now shows the "Hello World!" message just like we wanted.

Stop the container hello_world before moving on to the next section.

```
➜  ~ docker stop hello_world
hello_world
```

Step 11: Consider Your Options

There are a few optional things we can do using the commit command that will change information about our images.

For example, we might want to record who the author of our image is or capture a commit message telling us about the state of the image.

These are all controlled through optional parameters to the commit command.

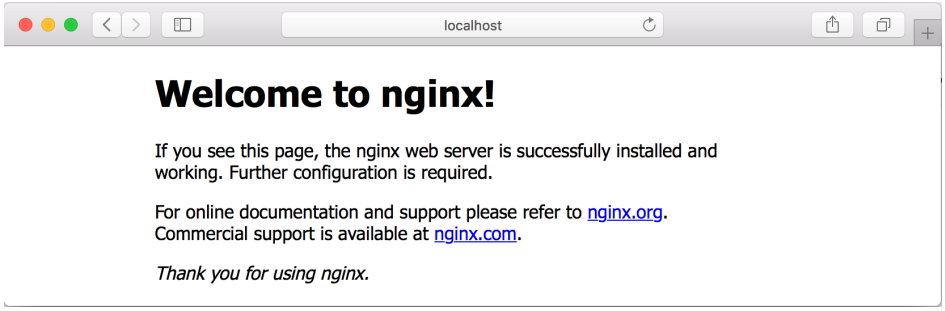
Let's go back to our original running container. We are going to use a slightly different command here to make cleanup easier:

```
➜  ~ docker run --name nginx_base --rm -d -p 80:80 nginx
92158632375ff41c0232cf69fcdff7beeec981ffd552eaaef11f45db
```

This command will run the image nginx:alpine with the name nginx_base; the creation of the image will be included in the command execution.

The –rm will cause the container to be deleted when it is shut down. The -d tells the command line client to run in detached mode. This will allow us to run other commands from the same terminal.

So if you visit http://localhost now, you should see the default nginx welcome page.



We went through changing things about the running container above, so I won't repeat that work here; instead, we want to look at the various options around the commit sub-command.

Option A: Set Authorship

Let's start by setting the authorship of the image. If you inspect the docker image hello_world_nginx above, you will discover that its author field is blank.

We will use the docker inspect command to get the details of the image and grep out the author line.

```
➜  ~ docker inspect hello_world_nginx | grep Author
        "Author": "",
```

So if we use the author option on the docker commit command, we can set the value of the author field.

```
➜  ~ docker commit --author amit.sharma@sentinelone.com
sha256:d0229f7f014bc510c16ec03d3c9ebcf25594827fde18c274c
```

And we can check the authorship of that image:

```
➜  ~ docker inspect authored | grep Author
        "Author": "amit.sharma@sentinelone.com",
```

Let's delete that image and try some other options:

```
➜  ~ docker rmi authored
Untagged: authored:latest
Deleted: sha256:d0229f7f014bc510c16ec03d3c9ebcf25594827f
Deleted: sha256:6d2a62cfa2e2801b9a9e5ed0a5ccf5e173e621e7
```

Option B: Create Commit Messages

Let's say you want a commit message to remind yourself what the image is about or what the state of the container was at the time the image was made.

There is a –message option you can use to include that information.

Execute this command:

```
➜  ~ docker commit --message 'this is a basic nginx imag
sha256:d717f5e1285ec7a539f1e59908375ef3111f59f176ec0e40e
```

Using the image name, we can look at the history of the Docker image to see our message. Here we are using the docker history command to show the change history of the image we created:

```
➜  ~ docker history mmm
IMAGE          CREATED              CREATED BY
d717f5e1285e   About a minute ago   nginx -g daemon off;
51696c87e77e   4 weeks ago          /bin/sh -c #(nop)  C
      4 weeks ago          /bin/sh -c #(nop)  STOPSIGNAL
      4 weeks ago          /bin/sh -c #(nop)  EXPOSE 80
      4 weeks ago          /bin/sh -c #(nop)  ENTRYPOINT
      4 weeks ago          /bin/sh -c #(nop) COPY file:0
      4 weeks ago          /bin/sh -c #(nop) COPY file:0
      4 weeks ago          /bin/sh -c #(nop) COPY file:0
      4 weeks ago          /bin/sh -c #(nop) COPY file:6
      4 weeks ago          /bin/sh -c set -x      && addg
      4 weeks ago          /bin/sh -c #(nop) ADD file:5d
```

Notice that we see the entire history here, and the first entry is from our commit of the running container. The first line listed shows our commit message in the rightmost column.

Let's remove this image and check out the other options:

```
➜  ~ docker rmi mmm
Untagged: mmm:latest
Deleted: sha256:d717f5e1285ec7a539f1e59908375ef3111f59f1
Deleted: sha256:6d2a62cfa2e2801b9a9e5ed0a5ccf5e173e621e7
```

Option C: Commit Without Pause

When you use the commit command, the container will be paused.

For our little play container this is unimportant, but you might be doing something like capturing an image of a production system where pausing isn't an option.

You can add the –pause=false flag to the commit command, and the image will be created from the container without the pause.

```
➜  ~ docker commit --pause=false nginx_base wo_pause
sha256:d78b9fb9c8a0115dd22ad6d142507d44c6300e90bbc32feb6
```

If you don't pause the container, you run the risk of corrupting your data.

For example, if the container is in the midst of a write operation, the data being written could be corrupted

or come out incomplete. That is why, by default, the container gets paused before the image is created.

Let's remove this image and check out the other options:

```
➜  ~ docker rmi wo_pause
Untagged: wo_pause:latest
Deleted: sha256:d78b9fb9c8a0115dd22ad6d142507d44c6300e90
Deleted: sha256:6d2a62cfa2e2801b9a9e5ed0a5ccf5e173e621e7
```

Option D: Change Configuration

The last option I want to discuss is the -c or –change flag. This option allows you to set the configuration of the image.

You can change any of the following settings of the image during the commit process:

- CMD
- ENTRYPOINT
- ENV
- EXPOSE
- LABEL
- ONBUILD
- USER
- VOLUME
- WORKDIR

Nginx's original docker file contains the following settings:

- CMD ["nginx", "-g", "daemon off;"]
- ENV NGINX_VERSION 1.15.3
- EXPOSE 80

So we will just play with one of those for a moment. The NGINX_VERSION and EXPOSE could cause issues with container startup, so we will mess with the command line (CMD) executed by the container.

Nginx allows us to pass the -T command line argument that will dump its configuration to standard out. Let's make an image with an alternate CMD value as follows:

```
➜  ~ docker commit --change='CMD ["nginx", "-T"]' nginx_
sha256:0a6cf9c4443e9d0a7722aeaf528ffc6b40622bf991928dfb9
```

Now stop the nginx_base container with this command:

```
➜  ~ docker stop nginx_base
nginx_base
```

And start a new container from the image we just created:

```
➜  ~ docker run --name dumper -p 80:80 conf_dump
```

The configuration for the nginx process will be dumped to standard out when you execute this

command. You can scroll back several pages to find the command we executed.

Creating Docker Images: Conclusion

The docker commit subcommand is very useful for diagnostic activities and bootstrapping new images from existing containers.

As I showed above, there are many helpful options available, too. The Docker CLI has many other power commands. If you like, you can explore some of them here.

DataSet is the best-of-breed log analytics solution for dynamic container environments. It is the only solution that provides unmatched performance and scale while optimizing the total cost of ownership.

Try DataSet For Free

To find out more about working with Docker and DataSet, check out these resources:
Installing the DataSet Agent in Docker
Configure the DataSet Agent for Docker

Unmatched Scale and Performance at a Lower Cost. Unlock the Ultimate Live Data Experience.

Get a Demo →