Sunday, 11 July 2021

Making Custom Docker Images for Kathara

Quick Start

This guide outlines the various steps required for creating a custom docker image needed to run the kathara lab for the Virtualisation of Internet Insecurity Demonstration.

Prerequisites

To create a custom docker image, you need to install the docker desktop/client, create an account and sign. You also need to have kathara installed.

Creating Custom Kathara Docker Image

There are two main ways to create a custom docker image i.e. to build from source and to extend an existing image. I used to second method (extending an existing image) since the existing kathara/quagga image has the the basic packages required to run the kathara lab. Extending an existing image creates a copy out of the existing image and allows you to add more packages to the copied image. Remember that by default docker needs root or sudo on Linux. The steps to achieve this are outlined below (Run the commands in the terminal or command line):

1. docker pull kathara/quagga

```
(base) kwakuappiah-adu ~
$ docker pull kathara/quagga
Using default tag: latest
latest: Pulling from kathara/quagga
Digest: sha256:e7bcb565ae1d3c7f7a59d8321a460398fd43560b53b4add3c3736eb0239f781f
Status: Image is up to date for kathara/quagga:latest
docker.io/kathara/quagga:latest
```

kathara/quagga is the name of the image that was extended to create the custom docker image. By default kathara labs are launched using this image. This command pulls the latest kathara/quagga image from the remote kathara docker repository.

2. docker run -tid --name custom-kathara-image kathara/quagga

```
(base) kwakuappiah-adu ~
$ docker run -tid --name custom-kathara-image kathara/quagga
5b4396307d57fe75ed546dc4d055fec7b8b1f9f4ac19e50313f03263a56d0d90
```

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This command creates a copy of the existing kathara/quagga image called “custom-kathara-image”.

3. docker exec -ti custom-kathara-image bash

```
(base) kwakuappiah-adu ~
$ docker exec -ti custom-kathara-image bash
root@5b4396307d57:/#
```

This command creates a bash prompt for the custom-kathara-image container that allows you to manually install packages needed onto the custom-kathara-image with apt.

Before installing the needed packages, run “apt update” in the bash prompt of the running container.

```
root@5b4396307d57:/# apt update
Get:1 http://security.debian.org/debian-security stretch/updates InRelease [53.0 kB]
Ign:2 http://deb.debian.org/debian stretch InRelease
Get:3 http://deb.debian.org/debian stretch-updates InRelease [93.6 kB]
Get:4 http://deb.debian.org/debian stretch Release [118 kB]
Get:5 http://deb.debian.org/debian stretch Release.gpg [2410 B]
Get:6 http://security.debian.org/debian-security stretch/updates/main amd64 Packages [700 kB]
Get:7 http://deb.debian.org/debian stretch/main amd64 Packages [7080 kB]
Fetched 8047 kB in 1s (5174 kB/s)
Reading package lists... Done
Building dependency tree
Reading state information... Done
46 packages can be upgraded. Run 'apt list --upgradable' to see them.
root@5b4396307d57:/#
```

Afterwards, run the commands required to install the needed packages. For my custom-kathara-image, I run “apt-get install -y python3-paramiko” to install the paramiko python module needed to send the commands via ssh to the router in the Kathara lab.

```
root@5b4396307d57:/# apt-get install -y python3-paramiko
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  python3-cffi-backend python3-cryptography python3-idna python3-pkg-resources python3-pyasn1
  python3-setuptools python3-six
Suggested packages:
  python-cryptography-doc python3-cryptography-vectors python3-gssapi doc-base python-setuptools-doc
The following NEW packages will be installed:
  python3-cffi-backend python3-cryptography python3-idna python3-paramiko python3-pkg-resources
  python3-pyasn1 python3-setuptools python3-six
0 upgraded, 8 newly installed, 0 to remove and 46 not upgraded.
Need to get 825 kB of archives.
After this operation, 4327 kB of additional disk space will be used.
Get:1 http://deb.debian.org/debian stretch/main amd64 python3-cffi-backend amd64 1.9.1-2 [70.1 kB]
Get:2 http://deb.debian.org/debian stretch/main amd64 python3-idna all 2.2-1 [32.7 kB]
Get:3 http://deb.debian.org/debian stretch/main amd64 python3-pyasn1 all 0.1.9-2 [34.5 kB]
Get:4 http://deb.debian.org/debian stretch/main amd64 python3-pkg-resources all 33.1.1-1 [137 kB]
Get:5 http://deb.debian.org/debian stretch/main amd64 python3-setuptools all 33.1.1-1 [215 kB]
Get:6 http://deb.debian.org/debian stretch/main amd64 python3-six all 1.10.0-3 [14.4 kB]
Get:7 http://deb.debian.org/debian stretch/main amd64 python3-cryptography amd64 1.7.1-3+deb9u2 [211 kB]
Get:8 http://deb.debian.org/debian stretch/main amd64 python3-paramiko all 2.0.0-1 [111 kB]
```

After the packages have been installed exit the bash prompt of the container to return to the terminal/command line.

```
root@5b4396307d57:/# exit
exit
(base) kwakuappiah-adu ~
```

4. docker commit custom-kathara-image kathara/custom-kathara-image

```
(base) kwakuappiah-adu ~
$ docker commit custom-kathara-image kathara/custom-kathara-image
sha256:a0768dd79ff3119ce26f4777d3d15f6df035ee402a44862b8ac66d1d6bf26ee5
```

This command commits the changes that have been made to the custom-kathara-image that was created out of the existing kathara image.

5. docker rm -f custom-kathara-image

```
(base) kwakuappiah-adu ~
$ docker rm -f custom-kathara-image
custom-kathara-image
```

This command removes the running container “custom-kathara-image” since the packages have now been installed.

6. docker image ls

```
(base) kwakuappiah-adu ~
$ docker image ls
REPOSITORY                      TAG         IMAGE ID       CREATED          SIZE
kathara/custom-kathara-image    latest      a0768dd79ff3   21 minutes ago   952MB
kathara/custom-ssh              latest      9bfdcab14075   5 days ago       954MB
kathara/quagga                  debian10    1e42fd012a82   5 days ago       798MB
kathara/base                    debian10    8b7dfeeb2c5a   5 days ago       773MB
custom-image                    latest      9e58e4a46e62   13 days ago      816MB
kathara/quagga                  latest      68a8736f634a   4 months ago     927MB
```

This command lists the docker images that have been created. As can be seen at the top the the custom-kathara-image has been created successfully.

7. kathara lstart -o “image=kathara/custom-kathara-image”

```
(base) kwakuappiah-adu (main) MITM-KATHARA
$ kathara lstart -o "image=kathara/custom-kathara-image"
```

Run this command in the kathara lab directory to start the lab with the custom kathara image.