

DT149G - Administration of UNIX-like systems

Mobile Nuntius servitium

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1 Introduction

In this laboratory assignment you will now take the e-mail server you created in the previous lab, and run it inside a container.

2 Aim

After completion of this assignment you will:

- Have the knowledge of creating your own docker image.
- Have a better insight into how containers can be created and used.

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3 Reading instructions

Before starting this assignment you should have read Nemeth et al., 2011, ch. 22, 17.13 or Nemeth et al., 2017, ch. 27.6, 27.8, 16.10. You should also have read inc, 2024, Core concepts, Building.

4 Tasks

This laboratory assignment can only be done after you have finished the DNS-lab and the E-mail lab.

The new container running your email-service will be given the IP-address: 10.YY.MM.5. Start by updating the Zone-file for `mcduckcorp.duckburg.cali` and point all the mail and MX-records to this new IP address.

4.1 Preparing host system

Before you start creating your own docker image, start by setting up your container environment similar to the one in L4.

That is, create a new container root for example `/var/docker/email`, and then link the local folders used by postfix, OpenDKIM and SPF to this container-root.

The files and folders used by each program are the following (*These folders might be different, depending on software versions and the Linux-distribution used. Adapt accordingly*):

- Postfix
 - `/etc/postfix/`
 - `/etc/ssl/`
 - `/var/mail`
- OpenDKIM
 - `/etc/opendkim.conf`
 - `/etc/opendkim/`
 - `/etc/default/opendkim`
 - `/etc/dkimkeys/`
 - `/etc/mailname`
 - `/etc/mail/`
- Policyd-spf
 - `/etc/postfix-policyd-spf-python`

Finally copy your configurations from the email-lab to your new environment. Ensure that the permissions are set correctly!

Remember to also link in your `/etc/passwd` and `/etc/group-files`

To answer in your report For this task, present the following in your report:

- Include a screenshot of your folder hierarchy by issuing the command `tree /var/docker/`
- Write one sentence per file and folder, explaining its purpose.

4.2 Configurations

Create the following folder `~/mail_container`. In this folder will add three files.

- `launch_email_services_<studentID>.sh` — Script that will run inside the container at start.
- `Dockerfile` — The Dockerfile containing all the instructions to create an image.
- `run_email.sh` — A script that you will use to start the container from your host.

4.2.1 `launch_email_services_<studentID>.sh`

Your launch script should do the following:

- Create the `/var/spool/postfix/openssl` folder
- Set the owner and permissions for the openssl-files, including the folder created above.
- Start the OpenDKIM service
- Run the `postfix set-permissions` command.
 - This will fix any potential permission problems related to postfix.
- Start postfix in foreground mode
 - This is important, since otherwise the container will not be kept running.

To answer in your report For this task, present the following in your report:

- Include a screenshot of your *commented* launch script.

4.2.2 Dockerfile

To create a docker container, you will need to write your own Dockerfile inc, 2024, Core concepts. The Dockerfile contains all the commands and information necessary for docker to create an image.

Start by creating an empty Dockerfile and add the following instructions:

- `FROM <base image>`
- `COPY <launch script>`

- RUN <installation instructions>
- CMD <run the startup script>

You might have to temporarily change back your DNS-server to your hosts DNS-server while building the Docker-image.

Once you have finished writing your Dockerfile, you can build your docker image.

Name your image **email_<studentID>**

Confirm that your image is available by running the command:

```
# docker image ls
```

To answer in your report For this task, present the following in your report:

- Include a screenshot showing your *commented* Dockerfile
- Motivate the choice of base image
- Describe the command you had to run to create your image
- Include a screenshot showing your newly created docker image.
- Summarize the process of creating your docker image. What difficulties did you have?

4.2.3 run_email.sh

This script should be written in a similar way as your scripts to start the different bind9-containers.

```
docker run \
-t \
-d \
--name=email_<studentID> \
--net=dt149g<StudentID> \
--ip=10.YY.MM.5 \
--log-driver=syslog \
-e TZ=Europe/Stockholm \
-v /var/docker/email/etc/passwd:/etc/passwd \
-v /var/docker/email/etc/group:/etc/group \
-v /var/docker/email/etc/postfix:/etc/postfix/ \
-v /var/docker/email/etc/ssl:/etc/ssl/ \
-v /var/docker/email/etc/opendkim.conf:/etc/opendkim.conf \
-v /var/docker/email/etc/opendkim:/etc/opendkim/ \
-v /var/docker/email/etc/default/opendkim:/etc/default/opendkim \
-v /var/docker/email/etc/dkimkeys:/etc/dkimkeys/ \
-v /var/docker/email/etc/mail:/etc/mail \
-v /var/docker/email/etc/postfix-policyd-spf-python:/etc/postfix-policyd-spf-python \
-v /var/docker/email/var/mail:/var/mail/ \
-v /etc/mailname:/etc/mailname \
--rm \
email_<studentID>
```

Ensure that your locally running Postfix and OpenDKIM services are shut down before you start your container.

To answer in your report For this task, present the following in your report:

- Include a screenshot of your script used to start your docker image
- Explain each line of the script.
- Include a screenshot of your docker network.
- Include a screenshot of all your docker containers running.

4.3 Testing the email-server

You can now try to send an email using your newly setup postfix-container.

- Include a screenshot showing the full header of the email that you sent, to show that your email server and DKIM works properly.

5 Examination

Hand in a report containing all your solutions to the questions in Section 4. *Remember that you must include references to the given reading instructions, alternatively to the laboratory work you have done*

References

- inc, D. (2024). *Overview of docker build*. Retrieved October 25, 2024, from <https://docs.docker.com/build/>
- Nemeth, E., Snyder, G., Hein, T. R., & Whaley, B. (2011). *Unix and linux system administration handbook* (4th ed.). Prentice Hall.
- Nemeth, E., Snyder, G., Hein, T. R., Whaley, B., & Mackin, D. (2017). *Unix and linux system administration handbook* (Fifth edition.). Addison-Wesley/Pearson.