Definició i execució d’un projecte de Docker

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Definició del projecte

Grup i assignatura

Es tracta del mòdul de primer Gestió de Bases de Dades del cicle de grau superior ASIX. Hi ha dos grups, un d'ASIX normal i l'altre d'ASIX dual. El centre és el CIFP Francesc de Borja Moll.

Context

- Antecedents i coneixements previs de l'alumne.

Els alumnes no tenen coneixements previs. Fa un mes que han començat el cicle i per tant parteixen de zero. Saben algunes comandes bàsiques de SQL i tenen algunes nocions bàsiques de virtualització amb virtualbox.

- Equipament necessari

Els alumnes disposen d'ordinadors portàtils amb un navegador i connexió a internet. S'utilitzarà google cloud shell. S'utilitzarà l'aula virtual google classroom per entregar l'enunciat als alumnes i recollir les seves entregues.

- Descripció del projecte

La descripció del projecte és en anglès ja que es tracta d'un mòdul que s'imparteix en anglès.

Introduction

The purpose of this assignment is to expose first year students to the docker technology and its application to the quick deployment and population of databases.

We also use Google's cloud shell. The advantage is that the students don't need to prepare and run their own virtual machine. The disadvantage is that the environment is volatile and the students have to start from scratch every time they connect to this service.

The assignment is divided into two parts that are independent. The first part is intended to be a first contact with docker while the second is where the student learns about the use of environment variables and volumes.

Goals

After completing this assignment the students will be able to

- Download an image and run a container.
- Use environment variables to configure a dockerized database.
- Create a docker volume to populate the database when it is started.

Task

Work in groups of two or three people.

If you want to submit more than one file, submit separate files. Please don't compress all of them in a single file.

PART I: Docker

A. Use google's cloud shell (https://console.cloud.google.com/cloudshell?pli=1) to launch a "hello-world" container.
B. Show the list of images in the local repository.
C. Show the list of running containers.
D. Show the list of all containers, including those that are not running.
E. Run a dockerized nginx.
F. In a different console, find out the address of the nginx server.
G. Use to curl to connect to the server and verify that it is working.
H. Look at the list of running containers.
I. Stop the nginx container.
J. Delete all containers.
K. Delete all images.

PART II: Docker database

L. Run a mysql docker database in detached mode. Use an environment variable to set the password.
M. Find the IP address of the database docker.
N. Connect to the database.
O. Create a database.
P. Use the database.
Q. Create a table 'department' with columns 'id', 'name','building' and 'budget'.
R. Insert a row into the table with values 'Physics', 'Watson', '110000.00'.

S. Exit the mysql client.
T. Create a directory named sql.
U. Use mysqldump to dump your database into a file called school.sql in the directory created in the previous step
V. Create a new container with a volume connecting the directory you created with /docker-entrypoint-initdb.d . This will automatically populate the database of your new container. Run it in detached mode.
W. Find the IP address of the new container.
X. Use the mysql client to connect to the new container.
Y. Verify that the table and its contents are available.
Z. Exit the mysql client.
AA. List all running containers.
BB. Stop all running containers.
CC. Delete the containers.
DD. Delete the directory you created and its contents.

Provide feedback about the difficulties you encountered and the things you have learned.

Evaluation

Criteria	Bad	Acceptable	Good
Technical competence	The student cannot complete the task on its own and requires continuous help from the teacher.	The student can complete the task with occasional help of the classmates.	The student can complete the task without requiring any help.
Report	The student does not produce a report that allows the teacher to verify that the task has been completed.	The student produces a report that allows the teacher to verify that the task has been completed.	The student produces a report that would allow someone else to easily follow the steps and understand what is done.
Insight	The student reproduces steps and does not understand their meaning.	The explanations in the report show that the student understands the concepts.	The report provides explanations that will help others to understand the concepts.

Cross-evaluation: After they have completed the task, the students will have the chance to comment on the strengths and weaknesses of the assignment to allow future improvements.

- Solució base

A. Command: `jbarcelo@cloudshell:~$ docker hello-world`
B. Command: `jbarcelo@cloudshell:~$ docker image ls`
C. Command: `jbarcelo@cloudshell:~$ docker ps`
D. Command: `jbarcelo@cloudshell:~$ docker ps -a`
E. Command: `jbarcelo@cloudshell:~$ docker run nginx`
F. Command: `jbarcelo@cloudshell:~$ docker inspect 98b|grep '"IPAddress"'`
G. Command: `jbarcelo@cloudshell:~$ curl 172.18.0.3`
H. Command: `jbarcelo@cloudshell:~$ docker ps`
I. Command: `jbarcelo@cloudshell:~$ docker stop 98b`
J. Command: `jbarcelo@cloudshell:~$ docker rm 44a 98b` ,
K. Command: `jbarcelo@cloudshell:~$ docker rmi hello-world nginx`
L. Command: `jbarcelo@cloudshell:~$ docker run --name test-mysql -e MYSQL_ROOT_PASSWORD=my-secret-pw -d mysql:latest`
M. Command: `jbarcelo@cloudshell:~$ docker inspect 53d | grep '"IPAddress"'`
N. Command: `jbarcelo@cloudshell:~$ mysql -u root -p -h 172.18.0.2`
O. Command: `mysql> CREATE DATABASE school;`
P. Command: `mysql> USE school;`
Q. Command: `mysql> CREATE TABLE department (id INT PRIMARY KEY AUTO_INCREMENT, name VARCHAR(20), building VARCHAR(20), budget DECIMAL(10,2));`
R. Command: `mysql> INSERT INTO department (name, building, budget) VALUES ('Physics', 'Whatson', 110000.00);`
S. Command: `mysql> exit`
T. Command: `jbarcelo@cloudshell:~$ mkdir sql`
U. Command: `jbarcelo@cloudshell:~$ mysqldump school -u root -p -h 172.18.0.2 > sql/school.sql`
V. Command: `jbarcelo@cloudshell:~$ docker run -v /home/jbarcelo/sql:/docker-entrypoint-initdb.d -e MYSQL_ROOT_PASSWORD=my-secret-pw -e MYSQL_DATABASE=school -d mysql`
W. Command: `jbarcelo@cloudshell:~$ docker inspect 36e | grep '"IPAddress"'`
X. Command: `jbarcelo@cloudshell:~$ mysql -u root -p -h 172.18.0.3`
Y. Command: `mysql> select * from school.department;`
Z. Command: `mysql> exit`
AA. Command: `jbarcelo@cloudshell:~$ docker ps`
BB. Command: `jbarcelo@cloudshell:~$ docker stop 36e 53d`
CC. Command: `jbarcelo@cloudshell:~$ docker rm 36e 53d`
DD. Command: `jbarcelo@cloudshell:~$ rm -rf sql`

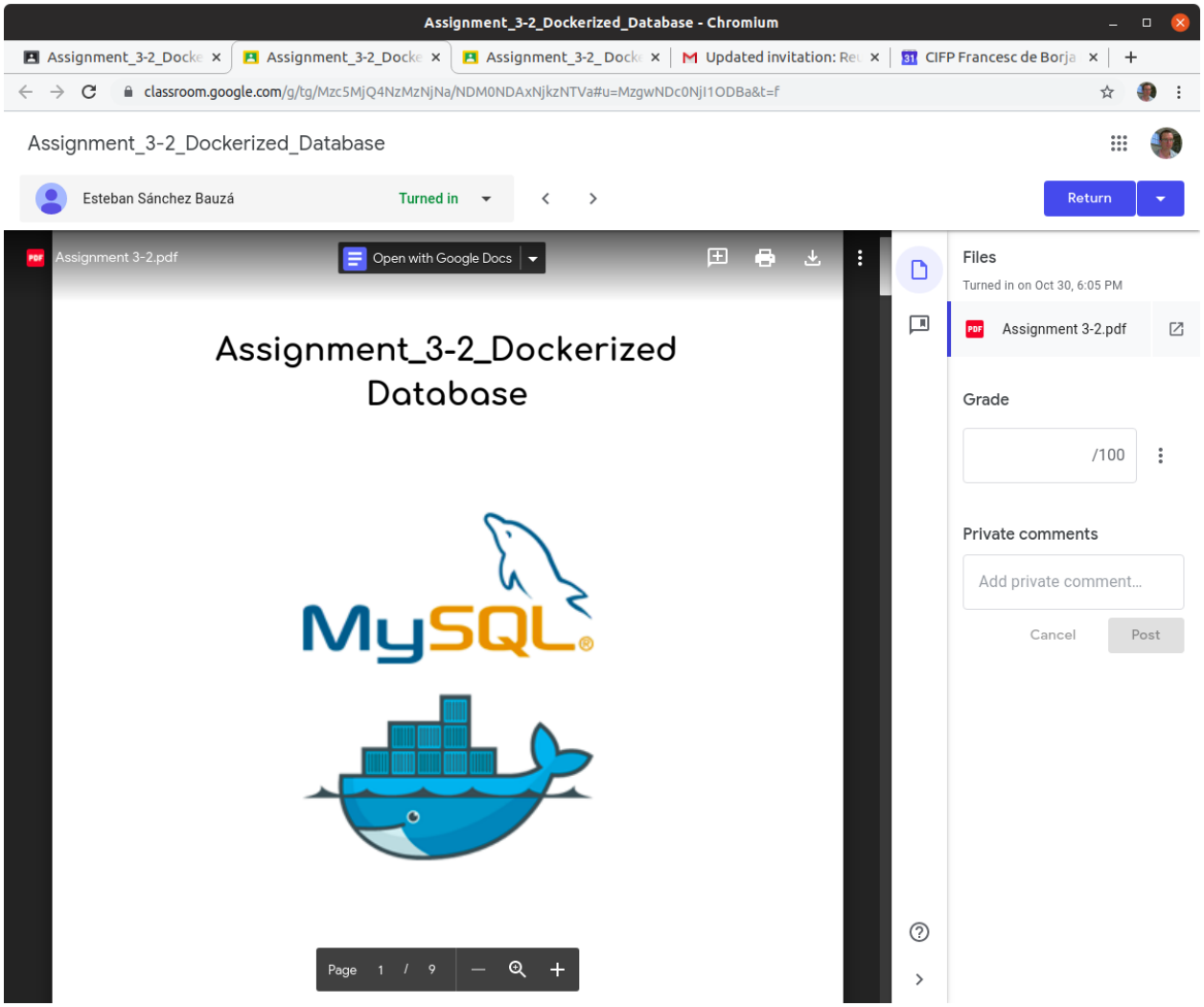
- Conclusions

El projecte proposat està pensat com un primer contacte amb docker en el context de bases de dades. Donades les circumstàncies, pens que és el més adequat. Els alumnes aprendran les comandes relacionades amb el cicle de vida dels contenidors. A més, també s'utilitzaran variables d'entorn i volums. Més endavant i en altres assignatures, ja tendran l'oportunitat d'aprofundir en els seus coneixements de docker.

Execució del projecte

El projecte s'ha executat la setmana del 28 d'octubre de 2019. El fet més important a destacar és que la majoria dels estudiants no han pogut completar la tasca en el temps previst. Tot i això, el resultat ha estat satisfactori ja que han après els principis bàsics de docker. Es tractava d'un exercici introductori i es pot dir que ha aconseguit els seus objectius. La part que ha necessitat explicació ha estat la de la creació d'un volum per tal que el contenidor tengués accés a una carpeta de l'amfitrió.

A continuació s'adjunten algunes captures de pantalla de les entregues realitzades pels alumnes.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Updated invitation: Re
CIFP Francesc de Borja
classroom.google.com/g/tg/Mzc5MjQ4NzMzNjNa/NDM0NDAxNjkzNTVa#u=MzgwNDc0NjI1ODBa&t=f
Assignment_3-2_Dockerized_Database
Esteban Sánchez Bauzá
Turned in
Return
Assignment 3-2.pdf
Open with Google Docs
Assignment_3-2_Dockerized Database
MySQL
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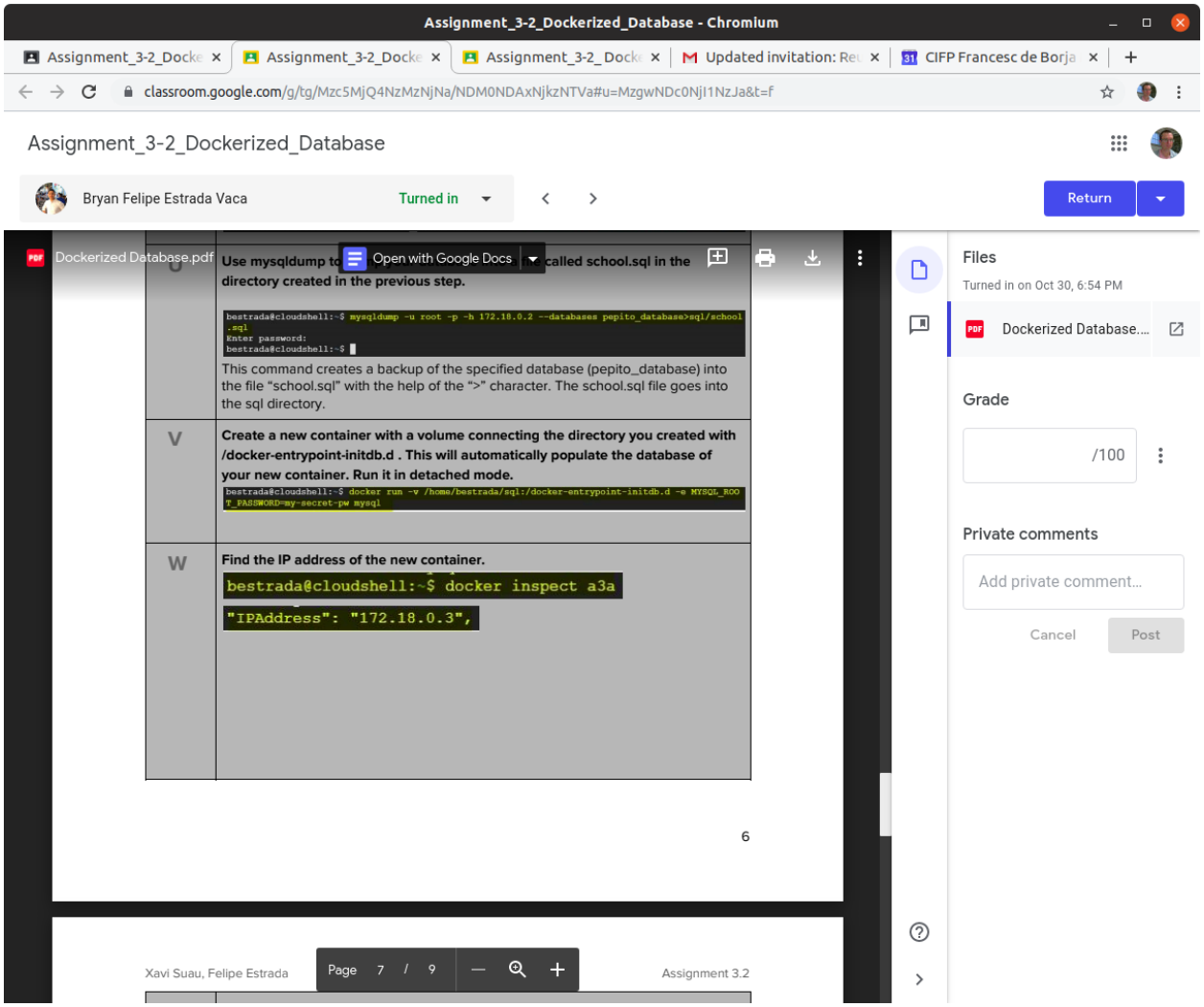
Files
Turned in on Oct 30, 6:05 PM
Assignment 3-2.pdf
Grade
/100
Private comments
Add private comment...
Cancel
Post


Assignment_3-2_Dockerized_Database - Chromium
classroom.google.com/g/tg/Mzc5MjQ4NzMzNjNa/NDM0NDAxNjkzNTVa#u=MzgwNDc0NjI1NzJa&t=f
Assignment_3-2_Dockerized_Database
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Return
Dockerized Database.pdf
Open with Google Docs
Use mysqldump to
called school.sql in the directory created in the previous step.
bestrada@cloudshell:~$ mysqldump -u root -p -h 172.18.0.2 --databases pepito_database>sql/school.sql
Enter password:
bestrada@cloudshell:~$
This command creates a backup of the specified database (pepito_database) into the file "school.sql" with the help of the ">" character. The school.sql file goes into the sql directory.
V
Create a new container with a volume connecting the directory you created with /docker-entrypoint-initdb.d . This will automatically populate the database of your new container. Run it in detached mode.
bestrada@cloudshell:~$ docker run -v /home/bestrada/sql:/docker-entrypoint-initdb.d -e MYSQL_ROOT_PASSWORD=my-secret-pw mysql
W
Find the IP address of the new container.
bestrada@cloudshell:~$ docker inspect a3a
"IPAddress": "172.18.0.3",
6
Xavi Suau, Felipe Estrada
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Assignment 3.2
Files
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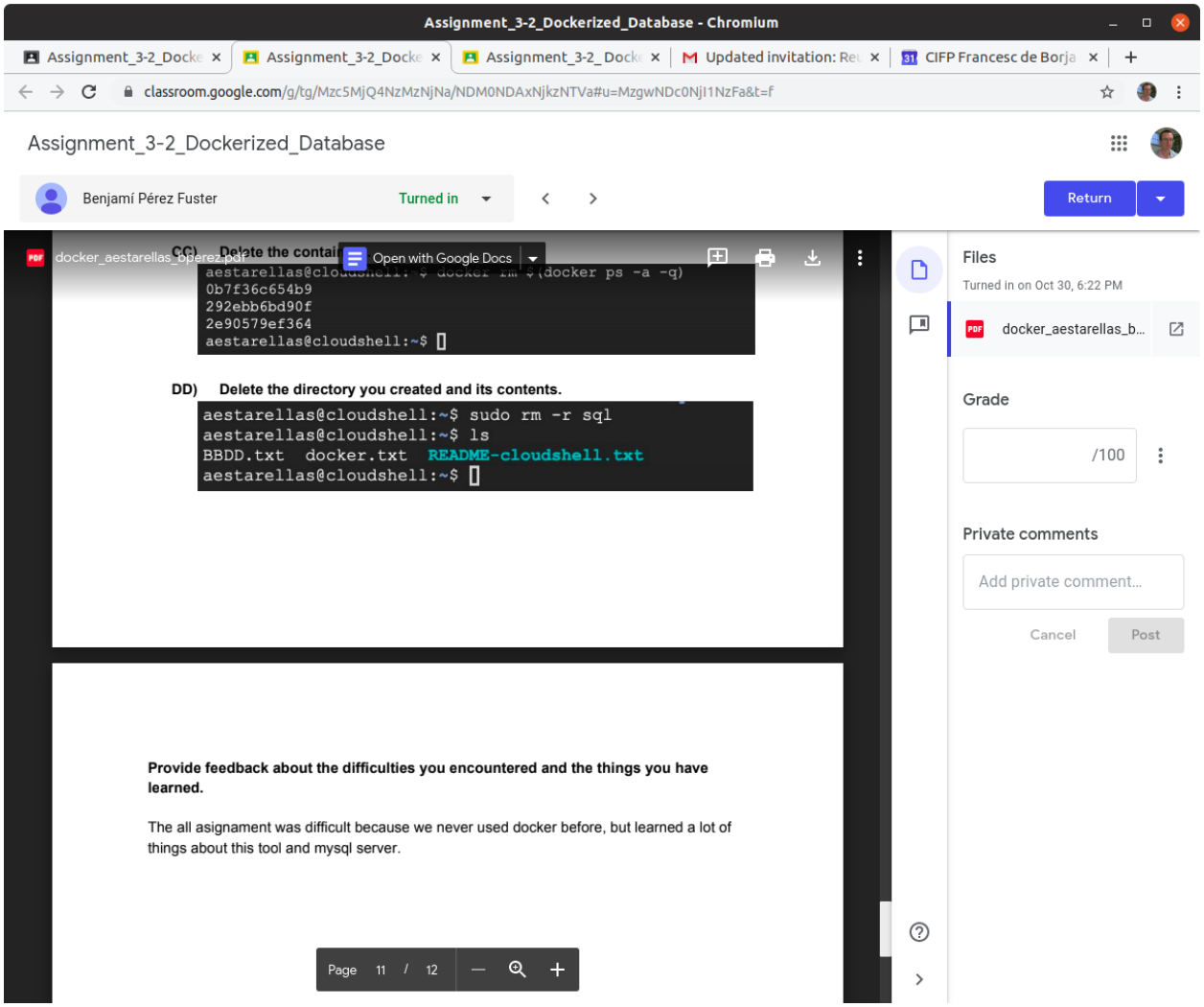
Dockerized Database....
Grade
/100
Private comments
Add private comment...
Cancel
Post


Assignment_3-2_Dockerized_Database - Chromium
classroom.google.com/g/tg/Mzc5MjQ4NzMzNjNa/NDM0NDAxNjkzNTVa#u=MzgwNDc0NjI1NzFa&t=f
Assignment_3-2_Dockerized_Database
Benjamí Pérez Fuster
Turned in
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aestarellas@cloudshell:~$
DD) Delete the directory you created and its contents.
aestarellas@cloudshell:~$ sudo rm -r sql
aestarellas@cloudshell:~$ ls
BBDD.txt docker.txt README-cloudshell.txt
aestarellas@cloudshell:~$
Provide feedback about the difficulties you encountered and the things you have learned.
The all asignament was difficult because we never used docker before, but learned a lot of things about this tool and mysql server.
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Files
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docker_aestarellas_b...
Grade
/100
Private comments
Add private comment...
Cancel
Post