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***Product Development***

# Clase 2 – Docker

Docker instalado, verificando versión:

```
C:\Users\mdonis>docker --version
Docker version 20.10.8, build 3967b7d
```

Verificando que la instalación es correcta corriendo un contenedor:

```
C:\Users\mdonis>docker run hello-world

Hello from Docker!
This message shows that your installation appears to be working correctly.

To generate this message, Docker took the following steps:
 1. The Docker client contacted the Docker daemon.
 2. The Docker daemon pulled the "hello-world" image from the Docker Hub.
    (amd64)
 3. The Docker daemon created a new container from that image which runs the
    executable that produces the output you are currently reading.
 4. The Docker daemon streamed that output to the Docker client, which sent it
    to your terminal.

To try something more ambitious, you can run an Ubuntu container with:
 $ docker run -it ubuntu bash

Share images, automate workflows, and more with a free Docker ID:
 https://hub.docker.com/

For more examples and ideas, visit:
 https://docs.docker.com/get-started/
```

Extraer una imagen de un registro (asume que es “latest” o la más actualizada si no se especifica una versión):

```
C:\Users\mdonis>docker pull busybox
Using default tag: latest
latest: Pulling from library/busybox
Digest: sha256:f7ca5a32c10d51aeda3b4d01c61c6061f497893d7f6628b92f822f7117182a57
Status: Image is up to date for busybox:latest
docker.io/library/busybox:latest
```

Verificar imágenes instaladas en nuestra máquina:

```
C:\Users\mdonis>docker images
REPOSITORY              TAG       IMAGE ID       CREATED        SIZE
mysql                   5.7.35    8a8a506ccfdc   4 days ago     448MB
jupyter/base-notebook   latest    f14b646c836f   5 days ago     668MB
hello-world             latest    feb5d9fea6a5   3 weeks ago    13.3kB
busybox                 latest    16ea53ea7c65   4 weeks ago    1.24MB
```

Corriendo un segundo contenedor:

```
C:\Users\mdonis>docker run busybox echo "Hello From Galileo Master!"
Hello From Galileo Master!
```

Contenedores que están corriendo:

```
C:\Users\mdonis>docker ps
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS     NAMES
```

Listado de contenedores que han sido ejecutados:

```
C:\Users\mdonis>docker ps -a
CONTAINER ID   IMAGE                  COMMAND                  CREATED             STATUS                      PORTS     NAMES
3b83af0afee0   busybox                "echo 'Hello From Ga…"   About a minute ago  Exited (0) About a minute ago           bold_blackwell
57c241d98ce0   busybox                "sh"                     3 minutes ago       Exited (0) 3 minutes ago            xenodochial_feynman
e3841c88e172   hello-world            "/hello"                 18 minutes ago      Exited (0) 18 minutes ago           heuristic_ardinghelli
4699491fd216   jupyter/base-notebook  "tini -g -- start-no…"   2 days ago          Exited (0) 2 days ago               stoic_swanson
c6fcb04c4f5b   mysql:5.7.35           "docker-entrypoint.s…"   2 days ago          Exited (0) 2 days ago               musing_mahavira
```

Correr y entrar a un contenedor e interactuar con el shell “sh”:

```
C:\Users\mdonis>docker run -it busybox sh
/ # ls
bin   dev   etc   home  proc  root  sys   tmp   usr   var
/ # uptime
 18:53:22 up 1 day, 23:43,  0 users,  load average: 0.00, 0.00, 0.00
/ # cd home/
/home # cd var/
sh: cd: can't cd to var/: No such file or directory
/home # exit
```

Eliminar contenedores:

```
C:\Users\mdonis>docker ps -a
CONTAINER ID   IMAGE                    COMMAND
9ba3893b8611   busybox                  "sh"
3b83af0afee0   busybox                  "echo 'Hello From Ga…"
57c241d98ce0   busybox                  "sh"
e3841c88e172   hello-world              "/hello"
4699491fd216   jupyter/base-notebook    "tini -g -- start-no…"
c6fcb04c4f5b   mysql:5.7.35             "docker-entrypoint.s…"

C:\Users\mdonis>docker rm 9ba3893b8611 3b83af0afee0
9ba3893b8611
3b83af0afee0

C:\Users\mdonis>docker ps -a
CONTAINER ID   IMAGE                    COMMAND
57c241d98ce0   busybox                  "sh"
e3841c88e172   hello-world              "/hello"
4699491fd216   jupyter/base-notebook    "tini -g -- start-no…"
c6fcb04c4f5b   mysql:5.7.35             "docker-entrypoint.s…"
```

Para eliminar todos los contenedores se puede hacer **Docker container prune**

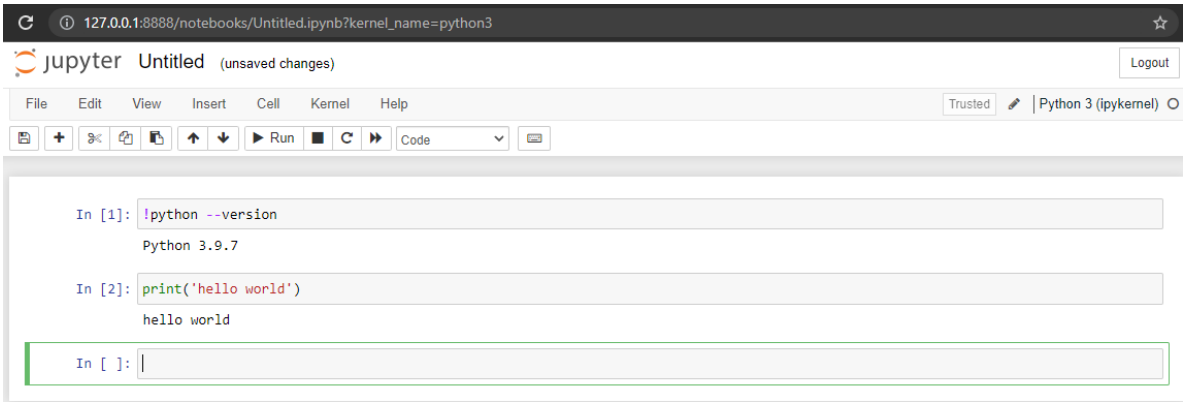
# Docker y Python

Instalar Jupyter

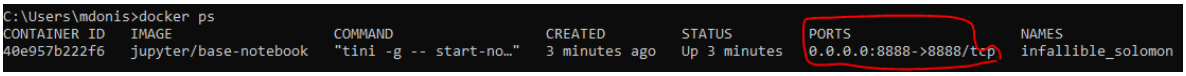
```
C:\Users\mdonis>docker pull jupyter/base-notebook
Using default tag: latest
latest: Pulling from jupyter/base-notebook
Digest: sha256:9e46cbef898c23c827c49a674cc53363bc68aec82ed27ee549f72c7149091763
Status: Image is up to date for jupyter/base-notebook:latest
docker.io/jupyter/base-notebook:latest
```

Ejecutar Jupyter por medio del mapeo de puertos máquina:contenedor:

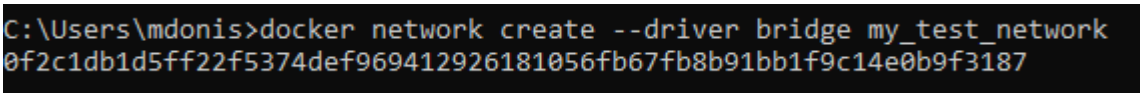
```
C:\Users\mdonis>docker run -p 8888:8888 jupyter/base-notebook
WARN: Jupyter Notebook deprecation notice https://github.com/jupyter/docker-stacks#jupyter-notebook-deprecation-notice.
Executing the command: jupyter notebook
[I 19:04:12.475 NotebookApp] Writing notebook server cookie secret to /home/jovyan/.local/share/jupyter/runtime/notebook_cookie_secret
[W 2021-10-16 19:04:19.159 LabApp] 'ip' has moved from NotebookApp to ServerApp. This config will be passed to ServerApp. Be sure to update your config befor
e our next release.
[W 2021-10-16 19:04:19.159 LabApp] 'port' has moved from NotebookApp to ServerApp. This config will be passed to ServerApp. Be sure to update your config bef
ore our next release.
[W 2021-10-16 19:04:19.159 LabApp] 'port' has moved from NotebookApp to ServerApp. This config will be passed to ServerApp. Be sure to update your config bef
ore our next release.
[W 2021-10-16 19:04:19.159 LabApp] 'port' has moved from NotebookApp to ServerApp. This config will be passed to ServerApp. Be sure to update your config bef
ore our next release.
[I 2021-10-16 19:04:19.167 LabApp] JupyterLab extension loaded from /opt/conda/lib/python3.9/site-packages/jupyterlab
[I 2021-10-16 19:04:19.167 LabApp] JupyterLab application directory is /opt/conda/share/jupyter/lab
[I 19:04:19.174 NotebookApp] Serving notebooks from local directory: /home/jovyan
[I 19:04:19.174 NotebookApp] Jupyter Notebook 6.4.4 is running at:
[I 19:04:19.174 NotebookApp] http://40e957b222f6:8888/?token=e7019729510a788bcba4e7eeb74e453de78638e0ad3e28d3
[I 19:04:19.174 NotebookApp]  or http://127.0.0.1:8888/?token=e7019729510a788bcba4e7eeb74e453de78638e0ad3e28d3
[I 19:04:19.174 NotebookApp] Use Control-C to stop this server and shut down all kernels (twice to skip confirmation).
[C 19:04:19.221 NotebookApp]

    To access the notebook, open this file in a browser:
        file:///home/jovyan/.local/share/jupyter/runtime/nbserver-8-open.html
    Or copy and paste one of these URLs:
        http://40e957b222f6:8888/?token=e7019729510a788bcba4e7eeb74e453de78638e0ad3e28d3
     or http://127.0.0.1:8888/?token=e7019729510a788bcba4e7eeb74e453de78638e0ad3e28d3
```

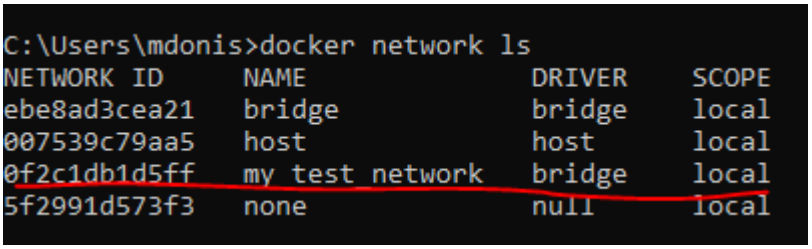



Verificando contenedor y mapeo de puertos:

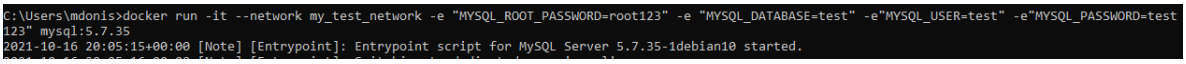


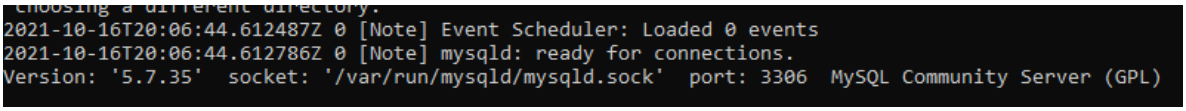

Crear una red para conectar Jupyter y MySQL:



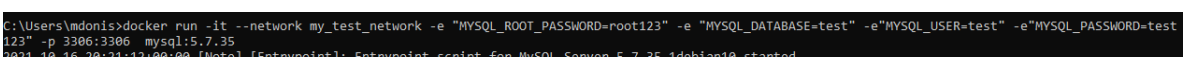




Ejecutar un contenedor de MySQL en la red previamente creada e interactivamente:




Ahora nos conectamos de nuevo, esta vez especificando el puerto para tener acceso a la base de datos desde nuestra máquina:



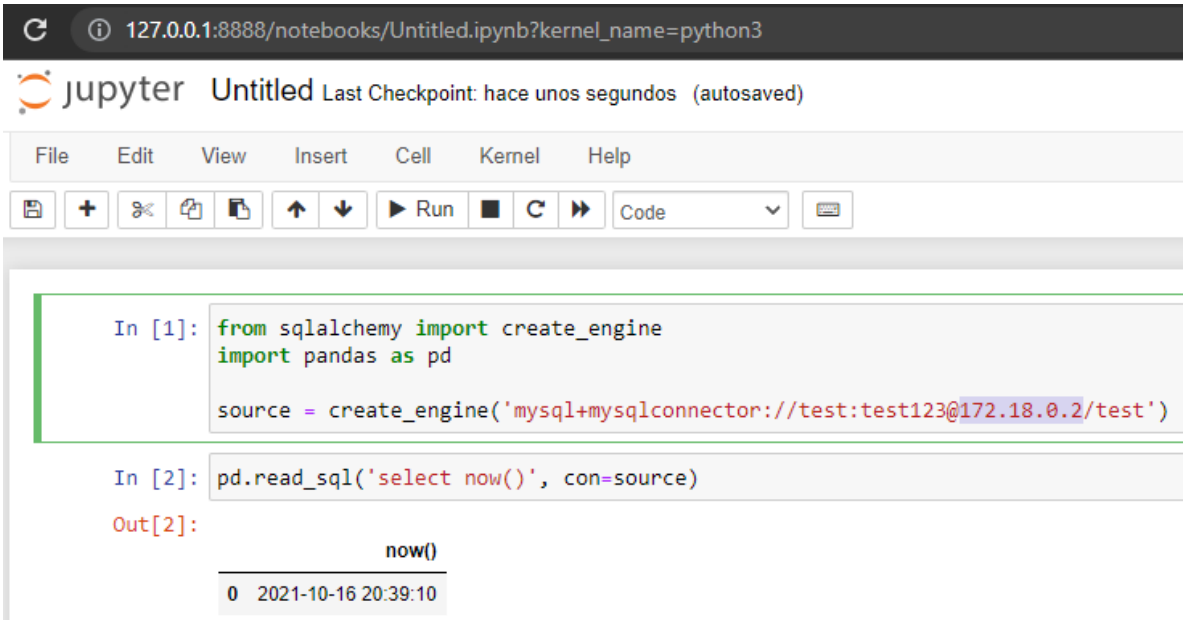

Ahora se ejecutará Jupyter pero en la misma red del contenedor de la base de datos para poder hacer una conexión:

```
C:\Users\mdonis>docker run -p 8888:8888 --network my_test_network jupyter/base-notebook
WARN: Jupyter Notebook deprecation notice https://github.com/jupyter/docker-stacks#jupyte
Executing the command: jupyter notebook
[I 20:27:26.801 NotebookApp] Writing notebook server cookie secret to /home/jovyan/.local
[W 2021-10-16 20:27:27.411 LabApp] 'ip' has moved from NotebookApp to ServerApp. This con
e our next release.
[W 2021-10-16 20:27:27.411 LabApp] 'port' has moved from NotebookApp to ServerApp. This c
ore our next release.
[W 2021-10-16 20:27:27.411 LabApp] 'port' has moved from NotebookApp to ServerApp. This c
ore our next release.
[W 2021-10-16 20:27:27.411 LabApp] 'port' has moved from NotebookApp to ServerApp. This c
ore our next release.
[I 2021-10-16 20:27:27.420 LabApp] JupyterLab extension loaded from /opt/conda/lib/python
[I 2021-10-16 20:27:27.420 LabApp] JupyterLab application directory is /opt/conda/share/j
[I 20:27:27.426 NotebookApp] Serving notebooks from local directory: /home/jovyan
[I 20:27:27.426 NotebookApp] Jupyter Notebook 6.4.4 is running at:
[I 20:27:27.426 NotebookApp] http://ecced141b322:8888/?token=ec48886e5fa12fca85a29ff7c6eb
[I 20:27:27.426 NotebookApp]  or http://127.0.0.1:8888/?token=ec48886e5fa12fca85a29ff7c6e
[I 20:27:27.426 NotebookApp] Use Control-C to stop this server and shut down all kernels
[C 20:27:27.431 NotebookApp]

    To access the notebook, open this file in a browser:
        file:///home/jovyan/.local/share/jupyter/runtime/nbserver-9-open.html
    Or copy and paste one of these URLs:
        http://ecced141b322:8888/?token=ec48886e5fa12fca85a29ff7c6eba8e4c272c842cee6fc42
     or http://127.0.0.1:8888/?token=ec48886e5fa12fca85a29ff7c6eba8e4c272c842cee6fc42
```

Instalación de librerías de Python ingresando al contenedor que contiene Jupyter:

```
CONTAINER ID   IMAGE                  COMMAND                  CREATED         STATUS         PORTS                                NAMES
ecced141b322   jupyter/base-notebook  "tini -g -- start-no…"   2 minutes ago   Up 2 minutes   0.0.0.0:8888->8888/tcp               festive_elgamal
35f272dc9069   mysql:5.7.35           "docker-entrypoint.s…"   8 minutes ago   Up 8 minutes   0.0.0.0:3306->3306/tcp, 33060/tcp    happy_dewdney

C:\Users\mdonis>docker exec -it festive_elgamal sh
$ ls
Untitled.ipynb  work
$ python --version
Python 3.9.7
$ pip install mysql-connector-python
Collecting mysql-connector-python
  Downloading mysql_connector_python-8.0.26-cp39-cp39-manylinux1_x86_64.whl (30.9 MB)
     |████████████████████████████████| 30.9 MB 609 kB/s
Collecting protobuf>=3.0.0
  Downloading protobuf-3.18.1-cp39-cp39-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (1.1 MB)
     |████████████████████████████████| 1.1 MB 104 kB/s
Installing collected packages: protobuf, mysql-connector-python
Successfully installed mysql-connector-python-8.0.26 protobuf-3.18.1
$ pip install pandas
Collecting pandas
  Downloading pandas-1.3.3-cp39-cp39-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (11.5 MB)
     |████████████████████████████████| 11.5 MB 1.3 MB/s
Requirement already satisfied: python-dateutil>=2.7.3 in /opt/conda/lib/python3.9/site-packages (from pandas) (2.8.2)
Requirement already satisfied: pytz>=2017.3 in /opt/conda/lib/python3.9/site-packages (from pandas) (2021.3)
Collecting numpy>=1.17.3
  Downloading numpy-1.21.2-cp39-cp39-manylinux_2_12_x86_64.manylinux2010_x86_64.whl (15.8 MB)
     |████████████████████████████████| 15.8 MB 18 kB/s
Requirement already satisfied: six>=1.5 in /opt/conda/lib/python3.9/site-packages (from python-dateutil>=2.7.3->pandas) (1.16.0)
Installing collected packages: numpy, pandas
Successfully installed numpy-1.21.2 pandas-1.3.3
$ exit
```

Ubicar ip del host: 172.18.0.2 y conectarnos a la base de datos vía Jupyter:

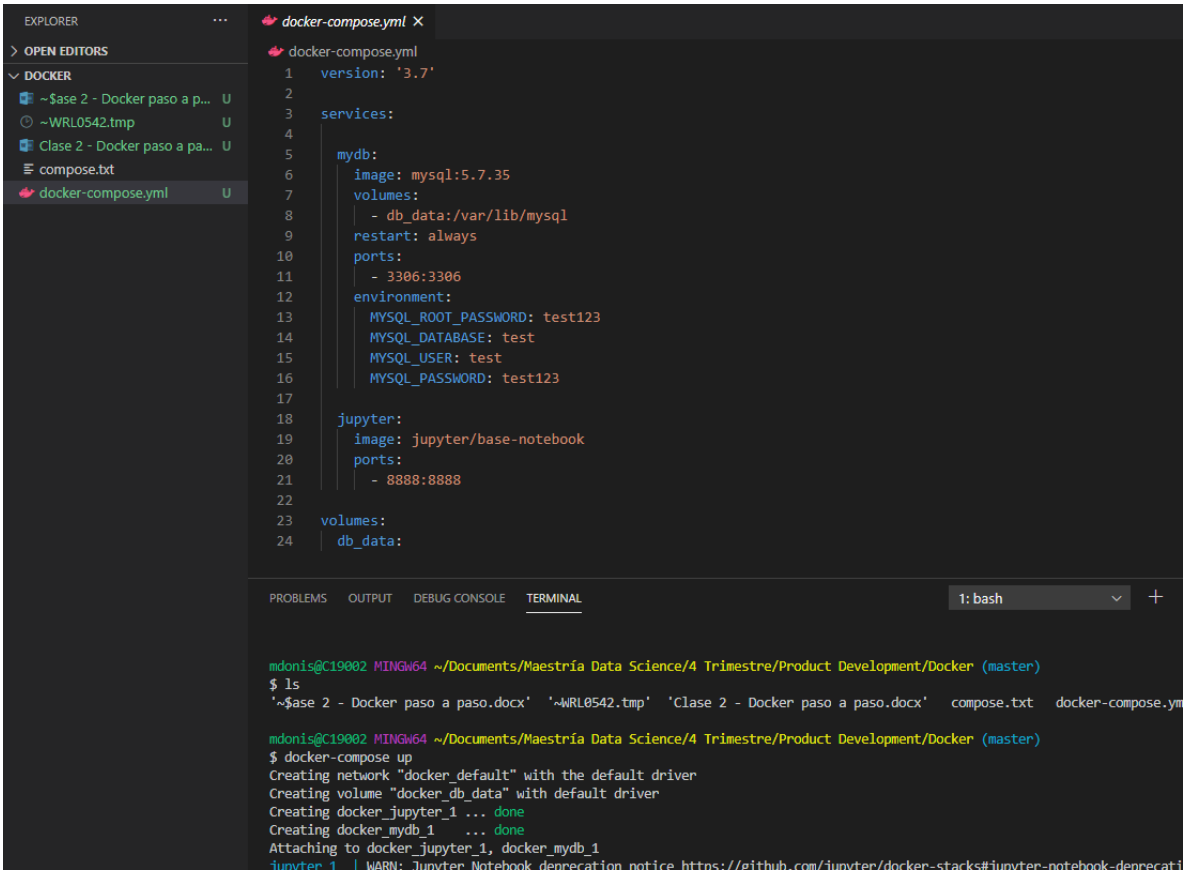



# Docker-Compose y Python

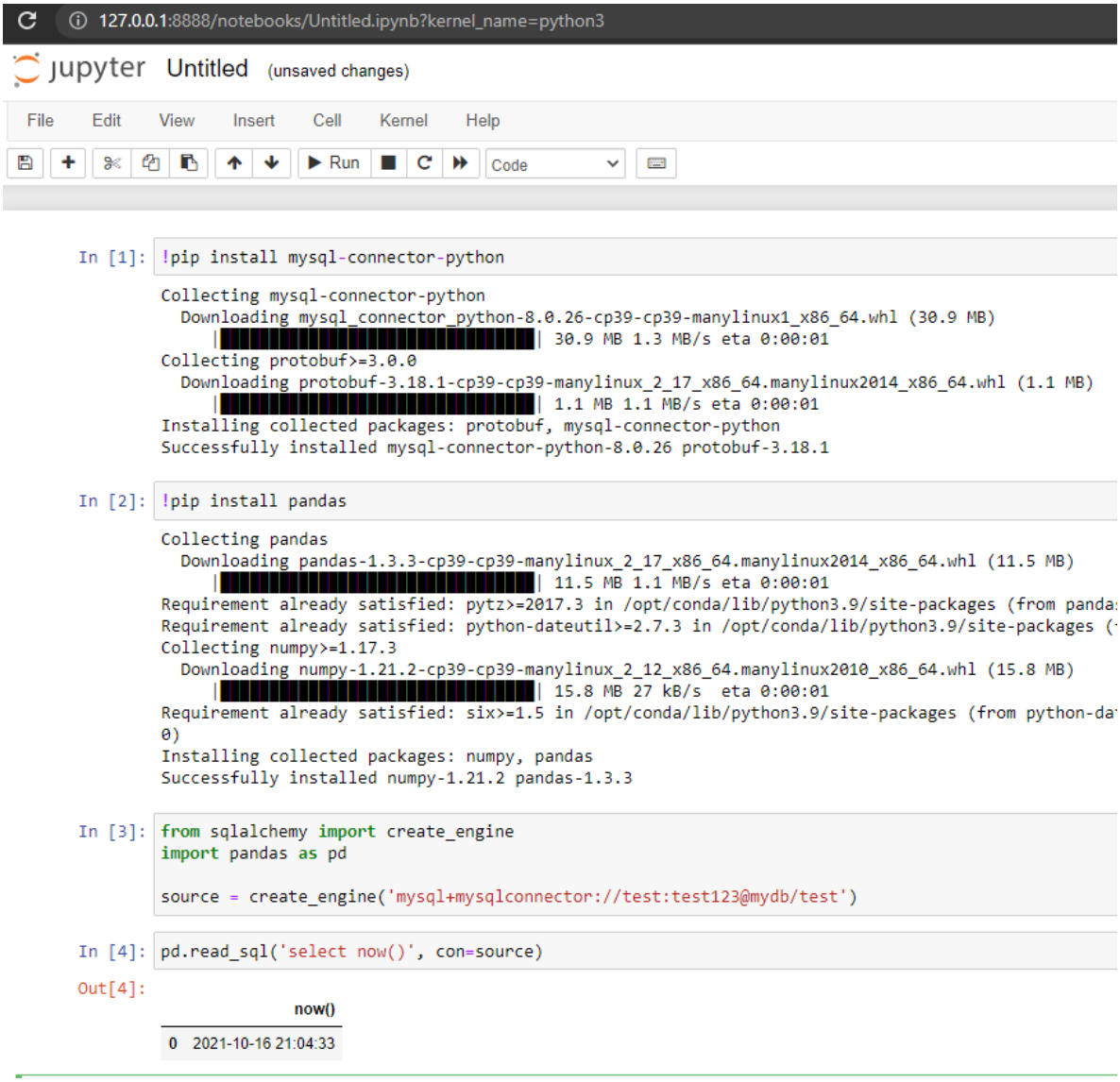
Verificando instalación:

```
C:\Users\mdonis>docker-compose --version
docker-compose version 1.29.2, build 5becea4c
```

Se crea archivo docker-compose.yml, se almacena en una carpeta y se ejecuta el comando docker-compose up:




Luego se instalan las librerías necesarias en Python y se realiza la conexión con la base de datos:




Como paso final se detienen los contenedores:

```
mdonis@C19002 MINGW64 ~/Documents/Maestría Data Science/4 Trimestre/Product Development/Docker (master)
$ docker-compose down
Stopping docker_jupyter_1 ... done
Stopping docker_mydb_1    ... done
Removing docker_jupyter_1 ... done
Removing docker_mydb_1    ... done
Removing network docker_default
```