

# ENGSCI 331 – Computational Techniques 2

## Lab 2 Part 3: Database Assignment 2023

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Includes updates from Andres Kempa-Liehr



**ENGINEERING**

Department of Engineering Science


Due Date: 20 Aug 2023 (see Canvas)

DB-CT2-lab assignment.pdf, Rev 2023814A







# Step 1 – Download Assignment Folder from Canvas

ENGSCI331 → Files → Databases → Assignment


ENGSCI 331 > Files > Databases








Search for files  0 items selected + Folder Upload ⋮

- ▼ ENGSCI 331: Computational Science
  - ▼ Databases
    - ▶ Assignment
    - ▶ Eigenproblems

Name ▲	Date Created	Date Modified	Modified By	Size	
 Assignment	8:43pm		--		 
 DB01-CT2_recording2019.m...	Thursday	Thursday	Andreas Ke...	229.6 MB	
					

Example view of downloaded folder:

 Downloads

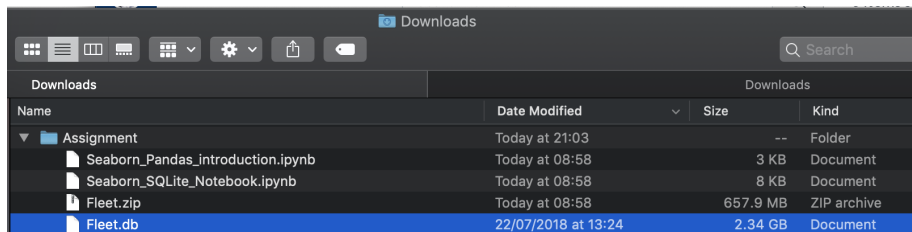
      

Search

Name	Date Modified	Size	Kind
▼ Assignment	Today at 08:58	--	Folder
Seaborn_Pandas_introduction.ipynb	Today at 08:58	3 KB	Document
Seaborn_SQLite_Notebook.ipynb	Today at 08:58	8 KB	Document
Fleet.zip	Today at 08:58	657.9 MB	ZIP archive

## Step 2 – Extract Fleet.zip into "Assignment" folder

View of downloaded folder after extraction of Fleet.zip to create Fleet.db:



Downloads		Downloads		
Name	Date Modified	Size	Kind	
▼ Assignment	Today at 21:03	--	Folder	
Seaborn_Pandas_introduction.ipynb	Today at 08:58	3 KB	Document	
Seaborn_SQLite_Notebook.ipynb	Today at 08:58	8 KB	Document	
Fleet.zip	Today at 08:58	657.9 MB	ZIP archive	
Fleet.db	22/07/2018 at 13:24	2.34 GB	Document	

We will be using JupyterLab to run the Python notebooks. You are welcome to use your preferred software for this, including Visual Studio Code or PyCharm.

The next slide shows how to install Jupyter Notebook support using Anaconda. You can skip this step in our labs and jump to Step 4.

## Step 3 – Install Python Anaconda for access to JupyterLab (if required at home)

<https://www.anaconda.com/products/distribution>

### Anaconda Installers

#### Windows

Python 3.9

64-Bit Graphical Installer (594 MB)

32-Bit Graphical Installer (488 MB)

#### MacOS

Python 3.9

64-Bit Graphical Installer (591 MB)

64-Bit Command Line Installer (584 MB)

64-Bit (M1) Graphical Installer (316 MB)

64-Bit (M1) Command Line Installer (305 MB)

#### Linux

Python 3.9

64-Bit (x86) Installer (659 MB)

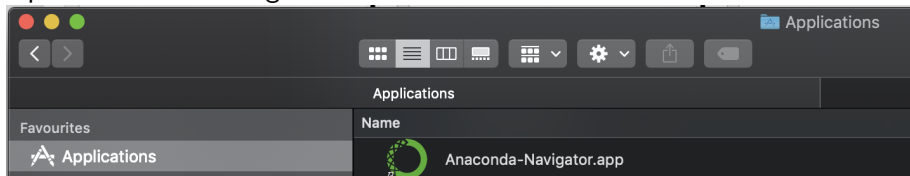
64-Bit (Power8 and Power9) Installer (367 MB)

64-Bit (AWS Graviton2 / ARM64) Installer (568 MB)

64-bit (Linux on IBM Z & LinuxONE) Installer (280 MB)

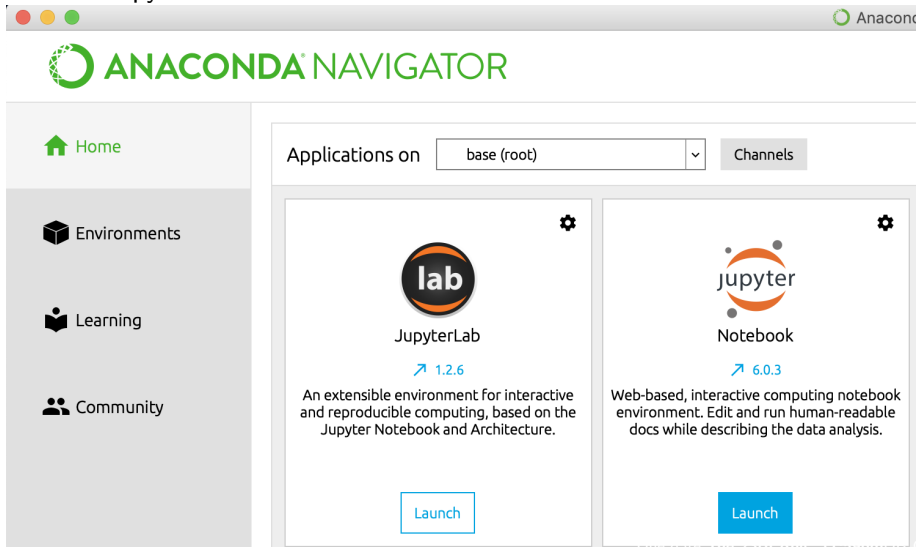
## Step 4 – Open Anaconda Navigator

Open Anaconda Navigator



# Step 5 – Launch Jupyter Notebook

## Launch Jupyter Notebook



The screenshot shows the Anaconda Navigator application window. The title bar includes standard macOS window controls (red, yellow, green buttons) and the text "Anaconda". The main interface features a sidebar on the left with navigation options: "Home" (with a house icon), "Environments" (with a cube icon), "Learning" (with a book icon), and "Community" (with a group of people icon). The main content area is titled "Applications on" followed by a dropdown menu set to "base (root)" and a "Channels" button. Below this, there are two application cards. The first card is for "JupyterLab", featuring its logo, version "1.2.6", a description: "An extensible environment for interactive and reproducible computing, based on the Jupyter Notebook and Architecture.", and a blue "Launch" button. The second card is for "Jupyter Notebook", featuring its logo, version "6.0.3", a description: "Web-based, interactive computing notebook environment. Edit and run human-readable docs while describing the data analysis.", and a blue "Launch" button. Each card also has a gear icon in the top right corner for settings.

ANACONDA NAVIGATOR

Home

Environments

Learning

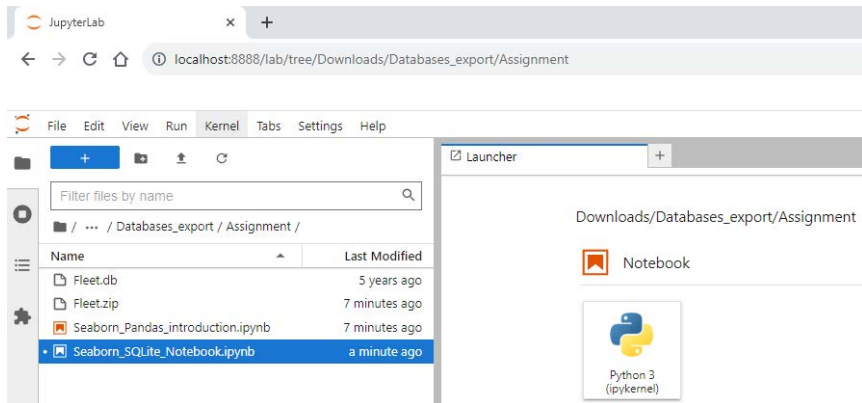
Community

Applications on base (root) Channels

**lab**  
JupyterLab  
1.2.6  
An extensible environment for interactive and reproducible computing, based on the Jupyter Notebook and Architecture.  
Launch

**jupyter**  
Notebook  
6.0.3  
Web-based, interactive computing notebook environment. Edit and run human-readable docs while describing the data analysis.  
Launch

## Step 6 – Navigate to "Assignment" folder



The screenshot displays the JupyterLab web interface in a browser. The address bar shows the URL `localhost:8888/lab/tree/Downloads/Databases_export/Assignment`. The left sidebar contains a file browser with a search bar and a list of files. The file `Seaborn_SQLite_Notebook.ipynb` is selected. The right pane shows the path `Downloads/Databases_export/Assignment` and a button to launch a notebook using the Python 3 (ipykernel) environment.

File browser contents:

Name	Last Modified
Fleet.db	5 years ago
Fleet.zip	7 minutes ago
Seaborn_Pandas_introduction.ipynb	7 minutes ago
Seaborn_SQLite_Notebook.ipynb	a minute ago

Right pane content:

Downloads/Databases\_export/Assignment

Notebook

Python 3 (ipykernel)

## Step 7 – Open Seaborn\_Pandas\_introduction.ipynb and run notebook

Seaborn is a library for making statistical graphics in Python. It builds on top of matplotlib and integrates closely with pandas data structures.

Open notebook Seaborn\_Pandas\_introduction.ipynb

The screenshot shows the JupyterLab interface. The top bar indicates the current location is `localhost:8888/lab/tree/Downloads/Databases_export/Assignment`. The left sidebar contains a file browser with a search bar and a list of files. The right sidebar shows the 'Launcher' view with a 'Notebook' icon and a 'Python 3 (ipykernel)' icon.

**File Browser:**

Name	Last Modified
Fleet.db	5 years ago
Fleet.zip	7 minutes ago
Seaborn_Pandas_introduction.ipynb	7 minutes ago
Seaborn_SQLite_Notebook.ipynb	a minute ago

**Launcher:**


Downloads/Databases\_export/Assignment

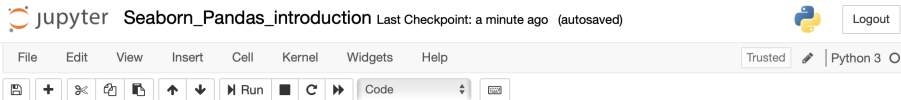
Notebook

Python 3 (ipykernel)



## Step 8 – Run notebook cells


- Run notebook cells by clicking the Run button  or using the keyboard command SHIFT+ENTER
- Work through the complete notebook



The image shows a Jupyter Notebook interface. At the top, the text "jupyter Seaborn\_Pandas\_introduction" is displayed, followed by "Last Checkpoint: a minute ago (autosaved)". To the right is a "Logout" button. Below this is a menu bar with "File", "Edit", "View", "Insert", "Cell", "Kernel", "Widgets", and "Help". To the right of the menu bar are "Trusted" and "Python 3" indicators. Below the menu bar is a toolbar with icons for saving, adding cells, undo, redo, and running cells. The "Run" button is highlighted.

### Introduction to seaborn and pandas

This notebook demonstrates basic seaborn functionality. For documentation and some more plots checkout <https://seaborn.pydata.org>

Execute the Python commands of the following cells by either clicking on the  button or the keyboard command SHIFT-ENTER

```
In [ ]: 1 # Install a conda package in the current Jupyter kernel
        2 import sys
        3 !conda install --yes --prefix {sys.prefix} seaborn
```

## Step 9 – Open Seaborn\_SQLite\_Notebook.ipynb

The notebook Seaborn SQLite Notebook.ipynb contains the main tasks of your assignment. You will be using SQL queries to analyse car information in the SQLite database fleet.db database.

Open notebook Seaborn\_SQLite\_Notebook.ipynb

The screenshot shows the JupyterLab web interface in a browser. The address bar indicates the URL is `localhost:8888/lab/tree/Downloads/Databases_export/Assignment`. The left sidebar contains a file explorer with a search bar and a list of files. The file `Seaborn_SQLite_Notebook.ipynb` is highlighted with a blue bar and red arrows. The right sidebar shows the 'Launcher' view with a 'Notebook' icon and a 'Python 3 (ipykernel)' button.

File Explorer:

Name	Last Modified
Fleet.db	5 years ago
Fleet.zip	7 minutes ago
Seaborn_Pandas_introduction.ipynb	7 minutes ago
Seaborn_SQLite_Notebook.ipynb	a minute ago

Launcher:

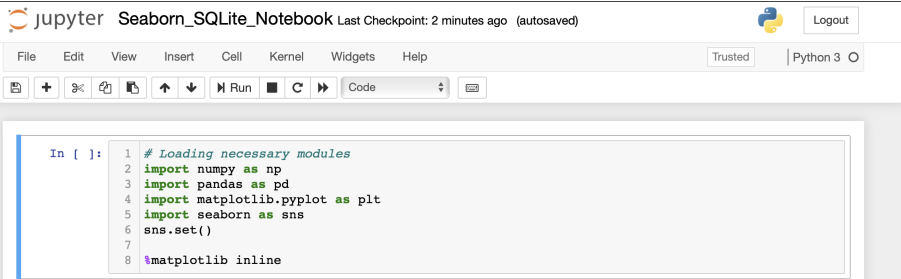
Downloads/Databases\_export/Assignment


Notebook

Python 3 (ipykernel)













## Step 10 – Work through the assignment notebook

- The notebook `Seaborn_SQLite_Notebook.ipynb` contains the main tasks of your assignment.
- Complete all tasks.



jupyter Seaborn\_SQLite\_Notebook Last Checkpoint: 2 minutes ago (autosaved)  Logout

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

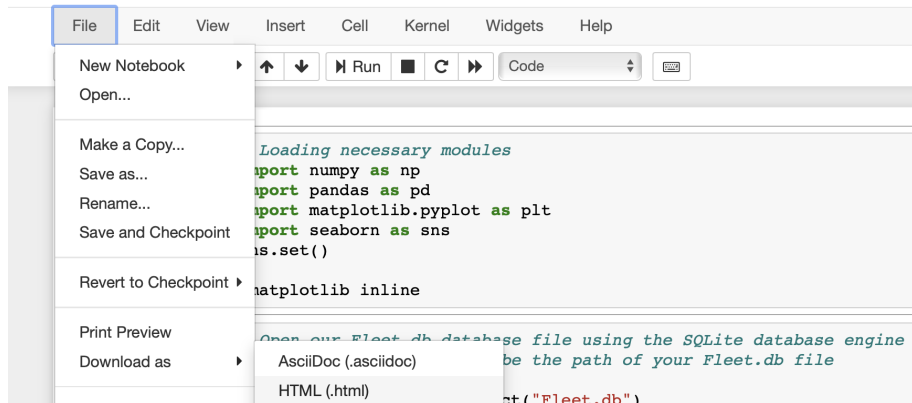
           Code 

```
In [ ]: 1 # Loading necessary modules
2 import numpy as np
3 import pandas as pd
4 import matplotlib.pyplot as plt
5 import seaborn as sns
6 sns.set()
7
8 %matplotlib inline
```

# Step 11 – Export your notebook as HTML file and upload to Canvas

Download your notebook as html: File → Download as → HTML (.html)

 jupyter Seaborn\_SQLite\_Notebook Last Checkpoint: 10 minutes ago (autosaved)



The screenshot shows the Jupyter Notebook interface. The 'File' menu is open, and the 'Download as' option is selected, which has opened a submenu. In the submenu, the 'HTML (.html)' option is highlighted. The background shows the notebook's code area with the following text:

```
Loading necessary modules
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
sns.set()

matplotlib inline

Open our Fleet.db database file using the SQLite database engine
be the path of your Fleet.db file

ct("Fleet.db")
```

- Upload the HTML file to Canvas.