

Rail Data Science

Handout - 0.1 Introduction to Python and Jupyter

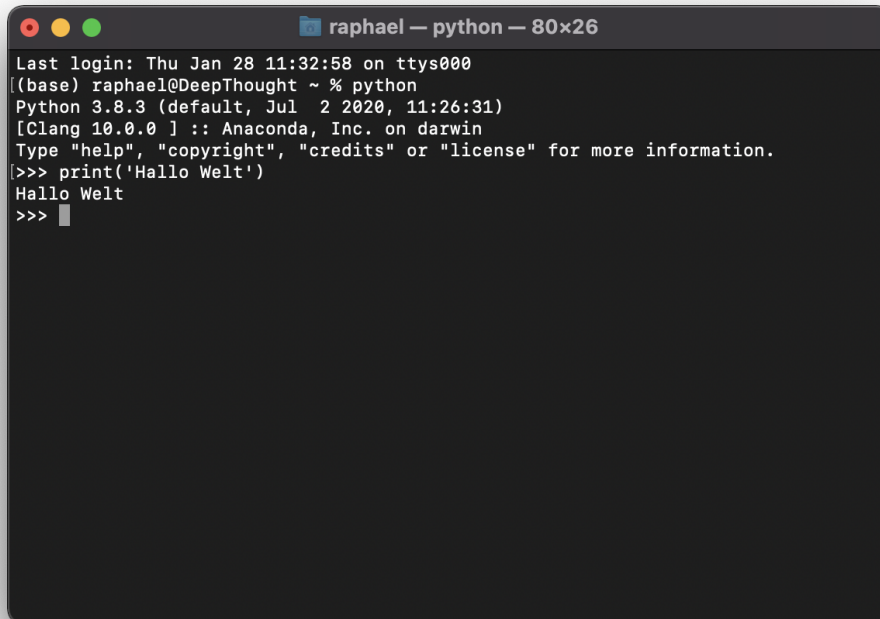
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Python

- Interpreted high-level language
- Focus on readability
- Program structure by indentation - no braces
- Dynamically typed - no variable definition required
- Highly popular
 - Provides numerous powerful packages
 - Trained staff and freelancers available

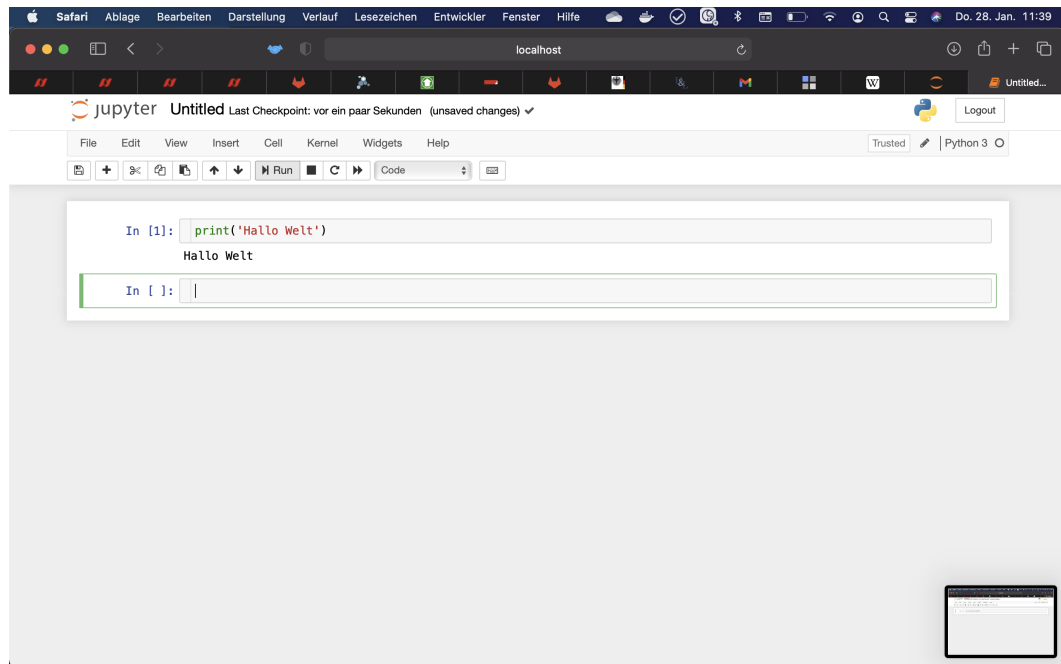
A terminal window titled 'raphael — python — 80x26' with a dark background. The window shows the output of running 'python' in a terminal. The text inside the terminal is: 'Last login: Thu Jan 28 11:32:58 on ttys000', '[(base) raphael@DeepThought ~ % python]', 'Python 3.8.3 (default, Jul 2 2020, 11:26:31)', '[Clang 10.0.0] :: Anaconda, Inc. on darwin', 'Type "help", "copyright", "credits" or "license" for more information.', '[>>> print('Hallo Welt')]', 'Hallo Welt', and '>>>'. There is a cursor at the end of the last line.

```
Last login: Thu Jan 28 11:32:58 on ttys000
[(base) raphael@DeepThought ~ % python
Python 3.8.3 (default, Jul 2 2020, 11:26:31)
[Clang 10.0.0 ] :: Anaconda, Inc. on darwin
Type "help", "copyright", "credits" or "license" for more information.
[>>> print('Hallo Welt')
Hallo Welt
>>> ]
```

Python in Terminal

Jupyter

- Interactive Notebook
- Can contain Text, images, code
 - Multiple languages, e.g. R, Julia, Python
- Powerful combination of code, results and explanations - in one document
- Notable extensions:
 - JupyterHub: Multi-User server
 - JupyterLab: Enriched user interface, more formatting options



Basic Jupyter Notebook

Installation

- (Mostly) required: Anaconda¹
 - Preselected python packages for data analysis
 - Package manager conda: conveniently add packages from console
 - Environment manager
 - Download at <https://www.anaconda.com/products/individual>
 - Follow installation instruction
- Convenient: Github desktop app
 - Version control of code
 - Clone course repository (and others...)
 - Download at <https://desktop.github.com>
 - Follow installation instruction

Special packages individual branches

- Base packages: anaconda

¹In case an installation is impossible, google Colab or Binder online-Solutions can be arranged.

- Using conda package manager
- Data analysis:
 - Plotly: `conda install -c conda-forge plotly`
- Simulation:
 - PyControl: `conda install -c conda-forge control`
- Computer Vision:
 - OpenCV: `pip install opencv-python`
 - Tesseract: `pip install tesseract pytesseract`