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# Jupman

*A template manager for online books made with Jupyter notebooks and NBSphinx  
doc generator*

**People That Write a Lot**

**Jul 09, 2023**

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The complete book can be found online for free at:

<https://jupman.softpython.org/en/latest/>



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## About

A template for online books made with [Jupyter](#)<sup>1</sup> notebooks and [NBSphinx](#)<sup>2</sup> doc generator.

### Features

- inherits generation of static websites from [NBSphinx](#)<sup>3</sup>, with search, PDF, EPUB
- builds with ReadTheDocs, [Github Actions](#)<sup>4</sup>, or local Docker emulating ReadTheDocs
- exercises generation from solution templates (both .ipynb and .py)
- zips chapters
- code sharing among chapters (so students don't need to install dependencies)
- Python Tutor integration (offline, no required dependencies)
- supports hundreds pages and deep nesting
- decent PDF layout
- basic exam management
- optional [softpython theme](#)<sup>5</sup>
- [documentation](#) and tests<sup>6</sup>
- Apache License v2.0, open source code [on Github](#)<sup>7</sup>

### Currently lacking

- generated PDF always displays solutions<sup>8</sup>
- Python Tutor doesn't work in JupyterLab<sup>9</sup>
- more testing for exam management<sup>10</sup>

### Requirements

- Python 3.7+
- based on [sphinx-rtd-theme](#)<sup>11</sup> (adds only minimal improvements for better browsing)

### Used by

- SoftPython book: [english](#)<sup>12</sup> | [italian](#)<sup>13</sup> (both 1000+ pdf pages from jupyter notebooks)
- [Scientific Programming Lab @ University of Trento, Data Science Master](#)<sup>14</sup> (english, many python exercises and exams in mixed jupyter + python format)

<sup>1</sup> <http://jupyter.org>

<sup>2</sup> <http://nbsphinx.readthedocs.io/>

<sup>3</sup> <http://nbsphinx.readthedocs.io/>

<sup>4</sup> <https://github.com/DavidLeoni/readthedocs-to-actions>

<sup>5</sup> <https://jupman.softpython.org/themed/>

<sup>6</sup> [https://github.com/DavidLeoni/jupman/tree/master/\\_test](https://github.com/DavidLeoni/jupman/tree/master/_test)

<sup>7</sup> <https://github.com/DavidLeoni/jupman>

<sup>8</sup> <https://github.com/DavidLeoni/jupman/issues/87>

<sup>9</sup> <https://github.com/DavidLeoni/jupman/issues/42>

<sup>10</sup> <https://github.com/DavidLeoni/jupman/issues?q=is%3Aopen+is%3Aissue+label%3Aexams>

<sup>11</sup> <https://sphinx-rtd-theme.readthedocs.io/en/stable/>

<sup>12</sup> <https://en.softpython.org/>

<sup>13</sup> <https://it.softpython.org/>

<sup>14</sup> <https://sciprogram.davidleoni.it/>

## Preface

This book is the result of ... We thank this and that ...

## OVERVIEW

### 1.1 Contents

1. *Quickstart*
2. *Editing worksheets*
3. *Customize*
4. *Exams management*
5. Chapter examples
  1. *Python example*
  2. *Jupyter example*
  3. *Mixed jupyter and python example*
  4. Challenges: *example worksheet* *solution*<sup>15</sup>
6. Templates
  1. *Past exams*
  2. *Changelog*
7. Tests
  1. *Rendering tests*
  2. *Python Tutor tests*

### 1.2 Revisions

- **19 September 2022:** Released v3.5.6
- **4 June 2022:** Released v3.5
- **30 April 2022:** Released v3.4
- **22 February 2022:** Released v3.3
- **16 October 2020:** Released v3.2
- **16 January 2020:** Released v3.1
- **29 December 2019:** Released v3.0

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<sup>15</sup> <https://github.com/DavidLeoni/jupman/blob/master/challenge-example/example-chal-sol.ipynb>

- **24 September 2018:** Released v2.0
- **3 August 2018:** Released v0.8
- *[Change log](#)*

## 1.3 Credits

- This site was made with Jupyter using [NBSphinx extension](#)<sup>16</sup> and [Jupman template](#)<sup>17</sup>.

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<sup>16</sup> <http://nbsphinx.readthedocs.io/>

<sup>17</sup> <http://jupman.readthedocs.io/>



## QUICKSTART

Jupman uses [NbSphinx](#)<sup>18</sup> and either [ReadTheDocs](#)<sup>19</sup> or [Github Actions](#)<sup>20</sup>

### 2.1 Installation

(Instructions are for Ubuntu, on Windows may differ)

First, on Github, fork as a template [jupman project](#)<sup>21</sup> to create yours, for example `my-project`.

Then, on your computer, clone the `my-project` from Github

You can choose to build either on:

- [ReadTheDocs](#)
- [Github Actions](#)
- locally with plain [Sphinx](#)
- locally with [RTD Docker](#)<sup>22</sup>

(Note Jupman itself is building on both [ReadTheDocs](#) and [Github Actions](#) only for testing purposes, one is enough)

#### 2.1.1 Building with ReadTheDocs:

**IMPORTANT:** choose a name which is NOT already on [ReadTheDocs](#)<sup>23</sup>

Create a [ReadTheDocs account](#)<sup>24</sup> using the same name as in [Github](#) so the address in readthedocs will be something like `my-project.readthedocs.org`.

- Use [ReadTheDocs panels](#) to link the project to your Github repository.
- In *Admin->Advanced settings panel*, set:
  - *Python interpreter* to *CPython 3.x*
  - *Requirements* to `requirements-build.txt`

---

<sup>18</sup> <http://nbsphinx.readthedocs.io/>

<sup>19</sup> <https://readthedocs.org>

<sup>20</sup> <https://github.com/features/actions>

<sup>21</sup> <https://github.com/DavidLeoni/jupman>

<sup>22</sup> <https://github.com/DavidLeoni/readthedocs-to-actions>

<sup>23</sup> <http://readthedocs.org>

<sup>24</sup> <http://readthedocs.org>

## 2.1.2 Building with Github Actions:

Configure `.github/workflows/main.yml`<sup>25</sup> on your computer to your needs - you will need to:

1. at the beginning in the `build_docs_job` section there is an `if` which makes the workflow only work in DavidLeoni/jupman repository, change it with your project repo and comment the following needs: `run_tests` line
2. set `RTD_PRJ_NAME`
3. If you want to publish to [Github Pages](#)<sup>26</sup>: everything is set, just create an empty branch `gh-pages` in a new `HTML_FOLDER` **before** committing - from some other folder in your file system:

```
git clone YOUR_REPO_ADDRESS HTML_FOLDER
cd HTML_FOLDER
git checkout --orphan gh-pages
git rm -rf .
touch bla
git add .
git commit -m "init"
git push origin gh-pages
```

## 2.1.3 Local build with Sphinx

Assuming you are on Linux/Mac:

- 1) Install Python 3.7+
- 2) [Install Jupyter](#)<sup>27</sup>
- 3) Install required modules:

3.a) In a virtual environment (**recommended**) - from the root of the project, run:

```
./create-env.sh
```

This will automatically install required modules in `_private/jupman_env` using `python3` system binary.

If you want to use a particular python binary (note it must already be on your system), run i.e.:

```
./create-env.sh python3.7
```

Afterwards, to activate the environment run:

- In Windows:

```
_private\jupman_env\bin\activate
```

- in Linux/Mac:

```
source activate
```

to deactivate (from anywhere):

```
deactivate
```

---

<sup>25</sup> <https://github.com/DavidLeoni/jupman/blob/master/.github/workflows/main.yml>

<sup>26</sup> <https://pages.github.com/>

<sup>27</sup> <http://jupyter.org/install.html>

3.b) without a virtual environment (**not recommended**): From the root of the project, run:

```
python3 -m pip install --user -r requirements-build.txt
```

Warning: to have reproducible builds `requirements-build.txt` pinpoints a lot of dependencies, installing without virtual environment may mess up other python programs!

## 2.1.4 Optional - Running tests

To check everything is working, you may want to run the tests.

1. Install test dependencies:

```
python3 -m pip install --user -r _test/requirements-test.txt
```

2. Run the tests:

```
python3 -m pytest _test/*_test.py
```

## 2.1.5 Optional - Install Jupyter contrib extensions

For a better editing experience like having Table of contents and other things, do the following:

1. install the [Jupyter contrib extensions](#)<sup>28</sup> package:

If you have Anaconda:

```
conda install -c conda-forge jupyter_contrib_nbextensions
```

If you don't have Anaconda:

```
python3 -m pip install --user jupyter_contrib_nbextensions
```

2. Install in Jupyter:

```
jupyter contrib nbextension install --user
```

3. Enable extension:

For being able to view table of contents while editing notebooks, install `toc2` extension:

```
jupyter nbextension enable toc2/main
```

For tocs to appear when in a document you will need to press a list button at the right-end of the toolbar.

(since Jupman 0.8 custom injected tocs are disabled by default)

4. For a nice GUI to install extensions, install the [Jupyter Nbextensions configurator](#)<sup>29</sup>:

If you have Anaconda:

From Anaconda Prompt:

```
conda install -c conda-forge jupyter_nbextensions_configurator
```

If you don't have Anaconda:

<sup>28</sup> [https://github.com/ipython-contrib/jupyter\\_contrib\\_nbextensions](https://github.com/ipython-contrib/jupyter_contrib_nbextensions)

<sup>29</sup> [https://github.com/Jupyter-contrib/jupyter\\_nbextensions\\_configurator](https://github.com/Jupyter-contrib/jupyter_nbextensions_configurator)

```
python3 -m pip install --user jupyter_nbextensions_configurator
```

After installing, enable it:

```
jupyter nbextensions_configurator enable --user
```

and then start Jupyter, in file browser look for a Nbextensions tab

## 2.2 Configure

1. Edit `conf.py`<sup>30</sup> as needed, which is the configuration file for Sphinx. In particular, you **MUST** edit the sections marked with **TODO**
2. Try launching build:

```
python3 build.py
```

For more info, see [related section](#)

3. If everything works fine on your computer, push changes back to Github
4. Go back to ReadTheDocs and try to run a build. Hopefully your project will become available on something like *my-project.readthedocs.org*
5. If you want to grade exams, see [Exams management](#) page.

You should now be ready to create your notebooks by launching from the project root:

```
jupyter notebook
```

1. If you wish your notebooks to appear in the generated manual, you have to add them in the `toc.rst` file.

**NOTE:** the page `toc-page.rst`<sup>31</sup>, which is set to be the `master_doc` of Sphinx, will just load the actual Table of Contents which is in `toc.rst`<sup>32</sup>. It looks a bit convoluted because when it comes to indexes Sphinx is not much reliable, see [this issue](#)<sup>33</sup>. We strongly advise *not* to change these settings !

2. edit the home, which is in the `index.ipynb`<sup>34</sup> file

## 2.3 Building the manual

**For a quick build** that only produces html:

```
python3 build.py -q
```

Site will be created in `_build/` folder.

For help:

```
python3 build.py -h
```

---

<sup>30</sup> <https://github.com/DavidLeoni/jupman/blob/master/conf.py>

<sup>31</sup> <https://github.com/DavidLeoni/jupman/blob/master/toc-page.rst>

<sup>32</sup> <https://github.com/DavidLeoni/jupman/blob/master/toc.rst>

<sup>33</sup> <https://github.com/DavidLeoni/jupman/issues/11>

<sup>34</sup> <https://github.com/DavidLeoni/jupman/blob/master/index.ipynb>

To build everything (html + pdf + epub), go to the console and from the root directory run:

```
python3 build.py
```

**NOTE:** to generate PDFs you will need to install Latex environment

## 2.4 Publish

Just push to master and Github Actions / ReadTheDocs will do the rest, for example, for jupman is available at addresses:

- <https://jupman.readthedocs.io/en/latest/>
- <https://davidleoni.github.io/jupman/en/latest/>

**IMPORTANT:** ReadTheDocs WILL **\*NOT\*** execute Jupyter notebooks because of [this bug](#)<sup>35</sup>

## 2.5 Further steps

See *Editing worksheets*, *Customize* and if needed *Exams management* pages

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<sup>35</sup> <https://github.com/DavidLeoni/softpython/issues/2>



## EDITING WORKSHEETS

Here we give an overview of how to edit worksheets. More info can be found in *Tests notebook*

### 3.1 Common files

There are a bunch of files common to all worksheets and possibly website

*You do not need to change them (except maybe `my_lib.py`)*

File	Description	Jupyter	Website	Student zips
<code>jupman_tools.py</code> <sup>36</sup>	back end stuff	X	•	
<code>jupman.py</code> <sup>37</sup>	utilities for work-sheets	X	•	X
<code>my_lib.py</code> <sup>38</sup>	custom utilities ex-ample	X	•	X
<code>_static/js/jupman.js</code> <sup>39</sup>	Javascript code	X	X	X
<code>_static/css/jupman.css</code> <sup>40</sup>	CSS	X	X	X
<code>_static/css/jupman-web.css</code> <sup>41</sup>	CSS		X	

### 3.2 Running Jupyter

First of all, run Jupyter from the root directory:

```
jupyter notebook
```

---

<sup>36</sup> [https://github.com/DavidLeoni/jupman/blob/master/jupman\\_tools.py](https://github.com/DavidLeoni/jupman/blob/master/jupman_tools.py)

<sup>37</sup> <https://github.com/DavidLeoni/jupman/blob/master/jupman.py>

<sup>38</sup> <https://github.com/DavidLeoni/jupman/blob/master/jupman.py>

<sup>39</sup> [https://github.com/DavidLeoni/jupman/blob/master/\\_static/js/jupman.js](https://github.com/DavidLeoni/jupman/blob/master/_static/js/jupman.js)

<sup>40</sup> [https://github.com/DavidLeoni/jupman/blob/master/\\_static/css/jupman.css](https://github.com/DavidLeoni/jupman/blob/master/_static/css/jupman.css)

<sup>41</sup> [https://github.com/DavidLeoni/jupman/blob/master/\\_static/css/jupman-web.css](https://github.com/DavidLeoni/jupman/blob/master/_static/css/jupman-web.css)

## 3.3 Source code for chapters

Put chapters one per folder, in the root. Any folder which doesn't start with underscore `_` or `exam/` will be considered a chapter.

During build, each chapter gets automatically zipped and zip goes to `_static/generated`. So for example, `python-example/` produces a zip called `_static/generated/python-example.zip`, which will have these contents:

```
python-example
  _static
    js
      jupman.js
      toc.js
    css
      jupman.css
    img
      cc-by.png
  python-example.ipynb
  lab.py
  lab_test.py
  lab_sol.py
  jupman.py
  my_lib.py
```

The zip folder structure will be a merge of chapter files and files shared by all chapters which are specified in `exercises_common_files` variable in `conf.py`. Since the root in the zip becomes the chapter itself, jupman will process `.py` and `.ipynb` files for fixing eventual relative imports. Markdown, HTML and CSS links in ipynb will also be adjusted.

Exercise files can be automatically generated from solutions, as we will see next.

## 3.4 Exercise types

There can be three kinds of exercises: exercises in Python files, exercises in Jupyter files and mixed jupyter and Python exercises.

You can automatically generate an exercise from a solution file by stripping text marked with special tags. You can inspect generated files in `_build/jupman/` directory

On the website, students will be able to see solutions by clicking on appropriate buttons.

In the zips to download, two versions of files will be provided, one without solution and one with solutions (in exam modality of course no solution will be shipped)



### 3.4.1 Exercises in Python files

See *python-example/python-example.ipynb*

In this type of exercises, typically you have a Jupyter file (like `python-example.ipynb`) that describes the exercise and then the actual exercises are in Python files.

If there is a solution file `FILE_sol.py` ending in `_sol.py` but no corresponding exercise file `FILE.py` without the `_sol`:

then Jupman will try to generate `FILE.py` one from `FILE_sol.py`. To do so, it will look for tags to strip inside the solution file.

If there is already an exercise file like this:

- `python_intro.py`
- `python_intro_sol.py`

Jupman will just copy the existing file.

### 3.4.2 Exercises in Jupyter files

See example: *jupyter-example/jupyter-example-sol.ipynb*

This type of exercises stay in a Jupyter notebook itself.

If there is a notebook ending in `-sol.ipynb`, the following applies (**WARNING**: for `ipynb` files we use dash `-`, *not* the underscore `_`):

- the notebook must contain tags to strip
- exercises derived will have 'EXERCISES' appended to the title (the word can be customized in `conf.py` - you might need to translate it)

### 3.4.3 Mixed exercises in Jupyter and Python files

See *jup-and-py-example/jup-and-py-example-sol.ipynb*

### 3.4.4 Challenges

This is an experimental feature, current implementation is subject to change.

Challenges are solutions which remain unpublished and from which exercises are generated **in the same original older** where the solution resides (not only in the zip!). Challenge files can be both Jupyter notebooks or Python files, ending in `-chal-sol.ipynb` or `_chal_sol.py`.

The idea is that challenges solutions are gitignored, and exercises are manually generated by calling `jupman.generate_exercise()` inside a Jupyter notebook like this:

```
#jupman-purge
import sys; sys.path.append('../'); from conf import jm;
jm.generate_exercise('great_chal_sol.py')
#/jupman-purge
```

It is a bit laborious but the idea is that typically you will also want to run and see tests results in Jupyter notebook so you can do it in the same final cell, which you will also probably want to set in cell metadata "nbsphinx": "hidden"

- the solution notebook must contain tags to strip and have SOLUTIONS at the end of the title (the word can be customized in `conf.py` - you might need to translate it)

## 3.5 Solution tags

Presence of these tags marks a cell as a solution.

Start tags begin with a # while end tags begin with a #\

### 3.5.1 jupman-raise

Replaces code inside with an Exception (text is customizable in `conf.py`). Be careful to position the comment exactly with the indentation you want the raise to appear. For example:

```
def add(x, y):  
    #jupman-raise  
    return x + y  
    #/jupman-raise
```

becomes

```
def add(x, y):  
    raise Exception('TODO IMPLEMENT ME !')
```

### 3.5.2 jupman-strip

Just strips code inside exercises

```
def f(x):  
    print(x)  
  
#jupman-strip  
def help_func(x, y):  
    return x - y  
#/jupman-strip  
  
def g(y):  
    return y
```

becomes

```
def f(x):  
    print(x)  
  
def g(y):  
    return y
```

### 3.5.3 write here

This special tag for python code erases whatever is found afterwards the `# write here` line

- you can put how many spaces you want in the comment
- phrase can be customized in `conf.py`

```
w = 5

# write here fast please

x = 5 + w
y = 2 + x
```

becomes

```
w = 5

# write here fast please
```

### 3.5.4 SOLUTION

In a code cell, if you put `# SOLUTION` at the beginning the whole cell content gets deleted (`# SOLUTION` string included).

- Word can be customized in `conf.py`

```
# SOLUTION

def f():
    print('hello')
```

becomes nothing:

```
[ ]:
```

### 3.5.5 QUESTION - ANSWER

In a markdown cell, everything in a cell with `**ANSWER**` : inside will be stripped.

- Markdown can be customized in `conf.py`

**QUESTION:** Describe why iPhone n+1 is better than iPhone n

ANSWER: it costs more

Becomes:

**QUESTION:** Describe why iPhone n+1 is better than iPhone n

```
[ ]:
```

## 3.6 Directive tags

Some tags change the preprocessor behaviour. They are applied before solution tags.

### 3.6.1 `jupman-purge`

Eliminate content both from exercises AND solutions. Can be helpful when you have code which creates expected output, like images or python data - the idea is to completely remove code so so students don't accidentally copy-paste it or uncomment it.

- `jupman-purge-input`: purges only cell source
- `jupman-purge-output`: purges only cell output
- `jupman-purge-io`: purges both input and output

`jupman-purge` purges only a span:

```
x=5
#jupman-purge
plt.savefig('expected_image.png')
jupman.save_py('expected_output_db.py', ['big', 'data', 'structure']*1000)
#/jupman-purge
x=6
```

becomes

```
x=5
x=6
```

### 3.6.2 `jupman-preprocess`

By default only notebooks solutions (ending in `-sol.ipynb`) are preprocessed before html conversion begins. If you want to force preprocessing on a particular non-solution notebook, add this in the first cell:

```
#jupman-preprocess
```

## 3.7 Hiding cells

A way to hide cells (like for example the `import jupman` code) is by clicking View->Cell toolbar -> Edit metadata and adding `"nbsphinx": "hidden"` to the JSON (see also original [NBSphinx docs](https://nbsphinx.readthedocs.io/en/0.2.14/hidden-cells.html#Hidden-Cells)<sup>42</sup> and *Toggable cells in Jupman tests*).

**NOTE 1:** As of NBSphinx 2.17, it is not possible to hide only cell text but not the output.

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<sup>42</sup> <https://nbsphinx.readthedocs.io/en/0.2.14/hidden-cells.html#Hidden-Cells>

## 3.8 Info boxes

Supported boxes are inherited from NBSphinx with div classes "alert alert-info", "alert alert-warning"

See [Rendering tests](#)<sup>43</sup> for examples.

Plus we add `jupman-alert-principle`: some alerts to be often reminded can be preceded with an empty div having class `jupman-alert-principle` followed by a regular alert box, so they will display as you want on the website and as fallback boxes in the pdf (did this way as we can't add classes nor other attributes, tried also `data-jupman` html attributes with no success)

**NOTE:** default colors are indicative and minimal on purpose, for a better view see [softpython themed version](#)<sup>44</sup>

**Recommended approach:** The typical principle alert should be brief and may have a link to more substantial text, with a short line under it. If you need more explicative text, put it outside:

```
<div class="jupman-alert-principle"></div>
<div class="alert alert-info">

[IV PRINCIPLE] (https://jupman.softpython.org/principles.html#V-PRINCIPLE): **You_
↪shall write tests!**

Who does **not** writes tests, falls into _Debugging Hell_!
</div>
```

---

**IV PRINCIPLE**<sup>45</sup>: **You shall write tests!**

Who does **not** writes tests, falls into *Debugging Hell*!

---

## 3.9 Utilities

**NOTE:** not mandatory, it's mostly intended to tweak notebooks downloaded locally. Should be avoided in notebooks meant for students, as it's more likely it will mess their configurations - also, they might copy the notebooks without knowing they contain the custom js and use weird extensions which could generate conflicts (such as double toc)

For notebooks in the root folder:

```
import jupman
```

Worksheets in subfolders can use `sys.path` to locate the module

```
import sys
sys.path.append('../')
import jupman
```

Some reason for this ugliness is reported in [this issue](#)<sup>46</sup>.

<sup>43</sup> <http://127.0.0.1:8888/notebooks/jupman/jupman-3.5.1/manual/tests.ipynb#Info/Warning-Boxes>

<sup>44</sup> <https://jupman.softpython.org/themed/manual/tests.html#jupman-alert-principle>

<sup>45</sup> <https://jupman.softpython.org/principles.html#IV-PRINCIPLE>

<sup>46</sup> <https://github.com/DavidLeoni/jupman/issues/12>

## 3.10 Launch unit tests

Inside worksheets you can run `unittest` tests.

To run all the tests of a test class, write like this

```
jupman.run(NameOfTheTestClass)
```

To run a single method, write like this:

```
jupman.run(NameOfTheTestClass.nameOfTheMethod)
```

## 3.11 Python Tutor

Among the various ways to embed Python Tutor, we decided to implement a special `jupman.pytut()` method. First you need to import the `jupman` module:

```
[1]: import sys
     sys.path.append('../')
     import jupman
```

Then you can put a call to `jupman.pytut()` at the end of a cell, and the cell code will magically appear in python tutor in the output (except the call to `pytut()` of course). To see Python Tutor you don't need to be online

```
[2]: x = [5,8,4]
     y = {3:9}
     z = [x]

     jupman.pytut()
```

```
[2]: <IPython.core.display.HTML object>
```

Beware of variables which were initialized in previous cells, they won't be available in Python Tutor and you will get an error:

```
[3]: w = 8
```

```
[4]: x = w + 5
     jupman.pytut()

Traceback (most recent call last):
  File "../jupman.py", line 2453, in _runscript
    self.run(script_str, user_globals, user_globals)
  File "/usr/lib/python3.7/bdb.py", line 578, in run
    exec(cmd, globals, locals)
  File "<string>", line 2, in <module>
NameError: name 'w' is not defined
```

```
[4]: <IPython.core.display.HTML object>
```

## 3.12 Pandas

Correctly rendering pandas in PDFs is not so easy (see [issue<sup>47</sup>](#)), so far we created this little function which sometimes is handy:

```
[5]: import pandas as pd

lista = [['Rosanna', 'Gippalanda', 26, 100, 500, 300, 600, 600, 100, 300, 600, 300, ↵
↵200, 400, 200, 300, 400, 500],
        ['Matilda', 'Zampola', 10, 500, 200, 300, 500, 400, 300, 200, 500, 300, ↵
↵200, 400, 200, 300, 400, 500],
        ['Mario', 'Cipolli', 25, 300, 500, 100, 500, 300, 500, 100, 500, 300, ↵
↵200, 400, 200, 300, 400, 500],
        ['Ugo', 'Sgarapirri', 30, 100, 400, 200, 500, 300, 200, 600, 300, 300, ↵
↵200, 400, 200, 300, 400, 500]
        ]

df = pd.DataFrame(lista, columns =['Name', 'Surname', 'Age', *['Par'+str(i) for i in ↵
↵range(1,16)]])
df # web
```

```
[5]:
```

	Name	Surname	Age	Par1	Par2	Par3	Par4	Par5	Par6	Par7	Par8	\
0	Rosanna	Gippalanda	26	100	500	300	600	600	100	300	600	
1	Matilda	Zampola	10	500	200	300	500	400	300	200	500	
2	Mario	Cipolli	25	300	500	100	500	300	500	100	500	
3	Ugo	Sgarapirri	30	100	400	200	500	300	200	600	300	

	Par9	Par10	Par11	Par12	Par13	Par14	Par15
0	300	200	400	200	300	400	500
1	300	200	400	200	300	400	500
2	300	200	400	200	300	400	500
3	300	200	400	200	300	400	500

```
[6]: import jupman
jupman.draw_df(df) # image for pdf
```

	Name	Surname	Age	Par1	Par2	Par3	Par4	Par5	Par6	Par7	Par8	Par9	Par10	Par11	Par12	Par13	Par14	Par15
0	Rosanna	Gippalanda	26	100	500	300	600	600	100	300	600	300	200	400	200	300	400	500
1	Matilda	Zampola	10	500	200	300	500	400	300	200	500	300	200	400	200	300	400	500
2	Mario	Cipolli	25	300	500	100	500	300	500	100	500	300	200	400	200	300	400	500
3	Ugo	Sgarapirri	30	100	400	200	500	300	200	600	300	300	200	400	200	300	400	500

## 3.13 Showing function help

Python help is already quite good, but adds two useless extra lines and only works as a print, so we defined `jupman.get_doc`:

```
[7]: print(jupman.get_doc(jupman.get_doc))

def get_doc(fun):
    """ Returns the help of a function formatted in a faithful manner
```

(continues on next page)

<sup>47</sup> <https://github.com/DavidLeoni/jupman/issues/69>

(continued from previous page)

```
@since 3.3  
"""
```

## 3.14 Custom js and css

If you need custom js and/or css in a notebook, you can inject it by running

```
jupman.init()
```

in the first cell, it will inject `jupman.js` and `jupman.css`

## 3.15 Show table of contents

Since 0.8, custom toc is disabled, try instead *installing `toc2` extension*. If you still want the `jupman` toc (not recommended), execute

```
jupman.init(toc=True)
```

it will create the sidebar even when editing in Jupyter. To refresh the sidebar, just rerun the cell.

Note: hiding the `jupman.init` code cell will prevent the build system to embed the Javascript file `jupman.js` inside the page in the HTML website: this is still fine as it is fetched separately by settings in `conf.py`.



## CUSTOMIZE

### 4.1 Change website theme

If you want to change site colors and other changes, copy/edit `_static/css/jupman-web.css`<sup>48</sup> and set it in `conf.html_css_files`:

```
html_css_files = [  
    'css/jupman.css',      # shared among jupyter and website  
    'css/jupman-web.css',  # only on website  
    #'css/softpython-theme.css', # uncomment to activate  
    #'css/scifi-theme.css',  
]
```

### 4.2 Fonts

Fonts are a bit of a complex topic

TODO this part is just a collection of personal notes

- The missing guide to font formats<sup>49</sup>
- <https://docs.readthedocs.io/en/latest/guides/adding-custom-css.html>
- RTD Code font issue on github<sup>50</sup>

Tools:

Comprehensive article: <https://www.useragentman.com/blog/2011/02/20/converting-font-face-fonts-quickly-in-any-os/>  
and <https://www.useragentman.com/blog/the-css3-font-converter/>

<https://github.com/zoltan-dulac/css3FontConverter>

woff2

<https://github.com/google/woff2>

sfnt2woff

```
sudo apt-get install libbrotli-dev  
sfnt2woff SomeFont.otf
```

mkeot

---

<sup>48</sup> [https://github.com/DavidLeoni/jupman/blob/master/\\_static/css/jupman-web.css](https://github.com/DavidLeoni/jupman/blob/master/_static/css/jupman-web.css)

<sup>49</sup> <https://creativemarket.com/blog/the-missing-guide-to-font-formats>

<sup>50</sup> [https://github.com/readthedocs/sphinx\\_rtd\\_theme/issues/524](https://github.com/readthedocs/sphinx_rtd_theme/issues/524)

```
sudo apt-get install eot-utils
mkeot SomeFont.otf > SomeFont.eot
```

or <https://github.com/wget/ttf2eot>

FontForge (GUI and scriptable)

```
sudo apt-get install fontforge
```

## 4.3 font sizes

<https://www.24a11y.com/2019/pixels-vs-relative-units-in-css-why-its-still-a-big-deal/>

<https://chiamakaikanyi.dev/sizing-in-css-px-vs-em-vs-rem/>

## 4.4 Warning about old versions

ReadTheDocs has a mechanism<sup>51</sup> to warn the user if he's looking at an old version of the site, but we found it doesn't work much for course-based documentation. So for versioning we think it's better to adopt a mixed git branch / tags development model, and we added a template warning to show in old branches. To enable it in an old branch, just edit `_templates/breadcrumbs.html`<sup>52</sup> as needed.

## 4.5 Fix nbsphinx to create rst files

Sometimes nbsphinx does not report properly RST conversion errors (see [bug](#)<sup>53</sup>). As a hacky workaround, you might take the `nbsphinx.py` from `~/local/lib/python3.5/site-packages/`, make a copy of it in your project home and patch it [like this](#)<sup>54</sup>. When you call sphinx, it will generate RST files in `_build/jupman-rst/`.

Of course, things can be cleaner using a virtual env [with venv](#)<sup>55</sup>

## 4.6 Git performance notes

Current suggested setup for hosting on Github is creating branch `gh-pages` and using Github Actions to populate it with html, zips, pdf and epub files. While keeping all that stuff versioned may seem pretty inefficient, apparently git is [pretty good](#)<sup>56</sup> at compressing binary files

The size of `.git` repo for a 1000 pdf page project SoftPython with 300 commits and 100 MB of code is:

```
.git: 183 MB
```

By truncating `gh-pages` to last commit and garbage collecting, we get:

---

<sup>51</sup> <https://docs.readthedocs.io/en/latest/versions.html>

<sup>52</sup> [https://github.com/DavidLeoni/jupman/blob/master/\\_templates/breadcrumbs.html](https://github.com/DavidLeoni/jupman/blob/master/_templates/breadcrumbs.html)

<sup>53</sup> <https://github.com/DavidLeoni/jupman/issues/9>

<sup>54</sup> <https://github.com/DavidLeoni/jupman/commit/0f332629ce4e2b0186c954c55aea7fa67992ace9#diff-bd3d9c4d2e80ed83fd2443d1301aa65bR649>

<sup>55</sup> <https://docs.python.org/3/library/venv.html>

<sup>56</sup> <https://stackoverflow.com/a/48305739>

```
.git: 139 MB
```

If we completely remove gh-pages branch, we get:

```
.git: 68.7 MB
```

So gh-pages size is:

- one commit: 70.3 MB
- 300 commits: 114.3 MB

which is not even double than source code git size.

If the repo gets really huge, in order to to shrink it some git knowledge is required.

**If the repo is served from another server** and you want to truncate that server git repo:

On that server console:

1. first make sure you are on gh-pages branch:

```
git checkout gh-pages
```

2. truncates previous commits:

```
git fetch --depth=1 origin gh-pages
```

3. removes various links around which may still point to old commits:

```
git reflog expire --expire-unreachable=now --all
```

4. actually deletes from disk old commits:

```
git gc --aggressive --prune=all
```

Note the result of truncation cannot be pushed back to origin as git would complain it is a *shallow* branch.

[ ]:



## EXAMS MANAGEMENT

Jupman comes with a script to manage exams called `exam.py`, which allows to manage the full cycle of an exam.

### 5.1 What is an exam

**Exam text** is represented as Jupyter notebooks, which are taken from `_templates/exam/solutions/exam-yyyy-mm-dd.ipynb`

**Exercises for students:** they are supposed to be the exam notebook itself and / or plain python files (or the notebook itself) plus unittests and relative solutions.

**Marks spreadsheet:** By default there is also an LibreOffice spreadsheet to give marks, in case you need it.

When you initialize an exam with the `init` command, for example for date `2000-12-31`, all the presets in `_templates/exam/` are copied to `private/2000-12-31/` and `private/2000-12-31/solutions`. Presets can be changed at will to suit your needs. When packaging, student zip is assembled in `private/2000-12-31/student-zip`

System is flexible enough so you can privately work on next exams in `private/` folder and still being able to publish modifications to main website. After an exam, you can copy the private exam to the public folders in `past-exams/`.

### 5.2 Exam commands

To see the help:

```
python3 exam.py -h
```

To see help for a particular subcommand, like i.e. `init`, type the subcommand followed by `-h`:

```
python3 exam.py init -h
```

Running commands should be quite self-explanatory.

NOTE: as of today (Dec 2019) software may contain bugs, but at least we check for major misuses (like trying to overwrite existing exams).

In the file `create-exam-example.sh` there is a typical run of the script, which creates the example exam for date `2000-12-31`. Notice it might ask you to delete the existing `2000-12-31` exam, if it does just follow the instructions. Here's the output:

```
> ./create-exam-example.sh
python3 exam.py init 2000-12-31
  Detected release from git: 3.2.0-3-g30a995c
No GOOGLE_ANALYTICS environment variable was found, skipping it

  You can now edit Python solutions, tests, exercises and exam notebook here  :

      _private/2000-12-31/solutions

DONE.

python3 exam.py package 2000-12-31
  Detected release from git: 3.2.0-3-g30a995c
No GOOGLE_ANALYTICS environment variable was found, skipping it
  Cleaning _private/2000-12-31/server/jupman  ...
  Copying exercises to _private/2000-12-31/student-zip/jupman-2000-12-31-FIRSTNAME-
↪LASTNAME-ID/
  Copying code
    from _private/2000-12-31/solutions
    to   _private/2000-12-31/student-zip/jupman-2000-12-31-FIRSTNAME-LASTNAME-ID/
  Writing (patched) _private/2000-12-31/student-zip/jupman-2000-12-31-FIRSTNAME-
↪LASTNAME-ID/exam-2000-12-31.ipynb
  Generating _private/2000-12-31/student-zip/jupman-2000-12-31-FIRSTNAME-LASTNAME-
↪ID/trees.py
  Writing _private/2000-12-31/student-zip/jupman-2000-12-31-FIRSTNAME-LASTNAME-ID/
↪example.txt
  Generating _private/2000-12-31/student-zip/jupman-2000-12-31-FIRSTNAME-LASTNAME-
↪ID/lists.py
  Writing (patched) _private/2000-12-31/student-zip/jupman-2000-12-31-FIRSTNAME-
↪LASTNAME-ID/trees_test.py
  Writing (patched) _private/2000-12-31/student-zip/jupman-2000-12-31-FIRSTNAME-
↪LASTNAME-ID/lists_test.py
  Creating dir _private/2000-12-31/student-zip/jupman-2000-12-31-FIRSTNAME-LASTNAME-
↪ID/img
  Writing _private/2000-12-31/student-zip/jupman-2000-12-31-FIRSTNAME-LASTNAME-ID/
↪img/mountains.jpg
  Building pdf ..
  Creating student exercises zip: _private/2000-12-31/server/jupman-2000-12-31-exam.
↪zip
  Writing jupman.py
  Writing my_lib.py
  Writing _static/img/cc-by.png
  Writing _static/js/jupman.js
  Writing _static/css/jupman.css
  Writing _static/js/toc.js
  Writing _static/js/pytutor-embed.bundle.min.js
  Wrote _private/2000-12-31/server/jupman-2000-12-31-exam.zip

DONE.

----- Simulating some shipped exams...
mkdir -p _private/2000-12-31/shipped/john-doe-112233
cp _templates/exam/solutions/lists_sol.py _templates/exam/solutions/lists_test.py _
↪templates/exam/solutions/trees_sol.py _templates/exam/solutions/trees_test.py _
↪private/2000-12-31/shipped/john-doe-112233
mkdir -p _private/2000-12-31/shipped/jane-doe-445566
```

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```

cp _templates/exam/solutions/lists_sol.py _templates/exam/solutions/lists_test.py _
↳ templates/exam/solutions/trees_sol.py _templates/exam/solutions/trees_test.py _
↳ private/2000-12-31/shipped/jane-doe-445566
----- Done with shipped exams simulation, time to grade ...

python3 exam.py grade 2000-12-31
  Detected release from git: 3.2.0-3-g30a995c
No GOOGLE_ANALYTICS environment variable was found, skipping it
  Copying Python files to execute and eventually grade in _private/2000-12-31/graded/
↳ john-doe-112233/graded
  Copying original shipped files (don't touch them!) in _private/2000-12-31/graded/
↳ john-doe-112233/shipped
  Copying Python files to execute and eventually grade in _private/2000-12-31/graded/
↳ jane-doe-445566/graded
  Copying original shipped files (don't touch them!) in _private/2000-12-31/graded/
↳ jane-doe-445566/shipped

  DONE.

python3 exam.py zip-grades 2000-12-31
  Detected release from git: 3.2.0-3-g30a995c
No GOOGLE_ANALYTICS environment variable was found, skipping it

  You can now find zips to send to students in _private/2000-12-31/graded

  DONE.

python3 exam.py publish 2000-12-31
  Detected release from git: 3.2.0-3-g30a995c
No GOOGLE_ANALYTICS environment variable was found, skipping it
  Copying solutions to exams/2000-12-31/solutions
  Copying exam PDF text

  Exam Python files copied.

  You can now manually build and run the following git instructions to publish the
↳ exam.
  ./build.py
  git status # just to check everything is ok
  git add .
  git commit -m 'published 2000-12-31 exam'
  git push

  DONE.

  Finished example exam run !!

```

[ ]:





## CHAPTER EXAMPLES

### 6.1 Python example

#### 6.1.1 Download exercises zip

Browse files online<sup>57</sup>

Example of notebook for exercises in Python files

#### 6.1.2 What to do

- unzip exercises in a folder, you should get something like this:

```
python-example
python-example.ipynb
lab1.py
lab1_test.py
lab1_sol.py
lab2.py
lab2_test.py
lab2_sol.py
jupman.py
my_lib.py
```

- open the editor of your choice (for example Visual Studio Code, Spyder or PyCharme), you will edit the files `lab1.py` and `lab2.py`
- Go on reading this notebook, and follow instructions inside.

#### Let's begin

You are going to program a simulator of bouncing clowns. To do so, we are going to load this module:

```
[2]: import local
```

```
[3]: local.gimme(5)
```

```
It was a 5 indeed
```

---

<sup>57</sup> <https://github.com/DavidLeoni/jupman/tree/master/python-example>

### Download test data

Local file:

- example.txt
- example.csv

### 6.1.3 Global image



### 6.1.4 Local exercise image



### 6.1.5 Python tutor

```
[4]: x = [1,2,3]
     y = 6
```

```
jupman.pytut()
```

```
[4]: <IPython.core.display.HTML object>
```

```
[5]: y = [1,2,3]
```

```
jupman.pytut()
```

```
[5]: <IPython.core.display.HTML object>
```

Start editing lab1.py in text editor

```
[6]: from lab1_sol import *
```

### 6.1.6 add

Implement add function:

```
[7]: add(3,5)
```

```
[7]: 8
```

### 6.1.7 sub

Implement sub function

```
[8]: sub(7,4)
```

```
[8]: 3
```

```
[ ]:
```

## 6.2 Jupyter example

### 6.2.1 Download exercises zip

Browse files online<sup>58</sup>

Example of notebook for exercises in Jupyter files.

For python files based example and more, see *Python example*

### 6.2.2 What to do

- unzip exercises in a folder, you should get something like this:

```
jupyter-example
  jupyter-example.ipynb
  jupyter-example-sol.ipynb
  jupman.py
  my_lib.py
```

**WARNING:** to correctly visualize the notebook, it MUST be in an unzipped folder !

- open Jupyter Notebook from that folder. Two things should open, first a console and then browser. The browser should show a file list: navigate the list and open the notebook `jupyter-example/jupyter-example.ipynb`
- Go on reading that notebook, and follow instructions inside.

<sup>58</sup> <https://github.com/DavidLeoni/jupman/tree/master/jupyter-example>

Shortcut keys:

- to execute Python code inside a Jupyter cell, press Control + Enter
- to execute Python code inside a Jupyter cell AND select next cell, press Shift + Enter
- to execute Python code inside a Jupyter cell AND a create a new cell afterwards, press Alt + Enter
- If the notebooks look stuck, try to select Kernel -> Restart

```
[2]: # REMEMBER TO IMPORT jupman !  
# This cell needs to be executed only once, you can usually find it at the beginning  
# of the worksheets  
  
import jupman
```

```
[3]: x = [1,2,3]  
y = x  
jupman.pytut()
```

```
[3]: <IPython.core.display.HTML object>
```

```
[4]: y = [1,2,3]  
w = y[0]  
jupman.pytut()
```

```
[4]: <IPython.core.display.HTML object>
```

### 6.2.3 Exercise 1

Implement `inc` function:

```
<a class="jupman-sol jupman-sol-toggler" onclick="jupman.toggleSolution(this);" data-jupman-show="Show solution"  
data-jupman-hide="Hide">Show solution</a><div class="jupman-sol jupman-sol-code" style="display:none">
```

```
[5]:  
  
def helper(x):  
    return x + 1  
  
def inc(x):  
  
    return helper(x)
```

```
</div>
```

```
[5]:  
  
def inc(x):  
    raise Exception('TODO IMPLEMENT ME !')
```

## 6.2.4 Exercise 2

Implement `upper` function

```
<a class="jupman-sol jupman-sol-toggler" onclick="jupman.toggleSolution(this);" data-jupman-show="Show solution" data-jupman-hide="Hide">Show solution</a><div class="jupman-sol jupman-sol-code" style="display:none">
```

```
[6]: def helper2(x):
      return x.upper()

      def upper(x):

          return helper2(x)
```

```
</div>
```

```
[6]: def upper(x):
      raise Exception('TODO IMPLEMENT ME !')
```

## Exercise 3

Note everything *after* the ‘write here’ comment will be discarded. Note you can put how many spaces you want in the comment

```
<a class="jupman-sol jupman-sol-toggler" onclick="jupman.toggleSolution(this);" data-jupman-show="Show solution" data-jupman-hide="Hide">Show solution</a><div class="jupman-sol jupman-sol-code" style="display:none">
```

```
[7]: w = 5

      # write here

      x = 5 + 6
      y = 6.4
      z = x / y
```

```
</div>
```

```
[7]: w = 5

      # write here
```

### Exercise 4

Shows how to completely remove the content of a solution cell (including the solution comment)

**EXERCISE:** write a function that prints 'hello'

```
<a class="jupman-sol jupman-sol-toggler" onclick="jupman.toggleSolution(this);" data-jupman-show="Show solution" data-jupman-hide="Hide">Show solution</a><div class="jupman-sol jupman-sol-code" style="display:none">
```

```
[8]: # SOLUTION

def f():
    print('hello')
```

```
</div>
```

```
[8]:
```

### Exercise 5

Shows the QUESTION / ANSWER feature. All content in 'ANSWER:' cell will be stripped

**QUESTION:** Describe why iPhone n + 1 is better than iPhone n

```
<a class="jupman-sol jupman-sol-toggler" onclick="jupman.toggleSolution(this);" data-jupman-show="Show answer" data-jupman-hide="Hide">Show answer</a><div class="jupman-sol jupman-sol-question" style="display:none">
```

**ANSWER:** it costs more

```
</div>
```

## 6.2.5 Conclusion

bla bla

Relative image test, Markdown format:



Relative image test, HTML img tag:



Relative link test, Markdown format:

*Back to index*

Relative link test, HTML a tag:

Back to index

## 6.3 Jupyter example with custom js and css

### 6.3.1 Download exercises zip

Browse files online<sup>59</sup>

Example of notebook for exercises in Jupyter files which calls `jupman.init()` for injecting `jupman.js` and `jupman.css` while editing in Jupyter.

Note calling `init()` is **not** mandatory. See also [Common files](#)<sup>60</sup> and [Custom-js-and-css](#)<sup>61</sup>.

### 6.3.2 Exercise 1

Implement `inc` function:

```
<a class="jupman-sol jupman-sol-toggler" onclick="jupman.toggleSolution(this);" data-jupman-show="Show solution" data-jupman-hide="Hide">Show solution</a><div class="jupman-sol jupman-sol-code" style="display:none">
```

[2]:

```
def helper(x):
    return x + 1

def inc(x):

    return helper(x)
```

```
</div>
```

[2]:

```
def inc(x):
    raise Exception('TODO IMPLEMENT ME !')
```

### 6.3.3 Exercise 2

Implement `upper` function

```
<a class="jupman-sol jupman-sol-toggler" onclick="jupman.toggleSolution(this);" data-jupman-show="Show solution" data-jupman-hide="Hide">Show solution</a><div class="jupman-sol jupman-sol-code" style="display:none">
```

[3]:

```
def helper2(x):
    return x.upper()

def upper(x):

    return helper2(x)
```

```
</div>
```

<sup>59</sup> <https://github.com/DavidLeoni/jupman/tree/master/jupyter-example>

<sup>60</sup> <https://jupman.softpython.org/en/latest/manual/editing.html#Common-files>

<sup>61</sup> <https://jupman.softpython.org/en/latest/manual/editing.html#Custom-js-and-css>

```
[3]: def upper(x):  
      raise Exception('TODO IMPLEMENT ME !')
```

## 6.4 Jupyter and Python example

### 6.4.1 Download exercises zip

Browse files online<sup>62</sup>

Most complex example of a notebook with exercises both in Jupyter and Python files, and ‘advanced’ features

### 6.4.2 What to do

- unzip exercises in a folder, you should get something like this:

```
jup-and-py-example  
  jup-and-py-example.ipynb  
  jup-and-py-example_sol.ipynb  
  lab.py  
  lab_test.py  
  lab_sol.py
```

- open the editor of your choice (for example Visual Studio Code, Spyder or PyCharme), and edit `lab.py` file
- Go on reading this notebook, and follow instructions inside.

### Let’s begin

You are going to program a simulator of bouncing clowns. To do so, we are going to load this module:

```
[2]: import local
```

```
[3]: local.gimme(5)
```

```
It was a 5 indeed
```

### Download test data

Local file:

- `example.txt`
- `example.csv`

---

<sup>62</sup> <https://github.com/DavidLeoni/jupman/tree/master/jup-and-py-example>



### 6.4.3 Global image



### 6.4.4 Local exercise image



### 6.4.5 Python tutor

```
[4]: x = 5
      y = 6
      z = x + y

      jupman.pytut()

[4]: <IPython.core.display.HTML object>
```

### 6.4.6 Exercise in Jupyter

Implement this function:

```
<a class="jupman-sol jupman-sol-toggler" onclick="jupman.toggleSolution(this);" data-jupman-show="Show solution" data-jupman-hide="Hide">Show solution</a><div class="jupman-sol jupman-sol-code" style="display:none">
```

```
[5]: def hello(s):
      return ['hello', s]*1000

      hello_db = hello("Guybrush")
```

(continues on next page)

(continued from previous page)

```
hello_db[:10]
```

```
[5]: ['hello',
      'Guybrush',
      'hello',
      'Guybrush',
      'hello',
      'Guybrush',
      'hello',
      'Guybrush',
      'hello',
      'Guybrush']
```

&lt;/div&gt;

```
[5]: def hello(s):
      raise Exception('TODO IMPLEMENT ME !')
```

```
hello_db = hello("Guybrush")
```

```
hello_db[:10]
```

```
[5]: ['hello',
      'Guybrush',
      'hello',
      'Guybrush',
      'hello',
      'Guybrush',
      'hello',
      'Guybrush',
      'hello',
      'Guybrush']
```

Full expected output is in file `expected_output_db.py`, if you can't manage to solve the exercise, as a last resort you can type: `from expected_hello_db import *` (DO NOT copy-paste file content, it would probably mess Jupyter up)

```
[6]: from expected_hello_db import *
expected_hello_db[:10]
```

```
[6]: ['hello',
      'Guybrush',
      'hello',
      'Guybrush',
      'hello',
      'Guybrush',
      'hello',
      'Guybrush',
      'hello',
      'Guybrush']
```

Other example:

```
[7]: hello_db2 = hello("Threepwood")

hello_db2[:10]
```

```
[7]: ['hello',
      'Threepwood',
      'hello',
      'Threepwood',
      'hello',
      'Threepwood',
      'hello',
      'Threepwood',
      'hello',
      'Threepwood']
```

### 6.4.7 Exercise using previous output

Write some code which says hello 3 times using previous functionand

```
[8]: print(hello('Guybrush')[:6])

['hello', 'Guybrush', 'hello', 'Guybrush', 'hello', 'Guybrush']
```

### 6.4.8 Question in Jupyter

**QUESTION:** Why learn coding?

<a class="jupman-sol jupman-sol-toggler" onclick="jupman.toggleSolution(this);" data-jupman-show="Show answer" data-jupman-hide="Hide">Show answer</a><div class="jupman-sol jupman-sol-question" style="display:none">

**ANSWER:** So they pay me more

```
x + 1
```

Some other comment

```
Some nasty formatting
even more formatting
```

</div>

### 6.4.9 Exercise in Python

Start editing lab.py in text editor

```
[9]: from lab_sol import *
```

### 6.4.10 add

Implement add function:

```
[10]: add(3, 5)
```

```
[10]: 8
```

### 6.4.11 sub

Implement sub function

```
[11]: sub(7, 4)
```

```
[11]: 3
```

### 6.4.12 Fine grained purging

This cell input will be completely removed

```
[13]:  
  
print("This cell output will be completely removed")
```

```
[ ]:
```

## 6.5 Big sub chapter

### 6.5.1 Big docs example 1

**reasonable header**

Bla bla

**reasonable sub header**

Bla bla

**Reasonable subsub header**

Bla bla

## **reasonable header**

Bla bla

## **reasonable sub header**

Bla bla

## **Reasonable subsub header**

Bla bla

## **header with long title**

Bla bla

## **sub header with long title**

Bla bla

## **header with long title**

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## 6.5.2 Big docs example 2

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### 6.5.3 Big sub chapter A

Big docs example A1

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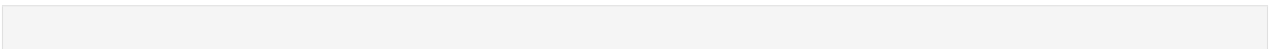
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Big sub chapter A.A

Big docs example AA1

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Big sub chapter A.B

Big docs example AB1

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Big sub chapter A.C

Big docs example AC1

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## 6.5.4 Big sub chapter B

Big docs example AB1

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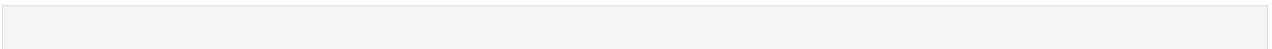
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## 6.6 Example Challenge

### 6.6.1 Download exercises zip

Browse files online<sup>63</sup>

This notebook has no solution!

**We published solution on Github<sup>64</sup> only for example purposes**, but normally all other files ending in `-chal-sol` or `_chal_sol` will be gitignored

```
[3]: from example_chal_sol import f
     f(3)
```

```
[3]: 3
```

```
[4]: def wow(x):
     raise Exception('TODO IMPLEMENT ME !')
```

```
[ ]:
```

---

<sup>63</sup> <https://github.com/DavidLeoni/jupman/tree/master/challenge-example>

<sup>64</sup> <https://github.com/DavidLeoni/jupman/blob/master/challenge-example/example-chal-sol.ipynb>



## TEMPLATES

### 7.1 Changelog

Jupman: A template for online manuals made with Jupyter notebooks.

[jupman.softpython.org](https://jupman.softpython.org)<sup>65</sup>

#### 7.1.1 July 9th, 2023 - 3.5.7

Added:

- Softpython theme eye candy #122
  - softpython-theme-textures.css with manually embedded base64 images
  - jupman-alert-principle in jupman-web.css as backbone for commandments
- logo, favicon #123
- explicitly stated all dependencies in requirements-build.txt, added create\_env script #82
- improved manual

Fixed:

- relative paths in cell outputs for zips #119
- now using relative js and css imports in jupman.init #117
- Python Tutor:
  - now shows unnest data structures by default #132
  - now shows in cloned cells #126 (changed stable ids #107)
  - sets are now correctly displaying with grey header #125
  - tutor Visual Studio Code no longer appears with grey text #136

Removed:

- `_private/README.md`

---

<sup>65</sup> <https://jupman.softpython.org>

### 7.1.2 August 11th, 2022 - 3.5.4

- Python Tutor:
  - added credits #111
  - visualized vertical separator bar #110
  - fixed red arrow misalignment #105
  - stable ids #107
  - removed ‘Customize visualization’ #108
- Github actions: automatically build themed version #100
- SoftPython theme #92: various fixes
- Fixed relative html a, img with attributes in markdown not working in zip: #113

### 7.1.3 June 4th 2022 - 3.5

- generated html can be really used offline #96, also fixes wrong math symbols with local build #3
- automated testing on github actions #99
- virtual env install, pinpointed build dependencies #82
- fixed text overflow on smartphones #94, fixed softpython theme flag
- github actions: always reset html output #98

### 7.1.4 April 28th 2022 - 3.4

- fixed softpython theme font size #92
- restructured manual

### 7.1.5 February 25th 2022 - 3.3

Implemented:

- jupman-preprocess #64
- big docs support #77
- Challenges support (suboptimal but usable) #56
- jupman-purge #59
- jupman.draw\_text for #66
- jupman.save\_py function
- jupman.get\_doc as nice way to print function documentation #68
- jupman.draw\_text to show some ASCII characters in local build #66
- jupman.mem\_limit for Linux #62
- Home link should point to index.html #71
- optional parameter conf to jmt.init

- deterministic zip #60 (requires python 3.7)

Fixed:

- Notebook validation failed: Non-unique cell id error #78
- exam pdf build breaks when using images #61

Defined:

- how to use custom anchors #80
- how to have single pages like References at menu bottom #70

### **7.1.6 October 17th 2020 - 3.2**

- added optional build on Github Actions
- solutions are finally hidden on the website, with a click-to-show button!
- introduced generic jupman-toggable and specific jupman-sol CSS classes
- improved menu navigation
- added softpython theme
- images are now shown centered in HTML
- moved to jupman.softpython.org
- fixed write here tag not preserving the line
- deprecated jupman\_tools.ignore\_spaces in favor of tag\_regex
- updated nbsphinx to 0.7.1
- updated sphinx\_rtd\_theme to 0.4.3
- updated sphinx to 2.3.1
- updated pygments to 2.7.1

### **7.1.7 January 16th 2020 - 3.1**

- removed jupman.init root parameter
- bugfixes
- upgraded nbsphinx from 0.3.4 to 0.5.0
- upgraded sphinx\_rtd\_theme from 0.2.5b1 to 0.4.3
- upgraded sphinx from 1.7.6 to 2.3.1
- upgraded recommonmark from 0.4.0 to 0.6.0

### 7.1.8 December 29th 2019 - 3.0

- much simplified folder structure
  - [Issue 33](#)<sup>66</sup>
- removed solutions from header requirement
  - [Issue 32](#)<sup>67</sup>
- introduced tests (pytest, hypothesis)
- removed old\_news in favor of changelog.md
- Latex:
  - much better PDF cover
  - using xelatex
  - set up unicode mappings
- several fixes

### 7.1.9 September 24th 2018 - 2.0

- now using index.ipynb as home. Hurray !

### 7.1.10 September 19th 2018 - 1.0

- fixed build.py
- added html templates examples
- cleaned toc (was showing too much when loading)

### 7.1.11 August 26th 2018 - 0.9

- implemented generation of exercises from solutions [Issue 14(<https://github.com/DavidLeoni/jupman/issues/14>)
- reverted to old jupman.init() code [Issue 12](#)<sup>68</sup>

### 7.1.12 August 12th 2018 - 0.8

- Prepended all functions in jupman.py with jupman\_
- replaced index with proper homepage. see [Issue 11](#)<sup>69</sup>
  - from now on you need home.ipynb file, because replacing index.rst is a nightmare!
  - new index.rst is just a placeholder which simply redirects to home.html. Do not modify it.
  - put the toctree in toc.rst

---

<sup>66</sup> <https://github.com/DavidLeoni/jupman/issues/33>

<sup>67</sup> <https://github.com/DavidLeoni/jupman/issues/32>

<sup>68</sup> <https://github.com/DavidLeoni/jupman/issues/12>

<sup>69</sup> <https://github.com/DavidLeoni/jupman/issues/11>

- exercises ipynb can now stay in exercises/ folder; when exercises are zipped, jupman automatically adds to the zip the required site files. see [Issue 12](#)<sup>70</sup>
- Tried %run at beginning of notebooks, without much satisfaction (see discussion in [Issue 12](#)<sup>71</sup>):
- disabled toc by default in html files. To enable it, in python use `%run -i ../../jupman --toc`
- renamed past-exams directory from 'past-exams' to 'exams'
- created `info`, `error`, `warn`, `fatal` functions to `conf.py`
- introduced new variable `exercise_common_files` in `conf.py` for common files to be zipped
- added pages `exam-project`, `markdown`, `project-ideas`,
- added `cc-by.png`
- renamed `changelog.txt` to `changelog.md`
- now using templates with curly brackets in in templating, like `_JM_{some_property}`
- `jupman.js` : now when manually saving html in Jupyter, resulting html correctly hides cells
- Fixes <https://github.com/DavidLeoni/jupman/issues/2> : now toc is present in local build for pdfs

### 7.1.13 August 3rd 2018 - 0.7

- added `jupman.py` `pytut()` for displaying Python tutor in the cells
- added `jupman.py` `toc=False` option to `jupman.py` `init` to disable toc
- removed `jupman.py` useless `networkx` import from
- fixed usage indentation
- added `changelog.txt`

## 7.2 Past Exams

[ ]:

### 7.3 Exam project

**\*\*For general (credits, attendance) info, see *course description***

**Delivery times**

**Ideas for possible projects:** [See here](#)

Last update: TODO

**In short:**

<sup>70</sup> <https://github.com/DavidLeoni/jupman/issues/12>

<sup>71</sup> <https://github.com/DavidLeoni/jupman/issues/12>

### 7.3.1 What to do

**First of all:** send by email to [TODO@TODO.COM](mailto:TODO@TODO.COM) a brief description of the project, to decide what to do. I will create a Google doc to keep track of progresses and / or problems found.

**Once the project is defined,** go on like this:

1 - Download [zip with template](#) (view online files [TODO<sup>72</sup>](#) )

After unzipped, you will find a folder named NAME-SURNAME-ID, with these files inside:

```
- NAME-SURNAME-ID
  - project.ipynb
  - markdown.ipynb
  - requirements.txt
  - img
    - example.png
```

2 - Rename the folder NAME-SURNAME-ID with your data

3 - run Jupyter from the folder you just renamed

4 - edit file `project.ipynb` , **closely following the indications** *in the following technical requirements*

5 - Once done, send project by email to [TODO@TODO.COM](mailto:TODO@TODO.COM)

### 7.3.2 Technical requirements

Write in *Markdown*

**Python code**

`requirements.txt` file

**Graphical interfaces**

**Be careful to**

## 7.4 Project ideas

### 7.4.1 TODO

**Last update:** TODO

---

<sup>72</sup> <https://www.GITHUB.TODO>

## 7.4.2 Introduction

[ ]:

## 7.5 Jupman Project

PUT:

TITLE

NAME - ID

DATAE

### 7.5.1 Introduction

Bla bla

### 7.5.2 Data sources

Bla bla

### 7.5.3 Data cleaning and integration

Bla bla

### 7.5.4 Analysis

Bla bla

### 7.5.5 Problems found

Bla bla

### 7.5.6 Conclusioni

Bla bla

[ ]:

## 7.6 Markdown

Briefly explain why markdown is so great ..

[ ]:



## 8.1 Rendering tests

Shows various recommendations and cornercases, see also [softpython themed](https://jupman.softpython.org/themed/manual/tests.html)<sup>73</sup> version.

The page Title has one sharp, sections always have two sharps.

### 8.1.1 Section 1

bla bla

### 8.1.2 Section 2

Subsections always have three sharps

#### Subsection 1

bla bla

#### Subsection 2

bla bla

### 8.1.3 Python code

```
[2]: x = 4  
     lst = [1, 2, 4]
```

---

<sup>73</sup> <https://jupman.softpython.org/themed/manual/tests.html>

### 8.1.4 Python in Markdown

```
x = 4
lst = [1, 2, 4]
```

### 8.1.5 Other quotes

I'm quoted with > symbol on multiple lines. **Am I readable?**

Somebody asked

```
I'm quoted with **spaces**
on multiple lines
Am I readable?
```

```
Generic quote with backticks
Can you read it?
Is it nice?
```

```
# bash quote with backticks
cd foo
ls
cat wiz.txt
```

### 8.1.6 Download links

Files manually put in `_static`:

- Download [trial.odt](#)
- Download [trial.pdf](#)

Files in arbitrary folder position :

- Download [requirements.txt](#)

NOTE: download links are messy, see issue 8<sup>74</sup>

### 8.1.7 Links to HTML

- Link to [trial.html](#)

---

<sup>74</sup> <https://github.com/DavidLeoni/jupman/issues/8>

### 8.1.8 Info/Warning Boxes

Inherited from NBSphinx:

Until there is an info/warning extension for Markdown/CommonMark, such boxes can be created by using HTML elements like the following

For this to work reliably, you should obey the following guidelines:

- The class attribute has to be either "alert alert-info" or "alert alert-warning", other values will not be converted correctly.
- No further attributes are allowed.
- For compatibility with CommonMark, you should add an empty line between the <div> start tag and the beginning of the content.

---

**Note:** This is an info, mixed bold!

---

**Note:** This is a warn, mixed bold!

---



---

Note: This is a long info, plain title, single paragraph

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---

This is a long warn, plain title, single paragraph

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---



---

Note: This is a long info, plain title, multiple paragraph

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---

This is a long warn, plain title, multiple paragraph

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---

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---

Note: This is a long info, plain title, multiple paragraph with code

Lorem ipsum dolor sit amet, consectetur adipisci elit, sed eiusmod tempor incidunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrum exercitationem ullam corporis suscipit laboriosam, nisi ut aliquid ex ea commodi consequatur.

Sed ut perspiciatis unde omnis iste natus error sit voluptatem accusantium doloremque laudantium, totam rem aperiam, eaque ipsa quae ab illo inventore veritatis et quasi architecto beatae vitae dicta sunt explicabo.

```
for x in range(4):
    if x in [8,3,1,5]:
        print(x)
```

---

This is a long warn, plain title, multiple paragraph, code

Lorem ipsum dolor sit amet, consectetur adipisci elit, sed eiusmod tempor incidunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrum exercitationem ullam corporis suscipit laboriosam, nisi ut aliquid ex ea commodi consequatur.

Sed ut perspiciatis unde omnis iste natus error sit voluptatem accusantium doloremque laudantium, totam rem aperiam, eaque ipsa quae ab illo inventore veritatis et quasi architecto beatae vitae dicta sunt explicabo.

```
for x in range(4):
    if x in [8,3,1,5]:
        print(x)
```

---

**Note: This is a long info, bold title**

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**This is a long warn, plain title!**

Lorem ipsum dolor sit amet, consectetur adipisci elit, sed eiusmod tempor incidunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrum exercitationem ullam corporis suscipit laboriosam, nisi ut aliquid ex ea commodi consequatur.

## jupman-alert-principle

**NOTE:** default colors are indicative and minimal on purpose, for a better view see [softpython themed version](#)<sup>75</sup>

**Recommended approach:** The typical principle alert should be brief and may have a link to more substantial text, with a short line under it. If you need more explicative text, put it outside:

```
<div class="jupman-alert-principle"></div>
<div class="alert alert-info">

[IV PRINCIPLE] (https://jupman.softpython.org/principles.html#V-PRINCIPLE) : **You_
↳shall write tests!**

Who does **not** writes tests, falls into _Debugging Hell_!
</div>
```

---

**IV PRINCIPLE**<sup>76</sup>: **You shall write tests!**

Who does **not** writes tests, falls into *Debugging Hell!*

---

**Normal weight font:**

---

**IV PRINCIPLE**<sup>77</sup>: You shall write tests!

Who does **not** writes tests, falls into *Debugging Hell!*

---

**Shorter principle recall, bold:**

---

**IV PRINCIPLE**<sup>78</sup>: **You shall write tests!**

---

**Shorter principle recall, normal font weight:**

---

**IV PRINCIPLE**<sup>79</sup>: You shall write tests!

---

**Shorter principle recall, all bold:** (doesn't work: shows artifacts)

---

**IV PRINCIPLE** <<https://jupman.softpython.org/principles.html#IV-PRINCIPLE>>`\_\_` : **You shall write tests!**

---

**Longer principle with text outside the box** (recommended):

---

**VII PRINCIPLE**<sup>80</sup>: **You shall never ever add nor remove elements from a sequence you are iterating with a `for` !**

---

Better to keep explanation text and code outside

<sup>75</sup> <https://jupman.softpython.org/themed/manual/tests.html#jupman-alert-principle>

<sup>76</sup> <https://jupman.softpython.org/principles.html#IV-PRINCIPLE>

<sup>77</sup> <https://jupman.softpython.org/principles.html#IV-PRINCIPLE>

<sup>78</sup> <https://jupman.softpython.org/principles.html#IV-PRINCIPLE>

<sup>79</sup> <https://jupman.softpython.org/principles.html#IV-PRINCIPLE>

<sup>80</sup> <https://jupman.softpython.org/principles.html#VII-PRINCIPLE>

```
lst = ['a', 'b', 'c']
for x in lst:
    lst.add(x) # aaargh
```

**Longer principle with text inside the box** (not recommended):

---

**VII PRINCIPLE<sup>81</sup>**: You shall never ever add nor remove elements from a sequence you are iterating with a `for` !

This is a **way too long** principle only for *testing* purposes, typically it's much better keeping long stuff outside.

```
lst = ['a', 'b', 'c']
for x in lst:
    lst.add(x) # aaargh
```

---

**Longer principle with text inside the box, all bold** (not recommended, doesn't work: shows artifacts):

---

**VII PRINCIPLE <<https://jupman.softpython.org/principles.html#VII-PRINCIPLE>>`\_\_**: You shall never ever add nor remove elements from a sequence you are iterating with a `for` !

This is a **way too long** principle only for *testing* purposes, typically it's much better keeping long stuff outside.

```
lst = ['a', 'b', 'c']
for x in lst:
    lst.add(x) # aaargh
```

---

### 8.1.9 Math

For math stuff, see [npshpinx docs](#)<sup>82</sup>

Here we put just some equation to show it behaves fine in Jupman

This is infinity:  $\infty$

### 8.1.10 Unicode

Unicode characters should display an HTML, but with latex you might have problems, and need to manually map characters in `conf.py`

You should see a star in a black circle:  $\odot$

You should see a check:  $\checkmark$

table characters:  $\begin{array}{|c|c|c|c|}\hline & & & \\ \hline\end{array}$

---

<sup>81</sup> <https://jupman.softpython.org/principles.html#VII-PRINCIPLE>

<sup>82</sup> <https://nbsphinx.readthedocs.io/en/0.2.14/markdown-cells.html#Equations>

## 8.1.11 Tables

### A small table

Name	Surname	Age	Occupation
Augustus	Gloop	40	Software Engineer
Veruca	Salt	34	Writer
Violet	Beauregarde	37	Accountant

### An extra large table

Why	do	you	need	so	much	chocolate?	I don't	understand.
Oompa	Loompa,	do	ba	dee	doo			
I've	got	a	perfect	puzzle	for	you.		
Oompa	Loompa,	do	ba	dee	doo			
If	you	are	wise	you'll	listen	to	me.	
What	do	you	get	when	you	guzzle	down	sweets?

### A table with extra large text

Note with default style text overflows, we fix this in themes

Who	do you	blame?
Gum chewing's fine when it's once in a while.	It stops you from smoking and brightens your smile.	But it's repulsive revolting and wrong.
Blaming the kids is a lie and a shame	You know exactly who's to blame:	The mother and the father!

### A table with links

Some of these links in markdown tables may show ill-formatted in HTML output

Test for [issue 137](https://github.com/DavidLeoni/jupman/issues/137)<sup>83</sup>

Operatore	Sintassi	Risultato	Significato
lunghezza	len(str)	int	Ritorna la lunghezza della stringa
<code>`indice &lt;#Leggere-caratteri &gt;`__</code>	str[int]	str	Legge il carattere all'indice specificato
<i>concatenazione</i>	str1 + str2	str	Concatena due stringhe
<code>`inclusione &lt;#Operatore-in&gt;`__</code>	str1 in str2	bool	Controlla se la stringa è presente in un'altra stringa

Operatore	Sintassi	Risultato	Significato
lunghezza	len(str)	int	Ritorna la lunghezza della stringa
<i>indice</i>	str[int]	str	Legge il carattere all'indice specificato
<i>concatenazione</i>	str1 + str2	str	Concatena due stringhe

<sup>83</sup> <https://github.com/DavidLeoni/jupman/issues/137>

Operatore	Sintassi	Risultato	Significato
<code>`inclusione &lt;#Operatore-in&gt;` _</code>	<code>str1 in str2</code>	<code>bool</code>	Controlla se la stringa è presente in un'altra stringa

Operatore	Sintassi	Risultato	Significato
<code>`inclusione &lt;#Operatore-in&gt;` _</code>	<code>str1 inabc str2</code>	<code>bool</code>	Controlla se la stringa è presente in un'altra stringa

with `#Operatore-inxyz` link and `inabc` operator:

Operatore	Sintassi	Risultato	Significato
<i>inclusione</i>	<code>str1 inabc str2</code>	<code>bool</code>	Controlla se la stringa è presente in un'altra stringa

with `#Operatore-inxyz` link and `in` operator:

Operatore	Sintassi	Risultato	Significato
<i>inclusione</i>	<code>str1 in str2</code>	<code>bool</code>	Controlla se la stringa è presente in un'altra stringa

with `#Operatore-in` (with end space) link and `in` operator:

Operatore	Sintassi	Risultato	Significato
<code>`inclusione &lt;#Operatore-in&gt;` _</code>	<code>str1 in str2</code>	<code>bool</code>	Controlla se la stringa è presente in un'altra stringa

with `#Opera-in`

Operatore	Sintassi	Risultato	Significato
<i>inclusione</i>	<code>str1 in str2</code>	<code>bool</code>	Controlla se la stringa è presente in un'altra stringa

with `#Operaz-in` (with target in quotes)

Operatore	Sintassi	Risultato	Significato
<i>inclusione</i>	<code>str1 in str2</code>	<code>bool</code>	Controlla se la stringa è presente in un'altra stringa

### Workaround with ``<a>`` tags

... doesn't work :-)

Operatore	Sintassi	Risultato	Significato
lunghezza	<code>len(str)</code>	<code>int</code>	Ritorna la lunghezza della stringa
indice	<code>str[int]</code>	<code>str</code>	Legge il carattere all'indice specificato
<i>concatenazione</i>	<code>str1 + str2</code>	<code>str</code>	Concatena due stringhe
inclusione	<code>str1 in str2</code>	<code>bool</code>	Controlla se la stringa è presente in un'altra stringa



### **Leggere caratteri**

bla bla

### **Sostituire caratteri**

bla bla

### **Operatore in**

bla bla

### **Opera in**

bla bla

### **Operaz in**

bla bla

### **Operatore inxyz**

bla bla

## **8.1.12 Lists**

- Home
  - Contents
  - Revisions
- More
  - Quickstart
  - Configure
    - \* Building the manual
    - \* Publish
    - \* Further steps
  - Installation

## 8.1.13 Images

### SVG Images

SVG images work in notebook, but here it is commented since it breaks Latex, [see issue<sup>84</sup>](#)

```
! [An image] (../img/cc-by.svg)
```

This one also doesn't work (and shows ugly code in the notebook anyway)

```
from IPython.display import SVG
SVG(filename='../img/cc-by.svg')
```

### PNG Images



### Inline images - pure markdown

```
Bla ![A PNG image md] (../_static/img/jupman/notebook_icon.png) bli blo
```



Bla

bli blo

### Inline images - markdown and img

```
bla  bli blo
```



bla

bli blo

---

<sup>84</sup> <https://github.com/DavidLeoni/jupman/issues/1>

## Img class

If we pass a class, it will to be present in the website:

```

```



This should be inline

## A picture with alternate text



### 8.1.14 Expressions list

Highlighting **does** work both in Jupyter and Sphinx

Three quotes, multiple lines - Careful: put **exactly 4 spaces** indentation

```
1. [2, 3, 1] != "[2, 3, 1]"
```

```
2. [4, 8, 12] == [2*2, "4*2", 6*2]
```

```
3. [][: ] == []
```

Three quotes, multiple lines, more compact - works in Jupyter, **doesn't** in Sphinx

```
1. python [2, 3, 1] != "[2, 3, 1]"
```

2. `python [4, 8, 12] == [2*2, "4*2", 6*2]`
3. `python [][: ] == []`

Highlighting **doesn't** work in Jupyter neither in Sphinx:

Three quotes, single line

1. `python [2, 3, 1] != ["2", 3, 1]`
2. `python [4, 8, 12] == [2*2, "4*2", 6*2]`
3. `python [][: ] == "[]"`

Single quote, single line

1. `python [2, 3, 1] != ["2", 3, 1]`
2. `python [4, 8, 12] == [2*2, "4*2", 6*2]`
3. `python [][: ] == "[]"`

### 8.1.15 Toggable cells

There are various ways to have toggable cells.

#### Show/hide exercises (RECOMMENDED)

If you need clickable show/hide buttons for exercise solutions , see here: [Editing - Exercise types](#)<sup>85</sup>. It manages comprehensively use cases for display in website, student zips, exams, etc

If you have other needs, we report here some test we made, but keep in mind this sort of hacks tend to change behaviour with different versions of jupyter.

#### Toggling with Javascript

- Works in Markdown
- Works while in Jupyter
- Works in HTML
- Does not show in Latex (which might be a good point, if you intend to put somehow solutions at the end of the document)
- NOTE: after creating the text to see the results you have to run the initial cell with `jupman.init` (as for the toc)
- NOTE: you can't use Markdown block code since of Sept 2017 doesn't show well in HTML output

---

<sup>85</sup> <https://jupman.softpython.org/en/latest/manual/editing.html#Exercise-types>

### HTML details in Markdown, code tag

- Works while in Jupyter
- Doesn't work in HTML output
- as of Sept Oct 2017, not yet supported in Microsoft browsers

Click here to see the code

```
question = raw_input("What?")
answers = random.randint(1,8)
if question == "":
    sys.exit()
```

### HTML details in Markdown, Markdown mixed code

- Works while in Jupyter
- Doesn't work in HTML output
- as of Sept Oct 2017, not yet supported in Microsoft browsers

Click here to see the code

```
question = raw_input("What?")
answers = random.randint(1,8)
if question == "":
    sys.exit()
```

### HTML details in HTML, raw NBConvert Format

- Doesn't work in Jupyter
- Works in HTML output
  - NOTE: as of Sept Oct 2017, not yet supported in Microsoft browsers
- Doesn't show at all in PDF output

Some other Markdown cell afterwards ....

## 8.1.16 Stripping answers

For stripping answers examples, see *jupyter-example/jupyter-example-sol*. For explanation, see *editing*

## 8.1.17 Files in templates

Since Dec 2019 they are not accessible [see issue 10](#)<sup>86</sup>, but it is not a great problem, you can always put a link to Github, see for example [exam-yyyy-mm-dd.ipynb](#)<sup>87</sup>

<sup>86</sup> <https://github.com/DavidLeoni/jupman/issues/10>

<sup>87</sup> [https://github.com/DavidLeoni/jupman/tree/master/\\_templates/exam/exam-yyyy-mm-dd.ipynb](https://github.com/DavidLeoni/jupman/tree/master/_templates/exam/exam-yyyy-mm-dd.ipynb)

### 8.1.18 Inline text style

For colors on the fly you can use inline style in markdown. Works on:

- website: yes
- Jupyter: no
- pdf: no

```
<style>
  .be-fancy {
    color: red;
  }
</style>

<div class="be-fancy">
  This should display in red
</div>
```

This should display in red

### 8.1.19 Formatting problems

#### Characters per line

Python standard for code has limit to 79, many styles have 80 (see [Wikipedia](https://en.wikipedia.org/wiki/Characters_per_line)<sup>88</sup>). We can keep 80 like this, which should **not** display a scrollbar:

Plain:

```
-----
```

As python markup:

```
-----
```

This should **not** display a scrollbar:

```
[3]: '-'*78
```

```
[3]: '-----'
```

This should **not** display a scrollbar:

```
[4]: print('-'*80)
```

```
-----
```

On website this **may** display a scroll bar, because it will actually print ' apexes plus the dashes

```
[5]: '-'*80
```

```
[5]: '-----'
```

---

<sup>88</sup> [https://en.wikipedia.org/wiki/Characters\\_per\\_line](https://en.wikipedia.org/wiki/Characters_per_line)

Note errors hold 75 dashes:

Plain:

```
-----
ZeroDivisionError                                Traceback (most recent call last)
<ipython-input-15-9e1622b385b6> in <module>()
----> 1 1/0

ZeroDivisionError: division by zero
```

As python markup:

```
-----
ZeroDivisionError                                Traceback (most recent call last)
<ipython-input-15-9e1622b385b6> in <module>()
----> 1 1/0

ZeroDivisionError: division by zero
```

```
[6]: len('-----')
```

```
[6]: 75
```

## Very long input

In Jupyter: default behaviour, show scrollbar

On the website: default behaviour, don't show scrollbar

Test for [issue 122](https://github.com/DavidLeoni/jupman/issues/122)<sup>89</sup> softpython theme eye candy scrollbars

```
[7]: 1
      2
      3
      4
      5
      6
      7
      8
      9
      10
      11
      12
      13
      14
      15
      16
      17
      18
      19
      20
      21
      22
      23
      24
```

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<sup>89</sup> <https://github.com/DavidLeoni/jupman/issues/122>

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25	
26	
27	
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60	
61	
62	
63	
64	
65	
66	
67	
68	
69	
70	
71	
72	
73	
74	
75	
76	
77	
78	
79	
80	

[7]: 80



```

line with an an out-of-this-world long comment line with an an out-of-this-world
long comment line with an an out-of-this-world long comment line with an an out-of-
this-world long comment line with an an out-of-this-world long comment line with an
an out-of-this-world long comment line with an an out-of-this-world long comment

```

## Very long and large input

In Jupyter: default behaviour, show horizontal scrollbar

On the website: default behaviour, show horizontal scrollbar

Test for [issue 122](#)<sup>90</sup> softpython theme eye candy scrollbars

[9]:

[illegible]

(continues on next page)

<sup>90</sup> <https://github.com/DavidLeoni/jupman/issues/122>



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```
long output ... 5
long output ... 6
long output ... 7
long output ... 8
long output ... 9
long output ... 10
long output ... 11
long output ... 12
long output ... 13
long output ... 14
long output ... 15
long output ... 16
long output ... 17
long output ... 18
long output ... 19
long output ... 20
long output ... 21
long output ... 22
long output ... 23
long output ... 24
long output ... 25
long output ... 26
long output ... 27
long output ... 28
long output ... 29
long output ... 30
long output ... 31
long output ... 32
long output ... 33
long output ... 34
long output ... 35
long output ... 36
long output ... 37
long output ... 38
long output ... 39
long output ... 40
long output ... 41
long output ... 42
long output ... 43
long output ... 44
long output ... 45
long output ... 46
long output ... 47
long output ... 48
long output ... 49
long output ... 50
long output ... 51
long output ... 52
long output ... 53
long output ... 54
long output ... 55
long output ... 56
long output ... 57
long output ... 58
long output ... 59
long output ... 60
long output ... 61
```

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long output ... 62  
long output ... 63  
long output ... 64  
long output ... 65  
long output ... 66  
long output ... 67  
long output ... 68  
long output ... 69  
long output ... 70  
long output ... 71  
long output ... 72  
long output ... 73  
long output ... 74  
long output ... 75  
long output ... 76  
long output ... 77  
long output ... 78  
long output ... 79  
long output ... 80  
long output ... 81  
long output ... 82  
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long output ... 101  
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long output ... 103  
long output ... 104  
long output ... 105  
long output ... 106  
long output ... 107  
long output ... 108  
long output ... 109  
long output ... 110  
long output ... 111  
long output ... 112  
long output ... 113  
long output ... 114  
long output ... 115  
long output ... 116  
long output ... 117  
long output ... 118

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```
long output ... 119
long output ... 120
long output ... 121
long output ... 122
long output ... 123
long output ... 124
long output ... 125
long output ... 126
long output ... 127
long output ... 128
long output ... 129
long output ... 130
long output ... 131
long output ... 132
long output ... 133
long output ... 134
long output ... 135
long output ... 136
long output ... 137
long output ... 138
long output ... 139
long output ... 140
long output ... 141
long output ... 142
long output ... 143
long output ... 144
long output ... 145
long output ... 146
long output ... 147
long output ... 148
long output ... 149
```

## Very large output

In Jupyter: automatically returns carriage

On the website: horiz scrollbar should appear

```
[12]: print(','.join([str(x) for x in range(150)]))
```

```
0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,
↪ 32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,
↪ 60,61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,
↪ 88,89,90,91,92,93,94,95,96,97,98,99,100,101,102,103,104,105,106,107,108,109,110,111,
↪ 112,113,114,115,116,117,118,119,120,121,122,123,124,125,126,127,128,129,130,131,132,
↪ 133,134,135,136,137,138,139,140,141,142,143,144,145,146,147,148,149
```



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[illegible]

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[illegible]

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### 8.1.20 Python tutor tests

## 8.2 Python Tutor tests

**RECOMMENDED:** You can put a call to `jupman.pytut()` at the end of a cell, and the cell code will magically appear in python tutor in the output (except the call to `pytut()` of course). Does not need internet connection.

### 8.2.1 Scope

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```
File "/usr/lib/python3.7/bdb.py", line 578, in run
    exec(cmd, globals, locals)
File "<string>", line 2, in <module>
NameError: name 'w' is not defined
```

```
[4]: <IPython.core.display.HTML object>
```

## 8.2.2 Data types

Data display review:

```
[5]: word = "wonder"
lst = [9,7,8]
t = (6,2,4,3)
mixed_set = {3,'b','e',9, 'm', 'n'}
numbers_set = {3,4,9}
char_set = {'r','a','h'}
d = {'a' : 8,
     'b' : 4,
     'c' : 5}

empty_str = ""
empty_tuple = ()
empty_set = set()
empty_dict = {}

#import numpy # not supported!

def f(par):
    print(par)

class C:
    def hello():
        print('ciao')

    def __init__(self, name, age):
        self.name = name
        self.age = age

m = C.hello
g = f

c = C('blah',30)

jupman.pytut()
```

```
[5]: <IPython.core.display.HTML object>
```

### 8.2.3 Window overflow

When too much right space is taken, it might be difficult to scroll:

```
[6]: x = [3,2,5,2,42,34,2,4,34,2,3,4,23,4,23,4,2,34,23,4,23,4,23,4,234,34,23,4,23,4,23,4,2]
      jupman.pytut()
```

```
[6]: <IPython.core.display.HTML object>
```

```
[7]: x = w + 5
      jupman.pytut()

Traceback (most recent call last):
  File "../jupman.py", line 2453, in _runscript
    self.run(script_str, user_globals, user_globals)
  File "/usr/lib/python3.7/bdb.py", line 578, in run
    exec(cmd, globals, locals)
  File "<string>", line 2, in <module>
NameError: name 'w' is not defined
```

```
[7]: <IPython.core.display.HTML object>
```

### 8.2.4 pytut execution

Some cells might execute in Jupyter but not so well in Python Tutor, due to [its inherent limitations](#)<sup>91</sup>:

```
[8]: x = 0
      for i in range(10000):
          x += 1
      print(x)
      jupman.pytut()
```

```
10000
```

```
[8]: <IPython.core.display.HTML object>
```

### 8.2.5 Infinite loops

Since execution occurs first in Jupyter and then in Python tutor, if you have an infinite loop no Python Tutor instance will be spawned:

```
while True:
    pass

jupman.pytut()
```

<sup>91</sup> <https://github.com/pgbovine/OnlinePythonTutor/blob/master/unsupported-features.md>

## 8.2.6 Resizability

Long vertical and horizontal expansion should work:

```
[9]: x = {0:'a'}
    for i in range(1,30):
        x[i] = x[i-1]+str(i*10000)
    jupman.pytut()

[9]: <IPython.core.display.HTML object>
```

## 8.2.7 Cross arrows

With multiple visualizations, arrows shouldn't cross from one to the other even if underlying script is loaded multiple times (relates to `visualizerIdOverride`)

```
[10]: x = [1,2,3]

    jupman.pytut()

[10]: <IPython.core.display.HTML object>
```

## 8.2.8 Print output

With only one line of print, Print output panel shouldn't be too short:

```
[11]: print("hello")

    jupman.pytut()

hello

[11]: <IPython.core.display.HTML object>
```

## 8.2.9 Alignment test 1

Test for <https://github.com/DavidLeoni/jupman/issues/105>

Before fixing red arrow was badly misaligned and went way past the function call.

```
[12]: def f(mat, i):
    """ Do something"""

    row = []
    row.append(mat[i ])
    return row

f([[2,3,4]], 0)
jupman.pytut()

[12]: <IPython.core.display.HTML object>
```

### 8.2.10 Alignment test 2

Check the arrow stays on right line even in long code.

```
[13]: def f(mat, i):
      """ Do something else"""

      row = []
      row.append(mat[i])
      return row

m = [
    ['a', 'b'],
    ['c', 'd'],
    ['a', 'e'],
]

#row = f(m, 0)

x = 3
if x == x:
    m = [
        [1, 2, 3],
        [4, 3]
    ]
print("zim")

y = 1
if y == y:
    m = [
        [1, 2, 3],
        [4, 3]
    ]
print("zam")

jupman.pytut()
```

```
zim
zam
```

```
[13]: <IPython.core.display.HTML object>
```

### 8.2.11 Cloned cell test

Tests PythonTutor output is correctly displayed when cells are cloned ([solved issue<sup>92</sup>](#))

```
[14]: maremma = 123
      jupman.pytut()
```

```
[14]: <IPython.core.display.HTML object>
```

Cloned cell:

```
[15]: maremma = 123
      jupman.pytut()
```

<sup>92</sup> <https://github.com/DavidLeoni/jupman/issues/126>

```
[15]: <IPython.core.display.HTML object>
```

### 8.2.12 Don't nest data structures

By default data structures shouldn't be displayed as nested (which is the actual default on Python Tutor site). Test for [this issue](#)<sup>93</sup>

```
[16]: listA = [ ['Keep', 'an'],
               ['eye', 'on'],
               ['the', 'arrow', 'tips']
       ]

       listB = listA.copy()
       jupman.pytut()
```

```
[16]: <IPython.core.display.HTML object>
```

### 8.2.13 Force nested data structures

```
[17]: listA = [ ['Keep', 'an'],
               ['eye', 'on'],
               ['the', 'arrow', 'tips']
       ]

       listB = listA.copy()
       jupman.pytut(disableHeapNesting=False)
```

```
[17]: <IPython.core.display.HTML object>
```

### 8.2.14 Function pointers

Containers should always contain links to functions, not inlined names

```
[18]: def f():
       print('hello')

       def g():
           print('world')

       fs = [f,g]

       jupman.pytut()
```

```
[18]: <IPython.core.display.HTML object>
```

---

<sup>93</sup> <https://github.com/DavidLeoni/jupman/issues/132>



### 8.2.15 Errors - Code after pytut

```
[19]: x = 3

jupman.pytut()

print("ciao")
```

ERROR: the call to jupman.pytut() must be the last in the cell, instead, found this.  
 ↪code afterwards:

```
print("ciao")
ciao
```

### 8.2.16 Errors - pytut double call

```
[20]: x = 3

jupman.pytut()

jupman.pytut()
```

ERROR: There should only be one call to jupman.pytut(), found 2 instead  
 ERROR: There should only be one call to jupman.pytut(), found 2 instead

### 8.2.17 Errors - Nothing to show

```
[21]: jupman.pytut()
```

Nothing to show ! You have to put ALL the code IN THE SAME cell as pytut()  
 right before its call.

Example:

```
x = 5
y = x + 3
jupman.pytut()
```

### 8.2.18 Spaces in attributes

Check spaces don't affect jupman.pytut() call strip

```
[22]: la = [['a', 'b'], ['c', 'd']]

jupman.pytut( disableHeapNesting = False )
```

```
[22]: <IPython.core.display.HTML object>
```

### 8.2.19 Alternative: HTML magics

Another option is to directly paste Python Tutor iframe in the cells, and use Jupyter `%%HTML` magics command.

HTML should be available both in notebook and website - of course, requires an internet connection.

Beware: you need the HTTPS !

```
[23]: %%HTML

<iframe width="800" height="300" frameborder="0"
      src="https://pythontutor.com/iframe-embed.html#code=x+%3D+5%0Ay+%3D+10%0Az+
      ↪+%3D+x+%2B+y&cumulative=false&py=3&curInstr=3">
</iframe>

<IPython.core.display.HTML object>
```

### 8.2.20 Alternative: NBTutor

To show Python Tutor in notebooks, there is already a jupyter extension called [NBTutor](https://github.com/lsgpage/nbtutor)<sup>94</sup>, afterwards you can use magic `%%nbtutor` to show the interpreter.

Unfortunately, it doesn't show in the generated HTML :-/

```
[24]: %reload_ext nbtutor
```

```
[25]: %%nbtutor

for x in range(1,4):
    print("ciao")
x=5
y=7
x +y
```

```
ciao
ciao
ciao
```

```
[25]: 12
```

```
[ ]:
```

---

<sup>94</sup> <https://github.com/lsgpage/nbtutor>

## REFERENCES

Shows how to put a single page at the bottom of the sidebar, visible without being inside a section. [See this issue](https://github.com/DavidLeoni/jupman/issues/70)<sup>95</sup>

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<sup>95</sup> <https://github.com/DavidLeoni/jupman/issues/70>