nbsphinx

Release 0.5.1-18-g9f33b8a

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2020-03-20

Contents

1 Installation ................................................. 4
   1.1 nbsphinx Packages ........................................ 4
   1.2 nbsphinx Prerequisites .................................. 6
       1.2.1 Python ................................................ 6
       1.2.2 Sphinx .............................................. 6
       1.2.3 pip .................................................. 7
       1.2.4 pandoc ............................................. 7
       1.2.5 Pygments Lexer for Syntax Highlighting .......... 7
       1.2.6 Jupyter Kernel .................................... 8

2 Usage ...................................................... 8
   2.1 Sphinx Setup ........................................... 8
       2.1.1 Sphinx Configuration Values ....................... 9
           2.1.1.1 exclude_patterns ............................... 9
           2.1.1.2 extensions ................................... 9
           2.1.1.3 highlight_language ........................... 9
           2.1.1.4 html_scaled_image_link ....................... 9
           2.1.1.5 html_sourcelink_suffix ....................... 10
           2.1.1.6 latex_additional_files ..................... 10
           2.1.1.7 mathjax_config ................................ 10
       2.1.2 nbsphinx Configuration Values .................... 10
           2.1.2.1 nbsphinx_allow_errors ......................... 10
           2.1.2.2 nbsphinx_codecell_lexer ...................... 10
           2.1.2.3 nbsphinx_custom_formats ..................... 10
           2.1.2.4 nbsphinx_epilog ................................ 11
           2.1.2.5 nbsphinx_execute ............................. 11
           2.1.2.6 nbsphinx_execute_arguments ................ 11
           2.1.2.7 nbsphinx_input_prompt ....................... 11
           2.1.2.8 nbsphinx_kernel_name ......................... 11
           2.1.2.9 nbsphinx_output_prompt ....................... 11
           2.1.2.10 nbsphinx_prolog ............................... 12
           2.1.2.11 nbsphinx_prompt_width ....................... 12
           2.1.2.12 nbsphinx_requirejs_options ................ 12
           2.1.2.13 nbsphinx_requirejs_path .................... 12
           2.1.2.14 nbsphinx_responsive_width ................ 12
           2.1.2.15 nbsphinx_timeout ............................ 12
           2.1.2.16 nbsphinx_widgets_options .................. 12
           2.1.2.17 nbsphinx_widgets_path ...................... 13
2.2 Running Sphinx .................................................. 13
2.3 Watching for Changes with sphinx-autobuild ................... 14
2.4 Automatic Creation of HTML and PDF output on readthedocs.org ........................................ 14
  2.4.1 Using requirements.txt .................................... 15
  2.4.2 Using conda ................................................ 15
2.5 HTML Themes ..................................................... 16
  2.5.1 Sphinx’s Built-In Themes ................................... 16
  2.5.2 3rd-Party Themes .......................................... 17
2.6 Using Notebooks with Git ....................................... 18

3 Markdown Cells ..................................................... 19
  3.1 Equations ....................................................... 19
    3.1.1 Automatic Equation Numbering ........................... 20
    3.1.2 Manual Equation Numbering ............................... 21
  3.2 Citations ........................................................ 21
  3.3 Code ............................................................ 21
  3.4 Tables ........................................................... 21
  3.5 Images .......................................................... 22
    3.5.1 SVG support for LaTeX .................................... 22
  3.6 Cell Attachments ............................................... 23
  3.7 HTML Elements (HTML only) .................................. 23
  3.8 Info/Warning Boxes ............................................ 24
  3.9 Links to Other Notebooks ..................................... 25
  3.10 Links to *.rst Files (and Other Sphinx Source Files) ......... 25
  3.11 Links to Local Files .......................................... 26
  3.12 Links to Domain Objects ...................................... 26

4 Code Cells .......................................................... 26
  4.1 Code, Output, Streams ......................................... 26
  4.2 Cell Magics ...................................................... 27
  4.3 Special Display Formats ....................................... 27
    4.3.1 Local Image Files ....................................... 28
    4.3.2 Image URLs ............................................... 28
    4.3.3 Math ..................................................... 29
    4.3.4 Plots ..................................................... 30
    4.3.5 Pandas Dataframes ....................................... 32
    4.3.6 YouTube Videos .......................................... 33
    4.3.7 Interactive Widgets (HTML only) ......................... 34
    4.3.8 Arbitrary JavaScript Output (HTML only) ................ 35
    4.3.9 Unsupported Output Types ................................ 35
  4.4 ANSI Colors ................................................... 35

5 Raw Cells ............................................................. 37
  5.1 Usage .......................................................... 37
  5.2 Available Raw Cell Formats ................................... 37
    5.2.1 None ..................................................... 38
    5.2.2 reST ..................................................... 38
    5.2.3 Markdown ................................................ 38
    5.2.4 HTML ..................................................... 38
    5.2.5 LaTeX .................................................... 38
    5.2.6 Python .................................................. 38

6 Hidden Cells ........................................................ 38

7 Controlling Notebook Execution .................................... 39
  7.1 Pre-Executing Notebooks ....................................... 39
nb\textsc{sphinx} is a \textsc{Sphinx}\footnote{https://www.sphinx-doc.org/} extension that provides a source parser for *.ipynb files. Custom Sphinx directives are used to show Jupyter Notebook\footnote{https://jupyter.org/} code cells (and of course their results) in both HTML and LaTeX output. Un-evaluated notebooks – i.e. notebooks without stored output cells – will be automatically executed during the Sphinx build process.

\textbf{Quick Start:}

1. Install \textsc{nbsphinx}

2. Edit your conf.py and add 'nbsphinx' to extensions.

3. Edit your index.rst and add the names of your *.ipynb files to the \texttt{toctree}.
4. Run Sphinx!

Online documentation (and example of use): http://nbsphinx.readthedocs.io/

Source code repository (and issue tracker): https://github.com/spatialaudio/nbsphinx/

License: MIT – see the file LICENSE for details.

All content shown below – except for the sections Normal reStructuredText Files (page 49), Contributing (page 54) and Version History (page 55) – was generated from Jupyter notebooks.

The following section was generated from doc/installation.ipynb .................................................................

1 Installation

Note that some packages may be out of date. You can always get the newest nbsphinx release from PyPI³ (using pip). If you want to try the latest development version, have a look at the section Contributing (page 54).

1.1 nbsphinx Packages

Anaconda Cloud 0.5.1

If you are using the conda package manager (e.g. with Anaconda⁵ for Linux/macOS/Windows), you can install nbsphinx from the conda-forge⁶ channel:

```
conda install -c conda-forge nbsphinx
```

If you are using Linux, there are packages available for many distributions.

---
³ https://pypi.org/project/nbsphinx
⁴ https://anaconda.org/conda-forge/nbsphinx
⁵ https://www.anaconda.com/distribution/
⁶ https://conda-forge.org/
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<tr>
<td>Ubuntu 20.04</td>
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</tbody>
</table>

https://repology.org/project/python:nbsphinx/versions
On any platform, you can also install nbsphinx with pip, Python’s own package manager:

```bash
python3 -m pip install nbsphinx --user
```

If you want to install it system-wide for all users (assuming you have the necessary rights), just drop the --user flag.

To upgrade an existing nbsphinx installation to the newest release, use the --upgrade flag:

```bash
python3 -m pip install nbsphinx --upgrade --user
```

If you suddenly change your mind, you can un-install it with:

```bash
python3 -m pip uninstall nbsphinx
```

Depending on your Python installation, you may have to use python instead of python3.

### 1.2 nbsphinx Prerequisites

Some of the aforementioned packages will install some of these prerequisites automatically, some of the things may be already installed on your computer anyway.

#### 1.2.1 Python

Of course you’ll need Python, because both Sphinx and nbsphinx are implemented in Python. There are many ways to get Python. If you don’t know which one is best for you, you can try Anaconda

#### 1.2.2 Sphinx

You’ll need Sphinx as well, because nbsphinx is just a Sphinx extension and doesn’t do anything on its own.

If you use conda, you can get Sphinx from the conda-forge channel:

```bash
conda install -c conda-forge sphinx
```

Alternatively, you can install it with pip (see below):

```bash
python3 -m pip install Sphinx --user
```

---

8 https://pypi.org/project/nbsphinx
9 https://www.anaconda.com/distribution/
10 https://www.sphinx-doc.org/
11 https://anaconda.org/conda-forge/sphinx
1.2.3 pip

Recent versions of Python already come with pip pre-installed. If you don’t have it, you can install it manually\(^\text{12}\).

1.2.4 pandoc

The stand-alone program pandoc\(^\text{13}\) is used to convert Markdown content to something Sphinx can understand. You have to install this program separately, ideally with your package manager. If you are using conda, you can install pandoc from the conda-forge channel\(^\text{14}\):

```
conda install -c conda-forge pandoc
```

If that doesn’t work out for you, have a look at pandoc’s installation instructions\(^\text{15}\).

Note

The use of pandoc in nbsphinx is temporary, but will likely stay that way for a long time, see issue #\text{36}\(^\text{16}\).

1.2.5 Pygments Lexer for Syntax Highlighting

To get proper syntax highlighting in code cells, you’ll need an appropriate Pygments lexer. This of course depends on the programming language of your Jupyter notebooks (more specifically, the pygments Lexer metadata of your notebooks).

For example, if you use Python in your notebooks, you’ll have to have the IPython package installed, e.g. with

```
conda install -c conda-forge ipython
```

or

```
python3 -m pip install IPython --user
```

Note

If you are using Anaconda with the default channel and syntax highlighting in code cells doesn’t seem to work, you can try to install IPython from the conda-forge channel or directly with pip, or as a work-around, add `IPython.sphinxext.ipython_console_highlighting` to extensions in your conf.py.

For details, see Anaconda issue #\text{1430}\(^\text{17}\) and nbsphinx issue #\text{24}\(^\text{18}\).

\(^{13}\) [https://pandoc.org/](https://pandoc.org/)
\(^{14}\) [https://anaconda.org/conda-forge/pandoc](https://anaconda.org/conda-forge/pandoc)
\(^{15}\) [https://pandoc.org/installing.html](https://pandoc.org/installing.html)
\(^{16}\) [https://github.com/spatialaudio/nbsphinx/issues/36](https://github.com/spatialaudio/nbsphinx/issues/36)
\(^{17}\) [https://github.com/ContinuumIO/anaconda-issues/issues/1430](https://github.com/ContinuumIO/anaconda-issues/issues/1430)
\(^{18}\) [https://github.com/spatialaudio/nbsphinx/issues/24](https://github.com/spatialaudio/nbsphinx/issues/24)
1.2.6 Jupyter Kernel

If you want to execute your notebooks during the Sphinx build process (see Controlling Notebook Execution (page 39)), you need an appropriate Jupyter kernel\(^1\) installed.

For example, if you use Python, you should install the ipykernel package, e.g. with

```bash
conda install -c conda-forge ipykernel
```

or

```bash
python3 -m pip install ipykernel --user
```

If you created your notebooks yourself with Jupyter, it’s very likely that you have the right kernel installed already.

\(^1\) https://jupyter.readthedocs.io/en/latest/projects/kernels.html

The following section was generated from doc/usage.ipynb

2 Usage

2.1 Sphinx Setup

In the directory with your notebook files, run this command (assuming you have Sphinx\(^2\) installed already):

```bash
python3 -m sphinx.cmd.quickstart
```

Answer the questions that appear on the screen. In case of doubt, just press the <Return> key repeatedly to take the default values.

After that, there will be a few brand-new files in the current directory. You’ll have to make a few changes to the file named `conf.py`. You should at least check if those two variables contain the right things:

```python
extensions = ['nbsphinx',
    'sphinx.ext.mathjax',
]
exclude_patterns = ['_build', '*.ipynb_checkpoints']
```

For an example, see this project’s `conf.py` file.

Once your `conf.py` is in place, edit the file named `index.rst` and add the file names of your notebooks (without the .ipynb extension) to the `toctree\(^3\)` directive. For an example, see this project’s `doc/index.rst` file.

\(^2\) https://www.sphinx-doc.org/

\(^3\) https://www.sphinx-doc.org/en/master/usage/restructuredtext/directives.html#directive-toctree
2.1.1 Sphinx Configuration Values

All configuration values are described in the Sphinx documentation\(^\text{22}\), here we mention only the ones which may be relevant in combination with \texttt{nbsphinx}.

2.1.1.1 exclude_patterns

Sphinx builds all potential source files (reST files, Jupyter notebooks, …) that are in the source directory, whether they are linked to or not. If you want certain files not to be built, specify them in \texttt{exclude_patterns}\(^\text{23}\). For example, you might want to ignore files in your build directory and temporary Jupyter files:

```python
exclude_patterns = [\'_build', '**.ipynb_checkpoints']
```

2.1.1.2 extensions

This is the only required value. You have to add \texttt{'nbsphinx'} to the list of \texttt{extensions}\(^\text{24}\), otherwise it won't work.

Other interesting extensions are:

- \texttt{'sphinx.ext.mathjax'} for \textit{math formulas} (page 19)
- \texttt{'sphinxcontrib.bibtex'} for \textit{bibliographic references} (page 52)
- \texttt{'sphinxcontrib.rsvgconverter'} for \textit{SVG->PDF conversion in LaTeX output} (page 22)
- \texttt{'sphinx_copybutton'} for adding “copy to clipboard” buttons\(^\text{25}\) to all text/code boxes

2.1.1.3 highlight_language

Default language for syntax highlighting in reST and Markdown cells, when no language is specified explicitly.

By default, this is \texttt{'python3'}, while Jupyter doesn’t have a default language. Set \texttt{highlight_language}\(^\text{26}\) to \texttt{'none'} to get the same behavior as in Jupyter:

```python
highlight_language = 'none'
```

See also \textit{nbsphinx\_codecell\_lexer} (page 10).

2.1.1.4 html_scaled_image_link

As a work-around – until \url{https://github.com/sphinx-doc/sphinx/issues/4229} is solved – you should set \texttt{html_scaled_image_link}\(^\text{27}\) to \texttt{False}:

```python
html_scaled_image_link = \texttt{False}
```

\(^{22}\) \url{http://www.sphinx-doc.org/en/master/usage/configuration.html}
\(^{23}\) \url{http://www.sphinx-doc.org/en/master/usage/configuration.html#confval-exclude_patterns}
\(^{24}\) \url{http://www.sphinx-doc.org/en/master/usage/configuration.html#confval-extensions}
\(^{25}\) \url{https://sphinx-copybutton.readthedocs.io/}
\(^{26}\) \url{http://www.sphinx-doc.org/en/master/usage/configuration.html#confval-highlight_language}
\(^{27}\) \url{http://www.sphinx-doc.org/en/master/usage/configuration.html#confval-html_scaled_image_link}
2.1.1.5 html_sourcelink_suffix

By default, a .txt suffix is added to source files. This is only relevant if the chosen HTML theme supports source links and if html_show_sourcelink\textsuperscript{28} is True.

Jupyter notebooks with the suffix .ipynb.txt are normally not very useful, so if you want to avoid the additional suffix, set html_sourcelink_suffix\textsuperscript{29} to the empty string:

\begin{verbatim}
html_sourcelink_suffix = ''
\end{verbatim}

2.1.1.6 latex_additional_files

latex_additional_files\textsuperscript{30} can be useful if you are using BibTeX files, see References (page 52).

2.1.1.7 mathjax_config

The configuration value mathjax_config\textsuperscript{31} can be useful to enable Automatic Equation Numbering (page 20).

2.1.2 nbsphinx Configuration Values

2.1.2.1 nbsphinx_allow_errors

If True, the build process is continued even if an exception occurs.

See Ignoring Errors (page 41).

2.1.2.2 nbsphinx_codecell_lexer

Default Pygments lexer for syntax highlighting in code cells. If available, this information is taken from the notebook metadata instead.

Please note that this is not the same as highlight_language (page 9), which is used for formatting code in Markdown cells!

2.1.2.3 nbsphinx_custom_formats

See Custom Notebook Formats (page 46).

\textsuperscript{28} http://www.sphinx-doc.org/en/master/usage/configuration.html#confval-html_show_sourcelink
\textsuperscript{29} http://www.sphinx-doc.org/en/master/usage/configuration.html#confval-html_sourcelink_suffix
\textsuperscript{30} http://www.sphinx-doc.org/en/master/usage/configuration.html#confval-latex_additional_files
\textsuperscript{31} https://www.sphinx-doc.org/en/master/usage/extensions/math.html#confval-mathjax_config
See Prolog and Epilog (page 44).

2.1.2.5 nbsphinx_execute

Whether to execute notebooks before conversion or not. Possible values: 'always', 'never', 'auto' (default).
See Explicitly Dis-/Enabling Notebook Execution (page 40).

2.1.2.6 nbsphinx_execute_arguments

Kernel arguments used when executing notebooks.
If you use Matplotlib for plots (page 30), this setting is recommended:

```python
nbsphinx_execute_arguments = [  
    "--InlineBackend.figure_formats={'svg', 'pdf'},",  
    "--InlineBackend.rc={'figure.dpi': 96}"  
]
```

If you don’t use LaTeX/PDF output, you can drop the 'pdf' figure format.
See Configuring the Kernels (page 43).

2.1.2.7 nbsphinx_input_prompt

Input prompt for code cells. %s is replaced by the execution count.
To get a prompt similar to the Classic Notebook, use

```python
nbsphinx_input_prompt = 'In [%s]:'
```

2.1.2.8 nbsphinx_kernel_name

Use a different kernel than stored in the notebook metadata, e.g.:  

```python
nbsphinx_kernel_name = 'python3'
```

See Configuring the Kernels (page 42).

2.1.2.9 nbsphinx_output_prompt

Output prompt for code cells. %s is replaced by the execution count.
To get a prompt similar to the Classic Notebook, use

```python
nbsphinx_output_prompt = 'Out[%s]:'
```
2.1.2.10 nbsphinx_prolog

See Prolog and Epilog (page 44).

2.1.2.11 nbsphinx_prompt_width

Width of input/output prompts (HTML only).
Any CSS length can be specified.

2.1.2.12 nbsphinx_requirejs_options

Options for loading RequireJS. See nbsphinx_requirejs_path (page 12).

2.1.2.13 nbsphinx_requirejs_path

URL or local path to override the default URL for RequireJS\(^{32}\).
If you use a local file, it should be located in a directory listed in html_static_path\(^{33}\).
Set to empty string to disable loading RequireJS.

2.1.2.14 nbsphinx-responsive_width

If the browser window is narrower than this, input/output prompts are on separate lines (HTML only).
Any CSS length can be specified.

2.1.2.15 nbsphinx_timeout

Controls when a cell will time out. The timeout is given in seconds. Given -1, cells will never time out, which is also the default.
See Cell Execution Timeout (page 44).

2.1.2.16 nbsphinx_widgets_options

Options for loading Jupyter widgets resources. See nbsphinx_widgets_path (page 13).

\(^{32}\) https://requirejs.org/
\(^{33}\) http://www.sphinx-doc.org/en/master/usage/configuration.html#confval-html_static_path
### 2.1.2.17 nbsphinx_widgets_path

URL or local path to override the default URL for Jupyter widgets resources. See *Interactive Widgets (HTML only)* (page 34).

If you use a local file, it should be located in a directory listed in `html_static_path`\textsuperscript{34}.

For loading the widgets resources, RequireJS is needed, see `nbsphinx_requirejs_path` (page 12).

If `nbsphinx_widgets_path` is not specified, widgets resources are only loaded if at least one notebook actually uses widgets. If you are loading the relevant JavaScript code by some other means already, you can set this option to the empty string to avoid loading it a second time.

### 2.2 Running Sphinx

To create the HTML pages, use this command:

```bash
python3 -m sphinx <source-dir> <build-dir>
```

If you have many notebooks, you can do a parallel build by using the `-j` option:

```bash
python3 -m sphinx <source-dir> <build-dir> -j<number-of-processes>
```

For example, if your source files are in the current directory and you have 4 CPU cores, you can run this:

```bash
python3 -m sphinx . _build -j4
```

Afterwards, you can find the main HTML file in `_build/index.html`.

Subsequent builds will be faster, because only those source files which have changed will be re-built. To force re-building all source files, use the `-E` option.

#### Note

By default, notebooks will be executed during the Sphinx build process only if they do not have any output cells stored. See *Controlling Notebook Execution* (page 39).

To create LaTeX output, use:

```bash
python3 -m sphinx <source-dir> <build-dir> -b latex
```

If you don’t know how to create a PDF file from the LaTeX output, you should have a look at `Latexmk`\textsuperscript{35} (see also *this tutorial*\textsuperscript{36}).

Sphinx can automatically check if the links you are using are still valid. Just invoke it like this:

```bash
python3 -m sphinx <source-dir> <build-dir> -b linkcheck
```

\textsuperscript{34} \url{http://www.sphinx-doc.org/en/master/usage/configuration.html#confval-html_static_path}

\textsuperscript{35} \url{http://personal.psu.edu/jcc8/software/latexmk-jcc/}

\textsuperscript{36} \url{https://mg.readthedocs.io/latexmk.html}
2.3 Watching for Changes with sphinx-autobuild

If you think it’s tedious to run the Sphinx build command again and again while you make changes to your notebooks, you’ll be happy to hear that there is a way to avoid that: sphinx-autobuild\(^{37}\)!

It can be installed with

```
python3 -m pip install sphinx-autobuild --user
```

You can start auto-building your files with

```
python3 -m sphinx_autobuild <source-dir> <build-dir>
```

This will start a local webserver which will serve the generated HTML pages at http://localhost:8000/. Whenever you save changes in one of your notebooks, the appropriate HTML page(s) will be re-built and when finished, your browser view will be refreshed automagically. Neat!

You can also abuse this to auto-build the LaTeX output:

```
python3 -m sphinx_autobuild <source-dir> <build-dir> -b latex
```

However, to auto-build the final PDF file as well, you’ll need an additional tool. Again, you can use latexmk for this (see above (page 13)). Change to the build directory and run

```
latexmk -pdf -pvc
```

If your PDF viewer isn’t opened because of LaTeX build errors, you can use the command line flag \(-f\) to force creating a PDF file.

2.4 Automatic Creation of HTML and PDF output on readthedocs.org

There are two different methods, both of which are described below.

In both cases, you’ll first have to create an account on https://readthedocs.org/ and connect your GitLab/Github/Bitbucket/… account. Instead of connecting, you can also manually add any publicly available Git/Subversion/Mercurial/Bazaar/… repository.

After doing the steps described below, you only have to “push” to your repository, and the HTML pages and the PDF file of your stuff are automagically created on readthedocs.org. Awesome!

You can even have different versions of your stuff, just use Git tags and branches and select in the readthedocs.org settings\(^{38}\) which of those should be created.

---

**Note**

If you want to execute notebooks (see Controlling Notebook Execution (page 39)), you’ll need to install the appropriate Jupyter kernel. In the examples below, the IPython kernel is installed from the packet ipykernel.

\(^{37}\) https://pypi.org/project/sphinx-autobuild

\(^{38}\) https://readthedocs.org/dashboard/
2.4.1 Using requirements.txt

1. Create a file named `.readthedocs.yml` in the main directory of your repository with the following contents:

```yaml
version: 2
formats: all
python:
    version: 3
    install:
        - requirements: doc/requirements.txt
system_packages: true
```

For further options see https://docs.readthedocs.io/en/latest/config-file/.

2. Create a file named `doc/requirements.txt` (or whatever you chose in the previous step) containing the required pip packages:

```
ipykernel
nbsphinx
```

You can also install directly from Github et al., using a specific branch/tag/commit, e.g.

```
git+https://github.com/spatialaudio/nbsphinx.git@master
```

2.4.2 Using conda

1. Create a file named `.readthedocs.yml` in the main directory of your repository with the following contents:

```yaml
version: 2
formats: all
conda:
    file: doc/environment.yml
```

For further options see https://docs.readthedocs.io/en/latest/config-file/.

2. Create a file named `doc/environment.yml` (or whatever you chose in the previous step) describing a conda environment\(^\text{39}\) like this:

```yaml
channels:
    - conda-forge
dependencies:
    - python>=3
    - pandoc
    - ipykernel
    - pip
    - pip:
        - nbsphinx
```

It is up to you if you want to install nbsphinx with conda or with pip (but note that the conda package might be outdated). And you can of course add further conda and pip packages. You can also install packages directly from Github et al., using a specific branch/tag/commit, e.g.

```
pip:
    - git+https://github.com/spatialaudio/nbsphinx.git@master
```

Note

The specification of the conda-forge channel is recommended because it tends to have more recent package versions than the default channel.

2.5 HTML Themes

The nbsphinx extension does not provide its own theme, you can use any of the available themes or create a custom one, if you feel like it.

The following (incomplete) list of themes contains up to three links for each theme:

1. The documentation (or the official sample page) of this theme (if available; see also the documentation of the built-in Sphinx themes)

2. How the nbsphinx documentation looks when using this theme

3. How to enable this theme using either requirements.txt or readthedocs.yml and theme-specific settings (in some cases)

2.5.1 Sphinx's Built-In Themes

- agogo: example, usage
- alabaster: example, usage
- bizstyle: example, usage
- classic: example, usage
- haiku: example, usage
- nature: example, usage
- pyramid: example, usage
- scrolls: example, usage
- sphinxdoc: example, usage
- traditional: example, usage

https://www.sphinx-doc.org/en/master/theming.html#creating-themes
https://nbsphinx.readthedocs.io/en/agogo-theme/
https://github.com/spatialaudio/nbsphinx/compare/agogo-theme...agogo-theme
https://github.com/spatialaudio/nbsphinx/compare/alabaster-theme...alabaster-theme
https://nbsphinx.readthedocs.io/en/bizstyle-theme/
https://github.com/spatialaudio/nbsphinx/compare/bizstyle-theme...bizstyle-theme
https://nbsphinx.readthedocs.io/en/classic-theme/
https://github.com/spatialaudio/nbsphinx/compare/classic-theme...classic-theme
https://nbsphinx.readthedocs.io/en/haiku-theme/
https://github.com/spatialaudio/nbsphinx/compare/haiku-theme...haiku-theme
https://nbsphinx.readthedocs.io/en/nature-theme/
https://github.com/spatialaudio/nbsphinx/compare/nature-theme...nature-theme
https://nbsphinx.readthedocs.io/en/pyramid-theme/
https://github.com/spatialaudio/nbsphinx/compare/pyramid-theme...pyramid-theme
https://nbsphinx.readthedocs.io/en/scrolls-theme/
https://github.com/spatialaudio/nbsphinx/compare/scrolls-theme...scrolls-theme
https://nbsphinx.readthedocs.io/en/sphinxdoc-theme/
https://github.com/spatialaudio/nbsphinx/compare/sphinxdoc-theme...sphinxdoc-theme
https://nbsphinx.readthedocs.io/en/traditional-theme/
https://github.com/spatialaudio/nbsphinx/compare/traditional-theme...traditional-theme
2.5.2 3rd-Party Themes

- alabaster_jupyterhub\(^{63}\): example\(^{64}\), usage\(^{65}\)
- basicstrap\(^{66}\): example\(^{67}\), usage\(^{68}\)
- better\(^{69}\): example\(^{70}\), usage\(^{71}\)
- bootstrap\(^{72}\): example\(^{73}\), usage\(^{74}\)
- bootstrap-astropy\(^{75}\): example\(^{76}\), usage\(^{77}\)
- cloud/redcloud/greencloud\(^{78}\): example\(^{79}\), usage\(^{80}\)
- dask_sphinx_theme\(^{81}\): example\(^{82}\), usage\(^{83}\)
- Guzzle_sphinx_theme\(^{84}\): example\(^{85}\), usage\(^{86}\)
- julia\(^{87}\): example\(^{88}\), usage\(^{89}\)
- jupyter\(^{90}\): example\(^{91}\), usage\(^{92}\)
- maisie_sphinx_theme\(^{93}\): example\(^{94}\), usage\(^{95}\)
- pandas_sphinx_theme\(^{96}\): example\(^{97}\), usage\(^{98}\)
- pangeo\(^{99}\): example\(^{100}\), usage\(^{101}\)
- press\(^{102}\): example\(^{103}\), usage\(^{104}\)

\(^{63}\) https://github.com/jupyterhub/alabaster-jupyterhub

\(^{64}\) https://nbsphinx.readthedocs.io/en/alabaster-jupyterhub-theme/

\(^{65}\) https://github.com/spatialaudio/nbsphinx/compare/alabaster-jupyterhub-theme%5E...alabaster-jupyterhub-theme

\(^{66}\) https://pythonhosted.org/sphinxjp.themes.basicstrap/

\(^{67}\) https://nbsphinx.readthedocs.io/en/basicstrap-theme/

\(^{68}\) https://github.com/spatialaudio/nbsphinx/compare/basicstrap-theme%5E...basicstrap-theme

\(^{69}\) https://sphinx-better-theme.readthedocs.io/

\(^{70}\) https://nbsphinx.readthedocs.io/en/better-theme/

\(^{71}\) https://github.com/spatialaudio/nbsphinx/compare/better-theme%5E...better-theme

\(^{72}\) https://sphinx-bootstrap-theme.readthedocs.io/

\(^{73}\) https://nbsphinx.readthedocs.io/en/bootstrap-theme/

\(^{74}\) https://github.com/spatialaudio/nbsphinx/compare/bootstrap-theme%5E...bootstrap-theme

\(^{75}\) https://github.com/astropy/astropy-sphinx-theme

\(^{76}\) https://nbsphinx.readthedocs.io/en/astropy-theme/

\(^{77}\) https://github.com/spatialaudio/nbsphinx/compare/astropy-theme%5E...astropy-theme

\(^{78}\) https://cloud-sphinxtheme.readthedocs.io/

\(^{79}\) https://nbsphinx.readthedocs.io/en/cloud-theme/

\(^{80}\) https://github.com/spatialaudio/nbsphinx/compare/cloud-theme%5E...cloud-theme

\(^{81}\) https://github.com/dask/dask-sphinx-theme

\(^{82}\) https://nbsphinx.readthedocs.io/en/dask-theme/

\(^{83}\) https://github.com/spatialaudio/nbsphinx/compare/dask-theme%5E...dask-theme

\(^{84}\) https://github.com/guzzle/guzzle_sphinx_theme

\(^{85}\) https://nbsphinx.readthedocs.io/en/guzzle-theme/

\(^{86}\) https://github.com/spatialaudio/nbsphinx/compare/guzzle-theme%5E...guzzle-theme

\(^{87}\) https://github.com/JuliaLang/JuliaDoc

\(^{88}\) https://github.com/jupyter/jupyter-sphinx-theme

\(^{89}\) https://nbsphinx.readthedocs.io/en/jupyter-theme/

\(^{90}\) https://github.com/spatialaudio/nbsphinx/compare/jupyter-theme%5E...jupyter-theme

\(^{91}\) https://github.com/maisie-dev/maisie-sphinx-theme

\(^{92}\) https://nbsphinx.readthedocs.io/en/maisie-theme/

\(^{93}\) https://github.com/spatialaudio/nbsphinx/compare/maisie-theme%5E...maisie-theme

\(^{94}\) https://github.com/pandas-dev/pandas-sphinx-theme

\(^{95}\) https://nbsphinx.readthedocs.io/en/pandas-theme/

\(^{96}\) https://github.com/pyspatialdata/sphinx_pangeo_theme

\(^{97}\) https://nbsphinx.readthedocs.io/en/pangeo-theme/

\(^{98}\) https://github.com/spatialaudio/nbsphinx/compare/pangeo-theme%5E...pangeo-theme

\(^{99}\) https://schettino72.github.io/sphinx_press_site/

\(^{100}\) https://nbsphinx.readthedocs.io/en/press-theme/

\(^{101}\) https://github.com/spatialaudio/nbsphinx/compare/press-theme%5E...press-theme
If you know of another Sphinx theme that should be included here, please open an issue on Github.

An overview of many more themes can be found at https://sphinx-themes.org/.

2.6 Using Notebooks with Git

Git is extremely useful for managing source code and it can and should also be used for managing Jupyter notebooks. There is one caveat, however: Notebooks can contain output cells with rich media like images, plots, sounds, HTML, JavaScript and many other types of bulky machine-created content. This can make it hard to work with Git efficiently, because changes in those bulky contents can completely obscure the more interesting human-made changes in text and source code. Working with multiple collaborators on a notebook can become very tedious because of this.

It is therefore highly recommended that you remove all outputs from your notebooks before committing changes to a Git repository (except for the reasons mentioned in Pre-Executing Notebooks (page 39)).

If there are no output cells in a notebook, nbstripout will by default execute the notebook, and the pages generated by Sphinx will therefore contain all the output cells. See Controlling Notebook Execution (page 39) for how this behavior can be customized.

In the Jupyter Notebook application, you can manually clear all outputs by selecting “Cell” → “All Output” → “Clear” from the menu. In JupyterLab, the menu items are “Edit” → “Clear All Outputs”.

There are several tools available to remove outputs from multiple files at once without having to open them separately. You can even include such a tool as “clean/smudge filters” into your Git workflow, which will strip the output cells automatically whenever a Git command is executed. For details, have a look at those links:

- https://github.com/kynan/nbstripout
- https://github.com/shiftlab/pytorch_sphinx_theme
- https://github.com/spatialaudio/nbsphinx/compare/pytorch-theme%5E...pytorch-theme
- https://docs.red-dove.com/sphinx_sizzle_theme/
- https://github.com/spatialaudio/nbsphinx/compare/sizzle-theme%5E...sizzle-theme
- https://github.com/bashtage/sphinx-material
- https://nbsphinx.readthedocs.io/en/material-theme/
- https://github.com/spatialaudio/nbsphinx/compare/material-theme%5E...material-theme
- https://github.com/ionelmc/sphinx-py3doc-enhanced-theme
- https://github.com/spatialaudio/nbsphinx/compare/py3doc-enhanced-theme%5E...py3doc-enhanced-theme
- https://github.com/pyviz-dev/sphinx_pyviz_theme
- https://github.com/spatialaudio/nbsphinx/compare/pyviz-theme%5E...pyviz-theme
- https://github.com/readthedocs/sphinx_rtd_theme
- https://github.com/spatialaudio/nbsphinx/compare/rtd-theme%5E...rtd-theme
- https://github.com/typlog/sphinx-typlog-theme
- https://github.com/spatialaudio/nbsphinx/compare/typlog-theme%5E...typlog-theme
- https://github.com/spatialaudio/nbsphinx/compare/typlog-theme%5E...typlog-theme
- https://github.com/spatialaudio/nbsphinx/issues
- https://git-scm.com/
3 Markdown Cells

We can use **emphasis**, *boldface*, preformatted text.

It looks like strike-out text is not supported: [STRIKEOUT:strikethrough].

- Red
- Green
- Blue

1. One
2. Two
3. Three

Arbitrary Unicode characters should be supported, e.g. łß ¯o. Note, however, that this only works if your HTML browser and your LaTeX processor provide the appropriate fonts.

3.1 Equations

Inline equations like $e^{i\pi} = -1$ can be created by putting a LaTeX expression between two dollar signs, like this: $\text{e}^{i\pi} = -1$.

Note

Avoid leading and trailing spaces around math expressions, otherwise errors like the following will occur when Sphinx is running:

```
ERROR: Unknown interpreted text role "raw-latex".
```

See also the pandoc docs\textsuperscript{128}:

Anything between two $ characters will be treated as TeX math. The opening $ must have a non-space character immediately to its right, while the closing $ must have a non-space character immediately to its left, and must not be followed immediately by a digit.

Equations can also be displayed on their own line like this:

$$\int_{-\infty}^{\infty} f(x)\delta(x-x_0)dx = f(x_0). \quad (1)$$

\textsuperscript{128} https://pandoc.org/MANUAL.html#math
This can be done by simply using one of the LaTeX math environments, like so:

\begin{equation}
\int\limits_{-\infty}^{\infty} f(x) \delta(x - x_0) \, dx = f(x_0)
\end{equation}

Note

For equations to be shown in HTML output, you have to specify a math extension\(^{129}\) in your extensions (page 9) setting, e.g.:

extensions = [
    'nbcsphinx',
    'sphinx.ext.mathjax',
    # ... other useful extensions ...
]

3.1.1 Automatic Equation Numbering

This is not automatically enabled in Jupyter notebooks, but you can install a notebook extension in order to enable equation numbering: https://jupyter-contrib-nbextensions.readthedocs.io/en/latest/nbextensions/equation-numbering/readme.html.

Automatic Equation Numbering is enabled on https://nbviewer.jupyter.org/, see e.g. the latest version of this very notebook at the link https://nbviewer.jupyter.org/github/spatialaudio/nbsphinx/blob/master/doc/markdown-cells.ipynb#Automatic-Equation-Numbering.

When using nbcsphinx, you can use the following mathjax_config setting in your conf.py file to enable automatic equation numbering in HTML output. In LaTeX output, the equations are numbered by default.

mathjax_config = {
    'TeX': {'equationNumbers': {'autoNumber': 'AMS', 'useLabelIds': True}},
}

You can use \label{...} to give a unique label to an equation:

\[ \phi = \frac{1 + \sqrt{5}}{2} \]

If automatic equation numbering is enabled, you can later reference that equation using its label. You can use \eqref{golden-mean} for a reference with parentheses: (2), or \ref{golden-mean} for a reference without them: 2.

In HTML output, these equation references only work for equations within a single HTML page. In LaTeX output, equations from other notebooks can be referenced, e.g. (08.15).

3.1.2 Manual Equation Numbering

If you prefer to assign equation numbers (or some kind of names) manually, you can do so with `\tag{...}`:

\[ a^2 + b^2 = c^2 \tag{99.4} \]

The above equation has the number 99.4.

3.2 Citations


Example: [KRKP+16].

\begin{quote}
<cite data-cite="kluyver2016jupyter">Kluyver et al. (2016)</cite>
\end{quote}

You don’t actually have to use <cite>, any inline HTML tag can be used, e.g. <strong>: [PGH11].

\begin{quote}
<strong data-cite="perez2011python">Python: An Ecosystem for Scientific Computing</strong>
\end{quote}

You’ll also have to define a list of references, see the section about references (page 52).

There is also a Notebook extension which may or may not be useful: https://github.com/takluyver/cite2c.

3.3 Code

We can also write code with nice syntax highlighting:

\begin{quote}
print("Hello, world!")
\end{quote}

3.4 Tables

\begin{table}
\begin{tabular}{|c|c|c|}
\hline
 A & B & A and B \\
\hline
False & False & False \\
True & False & False \\
False & True & False \\
True & True & True \\
\hline
\end{tabular}
\end{table}
3.5 Images

Local image:

![Jupyter notebook icon](images/notebook_icon.png)

Remote image:

![Python logo (remote)](https://www.python.org/static/img/python-logo-large.png)

3.5.1 SVG support for LaTeX

LaTeX doesn’t support SVG images, but there are Sphinx extensions that can be used for automatically converting SVG images for inclusion in LaTeX output.

Just include one of the following options in the list of `extensions` (page 9) in your `conf.py` file.

- `sphinxcontrib.inkscapeconverter` or `sphinxcontrib.rsvgconverter`: See [https://github.com/missinglinkelectronics/sphinxcontrib-svg2pdfconverter](https://github.com/missinglinkelectronics/sphinxcontrib-svg2pdfconverter) for installation instructions.

The external programs `inkscape` or `rsvg-convert` (Debian/Ubuntu package `librsvg2-bin`) are needed, respectively.


This needs the external program `convert` from `ImageMagick`.

The disadvantage of this extension is that SVGs are converted to bitmap images.

If one of those extensions is installed, SVG images can be used even for LaTeX output:
Remote SVG images can also be used (and will be shown in the LaTeX output):

3.6 Cell Attachments

Images can also be embedded in the notebook itself. Just drag an image file into the Markdown cell you are just editing or copy and paste some image data from an image editor/viewer.

The generated Markdown code will look just like a “normal” image link, except that it will have an attachment prefix:

![a stick figure](attachment:stickfigure.png)

This is a cell attachment:

In the Jupyter Notebook, there is a special “Attachments” cell toolbar which you can use to see all attachments of a cell and delete them, if needed.

3.7 HTML Elements (HTML only)

It is allowed to use plain HTML elements within Markdown cells. Those elements are passed through to the HTML output and are ignored for the LaTeX output. Below are a few examples.

HTML5 audio\textsuperscript{130} elements can be created like this:

```html
<audio src="https://example.org/audio.ogg" controls>alternative text</audio>
```

Example:

The HTML audio element is not supported!

HTML5 video\textsuperscript{131} elements can be created like this:

\textsuperscript{130} https://developer.mozilla.org/en-US/docs/Web/HTML/Element/audio
\textsuperscript{131} https://developer.mozilla.org/en-US/docs/Web/HTML/Element/video
Example:
The HTML video element is not supported!
The alternative text is shown in browsers that don’t support those elements. The same text is also shown in Sphinx’s LaTeX output.

Note: You can also use local files for the `<audio>` and `<video>` elements, but you have to create a link to the source file somewhere, because only then are the local files copied to the HTML output directory! You should do that anyway to make the audio/video file accessible to browsers that don’t support the `<audio>` and `<video>` elements.

### 3.8 Info/Warning Boxes

**Warning**
This is an experimental feature! Its usage will probably change in the future or it might be removed completely!

Until there is an info/warning extension for Markdown/CommonMark (see this issue[^1292]), such boxes can be created by using HTML `<div>` elements like this:

```
<div class="alert alert-info">
Note
This is a note!
</div>
```

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**
The text can contain further Markdown formatting. It is even possible to have nested boxes:

```
... but please don’t overuse this!
```

[^1292]: https://github.com/jupyter/notebook/issues/1292
3.9 Links to Other Notebooks

Relative links to local notebooks can be used: *a link to a notebook in a subdirectory* (page 47), a link to an orphan notebook (latter won’t work in LaTeX output, because orphan pages are not included there).

This is how a link is created in Markdown:

```
[a link to a notebook in a subdirectory](subdir/a-notebook-in-a-subdir.ipynb)
```

Markdown also supports *reference-style links*: *a reference-style link* (page 47), *another version of the same link* (page 47).

These can be created with this syntax:

```
[a reference-style link][mylink]

[mylink]: subdir/a-notebook-in-a-subdir.ipynb
```

Links to sub-sections are also possible, e.g. *this subsection* (page 47).

This link was created with:

```
[this subsection](subdir/a-notebook-in-a-subdir.ipynb#A-Sub-Section)
```

You just have to remember to replace spaces with hyphens!

BTW, links to sections of the current notebook work, too, e.g. *beginning of this section* (page 25).

This can be done, as expected, like this:

```
[beginning of this section] (#Links-to-Other-Notebooks)
```

3.10 Links to *.rst Files (and Other Sphinx Source Files)

Links to files whose extension is in the configuration value `source_suffix`\(^{133}\), will be converted to links to the generated HTML/LaTeX pages. Example: *A reStructuredText file* (page 49).

This was created with:

```
[A reStructuredText file](a-normal-rst-file.rst)
```

Links to sub-sections are also possible. Example: *Sphinx Directives* (page 51).

This was created with:

```
[Sphinx Directives](a-normal-rst-file.rst#sphinx-directives-for-info-warning-boxes)
```

Note

Sphinx section anchors are different from Jupyter section anchors! To create a link to a subsection in an .rst file (or another non-notebook source file), you not only have to replace spaces with hyphens, but also slashes and some other characters. In case of doubt, just check the target HTML page generated by Sphinx.

\(^{133}\) https://www.sphinx-doc.org/en/master/config.html#confval-source_suffix
3.11 Links to Local Files

Links to local files (other than Jupyter notebooks and other Sphinx source files) are also possible, e.g. `requirements.txt`.

This was simply created with:

```
[requirements.txt](requirements.txt)
```

The linked files are automatically copied to the HTML output directory. For LaTeX output, links are created, but the files are not copied to the target directory.

3.12 Links to Domain Objects

Links to Sphinx domain objects\(^{134}\) (such as a Python class or JavaScript function) are also possible. For example: `example_python_function()` (page 51).

This was created with:

```
[example_python_function()](a-normal-rst-file.rst#example_python_function)
```

This is especially useful for use with the Sphinx autodoc\(^{135}\) extension!

The following section was generated from `doc/code-cells.ipynb`.

4 Code Cells

4.1 Code, Output, Streams

An empty code cell:

```
[ ]:
```

Two empty lines:

```
[ ]:
```

Leading/trailing empty lines:

```
[1]:

# 2 empty lines before, 1 after
```

A simple output:

```
[2]: 6 * 7
[2]: 42
```

The standard output stream:

```
[3]: print('Hello, world!')
```
Hello, world!

Normal output + standard output

```python
[4]: print('Hello, world!')
6 * 7
Hello, world!
[4]: 42
```

The standard error stream is highlighted and displayed just below the code cell. The standard output stream comes afterwards (with no special highlighting). Finally, the “normal” output is displayed.

```python
[5]: import sys

    print("I'll appear on the standard error stream", file=sys.stderr)
    print("I'll appear on the standard output stream")
    "I'm the 'normal' output"

I'll appear on the standard output stream
I'll appear on the standard error stream
[5]: "I'm the 'normal' output"
```

Note

Using the IPython kernel, the order is actually mixed up, see https://github.com/ipython/ipykernel/issues/280.

### 4.2 Cell Magics

IPython can handle code in other languages by means of cell magics:\footnote{https://ipython.readthedocs.io/en/stable/interactive/magics.html#cell-magics}:

```bash
[6]: %%bash
    for i in 1 2 3
do
    echo $i
done
1
2
3
```

### 4.3 Special Display Formats


---

\footnote{https://nbviewer.jupyter.org/github/ipython/ipython/blob/master/examples/IPython%20Kernel/Rich%20Output.ipynb}
4.3.1 Local Image Files

```python
from IPython.display import Image
i = Image(filename='images/notebook_icon.png')
i
```

```
from IPython.display import SVG
SVG(filename='images/python_logo.svg')
```

See also SVG support for LaTeX (page 22).

4.3.2 Image URLs

```python
Image(url='https://www.python.org/static/img/python-logo-large.png')
```

```python
Image(url='https://www.python.org/static/img/python-logo-large.png', embed=True)
```
### 4.3.3 Math

```python
from IPython.display import Math
eq = Math(r'\int_{-\infty}^{\infty} f(x) \delta(x - x_0) \, dx = f(x_0)')
```

```latex
This is a \LaTeX{} equation: $a^2 + b^2 = c^2$
```

```latex
\begin{equation}
\int_{-\infty}^{\infty} f(x) \delta(x - x_0) \, dx = f(x_0)
\end{equation}
```

(3)
4.3.4 Plots

The output formats for Matplotlib plots can be customized. You’ll need separate settings for the Jupyter Notebook application and for nbSphinx.

If you want to use SVG images for Matplotlib plots, add this line to your IPython configuration file:

```python
c.InlineBackend.figure_formats = {'svg'}
```

If you want SVG images, but also want nice plots when exporting to LaTeX/PDF, you can select:

```python
c.InlineBackend.figure_formats = {'svg', 'pdf'}
```

If you want to use the default PNG plots or HiDPI plots using 'png2x' (a.k.a. 'retina'), make sure to set this:

```python
c.InlineBackend.rc = {'figure.dpi': 96}
```

This is needed because the default 'figure.dpi' value of 72 is only valid for the Qt Console\(^{138}\).

If you are planning to store your SVG plots as part of your notebooks, you should also have a look at the 'svg.hashsalt' setting.

For more details on these and other settings, have a look at Default Values for Matplotlib’s “inline” Backend\(^{139}\).

The configuration file `ipython_kernel_config.py` can be either in the directory where your notebook is located (see the `ipython_kernel_config.py` in this directory), or in your profile directory (typically ~/.ipython/profile_default/ipython_kernel_config.py). To find out your IPython profile directory, use this command:

```
python3 -m IPython profile locate
```

A local `ipython_kernel_config.py` in the notebook directory also works on https://mybinder.org/. Alternatively, you can create a file with those settings in a file named `.ipython/profile_default/ipython_kernel_config.py` in your repository.

To get SVG and PDF plots for nbSphinx, use something like this in your `conf.py` file:

```python
nbSphinx_execute_arguments = [  
    "--InlineBackend.figure_formats={'svg', 'pdf'},  
    "--InlineBackend.rc={'figure.dpi': 96}"],
```

In the following example, nbSphinx should use an SVG image in the HTML output and a PDF image for LaTeX/PDF output.

```python
[17]: import matplotlib.pyplot as plt

[18]: fig, ax = plt.subplots(figsize=[6, 3])
    ax.plot([4, 9, 7, 20, 6, 33, 13, 23, 16, 62, 8]);
```

\(^{138}\) https://qtconsole.readthedocs.io/  
\(^{139}\) https://nbviewer.jupyter.org/github/mgeier/python-audio/blob/master/plotting/matplotlib-inline-defaults.ipynb
Alternatively, the figure format(s) can also be chosen directly in the notebook (which overrides the setting in `nbsphinx_execute_arguments` and in the IPython configuration):

[19]: %config InlineBackend.figure_formats = ['png']

[20]: fig

If you want to use PNG images, but with HiDPI resolution, use the special `png2x` (a.k.a. `retina`) format (which also looks nice in the LaTeX output):

[21]: %config InlineBackend.figure_formats = ['png2x']

[22]: fig
4.3.5 Pandas Dataframes

Pandas dataframes\(^1\) should be displayed as nicely formatted HTML tables (if you are using HTML output).

```python
[23]: import numpy as np
import pandas as pd

[24]: df = pd.DataFrame(np.random.randint(0, 100, size=[5, 4]),
columns=['a', 'b', 'c', 'd'])
df
```

<table>
<thead>
<tr>
<th></th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>53</td>
<td>87</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>1</td>
<td>23</td>
<td>45</td>
<td>59</td>
<td>35</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>10</td>
<td>24</td>
<td>14</td>
</tr>
<tr>
<td>3</td>
<td>61</td>
<td>0</td>
<td>68</td>
<td>39</td>
</tr>
<tr>
<td>4</td>
<td>76</td>
<td>38</td>
<td>30</td>
<td>74</td>
</tr>
</tbody>
</table>

For LaTeX output, however, the plain text output is used by default. To get nice LaTeX tables, a few settings have to be changed:

```python
[25]: pd.set_option('display.latex.repr', True)
```

This is not enabled by default because of Pandas issue #12182\(^1\). The generated LaTeX tables utilize the `booktabs` package, so you have to make sure that package is loaded in the preamble\(^2\) with:

```
\usepackage{booktabs}
```

In order to allow page breaks within tables, you should use:

```python
[26]: pd.set_option('display.latex.longtable', True)
```

The `longtable` package is already used by Sphinx, so you don’t have to manually load it in the preamble.

\(^1\) https://pandas.pydata.org/pandas-docs/stable/getting_started/dsintro.html#dataframe
\(^2\) https://github.com/pandas-dev/pandas/issues/12182
\(^3\) https://www.sphinx-doc.org/en/master/latex.html
Finally, if you want to use LaTeX math expressions in your dataframe, you’ll have to disable escaping:

```python
pd.set_option('display.latex.escape', False)
```

The above settings should have no influence on the HTML output, but the LaTeX output should now look nicer:

```python
df = pd.DataFrame(np.random.randint(0, 100, size=[10, 4]),
columns=[r'$\alpha$', r'$\beta$', r'$\gamma$', r'$\delta$'])
df
```

<table>
<thead>
<tr>
<th></th>
<th>α</th>
<th>β</th>
<th>γ</th>
<th>δ</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>12</td>
<td>84</td>
<td>45</td>
<td>83</td>
</tr>
<tr>
<td>1</td>
<td>21</td>
<td>3</td>
<td>69</td>
<td>36</td>
</tr>
<tr>
<td>2</td>
<td>61</td>
<td>46</td>
<td>47</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>16</td>
<td>24</td>
<td>81</td>
<td>92</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>7</td>
<td>58</td>
<td>54</td>
</tr>
<tr>
<td>5</td>
<td>46</td>
<td>34</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>77</td>
<td>27</td>
<td>95</td>
<td>94</td>
</tr>
<tr>
<td>7</td>
<td>99</td>
<td>4</td>
<td>95</td>
<td>38</td>
</tr>
<tr>
<td>8</td>
<td>98</td>
<td>25</td>
<td>12</td>
<td>45</td>
</tr>
<tr>
<td>9</td>
<td>41</td>
<td>1</td>
<td>32</td>
<td>14</td>
</tr>
</tbody>
</table>

### 4.3.6 YouTube Videos

```python
from IPython.display import YouTubeVideo
YouTubeVideo('WAikxUGbomY')
```

![YouTube Video](WAikxUGbomY)
4.3.7 Interactive Widgets (HTML only)

The basic widget infrastructure is provided by the ipywidgets module. More advanced widgets are available in separate packages, see for example https://jupyter.org/widgets.

The JavaScript code which is needed to display Jupyter widgets is loaded automatically (using RequireJS). If you want to use non-default URLs or local files, you can use the nbsphinx_widgets_path (page 13) and nbsphinx_requirejs_path (page 12) settings.

```python
[30]: import ipywidgets as w

[31]: slider = w.IntSlider()
    slider.value = 42
    slider

IntSlider(value=42)
```

A widget typically consists of a so-called “model” and a “view” into that model.

If you display a widget multiple times, all instances act as a “view” into the same “model”. That means that their state is synchronized. You can move either one of these sliders to try this out:

```python
[32]: slider
    IntSlider(value=42)
```

You can also link different widgets.

Widgets can be linked via the kernel (which of course only works while a kernel is running) or directly in the client (which even works in the rendered HTML pages).

Widgets can be linked uni- or bi-directionally.

Examples for all 4 combinations are shown here:

```python
[33]: link = w.IntSlider(description='link')
    w.link((slider, 'value'), (link, 'value'))
    jslink = w.IntSlider(description='jslink')
    w.jslink((slider, 'value'), (jslink, 'value'))
    dlink = w.IntSlider(description='dlink')
    w.dlink((slider, 'value'), (dlink, 'value'))
    jsdlink = w.IntSlider(description='jsdlink')
    w.jsdlink((slider, 'value'), (jsdlink, 'value'))
    VBox([link, jslink, dlink, jsdlink])

VBox(children=(IntSlider(value=42, description='link'), IntSlider(value=0, description='jslink'), IntSlider(va...)
```

Other Languages

The examples shown here are using Python, but the widget technology can also be used with different Jupyter kernels (i.e. with different programming languages).

143 https://ipywidgets.readthedocs.io/
4.3.8 Arbitrary JavaScript Output (HTML only)

```javascript
var text = document.createTextNode("Hello, I was generated with JavaScript!");
// Content appended to "element" will be visible in the output area:
element.appendChild(text);
```

4.3.9 Unsupported Output Types

If a code cell produces data with an unsupported MIME type, the Jupyter Notebook doesn’t generate any output. nbSphinx, however, shows a warning message.

```python
display({
    'text/x-python': 'print("Hello, world!")',
    'text/x-haskell': 'main = putStrLn "Hello, world!"
}, raw=True)
```

Data type cannot be displayed: text/x-python, text/x-haskell

4.4 ANSI Colors

The standard output and standard error streams may contain ANSI escape sequences\[^{44}\] to change the text and background colors.

```python
print('BEWARE: \x1b[1;33;41mugly colors\x1b[m', file=sys.stderr)
print('AB\x1b[43mCD\x1b[35mEF\x1b[1mGH\x1b[4mIJ\x1b[7m',
'KL\x1b[49mMN\x1b[39mOP\x1b[22mQR\x1b[24mST\x1b[27mUV')
```

The following code showing the 8 basic ANSI colors is based on [http://tldp.org/HOWTO/Bash-Prompt-HOWTO/x329.html](http://tldp.org/HOWTO/Bash-Prompt-HOWTO/x329.html). Each of the 8 colors has an “intense” variation, which is used for bold text.

```python
text = ' XYZ'
formatstring = '\x1b[{}m' + text + '\x1b[m'

print(' ' * 6 + ' ' * len(text) + ''.join({':^{}'} .format(bg, len(text)) for bg in range(40, 48)))
for fg in range(30, 38):
    for bold in False, True:
        fg_code = ('1;' if bold else '') + str(fg)
        print(' ' * 4 + ' '.format(fg_code) + formatstring .format(fg_code) + ''.join(formatstring .format(fg_code + '1;' + str(bg))
            for bg in range(40, 48)))
```


(continues on next page)
ANSI also supports a set of 256 indexed colors. The following code showing all of them is based on http://bitmote.com/index.php?post/2012/11/19/Using-ANSI-Color-Codes-to-Colorize-Your-Bash-Prompt-on-Linux145.

```python
formatstring = '\x1b[38;5;{};48;5;{}mX\x1b[1mX\x1b[m'

print(' ' + ' '.join('{}:2'.format(i) for i in range(36)))
print('0 ' + ' '.join(formatstring.format(i) for i in range(16)))
for i in range(7):
    i = i * 36 + 16
    print('{}'.format(i) + ' '.join(formatstring.format(i + j)
                                 for j in range(36) if i + j < 256))
```

You can even use 24-bit RGB colors:

```python
start = 255, 0, 0
end = 0, 0, 255
length = 79
out = []
for i in range(length):
    rgb = [start[c] + int((end[c] - start[c]) / length) for c in range(3)]
    out.append('\x1b[1m'
               '38;2;{rgb[2]};{rgb[1]};{rgb[0]};'
               '48;2;{rgb[0]};{rgb[1]};{rgb[2]};mX\x1b[m'.format(rgb=rgb))
print(''.join(out))
```

5 Raw Cells

The “Raw NBConvert” cell type can be used to render different code formats into HTML or LaTeX by Sphinx. This information is stored in the notebook metadata and converted appropriately.

5.1 Usage

To select a desired format from within Jupyter, select the cell containing your special code and choose options from the following dropdown menus:

1. Select “Raw NBConvert”
2. Switch the Cell Toolbar to “Raw Cell Format”
3. Chose the appropriate “Raw NBConvert Format” within the cell

![Raw Cell Format Selection](image)

5.2 Available Raw Cell Formats

The following examples show how different Jupyter cell formats are rendered by Sphinx.
5.2.1 None

By default (if no cell format is selected), the cell content is included (without any conversion) in both the HTML and LaTeX output. This is typically not useful at all.

"I'm a raw cell with no format."

5.2.2 reST

Raw cells in “reST” format are interpreted as reStructuredText and parsed by Sphinx. The result is visible in both HTML and LaTeX output.

"I'm a raw cell in reST\(^{146}\) format."

5.2.3 Markdown

Raw cells in “Markdown” format are interpreted as Markdown, and the result is included in both HTML and LaTeX output. Since the Jupyter Notebook also supports normal Markdown cells, this might not be useful at all.

"I'm a raw cell in Markdown\(^{147}\) format."

5.2.4 HTML

Raw cells in “HTML” format are only visible in HTML output. This option might not be very useful, since raw HTML code is also allowed within normal Markdown cells.

5.2.5 LaTeX

Raw cells in “LaTeX” format are only visible in LaTeX output.

I'm a raw cell in \LaTeX\(^{148}\) format.

5.2.6 Python

Raw cells in “Python” format are not visible at all (nor executed in any way).

The following section was generated from doc/hidden-cells.ipynb  

6 Hidden Cells

You can remove cells from the HTML/LaTeX output by adding this to the cell metadata:

"nbsphinx": "hidden"

Hidden cells are still executed but removed afterwards.

For example, the following hidden cell defines the variable answer.

This is the cell after the hidden cell. Although the previous cell is not visible, its result is still available:

[2]: answer

\(^{146}\) https://www.sphinx-doc.org/rest.html

\(^{147}\) https://daringfireball.net/projects/markdown/
Don’t overuse this, because it may make it harder to follow what’s going on in your notebook. Also Markdown cells can be hidden. The following cell is hidden.

This is the cell after the hidden cell.

The following section was generated from doc/hidden-cells.ipynb.

7 Controlling Notebook Execution

Notebooks with no outputs are automatically executed during the Sphinx build process. If, however, there is at least one output cell present, the notebook is not evaluated and included as is.

The following notebooks show how this default behavior can be used and customized.

7.1 Pre-Executing Notebooks

Automatically executing notebooks during the Sphinx build process is an important feature of nbsphinx. However, there are a few use cases where pre-executing a notebook and storing the outputs might be preferable. Storing any output will, by default, stop nbsphinx from executing the notebook.

7.1.1 Long-Running Cells

If you are doing some very time-consuming computations, it might not be feasible to re-execute the notebook every time you build your Sphinx documentation. So just do it once – when you happen to have the time – and then just keep the output.

```
[1]: import time

[2]: %time time.sleep(60 * 60)
6 * 7
CPU times: user 160 ms, sys: 56 ms, total: 216 ms
Wall time: 1h 1s

[2]: 42
```

7.1.2 Rare Libraries

You might have created results with a library that’s hard to install and therefore you have only managed to install it on one very old computer in the basement, so you probably cannot run this whenever you build your Sphinx docs.

```
[3]: from a_very_rare_library import calculate_the_answer

[4]: calculate_the_answer()
[4]: 42
```
### 7.1.3 Exceptions

If an exception is raised during the Sphinx build process, it is stopped (the build process, not the exception!). If you want to show to your audience how an exception looks like, you have two choices:

1. Allow errors – either generally or on a per-notebook or per-cell basis – see *Ignoring Errors* (page 41) (*per cell* (page 42)).
2. Execute the notebook beforehand and save the results, like it’s done in this example notebook:

```python
[5]: 1 / 0

---------------------------------------------------------------------------
ZeroDivisionError Traceback (most recent call last)
<ipython-input-5-b710d87c980c> in <module>()
----> 1 1 / 0
ZeroDivisionError: division by zero
```

### 7.1.4 Client-specific Outputs

When *nbsphinx* executes notebooks, it uses the *nbconvert* module to do so. Certain Jupyter clients might produce output that differs from what *nbconvert* would produce. To preserve those original outputs, the notebook has to be executed and saved before running Sphinx.

For example, the JupyterLab help system shows the help text as cell outputs, while executing with *nbconvert* doesn’t produce any output.

```python
[6]: sorted?

Signature: sorted(iterable, /, *, key=None, reverse=False)
Docstring:
Return a new list containing all items from the iterable in ascending order.
A custom key function can be supplied to customize the sort order, and the reverse flag can be set to request the result in descending order.
Type:     builtin_function_or_method
```

The following section was generated from `doc/never-execute.ipynb`

#### 7.2 Explicitly Dis-/Enabling Notebook Execution

If you want to include a notebook without outputs and yet don’t want *nbsphinx* to execute it for you, you can explicitly disable this feature.

You can do this globally by setting the following option in *conf.py*:

```
nbsphinx_execute = 'never'
```

Or on a per-notebook basis by adding this to the notebook’s JSON metadata:

```
"nbsphinx": {
    "execute": "never"
},
```

There are three possible settings, "always", "auto" and "never". By default (= "auto"), notebooks with no outputs are executed and notebooks with at least one output are not. As always, per-notebook settings take precedence over the settings in *conf.py*.
This very notebook has its metadata set to "never", therefore the following cell is not executed:

```
[ ]: 6 * 7
```

The following section was generated from doc/allow-errors.ipynb

### 7.3 Ignoring Errors

Normally, if an exception is raised while executing a notebook, the Sphinx build process is stopped immediately.

If a notebook contains errors on purpose (or if you are too lazy to fix them right now), you have four options:

1. Manually execute the notebook in question and save the results, see the pre-executed example notebook (page 39).
2. Allow errors in all notebooks by setting this option in `conf.py`: `nbsphinx_allow_errors = True`
3. Allow errors on a per-notebook basis by adding this to the notebook’s JSON metadata: "nbsphinx": { "allow_errors": true },
4. Allow errors on a per-cell basis using the `raises-exception` tag, see Ignoring Errors on a Cell-by-Cell Basis (page 42).

This very notebook is an example for the third option. The results of the following code cells are not stored within the notebook, therefore it is executed during the Sphinx build process. Since the above-mentioned `allow_errors` flag is set in this notebook’s metadata, all cells are executed although most of them cause an exception.

```
[1]: nonsense
```
```
NameError Traceback (most recent call last)
<ipython-input-1-7dd4c0df649c> in <module>
----> 1 nonsense
NameError: name 'nonsense' is not defined
```

```
[2]: 42 / 0
```
```
ZeroDivisionError Traceback (most recent call last)
<ipython-input-2-52cebea8b64f> in <module>
----> 1 42 / 0
ZeroDivisionError: division by zero
```

```
[3]: print 'Hello, world!'
```
```
File "<ipython-input-3-653b30cd70a8">", line 1
print 'Hello, world!'
    ^
SyntaxError: Missing parentheses in call to 'print'. Did you mean print('Hello, world!')?
```

```
[4]: 6 - 7
```

41
7.4 Ignoring Errors on a Per-Cell Basis

Instead of ignoring errors for all notebooks or for some selected notebooks (see the previous notebook (page 41)), you can be more fine-grained and just allow errors on certain code cells by tagging them with the raises-exception tag.

```python
[1]: 'no problem'
[1]: 'no problem'
```

The following code cell has the raises-exception tag.

```python
[2]: problem
```

```
NameError Traceback (most recent call last)
<ipython-input-2-526ab3a89ffc> in <module>
----> 1 problem

NameError: name 'problem' is not defined
```

The following code cell is executed even though the previous cell raised an exception.

```python
[3]: 'no problem'
[3]: 'no problem'
```

Note

The behavior of the raises-exception tag doesn’t match its name. While it does allow exceptions, it does not check if an exception is actually raised!

This will hopefully be fixed at some point, see https://github.com/jupyter/nbconvert/issues/730.

---

7.5 Configuring the Kernels

7.5.1 Kernel Name

If we have multiple kernels installed, we can choose to override the kernel saved in the notebook using nbsphinx_kernel_name (page 11):
nbsphinx_kernel_name = 'python-upstream-dev'

which uses the kernel named `python-upstream-dev` instead of the kernel name stored in the notebook.

### 7.5.2 Kernel Arguments

We can also pass options to the kernel by setting `nbsphinx_execute_arguments` (page 11) in `conf.py`. These work the same way as `ipython_kernel_config.py`. For example, using

```
nbsphinx_execute_arguments = [
    "--InlineBackend.rc={'figure.dpi': 96}",
]
```

will set plot options (page 30) is the same as writing:

```
c.InlineBackend.rc = {'figure.dpi': 96}
```

in `ipython_kernel_config.py` or using:

```
%config InlineBackend.rc={'figure.dpi': 96}
```

at the top of a notebook:

```
[1]: get_ipython().config.InlineBackend.rc
[1]: {'figure.dpi': 96}
```

### 7.5.3 Environment Variables

The contents of `os.environ` after the execution of `conf.py` will be passed as environment variables to the kernel. As an example, `MY_DUMMY_VARIABLE` has been set in `conf.py` like this:

```
import os
os.environ['MY_DUMMY_VARIABLE'] = 'Hello from conf.py!
```

... and it can be checked in the notebook like this:

```
[2]: import os
[2]: os.environ['MY_DUMMY_VARIABLE']
[2]: 'Hello from conf.py!
```

This is useful if we want to edit `PYTHONPATH` in order to compile the documentation without installing the project:

```
import os
src = os.path.abspath('..src')
os.environ['PYTHONPATH'] = src
```

If you are using https://mybinder.org/ and you want to define environment variables, you should create a file `.binder/start` in your repository (see Binder docs\(^{148}\)) containing definitions like this:

\(^{148}\) https://mybinder.readthedocs.io/en/latest/config_files.html#start-run-code-before-the-user-sessions-starts
#!/bin/bash
export MY_DUMMY_VARIABLE="Hello from .binder/start!
exec "$@"

The following section was generated from doc/configuring-kernels.ipynb
ends here.

7.6 Cell Execution Timeout

By default, code cells will be executed until they are finished, even if that takes a very long time. In
some cases they might never finish.

If you would like to only use a finite amount of time per cell, you can choose a timeout length for all
notebooks by setting the following option in conf.py:

```
nbsphinx_timeout = 60
```

Or change the timeout length on a per-notebook basis by adding this to the notebook’s JSON metadata:

```
"nbsphinx": {
  "timeout": 60
},
```

The timeout is given in seconds, use -1 to disable the timeout (which is the default).

Alternatively, you can manually execute the notebook in question and save the results, see the pre-
executed example notebook (page 39).

The following section was generated from doc/prolog-and-epilog.ipynb
ends here.

8 Prolog and Epilog

When including notebooks in your Sphinx documentation, you can choose to add some generic content
before and after each notebook. This can be done with the configuration values nbsphinx_prolog and
nbsphinx_epilog in the file conf.py.

The prolog and epilog strings can hold arbitrary reST\(^\text{149}\) markup. Particularly, the only\(^\text{150}\) and raw\(^\text{151}\)
directives can be used to have different content for HTML and LaTeX output.

Those strings are also processed by the Jinja\(^\text{152}\) templating engine. This means you can run Python-
like code within those strings. You have access to the current Sphinx build environment\(^\text{153}\) via the
variable env. Most notably, you can get the file name of the current notebook with

```
{{ env.doc2path(env.docname, base=None) }}
```

Have a look at the Jinja2 template documentation\(^\text{154}\) for more information.

\footnote{149}{https://www.sphinx-doc.org/rest.html}
\footnote{150}{https://www.sphinx-doc.org/en/master/usage/restructuredtext/directives.html#directive-only}
\footnote{151}{https://docutils.readthedocs.io/en/sphinx-docs/ref/rst/directives.html#raw-data-pass-through}
\footnote{152}{http://jinja.pocoo.org/}
\footnote{153}{https://www.sphinx-doc.org/en/master/extdev/envapi.html}
\footnote{154}{http://jinja.pocoo.org/docs/latest/templates/}

44
This is especially prone to happen when using raw \LaTeX{}, with its abundance of braces. To avoid clashing braces you can try to insert additional spaces or \LaTeX{} macros that don’t have a visible effect, like e.g. $\strut{}$. For example, you can avoid three consecutive opening braces with something like that:

\verbatim{$\strut{}${ env.doc2path(env.docname, base=None) }}$

NB: The three consecutive closing braces in this example are not problematic.

An alternative work-around would be to surround \LaTeX{} braces with Jinja braces like this:

$\{ \{ ' ' \} \}$

The string within will not be touched by Jinja.

Another special Jinja syntax is $\{\%$, which is also often used in fancy TeX/\LaTeX{} code. A work-around for this situation would be to use

$\{ \{ '\%' \} \}$

## 8.1 Examples

You can include a simple static string, using reST\cite{rest} markup if you like:

nbsphinx_epilog = ""

-----

Generated by nbsphinx\_ from a Jupyter\_ notebook.

.. _nbsphinx: https://nbsphinx.readthedocs.io/

.. _Jupyter: https://jupyter.org/

""

Using some additional Jinja2 markup and the information from the `env` variable, you can create URLs that point to the current notebook file, but located on some other server:

nbsphinx_prolog = ""

Go there: https://example.org/notebooks/{{ env.doc2path(env.docname, base=None) }}

-----

""

You can also use separate content for HTML and \LaTeX{} output, e.g.:

nbsphinx_prolog = r""

{% set docname = env.doc2path(env.docname, base=None) %}

.. only:: html

    Go there: https://example.org/notebooks/{{ docname }}

.. raw:: latex

    \nbsphinxstartnotebook{The following section was created from \texttt{\strut}{{ docname }}::}

""

\footnote{\url{https://www.sphinx-doc.org/rest.html}}

(continues on next page)
Note the use of the `\bsphinxstartnotebook` and `\bsphinxstopnotebook` commands. Those make
sure there is not too much space between the “prolog” and the beginning of the notebook and, respec-
tively, between the end of the notebook and the “epilog”. They also avoid page breaks, in order for
the “prolog”/“epilog” not to end up on the page before/after the notebook.

For a more involved example for different HTML and LaTeX versions, see the file `conf.py` of the
`nbsphinx` documentation.

The following section was generated from `doc/custom-formats.ipynb`.

### 9 Custom Notebook Formats

By default, Jupyter notebooks are stored in files with the suffix `.ipynb`, which use the JSON format
for storage.

However, there are libraries available which allow storing notebooks in different formats, using differ-
ent file suffixes.

To use a custom format in `nbsphinx`, you can specify the `nbsphinx_custom_formats` option in your
`conf.py` file. You have to provide the file extension and a conversion function that takes the contents
of a file (as a string) and returns a Jupyter notebook object.

```python
nbsphinx_custom_formats = {
    '.mysuffix': 'mylibrary.converter_function',
}
```

The converter function can be given as a string or as a function object.

One example for such library is `jupytext`\(^{156}\), which allows storing the contents of Jupyter notebooks in
Markdown and R-Markdown, as well as plain Julia, Python and R files.

Since its conversion function takes more than a single string argument, just using the function name
`'jupytext.reads'` will not work. We have to create a function object, and one way to do that is using
a `lambda` function like this:

```python
import jupytext

nbsphinx_custom_formats = {
    '.Rmd': lambda s: jupytext.reads(s, '.Rmd'),
}
```

You can of course use multiple formats by specifying multiple conversion functions.

\(^{156}\) [https://github.com/mwouts/jupytext](https://github.com/mwouts/jupytext)
10 Notebooks in Sub-Directories

You can organize your notebooks in subdirectories and nbsphinx will take care that relative links to other notebooks, images and other files still work.

Let's see if links to local images work:

```python
from IPython.display import Image
Image(filename='..\images\notebook_icon.png')
```

Warning
There may be problems with images in output cells if your source directory contains symbolic links, see issue #49.

A link to a notebook in the same sub-directory: link (page 47).
A link to a notebook in the parent directory: link (page 19).
A link to a local file: link.
A random equation:

\[ F_n = F_{n-1} + F_{n-2} \] (08.15)

10.1 A Sub-Section

This is just for testing inter-notebook links, see this section (page 25).

11 Using toctree In A Notebook

In Sphinx-based documentation, there is typically a file called index.rst which contains one or more toctree directives. Those can be used to pull in further source files (which themselves can contain further toctree directives).

---

\[ ^{157} \text{https://github.com/spatialaudio/nbsphinx/issues/49} \]
\[ ^{158} \text{https://www.sphinx-doc.org/en/master/usage/restructuredtext/directives.html#directive-toctree} \]
With nbsphinx it is possible to get a similar effect within a Jupyter notebook using the "nbsphinx-toctree" cell tag or cell metadata. Markdown cells with "nbsphinx-toctree" tag/metadata are not converted like “normal” Markdown cells. Instead, they are only scanned for links to other notebooks (or *.rst files and other Sphinx source files) and those links are added to a toctree directive. External links can also be used, but they will not be visible in the LaTeX output.

If there is a section title in the selected cell, it is used as toctree caption (but it also works without a title).

Note
All other content of such a cell is ignored!

If you are satisfied with the default settings, you can simply use "nbsphinx-toctree" as a cell tag. Alternatively, you can store "nbsphinx-toctree" cell metadata. Use …

```yaml
{  "nbsphinx-toctree": {} }
```

… for the default settings, …

```yaml
{  "nbsphinx-toctree": {  "maxdepth": 2  }
}
```

… for setting the :maxdepth: option, or…

```yaml
{  "nbsphinx-toctree": {  "hidden": true  }
}
```

… for setting the :hidden: option.

Of course, multiple options can be used at the same time, e.g.

```yaml
{  "nbsphinx-toctree": {  "maxdepth": 3,  "numbered": true  }
}
```

For more options, have a look a the Sphinx documentation\textsuperscript{159}. All options can be used – except :glob:, which can only be used in rst files (page 49) and in raw reST cells (page 38).

Note
In HTML output, a toctree cell generates an in-line table of contents (containing links) at its position in the notebook, whereas in the LaTeX output, a new (sub-)section with the actual content is inserted at its position. All content below the toctree cell will appear after the table of contents/inserted section, respectively. If you want to use the LaTeX output, it is recommended that you don’t add further cells

\textsuperscript{159} https://www.sphinx-doc.org/en/master/usage/restructuredtext/directives.html#directive-toctree
below a `toctree` cell, otherwise their content may appear at unexpected places. Multiple `toctree` cells in a row should be fine, though.

The following cell is tagged with "nbsphinx-toctree" and contains a link to the notebook `yet-another.ipynb` (page 49) and an external link (which will only be visible in the HTML output). It also contains a section title which will be used as `toctree` caption (which also will only be visible in the HTML output).

---

11.1 Yet Another Notebook

This notebook is only here to show how (sub-)toctrees can be created with Markdown cell metadata. See there (page 47).

---

12 Normal reStructuredText Files

This is a normal RST file.

**Note:** Those still work!

---

12.1 Links to Notebooks (and Other Sphinx Source Files)

Links to Sphinx source files can be created like normal Sphinx hyperlinks\(^{160}\), just using a relative path to the local file: `link` (page 47).

```
using a relative path to the local file: link_
```

```
.. _link: subdir/a-notebook-in-a-subdir.ipynb
```

If the link text has a space (or some other strange character) in it, you have to surround it with backticks: *a notebook link* (page 47).

```
surround it with backticks: `a notebook link`_.
```

```
.. _a notebook link: subdir/a-notebook-in-a-subdir.ipynb
```

You can also use an anonymous hyperlink target\(^{161}\), like this: `link` (page 47). If you have multiple of those, their order matters!

```
like this: link_
```

```
__ subdir/a-notebook-in-a-subdir.ipynb
```

Finally, you can use Embedded URIs\(^{162}\), like this `link` (page 47).

```
like this `link <subdir/a-notebook-in-a-subdir.ipynb>`_.
```


\(^{161}\) [http://docutils.sourceforge.net/docs/ref/rst/restructuredtext.html#anonymous-hyperlinks](http://docutils.sourceforge.net/docs/ref/rst/restructuredtext.html#anonymous-hyperlinks)

Note: These links should also work on Github and in other rendered reStructuredText pages.

Links to subsections are also possible by adding a hash sign (#) and the section title to any of the above-mentioned link variants. You have to replace spaces in the section titles by hyphens. For example, see this subsection (page 47).

For example, see this subsection_.

.. _subsection: subdir/a-notebook-in-a-subdir.ipynb#A-Sub-Section

### 12.2 Links to Notebooks, Ye Olde Way

In addition to the way shown above, you can also create links to notebooks (and other Sphinx source files) with :ref:. This has some disadvantages:

- It is arguably a bit more clunky.
- Because :ref: is a Sphinx feature, the links don’t work on Github and other rendered reStructuredText pages that use plain old docutils.

It also has one important advantage:

- The link text can automatically be taken from the actual section title.

A link with automatic title looks like this: Notebooks in Sub-Directories (page 47).

```
:ref:`subdir/a-notebook-in-a-subdir.ipynb`
```

But you can also provide your own link title (page 47).

```
:ref:`your own link title </subdir/a-notebook-in-a-subdir.ipynb>`
```

However, if you want to use your own title, you are probably better off using the method described above in Links to Notebooks (and Other Sphinx Source Files) (page 49).

Links to subsections are also possible, e.g. A Sub-Section (page 47) (the subsection title is used as link text) and alternative text (page 47).

These links were created with:

```
:ref:`subdir/a-notebook-in-a-subdir.ipynb#A-Sub-Section`
:ref:`alternative text </subdir/a-notebook-in-a-subdir.ipynb#A-Sub-Section>`
```

Note:

- The paths have to be relative to the top source directory and they have to start with a slash (/).
- Spaces in the section title have to be replaced by hyphens!

---

163 https://www.sphinx-doc.org/en/master/usage/restructuredtext/roles.html#role-ref
12.3 Sphinx Directives for Info/Warning Boxes

Warning
This is an experimental feature! Its usage may change in the future or it might disappear completely, so don’t use it for now.

With a bit of luck, it will be possible (some time in the future) to create info/warning boxes in Markdown cells, see https://github.com/jupyter/notebook/issues/1292. If this ever happens, nbsphinx will provide directives for creating such boxes. For now, there are two directives available: nbinfo and nbwarning. This is how an info box looks like:

Note
This is an info box.
It may include nested formatting, even another info/warning box:

Warning: You should probably not use nested boxes!

12.4 Domain Objects

domain_object_function(foo)
This is just for testing domain object links. See this section (page 26).

Parameters foo (str) – Example string parameter

12.5 Citations

You could use standard Sphinx citations\footnote{https://www.sphinx-doc.org/en/master/usage/restructuredtext/basics.html#citations}, but it might be more practical to use the \texttt{sphinxcontrib.bibtex}\footnote{https://sphinxcontrib-bibtex.readthedocs.io/} extension.

If you install and enable this extension, you can create citations like [PGH11]:

\cite{perez2011python}

You can create similar citations in Jupyter notebooks with a special HTML syntax, see the section about \texttt{citations in Markdown cells} (page 21).

For those citations to work, you also need to specify a BibTeX file, as explained in the next section.

\footnote{https://www.sphinx-doc.org/en/master/usage/restructuredtext/basics.html#citations}
\footnote{https://sphinxcontrib-bibtex.readthedocs.io/}
12.6 References

After installing and enabling (page 9) the sphinxcontrib.bibtex extension, you can create a list of references from a BibTeX file like this:

```plaintext
.. bibliography:: references.bib
```

Have a look at the documentation for all the available options.

The list of references may look something like this (in HTML output):

However, in the LaTeX/PDF output the list of references will not appear here, but at the end of the document. For a possible work-around, see https://github.com/mcmtroffaes/sphinxcontrib-bibtex/issues/156.

There is an alternative Sphinx extension for creating bibliographies: https://bitbucket.org/wnielson/sphinx-natbib/. However, this project seems to be abandoned (last commit in 2011).

The following section was generated from doc/links.ipynb

13 External Links

**nbconvert**

The official conversion tool of the Jupyter project. It can be used to convert notebooks to HTML, LaTeX and many other formats.

Its `--execute` flag can be used to automatically execute notebooks before conversion.

https://nbconvert.readthedocs.io/

https://github.com/jupyter/nbconvert

**RunNotebook (notebook_sphinxext.py)**

Notebooks can be included in `*.rst` files with a custom `notebook` directive. Uses nbconvert to execute notebooks and to convert the result to HTML.

No LaTeX support.

https://github.com/ngoldbaum/RunNotebook

There are some forks:

- https://bitbucket.org/yt_analysis/yt-doc/src/default/extensions/notebook_sphinxext.py

**nbsite**

Build a tested, sphinx-based website from notebooks.

https://nbsite.pyviz.org/

**ipypublish**

A workflow for creating and editing publication ready scientific reports and presentations, from one or more Jupyter Notebooks, without leaving the browser!

https://ipypublish.readthedocs.io/

https://github.com/chrisjsewell/ipypublish

**jupyter-book**

https://sphinxcontrib-bibtex.readthedocs.io/
Create an online book with Jupyter Notebooks and Jekyll
https://jupyter.org/jupyter-book
https://github.com/jupyter/jupyter-book

nbinteract
Create interactive webpages from Jupyter Notebooks
https://www.nbinteract.com/
https://github.com/SamLau95/nbinteract

nb_pdf_template
An extended nbconvert template for LaTeX output.
https://github.com/t-makaro/nb_pdf_template

nb2plots
Notebook to reStructuredText converter which uses a modified version of the matplotlib plot directive.
https://github.com/matthew-brett/nb2plots

brole
A Sphinx role for IPython notebooks
https://github.com/matthew-brett/brole

Sphinx-Gallery
https://sphinx-gallery.readthedocs.io/

sphinx-nbexamples
https://sphinx-nbexamples.readthedocs.io/
https://github.com/Chilipp/sphinx-nbexamples

nbsphinx-link
https://github.com/vidartf/nbsphinx-link
Uses nbsphinx, but supports notebooks outside the Sphinx source directory.
See https://github.com/spatialaudio/nbsphinx/pull/33 for some limitations.

bookbook
Uses nbconvert to create a sequence of HTML or a concatenated LaTeX file from a sequence of notebooks.
https://github.com/takluyver/bookbook

jupyter-sphinx
Jupyter Sphinx is a Sphinx extension that executes embedded code in a Jupyter kernel, and embeds outputs of that code in the output document. It has support for rich output such as images, Latex math and even javascript widgets.
https://jupyter-sphinx.readthedocs.io/
https://github.com/jupyter/jupyter-sphinx

DocOnce

Converting Notebooks to reStructuredText
Converting reStructuredText to Notebooks
https://github.com/nthiery/rst-to-ipynb
https://github.com/QuantEcon/sphinxcontrib-jupyter
Converting Notebooks to HTML for Blog Posts
http://dongweiming.github.io/divingintoipynb_nikola/posts/nbconvert.html
https://github.com/getpelican/pelican-plugins/blob/master/liquid_tags/notebook.py
Further Posts and Issues
https://github.com/ipython/ipython/issues/

14 Contributing

If you find bugs, errors, omissions or other things that need improvement, please create an issue or a pull request at http://github.com/spatialaudio/nbsphinx/. Contributions are always welcome!

14.1 Development Installation

Instead of pip-installing the latest release from PyPI¹⁶⁹, you should get the newest development version (a.k.a. “master”) from Github¹⁷⁰:

```bash
git clone https://github.com/spatialaudio/nbsphinx.git
cd nbsphinx
python3 -m pip install -e . --user
```

This way, your installation always stays up-to-date, even if you pull new changes from the Github repository. If you have only Python 3 installed, you might have to use the command `python` instead of `python3`. When installing `nbsphinx` this way, you can also quickly check other Git branches (in this example the branch is called “another-branch”):

```bash
git checkout another-branch
```

When you run Sphinx now, it automatically uses the version “another-branch” of `nbsphinx`. If you want to go back to the “master” branch, use:

```bash
git checkout master
```

To get the latest changes from Github, use:

```bash
git pull --ff-only
```

¹⁶⁹ https://pypi.org/project/nbsphinx/
¹⁷⁰ https://github.com/spatialaudio/nbsphinx/
14.2 Building the Documentation

If you make changes to the documentation, you should create the HTML pages locally using Sphinx and check if they look OK.

Initially, you might need to install a few packages that are needed to build the documentation:

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

To (re-)build the HTML files, use:

```
python3 setup.py build_sphinx
```

If you want to check the LaTeX output, use:

```
python3 setup.py build_sphinx -b latex
```

Again, you’ll probably have to use python instead of python3. The generated files will be available in the directories build/sphinx/html/ and build/sphinx/latex/, respectively.

14.3 Testing

Unfortunately, the currently available automated tests are very limited. Contributions to improve the testing situation are of course also welcome!

The nbsphinx documentation also serves as a test case. However, the resulting HTML/LaTeX/PDF files have to be inspected manually to check whether they look as expected.

Sphinx’s warnings can help spot problems, therefore it is recommended to use the `-W` flag to turn Sphinx warnings into errors while testing:

```
python3 setup.py build_sphinx -W
```

This flag is also used for continuous integration on Travis-CI (see the file .travis.yml) and CircleCI (see the file .circleci/config.yml).

Sphinx has a linkcheck builder that can check whether all URLs used in the documentation are still valid. This is also part of the continuous integration setup on CirceleCI.

15 Version History

Version 0.5.1 (2020-01-28):
- This will be the last release supporting Python 2.x!
- Support for https://github.com/choldgraf/sphinx-copybutton
- Executed notebooks are now saved in the HTML output directory

Version 0.5.0 (2019-11-20):
- Automatic support for Jupyter widgets, customizable with nbsphinx_widgets_path (and nbsphinx_widgets_options)

Version 0.4.3 (2019-09-30):
- Add option nbsphinx_requirejs_path (and nbsphinx_requirejs_options)

Version 0.4.2 (2019-01-15):
- Re-establish Python 2 compatibility (but the clock is ticking …)
Version 0.4.1 (2018-12-16):
• Fix issue #266

Version 0.4.0 (2018-12-14):
• Support for “data-cite” HTML tags in Markdown cells
• Add option nbsphinx_custom_formats
• LaTeX macros \nbsphinxstartnotebook and \nbsphinxstopnotebook
• Support for cell attachments
• Add options nbsphinx_input_prompt and nbsphinx_output_prompt
• Re-design LaTeX output of code cells, fix image sizes

Version 0.3.5 (2018-09-10):
• Disable nbconvert version 5.4 to avoid issue #878\(^{71}\)

Version 0.3.4 (2018-07-28):
• Fix issue #196 and other minor changes

Version 0.3.3 (2018-04-25):
• Locally linked files are only copied for Jupyter notebooks (and not anymore for other Sphinx source files)

Version 0.3.2 (2018-03-28):
• Links to local files are rewritten for all Sphinx source files (not only Jupyter notebooks)

Version 0.3.1 (2018-01-17):
• Enable notebook translations (NB: The use of reST strings is temporary!)

Version 0.3.0 (2018-01-02):
• Add options nbsphinx_prolog and nbsphinx_epilog
• Links from *.rst files to notebooks have to start with a slash

Version 0.2.18 (2017-12-03):
• Fix issue #148

Version 0.2.17 (2017-11-12):
• Fix issue #146

Version 0.2.16 (2017-11-07):
• Fix issue #142

Version 0.2.15 (2017-11-03):
• Links to subsections are now possible in all source files

Version 0.2.14 (2017-06-09):
• Add option nbsphinx_kernel_name

Version 0.2.13 (2017-01-25):
• Minor fixes

Version 0.2.12 (2016-12-19):
• Basic support for widgets

\(^{71}\) https://github.com/jupyter/nbconvert/issues/878
• CSS is now “responsive”, some new CSS classes

Version 0.2.11 (2016-11-19):
• Minor fixes

Version 0.2.10 (2016-10-16):
• Enable JavaScript output cells

Version 0.2.9 (2016-07-26):
• Add option nbsphinx_prompt_width

Version 0.2.8 (2016-05-20):
• Add options nbsphinx_execute and nbsphinx_execute_arguments
• Separate “display priority” for HTML and LaTeX

Version 0.2.7 (2016-05-04):
• Special CSS tuning for sphinx_rtd_theme
• Replace info/warning <div> elements with nbinfo/nbwarning

Version 0.2.6 (2016-04-12):
• Support for LaTeX math environments in Markdown cells
• Add options nbsphinx_timeout and nbsphinx_codecell_lexer

Version 0.2.5 (2016-03-15):
• Add option nbsphinx_allow_errors to globally ignore exceptions
• Separate class nbsphinx.Exporter

Version 0.2.4 (2016-02-12):
• Support for “nbsphinx-toctree” cell metadata

Version 0.2.3 (2016-01-22):
• Links from notebooks to local files can now be used

Version 0.2.2 (2016-01-06):
• Support for links to sub-sections in other notebooks

Version 0.2.1 (2016-01-04):
• No need to mention source_suffix and source_parsers in conf.py

Version 0.2.0 (2015-12-27):
• Add support for allow_errors and hidden metadata
• Add custom reST template
• Add nbinput and nbsoutput directives with HTML+CSS and LaTeX formatting
• Turn nbsphinx into a Sphinx extension

Version 0.1.0 (2015-11-29): Initial release
References


167 https://doi.org/10.3233/978-1-61499-649-1-87
168 https://doi.org/10.1109/MCSE.2010.119