Documenting Python Packages

Docs or it didn't happen!

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2019/04/11 (updated: 2019-04-25)

$ whoami

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Links:

- : github.com/andreysmelter
- : linkedin.com/in/andreysmelter
- : instagram.com/andreysmelter
- : twitter.com/smelandr

Slides are available: bit.ly/DerbyPyWTD

Slides are available (short): bit.ly/DerbyPyWTDShort

[Ref]: https://twitter.com/ThatDocsLady/status/1115921726297247744

A regular slide with text or `code`.

A transition slide or terminal output.

[Ref]: Click me!

Why write docs?

You want people to use your code

You want your code to be better

You want contributors

You will be using your code in [X] months

To document or not to document?

> "There is a magical feeling that happens when you release your code. It comes in a variety of ways, but it always hits you the same. *Someone is using my code?!* A mix of terror and excitement."

[Ref]: https://www.writethedocs.org/guide/writing/beginners-guide-to-docs

Get Started

The Python Standard Library

[Ref]: https://www.netflix.com/title/771476

"Batteries Included" Philosophy

Having a rich and versatile standard library

Which is immediately available

Without making the user download separate packages

[Ref]: https://www.python.org/dev/peps/pep-0206

pydoc

built-in

pydoc

The pydoc module automatically generates documentation from Python modules.

The documentation can be presented as:

- pages of **text on the console**
- served to a **web browser**
- or saved to **HTML files**

[Ref]: https://docs.python.org/3/library/pydoc.html [Ref]: https://github.com/python/cpython/blob/3.7/Lib/pydoc.py

Let's use quadratic equation as an example

- The **quadratic equation** formula:

$$ax^2 + bx + c = 0$$

- The quadratic formula for the **roots**:

$$x_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

- The `equations/quadratic.py` module:

```
import cmath


def quadratic(a, b, c):
    discriminant = cmath.sqrt(b**2.0 - 4.0 * a * c)
    x1 = (-b + discriminant) / (2.0 * a)
    x2 = (-b - discriminant) / (2.0 * a)
    return x1, x2
```


[Ref]: Example 0.

pydoc

The pydoc module "automatically" generates documentation from Python modules

```
$ python3 -m pydoc equations.quadratic
Help on module quadratic:

NAME
    quadratic

FUNCTIONS
    quadratic(a, b, c)

FILE
    equations/quadratic.py
```

pydoc

- Add **module-level** docstrig.
- Add **function-level** docstring.

```
"""
This module contains routines for finding
roots of quadratic equations.
"""

import cmath


def quadratic(a, b, c):
    """Solve quadratic equation."""
    discriminant = cmath.sqrt(b**2.0 - 4.0 * a * c)
    x1 = (-b + discriminant) / (2.0 * a)
    x2 = (-b - discriminant) / (2.0 * a)
    return x1, x2
```


[Ref]: Example 1.

pydoc

The pydoc module automatically generates documentation from Python modules

```
$ python3 -m pydoc equations.quadratic
Help on module equations.quadratic in equations:

NAME
    equations.quadratic

DESCRIPTION
    This module contains routines for finding
    roots of quadratic equations.

FUNCTIONS
    quadratic(a, b, c)
        Solve quadratic equation.

FILE
    equations/quadratic.py
```

pydoc: HTML docs

```
$ python3 -m pydoc -w equations.quadratic
```

[Ref]: Example 3.

pydoc

- **Module-level** HTML doc:

examples.2_example.equations.quadratic

index
equations/quadratic.py

```
This module contains routines for finding
roots of quadratic equations.
```

Modules

math

Functions

quadratic(a, b, c)

```
Solve quadratic equation.
```

pydoc

Pros:

- **Built-in** docs generator.
- Used by `>>> help()` function to pull and display docstrings from functions/methods, modules, and packages.

Cons:

- Static HTML docs are very **retro style**.

doctest

built-in

doctest

Searches for pieces of text that look like interactive Python sessions (`>>>`).

Then executes those sessions to verify that they work exactly as shown.

[Ref]: https://docs.python.org/3/library/doctest.html [Ref]: https://github.com/python/cpython/blob/3.7/Lib/doctest.py

doctest

```
def quadratic(a, b, c):
    """Solve quadratic equation.

     For example:
     >>> x1, x2 = quadratic(a=2, b=-8, c=-24)
     >>> x1
     (6+0j)
     >>> x2
     (-2+0j)
     >>> 2*x1**2 - 8*x1 - 24
     0j
     >>> 2*x2**2 - 8*x2 - 24
     0j
    """
    discriminant = cmath.sqrt(b**2.0 - 4.0 * a * c)
    x1 = (-b + discriminant) / (2.0 * a)
    x2 = (-b - discriminant) / (2.0 * a)
    return x1, x2

if __name__ == "__main__":
    import doctest
    print(doctest.testmod())
```

[Ref]: Example 4.

doctest

```
$ python3 -m equations.quadratic
TestResults(failed=0, attempted=5)
```

doctest

```
$ python3 -m equations.quadratic -v
Trying:
    x1, x2 = quadratic(a=2, b=-8, c=-24)
Expecting nothing
ok
Trying:
    x1
Expecting:
    (6+0j)
ok
Trying:
    x2
Expecting:
    (-2+0j)
ok
Trying:
    2*x1**2 - 8*x1 - 24
Expecting:
    0j
ok
Trying:
    2*x2**2 - 8*x2 - 24
Expecting:
    0j
ok
1 items had no tests:
    __main__
1 items passed all tests:
   5 tests in __main__.quadratic
5 tests in 2 items.
5 passed and 0 failed.
Test passed.
TestResults(failed=0, attempted=5)
```

doctest

```python
def quadratic(a, b, c):
    """Solve quadratic equation.

    For example:
    >>> x1, x2 = quadratic(a=2, b=-8, c=-24)
    >>> x1
    (8+0j)
    >>> x2
    (-2+0j)
    >>> 2*x1**2 - 8*x1 - 24
    0j
    >>> 2*x2**2 - 8*x2 - 24
    0j
    """
    discriminant = cmath.sqrt(b**2.0 - 4.0 * a * c)
    x1 = (-b + discriminant) / (2.0 * a)
    x2 = (-b - discriminant) / (2.0 * a)
    return x1, x2

if __name__ == "__main__":
    import doctest
    print(doctest.testmod())
```

[Ref]: Example 5.

doctest

```
$ python3 -m equations.quadratic
**********************************************************************
File "equations/quadratic.py", line 14, in __main__.quadratic
Failed example:
    x1
Expected:
    (8+0j)
Got:
    (6+0j)
**********************************************************************
1 items had failures:
   1 of   5 in __main__.quadratic
Test Failed 1 failures.
TestResults(failed=1, attempted=5)
```

doctest

Pros:

- **Built-in** docs string test.
- Forces you to write **high-quality examples** in your doc strings.
- Makes sure that your doc string is **up-to-date**.

Cons:

- May not be useful for more **complex cases**.

[Ref]: doctest example from scikit-learn machine learning library.

a.k.a. Python Package Index (PyPI)

[Ref]: https://wiki.python.org/moin/CheeseShop [Ref]: https://youtu.be/uT3OQECSDoQ

Sphinx

```
python3 -m pip install Sphinx
```

Sphinx

Makes it easy to create beatiful documentation for Python projects.

Uses reStructuredText as its markup language format.

[Ref]: https://pypi.org/project/Sphinx [Ref]: https://github.com/sphinx-doc/sphinx [Ref]: http://www.sphinx-doc.org/en/master

Sphinx: `sphinx-quickstart`

```
$ mkdir docs && cd docs
$ sphinx-quickstart

> Separate source and build directories (y/n) [n]:
The project name will occur in several places in the built documentation.
> Project name: equations
> Author name(s): Andrey Smelter
> Project release []: 0.1.0
> Project language [en]:

Creating file ./conf.py.
Creating file ./index.rst.
Creating file ./Makefile.
Creating file ./make.bat.

Finished: An initial directory structure has been created.
You should now populate your master file ./index.rst and
create other documentation source files. Use the Makefile
to build the docs, like so:
   make builder
where "builder" is one of the supported builders,
e.g. html, latex or linkcheck.
```

[Ref]: Example 8.

Sphinx: `sphinx-quickstart`

```
$ tree docs
.
├── docs
│   ├── _build
│   ├── conf.py
│   ├── index.rst
│   ├── make.bat
│   ├── Makefile
│   ├── _static
│   └── _templates
└── equations
    ├── __init__.py
    └── quadratic.py
```

[Ref]: Example 8.

Sphinx: conf.py

```
# import os
# import sys
# sys.path.insert(0, os.path.abspath('.'))

project = 'equations'
copyright = '2019, Andrey Smelter'
author = 'Andrey Smelter'

release = '0.1.0'

extensions = [
]

templates_path = ['_templates']

html_theme = 'alabaster'

html_static_path = ['_static']
```


[Ref]: Example 8.

Sphinx: `index.rst`

```
Welcome to equations's documentation!
=====================================

.. toctree::
   :maxdepth: 2
   :caption: Contents:
```


[Ref]: Example 8.

Sphinx: `index.rst`

```
Welcome to equations's documentation!
=====================================

The library for solving equations.

.. note::

    The ``equations`` library currently can only solve
    quadratic equations.

.. toctree::
   :maxdepth: 2
   :caption: Contents:
```


[Ref]: Example 8.

Sphinx: Makefile

```
$ make html
Running Sphinx v2.0.1
making output directory... done
building [mo]: targets for 0 po files that are out of date
building [html]: targets for 1 source files that are out of date
updating environment: 1 added, 0 changed, 0 removed
reading sources... [100%] index
looking for now-outdated files... none found
pickling environment... done
checking consistency... done
preparing documents... done
writing output... [100%] index
generating indices... genindex
writing additional pages... search
copying static files... done
copying extra files... done
dumping search index in English (code: en) ... done
dumping object inventory... done
build succeeded.

The HTML pages are in _build/html.
```

[Ref]: Example 8.

Sphinx: html docs

equations

Navigation

Quick search

Go

Welcome to equations's documentation!

The library for solving equations.

> Note:
>
> The `equations` library currently can only solve quadratic equations.

Indices and tables

- Index
- Module Index
- Search Page

[Ref]: Example 8.

Sphinx: write doc string in reStructuredText format

```python
def quadratic(a, b, c):
    """Solve quadratic equation.

    :param float a: a coefficient of a quadratic equation.
    :param float b: b coefficient of a quadratic equation.
    :param float c: c coefficient of a quadratic equation.
    :return: quadratic equation roots.
    :rtype: :py:class:`tuple`.
    """
    discriminant = cmath.sqrt(b**2.0 - 4.0 * a * c)
    x1 = (-b + discriminant) / (2.0 * a)
    x2 = (-b - discriminant) / (2.0 * a)
    return x1, x2
```


[Ref]: Example 9.

Sphinx: html docs

equations

Navigation

Contents:

The equations API Reference

Quick search

Go

The equations API Reference

This package provides routines for solving equations.

This module contains routines for finding roots of quadratic equations.

`equations.quadratic.`**`quadratic`**(*a*, *b*, *c*) [source]

Solve quadratic equation.

Parameters:
- **a** (*float*) – a coefficient of a quadratic equation.
- **b** (*float*) – b coefficient of a quadratic equation.
- **c** (*float*) – c coefficient of a quadratic equation.

Returns: quadratic equation roots.

Return type: `tuple`

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[Ref]: Example 9.

Sphinx: useful extensions

```
extensions = [
    'sphinx.ext.autodoc',
    'sphinx.ext.doctest',
    'sphinx.ext.todo',
    'sphinx.ext.coverage',
    'sphinx.ext.mathjax',
    'sphinx.ext.viewcode',
    'sphinx.ext.intersphinx',
    'nbsphinx'
]
```

Sphinx: host on readthedocs.org

- **Register** an account on readthedocs.org.
- **Point** readthedocs to your **GitHub repo**.
- Add path to `requirements.txt` file under advanced settings.
- Push **commit to** trigger documentaion **build**.

Sphinx

Pros:

- Creates **beatiful** docs.
- Provides useful **extensions**.
- **Customizable** (templates and themes).
- Uses **reStructuredText**.

Cons:

- Uses **reStructuredText** (not really cons).

MkDocs

python3 -m pip install mkdocs

MkDocs

MkDocs is a fast, simple and beautiful static site generator for building project documentation.

Uses Markdown as its markup language format.

[Ref]: https://pypi.org/project/mkdocs [Ref]: https://github.com/mkdocs/mkdocs [Ref]: https://www.mkdocs.org/

MkDocs: quickstart

```
$ mkdocs new equations
$ tree equations
├── docs
│   └── index.md
├── equations
│   ├── __init__.py
│   └── quadratic.py
└── mkdocs.yml
```

[Ref]: Example 10.

MkDocs: mkdocs.yml

```
site_name: equations documentation!
```


[Ref]: See more complex mkdocs.yml - https://github.com/mkdocs/mkdocs/blob/master/mkdocs.yml

MkDocs: docs/index.md

```
# Welcome to `equations` documentation!

The library for solving equations.


### Note

The ``equations`` library currently can only solve
quadratic equations.
```

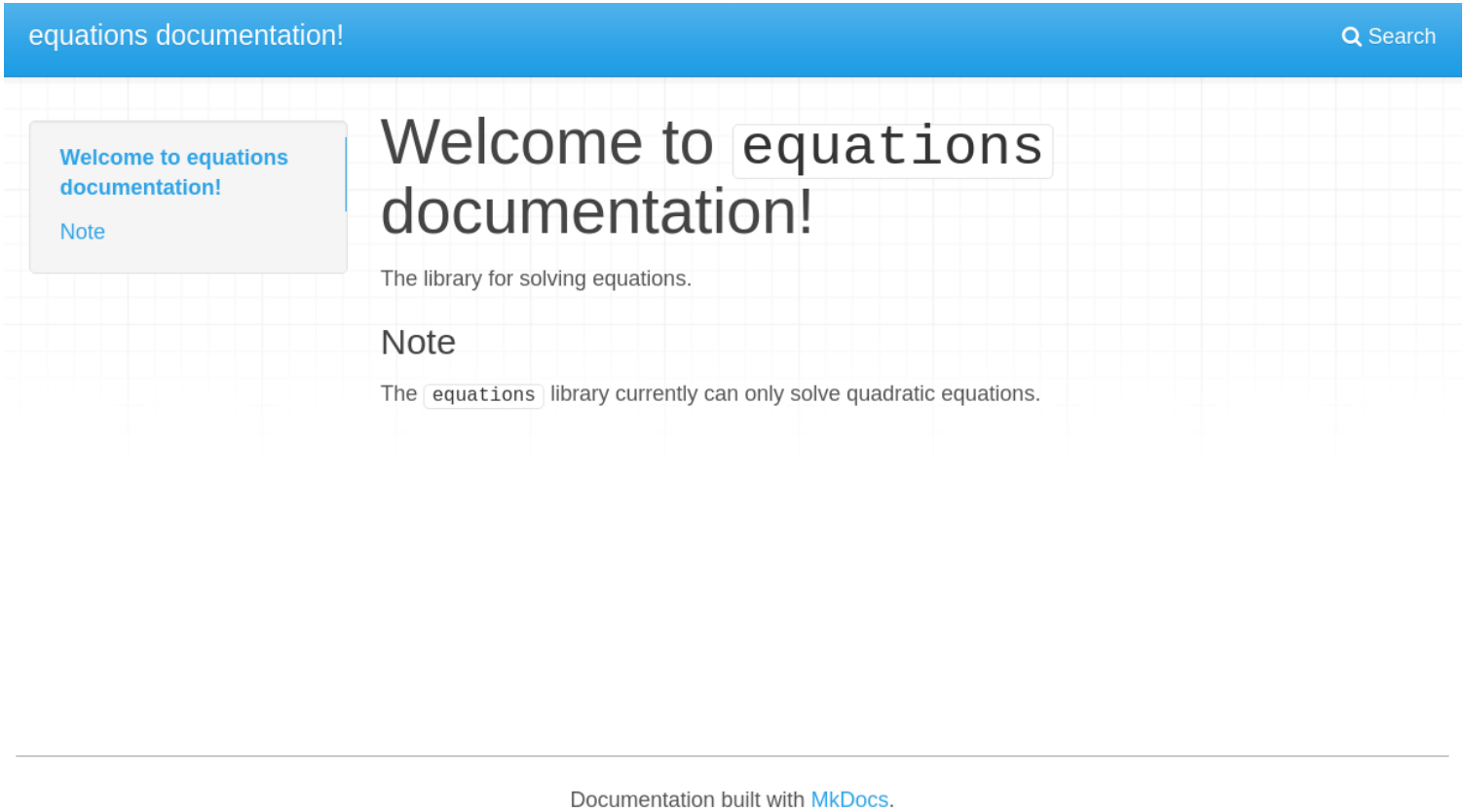

[Ref]: Example 10.

MkDocs: html docs

```
$ mkdocs serve
INFO    -  Building documentation...
INFO    -  Cleaning site directory
[I 190425 02:27:22 server:298] Serving on http://127.0.0.1:8000
[I 190425 02:27:22 handlers:59] Start watching changes
[I 190425 02:27:22 handlers:61] Start detecting changes
```

[Ref]: Example 10.

MkDocs: html docs



[Ref]: Example 10.

MkDocs

Pros:

- **Lowers** the **barrier** for writing docs.
- Focuses on **high quality prose** docs.
- Creates **beatiful** docs.
- **Customizable** themes based on Bootstrap.
- Uses **Markdown**.

Cons:

- Cannot automatically pull **API docs**.

Conclusion: #writethedocs

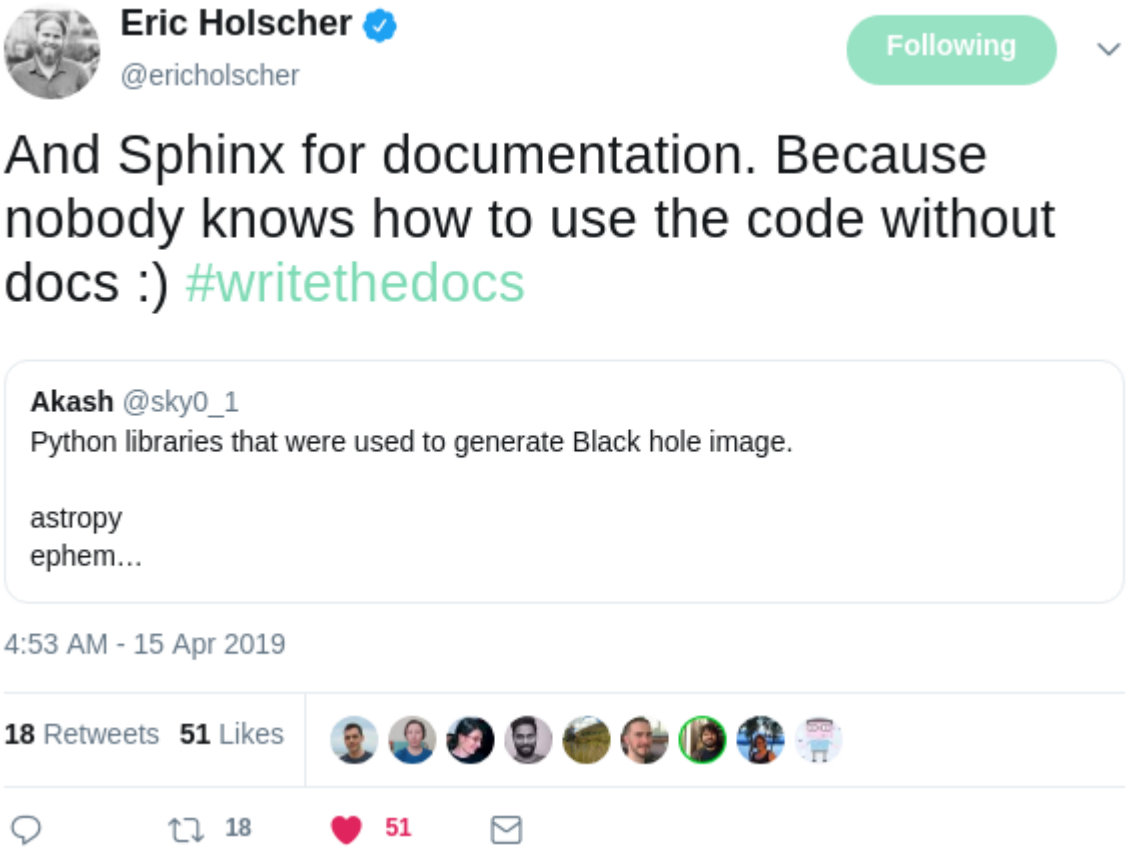
It teaches you about your own code.

It puts you in the shoes of software users.

It forces you to create high-quality examples.

It forces you to think about better API design for your software.

Conclusion: #writethedocs



- It **fits** so nicely into **development workflow** that people forget about it.