Documenting Python Packages

Docs or it didn't happen!

Andrey Smelter

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\$ whoami

Andrey (pronounced similar to André) Smelter

Postdoctoral Scholar at the University of Kentucky Markey Cancer Center

Links:

- **O**: github.com/andreysmelter
- in: linkedin.com/in/andreysmelter
- ©: instagram.com/andreysmelter
- **Y**: twitter.com/smelandr

Slides are available: bit.ly/DerbyPyWTD



A regular slide with text or code.

A transition slide or terminal output.



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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."



"Batteries Included" Philosophy

Having a rich and versatile standard library

Which is immediately available

Without making the user download separate packages

built-in

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

Let's use quadratic equation as an example

• The quadratic equation formula:

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

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

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

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
```

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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
```

- 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
```

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The pydoc module automatically generates documentation from Python modules

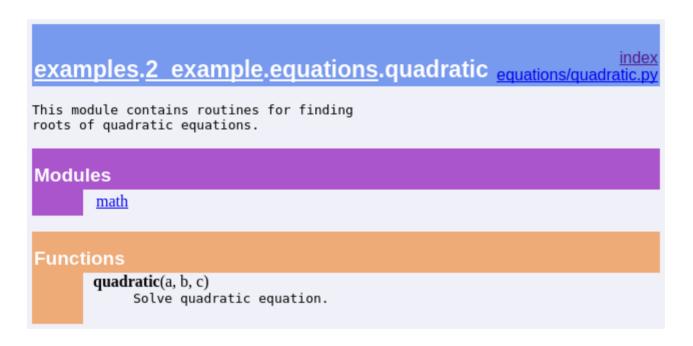
```
Help on module equations.quadratic in equations:
NAMF
    equations.quadratic
DESCRIPTION
    This module contains routines for finding
    roots of quadratic equations.
FUNCTIONS
    quadratic(a, b, c)
        Solve quadratic equation.
FILE
    equations/quadratic.py
```

pydoc: HTML docs

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

I: Example 3.

• Module-level HTML doc:



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**.



built-in

Searches for pieces of text that look like interactive Python sessions.

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

```
def quadratic(a, b, c):
    """Solve quadratic equation.
     For example:
     >>> x1, x2 = quadratic(a=2, b=-8, c=-24)
     >>> x1
     (6+0j)
     >>> x2
     (-2+0i)
     >>> 2*x1**2 - 8*x1 - 24
     Θi
     >>> 2*x2**2 - 8*x2 - 24
     0j
    11 11 11
    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())
```

 $21/5^{\circ}$

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

```
Trying:
    x1, x2 = quadratic(a=2, b=-8, c=-24)
Expecting nothing
ok
Trying:
Expecting:
    (6+0j)
ok
Trying:
Expecting:
    (-2+0j)
Trying:
    2*x1**2 - 8*x1 - 24
Expecting:
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)
```

```
def quadratic(a, b, c):
    """Solve quadratic equation.
    For example:
    >>> x1, x2 = quadratic(a=2, b=-8, c=-24)
    >>> x1
    (8+0i)
    >>> x2
    (-2+0i)
    >>> 2*x1**2 - 8*x1 - 24
    Θi
    >>> 2*x2**2 - 8*x2 - 24
    0j
    11 11 11
    discriminant = cmath.sqrt(b**2.0 - 4.0 * a * c)
    x1 = (-b + discriminant) / (2.0 * a)
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    return x1, x2
if __name == "__main__":
    import doctest
    print(doctest.testmod())
```

 $24/5^{\circ}$

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.



Sphinx

python3 -m pip install Sphinx

Sphinx

Makes it easy to create beatiful documentation for Python projects.

Uses reStructuredText as its markup language format.

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.
                                                                       30 / 51
```

30 / 51 xample 8.

Sphinx: sphinx-quickstart

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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']
```

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Sphinx: index.rst

Sphinx: index.rst

Sphinx: Makefile

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.

Sphinx: html docs

equations

Navigation

Quick search



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

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Sphinx: write doc string in reStructuredText format

```
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
```

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Sphinx: html docs

equations Navigation Contents: The equations API Reference Quick search

Welcome to equations's documentation!

The library for solving equations.

Note:

The equations library currently can only solve quadratic equations.

Contents:

· The equations API Reference

Indices and tables

- Index
- · Module Index
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Sphinx: html docs

The equations API Reference equations Navigation This package provides routines for solving equations. This module contains routines for finding roots of quadratic equations. Contents: The equations API equations.quadratic.quadratic(a, b, c) [source] Reference Solve quadratic equation. Quick search Parameters: • a (*float*) – a coefficient of a quadratic equation. • **b** (*float*) – b coefficient of a quadratic equation. Go • c (float) - c coefficient of a quadratic equation. Returns: quadratic equation roots. Return type: tuple

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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.

MkDocs: quickstart

```
mkdocs new equations
tree equations
docs
index.md
equations
current init__.py
quadratic.py
mkdocs.yml
```

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MkDocs: mkdocs.yml

site_name: equations documentation!

MkDocs: docs/index.md

```
# Welcome to `equations` documentation!
The library for solving equations.

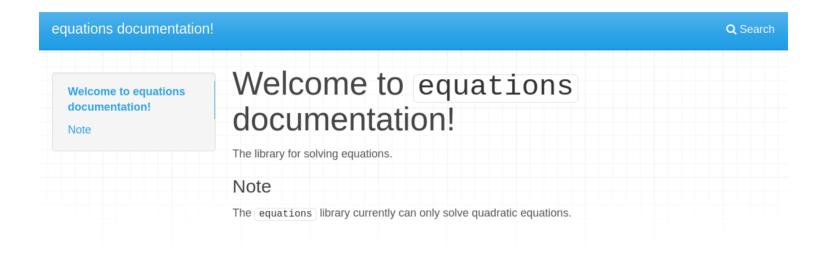
### Note
The ``equations`` library currently can only solve quadratic equations.
```

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
```

MkDocs: html docs



Documentation built with MkDocs.

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



And Sphinx for documentation. Because nobody knows how to use the code without docs:) #writethedocs

