tianocore

# Python Development Process and Coding Standards Specification

# TABLE OF CONTENTS

# EDK II Python Development Process Specification

**Revision 1.0**

**04/30/2025 09:37:29**

## Acknowledgements



## Revision History

| Revision | Revision History | Date |
|---|---|---|
| 0.10 | Initial release. | Jan 2017 |
| 1.0 | #2626 Typo in Python development Process and coding standards draft spec | March 2017 |

# 1 INTRODUCTION

This specification defines a set of python coding standards, development flow, and tools to help to identify and fix deviations in written code. These standards, flow and tools to establish

- Uniformity of style
- Uniform conventions
- To maintain consistency
- To maintain extensibility
- To improve readability
- To improve maintainability, reusability

These rules apply to all code developed in Python for inclusion in the EDK II , and are intended as an enabling philosophy. All changes or additions from this point on shall conform to this specification. Pre-existing code does not need to be updated for the sole purpose of conforming to this specification. As conforming updates are made, the developer may update other content within the modified file to bring it within compliance with this specification. This specification addresses the chronic problem of providing accurate documentation of the code base by embedding the documentation within the code. A document generation system, using inbuilt python module, then produce formatted documentation by extracting information from specially formatted comment blocks and the syntactic elements of the code.

# 2 PYTHON CODING GUIDELINES AND TOOLS

This section covers python coding style guidelines followed.

## PEP 8- Style guide for python code:

`PEP8` covers python code style guide and helps to maintain consistency in code. A style guide is about consistency. Consistency within a project or module or function is most important. Complete specification available at https://www.python.org/dev/peps/pep-0008/

## PEP 257- Docstring Conventions:

`PEP257` covers semantics and conventions associated with python docstrings. The aim of `PEP257` to standardize the high-level structure of docstrings. Complete specification available at https://www.python.org/dev/peps/pep-0257/

## PEP 484- Type Hints:

`PEP484` introduces a provisional module to provide the standard definitions and tools, along with some conventions for situations where annotations are not available. More details on PEP484 available at https://www.python.org/dev/peps/pep-0484/

## Flake8:

`Flake8` is a Python library wrapper around `PyFlakes, pycodestyle` and Ned Batchelder's `McCabe` script

**PyFlakes:**

- A simple program that checks Python source files for errors.
- It is available on PyPI https://pypi.org/project/pyflakes/

**Pydcodestyle:**

- `Pycodestyle` used to called pep8 is a tool to check your Python code against some of the style conventions in PEP8.
- It is available on PyPI https://pypi.org/project/pycodestyle/

**McCabe:**

- Ned's script to check for the `McCabe` complexity for Python code.
- It is available on PyPI https://pypi.org/project/mccabe/

## pytest:

It is important to validate the classes, methods, and functions we write. This will help to miniate the core software functionality of the modules. This is possible by writing a unit test which is the first level of software functionality validation. The `pytest` framework helps to write small test, yet scales to support complex functional testing for applications and libraries.

Complete features and documentation available at: https://docs.pytest.org/en/latest/contents.html

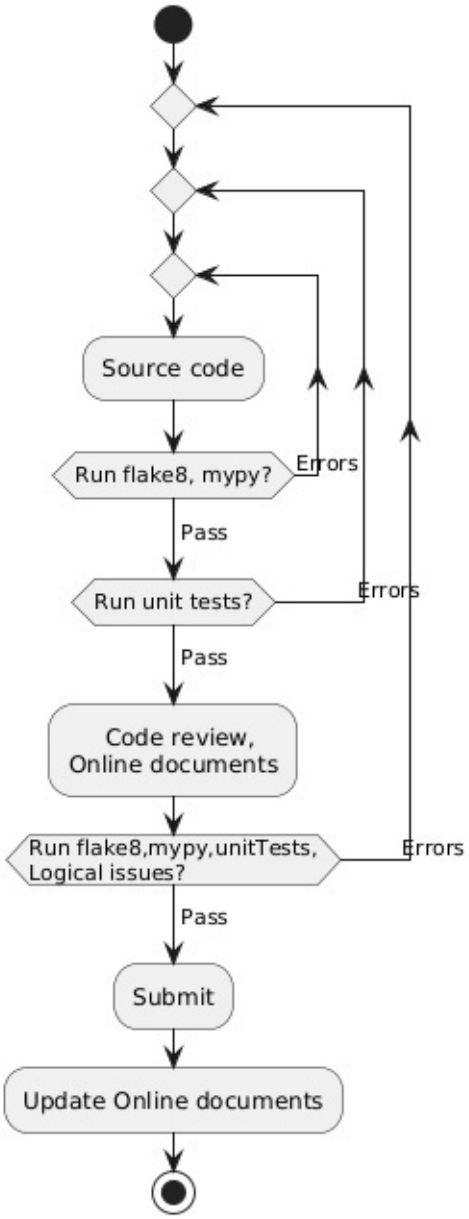
## mypy:

The `mypy` tool aims to combine the benefits of dynamic and static typing. `mypy` combines a powerful type system and compile-time type checking. It is an optional static type checker for python. `Mypy` type checks standard Python programs; run them using any Python VM with basically no runtime overhead. More details available at https://mypy.readthedocs.io/en/stable/

# 3 DEVELOPMENT STEPS AND FLOWCHART

- Write code which follows PEP8, PEP257 and PEP484 recommendations
- Run `flake8` on source code.
- Run **`mypy`** for type hints checking of the code
- Write unit tests using **`pytest`**
- Run all unit tests.
- Send review
- Generate documents using `pydoc`
- Write/modify/generate specifications wherever applicable

Following flow chart explains complete development lifecycle.



# 4 ENVIRONMENT SETUP AND EXAMPLE

# 4.1 Install and setup environment

- **Install flake8:**

```
python<version> -m pip install flake8
```

- **Install pytest:**

```
python<version> -m pip install -u pytest
```

- **Install mypy:**

```
python<version> -m pip install mypy
```

## 4.2 Create a project configuration file for flake8

Create a file at root level of the project directory and name it as "**.flake8**".

Flake8 configuration options needs to be in the flake8 section. The following options used for EDK II flake8 configuration.

```
[flake8]
# H903  Windows style line endings not allowed in code
# E266 too many leading '#' for block comment
# D203 : One blank line required before class docstring
# H306  : imports not in alphabetical order
ignore = H903, E266, D203, H306
exclude = .git,
max-complexity = 10
max_line_length = 120
```

# 4.3 Write python code

Create new file and name it as `sample.py` and start writing python code. Please note `sample.py` and `falke8` configuration files stored on same directory level.

## Source code `sample.py` :

```
# Source code sample.py:

import os

class AddTen:
    """Class for add ten to a given number"""

    def __init__(self, user_input):
            self.user_input = user_input
            self.new_varaible = 10
            d = {}

    def add_ten(self):
            """Init for calss."""
            try:
                    return self.newvaraible + self.user_input
            except:
                    print("Unknown Errror")
                    return None
```

# 4.4 Run flake8

Run `flake8`. The output of `flake8` on `sample.py` shown below

```
C:\kpurma\PythonDevelopmentProcess>python -m flake8 sample.py
sample.py:1:1: D100 Missing docstring in public module
sample.py:30:1: F401 'os' imported but unused
sample.py:31:1: W293 blank line contains whitespace
sample.py:32:1: E302 expected 2 blank lines, found 1
sample.py:33:1: D400 First line should end with a period
sample.py:35:1: D107 Missing docstring in __init__
sample.py:36:13: E117 over-indented
sample.py:38:13: F841 local variable 'd' is assigned to but never used
sample.py:41:13: E117 over-indented
sample.py:43:21: E117 over-indented
sample.py:44:13: E722 do not use bare 'except'
sample.py:45:21: E117 over-indented
sample.py:48:1: E305 expected 2 blank lines after class or
                function definition, found 1
```

Fix `flake8` issues and run falke8 again to check there is no errors reported.

## Source code `sample_fixed.py` :

```
#Source code sample.fixed.py:

"""Sample file with flake8 errors fixed."""

class AddTen:
    """Class for add ten to a given number."""

    def __init__(self, user_input: int = 0):
        """Initialization."""
        self.user_input = user_input
        self.new_varaible = 10

    def add_ten(self)->int:
        """Method to add ten to given number."""
        try:
            return self.new_varaible + self.user_input
        except Exception as e:
            raise e
```

Run flake on fixed code.

```
C:\kpurma\PythonDevelopmentProcess>python -m flake8 sample_fixed.py

C:\kpurma\PythonDevelopmentProcess>
```

## 4.5 Run `mypy` for type hints

Run `mypy` on the source file to check to find type hints.

```
C:\kpurma\PythonDevelopmentProcess>mypy sample.py --strict
sample.py:35: error: Function is missing a type annotation
sample.py:40: error: Function is missing a return type annotation
sample.py:43: error: "AddTen" has no attribute "newvaraible";
                     maybe "new_varaible"?
sample.py:48: error: Call to untyped function "AddTen" in typed context
Found 4 errors in 1 file (checked 1 source file)
```

`Mypy` output for fixed code:

```
C:\kpurma\PythonDevelopmentProcess>mypy sample_fixed.py --strict
Success: no issues found in 1 source file
```

# 4.6 Write a unit test using pytest

Use `pytest` library to write a unit test. Unit test for sample program is shown below for sample code.

```
from sample_fixed import AddTen

def test_answer():
  sum10 = AddTen(20)
  assert sum10.add_ten() == 30
```

Run the unit test and make sure all tests pass.

```
C:\kpurma\PythonDevelopmentProcess>python -m pytest test_sample.py
==============testsessionstarts=======================
platform win32 -- Python 3.8.0, pytest-5.2.2, py-1.8.0, pluggy-0.13.0
rootdir: C:\kpurma\PythonDevelopmentProcess
collected 1 item

test_sample.py .                                                                                                [100%]

======================1passedin 0.06s================
```

# 4.7 Generate documents using pydoc

By using the `pydoc` module, documentation is generated in the desired format.

Following command generates html version of document at source level directory.

```
python -m pydoc -w sample_fixed
```

**sample_fixed**

`sample_fixed.py`.

**Classes**

*builtins.object*

*AddTen*

class **AddTen**(builtins.object)

`AddTen(user_input: int = 0)`

`Class for add ten to a given number.`

Methods defined here:

**__init__(self, user_input: int = 0)**
`Initialization.`

**add_ten(self) -> int**
`Init for calss.`

Data descriptors defined here:

**__dict__**
`dictionary for instance variables (if defined)`

**__weakref__**
`list of weak references to the object (if defined)`

**Data**

**a** = <sample_fixed.AddTen object>
**c** = 20