1.1 Installation

To install Flake8, open an interactive shell and run:

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

If you want Flake8 to be installed for your default Python installation, you can instead use:

```
python -m pip install flake8
```

**Note:** It is very important to install Flake8 on the correct version of Python for your needs. If you want Flake8 to properly parse new language features in Python 3.5 (for example), you need it to be installed on 3.5 for Flake8 to understand those features. In many ways, Flake8 is tied to the version of Python on which it runs.

1.2 Using Flake8

To start using Flake8, open an interactive shell and run:

```
flake8 path/to/code/to/check.py
```

# or
```
flake8 path/to/code/
```

**Note:** If you have installed Flake8 on a particular version of Python (or on several versions), it may be best to instead run python<version> -m flake8.

If you only want to see the instances of a specific warning or error, you can select that error like so:

```
flake8 --select E123,W503 path/to/code/
```

Alternatively, if you want to add a specific warning or error to ignore:

```
flake8 --extend-ignore E203,W234 path/to/code/
```

Please read our user guide for more information about how to use and configure Flake8.
2.1 Frequently Asked Questions

2.1.1 When is Flake8 released?

Flake8 is released as necessary. Sometimes there are specific goals and drives to get to a release. Usually, we release as users report and fix bugs.

2.1.2 How can I help Flake8 release faster?

Look at the next milestone. If there’s work you can help us complete, that will help us get to the next milestone. If there’s a show-stopping bug that needs to be released, let us know but please be kind. Flake8 is developed and released entirely on volunteer time.

2.1.3 What is the next version of Flake8?

In general we try to use milestones to indicate this. If the last release on PyPI is 3.1.5 and you see a milestone for 3.2.0 in GitHub, there’s a good chance that 3.2.0 is the next release.

2.1.4 Why does Flake8 use ranges for its dependencies?

Flake8 uses ranges for mccabe, pyflakes, and pycodestyle because each of those projects tend to add new checks in minor releases. It has been an implicit design goal of Flake8’s to make the list of error codes stable in its own minor releases. That way if you install something from the 2.5 series today, you will not find new checks in the same series in a month from now when you install it again.

Flake8’s dependencies tend to avoid new checks in patch versions which is why Flake8 expresses its dependencies roughly as:

<table>
<thead>
<tr>
<th>Dependency</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>pycodestyle</td>
<td>&gt;= 2.0.0, &lt; 2.1.0</td>
</tr>
<tr>
<td>pyflakes</td>
<td>&gt;= 0.8.0, != 1.2.0, != 1.2.1, != 1.2.2, &lt; 1.3.0</td>
</tr>
<tr>
<td>mccabe</td>
<td>&gt;= 0.5.0, &lt; 0.6.0</td>
</tr>
</tbody>
</table>

This allows those projects to release patch versions that fix bugs and for Flake8 users to consume those fixes.
2.1.5 Should I file an issue when a new version of a dependency is available?

No. The current Flake8 core team (of one person) is also a core developer of pycodestyle, pyflakes, and mccabe. They are aware of these releases.

2.2 Glossary of Terms Used in Flake8 Documentation

check

A piece of logic that corresponds to an error code. A check may be a style check (e.g., check the length of a given line against the user configured maximum) or a lint check (e.g., checking for unused imports) or some other check as defined by a plugin.

class

error class

A larger grouping of related error codes. For example, W503 and W504 are two codes related to whitespace. W50 would be the most specific class of codes relating to whitespace. W would be the warning class that subsumes all whitespace errors.

error

error code

violation

The symbol associated with a specific check. For example, pycodestyle implements checks that look for whitespace around binary operators and will either return an error code of W503 or W504.

formatter

A plugin that augments the output of Flake8 when passed to flake8 --format.

mccabe

The project Flake8 depends on to calculate the McCabe complexity of a unit of code (e.g., a function). This uses the C class of error codes.

plugin

A package that is typically installed from PyPI to augment the behaviour of Flake8 either through adding one or more additional checks or providing additional formatters.

pycodestyle

The project Flake8 depends on to provide style enforcement. pycodestyle implements checks for PEP 8. This uses the E and W classes of error codes.

pyflakes

The project Flake8 depends on to lint files (check for unused imports, variables, etc.). This uses the F class of error codes reported by Flake8.

warning

Typically the W class of error codes from pycodestyle.
All users of Flake8 should read this portion of the documentation. This provides examples and documentation around Flake8’s assortment of options and how to specify them on the command-line or in configuration files.

### 3.1 Using Flake8

Flake8 can be used in many ways. A few:
- invoked on the command-line
- invoked via Python

This guide will cover all of these and the nuances for using Flake8.

**Note:** This portion of Flake8’s documentation does not cover installation. See the Installation section for how to install Flake8.

#### 3.1.1 Invoking Flake8

Once you have installed Flake8, you can begin using it. Most of the time, you will be able to generically invoke Flake8 like so:

```
$ flake8 ...
```

Where you simply allow the shell running in your terminal to locate Flake8. In some cases, though, you may have installed Flake8 for multiple versions of Python (e.g., Python 3.8 and Python 3.9) and you need to call a specific version. In that case, you will have much better results using:

```
$ python3.8 -m flake8
```

Or

```
$ python3.9 -m flake8
```

Since that will tell the correct version of Python to run Flake8.

**Note:** Installing Flake8 once will not install it on both Python 3.8 and Python 3.9. It will only install it for the version of Python that is running pip.

It is also possible to specify command-line options directly to Flake8:

```
$ flake8 --select E123
```
Or

$ python<version> -m flake8 --select E123

**Note:** This is the last time we will show both versions of an invocation. From now on, we’ll simply use `flake8` and assume that the user knows they can instead use `python<version> -m flake8` instead.

It’s also possible to narrow what `flake8` will try to check by specifying exactly the paths and directories you want it to check. Let’s assume that we have a directory with python files and sub-directories which have python files (and may have more sub-directories) called `my_project`. Then if we only want errors from files found inside `my_project` we can do:

$ flake8 my_project

And if we only want certain errors (e.g., E123) from files in that directory we can also do:

$ flake8 --select E123 my_project

If you want to explore more options that can be passed on the command-line, you can use the `--help` option:

$ flake8 --help

And you should see something like:

```
Usage: flake8 [options] file file ...

Options:
  --version show program's version number and exit
  -h, --help show this help message and exit
...
```

### 3.1.2 Configuring Flake8

Once you have learned how to *invoke* `flake8`, you will soon want to learn how to configure it so you do not have to specify the same options every time you use it.

This section will show you how to make

$ flake8

Remember that you want to specify certain options without writing

$ flake8 --select E123,W456 --enable-extensions H111

**Configuration Locations**

`flake8` supports storing its configuration in your project in one of `setup.cfg`, `tox.ini`, or `.flake8`.

Values set at the command line have highest priority, then those in the project configuration file, and finally there are the defaults. However, there are additional command line options which can alter this.
**Project Configuration**

**Flake8** is written with the understanding that people organize projects into sub-directories. Let’s take for example **Flake8**’s own project structure:

```
flake8
  |-- docs
  |   |-- build
  |       |-- source
  |       |   |-- _static
  |       |   |-- _templates
  |       |   |-- dev
  |       |   |-- internal
  |       |   |-- user
  |-- flake8
  |   |-- formatting
  |   |-- main
  |   |-- options
  |   |-- plugins
  |-- tests
  |   |-- fixtures
  |   |   |-- config_files
  |   |   |-- integration
  |   |   |-- unit
```

In the top-level **flake8** directory (which contains **docs**, **flake8**, and **tests**) there’s also **tox.ini** and **setup.cfg** files. In our case, we keep our **Flake8** configuration in **tox.ini**. Regardless of whether you keep your config in **.flake8**, **setup.cfg**, or **tox.ini** we expect you to use INI to configure **Flake8** (since each of these files already uses INI as a format). This means that any **Flake8** configuration you wish to set needs to be in the **flake8** section, which means it needs to start like so:

```
[flake8]
```

Each command-line option that you want to specify in your config file can be named in either of two ways:

1. Using underscores (_) instead of hyphens (-)
2. Simply using hyphens (without the leading hyphens)

**Note:** Not every **Flake8** command-line option can be specified in the configuration file. See [our list of options](#) to determine which options will be parsed from the configuration files.

Let’s actually look at **Flake8**’s own configuration section:

```
[flake8]
extend-ignore = E203
exclude = .git,__.pycache__,docs/source/conf.py,old,build,dist
max-complexity = 10
```

This is equivalent to:

```
$ flake8 --extend-ignore E203 --exclude .git,__.pycache__,docs/source/conf.py,old,build,dist
```

In our case, if we wanted to, we could also do:

### 3.1. Using Flake8
[flake8]
extend-ignore = E203
exclude =
  .git,
  __pycache__,
  docs/source/conf.py,
  old,
  build,
  dist
max-complexity = 10

This allows us to add comments for why we’re excluding items, e.g.

[flake8]
extend-ignore = E203
exclude =
  # No need to traverse our git directory
  .git,
  # There’s no value in checking cache directories
  __pycache__,
  # The conf file is mostly autogenerated, ignore it
  docs/source/conf.py,
  # The old directory contains Flake8 2.0
  old,
  # This contains our built documentation
  build,
  # This contains builds of flake8 that we don’t want to check
  dist
max-complexity = 10

Note: Following the recommended settings for Python’s configparser, Flake8 does not support inline comments for any of the keys. So while this is fine:

[flake8]
per-file-ignores =
  # imported but unused
  __init__.py: F401

this is not:

[flake8]
per-file-ignores =
  __init__.py: F401 # imported but unused

Note: If you’re using Python 2, you will notice that we download the configparser backport from PyPI. That backport enables us to support this behaviour on all supported versions of Python.

Please do not open issues about this dependency to Flake8.
Note: You can also specify `--max-complexity` as `max_complexity = 10`.

This is also useful if you have a long list of error codes to ignore. Let's look at a portion of a project's Flake8 configuration in their tox.ini:

```ini
[flake8]
# it's not a bug that we aren't using all of hacking, ignore:
# H101: Use TODO(NAME)
# H202: assertRaises Exception too broad
# H233: Python 3.x incompatible use of print operator
# H301: one import per line
# H306: imports not in alphabetical order (time, os)
# H401: docstring should not start with a space
# H403: multi line docstrings should end on a new line
# H404: multi line docstring should start without a leading new line
# H405: multi line docstring summary not separated with an empty line
# H501: Do not use self.__dict__ for string formatting
```

They use the comments to describe the check but they could also write this as:

```ini
[flake8]
# it's not a bug that we aren't using all of hacking
extend-ignore =
    # H101: Use TODO(NAME)
    H101,
    # H202: assertRaises Exception too broad
    H202,
    # H233: Python 3.x incompatible use of print operator
    H233,
    # H301: one import per line
    H301,
    # H306: imports not in alphabetical order (time, os)
    H306,
    # H401: docstring should not start with a space
    H401,
    # H403: multi line docstrings should end on a new line
    H403,
    # H404: multi line docstring should start without a leading new line
    H404,
    # H405: multi line docstring summary not separated with an empty line
    H405,
    # H501: Do not use self.__dict__ for string formatting
    H501
```

Or they could use each comment to describe why they've ignored the check. Flake8 knows how to parse these lists and will appropriately handle these situations.
Using Local Plugins

New in version 3.5.0.

**Flake8** allows users to write plugins that live locally in a project. These plugins do not need to use setuptools or any of the other overhead associated with plugins distributed on PyPI. To use these plugins, users must specify them in their configuration file (i.e., `.flake8`, `setup.cfg`, or `tox.ini`). This must be configured in a separate INI section named `flake8:local-plugins`.

Users may configure plugins that check source code, i.e., `extension` plugins, and plugins that report errors, i.e., `report` plugins.

An example configuration might look like:

```ini
[flake8:local-plugins]
extension =
    MC1 = project.flake8.checkers:MyChecker1
    MC2 = project.flake8.checkers:MyChecker2
report =
    MR1 = project.flake8.reporters:MyReporter1
    MR2 = project.flake8.reporters:MyReporter2
```

**Flake8** will also, however, allow for commas to separate the plugins for example:

```ini
[flake8:local-plugins]
extension =
    MC1 = project.flake8.checkers:MyChecker1,
    MC2 = project.flake8.checkers:MyChecker2
report =
    MR1 = project.flake8.reporters:MyReporter1,
    MR2 = project.flake8.reporters:MyReporter2
```

These configurations will allow you to select your own custom reporter plugin that you’ve designed or will utilize your new check classes.

If your package is installed in the same virtualenv that **Flake8** will run from, and your local plugins are part of that package, you’re all set; **Flake8** will be able to import your local plugins. However, if you are working on a project that isn’t set up as an installable package, or **Flake8** doesn’t run from the same virtualenv your code runs in, you may need to tell **Flake8** where to import your local plugins from. You can do this via the `paths` option in the `local-plugins` section of your config:

```ini
[flake8:local-plugins]
extension =
    MC1 = myflake8plugin:MyChecker1
paths =
    ./path/to
```

Relative paths will be interpreted relative to the config file. Multiple paths can be listed (comma separated just like `exclude`) as needed. If your local plugins have any dependencies, it’s up to you to ensure they are installed in whatever Python environment **Flake8** runs in.

**Note:** These plugins otherwise follow the same guidelines as regular plugins.
3.1.3 Full Listing of Options and Their Descriptions

Index of Options

- `flake8 --version`
- `flake8 --help`
- `flake8 --verbose`
- `flake8 --quiet`
- `flake8 --color`
- `flake8 --count`
- `flake8 --diff`
- `flake8 --exclude`
- `flake8 --filename`
- `flake8 --stdin-display-name`
- `flake8 --format`
- `flake8 --hang-closing`
- `flake8 --ignore`
- `flake8 --extend-ignore`
- `flake8 --per-file-ignores`
- `flake8 --max-line-length`
- `flake8 --max-doc-length`
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- `flake8 --enable-extensions`
- `flake8 --exit-zero`
- `flake8 --jobs`
- `flake8 --output-file`
- `flake8 --tee`
- `flake8 --append-config`
- `flake8 --config`
- `flake8 --isolated`
- `flake8 --builtins`
• `flake8 --doctests`
• `flake8 --include-in-doctest`
• `flake8 --exclude-from-doctest`
• `flake8 --benchmark`
• `flake8 --bug-report`
• `flake8 --max-complexity`

**Options and their Descriptions**

**--version**

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Show **Flake8**’s version as well as the versions of all plugins installed.

Command-line usage:

```
$ flake8 --version
```

This can not be specified in config files.

**-h**, **--help**

*Go back to index*

Show a description of how to use **Flake8** and its options.

Command-line usage:

```
$ flake8 --help
$ flake8 -h
```

This can not be specified in config files.

**-v**, **--verbose**

*Go back to index*

Increase the verbosity of **Flake8**’s output. Each time you specify it, it will print more and more information.

Command-line example:

```
$ flake8 -vv
```

This can not be specified in config files.

**-q**, **--quiet**

*Go back to index*

Decrease the verbosity of **Flake8**’s output. Each time you specify it, it will print less and less information.

Command-line example:

```
$ flake8 -q
```

This can be specified in config files.

Example config file usage:
quiet = 1

--color

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Whether to use color in output. Defaults to auto.
Possible options are auto, always, and never.
This can not be specified in config files.
When color is enabled, the following substitutions are enabled:
  • %(bold)s
  • %(black)s
  • %(red)s
  • %(green)s
  • %(yellow)s
  • %(blue)s
  • %(magenta)s
  • %(cyan)s
  • %(white)s
  • %(reset)s

--count

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Print the total number of errors.
Command-line example:

$ flake8 --count dir/

This can be specified in config files.
Example config file usage:

```ini
[flake8]
count = True
```

--diff

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**Warning:** Due to hiding potential errors, this option is deprecated and will be removed in a future version.

Use the unified diff provided on standard in to only check the modified files and report errors included in the diff.
Command-line example:

$ git diff -u | flake8 --diff

This can not be specified in config files.
flake8 Documentation, Release 5.0.4

--exclude=<patterns>

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Provide a comma-separated list of glob patterns to exclude from checks.

This defaults to: .svn,CVS,.bzr,.hg,.git,__.pycache__,.tox,.nox,.eggs,*.egg

Example patterns:

• *.pyc will match any file that ends with .pyc
• __pycache__ will match any path that has __pycache__ in it
• lib/python will look expand that using os.path.abspath() and look for matching paths

Command-line example:

$ flake8 --exclude=*.pyc dir/

This can be specified in config files.

Example config file usage:

```python
exclude =
    .tox,
    __pycache__
```

--extend-exclude=<patterns>

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New in version 3.8.0.

Provide a comma-separated list of glob patterns to add to the list of excluded ones. Similar considerations as in --exclude apply here with regard to the value.

The difference to the --exclude option is, that this option can be used to selectively add individual patterns without overriding the default list entirely.

Command-line example:

$ flake8 --extend-exclude=legacy/,vendor/ dir/

This can be specified in config files.

Example config file usage:

```python
extend-exclude =
    legacy/,
    vendor/
extend-exclude = legacy/,vendor/
```

--filename=<patterns>

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Provide a comma-separate list of glob patterns to include for checks.

This defaults to: *.py

Example patterns:

• *.py will match any file that ends with .py
• __pycache__ will match any path that has __pycache__ in it
• lib/python will look expand that using `os.path.abspath()` and look for matching paths

Command-line example:

```
$ flake8 --filename=*.py dir/
```

This can be specified in config files.

Example config file usage:

```
filename =
  example.py,
  another-example*.py
```

```
--stdin-display-name=<display_name>
```

*Go back to index*

Provide the name to use to report warnings and errors from code on stdin.

Instead of reporting an error as something like:

```
stdin:82:73 E501 line too long
```

You can specify this option to have it report whatever value you want instead of stdin.

This defaults to: stdin

Command-line example:

```
$ cat file.py | flake8 --stdin-display-name=file.py -
```

This can not be specified in config files.

```
--format=<format>
```

*Go back to index*

Select the formatter used to display errors to the user.

This defaults to: default

By default, there are two formatters available:

• default
• pylint

Other formatters can be installed. Refer to their documentation for the name to use to select them. Further, users can specify their own format string. The variables available are:

• code
• col
• path
• row
• text

The default formatter has a format string of:

```
'(%(path)s:%(row)d:%(col)d: %(code)s %(text)s')
```

Command-line example:

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flake8 Documentation, Release 5.0.4

$ flake8 --format=pylint dir/
$ flake8 --format='%(path)s::%(row)d,%(col)d:%(code)s::%(text)s' dir/

This can be specified in config files.

Example config file usage:

| format=pylint
| format='%(path)s::%(row)d,%(col)d:%(code)s::%(text)s

--hang-closing

Go back to index

Toggle whether pycodestyle should enforce matching the indentation of the opening bracket's line. When you specify this, it will prefer that you hang the closing bracket rather than match the indentation.

Command-line example:

$ flake8 --hang-closing dir/

This can be specified in config files.

Example config file usage:

| hang_closing = True
| hang_closing = True

--ignore=<errors>

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Specify a list of codes to ignore. The list is expected to be comma-separated, and does not need to specify an error code exactly. Since Flake8 3.0, this can be combined with --select. See --select for more information.

For example, if you wish to only ignore W234, then you can specify that. But if you want to ignore all codes that start with W23 you need only specify W23 to ignore them. This also works for W2 and W (for example).

This defaults to: E121,E123,E126,E226,E24,E704,W503,W504

Command-line example:

$ flake8 --ignore=E121,E123 dir/
$ flake8 --ignore=E24,E704 dir/

This can be specified in config files.

Example config file usage:

| ignore =
|   E121,
|   E123
| ignore = E121,E123

--extend-ignore=<errors>

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New in version 3.6.0.

Specify a list of codes to add to the list of ignored ones. Similar considerations as in --ignore apply here with regard to the value.
The difference to the `--ignore` option is, that this option can be used to selectively add individual codes without overriding the default list entirely.

Command-line example:

```
$ flake8 --extend-ignore=E4,E51,W234 dir/
```

This can be specified in config files.

Example config file usage:

```ini
extend-ignore =
   E4,
   E51,
   W234
extend-ignore = E4,E51,W234
```

`--per-file-ignores=<filename:errors>[ <filename:errors>]`

New in version 3.7.0.

Specify a list of mappings of files and the codes that should be ignored for the entirety of the file. This allows for a project to have a default list of violations that should be ignored as well as file-specific violations for files that have not been made compliant with the project rules.

This option supports syntax similar to `--exclude` such that glob patterns will also work here.

This can be combined with both `--ignore` and `--extend-ignore` to achieve a full flexibility of style options.

Command-line usage:

```
$ flake8 --per-file-ignores='project/__init__.py:F401 setup.py:E121'
$ flake8 --per-file-ignores='project/*/__init__.py:F401 setup.py:E121'
```

This can be specified in config files.

```ini
per-file-ignores =
   project/__init__.py:F401
   setup.py:E121
   other_project/*/:W9
```

`--max-line-length=<n>`

Set the maximum length that any line (with some exceptions) may be.

Exceptions include lines that are either strings or comments which are entirely URLs. For example:

```
# https://some-super-long-domain-name.com/with/some/very/long/path
```

URLs:

```
url = ''
   
https://...
```

This defaults to: 79

Command-line example:
$ flake8 --max-line-length 99 dir/
This can be specified in config files.
Example config file usage:

```
max-line-length = 79
```

--max-doc-length=<n>

Set the maximum length that a comment or docstring line may be.
By default, there is no limit on documentation line length.
Command-line example:

$ flake8 --max-doc-length 99 dir/
This can be specified in config files.
Example config file usage:

```
max-doc-length = 79
```

--indent-size=<n>

Set the number of spaces used for indentation.
By default, 4.
Command-line example:

$ flake8 --indent-size 2 dir/
This can be specified in config files.
Example config file usage:

```
indent-size = 2
```

--select=<errors>

Specify the list of error codes you wish Flake8 to report. Similarly to --ignore. You can specify a portion of an error code to get all that start with that string. For example, you can use E, E4, E43, and E431.
This defaults to: E,F,W,C90
Command-line example:

$ flake8 --select=E431,E5,W,F dir/
$ flake8 --select=E,W dir/
This can also be combined with --ignore:

$ flake8 --select=E --ignore=E432 dir/
This will report all codes that start with E, but ignore E432 specifically. This is more flexibly than the Flake8 2.x and 1.x used to be.

This can be specified in config files.

Example config file usage:

```python
select =
    E431,
    W,
    F
```

--extend-select=<errors>

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New in version 4.0.0.

Specify a list of codes to add to the list of selected ones. Similar considerations as in --select apply here with regard to the value.

The difference to the --select option is, that this option can be used to selectively add individual codes without overriding the default list entirely.

Command-line example:

```
$ flake8 --extend-select=E4,E51,W234 dir/
```

This can be specified in config files.

Example config file usage:

```python
extend-select =
    E4,
    E51,
    W234
```

--disable-noqa

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Report all errors, even if it is on the same line as a # NOQA comment. # NOQA can be used to silence messages on specific lines. Sometimes, users will want to see what errors are being silenced without editing the file. This option allows you to see all the warnings, errors, etc. reported.

Command-line example:

```
$ flake8 --disable-noqa dir/
```

This can be specified in config files.

Example config file usage:

```python
disable_noqa = True
disable-noqa = True
```

--show-source

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Print the source code generating the error/warning in question.

Command-line example:
$ flake8 --show-source dir/

This can be specified in config files.

Example config file usage:

```
show_source = True
show-source = True
```

--statistics

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Count the number of occurrences of each error/warning code and print a report.

Command-line example:

```
$ flake8 --statistics
```

This can be specified in config files.

Example config file usage:

```
statistics = True
```

--require-plugins=<names>

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Require specific plugins to be installed before running.

This option takes a list of distribution names (usually the name you would use when running `pip install`).

Command-line example:

```
$ flake8 --require-plugins=flake8-2020,flake8-typing-extensions dir/
```

This can be specified in config files.

Example config file usage:

```
require-plugins =
    flake8-2020
    flake8-typing-extensions
```

--enable-extensions=<errors>

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Enable off-by-default extensions.

Plugins to Flake8 have the option of registering themselves as off-by-default. These plugins will not be loaded unless enabled by this option.

Command-line example:

```
$ flake8 --enable-extensions=H111 dir/
```

This can be specified in config files.

Example config file usage:
enable-extensions =
   H111,
   G123
enable_extensions =
   H111,
   G123

--exit-zero

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Force Flake8 to use the exit status code 0 even if there are errors.

By default Flake8 will exit with a non-zero integer if there are errors.

Command-line example:

$ flake8 --exit-zero dir/

This can not be specified in config files.

--jobs=<n>

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Specify the number of subprocesses that Flake8 will use to run checks in parallel.

Note: This option is ignored on platforms where fork is not a supported multiprocessing method.

This defaults to: auto

The default behaviour will use the number of CPUs on your machine as reported by multiprocessing.cpu_count().

Command-line example:

$ flake8 --jobs=8 dir/

This can be specified in config files.

Example config file usage:

jobs = 8

--output-file=<path>

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Redirect all output to the specified file.

Command-line example:

$ flake8 --output-file=output.txt dir/
$ flake8 -vv --output-file=output.txt dir/

--tee

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Also print output to stdout if output-file has been configured.

Command-line example:
$ flake8 --tee --output-file=output.txt dir/

This can be specified in config files.

Example config file usage:

```markdown
tee = True
```

**--append-config=**<config>

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New in version 3.6.0.

Provide extra config files to parse in after and in addition to the files that Flask8 found on its own. Since these files are the last ones read into the Configuration Parser, so it has the highest precedence if it provides an option specified in another config file.

Command-line example:

$ flake8 --append-config=my-extra-config.ini dir/

This can not be specified in config files.

**--config=**<config>

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Provide a path to a config file that will be the only config file read and used. This will cause Flask8 to ignore all other config files that exist.

Command-line example:

$ flake8 --config=my-only-config.ini dir/

This can not be specified in config files.

**--isolated**

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Ignore any config files and use Flask8 as if there were no config files found.

Command-line example:

$ flake8 --isolated dir/

This can not be specified in config files.

**--builtins=**<builtins>

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Provide a custom list of builtin functions, objects, names, etc. This allows you to let pyflakes know about builtins that it may not immediately recognize so it does not report warnings for using an undefined name.

This is registered by the default PyFlakes plugin.

Command-line example:

$ flake8 --builtins=_,_LE,_LW dir/
This `can` be specified in config files.

Example config file usage:

```
builtins =
   _,
   _LE,
   _LW
```

**--doctests**

*Go back to index*

Enable PyFlakes syntax checking of doctests in docstrings.

This is registered by the default PyFlakes plugin.

Command-line example:

```
$ flake8 --doctests dir/
```

This `can` be specified in config files.

Example config file usage:

```
doctests = True
```

**--include-in-doctest=<paths>**

*Go back to index*

Specify which files are checked by PyFlakes for doctest syntax.

This is registered by the default PyFlakes plugin.

Command-line example:

```
$ flake8 --include-in-doctest=dir/subdir/file.py,dir/other/file.py dir/
```

This `can` be specified in config files.

Example config file usage:

```
include-in-doctest =
   dir/subdir/file.py,
   dir/other/file.py
include_in_doctest =
   dir/subdir/file.py,
   dir/other/file.py
```

**--exclude-from-doctest=<paths>**

*Go back to index*

Specify which files are not to be checked by PyFlakes for doctest syntax.

This is registered by the default PyFlakes plugin.

Command-line example:

```
$ flake8 --exclude-from-doctest=dir/subdir/file.py,dir/other/file.py dir/
```

3.1. Using `Flake8`
This can be specified in config files.

Example config file usage:

```
exclude-from-doctest =
    dir/subdir/file.py,
    dir/other/file.py
exclude_from_doctest =
    dir/subdir/file.py,
    dir/other/file.py
```

--benchmark

*Go back to index*

Collect and print benchmarks for this run of Flake8. This aggregates the total number of:

- tokens
- physical lines
- logical lines
- files

and the number of elapsed seconds.

Command-line usage:

```
$ flake8 --benchmark dir/
```

This can not be specified in config files.

--bug-report

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Generate information necessary to file a complete bug report for Flake8. This will pretty-print a JSON blob that should be copied and pasted into a bug report for Flake8.

Command-line usage:

```
$ flake8 --bug-report
```

The output should look vaguely like:

```
{
    "dependencies": [
        {
            "dependency": "setuptools",
            "version": "25.1.1"
        }
    ],
    "platform": {
        "python_implementation": "CPython",
        "python_version": "2.7.12",
        "system": "Darwin"
    },
    "plugins": [
        {
            "plugin": "mccabe",
```
This **cannot** be specified in config files.

```
--max-complexity=<n>
```

Set the maximum allowed McCabe complexity value for a block of code.

This option is provided by the `mccabe` dependency’s **Flake8** plugin.

Command-line usage:

```
$ flake8 --max-complexity 15 dir/
```

This **can** be specified in config files.

Example config file usage:

```
max-complexity = 15
```

### 3.1.4 Error / Violation Codes

Flake8 and its plugins assign a code to each message that we refer to as an error code (or violation). Most plugins will list their error codes in their documentation or README.

Flake8 installs `pycodestyle`, `pyflakes`, and `mccabe` by default and generates its own error codes for `pyflakes`:

<table>
<thead>
<tr>
<th>Code</th>
<th>Example Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>F401</td>
<td>module imported but unused</td>
</tr>
<tr>
<td>F402</td>
<td>import module from line N shadowed by loop variable</td>
</tr>
<tr>
<td>F403</td>
<td>'from module import *' used; unable to detect undefined names</td>
</tr>
<tr>
<td>F404</td>
<td>future import(s) name after other statements</td>
</tr>
<tr>
<td>F405</td>
<td>name may be undefined, or defined from star imports: module</td>
</tr>
<tr>
<td>F406</td>
<td>'from module import *' only allowed at module level</td>
</tr>
<tr>
<td>F407</td>
<td>an undefined <strong>future</strong> feature name was imported</td>
</tr>
<tr>
<td>F501</td>
<td>invalid % format literal</td>
</tr>
<tr>
<td>F502</td>
<td>% format expected mapping but got sequence</td>
</tr>
<tr>
<td>F503</td>
<td>% format expected sequence but got mapping</td>
</tr>
<tr>
<td>F504</td>
<td>% format unused named arguments</td>
</tr>
</tbody>
</table>

continues on next page
<table>
<thead>
<tr>
<th>Code</th>
<th>Example Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>F505</td>
<td>% format missing named arguments</td>
</tr>
<tr>
<td>F506</td>
<td>% format mixed positional and named arguments</td>
</tr>
<tr>
<td>F507</td>
<td>% format mismatch of placeholder and argument count</td>
</tr>
<tr>
<td>F508</td>
<td>% format with * specifier requires a sequence</td>
</tr>
<tr>
<td>F509</td>
<td>% format with unsupported format character</td>
</tr>
<tr>
<td>F521</td>
<td>.format(...) invalid format string</td>
</tr>
<tr>
<td>F522</td>
<td>.format(...) unused named arguments</td>
</tr>
<tr>
<td>F523</td>
<td>.format(...) unused positional arguments</td>
</tr>
<tr>
<td>F524</td>
<td>.format(...) missing argument</td>
</tr>
<tr>
<td>F525</td>
<td>.format(...) mixing automatic and manual numbering</td>
</tr>
<tr>
<td>F541</td>
<td>f-string without any placeholders</td>
</tr>
<tr>
<td>F601</td>
<td>dictionary key name repeated with different values</td>
</tr>
<tr>
<td>F602</td>
<td>dictionary key variable name repeated with different values</td>
</tr>
<tr>
<td>F621</td>
<td>too many expressions in an assignment with star-unpacking</td>
</tr>
<tr>
<td>F622</td>
<td>two or more starred expressions in an assignment (a, *b, *c = d)</td>
</tr>
<tr>
<td>F631</td>
<td>assertion test is a tuple, which is always True</td>
</tr>
<tr>
<td>F632</td>
<td>use ==/!= to compare str, bytes, and int literals</td>
</tr>
<tr>
<td>F633</td>
<td>use of &gt;&gt; is invalid with print function</td>
</tr>
<tr>
<td>F634</td>
<td>if test is a tuple, which is always True</td>
</tr>
<tr>
<td>F701</td>
<td>a break statement outside of a while or for loop</td>
</tr>
<tr>
<td>F702</td>
<td>a continue statement outside of a while or for loop</td>
</tr>
<tr>
<td>F703</td>
<td>a continue statement in a finally block in a loop</td>
</tr>
<tr>
<td>F704</td>
<td>a yield or yield from statement outside of a function</td>
</tr>
<tr>
<td>F706</td>
<td>a return statement outside of a function/method</td>
</tr>
<tr>
<td>F707</td>
<td>an except: block as not the last exception handler</td>
</tr>
<tr>
<td>F721</td>
<td>syntax error in doctest</td>
</tr>
<tr>
<td>F722</td>
<td>syntax error in forward annotation</td>
</tr>
<tr>
<td>F723</td>
<td>syntax error in type comment</td>
</tr>
<tr>
<td>F811</td>
<td>redefinition of unused name from line N</td>
</tr>
<tr>
<td>F821</td>
<td>undefined name name</td>
</tr>
<tr>
<td>F822</td>
<td>undefined name name in <strong>all</strong></td>
</tr>
<tr>
<td>F823</td>
<td>local variable name ... referenced before assignment</td>
</tr>
<tr>
<td>F831</td>
<td>duplicate argument name in function definition</td>
</tr>
<tr>
<td>F841</td>
<td>local variable name is assigned to but never used</td>
</tr>
<tr>
<td>F901</td>
<td>raise NotImplementedError should be raise NotImplementedErrorError</td>
</tr>
</tbody>
</table>

We also report one extra error: E999. We report E999 when we fail to compile a file into an Abstract Syntax Tree for the plugins that require it.

mccabe only ever reports one violation - C901 based on the complexity value provided by the user.

Users should also reference pycodestyle’s list of error codes.
### 3.1.5 Selecting and Ignoring Violations

It is possible to select and ignore certain violations reported by Flake8 and the plugins we’ve installed. It’s also possible as of Flake8 3.0 to combine usage of `flake8 --select` and `flake8 --ignore`. This chapter of the User Guide aims to educate about how Flake8 will report errors based on different inputs.

**Ignoring Violations with Flake8**

By default, Flake8 has a list of error codes that it ignores. The list used by a version of Flake8 may be different than the list used by a different version. To see the default list, `flake8 --help` will show the output with the current default list.

**Extending the Default Ignore List**

If we want to extend the default list of ignored error codes, we can use `flake8 --extend-ignore` to specify a comma-separated list of codes for a specific run on the command line, e.g.,

```
$ flake8 --extend-ignore=E1,E23 path/to/files/ path/to/more/files
```

This tells Flake8 to ignore any error codes starting with E1 and E23, in addition the default ignore list. To view the default error code ignore list, run `flake8 --help` and refer to the help text for `flake8 --ignore`.

**Overriding the Default Ignore List**

If we want to *completely* override the default list of ignored error codes, we can use `flake8 --ignore` to specify a comma-separated list of codes for a specific run on the command line, e.g.,

```
$ flake8 --ignore=E1,E23,W503 path/to/files/ path/to/more/files/
```

This tells Flake8 to only ignore error codes starting with E1, E23, or W503 while it is running.

**Note:** The documentation for `flake8 --ignore` shows examples for how to change the ignore list in the configuration file. See also *Configuring Flake8* as well for details about how to use configuration files.

**In-line Ignoring Errors**

In some cases, we might not want to ignore an error code (or class of error codes) for the entirety of our project. Instead, we might want to ignore the specific error code on a specific line. Let’s take for example a line like

```python
example = lambda: 'example'
```

Sometimes we genuinely need something this simple. We could instead define a function like we normally would. Note, in some contexts this distracts from what is actually happening. In those cases, we can also do:

```python
example = lambda: 'example'  # noqa: E731
```

This will only ignore the error from pycodestyle that checks for lambda assignments and generates an E731. If there are other errors on the line then those will be reported. `# noqa` is case-insensitive, without the colon the part after `#` `noqa` would be ignored.
Note: If we ever want to disable Flake8 respecting # noqa comments, we can refer to flake8 --disable-noqa.

If we instead had more than one error that we wished to ignore, we could list all of the errors with commas separating them:

```bash
# noqa: E731,E123
```

Finally, if we have a particularly bad line of code, we can ignore every error using simply # noqa with nothing after it. Contents before and after the # noqa: ... portion are ignored so multiple comments may appear on one line. Here are several examples:

```bash
# mypy requires `# type: ignore` to appear first
x = 5  # type: ignore # noqa: ABC123

# can use to add useful user information to a noqa comment
y = 6  # noqa: ABC456 # TODO: will fix this later
```

## Ignoring Entire Files

Imagine a situation where we are adding Flake8 to a codebase. Let’s further imagine that with the exception of a few particularly bad files, we can add Flake8 easily and move on with our lives. There are two ways to ignore the file:

1. By explicitly adding it to our list of excluded paths (see: flake8 --exclude)
2. By adding # flake8: noqa to the file

The former is the recommended way of ignoring entire files. By using our exclude list, we can include it in our configuration file and have one central place to find what files aren’t included in Flake8 checks. The latter has the benefit that when we run Flake8 with flake8 --disable-noqa all of the errors in that file will show up without having to modify our configuration. Both exist so we can choose which is better for us.

## Selecting Violations with Flake8

Flake8 has a default list of violation classes that we use. This list is:

- **C90**
  - All C90 class violations are reported when the user specifies flake8 --max-complexity
- **E**
  - All E class violations are “errors” reported by pycodestyle
- **F**
  - All F class violations are reported by pyflakes
- **W**
  - All W class violations are “warnings” reported by pycodestyle

This list can be overridden by specifying flake8 --select. Just as specifying flake8 --ignore will change the behaviour of Flake8, so will flake8 --select.

Let’s look through some examples using this sample code:
By default, if we run flake8 on this file we'll get:

```
$ flake8 example.py
```

```
example.py:4:9: E131 continuation line unaligned for hanging indent
```

Now let's select all E class violations:

```
$ flake8 --select E example.py
```

```
example.py:3:17: E126 continuation line over-indented for hanging indent
example.py:4:9: E131 continuation line unaligned for hanging indent
example.py:5:9: E121 continuation line under-indented for hanging indent
```

Suddenly we now have far more errors that are reported to us. Using --select alone will override the default --ignore list. In these cases, the user is telling us that they want all E violations and so we ignore our list of violations that we ignore by default.

We can also be highly specific. For example, we can do

```
$ flake8 --select E121 example.py
```

```
example.py:5:9: E121 continuation line under-indented for hanging indent
```

We can also specify lists of items to select both on the command-line and in our configuration files.

```
$ flake8 --select E121,E131 example.py
```

```
example.py:4:9: E131 continuation line unaligned for hanging indent
example.py:5:9: E121 continuation line under-indented for hanging indent
```

## Selecting and Ignoring Simultaneously For Fun and Profit

Prior to Flake8 3.0, all handling of flake8 --select and flake8 --ignore was delegated to pycodestyle. Its handling of the options significantly differs from how Flake8 3.0 has been designed.

pycodestyle has always preferred --ignore over --select and will ignore --select if the user provides both. Flake8 3.0 will now do its best to intuitively combine both options provided by the user. Let's look at some examples using:

```
# example.py
import os

def foo():
    var = 1
    print("Hello"
```

(continues on next page)
If we run `Flake8` with its default settings we get:

```bash
$ flake8 example.py
```

```
example.py:1:1: F401 'os' imported but unused
example.py:5:5: F841 local variable 'var' is assigned to but never used
example.py:8:9: E131 continuation line unaligned for hanging indent
```

Now let's select all E and F violations including those in the default ignore list.

```bash
$ flake8 --select E,F example.py
```

```
example.py:1:1: F401 'os' imported but unused
example.py:5:5: F841 local variable 'var' is assigned to but never used
example.py:7:17: E126 continuation line over-indented for hanging indent
example.py:8:9: E131 continuation line unaligned for hanging indent
example.py:9:9: E121 continuation line under-indented for hanging indent
```

Now let's selectively ignore some of these while selecting the rest:

```bash
$ flake8 --select E,F --ignore F401,E121 example.py
```

```
example.py:5:5: F841 local variable 'var' is assigned to but never used
example.py:7:17: E126 continuation line over-indented for hanging indent
example.py:8:9: E131 continuation line unaligned for hanging indent
```

Via this example, we can see that the most specific user-specified rule will win. So in the above, we had very vague select rules and two very specific ignore rules. Let's look at a different example:

```bash
$ flake8 --select F401,E131 --ignore E,F example.py
```

```
example.py:1:1: F401 'os' imported but unused
example.py:8:9: E131 continuation line unaligned for hanging indent
```

In this case, we see that since our selected violation codes were more specific those were reported.

### 3.1.6 Using Plugins For Fun and Profit

`Flake8` is useful on its own but a lot of `Flake8`’s popularity is due to its extensibility. Our community has developed plugins that augment `Flake8`’s behaviour. Most of these plugins are uploaded to PyPI. The developers of these plugins often have some style they wish to enforce.

For example, `flake8-docstrings` adds a check for PEP 257 style conformance. Others attempt to enforce consistency, like `flake8-quotes`.

**Note:** The accuracy or reliability of these plugins may vary wildly from plugin to plugin and not all plugins are guaranteed to work with `Flake8` 3.0.

To install a third-party plugin, make sure that you know which version of Python (or pip) you used to install `Flake8`. You can then use the most appropriate of:
$ pip install <plugin-name>
$ pip3 install <plugin-name>
$ python -m pip install <plugin-name>
$ python3 -m pip install <plugin-name>
$ python3.9 -m pip install <plugin-name>

To install the plugin, where <plugin-name> is the package name on PyPI. To verify installation use:

$ flake8 --version
$ python<version> -m flake8 --version

To see the plugin’s name and version in the output.

See also:

How to Invoke Flake8

After installation, most plugins immediately start reporting errors. Check the plugin’s documentation for which error codes it returns and if it disables any by default.

Note: You can use both `flake8 --select` and `flake8 --ignore` with plugins.

Some plugins register new options, so be sure to check `flake8 --help` for new flags and documentation. These plugins may also allow these flags to be specified in your configuration file. Hopefully, the plugin authors have documented this for you.

See also:

Configuring Flake8

3.1.7 Using Version Control Hooks

Usage with the pre-commit git hooks framework

Flake8 can be included as a hook for pre-commit. The easiest way to get started is to add this configuration to your .pre-commit-config.yaml:

```yaml
- repo: https://github.com/pycqa/flake8
  rev: ''  # pick a git hash / tag to point to
  hooks:
    - id: flake8
```

See the pre-commit docs for how to customize this configuration.

Checked-in python files will be passed as positional arguments. flake8 will always lint explicitly passed arguments (flake8 --exclude has no effect). Instead use pre-commit’s exclude: ... regex to exclude files. pre-commit won’t ever pass untracked files to flake8 so excluding .git/.tox/etc. is unnecessary.

```yaml
  - id: flake8
    exclude: ^testing/(data|examples)/
```

pre-commit creates an isolated environment for hooks. To use flake8 plugins, use the additional_dependencies setting.

```yaml
  - id: flake8
    additional_dependencies: [flake8-docstrings]
```
3.1.8 Public Python API

**flake8** 3.0.0 presently does not have a public, stable Python API. When it does, it will be located in `flake8.api` and that will be documented here.

**Legacy API**

When **flake8** broke its hard dependency on the tricky internals of pycodestyle, it lost the easy backwards compatibility as well. To help existing users of that API we have `flake8.api.legacy`. This module includes a couple classes (which are documented below) and a function.

The main usage that the developers of Flake8 observed was using the `get_style_guide()` function and then calling `check_files()`. To a lesser extent, people also seemed to use the `get_statistics()` method on what `check_files` returns. We then sought to preserve that API in this module.

Let’s look at an example piece of code together:

```python
from flake8.api import legacy as flake8

style_guide = flake8.get_style_guide(  
    ignore=['E24', 'W503'],
)
report = style_guide.check_files([...])
assert report.get_statistics('E') == [], ' Flake8 found violations'
```

This represents the basic universal usage of all existing Flake8 2.x integrations. Each example we found was obviously slightly different, but this is kind of the gist, so let’s walk through this.

Everything that is backwards compatible for our API is in the `flake8.api.legacy` submodule. This is to indicate clearly, that the old API is being used.

We create a `flake8.api.legacy.StyleGuide` by calling `flake8.api.legacy.get_style_guide()`. We can pass options to `flake8.api.legacy.get_style_guide()` that correspond to the command-line options one might use. For example, we can pass `ignore`, `select`, `exclude`, `format`, etc. Our legacy API, does not enforce legacy behaviour, so we can combine `ignore` and `select` like we might on the command-line, e.g.,

```python
style_guide = flake8.get_style_guide(  
    ignore=['E24', 'W5'],
    select=['E', 'W', 'F'],
    format='pylint',
)
```

Once we have our `flake8.api.legacy.StyleGuide` we can use the same methods that we used before, namely `StyleGuide.check_files(paths=None)`

- Run collected checks on the files provided.
- This will check the files passed in and return a `Report` instance.

**Parameters**

- `paths (list[str] | None)` – List of filenames (or paths) to check.

**Returns**

- Object that mimic’s Flake8 2.0’s Reporter class.

**Return type**

- `Report`
StyleGuide.excluded(filename, parent=None)
Determine if a file is excluded.

Parameters

- filename (str) – Path to the file to check if it is excluded.
- parent (str | None) – Name of the parent directory containing the file.

Returns
True if the filename is excluded, False otherwise.

Return type
bool

StyleGuide.init_report(reporter=None)
Set up a formatter for this run of Flake8.

Parameters

- reporter (type[formatter.BaseFormatter] | None) –

Return type
None

StyleGuide.input_file(filename, lines=None, expected=None, line_offset=0)
Run collected checks on a single file.
This will check the file passed in and return a Report instance.

Parameters

- filename (str) – The path to the file to check.
- lines (Any | None) – Ignored since Flake8 3.0.
- expected (Any | None) – Ignored since Flake8 3.0.
- line_offset (Any | None) – Ignored since Flake8 3.0.

Returns
Object that mimic’s Flake8 2.0’s Reporter class.

Return type
Report

Warning: These are not perfectly backwards compatible. Not all arguments are respected, and some of the types necessary for something to work have changed.

Most people, we observed, were using check_files(). You can use this to specify a list of filenames or directories to check. In Flake8 3.0, however, we return a different object that has similar methods. We return a flake8.api.legacy.Report which has the method

Report.get_statistics(violation)
Get the list of occurrences of a violation.

Returns
List of occurrences of a violation formatted as: {Count} {Error Code} {Message}, e.g., 8 E531 Some error message about the error

Parameters

- violation (str) –
**Return type**

`list[str]`

Most usage of this method that we noted was as documented above. Keep in mind, however, that it provides a list of strings and not anything more malleable.

**Autogenerated Legacy Documentation**

Module containing shims around Flake8 2.x behaviour.

Previously, users would import `get_style_guide()` from `flake8.engine`. In 3.0 we no longer have an “engine” module but we maintain the API from it.

```python
flake8.api.legacy.get_style_guide(**kwargs)
```

Provision a StyleGuide for use.

**Parameters**

- `**kwargs (Any)` – Keyword arguments that provide some options for the StyleGuide.

**Returns**

- An initialized StyleGuide

**Return type**

`StyleGuide`

**class** `flake8.api.legacy.StyleGuide(application)`

Public facing object that mimic's Flake8 2.0's StyleGuide.

**Note:** There are important changes in how this object behaves compared to the StyleGuide object provided in Flake8 2.x.

**Warning:** This object should not be instantiated directly by users.

Changed in version 3.0.0.

**Parameters**

- `application (app.Application)` –

**property options:** `Namespace`

Return application’s options.

An instance of `argparse.Namespace` containing parsed options.

**property paths:** `list[str]`

Return the extra arguments passed as paths.

**class** `flake8.api.legacy.Report(application)`

Public facing object that mimic's Flake8 2.0's API.

**Note:** There are important changes in how this object behaves compared to the object provided in Flake8 2.x.

**Warning:** This should not be instantiated by users.
Changed in version 3.0.0.

**Parameters**

- **application** (*app.Application*) –

**property total_errors**: *int*

Return the total number of errors.
If you’re maintaining a plugin for Flake8 or creating a new one, you should read this section of the documentation. It explains how you can write your plugins and distribute them to others.

4.1 Writing Plugins for Flake8

Since Flake8 2.0, the Flake8 tool has allowed for extensions and custom plugins. In Flake8 3.0, we’re expanding that ability to customize and extend and we’re attempting to thoroughly document it. Some of the documentation in this section may reference third-party documentation to reduce duplication and to point you, the developer, towards the authoritative documentation for those pieces.

4.1.1 Getting Started

To get started writing a Flake8 plugin you first need:

- An idea for a plugin
- An available package name on PyPI
- One or more versions of Python installed
- A text editor or IDE of some kind
- An idea of what kind of plugin you want to build:
  - Formatter
  - Check

Once you’ve gathered these things, you can get started.

All plugins for Flake8 must be registered via entry points. In this section we cover:

- How to register your plugin so Flake8 can find it
- How to make Flake8 provide your check plugin with information (via command-line flags, function/class parameters, etc.)
- How to make a formatter plugin
- How to write your check plugin so that it works with Flake8 2.x and 3.x
4.1.2 Video Tutorial

Here's a tutorial which goes over building an ast checking plugin from scratch:

Registering a Plugin with Flake8

To register any kind of plugin with Flake8, you need:

1. A way to install the plugin (whether it is packaged on its own or as part of something else). In this section, we will use a setup.py written for an example plugin.

2. A name for your plugin that will (ideally) be unique.

3. A somewhat recent version of setuptools (newer than 0.7.0 but preferably as recent as you can attain).

Flake8 relies on functionality provided by setuptools called Entry Points. These allow any package to register a plugin with Flake8 via that package’s setup.py file.

Let’s presume that we already have our plugin written and it’s in a module called flake8_example. We might have a setup.py that looks something like:

```python
import setuptools

requires = [
    "flake8 > 3.0.0",
]

flake8_entry_point = # ...

setuptools.setup(
    name="flake8_example",
    license="MIT",
    version="0.1.0",
    description="our extension to flake8",
    author="Me",
    author_email="example@example.com",
    url="https://github.com/me/flake8_example",
    packages=[
        "flake8_example",
    ],
    install_requires=requires,
    entry_points={
        flake8_entry_point: [
            'X = flake8_example:ExamplePlugin',
        ],
    },
    classifiers=[
        "Framework :: Flake8",
        "Environment :: Console",
        "Intended Audience :: Developers",
        "License :: OSI Approved :: MIT License",
        "Programming Language :: Python",
        "Programming Language :: Python :: 3",
        "Topic :: Software Development :: Libraries :: Python Modules",
        "Topic :: Software Development :: Quality Assurance",
    ],
)
```

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Note specifically these lines:

```python
flake8_entry_point = '# ...
setuptools.setup(
    # snip ...
    entry_points={
        flake8_entry_point: [
            'X = flake8_example:ExamplePlugin',
        ],
    },
    # snip ...
)
```

We tell setuptools to register our entry point `X` inside the specific grouping of entry-points that flake8 should look in. **Flake8** presently looks at two groups:

- `flake8.extension`
- `flake8.report`

If your plugin is one that adds checks to **Flake8**, you will use `flake8.extension`. If your plugin performs extra report handling (formatting, filtering, etc.) it will use `flake8.report`.

If our `ExamplePlugin` is something that adds checks, our code would look like:

```python
setuptools.setup(  
    entry_points={
        'flake8.extension': [
            'X = flake8_example:ExamplePlugin',
        ],
    },
    # snip ...
)
```

The `X` in checking plugins define what error codes it is going to report. So if the plugin reports only the error code `X101` your entry-point would look like:

```
X101 = flake8_example:ExamplePlugin
```

In the above case, the entry-point name and the error code produced by your plugin are the same.

If your plugin reports several error codes that all start with `X10`, then it would look like:

```
X10 = flake8_example:ExamplePlugin
```

In this case as well as the following case, your entry-point name acts as a prefix to the error codes produced by your plugin.

If all of your plugin’s error codes start with `X1` then it would look like:

```
X1 = flake8_example:ExamplePlugin
```
Finally, if all of your plugin’s error codes start with just X then it would look like the original example.

**Flake8** requires each entry point to be unique amongst all plugins installed in the users environment. Selecting an entry point that is already used can cause plugins to be deactivated without warning!

**Please Note:** Your entry point does not need to be exactly 4 characters as of **Flake8** 3.0. Single letter entry point prefixes (such as the ‘X’ in the examples above) have caused issues in the past. As such, please consider using a 2 or 3 character entry point prefix, i.e., ABC is better than A but ABCD is invalid. A 3 letters entry point prefix followed by 3 numbers (i.e. ABC123) is currently the longest allowed entry point name.

If your plugin is intended to be opt-in, it can set the attribute `off_by_default = True`. Users of your plugin will then need to utilize `enable-extensions` with your plugin’s entry point.

### Receiving Information For A Check Plugin

Plugins to **Flake8** have a great deal of information that they can request from a `FileProcessor` instance. Historically, **Flake8** has supported two types of plugins:

1. classes that accept parsed abstract syntax trees (ASTs)
2. functions that accept a range of arguments

**Flake8** now does not distinguish between the two types of plugins. Any plugin can accept either an AST or a range of arguments. Further, any plugin that has certain callable attributes can also register options and receive parsed options.

### Indicating Desired Data

**Flake8** inspects the plugin’s signature to determine what parameters it expects using `flake8.plugins.finder._parameters_for()`. `flake8.plugins.finder.LoadedPlugin.parameters` caches the values so that each plugin makes that fairly expensive call once per plugin. When processing a file, a plugin can ask for any of the following:

- `blank_before`
- `blank_lines`
- `checker_state`
- `indent_char`
- `indent_level`
- `line_number`
- `logical_line`
- `multiline`
- `noqa`
- `previous_indent_level`
- `previous_logical`
- `previous_unindented_logical_line`
- `tokens`

Some properties are set once per file for plugins which iterate itself over the data instead of being called on each physical or logical line.
• filename
• file_tokens
• lines
• max_line_length
• max_doc_length
• total_lines
• verbose

These parameters can also be supplied to plugins working on each line separately.

Plugins that depend on physical_line or logical_line are run on each physical or logical line once. These parameters should be the first in the list of arguments (with the exception of self). Plugins that need an AST (e.g., PyFlakes and McCabe) should depend on tree. These plugins will run once per file. The parameters listed above can be combined with physical_line, logical_line, and tree.

### Registering Options

Any plugin that has callable attributes add_options and parse_options can parse option information and register new options.

Your add_options function should expect to receive an instance of OptionManager. An OptionManager instance behaves very similarly to optparse.OptionParser. It, however, uses the layer that Flake8 has developed on top of argparse to also handle configuration file parsing. add_option() creates an Option which accepts the same parameters as optparse as well as three extra boolean parameters:

- parse_from_config
  
  The command-line option should also be parsed from config files discovered by Flake8.

  **Note:** This takes the place of appending strings to a list on the optparse.OptionParser.

- comma_separated_list

  The value provided to this option is a comma-separated list. After parsing the value, it should be further broken up into a list. This also allows us to handle values like:

  ```
  E123,E124,
  E125,
  E126
  ```

- normalize_paths

  The value provided to this option is a path. It should be normalized to be an absolute path. This can be combined with comma_separated_list to allow a comma-separated list of paths.

Each of these options works individually or can be combined. Let’s look at a couple examples from Flake8. In each example, we will have option_manager which is an instance of OptionManager.

```python
option_manager.add_option(
    '--max-line-length', type='int', metavar='n',
    default=defaults.MAX_LINE_LENGTH, parse_from_config=True,
    help='Maximum allowed line length for the entirety of this run.'
)
```

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Here we are adding the `--max-line-length` command-line option which is always an integer and will be parsed from the configuration file. Since we provide a default, we take advantage of `argparse`’s willingness to display that in the help text with `%{default}s`.

```python
option_manager.add_option(
    'select', metavar='errors', default='',
    parse_from_config=True, comma_separated_list=True,
    help='Comma-separated list of errors and warnings to enable.'
    # For example, `--select=E4,E51,W234` (Default: %{default}s),
)
```

In adding the `--select` command-line option, we’re also indicating to the `OptionManager` that we want the value parsed from the config files and parsed as a comma-separated list.

```python
option_manager.add_option(
    'exclude', metavar='patterns', default=defaults.EXCLUDE,
    comma_separated_list=True, parse_from_config=True,
    normalize_paths=True,
    help='Comma-separated list of files or directories to exclude.'
    # (Default: %{default}s),
)
```

Finally, we show an option that uses all three extra flags. Values from `--exclude` will be parsed from the config, converted from a comma-separated list, and then each item will be normalized.

For information about other parameters to `add_option()` refer to the documentation of `argparse`.

### Accessing Parsed Options

When a plugin has a callable `parse_options` attribute, Flake8 will call it and attempt to provide the `OptionManager` instance, the parsed options which will be an instance of `argparse.Namespace`, and the extra arguments that were not parsed by the `OptionManager`. If that fails, we will just pass the `argparse.Namespace`. In other words, your `parse_options` callable will have one of the following signatures:

```python
def parse_options(option_manager, options, args):
    pass
# or
def parse_options(options):
    pass
```
Developing a Formatting Plugin for Flake8

Flake8 allowed for custom formatting plugins in version 3.0.0. Let’s write a plugin together:

```python
from flake8.formatting import base

class Example(base.BaseFormatter):
    """Flake8's example formatter."""
    pass
```

We notice, as soon as we start, that we inherit from Flake8’s BaseFormatter class. If we follow the instructions to register a plugin and try to use our example formatter, e.g., `flake8 --format=example` then Flake8 will fail because we did not implement the format method. Let’s do that next.

```python
class Example(base.BaseFormatter):
    """Flake8's example formatter."""

    def format(self, error):
        return 'Example formatter: {0!r}'.format(error)
```

With that we’re done. Obviously this isn’t a very useful formatter, but it should highlight the simplicity of creating a formatter with Flask8. If we wanted to instead create a formatter that aggregated the results and returned XML, JSON, or subunit we could also do that. Flake8 interacts with the formatter in two ways:

1. It creates the formatter and provides it the options parsed from the configuration files and command-line
2. It uses the instance of the formatter and calls handle with the error.

By default `flake8.formatting.base.BaseFormatter.handle()` simply calls the format method and then write. Any extra handling you wish to do for formatting purposes should override the handle method.

**API Documentation**

```python
class flake8.formatting.base.BaseFormatter(options)
    Class defining the formatter interface.

    Parameters
    options (argparse.Namespace) –

    options
        The options parsed from both configuration files and the command-line.

    filename
        If specified by the user, the path to store the results of the run.

    output_fd
        Initialized when the start() is called. This will be a file object opened for writing.

    newline
        The string to add to the end of a line. This is only used when the output filename has been specified.

    after_init()
        Initialize the formatter further.
```

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Return type
None

beginning(filename)
Notify the formatter that we’re starting to process a file.

Parameters
filename (str) – The name of the file that Flake8 is beginning to report results from.

Return type
None

finished(filename)
Notify the formatter that we’ve finished processing a file.

Parameters
filename (str) – The name of the file that Flake8 has finished reporting results from.

Return type
None

format(error)
Format an error reported by Flake8.
This method must be implemented by subclasses.

Parameters
error (Violation) – This will be an instance of Violation.

Returns
The formatted error string.

Return type
str | None

handle(error)
Handle an error reported by Flake8.
This defaults to calling format(), show_source(), and then write(). To extend how errors are handled, override this method.

Parameters
error (Violation) – This will be an instance of Violation.

Return type
None

show_benchmarks(benchmarks)
Format and print the benchmarks.

Parameters
benchmarks (list[tuple[str, float]]) –

Return type
None

show_source(error)
Show the physical line generating the error.
This also adds an indicator for the particular part of the line that is reported as generating the problem.

Parameters
error (Violation) – This will be an instance of Violation.
**Returns**

The formatted error string if the user wants to show the source. If the user does not want to show the source, this will return `None`.

**Return type**

`str | None`

**show_statistics**(statistics)

Format and print the statistics.

**Parameters**

- **statistics** (`Statistics`) –

  **Return type**

  `None`

**start()**

Prepare the formatter to receive input.

This defaults to initializing `output_fd` if `filename`

**Return type**

`None`

**stop()**

Clean up after reporting is finished.

**Return type**

`None`

**write**(line, source)

Write the line either to the output file or stdout.

This handles deciding whether to write to a file or print to standard out for subclasses. Override this if you want behaviour that differs from the default.

**Parameters**

- **line** (`str | None`) – The formatted string to print or write.

- **source** (`str | None`) – The source code that has been formatted and associated with the line of output.

**Return type**

`None`
If you are reading Flake8’s source code for fun or looking to contribute, you should read this portion of the documentation. This is a mix of documenting the internal-only interfaces Flake8 and documenting reasoning for Flake8’s design.

5.1 Exploring Flake8’s Internals

While writing Flake8 3.0, the developers attempted to capture some reasoning and decision information in internal documentation meant for future developers and maintainers. Most of this information is unnecessary for users and plugin developers. Some of it, however, is linked to from the plugin development documentation.

Keep in mind that not everything will be here and you may need to help pull information out of the developers’ heads and into these documents. Please pull gently.

5.1.1 Contributing to Flake8

There are many ways to contribute to Flake8, and we encourage them all:

• contributing bug reports and feature requests
• contributing documentation (and yes that includes this document)
• reviewing and triaging bugs and merge requests

Before you go any further, please allow me to reassure you that I do want your contribution. If you think your contribution might not be valuable, I reassure you that any help you can provide is valuable.

Code of Conduct

Flake8 adheres to the Python Code Quality Authority’s Code of Conduct. Any violations of the Code of Conduct should be reported to Ian Stapleton Cordasco (graffatcolmingov [at] gmail [dot] com).
Setting Up A Development Environment

To contribute to Flake8’s development, you simply need:

- Python (one of the versions we support)
- tox

  We suggest installing this like:
  
  $ pip install --user tox
  
  Or
  
  $ python<version> -m pip install --user tox

- your favorite editor

Filing a Bug

When filing a bug against Flake8, please fill out the issue template as it is provided to you by GitHub. If your bug is in reference to one of the checks that Flake8 reports by default, please do not report them to Flake8 unless Flake8 is doing something to prevent the check from running or you have some reason to believe Flake8 is inhibiting the effectiveness of the check.

Please search for closed and open bug reports before opening new ones.

All bug reports about checks should go to their respective projects:

- Error codes starting with E and W should be reported to pycodestyle.
- Error codes starting with F should be reported to pyflakes
- Error codes starting with C should be reported to mccabe

Requesting a New Feature

When requesting a new feature in Flake8, please fill out the issue template. Please also note if there are any existing alternatives to your new feature either via plugins, or combining command-line options. Please provide example use cases. For example, do not ask for a feature like this:

I need feature frobulate for my job.

Instead ask:

I need Flake8 to frobulate these files because my team expects them to frobulated but Flake8 currently does not frobulate them. We tried using --filename but we could not create a pattern that worked.

The more you explain about why you need a feature, the more likely we are to understand your needs and help you to the best of our ability.
Contributing Documentation

To contribute to Flake8's documentation, you might want to first read a little about reStructuredText or Sphinx. Flake8 has a guide of best practices when contributing to our documentation. For the most part, you should be fine following the structure and style of the rest of Flake8's documentation.

All of Flake8's documentation is written in reStructuredText and rendered by Sphinx. The source (reStructuredText) lives in docs/source/. To build the documentation the way our Continuous Integration does, run:

```
$ tox -e docs
```

To view the documentation locally, you can also run:

```
$ tox -e serve-docs
```

You can run the latter in a separate terminal and continuously re-run the documentation generation and refresh the documentation you're working on.

**Note:** We lint our documentation just like we lint our code. You should also run:

```
$ tox -e linters
```

After making changes and before pushing them to ensure that they will pass our CI tests.

Contributing Code

Flake8 development happens on GitHub. Code contributions should be submitted there. Merge requests should:

- Fix one issue and fix it well
  - Fix the issue, but do not include extraneous refactoring or code reformatting. In other words, keep the diff short, but only as short as is necessary to fix the bug appropriately and add sufficient testing around it. Long diffs are fine, so long as everything that it includes is necessary to the purpose of the merge request.

- Have descriptive titles and descriptions
  - Searching old merge requests is made easier when a merge request is well described.

- Have commits that follow this style:

  ```
  Create a short title that is 50 characters long
  
  Ensure the title and commit message use the imperative voice. The commit and you are doing something. Also, please ensure that the body of the commit message does not exceed 72 characters.
  
  The body may have multiple paragraphs as necessary.
  
  The final line of the body references the issue appropriately.
  ```

- Follow the guidelines in Writing Code for Flake8

- Avoid having .gitignore file in your PR
  - Changes to .gitignore will rarely be accepted.
  - If you need to add files to .gitignore you have multiple options

5.1. Exploring Flake8’s Internals
– Create a global .gitignore file
– Create/update .git/info/exclude file.

Both these options are explained in detail here

**Reviewing and Triaging Issues and Merge Requests**

When reviewing other people’s merge requests and issues, please be especially mindful of how the words you choose can be read by someone else. We strive for professional code reviews that do not insult the contributor’s intelligence or impugn their character. The code review should be focused on the code, its effectiveness, and whether it is appropriate for **Flake8**.

If you have the ability to edit an issue or merge request’s labels, please do so to make search and prioritization easier. **Flake8** uses milestones with both issues and merge requests. This provides direction for other contributors about when an issue or merge request will be delivered.

**5.1.2 Writing Documentation for Flake8**

The maintainers of **Flake8** believe strongly in benefit of style guides. Hence, for all contributors who wish to work on our documentation, we’ve put together a loose set of guidelines and best practices when adding to our documentation.

**View the docs locally before submitting**

You can and should generate the docs locally before you submit a pull request with your changes. You can build the docs by running:

```
$ tox -e docs
```

From the directory containing the tox.ini file (which also contains the docs/ directory that this file lives in).

**Note:** If the docs don’t build locally, they will not build in our continuous integration system. We will generally not merge any pull request that fails continuous integration.

**Run the docs linter tests before submitting**

You should run the doc8 linter job before you’re ready to commit and fix any errors found.

**Capitalize Flake8 in prose**

We believe that by capitalizing **Flake8** in prose, we can help reduce confusion between the command-line usage of flake8 and the project.

We also have defined a global replacement `|Flake8|` that should be used and will replace each instance with `:program:`‘Flake8’.”
Use the prompt directive for command-line examples

When documenting something on the command-line, use the .. prompt:: directive to make it easier for users to copy and paste into their terminal.

Example:

```bash
.. prompt::

    flake8 --select E123,W503 dir/
    flake8 --ignore E24,W504 dir
```

Wrap lines around 79 characters

We use a maximum line-length in our documentation that is similar to the default in Flake8. Please wrap lines at 79 characters (or less).

Use two new-lines before new sections

After the final paragraph of a section and before the next section title, use two new-lines to separate them. This makes reading the plain-text document a little nicer. Sphinx ignores these when rendering so they have no semantic meaning.

Example:

```
Section Header
==============

Paragraph.

Next Section Header
===================

Paragraph.
```

Surround document titles with equal symbols

To indicate the title of a document, we place an equal number of = symbols on the lines before and after the title. For example:

```
==================================
Writing Documentation for Flake8
==================================
```

Note also that we “center” the title by adding a leading space and having extra = symbols at the end of those lines.
Use the option template for new options

All of Flake8’s command-line options are documented in the User Guide. Each option is documented individually using the .. option:: directive provided by Sphinx. At the top of the document, in a reStructuredText comment, is a template that should be copied and pasted into place when documenting new options.

Note: The ordering of the options page is the order that options are printed in the output of:

$ flake8 --help

Please insert your option documentation according to that order.

Use anchors for easy reference linking

Use link anchors to allow for other areas of the documentation to use the :ref: role for intralinking documentation. Example:

.. _use-anchors:

Use anchors for easy reference linking
======================================

Somewhere in this paragraph we will :ref:`reference anchors <use-anchors>`.

Note: You do not need to provide custom text for the :ref: if the title of the section has a title that is sufficient.

Keep your audience in mind

Flake8’s documentation has three distinct (but not separate) audiences:

1. Users
2. Plugin Developers
3. Flake8 Developers and Contributors

At the moment, you’re one of the third group (because you’re contributing or thinking of contributing).

Consider that most Users aren’t very interested in the internal working of Flake8. When writing for Users, focus on how to do something or the behaviour of a certain piece of configuration or invocation.

Plugin developers will only care about the internals of Flake8 as much as they will have to interact with that. Keep discussions of internal to the mininum required.

Finally, Flake8 Developers and Contributors need to know how everything fits together. We don’t need detail about every line of code, but cogent explanations and design specifications will help future developers understand the Hows and Whys of Flake8’s internal design.
5.1.3 Writing Code for Flake8

The maintainers of Flake8 unsurprisingly have some opinions about the style of code maintained in the project.

At the time of this writing, Flake8 enables all of PyCodeStyle’s checks, all of PyFlakes’ checks, and sets a maximum complexity value (for McCabe) of 10. On top of that, we enforce PEP-0257 style doc-strings via PyDocStyle (disabling only D203) and Google’s import order style using flake8-import-order.

The last two are a little unusual, so we provide examples below.

**PEP-0257 style doc-strings**

Flake8 attempts to document both internal interfaces as well as our API and doc-strings provide a very convenient way to do so. Even if a function, class, or method isn’t included specifically in our documentation having a doc-string is still preferred. Further, Flake8 has some style preferences that are not checked by PyDocStyle.

For example, while most people will never read the doc-string for `flake8.main.git.hook()` that doc-string still provides value to the maintainers and future collaborators. They (very explicitly) describe the purpose of the function, a little of what it does, and what parameters it accepts as well as what it returns.

```python
# src/flake8/main/git.py
def hook(lazy: bool = False, strict: bool = False) -> int:
    """Execute Flake8 on the files in git's index.

    Determine which files are about to be committed and run Flake8 over them to check for violations.

    :param lazy:
        Find files not added to the index prior to committing. This is useful if you frequently use `git commit -a` for example. This defaults to False since it will otherwise include files not in the index.

    :param strict:
        If True, return the total number of errors/violations found by Flake8. This will cause the hook to fail.

    :returns:
        Total number of errors found during the run.
    """
    # NOTE(sigmavirus24): Delay import of application until we need it.
    from flake8.main import application
    app = application.Application()
    with make_temporary_directory() as tempdir:
        filepaths = list(copy_indexed_files_to(tempdir, lazy))
        app.initialize([
            '.
        ])  # Update excludes
        app.options.exclude = update_excludes(app.options.exclude, tempdir)
        app.run_checks(filepaths)
        app.report_errors()
    if strict:
        return app.result_count
    return 0
```

Note that we begin the description of the parameter on a new-line and indented 4 spaces.

Following the above examples and guidelines should help you write doc-strings that are stylistically correct for Flake8.
**Imports**

**Flake8** follows the import guidelines that Google published in their Python Style Guide. In short this includes:

- Only importing modules
- Grouping imports into
  - standard library imports
  - third-party dependency imports
  - local application imports
- Ordering imports alphabetically

In practice this would look something like:

```python
import configparser
import logging
from os import path

import requests
from flake8 import exceptions
from flake8.formatting import base
```

As a result, of the above, we do not:

- Import objects into a namespace to make them accessible from that namespace
- Import only the objects we’re using
- Add comments explaining that an import is a standard library module or something else

**Other Stylistic Preferences**

Finally, **Flake8** has a few other stylistic preferences that it does not presently enforce automatically.

**Multi-line Function/Method Calls**

When you find yourself having to split a call to a function or method up across multiple lines, insert a new-line after the opening parenthesis, e.g.,

```python
# src/flake8/main/options.py
add_option(
    '-v', '--verbose', default=0, action='count',
    parse_from_config=True,
    help='Print more information about what is happening in flake8.'
        ' This option is repeatable and will increase verbosity each ' 'time it is repeated.',
)
```

```python
# src/flake8/formatting/base.py
def show_statistics(self, statistics):
    """Format and print the statistics.""
    for error_code in statistics.error_codes():
```

(continues on next page)
In the first example, we put a few of the parameters all on one line, and then added the last two on their own. In the second example, each parameter has its own line. This particular rule is a little subjective. The general idea is that putting one parameter per-line is preferred, but sometimes it’s reasonable and understandable to group a few together on one line.

**Comments**

If you’re adding an important comment, be sure to sign it. In Flake8 we generally sign comments by preceding them with NOTE(<name>). For example,

```python
# NOTE(sigmavirus24): The format strings are a little confusing, even
# to me, so here's a quick explanation:
# We specify the named value first followed by a ':' to indicate we're
# formatting the value.
# Next we use '<' to indicate we want the value left aligned.
# Then '10' is the width of the area.
# For floats, finally, we only want only want at most 3 digits after
# the decimal point to be displayed. This is the precision and it
# cannot be specified for integers which is why we need two separate
# format strings.
float_format = '{value:<10.3} {statistic}'.format
int_format = '{value:<10} {statistic}'.format
```

Ian is well known across most websites as sigmavirus24 so he signs his comments that way.

**Verbs Belong in Function Names**

Flake8 prefers that functions have verbs in them. If you’re writing a function that returns a generator of files then generate_files will always be preferable to make_files or files.

**5.1.4 Releasing Flake8**

There is not much that is hard to find about how Flake8 is released.

- We use major releases (e.g., 2.0.0, 3.0.0, etc.) for big, potentially backwards incompatible, releases.
- We use minor releases (e.g., 2.1.0, 2.2.0, 3.1.0, 3.2.0, etc.) for releases that contain features and dependency version changes.
- We use patch releases (e.g., 2.1.1, 2.1.2, 3.0.1, 3.0.10, etc.) for releases that contain only bug fixes.

In this sense we follow semantic versioning. But we follow it as more of a set of guidelines. We’re also not perfect, so we may make mistakes, and that’s fine.
Major Releases

Major releases are often associated with backwards incompatibility. Flake8 hopes to avoid those, but will occasionally need them.

Historically, Flake8 has generated major releases for:

- Unvendoring dependencies (2.0)
- Large scale refactoring (2.0, 3.0, 5.0)
- Subtly breaking CLI changes (3.0, 4.0, 5.0)
- Breaking changes to its plugin interface (3.0)

Major releases can also contain:

- Bug fixes (which may have backwards incompatible solutions)
- New features
- Dependency changes

Minor Releases

Minor releases often have new features in them, which we define roughly as:

- New command-line flags
- New behaviour that does not break backwards compatibility
- New errors detected by dependencies, e.g., by raising the upper limit on PyFlakes we introduce F405
- Bug fixes

Patch Releases

Patch releases should only ever have bug fixes in them.

We do not update dependency constraints in patch releases. If you do not install Flake8 from PyPI, there is a chance that your packager is using different requirements. Some downstream redistributors have been known to force a new version of PyFlakes, pep8/PyCodestyle, or McCabe into place. Occasionally this will cause breakage when using Flake8. There is little we can do to help you in those cases.

Process

To prepare a release, we create a file in docs/source/release-notes/ named: {{ release_number }}.rst (e.g., 3.0.0.rst). We note bug fixes, improvements, and dependency version changes as well as other items of note for users.

Before releasing, the following tox test environments must pass:

- Python 3.6 (a.k.a., tox -e py36)
- Python 3.7 (a.k.a., tox -e py37)
- PyPy 3 (a.k.a., tox -e pypy3)
- Linters (a.k.a., tox -e linters)
We tag the most recent commit that passes those items and contains our release notes.

Finally, we run `tox -e release` to build source distributions (e.g., `flake8-3.0.0.tar.gz`), universal wheels, and upload them to PyPI with Twine.

5.1.5 What Happens When You Run Flake8

Given Flake8 3.0’s new organization and structure, it might be a bit much for some people to understand what happens from when you call `flake8` on the command-line to when it completes. This section aims to give you something of a technical overview of what exactly happens.

Invocation

The exact way that we end up in our `main` function for Flake8 depends on how you invoke it. If you do something like:

```
$ flake8
```

Then your shell looks up where `flake8` the executable lives and executes it. In almost every case, this is a tiny python script generated by `setuptools` using the console script entry points that Flake8 declares in its `setup.py`. This might look something like:

```python
#!/path/to/python<version>
# EASY-INSTALL-ENTRY-SCRIPT: 'flake8==3.0.0','console_scripts','flake8'
__requires__ = 'flake8==3.0.0'
import sys
from pkg_resources import load_entry_point

if __name__ == '__main__':
    sys.exit(
        load_entry_point('flake8==3.0.0', 'console_scripts', 'flake8')()
    )
```

If instead you invoke it like:

```
$ python -m flake8
```

Then you’re relying on Python to find `flake8.__main__` and run that. In both cases, however, you end up in `flake8.main.cli.main()`. This is the primary way that users will end up starting Flake8. This function creates an instance of `Application`.

Application Logic

When we create our `Application` instance, we record the start time and parse our command-line arguments so we can configure the verbosity of Flake8’s logging. For the most part, every path then calls `run()` which in turn calls:

- `initialize()`
- `run_checks()`
- `report_errors()`
- `report_benchmarks()`

Our Git hook, however, runs these individually.

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Application Initialization

`initialize()` loads all of our plugins, registers the options for those plugins, parses the command-line arguments, makes our formatter (as selected by the user), makes our StyleGuide and finally makes our file checker manager.

Running Our Checks

`run_checks()` then creates an instance of `flake8.checker.FileChecker` for each file to be checked after aggregating all of the files that are not excluded and match the provided file-patterns. Then, if we’re on a system that supports multiprocessing and `flake8 --jobs` is either auto or a number greater than 1, we will begin processing the files in subprocesses. Otherwise, we’ll run the checks in parallel.

After we start running the checks, we start aggregating the reported violations in the main process. After the checks are done running, we record the end time.

Reporting Violations

Next, the application takes the violations from the file checker manager, and feeds them through the StyleGuide. This relies on a DecisionEngine instance to determine whether the particular error code is selected or ignored and then appropriately sends it to the formatter (or not).

Reporting Benchmarks

Finally, if the user has asked to see benchmarks (i.e., `flake8 --benchmark`) then we print the benchmarks.

Exiting

Once `run()` has finished, we then call `exit()` which looks at how many errors were reported and whether the user specified `flake8 --exit-zero` and exits with the appropriate exit code.

5.1.6 How Checks are Run

In Flake8 2.x, Flake8 delegated check running to pep8. In 3.0 Flake8 takes on that responsibility. This has allowed for simpler handling of the --jobs parameter (using multiprocessing) and simplified our fallback if something goes awry with concurrency. At the lowest level we have a FileChecker. Instances of FileChecker are created for each file to be analyzed by Flake8. Each instance, has a copy of all of the plugins registered with setuptools in the flake8.extension entry-point group.

The FileChecker instances are managed by an instance of Manager. The Manager instance handles creating subprocesses with multiprocessing module and falling back to running checks in serial if an operating system level error arises. When creating FileChecker instances, the Manager is responsible for determining if a particular file has been excluded.
Processing Files

Unfortunately, since Flake8 took over check running from pep8/pycodestyle, it also had to take over parsing and processing files for the checkers to use. Since it couldn’t reuse pycodestyle’s functionality (since it did not separate cleanly the processing from check running) that function was isolated into the FileProcessor class. We moved several helper functions into the flake8.processor module (see also Processor Utility Functions).

API Reference

class flake8.checker.FileChecker(*filename, plugins, options)
    Manage running checks for a file and aggregate the results.

    Parameters
    • filename (str) –
    • plugins (Checkers) –
    • options (argparse.Namespace) –

check_physical_eol(token, prev_physical)
    Run physical checks if and only if it is at the end of the line.

    Parameters
    • token (TokenInfo) –
    • prev_physical (str) –

    Return type
    None

handle_newline(token_type)
    Handle the logic when encountering a newline token.

    Parameters
    token_type (int) –

    Return type
    None

process_tokens()
    Process tokens and trigger checks.

    Instead of using this directly, you should use flake8.checker.FileChecker.run_checks().

    Return type
    None

report(error_code, line_number, column, text)
    Report an error by storing it in the results list.

    Parameters
    • error_code (str | None) –
    • line_number (int) –
    • column (int) –
    • text (str) –
Return type

str

run_ast_checks()

Run all checks expecting an abstract syntax tree.

Return type

None

runcheck(plugin, **arguments)

Run the check in a single plugin.

Parameters

* plugin (LoadedPlugin) –
* arguments (Any) –

Return type

Any

run_checks()

Run checks against the file.

Return type

tuple[str, Results, dict[str, int]]

run_logical_checks()

Run all checks expecting a logical line.

Return type

None

run_physical_checks(physical_line)

Run all checks for a given physical line.

A single physical check may return multiple errors.

Parameters

* physical_line (str) –

Return type

None

class flake8.checker.Manager(style_guide, plugins)

Manage the parallelism and checker instances for each plugin and file.

This class will be responsible for the following:

* Determining the parallelism of Flake8, e.g.:
  
  – Do we use multiprocessing or is it unavailable?
  
  – Do we automatically decide on the number of jobs to use or did the user provide that?

* Falling back to a serial way of processing files if we run into an OSError related to multiprocessing

* Organizing the results of each checker so we can group the output together and make our output deterministic.

Parameters

* style_guide (StyleGuideManager) –
* plugins (Checkers) –
**make_checkers**(paths=None)
Create checkers for each file.

**Parameters**
paths *(list[str] | None)*

**Return type**
None

**report()**
Report all of the errors found in the managed file checkers.
This iterates over each of the checkers and reports the errors sorted by line number.

**Returns**
A tuple of the total results found and the results reported.

**Return type**
tuple[int, int]

**run()**
Run all the checkers.
This will intelligently decide whether to run the checks in parallel or whether to run them in serial.
If running the checks in parallel causes a problem (e.g., #117) this also implements fallback to serial processing.

**Return type**
None

**run_parallel()**
Run the checkers in parallel.

**Return type**
None

**run_serial()**
Run the checkers in serial.

**Return type**
None

**start**(paths=None)
Start checking files.

**Parameters**
paths *(list[str] | None)* – Path names to check. This is passed directly to `make_checkers()`.

**Return type**
None

**stop()**
Stop checking files.

**Return type**
None
class `flake8.processor.FileProcessor`(filename, options, lines=None)

Processes a file and holds state.

This processes a file by generating tokens, logical and physical lines, and AST trees. This also provides a way of passing state about the file to checks expecting that state. Any public attribute on this object can be requested by a plugin. The known public attributes are:

- `blank_before`
- `blank_lines`
- `checker_state`
- `indent_char`
- `indent_level`
- `line_number`
- `logical_line`
- `max_line_length`
- `max_doc_length`
- `multiline`
- `noqa`
- `previous_indent_level`
- `previous_logical`
- `previous_unindented_logical_line`
- `tokens`
- `file_tokens`
- `total_lines`
- `verbose`

**Parameters**

- `filename` *(str)* —
- `options` *(argparse.Namespace)* —
- `lines` *(list[str] | None)* —

`blank_before`

Number of preceding blank lines

`blank_lines`

Number of blank lines

`build_ast()`

Build an abstract syntax tree from the list of lines.

**Return type**

`AST`
build_logical_line()
    Build a logical line from the current tokens list.
    
    Return type
    tuple[str, str, _LogicalMapping]

build_logical_line_tokens()
    Build the mapping, comments, and logical line lists.
    
    Return type
    Tuple[List[str], List[str], List[Tuple[int, Tuple[int, int]]]]

checker_state: dict[Any, Any]
    Current checker state

delete_first_token()
    Delete the first token in the list of tokens.
    
    Return type
    None

property file_tokens: list[tokenize.TokenInfo]
    Return the complete set of tokens for a file.

generate_tokens()
    Tokenize the file and yield the tokens.
    
    Return type
    Generator[TokenInfo, None, None]

hang_closing
    User provided option for hang closing

indent_char: str | None
    Character used for indentation

indent_size
    Number of spaces used for indentation

inside_multiline(line_number)
    Context-manager to toggle the multiline attribute.

    Parameters
    line_number (int) –
    
    Return type
    Generator[None, None, None]

keyword_arguments_for(parameters, arguments)
    Generate the keyword arguments for a list of parameters.

    Parameters
    • parameters (dict[str, bool]) –
    • arguments (dict[str, Any]) –
    
    Return type
    dict[str, Any]
line_number
   Line number in the file

logical_line
   Current logical line

max_doc_length
   Maximum docstring / comment line length as configured by the user

max_line_length
   Maximum line length as configured by the user

multiline
   Whether the current physical line is multiline

next_line()
   Get the next line from the list.

       Return type
       str

next_logical_line()
   Record the previous logical line.
   This also resets the tokens list and the blank_lines count.

       Return type
       None

noqa = False
   always False, included for compatibility

noqa_line_for(line_number)
   Retrieve the line which will be used to determine noqa.

       Parameters
       line_number (int) –

       Return type
       str | None

previous_indent_level
   Previous level of indentation

previous_logical
   Previous logical line

previous_unindented_logical_line
   Previous unindented (i.e. top-level) logical line

read_lines()
   Read the lines for this file checker.

       Return type
       list[str]

read_lines_from_filename()
   Read the lines for a file.

       Return type
       list[str]
read_lines_from_stdin()
  Read the lines from standard in.

  Return type
  list[str]

reset_blank_before()
  Reset the blank_before attribute to zero.

  Return type
  None

should_ignore_file()
  Check if `flake8: noqa` is in the file to be ignored.

  Returns
  True if a line matches `defaults.NOQA_FILE`, otherwise False

  Return type
  bool

split_line(token)
  Split a physical line’s line based on new-lines.
  This also auto-increments the line number for the caller.

  Parameters
  token (TokenInfo) –

  Return type
  Generator[str, None, None]

statistics
  Statistics dictionary

strip_utf_bom()
  Strip the UTF bom from the lines of the file.

  Return type
  None

tokens: list[tokenize.TokenInfo]
  Current set of tokens

total_lines
  Total number of lines in the file

update_checker_state_for(plugin)
  Update the checker_state attribute for the plugin.

  Parameters
  plugin (LoadedPlugin) –

  Return type
  None

update_state(mapping)
  Update the indent level based on the logical line mapping.

  Parameters
  mapping (List[Tuple[int, Tuple[int, int]]]) –
Return type
None

verbose
Verbosity level of Flake8

visited_new_blank_line()
Note that we visited a new blank line.

Return type
None

Utility Functions

flake8.processor.count_parentheses(current_parentheses_count, token_text)
Count the number of parentheses.

Parameters
• current_parentheses_count (int) –
• token_text (str) –

Return type
int

flake8.processor.expand_indent(line)
Return the amount of indentation. Tabs are expanded to the next multiple of 8.

```python
>>> expand_indent('   ')
4
>>> expand_indent('\t')
8
>>> expand_indent('   \t')
8
>>> expand_indent('   \t')
16
```

Parameters
• line (str) –

Return type
int

flake8.processor.is_eol_token(token)
Check if the token is an end-of-line token.

Parameters
• token (TokenInfo) –

Return type
bool

flake8.processor.is_multiline_string(token)
Check if this is a multiline string.
flake8 Documentation, Release 5.0.4

Parameters

token (TokenInfo) –

Return type

bool

flake8.processor.mutate_string(text)

Replace contents with 'xxx' to prevent syntax matching.

```python
>>> mutate_string('"abc"
"xxx"
>>> mutate_string('''abc''')
'''xxx''''
>>> mutate_string("r'abc'")
"r'xxx'"
```

Parameters

text (str) –

Return type

str

flake8.processor.token_is_newline(token)

Check if the token type is a newline token type.

Parameters

token (TokenInfo) –

Return type

bool

5.1.7 Command Line Interface

The command line interface of Flake8 is modeled as an application via Application. When a user runs flake8 at their command line, main() is run which handles management of the application.

User input is parsed twice to accommodate logging and verbosity options passed by the user as early as possible. This is so as much logging can be produced as possible.

The default Flake8 options are registered by register_default_options(). Trying to register these options in plugins will result in errors.

API Documentation

flake8.main.cli.main(argv=None)

Execute the main bit of the application.

This handles the creation of an instance of Application, runs it, and then exits the application.

Parameters

argv (Sequence[str] | None) – The arguments to be passed to the application for parsing.

Return type

int

5.1. Exploring Flake8’s Internals
class flake8.main.application.Application
    Abstract our application into a class.

catastrophic_failure
    Whether or not something catastrophic happened and we should exit with a non-zero status code

end_time: float | None
    The timestamp when the Application finished reported errors.

exit_code()
    Return the program exit code.
    
    Return type
    int

file_checker_manager: checker.Manager | None
    The flake8.checker.Manager that will handle running all of the checks selected by the user.

find_plugins(cfg, cfg_dir, *, enable_extensions, require_plugins)
    Find and load the plugins for this application.
    Set plugins based on loaded plugins.
    
    Parameters
    • cfg (configparser.RawConfigParser) –
    • cfg_dir (str) –
    • enable_extensions (str | None) –
    • require_plugins (str | None) –

    Return type
    None

formatter: BaseFormatter | None
    The user-selected formatter from formatting_plugins

guide: style_guide.StyleGuideManager | None
    The flake8.style_guide.StyleGuideManager built from the user’s options

initialize(argv)
    Initialize the application to be run.
    This finds the plugins, registers their options, and parses the command-line arguments.
    
    Parameters
    • argv (Sequence[str]) –

    Return type
    None

make_file_checker_manager()
    Initialize our FileChecker Manager.
    
    Return type
    None
make_formatter()
Initialize a formatter based on the parsed options.

Return type
None

make_guide()
Initialize our StyleGuide.

Return type
None

option_manager:  manager.OptionManager | None
The instance of flake8.options.manager.OptionManager used to parse and handle the options and arguments passed by the user

options:  argparse.Namespace | None
The user-supplied options parsed into an instance of argparse.Namespace

parse_configuration_and_cli(cfg, cfg_dir, argv)
Parse configuration files and the CLI options.

Parameters
• cfg (configparser.RawConfigParser) –
• cfg_dir (str) –
• argv (list[str]) –

Return type
None

parse_preliminary_options(argv)
Get preliminary options from the CLI, pre-plugin-loading.

We need to know the values of a few standard options so that we can locate configuration files and configure logging.

Since plugins aren’t loaded yet, there may be some as-yet-unknown options; we ignore those for now, they’ll be parsed later when we do real option parsing.

Parameters
argv (Sequence[str]) – Command-line arguments passed in directly.

Returns
Populated namespace and list of remaining argument strings.

Return type
tuple[argparse.Namespace, list[str]]

parsed_diff:  dict[str, set[int]]
The parsed diff information

prelim_arg_parser
The preliminary argument parser for handling options required for obtaining and parsing the configuration file.

register_plugin_options()
Register options provided by plugins to our option manager.

Return type
None

5.1. Exploring Flake8’s Internals
report()
    Report errors, statistics, and benchmarks.
    
    Return type
    None

report_benchmarks()
    Aggregate, calculate, and report benchmarks for this run.
    
    Return type
    None

report_errors()
    Report all the errors found by flake8 3.0.
    This also updates the result_count attribute with the total number of errors, warnings, and other messages found.
    
    Return type
    None

report_statistics()
    Aggregate and report statistics from this run.
    
    Return type
    None

result_count
    The number of errors, warnings, and other messages after running flake8 and taking into account ignored errors and lines.

run(argv)
    Run our application.
    
    This method will also handle KeyboardInterrupt exceptions for the entirety of the flake8 application. If it sees a KeyboardInterrupt it will forcibly clean up the Manager.
    
    Parameters
    argv (Sequence[str]) –
    
    Return type
    None

run_checks()
    Run the actual checks with the FileChecker Manager.
    
    This method encapsulates the logic to make a Manager instance run the checks it is managing.
    
    Return type
    None

start_time
    The timestamp when the Application instance was instantiated.

total_result_count
    The total number of errors before accounting for ignored errors and lines.

flake8.main.options.register_default_options(option_manager)
    Register the default options on our OptionManager.
    
    The default options include:
Parameters

- `option_manager` (OptionManager)

Return type

- `None`
5.1.8 Built-in Formatters

By default Flake8 has two formatters built-in, default and pylint. These correspond to two classes Default and Pylint.

In Flake8 2.0, pep8 handled formatting of errors and also allowed users to specify an arbitrary format string as a parameter to --format. In order to allow for this backwards compatibility, Flake8 3.0 made two choices:

1. To not limit a user’s choices for --format to the format class names
2. To make the default formatter attempt to use the string provided by the user if it cannot find a formatter with that name.

Default Formatter

The Default continues to use the same default format string as pep8: '%(path)s:%(row)d:%(col)d: %(code)s %(text)s'.

To provide the default functionality it overrides two methods:

1. after_init
2. format

The former allows us to inspect the value provided to --format by the user and alter our own format based on that value. The second simply uses that format string to format the error.

class flake8.formatting.default.Default(options)

    Default formatter for Flake8.

    This also handles backwards compatibility for people specifying a custom format string.

    Parameters

    options (argparse.Namespace) –

    after_init()

        Check for a custom format string.

        Return type

        None

Pylint Formatter

The Pylint simply defines the default Pylint format string from pep8: '%(path)s:%(row)d: [%(code)s] %(text)s'.

class flake8.formatting.default.Pylint(options)

    Pylint formatter for Flake8.

    Parameters

    options (argparse.Namespace) –
5.1.9 Option and Configuration Handling

Option Management

Command-line options are often also set in configuration files for Flake8. While not all options are meant to be parsed from configuration files, many default options are also parsed from configuration files as well as most plugin options.

In Flake8 2, plugins received a optparse.OptionParser instance and called optparse.OptionParser.add_option() to register options. If the plugin author also wanted to have that option parsed from config files they also had to do something like:

```python
parser.config_options.append('my_config_option')
parser.config_options.extend(['config_opt1', 'config_opt2'])
```

This was previously undocumented and led to a lot of confusion about why registered options were not automatically parsed from configuration files.

Since Flake8 3 was rewritten from scratch, we decided to take a different approach to configuration file parsing. Instead of needing to know about an undocumented attribute that pep8 looks for, Flake8 3 now accepts a parameter to add_option, specifically parse_from_config which is a boolean value.

Flake8 does this by creating its own abstractions on top of argparse. The first abstraction is the flake8.options.manager.Option class. The second is the flake8.options.manager.OptionManager. In fact, we add three new parameters:

- parse_from_config
- comma_separated_list
- normalize_paths

The last two are not specifically for configuration file handling, but they do improve that dramatically. We found that there were options that, when specified in a configuration file, often necessitated being split across multiple lines and those options were almost always comma-separated. For example, let’s consider a user’s list of ignored error codes for a project:

```python
[flake8]
ignore =
    # Reasoning
    E111,
    # Reasoning
    E711,
    # Reasoning
    E712,
    # Reasoning
    E121,
    # Reasoning
    E122,
    # Reasoning
    E123,
    # Reasoning
    E131,
    # Reasoning
    E251
```

It makes sense here to allow users to specify the value this way, but, the standard library’s configparser.RawConfigParser class does return a string that looks like
This means that a typical call to \texttt{str.split()} with \'\,\' will not be sufficient here. Telling \texttt{Flake8} that something is a comma-separated list (e.g., \texttt{comma_separated_list=True}) will handle this for you. \texttt{Flake8} will return:


Next let’s look at how users might like to specify their \texttt{exclude} list. Presently OpenStack’s Nova project has this line in their \texttt{tox.ini}:

\begin{verbatim}
exclude = .venv,.git,.tox,dist,doc,*openstack/common/*,*lib/python*,*egg,build,tools/xenserver*,releasenotes
\end{verbatim}

We think we can all agree that this would be easier to read like this:

\begin{verbatim}
exclude =
  .venv,
  .git,
  .tox,
  dist,
  doc,
  *openstack/common/*,
  *lib/python*,
  *egg,
  build,
  tools/xenserver*,
  releasenotes
\end{verbatim}

In this case, since these are actually intended to be paths, we would specify both \texttt{comma_separated_list=True} and \texttt{normalize_paths=True} because we want the paths to be provided to us with some consistency (either all absolute paths or not).

Now let’s look at how this will actually be used. Most plugin developers will receive an instance of \texttt{OptionManager} so to ease the transition we kept the same API as the \texttt{optparse.OptionParser} object. The only difference is that \texttt{add_option()} accepts the three extra arguments we highlighted above.

\section*{Configuration File Management}

In \texttt{Flake8 2}, configuration file discovery and management was handled by pep8. In pep8’s 1.6 release series, it drastically broke how discovery and merging worked (as a result of trying to improve it). To avoid a dependency breaking \texttt{Flake8} again in the future, we have created our own discovery and management in 3.0.0. In 4.0.0 we have once again changed how this works and we removed support for user-level config files.

\begin{itemize}
  \item Project files (files stored in the current directory) are read next and merged on top of the user file. In other words, configuration in project files takes precedence over configuration in user files.
  \item \textbf{New in 3.0.0} The user can specify --append-config \texttt{<path-to-file>} repeatedly to include extra configuration files that should be read and take precedence over user and project files.
  \item \textbf{New in 3.0.0} The user can specify --config \texttt{<path-to-file>} to so this file is the only configuration file used. This is a change from \texttt{Flake8 2} where pep8 would simply merge this configuration file into the configuration generated by user and project files (where this takes precedence).
  \item \textbf{New in 3.0.0} The user can specify --isolated to disable configuration via discovered configuration files.
\end{itemize}
To facilitate the configuration file management, we’ve taken a different approach to discovery and management of files than pep8. In pep8 1.5, 1.6, and 1.7 configuration discovery and management was centralized in 66 lines of very terse python which was confusing and not very explicit. The terseness of this function (Flake8 3.0.0’s authors believe) caused the confusion and problems with pep8’s 1.6 series. As such, Flake8 has separated out discovery, management, and merging into a module to make reasoning about each of these pieces easier and more explicit (as well as easier to test).

Configuration file discovery and raw ini reading is managed by load_config(). This produces a loaded RawConfigParser and a config directory (which will be used later to normalize paths).

Next, parse_config() parses options using the types in the OptionManager.

Most of this is done in aggregate_options().

### Aggregating Configuration File and Command Line Arguments

aggregate_options() accepts an instance of OptionManager and does the work to parse the command-line arguments.

After parsing the configuration file, we determine the default ignore list. We use the defaults from the OptionManager and update those with the parsed configuration files. Finally we parse the user-provided options one last time using the option defaults and configuration file values as defaults. The parser merges on the command-line specified arguments for us so we have our final, definitive, aggregated options.

### API Documentation

flake8.options.aggregator.aggregate_options(manager, cfg, cfg_dir, argv)

Aggregate and merge CLI and config file options.

**Parameters**

- **manager** (OptionManager) –
- **cfg** (configparser.RawConfigParser) –
- **cfg_dir** (str) –
- **argv** (Sequence[str] | None) –

**Return type**

argparse.Namespace

class flake8.options.manager.Option(short_option_name=_ARG.NO, long_option_name=_ARG.NO, action=_ARG.NO, default=_ARG.NO, type=_ARG.NO, dest=_ARG.NO, narg=_ARG.NO, const=_ARG.NO, choices=_ARG.NO, help=_ARG.NO, metavar=_ARG.NO, callback=_ARG.NO, callback_args=_ARG.NO, callback_kwargs=_ARG.NO, required=_ARG.NO, parse_from_config=False, comma_separated_list=False, normalize_paths=False)

Our wrapper around an argparse argument parsers to add features.

**Parameters**

- **short_option_name** (str | _ARG) –
- **long_option_name** (str | _ARG) –
- **action** (str | type[argparse.Action] | _ARG) –
• default (Any | _ARG) –
• type (str | Callable[..., Any] | _ARG) –
• dest (str | _ARG) –
• nargs (int | str | _ARG) –
• const (Any | _ARG) –
• choices (Sequence[Any] | _ARG) –
• help (str | _ARG) –
• metavar (str | _ARG) –
• callback (Callable[..., Any] | _ARG) –
• callback_args (Sequence[Any] | _ARG) –
• callback_kwargs (Mapping[str, Any] | _ARG) –
• required (bool | _ARG) –
• parse_from_config (bool) –
• comma_separated_list (bool) –
• normalize_paths (bool) –

__init__ (short_option_name=_ARG.NO, long_option_name=_ARG.NO, action=_ARG.NO, default=_ARG.NO, type=_ARG.NO, dest=_ARG.NO, nargs=_ARG.NO, const=_ARG.NO, choices=_ARG.NO, help=_ARG.NO, metavar=_ARG.NO, callback=_ARG.NO, callback_args=_ARG.NO, callback_kwargs=_ARG.NO, required=_ARG.NO, parse_from_config=False, comma_separated_list=False, normalize_paths=False)

Initialize an Option instance.

The following are all passed directly through to argparse.

**Parameters**

• short_option_name (str | _ARG) – The short name of the option (e.g., -x). This will be the first argument passed to ArgumentParser.add_argument

• long_option_name (str | _ARG) – The long name of the option (e.g., --xtra-long-option). This will be the second argument passed to ArgumentParser.add_argument

• default (Any | _ARG) – Default value of the option.

• dest (str | _ARG) – Attribute name to store parsed option value as.

• nargs (int | str | _ARG) – Number of arguments to parse for this option.

• const (Any | _ARG) – Constant value to store on a common destination. Usually used in conjunction with action="store_const".

• choices (Sequence[Any] | _ARG) – Possible values for the option.

• help (str | _ARG) – Help text displayed in the usage information.

• metavar (str | _ARG) – Name to use instead of the long option name for help text.

• required (bool | _ARG) – Whether this option is required or not.

• action (str | type[argparse.Action] | _ARG) –

• type (str | Callable[..., Any] | _ARG) –
• `callback` (*Callable[..., Any] | _ARG*) –
• `callback_args` (*Sequence[Any] | _ARG*) –
• `callback_kwargs` (*Mapping[str, Any] | _ARG*) –
• `parse_from_config` (*bool*) –
• `comma_separated_list` (*bool*) –
• `normalize_paths` (*bool*) –

**Return type**
None

The following options may be passed directly through to argparse but may need some massaging.

**Parameters**

- `type` (*str | Callable[..., Any] | _ARG*) – A callable to normalize the type (as is the case in argparse). Deprecated: you can also pass through type strings such as 'int' which are handled by optparse.

- `action` (*str | type[argparse.Action] | _ARG*) – Any action allowed by argparse. Deprecated: this also understands the action='callback' action from optparse.

- `callback` (*Callable[..., Any] | _ARG*) – Callback used if the action is "callback". Deprecated: please use action= instead.


- `short_option_name` (*str | _ARG*) –

- `long_option_name` (*str | _ARG*) –

- `default` (*Any | _ARG*) –

- `dest` (*str | _ARG*) –

- `nargs` (*int | str | _ARG*) –

- `const` (*Any | _ARG*) –

- `choices` (*Sequence[Any] | _ARG*) –

- `help` (*str | _ARG*) –

- `metavar` (*str | _ARG*) –

- `required` (*bool | _ARG*) –

- `parse_from_config` (*bool*) –

- `comma_separated_list` (*bool*) –

- `normalize_paths` (*bool*) –

**Return type**
None

The following parameters are for Flake8’s option handling alone.
Parameters

- **parse_from_config**(bool) – Whether or not this option should be parsed out of config files.
- **comma_separated_list**(bool) – Whether the option is a comma separated list when parsing from a config file.
- **normalize_paths**(bool) – Whether the option is expecting a path or list of paths and should attempt to normalize the paths to absolute paths.
- **short_option_name**(str | _ARG)
- **long_option_name**(str | _ARG)
- **action**(str | type[argparse.Action] | _ARG)
- **default**(Any | _ARG)
- **type**(str | Callable[..., Any] | _ARG)
- **dest**(str | _ARG)
- **nargs**(int | str | _ARG)
- **const**(Any | _ARG)
- **choices**(Sequence[Any] | _ARG)
- **help**(str | _ARG)
- **metavar**(str | _ARG)
- **callback**(Callable[..., Any] | _ARG)
- **callback_args**(Sequence[Any] | _ARG)
- **callback_kwargs**(Mapping[str, Any] | _ARG)
- **required**(bool | _ARG)

Return type

None

**normalize**(value, *normalize_args)

Normalize the value based on the option configuration.

Parameters

- **value**(Any)
- **normalize_args**(str)

Return type

Any

**to_argparse**(())

Convert a Flake8 Option to argparse add_argument arguments.

Return type

tuple[list[str], dict[str, Any]]

class flake8.options.manager.OptionManager(*, version, plugin_versions, parents)

Manage Options and OptionParser while adding post-processing.

Parameters

- **version**(str)
• `plugin_versions (str)` –

• `parents (list[argparse.ArgumentParser])` –

```python
__init__(*, version, plugin_versions, parents)
```

Initialize an instance of an OptionManager.

Parameters

• `prog` – Name of the actual program (e.g., flake8).
• `version (str)` – Version string for the program.
• `usage` – Basic usage string used by the OptionParser.
• `parents (list[argparse.ArgumentParser])` – A list of ArgumentParser objects whose arguments should also be included.
• `plugin_versions (str)` –

Return type

None

```python
__weakref__
```

list of weak references to the object (if defined)

```python
add_option(*args, **kwargs)
```

Create and register a new option.

See parameters for `Option` for acceptable arguments to this method.

Note: short_option_name and long_option_name may be specified positionally as they are with argparse normally.

Parameters

• `args (Any)` –
• `kwargs (Any)` –

Return type

None

```python
extend_default_ignore(error_codes)
```

Extend the default ignore list with the error codes provided.

Parameters

• `error_codes (Sequence[str])` – List of strings that are the error/warning codes with which to extend the default ignore list.

Return type

None

```python
extend_default_select(error_codes)
```

Extend the default select list with the error codes provided.

Parameters

• `error_codes (Sequence[str])` – List of strings that are the error/warning codes with which to extend the default select list.
```
Return type
None

parse_args(args=None, values=None)
Proxy to calling the OptionParser’s parse_args method.

Parameters

  • **args** (Sequence[str] | None) –
  • **values** (argparse.Namespace | None) –

Return type
argparse.Namespace

register_plugins(plugins)
Register the plugin options (if needed).

Parameters

  • **plugins** (Plugins) –

Return type
None

flake8.options.config.load_config(config, extra, *, isolated=False)
Load the configuration given the user options.

  • in isolated mode, return an empty configuration
  • if a config file is given in config use that, otherwise attempt to discover a configuration using tox.ini / setup.cfg / .flake8
  • finally, load any extra configuration files

Parameters

  • **config** (str | None) –
  • **extra** (list[str]) –
  • **isolated** (bool) –

Return type
tuple[configparser.RawConfigParser, str]

flake8.options.config.parse_config(option_manager, cfg, cfg_dir)
Parse and normalize the typed configuration options.

Parameters

  • **option_manager** (OptionManager) –
  • **cfg** (configparser.RawConfigParser) –
  • **cfg_dir** (str) –

Return type
dict[str, Any]
```
5.1.10 Plugin Handling

Plugin Management

**Flake8** 3.0 added support for other plugins besides those which define new checks. It now supports:

- extra checks
- alternative report formatters

Default Plugins

Finally, **Flake8** has always provided its own plugin shim for Pyflakes. As part of that we carry our own shim in-tree and now store that in `flake8.plugins.pyflakes`.

**Flake8** also registers plugins for pycodestyle. Each check in pycodestyle requires different parameters and it cannot easily be shimmed together like Pyflakes was. As such, plugins have a concept of a “group”. If you look at our `setup.py` you will see that we register pycodestyle checks roughly like so:

```python
pycodestyle.<check-name> = pycodestyle:<check-name>
```

We do this to identify that `<check-name>` is part of a group. This also enables us to special-case how we handle reporting those checks. Instead of reporting each check in the `--version` output, we only report `pycodestyle` once.

API Documentation

```python
flake8.plugins.finder.parse_plugin_options(cfg, cfg_dir, *, enable_extensions, require_plugins)
```

Parse plugin loading related options.

**Parameters**

- `cfg` *(configparser.RawConfigParser)*
- `cfg_dir` *(str)*
- `enable_extensions` *(str | None)*
- `require_plugins` *(str | None)*

**Return type**

PluginOptions

```python
flake8.plugins.finder.find_plugins(cfg, opts)
```

Discovers all plugins (but does not load them).

**Parameters**

- `cfg` *(configparser.RawConfigParser)*
- `opts` *(PluginOptions)*

**Return type**

list[Plugin]

```python
flake8.plugins.finder.load_plugins(plugins, opts)
```

Load and classify all flake8 plugins.

- `first`: extends `sys.path` with `paths` (to import local plugins)
- `next`: converts the Plugin`s to `LoadedPlugins`
• finally: classifies plugins into their specific types

Parameters

• **plugins** *(list[Plugin]) –*
• **opts** *(PluginOptions) –*

Return type

Plugins

### 5.1.11 Utility Functions

**flake8** has a few utility functions that it uses internally.

---

**Warning:** As should be implied by where these are documented, these are all **internal** utility functions. Their signatures and return types may change between releases without notice.

Bugs reported about these **internal** functions will be closed immediately.

If functions are needed by plugin developers, they may be requested in the bug tracker and after careful consideration they *may* be added to the **documented** stable API.

---

`flake8.utils.parse_comma_separated_list(value, regexp=re.compile('[,\s]'))`

Parse a comma-separated list.

**Parameters**

• **value** *(str) –* String to be parsed and normalized.

• **regexp** *(Pattern[str]) –* Compiled regular expression used to split the value when it is a string.

**Returns**

List of values with whitespace stripped.

**Return type**

list[str]

`parse_comma_separated_list()` takes either a string like

```
"E121,W123,F904"
"E121,\W123,\nF804"
" E121,\n\tW123,\n\ttF804 "
" E121\n\t\tW123 \n\ttF804"
```

And converts it to a list that looks as follows

```
["E121", "W123", "F904"]
```

This function helps normalize any kind of comma-separated input you or **flake8** might receive. This is most helpful when taking advantage of **flake8**’s additional parameters to **Option**.

`flake8.utils.normalize_path(path, parent=’’)`

Normalize a single-path.

**Returns**

The normalized path.
Parameters

- path (str)
- parent (str)

Return type

str

This utility takes a string that represents a path and returns the absolute path if the string has a / in it. It also removes trailing /s.

```
flake8.utils.normalize_paths(paths, parent='')
```

Normalize a list of paths relative to a parent directory.

Returns

The normalized paths.

Parameters

- paths (Sequence[str])
- parent (str)

Return type

list[str]

This function utilizes `normalize_path()` to normalize a sequence of paths. See `normalize_path()` for what defines a normalized path.

```
flake8.utils.stdin_get_value()
```

Get and cache it so plugins can use it.

Return type

str

This function retrieves and caches the value provided on `sys.stdin`. This allows plugins to use this to retrieve stdin if necessary.

```
flake8.utils.is_using_stdin(paths)
```

Determine if we’re going to read from stdin.

Parameters

- paths (list[str]) – The paths that we’re going to check.

Returns

True if stdin (-) is in the path, otherwise False

Return type

bool

Another helpful function that is named only to be explicit given it is a very trivial check, this checks if the user specified - in their arguments to Flake8 to indicate we should read from stdin.

```
flake8.utils.fnmatch(filename, patterns)
```

Wrap `fnmatch.fnmatch()` to add some functionality.

Parameters

- filename (str) – Name of the file we’re trying to match.
- patterns (Sequence[str]) – Patterns we’re using to try to match the filename.
- default – The default value if patterns is empty
Returns
True if a pattern matches the filename, False if it doesn’t. True if patterns is empty.

Return type
bool

The standard library’s `fnmatch.fnmatch()` is excellent at deciding if a filename matches a single pattern. In our use case, however, we typically have a list of patterns and want to know if the filename matches any of them. This function abstracts that logic away with a little extra logic.

flake8.utils.parse_unified_diff(diff=None)

Parse the unified diff passed on stdin.

Returns
dictionary mapping file names to sets of line numbers

Parameters
diff (str | None) –

Return type
dict[str, set[int]]

To handle usage of `flake8 --diff`, Flake8 needs to be able to parse the name of the files in the diff as well as the ranges indicated the sections that have been changed. This function either accepts the diff as an argument or reads the diff from standard-in. It then returns a dictionary with filenames as the keys and sets of line numbers as the value.
6.1 Release Notes and History

All of the release notes that have been recorded for Flake8 are organized here with the newest releases first.

6.1.1 5.x Release Series

5.0.4 – 2022-08-03

You can view the 5.0.4 milestone on GitHub for more details.

Bugs Fixed

• Set a lower bound on importlib-metadata to prevent RecursionError (See also #1650, #1653).

5.0.3 – 2022-08-01

You can view the 5.0.3 milestone on GitHub for more details.

Bugs Fixed

• Work around partial reads of configuration files with syntax errors (See also #1647, #1648).

5.0.2 – 2022-08-01

You can view the 5.0.2 milestone on GitHub for more details.
Bugs Fixed

- Fix execution on python == 3.8.0 (See also #1637, #1641).
- Fix config discovery when home does not exist (See also #1640, #1642).

5.0.1 – 2022-07-31

You can view the 5.0.1 milestone on GitHub for more details.

Bugs Fixed

- Fix duplicate plugin discovery on misconfigured pythons (See also #1627, #1631).

5.0.0 – 2022-07-30

You can view the 5.0.0 milestone on GitHub for more details.

Backwards Incompatible Changes

- Remove `indent_size_str` (See also #1411).
- Remove some dead code (See also #1453, #1540, #1541).
- Missing explicitly-specified configuration is now an error (See also #1497, #1498).
- Always read configuration files as UTF-8 (See also #1532, #1533).
- Remove manpage from docs – use `help2man` or related tools instead (See also #1557).
- Forbid invalid plugin codes (See also #325, #1579).

Deprecations

- Deprecate `--diff` option (See also #1389, #1441).

New Dependency Information

- `pycodestyle` has been updated to >= 2.9.0, < 2.10.0 (See also #1626).
- Pyflakes has been updated to >= 2.5.0, < 2.6.0 (See also #1625).
- `mccabe` has been updated to >= 0.7.0, < 0.8.0 (See also #1542).
Features

- Add colors to output, configurable via `--color` (See also #1379, #1440).
- Add `.nox` to the default exclude list (See also #1442, #1443).
- Don’t consider a config file which does not contain flake8 settings (See also #199, #1472).
- Duplicate `local-plugins` names are now allowed (See also #362, #1504).
- Consider . to be a path in config files (See also #1494, #1508)
- Add `--require-plugins` option taking distribution names (See also #283, #1535).
- Improve performance by removing debug logs (See also #1537, #1544).
- Include failing file path in plugin execution error (See also #265, #1543).
- Improve performance by pre-generating a `pycodestyle` plugin (See also #1545).
- Properly differentiate between explicitly ignored / selected and default ignored / selected options (See also #284, #1576, #1609).

Bugs Fixed

- Fix physical line plugins not receiving all lines in the case of triple-quoted strings (See also #1534, #1536).
- Fix duplicate error logging in the case of plugin issues (See also #1538).
- Fix inconsistent ordering of `--ignore` in `--help` (See also #1550, #1552).
- Fix memory leak of style guides by avoiding `@lru_cache` of a method (See also #1573).
- Fix ignoring of configuration files exactly in the home directory (See also #1617, #1618).

6.1.2 4.x Release Series

4.0.1 – 2021-10-11

You can view the 4.0.1 milestone on GitHub for more details.

Bugs Fixed

- Fix parallel execution collecting a `SyntaxError` (See also #1410 #1408).

4.0.0 – 2021-10-10

You can view the 4.0.0 milestone on GitHub for more details.
Backwards Incompatible Changes

- Remove `--install-hook` vcs integration (See also #1008).
- Remove `setuptools` command (See also #1009).
- Migrate from GitLab to GitHub (See also #1305).
- Due to constant confusion by users, user-level `Flake8` configuration files are no longer supported. Files will not be searched for in the user’s home directory (e.g., `~/.flake`) nor in the XDG config directory (e.g., `~/.config/flake8`). (See also #1404).

New Dependency Information

- `pycodestyle` has been updated to >= 2.8.0, < 2.9.0 (See also #1406).
- Pyflakes has been updated to >= 2.4.0, < 2.5.0 (See also #1406).
- `flake8` requires python >= 3.6 (See also #1010).

Features

- Add `--extend-select` option (See also #1312 #1061).
- Automatically create directories for output files (See also #1329).

Bugs Fixed

- `ast` parse before tokenizing to improve `SyntaxError` errors (See also #1320 #740).
- Fix warning in `--indent-size` argparse help (See also #1367).
- Fix handling `SyntaxError` in python 3.10+ (See also #1374 #1372).
- Fix writing non-cp1252-encodable when output is piped on windows (See also #1382 #1381).

6.1.3 3.x Release Series

3.9.2 – 2021-05-08

You can view the 3.9.2 milestone on GitHub for more details.

Bugs Fixed

- Fix error message for E111 in `pycodestyle` (See also #1328, #1327).
Deprecations

- indent_size_str is deprecated, use str(indent_size) instead (See also #1328, #1327).

3.9.1 – 2021-04-15

You can view the 3.9.1 milestone on GitHub for more details.

Bugs Fixed

- Fix codes being ignored by plugins utilizing extend_default_ignore (See also #1317)

3.9.0 – 2021-03-14

You can view the 3.9.0 milestone on GitHub for more details.

New Dependency Information

- Pyflakes has been updated to >= 2.3.0, < 2.4.0 (See also #1006)
- pycodestyle has been updated to >= 2.7.0, < 2.8.0 (See also #1007)

Deprecations

- Drop support for python 3.4 (See also #1283)

Features

- Add --no-show-source option to disable --show-source (See also #995)

Bugs Fixed

- Fix handling of crlf line endings when linting stdin (See also #1002)

3.8.4 – 2020-10-02

You can view the 3.8.4 milestone on GitHub for more details.
Bugs Fixed

- Fix multiprocessing errors on platforms without `sem_open` syscall. (See also #1282)
- Fix skipping of physical checks on the last line of a file which does not end in a newline. (See also #997)

3.8.3 – 2020-06-08

You can view the 3.8.3 milestone on GitHub for more details.

Bugs Fixed

- Also catch `SyntaxError` when tokenizing. (See also #992, #747)
- Fix `--jobs` default display in `flake8 --help`. (See also #1272, #750)

3.8.2 – 2020-05-22

You can view the 3.8.2 milestone on GitHub for more details.

Bugs Fixed

- Improve performance by eliminating unnecessary sort. (See also #991)
- Improve messaging of `--jobs` argument by utilizing `argparse`. (See also #1269, #1110)
- Fix file configuration options to be relative to the config passed on the command line. (See also #442, #736)
- Fix incorrect handling of `--extend-exclude` by treating its values as files. (See also #1271, #738)

3.8.1 – 2020-05-11

You can view the 3.8.1 milestone on GitHub for more details.

Bugs Fixed

- Fix `--output-file` (regression in 3.8.0). (See also #990, #725)

3.8.0 – 2020-05-11

You can view the 3.8.0 milestone on GitHub for more details.
Bugs Fixed

- Fix logical checks which report positions out of bounds (See also #987, #723)
- Fix `--exclude=.*` accidentally matching `.` and `..` (See also #441, #360)

Deprecations

- Add deprecation message for vcs hooks (See also #985, #296)

3.8.0a2 – 2020-04-24

You can view the 3.8.0 milestone on GitHub for more details.

Bugs Fixed

- Fix `type="str"` optparse options (See also #984)

3.8.0a1 – 2020-04-24

You can view the 3.8.0 milestone on GitHub for more details.

New Dependency Information

- Remove dependency on `entrypoints` and add dependency on `importlib-metadata` (only for python<3.8) (See also #1297, #297)
- Pyflakes has been updated to >= 2.2.0, < 2.3.0 (See also #982)
- pycodestyle has been updated to >= 2.6.0a1, < 2.7.0 (See also #983)

Features

- Add `--extend-exclude` option to add to `--exclude` without overwriting (See also #1211, #1091)
- Move argument parsing from `optparse` to `argparse` (See also #939)
- Group plugin options in `--help` (See also #1219, #294)
- Remove parsing of `verbose` from configuration files as it was not consistently applied (See also #1245, #245)
- Remove parsing of `output_file` from configuration files as it was not consistently applied (See also #1246)
- Resolve configuration files relative to `cwd` instead of common prefix of passed filenames. You may need to change `flake8 subproject to cd subproject && flake8 .` (See also #952)
- Officially support python3.8 (See also #963)
- `--disable-noqa` now also disables `# flake8: noqa` (See also #1296, #318)
- Ensure that a missing file produces a E902 error (See also #1262, #328)
- `# noqa` comments now apply to all of the lines in an explicit \ continuation or in a line continued by a multi-line string (See also #1266, #621)
Bytecode compilation

3.7.9 – 2019-10-28

You can view the 3.7.9 milestone on GitHub for more details.

Bugs Fixed

• Disable multiprocessing when the multiprocessing method is spawn (such as on macos in python3.8) (See also #956, #315)

3.7.8 – 2019-07-08

You can view the 3.7.8 milestone on GitHub for more details.
Bugs Fixed

- Fix handling of `Application.parse_preliminary_options_and_args` when `argv` is an empty list (See also #1303, #694)
- Fix crash when a file parses but fails to tokenize (See also #1210, #1088)
- Log the full traceback on plugin exceptions (See also #926)
- Fix `# noqa: ...` comments with multi-letter codes (See also #931, #1101)

3.7.7 – 2019-02-25

You can view the 3.7.7 milestone on GitHub for more details.

Bugs Fixed

- Fix crashes in plugins causing flake8 to hang while unpickling errors (See also #1206, #681)

3.7.6 – 2019-02-18

You can view the 3.7.6 milestone on GitHub for more details.

Bugs Fixed

- Fix `--per-file-ignores` for multi-letter error codes (See also #1203, #683)
- Improve flake8 speed when only 1 filename is passed (See also #1204)

3.7.5 – 2019-02-04

You can view the 3.7.5 milestone on GitHub for more details.

Bugs Fixed

- Fix reporting of pyflakes “referenced before assignment” error (See also #923, #679)

3.7.4 – 2019-01-31

You can view the 3.7.4 milestone on GitHub for more details.
Bugs Fixed

• Fix performance regression with lots of per-file-ignores and errors (See also #922, #677)

3.7.3 – 2019-01-30

You can view the 3.7.3 milestone on GitHub for more details.

Bugs Fixed

• Fix imports of typing in python 3.5.0 / 3.5.1 (See also #1199, #674)
• Fix flake8 --statistics (See also #920, #675)
• Gracefully ignore flake8-per-file-ignores plugin if installed (See also #1201, #671)
• Improve error message for malformed per-file-ignores (See also #921, #288)

3.7.2 – 2019-01-30

You can view the 3.7.2 milestone on GitHub for more details.

Bugs Fixed

• Fix broken flake8 --diff (regressed in 3.7.0) (See also #919, #667)
• Fix typo in plugin exception reporting (See also #908, #668)
• Fix AttributeError while attempting to use the legacy api (regressed in 3.7.0) (See also #1198, #673)

3.7.1 – 2019-01-30

You can view the 3.7.1 milestone on GitHub for more details.

Bugs Fixed

• Fix capitalized filenames in per-file-ignores setting (See also #917, #287)

3.7.0 – 2019-01-29

You can view the 3.7.0 milestone on GitHub for more details.
New Dependency Information

- Add dependency on `entrypoints` >= 0.3, < 0.4 (See also #897, #1197)
- Pyflakes has been updated to >= 2.1.0, < 2.2.0 (See also #912, #913)
- `pycodestyle` has been updated to >= 2.5.0, < 2.6.0 (See also #915)

Features

- Add support for `per-file-ignores` (See also #892, #511, #911, #277)
- Enable use of `float` and `complex` option types (See also #894, #258)
- Improve startup performance by switching from `pkg_resources` to `entrypoints` (See also #897)
- Add metadata for use through the `pre-commit` git hooks framework (See also #901, #1196)
- Allow physical line checks to return more than one result (See also #902)
- Allow `# noqa:X123` comments without space between the colon and codes list (See also #906, #276)
- Remove broken and unused `flake8.listen` plugin type (See also #907, #663)

3.6.0 – 2018-10-23

You can view the 3.6.0 milestone on GitHub for more details.

New Dependency Information

- `pycodestyle` has been updated to >= 2.4.0, < 2.5.0 (See also #1068, #652, #869, #881, #1239)
- Pyflakes has been updated to >= 2.0.0, < 2.1.0 (See also #655, #883)
- `flake8` requires python 2.x >= 2.7 or python 3.x >= 3.4 (See also #876)

Features

- Add `paths` to allow local plugins to exist outside of `sys.path` (See also #1067, #1237)
- Copy `setup.cfg` files to the temporary git hook execution directory (See also #1299)
- Only skip a file if `# flake8: noqa` is on a line by itself (See also #259, #873)
- Provide a better user experience for broken plugins (See also #1178)
- Report `E902` when a file passed on the command line does not exist (See also #645, #878)
- Add `--extend-ignore` for extending the default `ignore` instead of overriding it (See also #1061, #1180)
Bugs Fixed

- Respect a formatter’s newline setting when printing (See also #1238)
- Fix leaking of processes in the legacy api (See also #650, #879)
- Fix a SyntaxWarning for an invalid escape sequence (See also #1186)
- Fix DeprecationWarning due to import of abc classes from the collections module (See also #887)
- Defer setuptools import to improve flake8 startup time (See also #1190)
- Fix inconsistent line endings in FileProcessor.lines when running under python 3.x (See also #263, #889)

3.5.0 – 2017-10-23

You can view the 3.5.0 milestone on GitHub for more details.

New Dependency Information

- Allow for PyFlakes 1.6.0 (See also #1058)
- Start using new PyCodestyle checks for bare excepts and ambiguous identifier (See also #611)

Features

- Print out information about configuring VCS hooks (See also #586)
- Allow users to develop plugins “local” to a repository without using setuptools. See our documentation on local plugins for more information. (See also #608)

Bugs Fixed

- Catch and helpfully report UnicodeDecodeErrors when parsing configuration files. (See also #609)

3.4.1 – 2017-07-28

You can view the 3.4.1 milestone on GitHub for more details.

- Fix minor regression when users specify only a --select list with items in the enabled/extended select list. (See also #605)

3.4.0 – 2017-07-27

You can view the 3.4.0 milestone on GitHub for more details.

- Refine logic around --select and --ignore when combined with the default values for each. (See also #572)
- Handle spaces as an alternate separate for error codes, e.g., --ignore 'E123  E234'. (See also #580)
- Filter out empty select and ignore codes, e.g., --ignore E123 , ,E234. (See also #581)
- Specify dependencies appropriately in setup.py (See also #592)
- Fix bug in parsing --quiet and --verbose from config files. (See also #1169)
• Remove unused import of `os` in the git hook template (See also #1170)

3.3.0 – 2017-02-06

You can view the 3.3.0 milestone on GitHub for more details.

• Add support for Python 3.6 (via dependencies). **Note** Flake8 does not guarantee that all plugins will support Python 3.6.
• Added unique error codes for all missing PyFlakes messages. (14 new codes, see “Error / Violation Codes”)
• Dramatically improve the performance of Flake8. (See also #829)
• Display the local file path instead of the temporary file path when using the git hook. (See also #176)
• Add methods to Report class that will be called when Flake8 starts and finishes processing a file. (See also #183)
• Fix problem where hooks should only check *.py files. (See also #200)
• Fix handling of SyntaxErrors that do not include physical line information. (See also #542)
• Update upper bound on PyFlakes to allow for PyFlakes 1.5.0. (See also #549)
• Update setuptools integration to less eagerly deduplicate packages. (See also #552)
• Force `flake8 --version` to be repeatable between invocations. (See also #554)

3.2.1 – 2016-11-21

You can view the 3.2.1 milestone on GitHub for more details.

• Fix subtle bug when deciding whether to report an on-by-default’s violation (See also #189)
• Fix another bug around SyntaxErrors not being reported at the right column and row (See also #191 and #169 for a related, previously fixed bug)
• Fix regression from 2.x where we run checks against explicitly provided files, even if they don’t match the file-name patterns. (See also #198)

3.2.0 – 2016-11-14

You can view the 3.2.0 milestone on GitHub for more details.

• Allow for pycodestyle 2.2.0 which fixes a bug in E305 (See also #188)

3.1.1 – 2016-11-14

You can view the 3.1.1 milestone on GitHub for more details.

• Do not attempt to install/distribute a man file with the Python package; leave this for others to do. (See also #186)
• Fix packaging bug where wheel version constraints specified in setup.cfg did not match the constraints in setup.py. (See also #187)
3.1.0 – 2016-11-14

You can view the 3.1.0 milestone on GitHub for more details.

- Add --bug-report flag to make issue reporters’ lives easier.
- Collect configuration files from the current directory when using our Git hook. (See also #142, #150, #155)
- Avoid unhandled exceptions when dealing with SyntaxErrors. (See also #146, #170)
- Exit early if the value for --diff is empty. (See also #158)
- Handle empty --stdin-display-name values. (See also #167)
- Properly report the column number of Syntax Errors. We were assuming that all reports of column numbers were 0-indexed, however, SyntaxErrors report the column number as 1-indexed. This caused us to report a column number that was 1 past the actual position. Further, when combined with SyntaxErrors that occur at a newline, this caused the position to be visually off by two. (See also #169)
- Fix the behaviour of --enable-extensions. Previously, items specified here were still ignored due to the fact that the off-by-default extension codes were being left in the ignore list. (See also #171)
- Fix problems around --select and --ignore behaviour that prevented codes that were neither explicitly selected nor explicitly ignored from being reported. (See also #174)
- Truly be quiet when the user specifies -q one or more times. Previously, we were showing the if the user specified -q and --show-source. We have fixed this bug. (See also #177)
- Add new File Processor attribute, previous_unindented_logical_line to accommodate pycodestyle 2.1.0. (See also #178)
- When something goes wrong, exit non-zero. (See also #180, #141)
- Add --tee as an option to allow use of --output-file and printing to standard out.
- Allow the git plugin to actually be lazy when collecting files.
- Allow for pycodestyle 2.1 series and pyflakes 1.3 series.

3.0.4 – 2016-08-08

- Side-step a Pickling Error when using Flake8 with multiprocessing on Unix systems. (See also #1014)
- Fix an Attribute Error raised when dealing with Invalid Syntax. (See also #539)
- Fix an unhandled Syntax Error when tokenizing files. (See also #540)

3.0.3 – 2016-07-30

- Disable --jobs for any version of Python on Windows. (See also this Python bug report)
- Raise exception when entry_point in plugin not callable. This raises an informative error when a plugin fails to load because its entry_point is not callable, which can happen with a plugin which is buggy or not updated for the current version of flake8. This is nicer than raising a PicklingError about failing to pickle a module (See also #1014)
- Fix # noqa comments followed by a : and explanation broken by 3.0.0 (See also #1025)
- Always open our output file in append mode so we do not overwrite log messages. (See also #535)
- When normalizing path values read from configuration, keep in context the directory where the configuration was found so that relative paths work. (See also #1036)
• Fix issue where users were unable to ignore plugin errors that were on by default. (See also #1037)
• Fix our legacy API StyleGuide’s init_report method to actually override the previous formatter. (See also #136)

3.0.2 – 2016-07-26

• Fix local config file discovery. (See also #528)
• Fix indexing of column numbers. We accidentally were starting column indices at 0 instead of 1.
• Fix regression in handling of errors like E402 that rely on a combination of attributes. (See also #530)

3.0.1 – 2016-07-25

• Fix regression in handling of # noqa for multiline strings. (See also #1024)
• Fix regression in handling of --output-file when not also using --verbose. (See also #1026)
• Fix regression in handling of --quiet. (See also #1026)
• Fix regression in handling of --statistics. (See also #1026)

3.0.0 – 2016-07-25

• Rewrite our documentation from scratch! (https://flake8.pycqa.org)
• Drop explicit support for Pythons 2.6, 3.2, and 3.3.
• Remove dependence on pep8/pycodestyle for file processing, plugin dispatching, and more. We now control all of this while keeping backwards compatibility.
• --select and --ignore can now both be specified and try to find the most specific rule from each. For example, if you do --select E --ignore E123 then we will report everything that starts with E except for E123. Previously, you would have had to do --ignore E123,F,W which will also still work, but the former should be far more intuitive.
• Add support for in-line # noqa comments to specify only the error codes to be ignored, e.g., # noqa: E123, W503
• Add entry-point for formatters as well as a base class that new formatters can inherit from. See the documentation for more details.
• Add detailed verbose output using the standard library logging module.
• Enhance our usage of optparse for plugin developers by adding new parameters to the add_option that plugins use to register new options.
• Update --install-hook to require the name of version control system hook you wish to install a Flake8.
• Stop checking sub-directories more than once via the setuptools command
• When passing a file on standard-in, allow the caller to specify --stdin-display-name so the output is properly formatted
• The Git hook now uses sys.executable to format the shebang line. This allows Flake8 to install a hook script from a virtualenv that points to that virtualenv’s Flake8 as opposed to a global one (without the virtualenv being sourced).
• Print results in a deterministic and consistent ordering when used with multiprocessing
• When using --count, the output is no longer written to stderr.

• AST plugins can either be functions or classes and all plugins can now register options so long as there are callable attributes named as we expect.

• Stop forcibly re-adding .tox, .eggs, and *.eggs to --exclude. Flake8 2.x started always appending those three patterns to any exclude list (including the default and any user supplied list). Flake8 3 has stopped adding these in, so you may see errors when upgrading due to these patterns no longer being forcibly excluded by default if you have your own exclude patterns specified.

To fix this, add the appropriate patterns to your exclude patterns list.

**Note:** This item was added in November of 2016, as a result of a bug report.

## 6.1.4 2.x Release Series

### 2.6.2 - 2016-06-25

• **Bug** Fix packaging error during release process.

### 2.6.1 - 2016-06-25

• **Bug** Update the config files to search for to include setup.cfg and tox.ini. This was broken in 2.5.5 when we stopped passing config_file to our Style Guide

### 2.6.0 - 2016-06-15

• **Requirements Change** Switch to pycodestyle as all future pep8 releases will use that package name

• **Improvement** Allow for Windows users on *select* versions of Python to use --jobs and multiprocessing

• **Improvement** Update bounds on McCabe

• **Improvement** Update bounds on PyFlakes and blacklist known broken versions

• **Improvement** Handle new PyFlakes warning with a new error code: F405

### 2.5.5 - 2016-06-14

• **Bug** Fix setuptools integration when parsing config files

• **Bug** Don't pass the user's config path as the config_file when creating a StyleGuide
2.5.4 - 2016-02-11

• Bug Missed an attribute rename during the v2.5.3 release.

2.5.3 - 2016-02-11

• Bug Actually parse output_file and enable_extensions from config files

2.5.2 - 2016-01-30

• Bug Parse output_file and enable_extensions from config files
• Improvement Raise upper bound on mccabe plugin to allow for version 0.4.0

2.5.1 - 2015-12-08

• Bug Properly look for .flake8 in current working directory (#458)
• Bug Monkey-patch pep8.stdin_get_value to cache the actual value in stdin. This helps plugins relying on the function when run with multiprocessing. (#460, #462)

2.5.0 - 2015-10-26

• Improvement Raise cap on PyFlakes for Python 3.5 support
• Improvement Avoid deprecation warnings when loading extensions (#102, #445)
• Improvement Separate logic to enable “off-by-default” extensions (#110)
• Bug Properly parse options to setuptools Flake8 command (#408)
• Bug Fix exceptions when output on stdout is truncated before Flake8 finishes writing the output (#112)
• Bug Fix error on OS X where Flake8 can no longer acquire or create new semaphores (#117)

2.4.1 - 2015-05-18

• Bug Do not raise a SystemError unless there were errors in the setuptools command. (#82, #390)
• Bug Do not verify dependencies of extensions loaded via entry-points.
• Improvement Blacklist versions of pep8 we know are broken

2.4.0 - 2015-03-07

• Bug Print filenames when using multiprocessing and -q option. (#74)
• Bug Put upper cap on dependencies. The caps for 2.4.0 are:
  – pep8 < 1.6 (Related to #78)
  – mccabe < 0.4
  – pyflakes < 0.9
See also #75

6.1. Release Notes and History
• **Bug** Files excluded in a config file were not being excluded when flake8 was run from a git hook. (#2)
• **Improvement** Print warnings for users who are providing mutually exclusive options to flake8. (#51, #386)
• **Feature** Allow git hook configuration to live in .git/config. See the updated VCS hooks docs for more details. (#387)

**2.3.0 - 2015-01-04**

• **Feature**: Add --output-file option to specify a file to write to instead of stdout.
• **Bug** Fix interleaving of output while using multiprocessing (#60)

**2.2.5 - 2014-10-19**

• Flush standard out when using multiprocessing
• Make the check for “# flake8: noqa” more strict

**2.2.4 - 2014-10-09**

• Fix bugs triggered by turning multiprocessing on by default (again)
  Multiprocessing is forcibly disabled in the following cases:
  – Passing something in via stdin
  – Analyzing a diff
  – Using windows
• Fix –install-hook when there are no config files present for pep8 or flake8.
• Fix how the setuptools command parses excludes in config files
• Fix how the git hook determines which files to analyze (Thanks Chris Buccella!)

**2.2.3 - 2014-08-25**

• Actually turn multiprocessing on by default

**2.2.2 - 2014-07-04**

• Re-enable multiprocessing by default while fixing the issue Windows users were seeing.

**2.2.1 - 2014-06-30**

• Turn off multiple jobs by default. To enable automatic use of all CPUs, use --jobs=auto. Fixes #155 and #154.
2.2.0 - 2014-06-22

- New option `doctests` to run Pyflakes checks on doctests too
- New option `jobs` to launch multiple jobs in parallel
- Turn on using multiple jobs by default using the CPU count
- Add support for `python -m flake8` on Python 2.7 and Python 3
- Fix Git and Mercurial hooks: issues #88, #133, #148 and #149
- Fix crashes with Python 3.4 by upgrading dependencies
- Fix traceback when running tests with Python 2.6
- Fix the setuptools command `python setup.py flake8` to read the project configuration

2.1.0 - 2013-10-26

- Add FLAKE8_LAZY and FLAKE8_IGNORE environment variable support to git and mercurial hooks
- Force git and mercurial hooks to respect configuration in setup.cfg
- Only check staged files if that is specified
- Fix hook file permissions
- Fix the git hook on python 3
- Ignore non-python files when running the git hook
- Ignore .tox directories by default
- Flake8 now reports the column number for PyFlakes messages

2.0.0 - 2013-02-23

- Pyflakes errors are prefixed by an F instead of an E
- McCabe complexity warnings are prefixed by a C instead of a W
- Flake8 supports extensions through entry points
- Due to the above support, we require setuptools
- We publish the documentation
- Fixes #13: pep8, pyflakes and mccabe become external dependencies
- Split run.py into main.py, engine.py and hooks.py for better logic
- Expose our parser for our users
- New feature: Install git and hg hooks automagically
- By relying on pyflakes (0.6.1), we also fixed #45 and #35
6.1.5 1.x Release Series

1.7.0 - 2012-12-21

- Fixes part of #35: Exception for no WITHITEM being an attribute of Checker for Python 3.3
- Support stdin
- Incorporate @phd's builtins pull request
- Fix the git hook
- Update pep8.py to the latest version

1.6.2 - 2012-11-25

- fixed the NameError: global name ‘message’ is not defined (#46)

1.6.1 - 2012-11-24

- fixed the mercurial hook, a change from a previous patch was not properly applied
- fixed an assumption about warnings/error messages that caused an exception to be thrown when McCabe is used

1.6 - 2012-11-16

- changed the signatures of the check_file function in flake8/run.py, skip_warning in flake8/util.py and the check, checkPath functions in flake8/pyflakes.py.
- fix --exclude and --ignore command flags (#14, #19)
- fix the git hook that wasn't catching files not already added to the index (#29)
- pre-emptively includes the addition to pep8 to ignore certain lines. Add # nopep8 to the end of a line to ignore it. (#37)
- check_file can now be used without any special prior setup (#21)
- unpacking exceptions will no longer cause an exception (#20)
- fixed crash on non-existent file (#38)

1.5 - 2012-10-13

- fixed the stdin
- make sure mccabe catches the syntax errors as warnings
- pep8 upgrade
- added max_line_length default value
- added Flake8Command and entry points if setuptools is around
- using the setuptools console wrapper when available
1.4 - 2012-07-12

- git_hook: Only check staged changes for compliance
- use pep8 1.2

1.3.1 - 2012-05-19

- fixed support for Python 2.5

1.3 - 2012-03-12

- fixed false W402 warning on exception blocks.

1.2 - 2012-02-12

- added a git hook
- now Python 3 compatible
- mccabe and pyflakes have warning codes like pep8 now

1.1 - 2012-02-14

- fixed the value returned by --version
- allow the flake8: header to be more generic
- fixed the “hg hook raises ‘physical lines’” bug
- allow three argument form of raise
- now uses setuptools if available, for ‘develop’ command

1.0 - 2011-11-29

- Deactivates by default the complexity checker
- Introduces the complexity option in the HG hook and the command line.

6.1.6 0.x Release Series

0.9 - 2011-11-09

- update pep8 version to 0.6.1
- mccabe check: gracefully handle compile failure
0.8 - 2011-02-27

- fixed hg hook
- discard unexisting files on hook check

0.7 - 2010-02-18

- Fix pep8 initialization when run through Hg
- Make pep8 short options work when run through the command line
- Skip duplicates when controlling files via Hg

0.6 - 2010-02-15

- Fix the McCabe metric on some loops
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