pathlib Documentation

Release 1.0.1

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Contents

Manipulating filesystem paths as string objects can quickly become cumbersome: multiple calls to `os.path.join()` or `os.path.dirname()`, etc. This module offers a set of classes featuring all the common operations on paths in an easy, object-oriented way.

This module is best used with Python 3.2 or later, but it is also compatible with Python 2.6 and 2.7.

Note: This module has been included in the Python 3.4 standard library after **PEP 428** acceptance. You only need to install it for Python 3.3 or older.

See also:

PEP 428: Rationale for the final pathlib design and API.

CHAPTER 1

Download

Standalone releases are available on PyPI: http://pypi.python.org/pypi/pathlib/

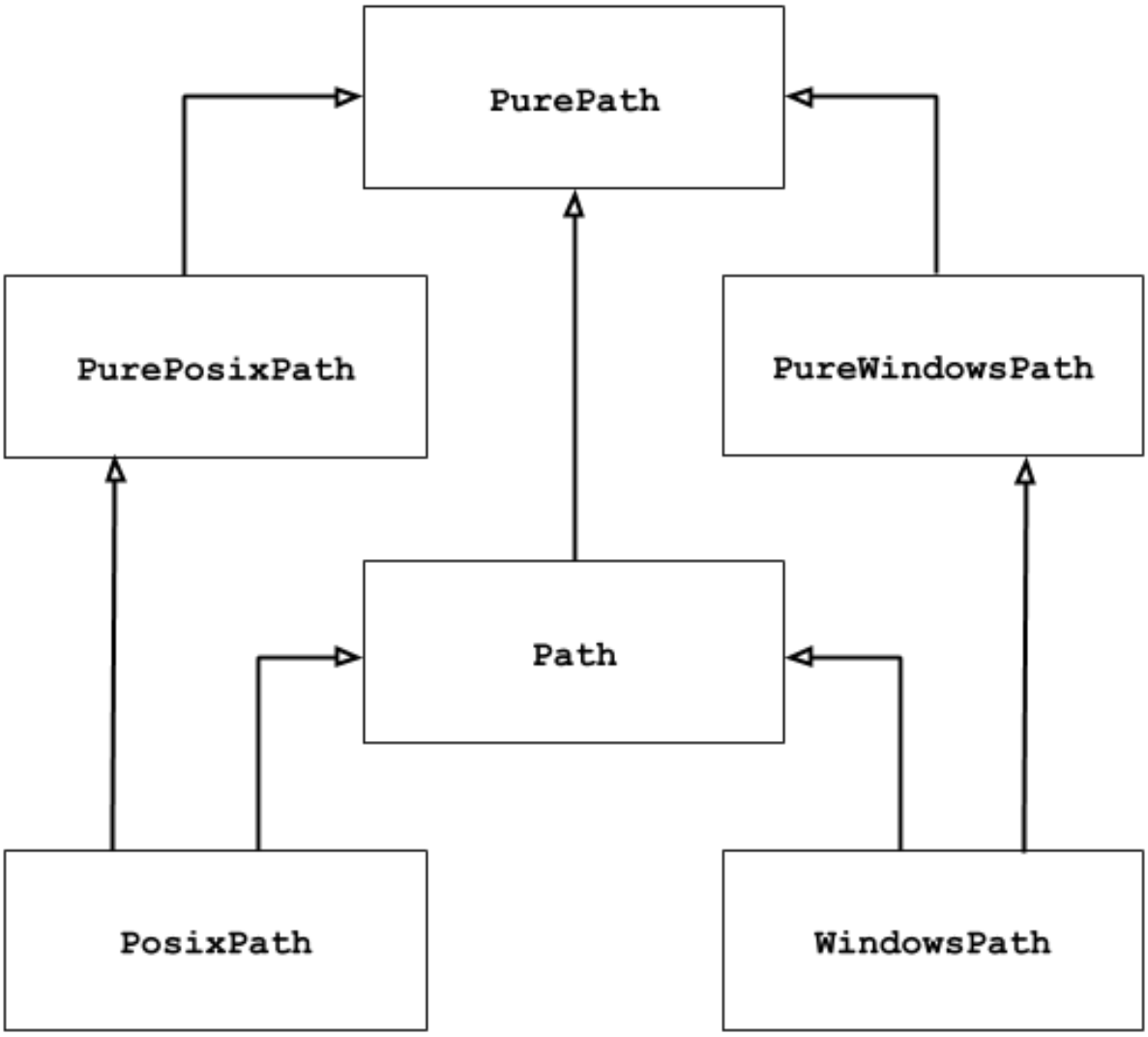
Main development now takes place in the Python standard library: see the Python developer's guide.

The maintenance repository for this standalone backport module can be found on BitBucket, but activity is expected to be quite low: https://bitbucket.org/pitrou/pathlib/

CHAPTER 2

High-level view

This module offers classes representing filesystem paths with semantics appropriate for different operating systems. Path classes are divided between *pure paths*, which provide purely computational operations without I/O, and *concrete paths*, which inherit from pure paths but also provide I/O operations.



If you've never used this module before or just aren't sure which class is right for your task, `Path` is most likely what you need. It instantiates a *concrete path* for the platform the code is running on.

Pure paths are useful in some special cases; for example:

1. If you want to manipulate Windows paths on a Unix machine (or vice versa). You cannot instantiate a `WindowsPath` when running on Unix, but you can instantiate `PureWindowsPath`.
2. You want to make sure that your code only manipulates paths without actually accessing the OS. In this case, instantiating one of the pure classes may be useful since those simply don't have any OS-accessing operations.

CHAPTER 3

Basic use

Importing the module classes:

```
>>> from pathlib import *
```

Listing subdirectories:

```
>>> p = Path('.')
>>> [x for x in p.iterdir() if x.is_dir()]
[PosixPath('.hg'), PosixPath('docs'), PosixPath('dist'),
 PosixPath('__pycache__'), PosixPath('build')]
```

Listing Python source files in this directory tree:

```
>>> list(p.glob('**/*.py'))
[PosixPath('test_pathlib.py'), PosixPath('setup.py'),
 PosixPath('pathlib.py'), PosixPath('docs/conf.py'),
 PosixPath('build/lib/pathlib.py')]
```

Navigating inside a directory tree:

```
>>> p = Path('/etc')
>>> q = p / 'init.d' / 'reboot'
>>> q
PosixPath('/etc/init.d/reboot')
>>> q.resolve()
PosixPath('/etc/rc.d/init.d/halt')
```

Querying path properties:

```
>>> q.exists()
True
>>> q.is_dir()
False
```

Opening a file:

```
>>> with q.open() as f: f.readline()
...
'#!/bin/bash\n'
```

CHAPTER 4

Pure paths

Pure path objects provide path-handling operations which don't actually access a filesystem. There are three ways to access these classes, which we also call *flavours*:

class pathlib.**PurePath**(**pathsegments*)

A generic class that represents the system's path flavour (instantiating it creates either a PurePosixPath or a PureWindowsPath):

```
>>> PurePath('setup.py')      # Running on a Unix machine
PurePosixPath('setup.py')
```

Each element of *pathsegments* can be either a string or bytes object representing a path segment; it can also be another path object:

```
>>> PurePath('foo', 'some/path', 'bar')
PurePosixPath('foo/some/path/bar')
>>> PurePath(Path('foo'), Path('bar'))
PurePosixPath('foo/bar')
```

When *pathsegments* is empty, the current directory is assumed:

```
>>> PurePath()
PurePosixPath('.')
```

When several absolute paths are given, the last is taken as an anchor (mimicking os.path.join()'s behaviour):

```
>>> PurePath('/etc', '/usr', 'lib64')
PurePosixPath('/usr/lib64')
>>> PureWindowsPath('c:/Windows', 'd:bar')
PureWindowsPath('d:bar')
```

However, in a Windows path, changing the local root doesn't discard the previous drive setting:

```
>>> PureWindowsPath('c:/Windows', '/Program Files')
PureWindowsPath('c:/Program Files')
```

Spurious slashes and single dots are collapsed, but double dots ('..') are not, since this would change the meaning of a path in the face of symbolic links:

```
>>> PurePath('foo//bar')
PurePosixPath('foo/bar')
>>> PurePath('foo/./bar')
PurePosixPath('foo/bar')
>>> PurePath('foo/../bar')
PurePosixPath('foo/../bar')
```

(a naïve approach would make `PurePosixPath('foo/../bar')` equivalent to `PurePosixPath('bar')`, which is wrong if `foo` is a symbolic link to another directory)

class `pathlib.`**`PurePosixPath`**`(`*pathsegments*`)`
A subclass of `PurePath`, this path flavour represents non-Windows filesystem paths:

```
>>> PurePosixPath('/etc')
PurePosixPath('/etc')
```

pathsegments is specified similarly to `PurePath`.

class `pathlib.`**`PureWindowsPath`**`(`*pathsegments*`)`
A subclass of `PurePath`, this path flavour represents Windows filesystem paths:

```
>>> PureWindowsPath('c:/Program Files/')
PureWindowsPath('c:/Program Files')
```

pathsegments is specified similarly to `PurePath`.

Regardless of the system you're running on, you can instantiate all of these classes, since they don't provide any operation that does system calls.

4.1 General properties

Paths are immutable and hashable. Paths of a same flavour are comparable and orderable. These properties respect the flavour's case-folding semantics:

```
>>> PurePosixPath('foo') == PurePosixPath('FOO')
False
>>> PureWindowsPath('foo') == PureWindowsPath('FOO')
True
>>> PureWindowsPath('FOO') in { PureWindowsPath('foo') }
True
>>> PureWindowsPath('C:') < PureWindowsPath('d:')
True
```

Paths of a different flavour compare unequal and cannot be ordered:

```
>>> PureWindowsPath('foo') == PurePosixPath('foo')
False
>>> PureWindowsPath('foo') < PurePosixPath('foo')
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
TypeError: unorderable types: PureWindowsPath() < PurePosixPath()
```

4.2 Operators

The slash operator helps create child paths, similarly to `os.path.join`:

```
>>> p = PurePath('/etc')
>>> p
PurePosixPath('/etc')
>>> p / 'init.d' / 'apache2'
PurePosixPath('/etc/init.d/apache2')
```

```
>>> q = PurePath('bin')
>>> '/usr' / q
PurePosixPath('/usr/bin')
```

The string representation of a path is the raw filesystem path itself (in native form, e.g. with backslashes under Windows), which you can pass to any function taking a file path as a string:

```
>>> p = PurePath('/etc')
>>> str(p)
'/etc'
>>> p = PureWindowsPath('c:/Program Files')
>>> str(p)
'c:\\Program Files'
```

Similarly, calling `bytes` on a path gives the raw filesystem path as a bytes object, as encoded by `os.fsencode`:

```
>>> bytes(p)
b'/etc'
```

4.3 Accessing individual parts

To access the individual "parts" (components) of a path, use the following property:

`PurePath.`**`parts`**

A tuple giving access to the path's various components:

```
>>> p = PurePath('/usr/bin/python3')
>>> p.parts
('/', 'usr', 'bin', 'python3')

>>> p = PureWindowsPath('c:/Program Files/PSF')
>>> p.parts
('c:\\', 'Program Files', 'PSF')
```

(note how the drive and local root are regrouped in a single part)

4.4 Methods and properties

Pure paths provide the following methods and properties:

`PurePath.`**`drive`**

A string representing the drive letter or name, if any:

```
>>> PureWindowsPath('c:/Program Files/').drive
'c:'
>>> PureWindowsPath('/Program Files/').drive
''
>>> PurePosixPath('/etc').drive
''
```

UNC shares are also considered drives:

```
>>> PureWindowsPath('//host/share/foo.txt').drive
'\\\\host\\share'
```

PurePath.**root**
A string representing the (local or global) root, if any:

```
>>> PureWindowsPath('c:/Program Files/').root
'\\'
>>> PureWindowsPath('c:Program Files/').root
''
>>> PurePosixPath('/etc').root
'/'
```

UNC shares always have a root:

```
>>> PureWindowsPath('//host/share').root
'\\'
```

PurePath.**anchor**
The concatenation of the drive and root:

```
>>> PureWindowsPath('c:/Program Files/').anchor
'c:\\'
>>> PureWindowsPath('c:Program Files/').anchor
'c:'
>>> PurePosixPath('/etc').anchor
'/'
>>> PureWindowsPath('//host/share').anchor
'\\\\host\\share\\'
```

PurePath.**parents**
An immutable sequence providing access to the logical ancestors of the path:

```
>>> p = PureWindowsPath('c:/foo/bar/setup.py')
>>> p.parents[0]
PureWindowsPath('c:/foo/bar')
>>> p.parents[1]
PureWindowsPath('c:/foo')
>>> p.parents[2]
PureWindowsPath('c:/')
```

PurePath.**parent**
The logical parent of the path:

```
>>> p = PurePosixPath('/a/b/c/d')
>>> p.parent
PurePosixPath('/a/b/c')
```

You cannot go past an anchor, or empty path:

```
>>> p = PurePosixPath('/')
>>> p.parent
PurePosixPath('/')
>>> p = PurePosixPath('.')
>>> p.parent
PurePosixPath('.')
```

Note: This is a purely lexical operation, hence the following behaviour:

```
>>> p = PurePosixPath('foo/..')
>>> p.parent
PurePosixPath('foo')
```

If you want to walk an arbitrary filesystem path upwards, it is recommended to first call `Path.resolve()` so as to resolve symlinks and eliminate ".." components.

`PurePath.`**`name`**

A string representing the final path component, excluding the drive and root, if any:

```
>>> PurePosixPath('my/library/setup.py').name
'setup.py'
```

UNC drive names are not considered:

```
>>> PureWindowsPath('//some/share/setup.py').name
'setup.py'
>>> PureWindowsPath('//some/share').name
''
```

`PurePath.`**`suffix`**

The file extension of the final component, if any:

```
>>> PurePosixPath('my/library/setup.py').suffix
'.py'
>>> PurePosixPath('my/library.tar.gz').suffix
'.gz'
>>> PurePosixPath('my/library').suffix
''
```

`PurePath.`**`suffixes`**

A list of the path's file extensions:

```
>>> PurePosixPath('my/library.tar.gar').suffixes
['.tar', '.gar']
>>> PurePosixPath('my/library.tar.gz').suffixes
['.tar', '.gz']
>>> PurePosixPath('my/library').suffixes
[]
```

`PurePath.`**`stem`**

The final path component, without its suffix:

```
>>> PurePosixPath('my/library.tar.gz').stem
'library.tar'
>>> PurePosixPath('my/library.tar').stem
'library'
>>> PurePosixPath('my/library').stem
'library'
```

`PurePath.`**`as_posix`**`()`

Return a string representation of the path with forward slashes (`/`):

```
>>> p = PureWindowsPath('c:\\windows')
>>> str(p)
'c:\\windows'
>>> p.as_posix()
'c:/windows'
```

`PurePath.`**`as_uri`**`()`

Represent the path as a `file` URI. `ValueError` is raised if the path isn't absolute.

```
>>> p = PurePosixPath('/etc/passwd')
>>> p.as_uri()
```

```
'file:///etc/passwd'
>>> p = PureWindowsPath('c:/Windows')
>>> p.as_uri()
'file:///c:/Windows'
```

PurePath.**is_absolute**()
Return whether the path is absolute or not. A path is considered absolute if it has both a root and (if the flavour allows) a drive:

```
>>> PurePosixPath('/a/b').is_absolute()
True
>>> PurePosixPath('a/b').is_absolute()
False

>>> PureWindowsPath('c:/a/b').is_absolute()
True
>>> PureWindowsPath('/a/b').is_absolute()
False
>>> PureWindowsPath('c:').is_absolute()
False
>>> PureWindowsPath('//some/share').is_absolute()
True
```

PurePath.**is_reserved**()
With PureWindowsPath, return True if the path is considered reserved under Windows, False otherwise. With PurePosixPath, False is always returned.

```
>>> PureWindowsPath('nul').is_reserved()
True
>>> PurePosixPath('nul').is_reserved()
False
```

File system calls on reserved paths can fail mysteriously or have unintended effects.

PurePath.**joinpath**(**other*)
Calling this method is equivalent to combining the path with each of the *other* arguments in turn:

```
>>> PurePosixPath('/etc').joinpath('passwd')
PurePosixPath('/etc/passwd')
>>> PurePosixPath('/etc').joinpath(PurePosixPath('passwd'))
PurePosixPath('/etc/passwd')
>>> PurePosixPath('/etc').joinpath('init.d', 'apache2')
PurePosixPath('/etc/init.d/apache2')
>>> PureWindowsPath('c:').joinpath('/Program Files')
PureWindowsPath('c:/Program Files')
```

PurePath.**match**(*pattern*)
Match this path against the provided glob-style pattern. Return True if matching is successful, False otherwise.

If *pattern* is relative, the path can be either relative or absolute, and matching is done from the right:

```
>>> PurePath('a/b.py').match('*.py')
True
>>> PurePath('/a/b/c.py').match('b/*.py')
True
>>> PurePath('/a/b/c.py').match('a/*.py')
False
```

If *pattern* is absolute, the path must be absolute, and the whole path must match:

```
>>> PurePath('/a.py').match('/*.py')
True
>>> PurePath('a/b.py').match('/*.py')
False
```

As with other methods, case-sensitivity is observed:

```
>>> PureWindowsPath('b.py').match('*.PY')
True
```

PurePath.**relative_to**(**other*)
Compute a version of this path relative to the path represented by *other*. If it's impossible, ValueError is raised:

```
>>> p = PurePosixPath('/etc/passwd')
>>> p.relative_to('/')
PurePosixPath('etc/passwd')
>>> p.relative_to('/etc')
PurePosixPath('passwd')
>>> p.relative_to('/usr')
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
  File "pathlib.py", line 694, in relative_to
    .format(str(self), str(formatted)))
ValueError: '/etc/passwd' does not start with '/usr'
```

PurePath.**with_name**(*name*)
Return a new path with the `name` changed. If the original path doesn't have a name, ValueError is raised:

```
>>> p = PureWindowsPath('c:/Downloads/pathlib.tar.gz')
>>> p.with_name('setup.py')
PureWindowsPath('c:/Downloads/setup.py')
>>> p = PureWindowsPath('c:/')
>>> p.with_name('setup.py')
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
  File "/home/antoine/cpython/default/Lib/pathlib.py", line 751, in with_name
    raise ValueError("%r has an empty name" % (self,))
ValueError: PureWindowsPath('c:/') has an empty name
```

PurePath.**with_suffix**(*suffix*)
Return a new path with the `suffix` changed. If the original path doesn't have a suffix, the new *suffix* is appended instead:

```
>>> p = PureWindowsPath('c:/Downloads/pathlib.tar.gz')
>>> p.with_suffix('.bz2')
PureWindowsPath('c:/Downloads/pathlib.tar.bz2')
>>> p = PureWindowsPath('README')
>>> p.with_suffix('.txt')
PureWindowsPath('README.txt')
```

CHAPTER 5

Concrete paths

Concrete paths are subclasses of the pure path classes. In addition to operations provided by the latter, they also provide methods to do system calls on path objects. There are three ways to instantiate concrete paths:

class pathlib.**Path**(**pathsegments*)
A subclass of PurePath, this class represents concrete paths of the system's path flavour (instantiating it creates either a PosixPath or a WindowsPath):

```
>>> Path('setup.py')
PosixPath('setup.py')
```

pathsegments is specified similarly to PurePath.

class pathlib.**PosixPath**(**pathsegments*)
A subclass of Path and PurePosixPath, this class represents concrete non-Windows filesystem paths:

```
>>> PosixPath('/etc')
PosixPath('/etc')
```

pathsegments is specified similarly to PurePath.

class pathlib.**WindowsPath**(**pathsegments*)
A subclass of Path and PureWindowsPath, this class represents concrete Windows filesystem paths:

```
>>> WindowsPath('c:/Program Files/')
WindowsPath('c:/Program Files')
```

pathsegments is specified similarly to PurePath.

You can only instantiate the class flavour that corresponds to your system (allowing system calls on non-compatible path flavours could lead to bugs or failures in your application):

```
>>> import os
>>> os.name
'posix'
>>> Path('setup.py')
PosixPath('setup.py')
>>> PosixPath('setup.py')
PosixPath('setup.py')
>>> WindowsPath('setup.py')
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
  File "pathlib.py", line 798, in __new__
    % (cls.__name__,))
NotImplementedError: cannot instantiate 'WindowsPath' on your system
```

5.1 Methods

Concrete paths provide the following methods in addition to pure paths methods. Many of these methods can raise an `OSError` if a system call fails (for example because the path doesn't exist):

classmethod `Path.`**`cwd`**`()`
Return a new path object representing the current directory (as returned by `os.getcwd()`):

```
>>> Path.cwd()
PosixPath('/home/antoine/pathlib')
```

`Path.`**`stat`**`()`
Return information about this path (similarly to `os.stat()`). The result is looked up at each call to this method.

```
>>> p = Path('setup.py')
>>> p.stat().st_size
956
>>> p.stat().st_mtime
1327883547.852554
```

`Path.`**`chmod`**`(`*mode*`)`
Change the file mode and permissions, like `os.chmod()`:

```
>>> p = Path('setup.py')
>>> p.stat().st_mode
33277
>>> p.chmod(0o444)
>>> p.stat().st_mode
33060
```

`Path.`**`exists`**`()`
Whether the path points to an existing file or directory:

```
>>> from pathlib import *
>>> Path('.').exists()
True
>>> Path('setup.py').exists()
True
>>> Path('/etc').exists()
True
>>> Path('nonexistentfile').exists()
False
```

`Path.`**`glob`**`(`*pattern*`)`
Glob the given *pattern* in the directory represented by this path, yielding all matching files (of any kind):

```
>>> sorted(Path('.').glob('*.py'))
[PosixPath('pathlib.py'), PosixPath('setup.py'), PosixPath('test_pathlib.py')]
>>> sorted(Path('.').glob('*/*.py'))
[PosixPath('docs/conf.py')]
```

The "`**`" pattern means "this directory and all subdirectories, recursively". In other words, it enables recursive globbing:

```
>>> sorted(Path('.').glob('**/*.py'))
[PosixPath('build/lib/pathlib.py'),
 PosixPath('docs/conf.py'),
 PosixPath('pathlib.py'),
```

```
 PosixPath('setup.py'),
 PosixPath('test_pathlib.py')]
```

Note: Using the "**" pattern in large directory trees may consume an inordinate amount of time.

`Path.`**`group`**`()`
Return the name of the group owning the file. `KeyError` is raised if the file's gid isn't found in the system database.

`Path.`**`is_dir`**`()`
Return `True` if the path points to a directory (or a symbolic link pointing to a directory), `False` if it points to another kind of file.

`False` is also returned if the path doesn't exist or is a broken symlink; other errors (such as permission errors) are propagated.

`Path.`**`is_file`**`()`
Return `True` if the path points to a regular file (or a symbolic link pointing to a regular file), `False` if it points to another kind of file.

`False` is also returned if the path doesn't exist or is a broken symlink; other errors (such as permission errors) are propagated.

`Path.`**`is_symlink`**`()`
Return `True` if the path points to a symbolic link, `False` otherwise.

`False` is also returned if the path doesn't exist; other errors (such as permission errors) are propagated.

`Path.`**`is_socket`**`()`
Return `True` if the path points to a Unix socket (or a symbolic link pointing to a Unix socket), `False` if it points to another kind of file.

`False` is also returned if the path doesn't exist or is a broken symlink; other errors (such as permission errors) are propagated.

`Path.`**`is_fifo`**`()`
Return `True` if the path points to a FIFO (or a symbolic link pointing to a FIFO), `False` if it points to another kind of file.

`False` is also returned if the path doesn't exist or is a broken symlink; other errors (such as permission errors) are propagated.

`Path.`**`is_block_device`**`()`
Return `True` if the path points to a block device (or a symbolic link pointing to a block device), `False` if it points to another kind of file.

`False` is also returned if the path doesn't exist or is a broken symlink; other errors (such as permission errors) are propagated.

`Path.`**`is_char_device`**`()`
Return `True` if the path points to a character device (or a symbolic link pointing to a character device), `False` if it points to another kind of file.

`False` is also returned if the path doesn't exist or is a broken symlink; other errors (such as permission errors) are propagated.

`Path.`**`iterdir`**`()`
When the path points to a directory, yield path objects of the directory contents:

```
>>> p = Path('docs')
>>> for child in p.iterdir(): child
```

```
...
PosixPath('docs/conf.py')
PosixPath('docs/_templates')
PosixPath('docs/make.bat')
PosixPath('docs/index.rst')
PosixPath('docs/_build')
PosixPath('docs/_static')
PosixPath('docs/Makefile')
```

`Path.`**`lchmod`**(*mode*)
Like `Path.chmod()` but, if the path points to a symbolic link, the symbolic link's mode is changed rather than its target's.

`Path.`**`lstat`**()
Like `Path.stat()` but, if the path points to a symbolic link, return the symbolic link's information rather than its target's.

`Path.`**`mkdir`**(*mode=0o777*, *parents=False*)
Create a new directory at this given path. If *mode* is given, it is combined with the process' `umask` value to determine the file mode and access flags. If the path already exists, `OSError` is raised.

If *parents* is true, any missing parents of this path are created as needed; they are created with the default permissions without taking *mode* into account (mimicking the POSIX `mkdir -p` command).

If *parents* is false (the default), a missing parent raises `OSError`.

`Path.`**`open`**(*mode='r'*, *buffering=-1*, *encoding=None*, *errors=None*, *newline=None*)
Open the file pointed to by the path, like the built-in `open()` function does:

```
>>> p = Path('setup.py')
>>> with p.open() as f:
...     f.readline()
...
'#!/usr/bin/env python3\n'
```

`Path.`**`owner`**()
Return the name of the user owning the file. `KeyError` is raised if the file's uid isn't found in the system database.

`Path.`**`rename`**(*target*)
Rename this file or directory to the given *target*. *target* can be either a string or another path object:

```
>>> p = Path('foo')
>>> p.open('w').write('some text')
9
>>> target = Path('bar')
>>> p.rename(target)
>>> target.open().read()
'some text'
```

`Path.`**`replace`**(*target*)
Rename this file or directory to the given *target*. If *target* points to an existing file or directory, it will be unconditionally replaced.

This method is only available with Python 3.3; it will raise `NotImplementedError` on previous Python versions.

`Path.`**`resolve`**()
Make the path absolute, resolving any symlinks. A new path object is returned:

```
>>> p = Path()
>>> p
PosixPath('.')
>>> p.resolve()
PosixPath('/home/antoine/pathlib')
```

".." components are also eliminated (this is the only method to do so):

```
>>> p = Path('docs/../setup.py')
>>> p.resolve()
PosixPath('/home/antoine/pathlib/setup.py')
```

If the path doesn't exist, an `OSError` is raised. If an infinite loop is encountered along the resolution path, `RuntimeError` is raised.

`Path.`**`rglob`**(*pattern*)

This is like calling `glob()` with "`**`" added in front of the given *pattern*:

```
>>> sorted(Path().rglob("*.py"))
[PosixPath('build/lib/pathlib.py'),
 PosixPath('docs/conf.py'),
 PosixPath('pathlib.py'),
 PosixPath('setup.py'),
 PosixPath('test_pathlib.py')]
```

`Path.`**`rmdir`**()

Remove this directory. The directory must be empty.

`Path.`**`symlink_to`**(*target*, *target_is_directory=False*)

Make this path a symbolic link to *target*. Under Windows, *target_is_directory* must be true (default `False`) if the link's target is a directory. Under POSIX, *target_is_directory*'s value is ignored.

```
>>> p = Path('mylink')
>>> p.symlink_to('setup.py')
>>> p.resolve()
PosixPath('/home/antoine/pathlib/setup.py')
>>> p.stat().st_size
956
>>> p.lstat().st_size
8
```

Note: The order of arguments (link, target) is the reverse of `os.symlink()`'s.

`Path.`**`touch`**(*mode=0o777*, *exist_ok=True*)

Create a file at this given path. If *mode* is given, it is combined with the process' `umask` value to determine the file mode and access flags. If the file already exists, the function succeeds if *exist_ok* is true (and its modification time is updated to the current time), otherwise `OSError` is raised.

`Path.`**`unlink`**()

Remove this file or symbolic link. If the path points to a directory, use `Path.rmdir()` instead.

p

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