

---

# **rfc3986 Documentation**

*Release 1.0.0*

**Ian Cordasco**

**Jul 18, 2017**



---

## Contents:

---

<b>1</b>	<b>User Documentation</b>	<b>3</b>
1.1	Parsing a URI . . . . .	3
1.2	Validating URIs . . . . .	5
1.3	Building URIs . . . . .	8
<b>2</b>	<b>API Reference</b>	<b>11</b>
2.1	API Submodule . . . . .	11
2.2	URI Builder Module . . . . .	12
2.3	URI Submodule . . . . .	14
2.4	Validators Submodule . . . . .	17
2.5	Miscellaneous Submodules . . . . .	19
<b>3</b>	<b>Release Notes and History</b>	<b>23</b>
3.1	1.x Release Series . . . . .	23
3.2	0.x Release Series . . . . .	24
	<b>Python Module Index</b>	<b>27</b>



rfc3986 is a Python implementation of **RFC 3986** including validation and authority parsing. This module also supports **RFC 6874** which adds support for zone identifiers to IPv6 Addresses.

The maintainers strongly suggest using `pip` to install `rfc3986`. For example,

```
$ pip install rfc3986
$ python -m pip install rfc3986
$ python3.6 -m pip install rfc3986
```



`rfc3986` has several API features and convenience methods. The core of `rfc3986`'s API revolves around parsing, validating, and building URIs.

There is an API to provide compatibility with `urllib.parse`, there is an API to parse a URI as a URI Reference, there's an API to provide validation of URIs, and finally there's an API to build URIs.

---

**Note:** There's presently no support for IRIs as defined in [RFC 3987](#).

---

`rfc3986` parses URIs much differently from `urllib.parse` so users may see some subtle differences with very specific URLs that contain rough edgcases. Regardless, we do our best to implement the same API so you should be able to seamlessly swap `rfc3986` for `urlparse`.

## Parsing a URI

There are two ways to parse a URI with `rfc3986`

1. `rfc3986.api.uri_reference()`

This is best when you're **not** replacing existing usage of `urllib.parse`. This also provides convenience methods around safely normalizing URIs passed into it.

2. `rfc3986.api.urlparse()`

This is best suited to completely replace `urllib.parse.urlparse()`. It returns a class that should be indistinguishable from `urllib.parse.ParseResult`

Let's look at some code samples.

## Some Examples

First we'll parse the URL that points to the repository for this project.

```
url = rfc3986.urlparse('https://github.com/sigmavirus24/rfc3986')
```

Then we'll replace parts of that URL with new values:

```
print(url.copy_with(
    userinfo='username:password',
    port='443',
).unsplit())
```

```
https://username:password@github.com:443/sigmavirus24/rfc3986
```

This, however, does not change the current url instance of ParseResult. As the method name might suggest, we're copying that instance and then overriding certain attributes. In fact, we can make as many copies as we like and nothing will change.

```
print(url.copy_with(
    scheme='ssh',
    userinfo='git',
).unsplit())
```

```
ssh://git@github.com/sigmavirus24/rfc3986
```

```
print(url.scheme)
```

```
https
```

We can do similar things with URI References as well.

```
uri = rfc3986.uri_reference('https://github.com/sigmavirus24/rfc3986')
```

```
print(uri.copy_with(
    authority='username:password@github.com:443',
    path='/sigmavirus24/github3.py',
).unsplit())
```

```
https://username:password@github.com:443/sigmavirus24/github3.py
```

However, URI References may have some unexpected behaviour based strictly on the RFC.

Finally, if you want to remove a component from a URI, you may pass None to remove it, for example:

```
print(uri.copy_with(path=None).unsplit())
```

```
https://github.com
```

This will work on both URI References and Parse Results.

## And Now For Something Slightly Unusual

If you are familiar with GitHub, GitLab, or a similar service, you may have interacted with the “SSH URL” for some projects. For this project, the SSH URL is:



```
git@github.com:sigmavirus24/rfc3986
```

Let's see what happens when we parse this.

```
>>> rfc3986.uri_reference('git@github.com:sigmavirus24/rfc3986')
URIReference(scheme=None, authority=None,
path=u'git@github.com:sigmavirus24/rfc3986', query=None, fragment=None)
```

There's no scheme present, but it is apparent to our (human) eyes that `git@github.com` should not be part of the path. This is one of the areas where `rfc3986` suffers slightly due to its strict conformance to [RFC 3986](#). In the RFC, an authority must be preceded by `//`. Let's see what happens when we add that to our URI

```
>>> rfc3986.uri_reference('//git@github.com:sigmavirus24/rfc3986')
URIReference(scheme=None, authority=u'git@github.com:sigmavirus24',
path=u'/rfc3986', query=None, fragment=None)
```

Somewhat better, but not much.

---

**Note:** The maintainers of `rfc3986` are working to discern better ways to parse these less common URIs in a reasonable and sensible way without losing conformance to the RFC.

---

## Validating URIs

While not as difficult as [validating an email address](#), validating URIs is tricky. Different parts of the URI allow different characters. Those sets sometimes overlap and othertimes they don't and it's not very convenient. Luckily, `rfc3986` makes validating URIs far simpler.

### Example Usage

First we need to create an instance of a `Validator` which takes no parameters. After that we can call methods on the instance to indicate what we want to validate.

#### Allowing Only Trusted Domains and Schemes

Let's assume that we're building something that takes user input for a URL and we want to ensure that URL is only ever using a specific domain with `https`. In that case, our code would look like this:

```
>>> from rfc3986 import validators, uri_reference
>>> user_url = 'https://github.com/sigmavirus24/rfc3986'
>>> validator = validators.Validator().allow_schemes(
...     'https',
... ).allow_hosts(
...     'github.com',
... )
>>> validator.validate(uri_reference(
...     'https://github.com/sigmavirus24/rfc3986'
... ))
>>> validator.validate(uri_reference(
...     'https://github.com/'
... ))
>>> validator.validate(uri_reference(
```

```
...     'http://example.com'
... ))
Traceback (most recent call last):
...
rfc3986.exceptions.UnpermittedComponentError
```

First notice that we can easily reuse our validator object for each URL. This allows users to not have to constantly reconstruct Validators for each bit of user input. Next, we have three different URLs that we validate:

1. `https://github.com/sigmavirus24/rfc3986`
2. `https://github.com/`
3. `http://example.com`

As it stands, our validator will allow the first two URLs to pass but will fail the third. This is specifically because we only allow URLs using `https` as a scheme and `github.com` as the domain name.

### Preventing Leaks of User Credentials

Next, let's imagine that we want to prevent leaking user credentials. In that case, we want to ensure that there is no password in the user information portion of the authority. In that case, our new validator would look like this:

```
>>> from rfc3986 import validators, uri_reference
>>> user_url = 'https://github.com/sigmavirus24/rfc3986'
>>> validator = validators.Validator().allow_schemes(
...     'https',
... ).allow_hosts(
...     'github.com',
... ).forbid_use_of_password()
>>> validator.validate(uri_reference(
...     'https://github.com/sigmavirus24/rfc3986'
... ))
>>> validator.validate(uri_reference(
...     'https://github.com/'
... ))
>>> validator.validate(uri_reference(
...     'http://example.com'
... ))
Traceback (most recent call last):
...
rfc3986.exceptions.UnpermittedComponentError
>>> validator.validate(uri_reference(
...     'https://sigmavirus24@github.com'
... ))
>>> validator.validate(uri_reference(
...     'https://sigmavirus24:not-my-real-password@github.com'
... ))
Traceback (most recent call last):
...
rfc3986.exceptions.PasswordForbidden
```

### Requiring the Presence of Components

Up until now, we have assumed that we will get a URL that has the appropriate components for validation. For example, we assume that we will have a URL that has a scheme and hostname. However, our current validation doesn't require those items exist.

```
>>> from rfc3986 import validators, uri_reference
>>> user_url = 'https://github.com/sigmavirus24/rfc3986'
>>> validator = validators.Validator().allow_schemes(
...     'https',
... ).allow_hosts(
...     'github.com',
... ).forbid_use_of_password()
>>> validator.validate(uri_reference('//github.com'))
>>> validator.validate(uri_reference('https://'))
```

In the first case, we have a host name but no scheme and in the second we have a scheme and a path but no host. If we want to ensure that those components are there and that they are *always* what we allow, then we must add one last item to our validator:

```
>>> from rfc3986 import validators, uri_reference
>>> user_url = 'https://github.com/sigmavirus24/rfc3986'
>>> validator = validators.Validator().allow_schemes(
...     'https',
... ).allow_hosts(
...     'github.com',
... ).forbid_use_of_password(
... ).require_presence_of(
...     'scheme', 'host',
... )
>>> validator.validate(uri_reference('//github.com'))
Traceback (most recent call last):
...
rfc3986.exceptions.MissingComponentError
>>> validator.validate(uri_reference('https://'))
Traceback (most recent call last):
...
rfc3986.exceptions.MissingComponentError
>>> validator.validate(uri_reference('https://github.com'))
>>> validator.validate(uri_reference(
...     'https://github.com/sigmavirus24/rfc3986'
... ))
```

## Checking the Validity of Components

As of version 1.1.0, rfc3986 allows users to check the validity of a URI Reference using a *Validator*. Along with the above examples we can also check that a URI is valid per **RFC 3986**. The validation of the components is pre-determined so all we need to do is specify which components we want to validate:

```
>>> from rfc3986 import validators, uri_reference
>>> valid_uri = uri_reference('https://github.com/')
>>> validator = validators.Validator().allow_schemes(
...     'https',
... ).allow_hosts(
...     'github.com',
... ).forbid_use_of_password(
... ).require_presence_of(
...     'scheme', 'host',
... ).check_validity_of(
...     'scheme', 'host', 'path',
... )
>>> validator.validate(valid_uri)
```

```
>>> invalid_uri = valid_uri.copy_with(path='#invalid/path')
>>> validator.validate(invalid_uri)
Traceback (most recent call last):
...
rfc3986.exceptions.InvalidComponentsError
```

Paths are not allowed to contain a # character unless it's percent-encoded. This is why our `invalid_uri` raises an exception when we attempt to validate it.

## Building URIs

Constructing URLs often seems simple. There are some problems with concatenating strings to build a URL:

- Certain parts of the URL disallow certain characters
- Formatting some parts of the URL is tricky and doing it manually isn't fun

To make the experience better `rfc3986` provides the `URIBuilder` class to generate valid `URIReference` instances. The `URIBuilder` class will handle ensuring that each component is normalized and safe for real world use.

## Example Usage

---

**Note:** All of the methods on a `URIBuilder` are chainable (except `finalize()`).

---

Let's build a basic URL with just a scheme and host. First we create an instance of `URIBuilder`. Then we call `add_scheme()` and `add_host()` with the scheme and host we want to include in the URL. Then we convert our builder object into a `URIReference` and call `unsplit()`.

```
>>> from rfc3986 import builder
>>> print(builder.URIBuilder().add_scheme(
...     'https'
... ).add_host(
...     'github.com'
... ).finalize().unsplit())
https://github.com
```

Each time you invoke a method, you get a new instance of a `URIBuilder` class so you can build several different URLs from one base instance.

```
>>> from rfc3986 import builder
>>> github_builder = builder.URIBuilder().add_scheme(
...     'https'
... ).add_host(
...     'api.github.com'
... )
>>> print(github_builder.add_path(
...     '/users/sigmavirus24'
... ).finalize().unsplit())
https://api.github.com/users/sigmavirus24
>>> print(github_builder.add_path(
...     '/repos/sigmavirus24/rfc3986')
```

```
... ).finalize().unsplit())
https://api.github.com/repos/sigmavirus24/rfc3986
```

rfc3986 makes adding authentication credentials convenient. It takes care of making the credentials URL safe. There are some characters someone might want to include in a URL that are not safe for the authority component of a URL.

```
>>> from rfc3986 import builder
>>> print(builder.URIBuilder().add_scheme(
...     'https'
... ).add_host(
...     'api.github.com'
... ).add_credentials(
...     username='us3r',
...     password='p@ssw0rd',
... ).finalize().unsplit())
https://us3r:p%40ssw0rd@api.github.com
```

Further, rfc3986 attempts to simplify the process of adding query parameters to a URL. For example, if we were using Elasticsearch, we might do something like:

```
>>> from rfc3986 import builder
>>> print(builder.URIBuilder().add_scheme(
...     'https'
... ).add_host(
...     'search.example.com'
... ).add_path(
...     '_search'
... ).add_query_from(
...     [('q', 'repo:sigmavirus24/rfc3986'), ('sort', 'created_at:asc')])
... ).finalize().unsplit())
https://search.example.com/_search?q=repo%3Asigmavirus24%2Frfc3986&sort=created_at
↪%3Aasc
```

Finally, we provide a way to add a fragment to a URL. Let's build up a URL to view the section of the RFC that refers to fragments:

```
>>> from rfc3986 import builder
>>> print(builder.URIBuilder().add_scheme(
...     'https'
... ).add_host(
...     'tools.ietf.org'
... ).add_path(
...     '/html/rfc3986'
... ).add_fragment(
...     'section-3.5'
... ).finalize().unsplit())
https://tools.ietf.org/html/rfc3986#section-3.5
```



This section contains API documentation generated from the source code of `rfc3986`. If you're looking for an introduction to the module and how it can be utilized, please see [User Documentation](#) instead.

### API Submodule

`rfc3986.api.urlparse` (*uri*, *encoding='utf-8'*)

Parse a given URI and return a `ParseResult`.

This is a partial replacement of the standard library's `urlparse` function.

#### Parameters

- **uri** (*str*) – The URI to be parsed.
- **encoding** (*str*) – The encoding of the string provided.

**Returns** A parsed URI

**Return type** `ParseResult`

`rfc3986.api.uri_reference` (*uri*, *encoding='utf-8'*)

Parse a URI string into a `URIReference`.

This is a convenience function. You could achieve the same end by using `URIReference.from_string(uri)`.

#### Parameters

- **uri** (*str*) – The URI which needs to be parsed into a reference.
- **encoding** (*str*) – The encoding of the string provided

**Returns** A parsed URI

**Return type** `URIReference`

```
rfc3986.api.normalize_uri(uri, encoding='utf-8')
```

Normalize the given URI.

This is a convenience function. You could use either `uri_reference(uri).normalize().unsplit()` or `URIReference.from_string(uri).normalize().unsplit()` instead.

**Parameters**

- **uri** (*str*) – The URI to be normalized.
- **encoding** (*str*) – The encoding of the string provided

**Returns** The normalized URI.

**Return type** `str`

## URI Builder Module

```
class rfc3986.builder.URIBuilder(scheme=None, userinfo=None, host=None, port=None,
                                path=None, query=None, fragment=None)
```

Object to aid in building up a URI Reference from parts.

---

**Note:** This object should be instantiated by the user, but it's recommended that it is not provided with arguments. Instead, use the available method to populate the fields.

---

```
URIBuilder.add_scheme(scheme)
```

Add a scheme to our builder object.

After normalizing, this will generate a new URIBuilder instance with the specified scheme and all other attributes the same.

```
>>> URIBuilder().add_scheme('HTTPS')
URIBuilder(scheme='https', userinfo=None, host=None, port=None,
           path=None, query=None, fragment=None)
```

```
URIBuilder.add_credentials(username, password)
```

Add credentials as the userinfo portion of the URI.

```
>>> URIBuilder().add_credentials('root', 's3crete')
URIBuilder(scheme=None, userinfo='root:s3crete', host=None,
           port=None, path=None, query=None, fragment=None)

>>> URIBuilder().add_credentials('root', None)
URIBuilder(scheme=None, userinfo='root', host=None,
           port=None, path=None, query=None, fragment=None)
```

```
URIBuilder.add_host(host)
```

Add hostname to the URI.

```
>>> URIBuilder().add_host('google.com')
URIBuilder(scheme=None, userinfo=None, host='google.com',
           port=None, path=None, query=None, fragment=None)
```

```
URIBuilder.add_port(port)
```

Add port to the URI.



```
>>> URIBuilder().add_port(80)
URIBuilder(scheme=None, userinfo=None, host=None, port='80',
           path=None, query=None, fragment=None)

>>> URIBuilder().add_port(443)
URIBuilder(scheme=None, userinfo=None, host=None, port='443',
           path=None, query=None, fragment=None)
```

**URIBuilder.add\_path(*path*)**

Add a path to the URI.

```
>>> URIBuilder().add_path('sigmavirus24/rfc3985')
URIBuilder(scheme=None, userinfo=None, host=None, port=None,
           path='/sigmavirus24/rfc3986', query=None, fragment=None)

>>> URIBuilder().add_path('/checkout.php')
URIBuilder(scheme=None, userinfo=None, host=None, port=None,
           path='/checkout.php', query=None, fragment=None)
```

**URIBuilder.add\_query\_from(*query\_items*)**

Generate and add a query a dictionary or list of tuples.

```
>>> URIBuilder().add_query_from({'a': 'b c'})
URIBuilder(scheme=None, userinfo=None, host=None, port=None,
           path=None, query='a=b+c', fragment=None)

>>> URIBuilder().add_query_from([('a', 'b c')])
URIBuilder(scheme=None, userinfo=None, host=None, port=None,
           path=None, query='a=b+c', fragment=None)
```

**URIBuilder.add\_query(*query*)**

Add a pre-formatted query string to the URI.

```
>>> URIBuilder().add_query('a=b&c=d')
URIBuilder(scheme=None, userinfo=None, host=None, port=None,
           path=None, query='a=b&c=d', fragment=None)
```

**URIBuilder.add\_fragment(*fragment*)**

Add a fragment to the URI.

```
>>> URIBuilder().add_fragment('section-2.6.1')
URIBuilder(scheme=None, userinfo=None, host=None, port=None,
           path=None, query=None, fragment='section-2.6.1')
```

**URIBuilder.finalize()**

Create a URIReference from our builder.

```
>>> URIBuilder().add_scheme('https').add_host('github.com')
...      ).add_path('sigmavirus24/rfc3986').finalize().unsplit()
'https://github.com/sigmavirus24/rfc3986'

>>> URIBuilder().add_scheme('https').add_host('github.com')
...      ).add_path('sigmavirus24/rfc3986').add_credentials(
...      'sigmavirus24', 'not-re@1').finalize().unsplit()
'https://sigmavirus24:not-re%401@github.com/sigmavirus24/rfc3986'
```

## URI Submodule

**class** `rfc3986.uri.URIFerence`

Immutable object representing a parsed URI Reference.

---

**Note:** This class is not intended to be directly instantiated by the user.

---

This object exposes attributes for the following components of a URI:

- `scheme`
- `authority`
- `path`
- `query`
- `fragment`

**scheme**

The scheme that was parsed for the URI Reference. For example, `http`, `https`, `smtp`, `imap`, etc.

**authority**

Component of the URI that contains the user information, host, and port sub-components. For example, `google.com`, `127.0.0.1:5000`, `username@[::1]`, `username:password@example.com:443`, etc.

**path**

The path that was parsed for the given URI Reference. For example, `/`, `/index.php`, etc.

**query**

The query component for a given URI Reference. For example, `a=b`, `a=b%20c`, `a=b+c`, `a=b,c=d`, `e=%20f`, etc.

**fragment**

The fragment component of a URI. For example, `section-3.1`.

This class also provides extra attributes for easier access to information like the subcomponents of the authority component.

**userinfo**

The user information parsed from the authority.

**host**

The hostname, IPv4, or IPv6 address parsed from the authority.

**port**

The port parsed from the authority.

**classmethod** `URIFerence.from_string(uri_string, encoding='utf-8')`

Parse a URI reference from the given unicode URI string.

**Parameters**

- **uri\_string** (*str*) – Unicode URI to be parsed into a reference.
- **encoding** (*str*) – The encoding of the string provided

**Returns** `URIFerence` or subclass thereof

`URIFerence.unsplit()`

Create a URI string from the components.

**Returns** The URI Reference reconstituted as a string.

**Return type** `str`

`URIReference.resolve_with(base_uri, strict=False)`

Use an absolute URI Reference to resolve this relative reference.

Assuming this is a relative reference that you would like to resolve, use the provided base URI to resolve it.

See <http://tools.ietf.org/html/rfc3986#section-5> for more information.

**Parameters** `base_uri` – Either a string or `URIReference`. It must be an absolute URI or it will raise an exception.

**Returns** A new `URIReference` which is the result of resolving this reference using `base_uri`.

**Return type** `URIReference`

**Raises** `rfc3986.exceptions.ResolutionError` – If the `base_uri` is not an absolute URI.

`URIReference.copy_with(scheme=<object object>, authority=<object object>, path=<object object>, query=<object object>, fragment=<object object>)`

Create a copy of this reference with the new components.

**Parameters**

- **scheme** (`str`) – (optional) The scheme to use for the new reference.
- **authority** (`str`) – (optional) The authority to use for the new reference.
- **path** (`str`) – (optional) The path to use for the new reference.
- **query** (`str`) – (optional) The query to use for the new reference.
- **fragment** (`str`) – (optional) The fragment to use for the new reference.

**Returns** New `URIReference` with provided components.

**Return type** `URIReference`

`URIReference.normalize()`

Normalize this reference as described in Section 6.2.2.

This is not an in-place normalization. Instead this creates a new `URIReference`.

**Returns** A new reference object with normalized components.

**Return type** `URIReference`

`URIReference.is_absolute()`

Determine if this URI Reference is an absolute URI.

See <http://tools.ietf.org/html/rfc3986#section-4.3> for explanation.

**Returns** `True` if it is an absolute URI, `False` otherwise.

**Return type** `bool`

`URIReference.authority_info()`

Return a dictionary with the `userinfo`, `host`, and `port`.

If the authority is not valid, it will raise a `InvalidAuthorityException`.

**Returns** `{'userinfo': 'username:password', 'host': 'www.example.com', 'port': '80'}`

**Return type** `dict`

Raises `rfc3986.exceptions.InvalidAuthority` – If the authority is not `None` and can not be parsed.

## Deprecated Methods

`URIReference.is_valid(**kwargs)`

Determine if the URI is valid.

Deprecated since version 1.1.0: Use the `Validator` object instead.

### Parameters

- **require\_scheme** (*bool*) – Set to `True` if you wish to require the presence of the scheme component.
- **require\_authority** (*bool*) – Set to `True` if you wish to require the presence of the authority component.
- **require\_path** (*bool*) – Set to `True` if you wish to require the presence of the path component.
- **require\_query** (*bool*) – Set to `True` if you wish to require the presence of the query component.
- **require\_fragment** (*bool*) – Set to `True` if you wish to require the presence of the fragment component.

**Returns** `True` if the URI is valid. `False` otherwise.

**Return type** `bool`

`URIReference.authority_is_valid(require=False)`

Determine if the authority component is valid.

Deprecated since version 1.1.0: Use the `Validator` object instead.

**Parameters** **require** (*bool*) – Set to `True` to require the presence of this component.

**Returns** `True` if the authority is valid. `False` otherwise.

**Return type** `bool`

`URIReference.scheme_is_valid(require=False)`

Determine if the scheme component is valid.

Deprecated since version 1.1.0: Use the `Validator` object instead.

**Parameters** **require** (*str*) – Set to `True` to require the presence of this component.

**Returns** `True` if the scheme is valid. `False` otherwise.

**Return type** `bool`

`URIReference.path_is_valid(require=False)`

Determine if the path component is valid.

Deprecated since version 1.1.0: Use the `Validator` object instead.

**Parameters** **require** (*str*) – Set to `True` to require the presence of this component.

**Returns** `True` if the path is valid. `False` otherwise.

**Return type** `bool`

`URIReference.query_is_valid(require=False)`

Determine if the query component is valid.

Deprecated since version 1.1.0: Use the *Validator* object instead.

**Parameters** `require` (*str*) – Set to `True` to require the presence of this component.

**Returns** `True` if the query is valid. `False` otherwise.

**Return type** `bool`

`URIReference.fragment_is_valid(require=False)`

Determine if the fragment component is valid.

Deprecated since version 1.1.0: Use the *Validator* object instead.

**Parameters** `require` (*str*) – Set to `True` to require the presence of this component.

**Returns** `True` if the fragment is valid. `False` otherwise.

**Return type** `bool`

## Validators Submodule

**class** `rfc3986.validators.Validator`

Object used to configure validation of all objects in `rfc3986`.

New in version 1.0.

Example usage:

```
>>> from rfc3986 import api, validators
>>> uri = api.uri_reference('https://github.com/')
>>> validator = validators.Validator().require_presence_of(
...     'scheme', 'host', 'path',
... ).allow_schemes(
...     'http', 'https',
... ).allow_hosts(
...     '127.0.0.1', 'github.com',
... )
>>> validator.validate(uri)
>>> invalid_uri = rfc3986.uri_reference('imap://mail.google.com')
>>> validator.validate(invalid_uri)
Traceback (most recent call last):
...
rfc3986.exceptions.MissingComponentError: ('path was required but
missing', URIReference(scheme=u'imap', authority=u'mail.google.com',
path=None, query=None, fragment=None), ['path'])
```

`Validator.allow_schemes(*schemes)`

Require the scheme to be one of the provided schemes.

New in version 1.0.

**Parameters** `schemes` – Schemes, without `://` that are allowed.

**Returns** The validator instance.

**Return type** *Validator*

`Validator.allow_hosts(*hosts)`

Require the host to be one of the provided hosts.

New in version 1.0.

**Parameters** `hosts` – Hosts that are allowed.

**Returns** The validator instance.

**Return type** *Validator*

`Validator.allow_ports(*ports)`

Require the port to be one of the provided ports.

New in version 1.0.

**Parameters** `ports` – Ports that are allowed.

**Returns** The validator instance.

**Return type** *Validator*

`Validator.allow_use_of_password()`

Allow passwords to be present in the URI.

New in version 1.0.

**Returns** The validator instance.

**Return type** *Validator*

`Validator.check_validity_of(*components)`

Check the validity of the components provided.

This can be specified repeatedly.

New in version 1.1.

**Parameters** `components` – Names of components from `Validator.COMPONENT_NAMES`.

**Returns** The validator instance.

**Return type** *Validator*

`Validator.forbid_use_of_password()`

Prevent passwords from being included in the URI.

New in version 1.0.

**Returns** The validator instance.

**Return type** *Validator*

`Validator.require_presence_of(*components)`

Require the components provided.

This can be specified repeatedly.

New in version 1.0.

**Parameters** `components` – Names of components from `Validator.COMPONENT_NAMES`.

**Returns** The validator instance.

**Return type** *Validator*

`Validator.validate(uri)`

Check a URI for conditions specified on this validator.

New in version 1.0.

**Parameters** `uri` (`rfc3986.uri.URIReference`) – Parsed URI to validate.

**Raises**

- **MissingComponentError** – When a required component is missing.
- **UnpermittedComponentError** – When a component is not one of those allowed.
- **PasswordForbidden** – When a password is present in the userinfo component but is not permitted by configuration.
- **InvalidComponentsError** – When a component was found to be invalid.

## Miscellaneous Submodules

There are several submodules in `rfc3986` that are not meant to be exposed to users directly but which are valuable to document, regardless.

`rfc3986.misc.UseExisting`

A sentinel object to make certain APIs simpler for users.

The `rfc3986.abnf_regexp` module contains the regular expressions written from the RFC’s ABNF. The `rfc3986.misc` module contains compiled regular expressions from `rfc3986.abnf_regexp` and previously contained those regular expressions.

`rfc3986.abnf_regexp.GEN_DELIMS`

`rfc3986.abnf_regexp.GENERIC_DELIMITERS`

The string containing all of the generic delimiters as defined on page 13.

`rfc3986.abnf_regexp.GENERIC_DELIMITERS_SET`

`rfc3986.abnf_regexp.GEN_DELIMS` represented as a *set*.

`rfc3986.abnf_regexp.SUB_DELIMS`

`rfc3986.abnf_regexp.SUB_DELIMITERS`

The string containing all of the ‘sub’ delimiters as defined on page 13.

`rfc3986.abnf_regexp.SUB_DELIMITERS_SET`

`rfc3986.abnf_regexp.SUB_DELIMS` represented as a *set*.

`rfc3986.abnf_regexp.SUB_DELIMITERS_RE`

`rfc3986.abnf_regexp.SUB_DELIMS` with the `*` escaped for use in regular expressions.

`rfc3986.abnf_regexp.RESERVED_CHARS_SET`

A *set* constructed of `GEN_DELIMS` and `SUB_DELIMS`. This union is defined on page 13.

`rfc3986.abnf_regexp.ALPHA`

The string of upper- and lower-case letters in USASCII.

`rfc3986.abnf_regexp.DIGIT`

The string of digits 0 through 9.

`rfc3986.abnf_regexp.UNRESERVED`

`rfc3986.abnf_regexp.UNRESERVED_CHARS`

The string of unreserved characters defined in [RFC 3986#section-2.3](#).

- `rfc3986.abnf_regexp.UNRESERVED_CHARS_SET`  
*rfc3986.abnf\_regexp.UNRESERVED\_CHARS* represented as a *set*.
- `rfc3986.abnf_regexp.NON_PCT_ENCODED_SET`  
The non-percent encoded characters represented as a *set*.
- `rfc3986.abnf_regexp.UNRESERVED_RE`  
Optimized regular expression for unreserved characters.
- `rfc3986.abnf_regexp.SHEME_RE`  
Stricter regular expression to match and validate the scheme part of a URI.
- `rfc3986.abnf_regexp.COMPONENT_PATTERN_DICT`  
Dictionary with regular expressions to match various components in a URI. Except for *rfc3986.abnf\_regexp.SHEME\_RE*, all patterns are from **RFC 3986#appendix-B**.
- `rfc3986.abnf_regexp.URL_PARSING_RE`  
Regular expression composed from the components in *rfc3986.abnf\_regexp.COMPONENT\_PATTERN\_DICT*.
- `rfc3986.abnf_regexp.HEXDIG_RE`  
Hexadecimal characters used in each piece of an IPv6 address. See **RFC 3986#section-3.2.2**.
- `rfc3986.abnf_regexp.LS32_RE`  
Lease significant 32 bits of an IPv6 address. See **RFC 3986#section-3.2.2**.
- `rfc3986.abnf_regexp.REG_NAME`
- `rfc3986.abnf_regexp.REGULAR_NAME_RE`  
The pattern for a regular name, e.g., `www.google.com`, `api.github.com`. See **RFC 3986#section-3.2.2**.
- `rfc3986.abnf_regexp.IPv4_RE`  
The pattern for an IPv4 address, e.g., `192.168.255.255`. See **RFC 3986#section-3.2.2**.
- `rfc3986.abnf_regexp.IPv6_RE`  
The pattern for an IPv6 address, e.g., `:::1`. See **RFC 3986#section-3.2.2**.
- `rfc3986.abnf_regexp.IPv_FUTURE_RE`  
A regular expression to parse out IPv Futures. See **RFC 3986#section-3.2.2**.
- `rfc3986.abnf_regexp.IP_LITERAL_RE`  
Pattern to match IPv6 addresses and IPv Future addresses. See **RFC 3986#section-3.2.2**.
- `rfc3986.abnf_regexp.HOST_RE`
- `rfc3986.abnf_regexp.HOST_PATTERN`  
Pattern to match and validate the host piece of an authority. This is composed of
- *rfc3986.abnf\_regexp.REG\_NAME*
  - *rfc3986.abnf\_regexp.IPv4\_RE*
  - *rfc3986.abnf\_regexp.IP\_LITERAL\_RE*
- See **RFC 3986#section-3.2.2**.
- `rfc3986.abnf_regexp.USERINFO_RE`  
Pattern to match and validate the user information portion of an authority component.  
See **RFC 3986#section-3.2.2**.
- `rfc3986.abnf_regexp.PORT_RE`  
Pattern to match and validate the port portion of an authority component.  
See **RFC 3986#section-3.2.2**.



`rfc3986.abnf_regex.PCT_ENCODED`

`rfc3986.abnf_regex.PERCENT_ENCODED`  
Regular expression to match percent encoded character values.

`rfc3986.abnf_regex.PCHAR`  
Regular expression to match printable characters.

`rfc3986.abnf_regex.PATH_RE`  
Regular expression to match and validate the path component of a URI.  
See [RFC 3986#section-3.3](#).

`rfc3986.abnf_regex.PATH_EMPTY`

`rfc3986.abnf_regex.PATH_ROOTLESS`

`rfc3986.abnf_regex.PATH_NOSHEME`

`rfc3986.abnf_regex.PATH_ABSOLUTE`

`rfc3986.abnf_regex.PATH_AEMPTY`  
Components of the `rfc3986.abnf_regex.PATH_RE`.  
See [RFC 3986#section-3.3](#).

`rfc3986.abnf_regex.QUERY_RE`  
Regular expression to parse and validate the query component of a URI.

`rfc3986.abnf_regex.FRAGMENT_RE`  
Regular expression to parse and validate the fragment component of a URI.

`rfc3986.abnf_regex.RELATIVE_PART_RE`  
Regular expression to parse the relative URI when resolving URIs.

`rfc3986.abnf_regex.HIER_PART_RE`  
The hierarchical part of a URI. This regular expression is used when resolving relative URIs.  
See [RFC 3986#section-3](#).

`rfc3986.misc.URI_MATCHER`  
Compiled version of `rfc3986.abnf_regex.URL_PARSING_RE`.

`rfc3986.misc.SUBAUTHORITY_MATCHER`  
Compiled compilation of `rfc3986.abnf_regex.USERINFO_RE`, `rfc3986.abnf_regex.HOST_PATTERN`, `rfc3986.abnf_regex.PORT_RE`.

`rfc3986.misc.SCHEME_MATCHER`  
Compiled version of `rfc3986.abnf_regex.SCHEME_RE`.

`rfc3986.misc.IPv4_MATCHER`  
Compiled version of `rfc3986.abnf_regex.IPv4_RE`.

`rfc3986.misc.PATH_MATCHER`  
Compiled version of `rfc3986.abnf_regex.PATH_RE`.

`rfc3986.misc.QUERY_MATCHER`  
Compiled version of `rfc3986.abnf_regex.QUERY_RE`.

`rfc3986.misc.RELATIVE_REF_MATCHER`  
Compiled compilation of `rfc3986.abnf_regex.SCHEME_RE`, `rfc3986.abnf_regex.HIER_PART_RE`, `rfc3986.abnf_regex.QUERY_RE`.



---

## Release Notes and History

---

All of the release notes that have been recorded for `rfc3986` are organized here with the newest releases first.

### 1.x Release Series

#### 1.1.0 – 2017-07-18

- Correct the regular expression for the User Information sub-component of the Authority Component.  
See also [GitHub #26](#)
- `check_validity_of()` to the `Validator` class. See [Validating URIs](#) documentation for more information.

#### 1.0.0 – 2017-05-10

- Add support for [RFC 6874](#) - Zone Identifiers in IPv6 Addresses  
See also [issue #2](#)
- Add a more flexible and usable validation framework. See our documentation for more information.
- Add an object to aid in building new URIs from scratch. See our documentation for more information.
- Add real documentation for the entire module.
- Add separate submodule with documented regular expression strings for the collected ABNF.
- Allow `None` to be used to eliminate components via `copy_with` for URIs and `ParseResults`.
- Move release history into our documentation.

## 0.x Release Series

### 0.4.2 – 2016-08-22

- Avoid parsing an string with just an IPv6 address as having a scheme of [].

### 0.4.1 – 2016-08-22

- Normalize URIs constructed using `ParseResult.from_parts` and `ParseResultBytes.from_parts`

### 0.4.0 – 2016-08-20

- Add `ParseResult.from_parts` and `ParseResultBytes.from_parts` class methods to easily create a `ParseResult`
- When using regular expressions, use `[0-9]` instead of `\d` to avoid finding ports with “numerals” that are not valid in a port

### 0.3.1 – 2015-12-15

- Preserve empty query strings during normalization

### 0.3.0 – 2015-10-20

- Read README and HISTORY files using the appropriate codec so rfc3986 can be installed on systems with locale’s other than utf-8 (specifically C)
- Replace the standard library’s `urlparse` behaviour

### 0.2.2 – 2015-05-27

- Update the regular name regular expression to accept all of the characters allowed in the RFC. Closes bug #11 (Thanks Viktor Haag). Previously URIs similar to “`http://http-bin.org`” would be considered invalid.

### 0.2.1 – 2015-03-20

- Check that the bytes of an IPv4 Host Address are within the valid range. Otherwise, URIs like “`http://256.255.255.0/v1/resource`” are considered valid.
- Add 6 to the list of unreserved characters. It was previously missing. Closes bug #9

### 0.2.0 – 2014-06-30

- Add support for requiring components during validation. This includes adding parameters `require_scheme`, `require_authority`, `require_path`, `require_query`, and `require_fragment` to `rfc3986.is_valid_uri` and `URIReference#is_valid`.

## 0.1.0 – 2014-06-27

- Initial Release includes validation and normalization of URIs



**r**

`rfc3986.abnf_regexp`, 19

`rfc3986.misc`, 21





**A**

add\_credentials() (rfc3986.builder.URIBuilder method), 12

add\_fragment() (rfc3986.builder.URIBuilder method), 13

add\_host() (rfc3986.builder.URIBuilder method), 12

add\_path() (rfc3986.builder.URIBuilder method), 13

add\_port() (rfc3986.builder.URIBuilder method), 12

add\_query() (rfc3986.builder.URIBuilder method), 13

add\_query\_from() (rfc3986.builder.URIBuilder method), 13

add\_scheme() (rfc3986.builder.URIBuilder method), 12

allow\_hosts() (rfc3986.validators.Validator method), 17

allow\_ports() (rfc3986.validators.Validator method), 18

allow\_schemes() (rfc3986.validators.Validator method), 17

allow\_use\_of\_password() (rfc3986.validators.Validator method), 18

authority (URIReference attribute), 14

authority\_info() (rfc3986.uri.URIReference method), 15

authority\_is\_valid() (rfc3986.uri.URIReference method), 16

**C**

check\_validity\_of() (rfc3986.validators.Validator method), 18

copy\_with() (rfc3986.uri.URIReference method), 15

**F**

finalize() (rfc3986.builder.URIBuilder method), 13

forbid\_use\_of\_password() (rfc3986.validators.Validator method), 18

fragment (URIReference attribute), 14

fragment\_is\_valid() (rfc3986.uri.URIReference method), 17

from\_string() (rfc3986.uri.URIReference class method), 14

**H**

host (URIReference attribute), 14

**I**

is\_absolute() (rfc3986.uri.URIReference method), 15

is\_valid() (rfc3986.uri.URIReference method), 16

**N**

normalize() (rfc3986.uri.URIReference method), 15

normalize\_uri() (in module rfc3986.api), 11

**P**

path (URIReference attribute), 14

path\_is\_valid() (rfc3986.uri.URIReference method), 16

port (URIReference attribute), 14

**Q**

query (URIReference attribute), 14

query\_is\_valid() (rfc3986.uri.URIReference method), 16

**R**

require\_presence\_of() (rfc3986.validators.Validator method), 18

resolve\_with() (rfc3986.uri.URIReference method), 15

RFC

RFC 3986, 1, 5, 7

RFC 3986#appendix-B, 20

RFC 3986#section-2.3, 19

RFC 3986#section-3, 21

RFC 3986#section-3.2.2, 20

RFC 3986#section-3.3, 21

RFC 3987, 3

RFC 6874, 1, 23

rfc3986.abnf\_regexp (module), 19

rfc3986.abnf\_regexp.ALPHA (in module rfc3986.abnf\_regexp), 19

rfc3986.abnf\_regexp.COMPONENT\_PATTERN\_DICT (in module rfc3986.abnf\_regexp), 20

rfc3986.abnf\_regexp.DIGIT (in module rfc3986.abnf\_regexp), 19

rfc3986.abnf\_regexp.FRAGMENT\_RE (in module rfc3986.abnf\_regexp), 21

rfc3986.abnf\_regexp.GEN\_DELIMS (in module rfc3986.abnf\_regexp), 19

rfc3986.abnf\_regexp.GENERIC\_DELIMITERS (in module rfc3986.abnf\_regexp), 19

rfc3986.abnf\_regexp.GENERIC\_DELIMITERS\_SET (in module rfc3986.abnf\_regexp), 19

rfc3986.abnf\_regexp.HEXDIG\_RE (in module rfc3986.abnf\_regexp), 20

rfc3986.abnf\_regexp.HIER\_PART\_RE (in module rfc3986.abnf\_regexp), 21

rfc3986.abnf\_regexp.HOST\_PATTERN (in module rfc3986.abnf\_regexp), 20

rfc3986.abnf\_regexp.HOST\_RE (in module rfc3986.abnf\_regexp), 20

rfc3986.abnf\_regexp.IP\_LITERAL\_RE (in module rfc3986.abnf\_regexp), 20

rfc3986.abnf\_regexp.IPv4\_RE (in module rfc3986.abnf\_regexp), 20

rfc3986.abnf\_regexp.IPv6\_RE (in module rfc3986.abnf\_regexp), 20

rfc3986.abnf\_regexp.IPv\_FUTURE\_RE (in module rfc3986.abnf\_regexp), 20

rfc3986.abnf\_regexp.LS32\_RE (in module rfc3986.abnf\_regexp), 20

rfc3986.abnf\_regexp.NON\_PCT\_ENCODED\_SET (in module rfc3986.abnf\_regexp), 20

rfc3986.abnf\_regexp.PATH\_ABEMPTY (in module rfc3986.abnf\_regexp), 21

rfc3986.abnf\_regexp.PATH\_ABSOLUTE (in module rfc3986.abnf\_regexp), 21

rfc3986.abnf\_regexp.PATH\_EMPTY (in module rfc3986.abnf\_regexp), 21

rfc3986.abnf\_regexp.PATH\_NOSHEME (in module rfc3986.abnf\_regexp), 21

rfc3986.abnf\_regexp.PATH\_RE (in module rfc3986.abnf\_regexp), 21

rfc3986.abnf\_regexp.PATH\_ROOTLESS (in module rfc3986.abnf\_regexp), 21

rfc3986.abnf\_regexp.PCHAR (in module rfc3986.abnf\_regexp), 21

rfc3986.abnf\_regexp.PCT\_ENCODED (in module rfc3986.abnf\_regexp), 20

rfc3986.abnf\_regexp.PERCENT\_ENCODED (in module rfc3986.abnf\_regexp), 21

rfc3986.abnf\_regexp.PORT\_RE (in module rfc3986.abnf\_regexp), 20

rfc3986.abnf\_regexp.QUERY\_RE (in module rfc3986.abnf\_regexp), 21

rfc3986.abnf\_regexp.REG\_NAME (in module rfc3986.abnf\_regexp), 20

rfc3986.abnf\_regexp.REGULAR\_NAME\_RE (in module rfc3986.abnf\_regexp), 20

rfc3986.abnf\_regexp.RELATIVE\_PART\_RE (in module rfc3986.abnf\_regexp), 21

rfc3986.abnf\_regexp.RESERVED\_CHARS\_SET (in module rfc3986.abnf\_regexp), 19

rfc3986.abnf\_regexp.SCHEME\_RE (in module rfc3986.abnf\_regexp), 20

rfc3986.abnf\_regexp.SUB\_DELIMITERS (in module rfc3986.abnf\_regexp), 19

rfc3986.abnf\_regexp.SUB\_DELIMITERS\_RE (in module rfc3986.abnf\_regexp), 19

rfc3986.abnf\_regexp.SUB\_DELIMITERS\_SET (in module rfc3986.abnf\_regexp), 19

rfc3986.abnf\_regexp.SUB\_DELIMS (in module rfc3986.abnf\_regexp), 19

rfc3986.abnf\_regexp.UNRESERVED (in module rfc3986.abnf\_regexp), 19

rfc3986.abnf\_regexp.UNRESERVED\_CHARS (in module rfc3986.abnf\_regexp), 19

rfc3986.abnf\_regexp.UNRESERVED\_CHARS\_SET (in module rfc3986.abnf\_regexp), 19

rfc3986.abnf\_regexp.UNRESERVED\_RE (in module rfc3986.abnf\_regexp), 20

rfc3986.abnf\_regexp.URL\_PARSING\_RE (in module rfc3986.abnf\_regexp), 20

rfc3986.abnf\_regexp.USERINFO\_RE (in module rfc3986.abnf\_regexp), 20

rfc3986.misc (module), 21

rfc3986.misc.IPv4\_MATCHER (in module rfc3986.misc), 21

rfc3986.misc.PATH\_MATCHER (in module rfc3986.misc), 21

rfc3986.misc.QUERY\_MATCHER (in module rfc3986.misc), 21

rfc3986.misc.RELATIVE\_REF\_MATCHER (in module rfc3986.misc), 21

rfc3986.misc.SCHEME\_MATCHER (in module rfc3986.misc), 21

rfc3986.misc.SUBAUTHORITY\_MATCHER (in module rfc3986.misc), 21

rfc3986.misc.URI\_MATCHER (in module rfc3986.misc), 21

rfc3986.misc.UseExisting (built-in variable), 19

## S

scheme (URIReference attribute), 14

scheme\_is\_valid() (rfc3986.uri.URIReference method), 16

## U

unsplit() (rfc3986.uri.URIReference method), 14

uri\_reference() (in module rfc3986.api), 11

URIBuilder (class in rfc3986.builder), 12

URIReference (class in rfc3986.uri), 14

urlparse() (in module rfc3986.api), 11

userinfo (URIReference attribute), 14

## V

`validate()` (rfc3986.validators.Validator method), 18

Validator (class in rfc3986.validators), 17