
headerparser

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CHAPTER 1

Input Format

`headerparser` accepts a syntax that is intended to be a simplified superset of the Internet Message (e-mail) Format specified in **RFC 822**, **RFC 2822**, and **RFC 5322**. Specifically:

- Everything in the input up to (but not including) the first blank line (i.e., a line containing only a line ending) constitutes the *header section*. Everything after the first blank line is a free-form *message body*. If there are no blank lines, the entire input is used as the header section, and there is no body.
- The header section is composed of zero or more *header fields*. A header field is composed of one or more lines, with all lines after the first beginning with a space or tab. Additionally, the first line must contain a colon (optionally surrounded by whitespace); everything before the colon is the *header field name*, while everything after (including subsequent lines) is the *header field value*.

Note: Name-value separators other than a colon can be used by setting the `separator_regex` *scanner option*.

Note: This format only recognizes CR, LF, and CR LF sequences as line endings.

An example:

```
Key: Value
Foo: Bar
Bar:Whitespace around the colon is optional
Baz  : Very optional
Long-Field: This field has a very long value, so I'm going to split it
        across multiple lines.
```

```
The above line is all whitespace. This counts as line folding, and so
we're still in the "Long Field" value, but the RFCs consider such lines
obsolete, so you should avoid using them.
```

```
.
One alternative to an all-whitespace line is a line with just indentation
and a period. Debian package description fields use this.
```

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```
Foo: Wait, I already defined a value for this key.  What happens now?
What happens now: It depends on whether the `multiple` option for the "Foo"
    field was set in the HeaderParser.
If multiple=True: The "Foo" key in the dictionary returned by
    HeaderParser.parse_string() would map to a list of all of Foo's values
If multiple=False: A ParserError is raised
If multiple=False but there's only one "Foo" anyway:
    The "Foo" key in the result dictionary would map to just a single string.
Compare this to: the standard library's `email` package, which accepts
    multi-occurrence fields, but *which* occurrence Message.__getitem__
    returns is unspecified!

Are we still in the header: no
    There was a blank line above, so we're now in the body, which isn't
    processed for headers.
Good thing, too, because this isn't a valid header line.
```

On the other hand, this is not a valid RFC 822-style document:

```
    An indented first line -- without a "Name:" line before it!
A header line without a colon isn't good, either.
Does this make up for the above: no
```

class `headerparser.HeaderParser` (*normalizer=None, body=None, **kwargs*)

A parser for RFC 822-style header sections. Define the fields the parser should recognize with the `add_field` method, configure handling of unrecognized fields with `add_additional`, and then parse input with `parse_file` or `parse_string`.

Parameters

- **normalizer** (*callable*) – By default, the parser will consider two field names to be equal iff their lowercased forms are equal. This can be overridden by setting `normalizer` to a custom callable that takes a field name and returns a “normalized” name for use in equality testing. The normalizer will also be used when looking up keys in the `NormalizedDict` instances returned by the parser’s `parse_*` methods.
- **body** (*bool*) – whether the parser should allow or forbid a body after the header section; `True` means a body is required, `False` means a body is prohibited, and `None` (the default) means a body is optional
- **kwargs** – *scanner options*

add_additional (*enable=True, **kwargs*)

Specify how the parser should handle fields in the input that were not previously registered with `add_field`. By default, unknown fields will cause the `parse_*` methods to raise an `UnknownFieldError`, but calling this method with `enable=True` (the default) will change the parser’s behavior so that all unregistered fields are processed according to the options in `**kwargs`. (If no options are specified, the additional values will just be stored in the result dictionary.)

If this method is called more than once, only the settings from the last call will be used.

Note that additional field values are always stored in the result dictionary using their field name as the key, and two fields are considered the same (for the purposes of `multiple`) iff their names are the same after normalization. Customization of the dictionary key and field name can only be done through `add_field`.

New in version 0.2.0: `action` argument added

Parameters

- **enable** (*bool*) – whether the parser should accept input fields that were not registered with `add_field`; setting this to `False` disables additional fields and restores the parser’s default behavior
- **multiple** (*bool*) – If `True`, each additional header field will be allowed to occur more than once in the input, and each field’s values will be stored in a list. If `False` (the default), a `DuplicateFieldError` will be raised if an additional field occurs more than once in the input.
- **unfold** (*bool*) – If `True` (default `False`), additional field values will be “unfolded” (i.e., line breaks will be removed and whitespace around line breaks will be converted to a single space) before applying `type`
- **type** (*callable*) – a callable to apply to additional field values before storing them in the result dictionary
- **choices** (*iterable*) – A sequence of values which additional fields are allowed to have. If `choices` is defined, all additional field values in the input must have one of the given values (after applying `type`) or else an `InvalidChoiceError` is raised.
- **action** (*callable*) – A callable to invoke whenever the field is encountered in the input. The callable will be passed the current dictionary of header fields, the field’s name, and the field’s value (after processing with `type` and `unfold` and checking against `choices`). The callable replaces the default behavior of storing the field’s values in the result dictionary, and so the callable must explicitly store the values if desired.

Returns `None`

Raises `ValueError` –

- if `enable` is true and a previous call to `add_field` used a custom `dest`
- if `choices` is an empty sequence

add_field (*name*, **altnames*, ***kwargs*)

Define a header field for the parser to parse. During parsing, if a field is encountered whose name (*modulo* normalization) equals either *name* or one of the *altnames*, the field’s value will be processed according to the options in ***kwargs*. (If no options are specified, the value will just be stored in the result dictionary.)

New in version 0.2.0: `action` argument added

Parameters

- **name** (*string*) – the primary name for the field, used in error messages and as the default value of `dest`
- **altnames** (*strings*) – field name synonyms
- **dest** – The key in the result dictionary in which the field’s value(s) will be stored; defaults to `name`. When additional headers are enabled (see `add_additional`), `dest` must equal (after normalization) one of the field’s names.
- **required** (*bool*) – If `True` (default `False`), the `parse_*` methods will raise a `MissingFieldError` if the field is not present in the input
- **default** – The value to associate with the field if it is not present in the input. If no default value is specified, the field will be omitted from the result dictionary if it is not present in the input. `default` cannot be set when the field is required. `type`, `unfold`, and `action` will not be applied to the default value, and the default value need not belong to `choices`.

- **multiple** (*bool*) – If `True`, the header field will be allowed to occur more than once in the input, and all of the field’s values will be stored in a list. If `False` (the default), a `DuplicateFieldError` will be raised if the field occurs more than once in the input.
- **unfold** (*bool*) – If `True` (default `False`), the field value will be “unfolded” (i.e., line breaks will be removed and whitespace around line breaks will be converted to a single space) before applying `type`
- **type** (*callable*) – a callable to apply to the field value before storing it in the result dictionary
- **choices** (*iterable*) – A sequence of values which the field is allowed to have. If `choices` is defined, all occurrences of the field in the input must have one of the given values (after applying `type`) or else an `InvalidChoiceError` is raised.
- **action** (*callable*) – A callable to invoke whenever the field is encountered in the input. The callable will be passed the current dictionary of header fields, the field’s `name`, and the field’s value (after processing with `type` and `unfold` and checking against `choices`). The callable replaces the default behavior of storing the field’s values in the result dictionary, and so the callable must explicitly store the values if desired. When `action` is defined for a field, `dest` cannot be.

Returns `None`

Raises

- **ValueError** –
 - if another field with the same `name` or `dest` was already defined
 - if `dest` is not one of the field’s names and `add_additional` is enabled
 - if `default` is defined and `required` is `true`
 - if `choices` is an empty sequence
 - if both `dest` and `action` are defined
- **TypeError** – if `name` or one of the `altnames` is not a string

parse_file (*fp*)

Parse an RFC 822-style header field section (possibly followed by a message body) from the contents of the given filehandle and return a dictionary of the header fields (possibly with body attached)

Parameters `fp` (*file-like object*) – the file to parse

Return type `NormalizedDict`

Raises

- **ParserError** – if the input fields do not conform to the field definitions declared with `add_field` and `add_additional`
- **ScannerError** – if the header section is malformed

parse_lines (*iterable*)

Parse an RFC 822-style header field section (possibly followed by a message body) from the given sequence of lines and return a dictionary of the header fields (possibly with body attached). Newlines will be inserted where not already present in multiline header fields but will not be inserted inside the body.

Parameters `iterable` (*iterable of strings*) – a sequence of lines comprising the text to parse

Return type `NormalizedDict`

Raises

- **ParserError** – if the input fields do not conform to the field definitions declared with `add_field` and `add_additional`
- **ScannerError** – if the header section is malformed

parse_stream (*fields*)

Process a sequence of (name, value) pairs as returned by `scan_lines()` and return a dictionary of header fields (possibly with body attached). This is a low-level method that you will usually not need to call.

Parameters **fields** (*iterable of pairs of strings*) – a sequence of (name, value) pairs representing the input fields

Return type *NormalizedDict*

Raises

- **ParserError** – if the input fields do not conform to the field definitions declared with `add_field` and `add_additional`
- **ValueError** – if the input contains more than one body pair

parse_string (*s*)

Parse an RFC 822-style header field section (possibly followed by a message body) from the given string and return a dictionary of the header fields (possibly with body attached)

Parameters **s** (*string*) – the text to parse

Return type *NormalizedDict*

Raises

- **ParserError** – if the input fields do not conform to the field definitions declared with `add_field` and `add_additional`
- **ScannerError** – if the header section is malformed

`headerparser.scan_file(fp, **kwargs)`

Scan a file for RFC 822-style header fields and return a generator of `(name, value)` pairs for each header field in the input, plus a `(None, body)` pair representing the body (if any) after the header section.

See `scan_lines()` for more information on the exact behavior of the scanner.

Parameters

- **fp** – A file-like object than can be iterated over to produce lines to pass to `scan_lines()`. Opening the file in universal newlines mode is recommended.
- **kwargs** – *scanner options*

Return type generator of pairs of strings

Raises

- **MalformedHeaderError** – if an invalid header line, i.e., a line without either a colon or leading whitespace, is encountered
- **UnexpectedFoldingError** – if a folded (indented) line that is not preceded by a valid header line is encountered

`headerparser.scan_lines(iterable, **kwargs)`

Scan an iterable of lines for RFC 822-style header fields and return a generator of `(name, value)` pairs for each header field in the input, plus a `(None, body)` pair representing the body (if any) after the header section.

Each field value is a single string, the concatenation of one or more lines, with leading whitespace on lines after the first preserved. The ending of each line is converted to `'\n'` (added if there is no ending), and the last line of the field value has its trailing line ending (if any) removed.

Note: “Line ending” here means a CR, LF, or CR LF sequence at the end of one of the lines in `iterable`. Unicode line separators, along with line endings occurring in the middle of a line, are not treated as line endings and are not trimmed or converted to `\n`.

All lines after the first blank line are concatenated & yielded as-is in a `(None, body)` pair. (Note that body lines which do not end with a line terminator will not have one appended.) If there is no empty line in `iterable`, then no body pair is yielded. If the empty line is the last line in `iterable`, the body will be the empty string. If the empty line is the *first* line in `iterable` and the `skip_leading_newlines` option is `False` (the default), then all other lines will be treated as part of the body and will not be scanned for header fields.

Parameters

- **iterable** – an iterable of strings representing lines of input
- **kwargs** – *scanner options*

Return type generator of pairs of strings

Raises

- **MalformedHeaderError** – if an invalid header line, i.e., a line without either a colon or leading whitespace, is encountered
- **UnexpectedFoldingError** – if a folded (indented) line that is not preceded by a valid header line is encountered

`headerparser.scan_string(s, **kwargs)`

Scan a string for RFC 822-style header fields and return a generator of `(name, value)` pairs for each header field in the input, plus a `(None, body)` pair representing the body (if any) after the header section.

See `scan_lines()` for more information on the exact behavior of the scanner.

Parameters

- **s** – a string which will be broken into lines on CR, LF, and CR LF boundaries and passed to `scan_lines()`
- **kwargs** – *scanner options*

Return type generator of pairs of strings

Raises

- **MalformedHeaderError** – if an invalid header line, i.e., a line without either a colon or leading whitespace, is encountered
- **UnexpectedFoldingError** – if a folded (indented) line that is not preceded by a valid header line is encountered

3.1 Scanner Options

The following keyword arguments can be passed to `HeaderParser` and the scanner functions in order to configure scanning behavior:

separator_regex=r'[\t]*:[\t]*' A regex (as a `str` or compiled regex object) defining the name-value separator. When the regex matches a line, everything before the matched substring becomes the field name, and everything after becomes the first line of the field value. Note that the regex must match any surrounding whitespace in order for it to be trimmed from the key & value.

skip_leading_newlines=False If `True`, blank lines at the beginning of the input will be discarded. If `False`, a blank line at the beginning of the input marks the end of an empty header section and the beginning of the message body.

New in version 0.3.0: `separator_regex`, `skip_leading_newlines`

```
class headerparser.NormalizedDict (data=None, normalizer=None, body=None)
```

A generalization of a case-insensitive dictionary. *NormalizedDict* takes a callable (the “normalizer”) that is applied to any key passed to its `__getitem__`, `__setitem__`, or `__delitem__` method, and the result of the call is then used for the actual lookup. When iterating over a *NormalizedDict*, each key is returned as the “pre-normalized” form passed to `__setitem__` the last time the key was set (but see *normalized()* below). Aside from this, *NormalizedDict* behaves like a normal *MutableMapping* class.

If a normalizer is not specified upon instantiation, a default will be used that converts strings to lowercase and leaves everything else unchanged, so *NormalizedDict* defaults to yet another case-insensitive dictionary.

Two *NormalizedDict* instances compare equal iff their normalizers, bodies, and *normalized_dict()* return values are equal. When comparing a *NormalizedDict* to any other type of mapping, the other mapping is first converted to a *NormalizedDict* using the same normalizer.

Parameters

- **data** (*mapping*) – a mapping or iterable of (*key*, *value*) pairs with which to initialize the instance
- **normalizer** (*callable*) – A callable to apply to keys before looking them up; defaults to *lower*. The callable MUST be idempotent (i.e., `normalizer(x)` must equal `normalizer(normalizer(x))` for all inputs) or else bad things will happen to your dictionary.
- **body** (string or *None*) – initial value for the *body* attribute

body = None

This is where *HeaderParser* stores the message body (if any) accompanying the header section represented by the mapping

copy()

Create a shallow copy of the mapping

normalized()

Return a copy of the instance such that iterating over it will return normalized keys instead of the keys passed to `__setitem__`

```
>>> normdict = NormalizedDict()
>>> normdict['Foo'] = 23
>>> normdict['bar'] = 42
>>> sorted(normdict)
['Foo', 'bar']
>>> sorted(normdict.normalized())
['bar', 'foo']
```

Return type *NormalizedDict*

normalized_dict()

Convert to a *dict* with all keys normalized. (A *dict* with non-normalized keys can be obtained with `dict(normdict)`.)

Return type *dict*

`headerparser.BOOL(s)`

Convert boolean-like strings to *bool* values. The strings 'yes', 'y', 'on', 'true', and '1' are converted to *True*, and the strings 'no', 'n', 'off', 'false', and '0' are converted to *False*. The conversion is case-insensitive and ignores leading & trailing whitespace. Any value that cannot be converted to a *bool* results in a *ValueError*.

Parameters *s* (*string*) – a boolean-like string to convert to a *bool*

Return type *bool*

Raises *ValueError* – if *s* is not one of the values listed above

`headerparser.lower(s)`

New in version 0.2.0.

Convert *s* to lowercase by calling its `lower()` method if it has one; otherwise, return *s* unchanged

`headerparser.unfold(s)`

New in version 0.2.0.

Remove folding whitespace from a string by converting line breaks (and any whitespace adjacent to line breaks) to a single space and removing leading & trailing whitespace.

```
>>> unfold('This is a \n folded string.\n')
'This is a folded string.'
```

Parameters *s* (*string*) – a string to unfold

Return type *string*

exception `headerparser.errors.Error`

Bases: `Exception`

Superclass for all custom exceptions raised by the package

5.1 Parser Errors

exception `headerparser.errors.ParserError`

Bases: `headerparser.errors.Error`, `ValueError`

Superclass for all custom exceptions related to errors in parsing

exception `headerparser.errors.BodyNotAllowedError`

Bases: `headerparser.errors.ParserError`

Raised when `body=False` and the parser encounters a message body

exception `headerparser.errors.DuplicateFieldError` (*name*)

Bases: `headerparser.errors.ParserError`

Raised when a header field not marked as multiple occurs two or more times in the input

name = None

The name of the duplicated header field

exception `headerparser.errors.FieldTypeError` (*name*, *value*, *exc_value*)

Bases: `headerparser.errors.ParserError`

Raised when a type callable raises an exception

exc_value = None

The exception raised by the type callable

name = None

The name of the header field for which the type callable was called

value = None

The value on which the type callable was called

exception `headerparser.errors.InvalidChoiceError` (*name*, *value*)

Bases: `headerparser.errors.ParserError`

Raised when a header field is given a value that is not one of its allowed choices

name = None

The name of the header field

value = None

The invalid value

exception `headerparser.errors.MissingBodyError`

Bases: `headerparser.errors.ParserError`

Raised when `body=True` but there is no message body in the input

exception `headerparser.errors.MissingFieldError` (*name*)

Bases: `headerparser.errors.ParserError`

Raised when a header field marked as required is not present in the input

name = None

The name of the missing header field

exception `headerparser.errors.UnknownFieldError` (*name*)

Bases: `headerparser.errors.ParserError`

Raised when an unknown header field is encountered and additional header fields are not enabled

name = None

The name of the unknown header field

5.2 Scanner Errors

exception `headerparser.errors.ScannerError`

Bases: `headerparser.errors.Error`, `ValueError`

Superclass for all custom exceptions related to errors in scanning

exception `headerparser.errors.MalformedHeaderError` (*line*)

Bases: `headerparser.errors.ScannerError`

Raised when the scanner encounters an invalid header line, i.e., a line without either a colon or leading whitespace

line = None

The invalid header line

exception `headerparser.errors.UnexpectedFoldingError` (*line*)

Bases: `headerparser.errors.ScannerError`

Raised when the scanner encounters a folded (indented) line that is not preceded by a valid header line

line = None

The line containing the unexpected folding (indentation)

`headerparser` parses key-value pairs in the style of [RFC 822](#) (e-mail) headers and converts them into case-insensitive dictionaries with the trailing message body (if any) attached. Fields can be converted to other types, marked required, or given default values using an API based on the standard library's `argparse` module. (Everyone loves

`argparse`, right?) Low-level functions for just scanning header fields (breaking them into sequences of key-value pairs without any further processing) are also included.

CHAPTER 6

Installation

Just use `pip` (You have `pip`, right?) to install `headerparser` and its dependencies:

```
pip install headerparser
```


CHAPTER 7

Examples

Define a parser:

```
>>> import headerparser
>>> parser = headerparser.HeaderParser()
>>> parser.add_field('Name', required=True)
>>> parser.add_field('Type', choices=['example', 'demonstration', 'prototype'],
↳ default='example')
>>> parser.add_field('Public', type=headerparser.BOOL, default=False)
>>> parser.add_field('Tag', multiple=True)
>>> parser.add_field('Data')
```

Parse some headers and inspect the results:

```
>>> msg = parser.parse_string('''\
... Name: Sample Input
... Public: yes
... tag: doctest, examples,
...   whatever
... TAG: README
...
... Wait, why I am using a body instead of the "Data" field?
... ''')
>>> sorted(msg.keys())
['Name', 'Public', 'Tag', 'Type']
>>> msg['Name']
'Sample Input'
>>> msg['Public']
True
>>> msg['Tag']
['doctest, examples,\n  whatever', 'README']
>>> msg['TYPE']
'example'
>>> msg['Data']
Traceback (most recent call last):
```

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```
...
KeyError: 'data'
>>> msg.body
'Wait, why I am using a body instead of the "Data" field?\n'
```

Fail to parse headers that don't meet your requirements:

```
>>> parser.parse_string('Type: demonstration')
Traceback (most recent call last):
...
headerparser.errors.MissingFieldError: Required header field 'Name' is not present
>>> parser.parse_string('Name: Bad type\nType: other')
Traceback (most recent call last):
...
headerparser.errors.InvalidChoiceError: 'other' is not a valid choice for 'Type'
>>> parser.parse_string('Name: unknown field\nField: Value')
Traceback (most recent call last):
...
headerparser.errors.UnknownFieldError: Unknown header field 'Field'
```

Allow fields you didn't even think of:

```
>>> parser.add_additional()
>>> msg = parser.parse_string('Name: unknown field\nField: Value')
>>> msg['Field']
'Value'
```

Just split some headers into names & values and worry about validity later:

```
>>> for field in headerparser.scan_string(''\
... Name: Scanner Sample
... Unknown headers: no problem
... Unparsed-Boolean: yes
... CaSe-SeNsItIvE-rEsUlTs: true
... Whitespace around colons: optional
... Whitespace around colons : I already said it's optional.
... That means you have the _option_ to use as much as you want!
...
... And there's a body, too, I guess.
... ''): print(field)
('Name', 'Scanner Sample')
('Unknown headers', 'no problem')
('Unparsed-Boolean', 'yes')
('CaSe-SeNsItIvE-rEsUlTs', 'true')
('Whitespace around colons', 'optional')
('Whitespace around colons', "I already said it's optional.\n That means you have_
↳ the _option_ to use as much as you want!")
(None, "And there's a body, too, I guess.\n")
```

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