

16.4 argparse — Parser for command-line options, arguments and sub-commands

New in version 3.2.

Source code: [Lib/argparse.py](#)

Tutorial

This page contains the API reference information. For a more gentle introduction to Python command-line parsing, have a look at the [argparse tutorial](#).

The `argparse` module makes it easy to write user-friendly command-line interfaces. The program defines what arguments it requires, and `argparse` will figure out how to parse those out of `sys.argv`. The `argparse` module also automatically generates help and usage messages. The module will also issue errors when users give the program invalid arguments.

16.4.1 Core Functionality

The `argparse` module's support for command-line interfaces is built around an instance of `argparse.ArgumentParser`. It is a container for argument specifications and has options that apply the parser as whole:

```
parser = argparse.ArgumentParser(
    prog='ProgramName',
    description='What the program does',
    epilog='Text at the bottom of help')
```

The `ArgumentParser.add_argument()` method attaches individual argument specifications to the parser. It supports positional arguments, options that accept values, and on/off flags:

```
parser.add_argument('filename')           # positional argument
parser.add_argument('-c', '--count')      # option that takes a value
parser.add_argument('-v', '--verbose',
                    action='store_true')  # on/off flag
```

The `ArgumentParser.parse_args()` method runs the parser and places the extracted data in a `argparse.Namespace` object:

```
args = parser.parse_args()
print(args.filename, args.count, args.verbose)
```

16.4.2 Quick Links for `add_argument()`

Name	Description	Values
<i>action</i>	Specify how an argument should be handled	'store', 'store_const', 'store_true', 'append', 'append_const', 'count', 'help', 'version'
<i>choices</i>	Limit values to a specific set of choices	['foo', 'bar'], range(1, 10), or <i>Container</i> instance
<i>const</i>	Store a constant value	
<i>default</i>	Default value used when an argument is not provided	Defaults to None
<i>dest</i>	Specify the attribute name used in the result namespace	
<i>help</i>	Help message for an argument	
<i>metavar</i>	Alternate display name for the argument as shown in help	
<i>nargs</i>	Number of times the argument can be used	<i>int</i> , '?', '*', or '+'
<i>required</i>	Indicate whether an argument is required or optional	True or False
<i>type</i>	Automatically convert an argument to the given type	<i>int</i> , <i>float</i> , <code>argparse.FileType('w')</code> , or callable function

16.4.3 Example

The following code is a Python program that takes a list of integers and produces either the sum or the max:

```
import argparse

parser = argparse.ArgumentParser(description='Process some integers.')
parser.add_argument('integers', metavar='N', type=int, nargs='+',
                    help='an integer for the accumulator')
parser.add_argument('--sum', dest='accumulate', action='store_const',
                    const=sum, default=max,
                    help='sum the integers (default: find the max)')

args = parser.parse_args()
print(args.accumulate(args.integers))
```

Assuming the above Python code is saved into a file called `prog.py`, it can be run at the command line and it provides useful help messages:

```
$ python prog.py -h
usage: prog.py [-h] [--sum] N [N ...]

Process some integers.

positional arguments:
  N                an integer for the accumulator

options:
  -h, --help      show this help message and exit
  --sum           sum the integers (default: find the max)
```

When run with the appropriate arguments, it prints either the sum or the max of the command-line integers:

```
$ python prog.py 1 2 3 4
4
```

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```
$ python prog.py 1 2 3 4 --sum
10
```

If invalid arguments are passed in, an error will be displayed:

```
$ python prog.py a b c
usage: prog.py [-h] [--sum] N [N ...]
prog.py: error: argument N: invalid int value: 'a'
```

The following sections walk you through this example.

Creating a parser

The first step in using the `argparse` is creating an `ArgumentParser` object:

```
>>> parser = argparse.ArgumentParser(description='Process some integers.')
```

The `ArgumentParser` object will hold all the information necessary to parse the command line into Python data types.

Adding arguments

Filling an `ArgumentParser` with information about program arguments is done by making calls to the `add_argument()` method. Generally, these calls tell the `ArgumentParser` how to take the strings on the command line and turn them into objects. This information is stored and used when `parse_args()` is called. For example:

```
>>> parser.add_argument('integers', metavar='N', type=int, nargs='+',
...                     help='an integer for the accumulator')
>>> parser.add_argument('--sum', dest='accumulate', action='store_const',
...                     const=sum, default=max,
...                     help='sum the integers (default: find the max)')
```

Later, calling `parse_args()` will return an object with two attributes, `integers` and `accumulate`. The `integers` attribute will be a list of one or more integers, and the `accumulate` attribute will be either the `sum()` function, if `--sum` was specified at the command line, or the `max()` function if it was not.

Parsing arguments

`ArgumentParser` parses arguments through the `parse_args()` method. This will inspect the command line, convert each argument to the appropriate type and then invoke the appropriate action. In most cases, this means a simple `Namespace` object will be built up from attributes parsed out of the command line:

```
>>> parser.parse_args(['--sum', '7', '-1', '42'])
Namespace(accumulate=<built-in function sum>, integers=[7, -1, 42])
```

In a script, `parse_args()` will typically be called with no arguments, and the `ArgumentParser` will automatically determine the command-line arguments from `sys.argv`.

16.4.4 ArgumentParser objects

class `argparse.ArgumentParser` (*prog=None, usage=None, description=None, epilog=None, parents=[], formatter_class=argparse.HelpFormatter, prefix_chars='-', fromfile_prefix_chars=None, argument_default=None, conflict_handler='error', add_help=True, allow_abbrev=True, exit_on_error=True*)

Create a new *ArgumentParser* object. All parameters should be passed as keyword arguments. Each parameter has its own more detailed description below, but in short they are:

- *prog* - The name of the program (default: `os.path.basename(sys.argv[0])`)
- *usage* - The string describing the program usage (default: generated from arguments added to parser)
- *description* - Text to display before the argument help (by default, no text)
- *epilog* - Text to display after the argument help (by default, no text)
- *parents* - A list of *ArgumentParser* objects whose arguments should also be included
- *formatter_class* - A class for customizing the help output
- *prefix_chars* - The set of characters that prefix optional arguments (default: '-')
- *fromfile_prefix_chars* - The set of characters that prefix files from which additional arguments should be read (default: None)
- *argument_default* - The global default value for arguments (default: None)
- *conflict_handler* - The strategy for resolving conflicting optionals (usually unnecessary)
- *add_help* - Add a `-h/--help` option to the parser (default: True)
- *allow_abbrev* - Allows long options to be abbreviated if the abbreviation is unambiguous. (default: True)
- *exit_on_error* - Determines whether or not *ArgumentParser* exits with error info when an error occurs. (default: True)

Changed in version 3.5: *allow_abbrev* parameter was added.

Changed in version 3.8: In previous versions, *allow_abbrev* also disabled grouping of short flags such as `-vv` to mean `-v -v`.

Changed in version 3.9: *exit_on_error* parameter was added.

The following sections describe how each of these are used.

prog

By default, *ArgumentParser* objects use `sys.argv[0]` to determine how to display the name of the program in help messages. This default is almost always desirable because it will make the help messages match how the program was invoked on the command line. For example, consider a file named `myprogram.py` with the following code:

```
import argparse
parser = argparse.ArgumentParser()
parser.add_argument('--foo', help='foo help')
args = parser.parse_args()
```

The help for this program will display `myprogram.py` as the program name (regardless of where the program was invoked from):

```
$ python myprogram.py --help
usage: myprogram.py [-h] [--foo FOO]

options:
  -h, --help  show this help message and exit
```

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```
--foo FOO    foo help
$ cd ..
$ python subdir/myprogram.py --help
usage: myprogram.py [-h] [--foo FOO]

options:
  -h, --help  show this help message and exit
  --foo FOO   foo help
```

To change this default behavior, another value can be supplied using the `prog=` argument to [ArgumentParser](#):

```
>>> parser = argparse.ArgumentParser(prog='myprogram')
>>> parser.print_help()
usage: myprogram [-h]

options:
  -h, --help  show this help message and exit
```

Note that the program name, whether determined from `sys.argv[0]` or from the `prog=` argument, is available to help messages using the `%(prog)s` format specifier.

```
>>> parser = argparse.ArgumentParser(prog='myprogram')
>>> parser.add_argument('--foo', help='foo of the %(prog)s program')
>>> parser.print_help()
usage: myprogram [-h] [--foo FOO]

options:
  -h, --help  show this help message and exit
  --foo FOO   foo of the myprogram program
```

usage

By default, [ArgumentParser](#) calculates the usage message from the arguments it contains:

```
>>> parser = argparse.ArgumentParser(prog='PROG')
>>> parser.add_argument('--foo', nargs='?', help='foo help')
>>> parser.add_argument('bar', nargs='+', help='bar help')
>>> parser.print_help()
usage: PROG [-h] [--foo [FOO]] bar [bar ...]

positional arguments:
  bar                bar help

options:
  -h, --help  show this help message and exit
  --foo [FOO] foo help
```

The default message can be overridden with the `usage=` keyword argument:

```
>>> parser = argparse.ArgumentParser(prog='PROG', usage='%(prog)s [options]')
>>> parser.add_argument('--foo', nargs='?', help='foo help')
>>> parser.add_argument('bar', nargs='+', help='bar help')
>>> parser.print_help()
usage: PROG [options]

positional arguments:
  bar                bar help

options:
```

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```
-h, --help    show this help message and exit
--foo [FOO]  foo help
```

The `% (prog) s` format specifier is available to fill in the program name in your usage messages.

description

Most calls to the `ArgumentParser` constructor will use the `description=` keyword argument. This argument gives a brief description of what the program does and how it works. In help messages, the description is displayed between the command-line usage string and the help messages for the various arguments:

```
>>> parser = argparse.ArgumentParser(description='A foo that bars')
>>> parser.print_help()
usage: argparse.py [-h]

A foo that bars

options:
  -h, --help  show this help message and exit
```

By default, the description will be line-wrapped so that it fits within the given space. To change this behavior, see the `formatter_class` argument.

epilog

Some programs like to display additional description of the program after the description of the arguments. Such text can be specified using the `epilog=` argument to `ArgumentParser`:

```
>>> parser = argparse.ArgumentParser(
...     description='A foo that bars',
...     epilog="And that's how you'd foo a bar")
>>> parser.print_help()
usage: argparse.py [-h]

A foo that bars

options:
  -h, --help  show this help message and exit

And that's how you'd foo a bar
```

As with the `description` argument, the `epilog=` text is by default line-wrapped, but this behavior can be adjusted with the `formatter_class` argument to `ArgumentParser`.

parents

Sometimes, several parsers share a common set of arguments. Rather than repeating the definitions of these arguments, a single parser with all the shared arguments and passed to `parents=` argument to `ArgumentParser` can be used. The `parents=` argument takes a list of `ArgumentParser` objects, collects all the positional and optional actions from them, and adds these actions to the `ArgumentParser` object being constructed:

```
>>> parent_parser = argparse.ArgumentParser(add_help=False)
>>> parent_parser.add_argument('--parent', type=int)

>>> foo_parser = argparse.ArgumentParser(parents=[parent_parser])
>>> foo_parser.add_argument('foo')
>>> foo_parser.parse_args(['--parent', '2', 'xxx'])
```

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```

Namespace(foo='XXX', parent=2)

>>> bar_parser = argparse.ArgumentParser(parents=[parent_parser])
>>> bar_parser.add_argument('--bar')
>>> bar_parser.parse_args(['--bar', 'YYY'])
Namespace(bar='YYY', parent=None)

```

Note that most parent parsers will specify `add_help=False`. Otherwise, the *ArgumentParser* will see two `-h/--help` options (one in the parent and one in the child) and raise an error.

Note: You must fully initialize the parsers before passing them via `parents=`. If you change the parent parsers after the child parser, those changes will not be reflected in the child.

formatter_class

ArgumentParser objects allow the help formatting to be customized by specifying an alternate formatting class. Currently, there are four such classes:

```

class argparse.RawDescriptionHelpFormatter
class argparse.RawTextHelpFormatter
class argparse.ArgumentDefaultsHelpFormatter
class argparse.MetavarTypeHelpFormatter

```

RawDescriptionHelpFormatter and *RawTextHelpFormatter* give more control over how textual descriptions are displayed. By default, *ArgumentParser* objects line-wrap the *description* and *epilog* texts in command-line help messages:

```

>>> parser = argparse.ArgumentParser(
...     prog='PROG',
...     description='''this description
...         was indented weird
...         but that is okay''',
...     epilog='''
...         likewise for this epilog whose whitespace will
...         be cleaned up and whose words will be wrapped
...         across a couple lines''')
>>> parser.print_help()
usage: PROG [-h]

this description was indented weird but that is okay

options:
  -h, --help  show this help message and exit

likewise for this epilog whose whitespace will be cleaned up and whose words
will be wrapped across a couple lines

```

Passing *RawDescriptionHelpFormatter* as `formatter_class=` indicates that *description* and *epilog* are already correctly formatted and should not be line-wrapped:

```

>>> parser = argparse.ArgumentParser(
...     prog='PROG',
...     formatter_class=argparse.RawDescriptionHelpFormatter,
...     description=textwrap.dedent('''\
...         Please do not mess up this text!
...         -----
...         I have indented it

```

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```
...         exactly the way
...         I want it
...         '''))
>>> parser.print_help()
usage: PROG [-h]

Please do not mess up this text!
-----
    I have indented it
    exactly the way
    I want it

options:
  -h, --help  show this help message and exit
```

RawTextHelpFormatter maintains whitespace for all sorts of help text, including argument descriptions. However, multiple new lines are replaced with one. If you wish to preserve multiple blank lines, add spaces between the newlines.

ArgumentDefaultsHelpFormatter automatically adds information about default values to each of the argument help messages:

```
>>> parser = argparse.ArgumentParser(
...     prog='PROG',
...     formatter_class=argparse.ArgumentDefaultsHelpFormatter)
>>> parser.add_argument('--foo', type=int, default=42, help='FOO!')
>>> parser.add_argument('bar', nargs='*', default=[1, 2, 3], help='BAR!')
>>> parser.print_help()
usage: PROG [-h] [--foo FOO] [bar ...]

positional arguments:
  bar          BAR! (default: [1, 2, 3])

options:
  -h, --help  show this help message and exit
  --foo FOO   FOO! (default: 42)
```

MetavarTypeHelpFormatter uses the name of the *type* argument for each argument as the display name for its values (rather than using the *dest* as the regular formatter does):

```
>>> parser = argparse.ArgumentParser(
...     prog='PROG',
...     formatter_class=argparse.MetavarTypeHelpFormatter)
>>> parser.add_argument('--foo', type=int)
>>> parser.add_argument('bar', type=float)
>>> parser.print_help()
usage: PROG [-h] [--foo int] float

positional arguments:
  float

options:
  -h, --help  show this help message and exit
  --foo int
```


prefix_chars

Most command-line options will use `-` as the prefix, e.g. `-f/--foo`. Parsers that need to support different or additional prefix characters, e.g. for options like `+f` or `/foo`, may specify them using the `prefix_chars=` argument to the `ArgumentParser` constructor:

```
>>> parser = argparse.ArgumentParser(prog='PROG', prefix_chars='+-')
>>> parser.add_argument('+f')
>>> parser.add_argument('++bar')
>>> parser.parse_args('+f X ++bar Y'.split())
Namespace(bar='Y', f='X')
```

The `prefix_chars=` argument defaults to `'-'`. Supplying a set of characters that does not include `-` will cause `-f/--foo` options to be disallowed.

fromfile_prefix_chars

Sometimes, when dealing with a particularly long argument list, it may make sense to keep the list of arguments in a file rather than typing it out at the command line. If the `fromfile_prefix_chars=` argument is given to the `ArgumentParser` constructor, then arguments that start with any of the specified characters will be treated as files, and will be replaced by the arguments they contain. For example:

```
>>> with open('args.txt', 'w') as fp:
...     fp.write('-f\nbar')
>>> parser = argparse.ArgumentParser(fromfile_prefix_chars='@')
>>> parser.add_argument('-f')
>>> parser.parse_args(['-f', 'foo', '@args.txt'])
Namespace(f='bar')
```

Arguments read from a file must by default be one per line (but see also `convert_arg_line_to_args()`) and are treated as if they were in the same place as the original file referencing argument on the command line. So in the example above, the expression `['-f', 'foo', '@args.txt']` is considered equivalent to the expression `['-f', 'foo', '-f', 'bar']`.

The `fromfile_prefix_chars=` argument defaults to `None`, meaning that arguments will never be treated as file references.

argument_default

Generally, argument defaults are specified either by passing a default to `add_argument()` or by calling the `set_defaults()` methods with a specific set of name-value pairs. Sometimes however, it may be useful to specify a single parser-wide default for arguments. This can be accomplished by passing the `argument_default=` key-word argument to `ArgumentParser`. For example, to globally suppress attribute creation on `parse_args()` calls, we supply `argument_default=SUPPRESS`:

```
>>> parser = argparse.ArgumentParser(argument_default=argparse.SUPPRESS)
>>> parser.add_argument('--foo')
>>> parser.add_argument('bar', nargs='?')
>>> parser.parse_args(['--foo', '1', 'BAR'])
Namespace(bar='BAR', foo='1')
>>> parser.parse_args([])
Namespace()
```

allow_abbrev

Normally, when you pass an argument list to the `parse_args()` method of an `ArgumentParser`, it *recognizes abbreviations* of long options.

This feature can be disabled by setting `allow_abbrev` to `False`:

```
>>> parser = argparse.ArgumentParser(prog='PROG', allow_abbrev=False)
>>> parser.add_argument('--foobar', action='store_true')
>>> parser.add_argument('--foonley', action='store_false')
>>> parser.parse_args(['--foon'])
usage: PROG [-h] [--foobar] [--foonley]
PROG: error: unrecognized arguments: --foon
```

New in version 3.5.

conflict_handler

`ArgumentParser` objects do not allow two actions with the same option string. By default, `ArgumentParser` objects raise an exception if an attempt is made to create an argument with an option string that is already in use:

```
>>> parser = argparse.ArgumentParser(prog='PROG')
>>> parser.add_argument('-f', '--foo', help='old foo help')
>>> parser.add_argument('--foo', help='new foo help')
Traceback (most recent call last):
..
ArgumentError: argument --foo: conflicting option string(s): --foo
```

Sometimes (e.g. when using *parents*) it may be useful to simply override any older arguments with the same option string. To get this behavior, the value `'resolve'` can be supplied to the `conflict_handler=` argument of `ArgumentParser`:

```
>>> parser = argparse.ArgumentParser(prog='PROG', conflict_handler='resolve')
>>> parser.add_argument('-f', '--foo', help='old foo help')
>>> parser.add_argument('--foo', help='new foo help')
>>> parser.print_help()
usage: PROG [-h] [-f FOO] [--foo FOO]

options:
  -h, --help  show this help message and exit
  -f FOO      old foo help
  --foo FOO   new foo help
```

Note that `ArgumentParser` objects only remove an action if all of its option strings are overridden. So, in the example above, the old `-f/--foo` action is retained as the `-f` action, because only the `--foo` option string was overridden.

add_help

By default, `ArgumentParser` objects add an option which simply displays the parser's help message. For example, consider a file named `myprogram.py` containing the following code:

```
import argparse
parser = argparse.ArgumentParser()
parser.add_argument('--foo', help='foo help')
args = parser.parse_args()
```

If `-h` or `--help` is supplied at the command line, the `ArgumentParser` help will be printed:

```
$ python myprogram.py --help
usage: myprogram.py [-h] [--foo FOO]

options:
  -h, --help  show this help message and exit
  --foo FOO   foo help
```

Occasionally, it may be useful to disable the addition of this help option. This can be achieved by passing `False` as the `add_help=` argument to `ArgumentParser`:

```
>>> parser = argparse.ArgumentParser(prog='PROG', add_help=False)
>>> parser.add_argument('--foo', help='foo help')
>>> parser.print_help()
usage: PROG [--foo FOO]

options:
  --foo FOO  foo help
```

The help option is typically `-h/--help`. The exception to this is if the `prefix_chars=` is specified and does not include `-`, in which case `-h` and `--help` are not valid options. In this case, the first character in `prefix_chars` is used to prefix the help options:

```
>>> parser = argparse.ArgumentParser(prog='PROG', prefix_chars='+/')
>>> parser.print_help()
usage: PROG [+h]

options:
  +h, ++help  show this help message and exit
```

exit_on_error

Normally, when you pass an invalid argument list to the `parse_args()` method of an `ArgumentParser`, it will exit with error info.

If the user would like to catch errors manually, the feature can be enabled by setting `exit_on_error` to `False`:

```
>>> parser = argparse.ArgumentParser(exit_on_error=False)
>>> parser.add_argument('--integers', type=int)
_StoreAction(option_strings=['--integers'], dest='integers', nargs=None,
↳const=None, default=None, type=<class 'int'>, choices=None, help=None,
↳metavar=None)
>>> try:
...     parser.parse_args('--integers a'.split())
... except argparse.ArgumentError:
...     print('Catching an argumentError')
...
Catching an argumentError
```

New in version 3.9.

16.4.5 The `add_argument()` method

`ArgumentParser.add_argument` (*name or flags*...[, *action*][, *nargs*][, *const*][, *default*][, *type*][, *choices*][, *required*][, *help*][, *metavar*][, *dest*])

Define how a single command-line argument should be parsed. Each parameter has its own more detailed description below, but in short they are:

- *name or flags* - Either a name or a list of option strings, e.g. `foo` or `-f`, `--foo`.
- *action* - The basic type of action to be taken when this argument is encountered at the command line.
- *nargs* - The number of command-line arguments that should be consumed.
- *const* - A constant value required by some *action* and *nargs* selections.
- *default* - The value produced if the argument is absent from the command line and if it is absent from the namespace object.
- *type* - The type to which the command-line argument should be converted.
- *choices* - A sequence of the allowable values for the argument.
- *required* - Whether or not the command-line option may be omitted (optionals only).
- *help* - A brief description of what the argument does.
- *metavar* - A name for the argument in usage messages.
- *dest* - The name of the attribute to be added to the object returned by `parse_args()`.

The following sections describe how each of these are used.

name or flags

The `add_argument()` method must know whether an optional argument, like `-f` or `--foo`, or a positional argument, like a list of filenames, is expected. The first arguments passed to `add_argument()` must therefore be either a series of flags, or a simple argument name.

For example, an optional argument could be created like:

```
>>> parser.add_argument('-f', '--foo')
```

while a positional argument could be created like:

```
>>> parser.add_argument('bar')
```

When `parse_args()` is called, optional arguments will be identified by the `-` prefix, and the remaining arguments will be assumed to be positional:

```
>>> parser = argparse.ArgumentParser(prog='PROG')
>>> parser.add_argument('-f', '--foo')
>>> parser.add_argument('bar')
>>> parser.parse_args(['BAR'])
Namespace(bar='BAR', foo=None)
>>> parser.parse_args(['BAR', '--foo', 'FOO'])
Namespace(bar='BAR', foo='FOO')
>>> parser.parse_args(['--foo', 'FOO'])
usage: PROG [-h] [-f FOO] bar
PROG: error: the following arguments are required: bar
```

action

`ArgumentParser` objects associate command-line arguments with actions. These actions can do just about anything with the command-line arguments associated with them, though most actions simply add an attribute to the object returned by `parse_args()`. The `action` keyword argument specifies how the command-line arguments should be handled. The supplied actions are:

- `'store'` - This just stores the argument's value. This is the default action. For example:

```
>>> parser = argparse.ArgumentParser()
>>> parser.add_argument('--foo')
>>> parser.parse_args('--foo 1'.split())
Namespace(foo='1')
```

- `'store_const'` - This stores the value specified by the `const` keyword argument; note that the `const` keyword argument defaults to `None`. The `'store_const'` action is most commonly used with optional arguments that specify some sort of flag. For example:

```
>>> parser = argparse.ArgumentParser()
>>> parser.add_argument('--foo', action='store_const', const=42)
>>> parser.parse_args(['--foo'])
Namespace(foo=42)
```

- `'store_true'` and `'store_false'` - These are special cases of `'store_const'` used for storing the values `True` and `False` respectively. In addition, they create default values of `False` and `True` respectively. For example:

```
>>> parser = argparse.ArgumentParser()
>>> parser.add_argument('--foo', action='store_true')
>>> parser.add_argument('--bar', action='store_false')
>>> parser.add_argument('--baz', action='store_false')
>>> parser.parse_args('--foo --bar'.split())
Namespace(foo=True, bar=False, baz=True)
```

- `'append'` - This stores a list, and appends each argument value to the list. It is useful to allow an option to be specified multiple times. If the default value is non-empty, the default elements will be present in the parsed value for the option, with any values from the command line appended after those default values. Example usage:

```
>>> parser = argparse.ArgumentParser()
>>> parser.add_argument('--foo', action='append')
>>> parser.parse_args('--foo 1 --foo 2'.split())
Namespace(foo=['1', '2'])
```

- `'append_const'` - This stores a list, and appends the value specified by the `const` keyword argument to the list; note that the `const` keyword argument defaults to `None`. The `'append_const'` action is typically useful when multiple arguments need to store constants to the same list. For example:

```
>>> parser = argparse.ArgumentParser()
>>> parser.add_argument('--str', dest='types', action='append_const',
    ↪const=str)
>>> parser.add_argument('--int', dest='types', action='append_const',
    ↪const=int)
>>> parser.parse_args('--str --int'.split())
Namespace(types=[<class 'str'>, <class 'int'>])
```

- `'count'` - This counts the number of times a keyword argument occurs. For example, this is useful for increasing verbosity levels:

```
>>> parser = argparse.ArgumentParser()
>>> parser.add_argument('--verbose', '-v', action='count', default=0)
```

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```
>>> parser.parse_args(['-vvv'])
Namespace(verbose=3)
```

Note, the *default* will be `None` unless explicitly set to `0`.

- 'help' - This prints a complete help message for all the options in the current parser and then exits. By default a help action is automatically added to the parser. See [ArgumentParser](#) for details of how the output is created.
- 'version' - This expects a `version=` keyword argument in the `add_argument()` call, and prints version information and exits when invoked:

```
>>> import argparse
>>> parser = argparse.ArgumentParser(prog='PROG')
>>> parser.add_argument('--version', action='version', version='% (prog)s 2.0')
>>> parser.parse_args(['--version'])
PROG 2.0
```

- 'extend' - This stores a list, and extends each argument value to the list. Example usage:

```
>>> parser = argparse.ArgumentParser()
>>> parser.add_argument("--foo", action="extend", nargs="+", type=str)
>>> parser.parse_args(["--foo", "f1", "--foo", "f2", "f3", "f4"])
Namespace(foo=['f1', 'f2', 'f3', 'f4'])
```

New in version 3.8.

You may also specify an arbitrary action by passing an `Action` subclass or other object that implements the same interface. The `BooleanOptionalAction` is available in `argparse` and adds support for boolean actions such as `--foo` and `--no-foo`:

```
>>> import argparse
>>> parser = argparse.ArgumentParser()
>>> parser.add_argument('--foo', action=argparse.BooleanOptionalAction)
>>> parser.parse_args(['--no-foo'])
Namespace(foo=False)
```

New in version 3.9.

The recommended way to create a custom action is to extend `Action`, overriding the `__call__` method and optionally the `__init__` and `format_usage` methods.

An example of a custom action:

```
>>> class FooAction(argparse.Action):
...     def __init__(self, option_strings, dest, nargs=None, **kwargs):
...         if nargs is not None:
...             raise ValueError("nargs not allowed")
...         super().__init__(option_strings, dest, **kwargs)
...     def __call__(self, parser, namespace, values, option_string=None):
...         print('%r %r %r' % (namespace, values, option_string))
...         setattr(namespace, self.dest, values)
...
>>> parser = argparse.ArgumentParser()
>>> parser.add_argument('--foo', action=FooAction)
>>> parser.add_argument('bar', action=FooAction)
>>> args = parser.parse_args('1 --foo 2'.split())
Namespace(bar=None, foo=None) '1' None
Namespace(bar='1', foo=None) '2' '--foo'
>>> args
Namespace(bar='1', foo='2')
```

For more details, see [Action](#).

nargs

ArgumentParser objects usually associate a single command-line argument with a single action to be taken. The `nargs` keyword argument associates a different number of command-line arguments with a single action. The supported values are:

- `N` (an integer). `N` arguments from the command line will be gathered together into a list. For example:

```
>>> parser = argparse.ArgumentParser()
>>> parser.add_argument('--foo', nargs=2)
>>> parser.add_argument('bar', nargs=1)
>>> parser.parse_args('c --foo a b'.split())
Namespace(bar=['c'], foo=['a', 'b'])
```

Note that `nargs=1` produces a list of one item. This is different from the default, in which the item is produced by itself.

- `'?'`. One argument will be consumed from the command line if possible, and produced as a single item. If no command-line argument is present, the value from *default* will be produced. Note that for optional arguments, there is an additional case - the option string is present but not followed by a command-line argument. In this case the value from *const* will be produced. Some examples to illustrate this:

```
>>> parser = argparse.ArgumentParser()
>>> parser.add_argument('--foo', nargs='?', const='c', default='d')
>>> parser.add_argument('bar', nargs='?', default='d')
>>> parser.parse_args(['XX', '--foo', 'YY'])
Namespace(bar='XX', foo='YY')
>>> parser.parse_args(['XX', '--foo'])
Namespace(bar='XX', foo='c')
>>> parser.parse_args([])
Namespace(bar='d', foo='d')
```

One of the more common uses of `nargs='?'` is to allow optional input and output files:

```
>>> parser = argparse.ArgumentParser()
>>> parser.add_argument('infile', nargs='?', type=argparse.FileType('r'),
...                     default=sys.stdin)
>>> parser.add_argument('outfile', nargs='?', type=argparse.FileType('w'),
...                     default=sys.stdout)
>>> parser.parse_args(['input.txt', 'output.txt'])
Namespace(infile=<_io.TextIOWrapper name='input.txt' encoding='UTF-8'>,
          outfile=<_io.TextIOWrapper name='output.txt' encoding='UTF-8'>)
>>> parser.parse_args([])
Namespace(infile=<_io.TextIOWrapper name='<stdin>' encoding='UTF-8'>,
          outfile=<_io.TextIOWrapper name='<stdout>' encoding='UTF-8'>)
```

- `'*'`. All command-line arguments present are gathered into a list. Note that it generally doesn't make much sense to have more than one positional argument with `nargs='*'`, but multiple optional arguments with `nargs='*'` is possible. For example:

```
>>> parser = argparse.ArgumentParser()
>>> parser.add_argument('--foo', nargs='*')
>>> parser.add_argument('--bar', nargs='*')
>>> parser.add_argument('baz', nargs='*')
>>> parser.parse_args('a b --foo x y --bar 1 2'.split())
Namespace(bar=['1', '2'], baz=['a', 'b'], foo=['x', 'y'])
```

- `'+'`. Just like `'*'`, all command-line args present are gathered into a list. Additionally, an error message will be generated if there wasn't at least one command-line argument present. For example:

```
>>> parser = argparse.ArgumentParser(prog='PROG')
>>> parser.add_argument('foo', nargs='+')
```

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```
>>> parser.parse_args(['a', 'b'])
Namespace(foo=['a', 'b'])
>>> parser.parse_args([])
usage: PROG [-h] foo [foo ...]
PROG: error: the following arguments are required: foo
```

If the `nargs` keyword argument is not provided, the number of arguments consumed is determined by the [action](#). Generally this means a single command-line argument will be consumed and a single item (not a list) will be produced.

const

The `const` argument of `add_argument()` is used to hold constant values that are not read from the command line but are required for the various *ArgumentParser* actions. The two most common uses of it are:

- When `add_argument()` is called with `action='store_const'` or `action='append_const'`. These actions add the `const` value to one of the attributes of the object returned by `parse_args()`. See the [action](#) description for examples. If `const` is not provided to `add_argument()`, it will receive a default value of `None`.
- When `add_argument()` is called with option strings (like `-f` or `--foo`) and `nargs='?'`. This creates an optional argument that can be followed by zero or one command-line arguments. When parsing the command line, if the option string is encountered with no command-line argument following it, the value of `const` will be assumed to be `None` instead. See the [nargs](#) description for examples.

Changed in version 3.11: `const=None` by default, including when `action='append_const'` or `action='store_const'`.

default

All optional arguments and some positional arguments may be omitted at the command line. The default keyword argument of `add_argument()`, whose value defaults to `None`, specifies what value should be used if the command-line argument is not present. For optional arguments, the default value is used when the option string was not present at the command line:

```
>>> parser = argparse.ArgumentParser()
>>> parser.add_argument('--foo', default=42)
>>> parser.parse_args(['--foo', '2'])
Namespace(foo='2')
>>> parser.parse_args([])
Namespace(foo=42)
```

If the target namespace already has an attribute set, the action *default* will not over write it:

```
>>> parser = argparse.ArgumentParser()
>>> parser.add_argument('--foo', default=42)
>>> parser.parse_args([], namespace=argparse.Namespace(foo=101))
Namespace(foo=101)
```

If the default value is a string, the parser parses the value as if it were a command-line argument. In particular, the parser applies any *type* conversion argument, if provided, before setting the attribute on the *Namespace* return value. Otherwise, the parser uses the value as is:

```
>>> parser = argparse.ArgumentParser()
>>> parser.add_argument('--length', default='10', type=int)
>>> parser.add_argument('--width', default=10.5, type=int)
>>> parser.parse_args()
Namespace(length=10, width=10.5)
```


For positional arguments with *nargs* equal to `?` or `*`, the default value is used when no command-line argument was present:

```
>>> parser = argparse.ArgumentParser()
>>> parser.add_argument('foo', nargs='?', default=42)
>>> parser.parse_args(['a'])
Namespace(foo='a')
>>> parser.parse_args([])
Namespace(foo=42)
```

Providing `default=argparse.SUPPRESS` causes no attribute to be added if the command-line argument was not present:

```
>>> parser = argparse.ArgumentParser()
>>> parser.add_argument('--foo', default=argparse.SUPPRESS)
>>> parser.parse_args([])
Namespace()
>>> parser.parse_args(['--foo', '1'])
Namespace(foo='1')
```

type

By default, the parser reads command-line arguments in as simple strings. However, quite often the command-line string should instead be interpreted as another type, such as a *float* or *int*. The `type` keyword for `add_argument()` allows any necessary type-checking and type conversions to be performed.

If the `type` keyword is used with the `default` keyword, the type converter is only applied if the default is a string.

The argument to `type` can be any callable that accepts a single string. If the function raises *ArgumentTypeError*, *TypeError*, or *ValueError*, the exception is caught and a nicely formatted error message is displayed. No other exception types are handled.

Common built-in types and functions can be used as type converters:

```
import argparse
import pathlib

parser = argparse.ArgumentParser()
parser.add_argument('count', type=int)
parser.add_argument('distance', type=float)
parser.add_argument('street', type=ascii)
parser.add_argument('code_point', type=ord)
parser.add_argument('source_file', type=open)
parser.add_argument('dest_file', type=argparse.FileType('w', encoding='latin-1'))
parser.add_argument('datapath', type=pathlib.Path)
```

User defined functions can be used as well:

```
>>> def hyphenated(string):
...     return '-'.join([word[:4] for word in string.casefold().split()])
...
>>> parser = argparse.ArgumentParser()
>>> _ = parser.add_argument('short_title', type=hyphenated)
>>> parser.parse_args(['The Tale of Two Cities'])
Namespace(short_title='the-tale-of-two-citi')
```

The `bool()` function is not recommended as a type converter. All it does is convert empty strings to `False` and non-empty strings to `True`. This is usually not what is desired.

In general, the `type` keyword is a convenience that should only be used for simple conversions that can only raise one of the three supported exceptions. Anything with more interesting error-handling or resource management should be done downstream after the arguments are parsed.

For example, JSON or YAML conversions have complex error cases that require better reporting than can be given by the `type` keyword. A `JSONDecodeError` would not be well formatted and a `FileNotFoundError` exception would not be handled at all.

Even `FileType` has its limitations for use with the `type` keyword. If one argument uses `FileType` and then a subsequent argument fails, an error is reported but the file is not automatically closed. In this case, it would be better to wait until after the parser has run and then use the `with`-statement to manage the files.

For type checkers that simply check against a fixed set of values, consider using the `choices` keyword instead.

choices

Some command-line arguments should be selected from a restricted set of values. These can be handled by passing a sequence object as the `choices` keyword argument to `add_argument()`. When the command line is parsed, argument values will be checked, and an error message will be displayed if the argument was not one of the acceptable values:

```
>>> parser = argparse.ArgumentParser(prog='game.py')
>>> parser.add_argument('move', choices=['rock', 'paper', 'scissors'])
>>> parser.parse_args(['rock'])
Namespace(move='rock')
>>> parser.parse_args(['fire'])
usage: game.py [-h] {rock,paper,scissors}
game.py: error: argument move: invalid choice: 'fire' (choose from 'rock',
'paper', 'scissors')
```

Note that inclusion in the `choices` sequence is checked after any `type` conversions have been performed, so the type of the objects in the `choices` sequence should match the `type` specified:

```
>>> parser = argparse.ArgumentParser(prog='doors.py')
>>> parser.add_argument('door', type=int, choices=range(1, 4))
>>> print(parser.parse_args(['3']))
Namespace(door=3)
>>> parser.parse_args(['4'])
usage: doors.py [-h] {1,2,3}
doors.py: error: argument door: invalid choice: 4 (choose from 1, 2, 3)
```

Any sequence can be passed as the `choices` value, so `list` objects, `tuple` objects, and custom sequences are all supported.

Use of `enum.Enum` is not recommended because it is difficult to control its appearance in usage, help, and error messages.

Formatted choices override the default *metavar* which is normally derived from *dest*. This is usually what you want because the user never sees the *dest* parameter. If this display isn't desirable (perhaps because there are many choices), just specify an explicit *metavar*.

required

In general, the `argparse` module assumes that flags like `-f` and `--bar` indicate *optional* arguments, which can always be omitted at the command line. To make an option *required*, `True` can be specified for the `required=` keyword argument to `add_argument()`:

```
>>> parser = argparse.ArgumentParser()
>>> parser.add_argument('--foo', required=True)
>>> parser.parse_args(['--foo', 'BAR'])
Namespace(foo='BAR')
>>> parser.parse_args([])
usage: [-h] --foo FOO
: error: the following arguments are required: --foo
```

As the example shows, if an option is marked as required, `parse_args()` will report an error if that option is not present at the command line.

Note: Required options are generally considered bad form because users expect *options* to be *optional*, and thus they should be avoided when possible.

help

The help value is a string containing a brief description of the argument. When a user requests help (usually by using `-h` or `--help` at the command line), these help descriptions will be displayed with each argument:

```
>>> parser = argparse.ArgumentParser(prog='frobble')
>>> parser.add_argument('--foo', action='store_true',
...                       help='foo the bars before frobbling')
>>> parser.add_argument('bar', nargs='+',
...                       help='one of the bars to be frobbled')
>>> parser.parse_args(['-h'])
usage: frobble [-h] [--foo] bar [bar ...]

positional arguments:
  bar      one of the bars to be frobbled

options:
  -h, --help  show this help message and exit
  --foo      foo the bars before frobbling
```

The help strings can include various format specifiers to avoid repetition of things like the program name or the argument *default*. The available specifiers include the program name, `%(prog)s` and most keyword arguments to `add_argument()`, e.g. `%(default)s`, `%(type)s`, etc.:

```
>>> parser = argparse.ArgumentParser(prog='frobble')
>>> parser.add_argument('bar', nargs='?', type=int, default=42,
...                       help='the bar to %(prog)s (default: %(default)s)')
>>> parser.print_help()
usage: frobble [-h] [bar]

positional arguments:
  bar      the bar to frobble (default: 42)

options:
  -h, --help  show this help message and exit
```

As the help string supports %-formatting, if you want a literal % to appear in the help string, you must escape it as %%.

`argparse` supports silencing the help entry for certain options, by setting the help value to `argparse.SUPPRESS`:

```
>>> parser = argparse.ArgumentParser(prog='frobble')
>>> parser.add_argument('--foo', help=argparse.SUPPRESS)
>>> parser.print_help()
usage: frobble [-h]

options:
  -h, --help  show this help message and exit
```

metavar

When `ArgumentParser` generates help messages, it needs some way to refer to each expected argument. By default, `ArgumentParser` objects use the `dest` value as the “name” of each object. By default, for positional argument actions, the `dest` value is used directly, and for optional argument actions, the `dest` value is uppercased. So, a single positional argument with `dest='bar'` will be referred to as `bar`. A single optional argument `--foo` that should be followed by a single command-line argument will be referred to as `FOO`. An example:

```
>>> parser = argparse.ArgumentParser()
>>> parser.add_argument('--foo')
>>> parser.add_argument('bar')
>>> parser.parse_args('X --foo Y'.split())
Namespace(bar='X', foo='Y')
>>> parser.print_help()
usage: [-h] [--foo FOO] bar

positional arguments:
  bar

options:
  -h, --help  show this help message and exit
  --foo FOO
```

An alternative name can be specified with `metavar`:

```
>>> parser = argparse.ArgumentParser()
>>> parser.add_argument('--foo', metavar='YYY')
>>> parser.add_argument('bar', metavar='XXX')
>>> parser.parse_args('X --foo Y'.split())
Namespace(bar='X', foo='Y')
>>> parser.print_help()
usage: [-h] [--foo YYY] XXX

positional arguments:
  XXX

options:
  -h, --help  show this help message and exit
  --foo YYY
```

Note that `metavar` only changes the *displayed* name - the name of the attribute on the `parse_args()` object is still determined by the `dest` value.

Different values of `nargs` may cause the `metavar` to be used multiple times. Providing a tuple to `metavar` specifies a different display for each of the arguments:

```
>>> parser = argparse.ArgumentParser(prog='PROG')
>>> parser.add_argument('-x', nargs=2)
>>> parser.add_argument('--foo', nargs=2, metavar=('bar', 'baz'))
>>> parser.print_help()
usage: PROG [-h] [-x X X] [--foo bar baz]

options:
  -h, --help            show this help message and exit
  -x X X
  --foo bar baz
```

dest

Most *ArgumentParser* actions add some value as an attribute of the object returned by *parse_args()*. The name of this attribute is determined by the *dest* keyword argument of *add_argument()*. For positional argument actions, *dest* is normally supplied as the first argument to *add_argument()*:

```
>>> parser = argparse.ArgumentParser()
>>> parser.add_argument('bar')
>>> parser.parse_args(['XXX'])
Namespace(bar='XXX')
```

For optional argument actions, the value of *dest* is normally inferred from the option strings. *ArgumentParser* generates the value of *dest* by taking the first long option string and stripping away the initial *--* string. If no long option strings were supplied, *dest* will be derived from the first short option string by stripping the initial *-* character. Any internal *-* characters will be converted to *_* characters to make sure the string is a valid attribute name. The examples below illustrate this behavior:

```
>>> parser = argparse.ArgumentParser()
>>> parser.add_argument('-f', '--foo-bar', '--foo')
>>> parser.add_argument('-x', '-y')
>>> parser.parse_args('-f 1 -x 2'.split())
Namespace(foo_bar='1', x='2')
>>> parser.parse_args('--foo 1 -y 2'.split())
Namespace(foo_bar='1', x='2')
```

dest allows a custom attribute name to be provided:

```
>>> parser = argparse.ArgumentParser()
>>> parser.add_argument('--foo', dest='bar')
>>> parser.parse_args('--foo XXX'.split())
Namespace(bar='XXX')
```

Action classes

Action classes implement the Action API, a callable which returns a callable which processes arguments from the command-line. Any object which follows this API may be passed as the *action* parameter to *add_argument()*.

```
class argparse.Action(option_strings, dest, nargs=None, const=None, default=None, type=None,
                      choices=None, required=False, help=None, metavar=None)
```

Action objects are used by an *ArgumentParser* to represent the information needed to parse a single argument from one or more strings from the command line. The Action class must accept the two positional arguments plus any keyword arguments passed to *ArgumentParser.add_argument()* except for the *action* itself.

Instances of Action (or return value of any callable to the *action* parameter) should have attributes “*dest*”, “*option_strings*”, “*default*”, “*type*”, “*required*”, “*help*”, etc. defined. The easiest way to ensure these attributes are defined is to call *Action.__init__*.

Action instances should be callable, so subclasses must override the *__call__* method, which should accept four parameters:

- *parser* - The *ArgumentParser* object which contains this action.
- *namespace* - The *Namespace* object that will be returned by *parse_args()*. Most actions add an attribute to this object using *setattr()*.
- *values* - The associated command-line arguments, with any type conversions applied. Type conversions are specified with the *type* keyword argument to *add_argument()*.
- *option_string* - The option string that was used to invoke this action. The *option_string* argument is optional, and will be absent if the action is associated with a positional argument.

The `__call__` method may perform arbitrary actions, but will typically set attributes on the `namespace` based on `dest` and `values`.

Action subclasses can define a `format_usage` method that takes no argument and return a string which will be used when printing the usage of the program. If such method is not provided, a sensible default will be used.

16.4.6 The `parse_args()` method

`ArgumentParser.parse_args(args=None, namespace=None)`

Convert argument strings to objects and assign them as attributes of the `namespace`. Return the populated `namespace`.

Previous calls to `add_argument()` determine exactly what objects are created and how they are assigned. See the documentation for `add_argument()` for details.

- `args` - List of strings to parse. The default is taken from `sys.argv`.
- `namespace` - An object to take the attributes. The default is a new empty `Namespace` object.

Option value syntax

The `parse_args()` method supports several ways of specifying the value of an option (if it takes one). In the simplest case, the option and its value are passed as two separate arguments:

```
>>> parser = argparse.ArgumentParser(prog='PROG')
>>> parser.add_argument('-x')
>>> parser.add_argument('--foo')
>>> parser.parse_args(['-x', 'X'])
Namespace(foo=None, x='X')
>>> parser.parse_args(['--foo', 'FOO'])
Namespace(foo='FOO', x=None)
```

For long options (options with names longer than a single character), the option and value can also be passed as a single command-line argument, using `=` to separate them:

```
>>> parser.parse_args(['--foo=FOO'])
Namespace(foo='FOO', x=None)
```

For short options (options only one character long), the option and its value can be concatenated:

```
>>> parser.parse_args(['-xX'])
Namespace(foo=None, x='X')
```

Several short options can be joined together, using only a single `-` prefix, as long as only the last option (or none of them) requires a value:

```
>>> parser = argparse.ArgumentParser(prog='PROG')
>>> parser.add_argument('-x', action='store_true')
>>> parser.add_argument('-y', action='store_true')
>>> parser.add_argument('-z')
>>> parser.parse_args(['-xyzZ'])
Namespace(x=True, y=True, z='Z')
```

Invalid arguments

While parsing the command line, `parse_args()` checks for a variety of errors, including ambiguous options, invalid types, invalid options, wrong number of positional arguments, etc. When it encounters such an error, it exits and prints the error along with a usage message:

```
>>> parser = argparse.ArgumentParser(prog='PROG')
>>> parser.add_argument('--foo', type=int)
>>> parser.add_argument('bar', nargs='?')

>>> # invalid type
>>> parser.parse_args(['--foo', 'spam'])
usage: PROG [-h] [--foo FOO] [bar]
PROG: error: argument --foo: invalid int value: 'spam'

>>> # invalid option
>>> parser.parse_args(['--bar'])
usage: PROG [-h] [--foo FOO] [bar]
PROG: error: no such option: --bar

>>> # wrong number of arguments
>>> parser.parse_args(['spam', 'badger'])
usage: PROG [-h] [--foo FOO] [bar]
PROG: error: extra arguments found: badger
```

Arguments containing –

The `parse_args()` method attempts to give errors whenever the user has clearly made a mistake, but some situations are inherently ambiguous. For example, the command-line argument `-1` could either be an attempt to specify an option or an attempt to provide a positional argument. The `parse_args()` method is cautious here: positional arguments may only begin with `-` if they look like negative numbers and there are no options in the parser that look like negative numbers:

```
>>> parser = argparse.ArgumentParser(prog='PROG')
>>> parser.add_argument('-x')
>>> parser.add_argument('foo', nargs='?')

>>> # no negative number options, so -1 is a positional argument
>>> parser.parse_args(['-x', '-1'])
Namespace(foo=None, x='-1')

>>> # no negative number options, so -1 and -5 are positional arguments
>>> parser.parse_args(['-x', '-1', '-5'])
Namespace(foo='-5', x='-1')

>>> parser = argparse.ArgumentParser(prog='PROG')
>>> parser.add_argument('-1', dest='one')
>>> parser.add_argument('foo', nargs='?')

>>> # negative number options present, so -1 is an option
>>> parser.parse_args(['-1', 'X'])
Namespace(foo=None, one='X')

>>> # negative number options present, so -2 is an option
>>> parser.parse_args(['-2'])
usage: PROG [-h] [-1 ONE] [foo]
PROG: error: no such option: -2

>>> # negative number options present, so both -1s are options
>>> parser.parse_args(['-1', '-1'])
```

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```
usage: PROG [-h] [-1 ONE] [foo]
PROG: error: argument -1: expected one argument
```

If you have positional arguments that must begin with `-` and don't look like negative numbers, you can insert the pseudo-argument `'--'` which tells `parse_args()` that everything after that is a positional argument:

```
>>> parser.parse_args(['--', '-f'])
Namespace(foo='-f', one=None)
```

Argument abbreviations (prefix matching)

The `parse_args()` method *by default* allows long options to be abbreviated to a prefix, if the abbreviation is unambiguous (the prefix matches a unique option):

```
>>> parser = argparse.ArgumentParser(prog='PROG')
>>> parser.add_argument('-bacon')
>>> parser.add_argument('-badger')
>>> parser.parse_args(['-bac MMM'].split())
Namespace(bacon='MMM', badger=None)
>>> parser.parse_args(['-bad WOOD'].split())
Namespace(bacon=None, badger='WOOD')
>>> parser.parse_args(['-ba BA'].split())
usage: PROG [-h] [-bacon BACON] [-badger BADGER]
PROG: error: ambiguous option: -ba could match -badger, -bacon
```

An error is produced for arguments that could produce more than one options. This feature can be disabled by setting `allow_abbrev` to `False`.

Beyond `sys.argv`

Sometimes it may be useful to have an `ArgumentParser` parse arguments other than those of `sys.argv`. This can be accomplished by passing a list of strings to `parse_args()`. This is useful for testing at the interactive prompt:

```
>>> parser = argparse.ArgumentParser()
>>> parser.add_argument(
...     'integers', metavar='int', type=int, choices=range(10),
...     nargs='+', help='an integer in the range 0..9')
>>> parser.add_argument(
...     '--sum', dest='accumulate', action='store_const', const=sum,
...     default=max, help='sum the integers (default: find the max)')
>>> parser.parse_args(['1', '2', '3', '4'])
Namespace(accumulate=<built-in function max>, integers=[1, 2, 3, 4])
>>> parser.parse_args(['1', '2', '3', '4', '--sum'])
Namespace(accumulate=<built-in function sum>, integers=[1, 2, 3, 4])
```

The Namespace object

`class` `argparse.Namespace`

Simple class used by default by `parse_args()` to create an object holding attributes and return it.

This class is deliberately simple, just an *object* subclass with a readable string representation. If you prefer to have dict-like view of the attributes, you can use the standard Python idiom, `vars()`:

```
>>> parser = argparse.ArgumentParser()
>>> parser.add_argument('--foo')
>>> args = parser.parse_args(['--foo', 'BAR'])
```

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```
>>> vars(args)
{'foo': 'BAR'}
```

It may also be useful to have an *ArgumentParser* assign attributes to an already existing object, rather than a new *Namespace* object. This can be achieved by specifying the `namespace=` keyword argument:

```
>>> class C:
...     pass
...
>>> c = C()
>>> parser = argparse.ArgumentParser()
>>> parser.add_argument('--foo')
>>> parser.parse_args(args=['--foo', 'BAR'], namespace=c)
>>> c.foo
'BAR'
```

16.4.7 Other utilities

Sub-commands

`ArgumentParser.add_subparsers` (*[title]*, *[description]*, *[prog]*, *[parser_class]*, *[action]*, *[option_strings]*, *[dest]*, *[required]*, *[help]*, *[metavar]*)

Many programs split up their functionality into a number of sub-commands, for example, the `svn` program can invoke sub-commands like `svn checkout`, `svn update`, and `svn commit`. Splitting up functionality this way can be a particularly good idea when a program performs several different functions which require different kinds of command-line arguments. *ArgumentParser* supports the creation of such sub-commands with the `add_subparsers()` method. The `add_subparsers()` method is normally called with no arguments and returns a special action object. This object has a single method, `add_parser()`, which takes a command name and any *ArgumentParser* constructor arguments, and returns an *ArgumentParser* object that can be modified as usual.

Description of parameters:

- *title* - title for the sub-parser group in help output; by default “subcommands” if description is provided, otherwise uses title for positional arguments
- *description* - description for the sub-parser group in help output, by default `None`
- *prog* - usage information that will be displayed with sub-command help, by default the name of the program and any positional arguments before the subparser argument
- *parser_class* - class which will be used to create sub-parser instances, by default the class of the current parser (e.g. *ArgumentParser*)
- *action* - the basic type of action to be taken when this argument is encountered at the command line
- *dest* - name of the attribute under which sub-command name will be stored; by default `None` and no value is stored
- *required* - Whether or not a subcommand must be provided, by default `False` (added in 3.7)
- *help* - help for sub-parser group in help output, by default `None`
- *metavar* - string presenting available sub-commands in help; by default it is `None` and presents sub-commands in form `{cmd1, cmd2, ...}`

Some example usage:

```
>>> # create the top-level parser
>>> parser = argparse.ArgumentParser(prog='PROG')
>>> parser.add_argument('--foo', action='store_true', help='foo help')
```

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```

>>> subparsers = parser.add_subparsers(help='sub-command help')
>>>
>>> # create the parser for the "a" command
>>> parser_a = subparsers.add_parser('a', help='a help')
>>> parser_a.add_argument('bar', type=int, help='bar help')
>>>
>>> # create the parser for the "b" command
>>> parser_b = subparsers.add_parser('b', help='b help')
>>> parser_b.add_argument('--baz', choices='XYZ', help='baz help')
>>>
>>> # parse some argument lists
>>> parser.parse_args(['a', '12'])
Namespace(bar=12, foo=False)
>>> parser.parse_args(['--foo', 'b', '--baz', 'Z'])
Namespace(baz='Z', foo=True)

```

Note that the object returned by `parse_args()` will only contain attributes for the main parser and the subparser that was selected by the command line (and not any other subparsers). So in the example above, when the `a` command is specified, only the `foo` and `bar` attributes are present, and when the `b` command is specified, only the `foo` and `baz` attributes are present.

Similarly, when a help message is requested from a subparser, only the help for that particular parser will be printed. The help message will not include parent parser or sibling parser messages. (A help message for each subparser command, however, can be given by supplying the `help=` argument to `add_parser()` as above.)

```

>>> parser.parse_args(['--help'])
usage: PROG [-h] [--foo] {a,b} ...

positional arguments:
  {a,b}    sub-command help
    a      a help
    b      b help

options:
  -h, --help  show this help message and exit
  --foo       foo help

>>> parser.parse_args(['a', '--help'])
usage: PROG a [-h] bar

positional arguments:
  bar      bar help

options:
  -h, --help  show this help message and exit

>>> parser.parse_args(['b', '--help'])
usage: PROG b [-h] [--baz {X,Y,Z}]

options:
  -h, --help      show this help message and exit
  --baz {X,Y,Z}  baz help

```

The `add_subparsers()` method also supports `title` and `description` keyword arguments. When either is present, the subparser's commands will appear in their own group in the help output. For example:

```

>>> parser = argparse.ArgumentParser()
>>> subparsers = parser.add_subparsers(title='subcommands',
...                                   description='valid subcommands',
...                                   help='additional help')
>>> subparsers.add_parser('foo')

```

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```
>>> subparsers.add_parser('bar')
>>> parser.parse_args(['-h'])
usage: [-h] {foo,bar} ...

options:
  -h, --help  show this help message and exit

subcommands:
  valid subcommands

  {foo,bar}  additional help
```

Furthermore, `add_parser` supports an additional `aliases` argument, which allows multiple strings to refer to the same subparser. This example, like `svn`, aliases `co` as a shorthand for `checkout`:

```
>>> parser = argparse.ArgumentParser()
>>> subparsers = parser.add_subparsers()
>>> checkout = subparsers.add_parser('checkout', aliases=['co'])
>>> checkout.add_argument('foo')
>>> parser.parse_args(['co', 'bar'])
Namespace(foo='bar')
```

One particularly effective way of handling sub-commands is to combine the use of the `add_subparsers()` method with calls to `set_defaults()` so that each subparser knows which Python function it should execute. For example:

```
>>> # sub-command functions
>>> def foo(args):
...     print(args.x * args.y)
...
>>> def bar(args):
...     print('((%s))' % args.z)
...
>>> # create the top-level parser
>>> parser = argparse.ArgumentParser()
>>> subparsers = parser.add_subparsers(required=True)
>>>
>>> # create the parser for the "foo" command
>>> parser_foo = subparsers.add_parser('foo')
>>> parser_foo.add_argument('-x', type=int, default=1)
>>> parser_foo.add_argument('y', type=float)
>>> parser_foo.set_defaults(func=foo)
>>>
>>> # create the parser for the "bar" command
>>> parser_bar = subparsers.add_parser('bar')
>>> parser_bar.add_argument('z')
>>> parser_bar.set_defaults(func=bar)
>>>
>>> # parse the args and call whatever function was selected
>>> args = parser.parse_args('foo 1 -x 2'.split())
>>> args.func(args)
2.0
>>>
>>> # parse the args and call whatever function was selected
>>> args = parser.parse_args('bar XYZYX'.split())
>>> args.func(args)
((XYZYX))
```

This way, you can let `parse_args()` do the job of calling the appropriate function after argument parsing is complete. Associating functions with actions like this is typically the easiest way to handle the different actions for each of your subparsers. However, if it is necessary to check the name of the subparser that was invoked,

the `dest` keyword argument to the `add_subparsers()` call will work:

```
>>> parser = argparse.ArgumentParser()
>>> subparsers = parser.add_subparsers(dest='subparser_name')
>>> subparser1 = subparsers.add_parser('1')
>>> subparser1.add_argument('-x')
>>> subparser2 = subparsers.add_parser('2')
>>> subparser2.add_argument('y')
>>> parser.parse_args(['2', 'frobble'])
Namespace(subparser_name='2', y='frobble')
```

Changed in version 3.7: New *required* keyword argument.

FileType objects

class `argparse.FileType` (*mode='r', bufsize=-1, encoding=None, errors=None*)

The `FileType` factory creates objects that can be passed to the `type` argument of `ArgumentParser.add_argument()`. Arguments that have `FileType` objects as their type will open command-line arguments as files with the requested modes, buffer sizes, encodings and error handling (see the `open()` function for more details):

```
>>> parser = argparse.ArgumentParser()
>>> parser.add_argument('--raw', type=argparse.FileType('wb', 0))
>>> parser.add_argument('out', type=argparse.FileType('w', encoding='UTF-8'))
>>> parser.parse_args(['--raw', 'raw.dat', 'file.txt'])
Namespace(out=<_io.TextIOWrapper name='file.txt' mode='w' encoding='UTF-8'>,
  →raw=<_io.FileIO name='raw.dat' mode='wb'>)
```

`FileType` objects understand the pseudo-argument `'-'` and automatically convert this into `sys.stdin` for readable `FileType` objects and `sys.stdout` for writable `FileType` objects:

```
>>> parser = argparse.ArgumentParser()
>>> parser.add_argument('infile', type=argparse.FileType('r'))
>>> parser.parse_args(['-'])
Namespace(infile=<_io.TextIOWrapper name='<stdin>' encoding='UTF-8'>)
```

New in version 3.4: The *encodings* and *errors* keyword arguments.

Argument groups

`ArgumentParser.add_argument_group` (*title=None, description=None*)

By default, `ArgumentParser` groups command-line arguments into “positional arguments” and “options” when displaying help messages. When there is a better conceptual grouping of arguments than this default one, appropriate groups can be created using the `add_argument_group()` method:

```
>>> parser = argparse.ArgumentParser(prog='PROG', add_help=False)
>>> group = parser.add_argument_group('group')
>>> group.add_argument('--foo', help='foo help')
>>> group.add_argument('bar', help='bar help')
>>> parser.print_help()
usage: PROG [--foo FOO] bar

group:
  bar      bar help
  --foo FOO  foo help
```

The `add_argument_group()` method returns an argument group object which has an `add_argument()` method just like a regular `ArgumentParser`. When an argument is added to the group, the parser treats it just like a normal argument, but displays the argument in a separate group for

help messages. The `add_argument_group()` method accepts *title* and *description* arguments which can be used to customize this display:

```
>>> parser = argparse.ArgumentParser(prog='PROG', add_help=False)
>>> group1 = parser.add_argument_group('group1', 'group1 description')
>>> group1.add_argument('foo', help='foo help')
>>> group2 = parser.add_argument_group('group2', 'group2 description')
>>> group2.add_argument('--bar', help='bar help')
>>> parser.print_help()
usage: PROG [--bar BAR] foo

group1:
  group1 description

  foo      foo help

group2:
  group2 description

  --bar BAR  bar help
```

Note that any arguments not in your user-defined groups will end up back in the usual “positional arguments” and “optional arguments” sections.

Changed in version 3.11: Calling `add_argument_group()` on an argument group is deprecated. This feature was never supported and does not always work correctly. The function exists on the API by accident through inheritance and will be removed in the future.

Mutual exclusion

`ArgumentParser.add_mutually_exclusive_group(required=False)`

Create a mutually exclusive group. *argparse* will make sure that only one of the arguments in the mutually exclusive group was present on the command line:

```
>>> parser = argparse.ArgumentParser(prog='PROG')
>>> group = parser.add_mutually_exclusive_group()
>>> group.add_argument('--foo', action='store_true')
>>> group.add_argument('--bar', action='store_false')
>>> parser.parse_args(['--foo'])
Namespace(bar=True, foo=True)
>>> parser.parse_args(['--bar'])
Namespace(bar=False, foo=False)
>>> parser.parse_args(['--foo', '--bar'])
usage: PROG [-h] [--foo | --bar]
PROG: error: argument --bar: not allowed with argument --foo
```

The `add_mutually_exclusive_group()` method also accepts a *required* argument, to indicate that at least one of the mutually exclusive arguments is required:

```
>>> parser = argparse.ArgumentParser(prog='PROG')
>>> group = parser.add_mutually_exclusive_group(required=True)
>>> group.add_argument('--foo', action='store_true')
>>> group.add_argument('--bar', action='store_false')
>>> parser.parse_args([])
usage: PROG [-h] (--foo | --bar)
PROG: error: one of the arguments --foo --bar is required
```

Note that currently mutually exclusive argument groups do not support the *title* and *description* arguments of `add_argument_group()`.

Changed in version 3.11: Calling `add_argument_group()` or `add_mutually_exclusive_group()` on a mutually exclusive group is deprecated. These fea-

tures were never supported and do not always work correctly. The functions exist on the API by accident through inheritance and will be removed in the future.

Parser defaults

`ArgumentParser.set_defaults(**kwargs)`

Most of the time, the attributes of the object returned by `parse_args()` will be fully determined by inspecting the command-line arguments and the argument actions. `set_defaults()` allows some additional attributes that are determined without any inspection of the command line to be added:

```
>>> parser = argparse.ArgumentParser()
>>> parser.add_argument('foo', type=int)
>>> parser.set_defaults(bar=42, baz='badger')
>>> parser.parse_args(['736'])
Namespace(bar=42, baz='badger', foo=736)
```

Note that parser-level defaults always override argument-level defaults:

```
>>> parser = argparse.ArgumentParser()
>>> parser.add_argument('--foo', default='bar')
>>> parser.set_defaults(foo='spam')
>>> parser.parse_args([])
Namespace(foo='spam')
```

Parser-level defaults can be particularly useful when working with multiple parsers. See the `add_subparsers()` method for an example of this type.

`ArgumentParser.get_default(dest)`

Get the default value for a namespace attribute, as set by either `add_argument()` or by `set_defaults()`:

```
>>> parser = argparse.ArgumentParser()
>>> parser.add_argument('--foo', default='badger')
>>> parser.get_default('foo')
'badger'
```

Printing help

In most typical applications, `parse_args()` will take care of formatting and printing any usage or error messages. However, several formatting methods are available:

`ArgumentParser.print_usage(file=None)`

Print a brief description of how the `ArgumentParser` should be invoked on the command line. If `file` is `None`, `sys.stdout` is assumed.

`ArgumentParser.print_help(file=None)`

Print a help message, including the program usage and information about the arguments registered with the `ArgumentParser`. If `file` is `None`, `sys.stdout` is assumed.

There are also variants of these methods that simply return a string instead of printing it:

`ArgumentParser.format_usage()`

Return a string containing a brief description of how the `ArgumentParser` should be invoked on the command line.

`ArgumentParser.format_help()`

Return a string containing a help message, including the program usage and information about the arguments registered with the `ArgumentParser`.

Partial parsing

`ArgumentParser.parse_known_args (args=None, namespace=None)`

Sometimes a script may only parse a few of the command-line arguments, passing the remaining arguments on to another script or program. In these cases, the `parse_known_args()` method can be useful. It works much like `parse_args()` except that it does not produce an error when extra arguments are present. Instead, it returns a two item tuple containing the populated namespace and the list of remaining argument strings.

```
>>> parser = argparse.ArgumentParser()
>>> parser.add_argument('--foo', action='store_true')
>>> parser.add_argument('bar')
>>> parser.parse_known_args(['--foo', '--badger', 'BAR', 'spam'])
(Namespace(bar='BAR', foo=True), ['--badger', 'spam'])
```

Warning: *Prefix matching* rules apply to `parse_known_args()`. The parser may consume an option even if it's just a prefix of one of its known options, instead of leaving it in the remaining arguments list.

Customizing file parsing

`ArgumentParser.convert_arg_line_to_args (arg_line)`

Arguments that are read from a file (see the `fromfile_prefix_chars` keyword argument to the `ArgumentParser` constructor) are read one argument per line. `convert_arg_line_to_args()` can be overridden for fancier reading.

This method takes a single argument `arg_line` which is a string read from the argument file. It returns a list of arguments parsed from this string. The method is called once per line read from the argument file, in order.

A useful override of this method is one that treats each space-separated word as an argument. The following example demonstrates how to do this:

```
class MyArgumentParser(argparse.ArgumentParser):
    def convert_arg_line_to_args(self, arg_line):
        return arg_line.split()
```

Exiting methods

`ArgumentParser.exit (status=0, message=None)`

This method terminates the program, exiting with the specified `status` and, if given, it prints a `message` before that. The user can override this method to handle these steps differently:

```
class ErrorCatchingArgumentParser(argparse.ArgumentParser):
    def exit(self, status=0, message=None):
        if status:
            raise Exception(f'Exiting because of an error: {message}')
        exit(status)
```

`ArgumentParser.error (message)`

This method prints a usage message including the `message` to the standard error and terminates the program with a status code of 2.

Intermixed parsing

`ArgumentParser.parse_intermixed_args(args=None, namespace=None)`

`ArgumentParser.parse_known_intermixed_args(args=None, namespace=None)`

A number of Unix commands allow the user to intermix optional arguments with positional arguments. The `parse_intermixed_args()` and `parse_known_intermixed_args()` methods support this parsing style.

These parsers do not support all the `argparse` features, and will raise exceptions if unsupported features are used. In particular, subparsers, and mutually exclusive groups that include both optionals and positionals are not supported.

The following example shows the difference between `parse_known_args()` and `parse_intermixed_args()`: the former returns `['2', '3']` as unparsed arguments, while the latter collects all the positionals into `rest`.

```
>>> parser = argparse.ArgumentParser()
>>> parser.add_argument('--foo')
>>> parser.add_argument('cmd')
>>> parser.add_argument('rest', nargs='*', type=int)
>>> parser.parse_known_args('doit 1 --foo bar 2 3'.split())
(Namespace(cmd='doit', foo='bar', rest=[1]), ['2', '3'])
>>> parser.parse_intermixed_args('doit 1 --foo bar 2 3'.split())
Namespace(cmd='doit', foo='bar', rest=[1, 2, 3])
```

`parse_known_intermixed_args()` returns a two item tuple containing the populated namespace and the list of remaining argument strings. `parse_intermixed_args()` raises an error if there are any remaining unparsed argument strings.

New in version 3.7.

16.4.8 Upgrading optparse code

Originally, the `argparse` module had attempted to maintain compatibility with `optparse`. However, `optparse` was difficult to extend transparently, particularly with the changes required to support the new `nargs=` specifiers and better usage messages. When most everything in `optparse` had either been copy-pasted over or monkey-patched, it no longer seemed practical to try to maintain the backwards compatibility.

The `argparse` module improves on the standard library `optparse` module in a number of ways including:

- Handling positional arguments.
- Supporting sub-commands.
- Allowing alternative option prefixes like `+` and `/`.
- Handling zero-or-more and one-or-more style arguments.
- Producing more informative usage messages.
- Providing a much simpler interface for custom type and action.

A partial upgrade path from `optparse` to `argparse`:

- Replace all `optparse.OptionParser.add_option()` calls with `ArgumentParser.add_argument()` calls.
- Replace `(options, args) = parser.parse_args()` with `args = parser.parse_args()` and add additional `ArgumentParser.add_argument()` calls for the positional arguments. Keep in mind that what was previously called `options`, now in the `argparse` context is called `args`.
- Replace `optparse.OptionParser.disable_interspersed_args()` by using `parse_intermixed_args()` instead of `parse_args()`.

- Replace callback actions and the `callback_*` keyword arguments with `type` or `action` arguments.
- Replace string names for `type` keyword arguments with the corresponding type objects (e.g. `int`, `float`, `complex`, etc).
- Replace `optparse.Values` with `Namespace` and `optparse.OptionError` and `optparse.OptionValueError` with `ArgumentError`.
- Replace strings with implicit arguments such as `%default` or `%prog` with the standard Python syntax to use dictionaries to format strings, that is, `%(default)s` and `%(prog)s`.
- Replace the `OptionParser` constructor `version` argument with a call to `parser.add_argument('--version', action='version', version='<the version>')`.

16.4.9 Exceptions

exception `argparse.ArgumentError`

An error from creating or using an argument (optional or positional).

The string value of this exception is the message, augmented with information about the argument that caused it.

exception `argparse.ArgumentTypeError`

Raised when something goes wrong converting a command line string to a type.

16.5 getopt — C-style parser for command line options

Source code: [Lib/getopt.py](#)

Note: The `getopt` module is a parser for command line options whose API is designed to be familiar to users of the C `getopt()` function. Users who are unfamiliar with the C `getopt()` function or who would like to write less code and get better help and error messages should consider using the `argparse` module instead.

This module helps scripts to parse the command line arguments in `sys.argv`. It supports the same conventions as the Unix `getopt()` function (including the special meanings of arguments of the form `'-'` and `'--'`). Long options similar to those supported by GNU software may be used as well via an optional third argument.

This module provides two functions and an exception:

`getopt.getopt(args, shortopts, longopts=[])`

Parses command line options and parameter list. *args* is the argument list to be parsed, without the leading reference to the running program. Typically, this means `sys.argv[1:]`. *shortopts* is the string of option letters that the script wants to recognize, with options that require an argument followed by a colon (':'); i.e., the same format that Unix `getopt()` uses).

Note: Unlike GNU `getopt()`, after a non-option argument, all further arguments are considered also non-options. This is similar to the way non-GNU Unix systems work.

longopts, if specified, must be a list of strings with the names of the long options which should be supported. The leading `'--'` characters should not be included in the option name. Long options which require an argument should be followed by an equal sign ('='). Optional arguments are not supported. To accept only long options, *shortopts* should be an empty string. Long options on the command line can be recognized so long as they provide a prefix of the option name that matches exactly one of the accepted options. For example, if *longopts* is `['foo', 'frob']`, the option `--fo` will match as `--foo`, but `--f` will not match uniquely, so `GetoptError` will be raised.