fluent Documentation

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FOR MORE INFORMATION SEE:

CHAPTER

ONE

FLUENTPY - THE FLUENT PYTHON LIBRARY

Fluentpy provides fluent interfaces to existing APIs such as the standard library, allowing you to use them in an object oriented and fluent style.

Fluentpy is inspired by JavaScript's `jQuery` and `underscore` / `lodash` and takes some inspiration from the collections API in Ruby and SmallTalk.

Please note: **This library is based on an wrapper**, that returns another wrapper for any operation you perform on a wrapped value. See the section **Caveats** below for details.

See Fowler, Wikipedia for definitions of fluent interfaces.

1.1 Motivation: Why use `fluentpy`?

Many of the most useful standard library methods such as `map`, `zip`, `filter` and `join` are either free functions or available on the wrong type or module. This prevents fluent method chaining.

Let's consider this example:

```
>>> list(map(str.upper, sorted("ba,dc".split(","), reverse=True)))
['DC', 'BA']
```

To understand this code, I have to start in the middle at `"ba,dc".split(",")`, then backtrack to `sorted(..., reverse=True)`, then to `list(map(str.upper, ...))`. All the while making sure that the parentheses all match up.

Wouldn't it be nice if we could think and write code in the same order? Something like how you would write this in other languages?

```
>>> _("ba,dc").split(",").sorted(reverse=True).map(str.upper)._
['DC', 'BA']
```

"Why no, but python has list comprehensions for that", you might say? Let's see:

```
>>> [each.upper() for each in sorted("ba,dc".split(","), reverse=True)]
['DC', 'BA']
```

This is clearly better: To read it, I have to skip back and forth less. It still leaves room for improvement though. Also, adding filtering to list comprehensions doesn't help:

```
>>> [each.upper() for each in sorted("ba,dc".split(","), reverse=True) if each.upper().
↪startswith('D')]
['DC']
```

The backtracking problem persists. Additionally, if the filtering has to be done on the processed version (on `each.upper().startswith()`), then the operation has to be applied twice - which sucks because you write it twice and compute it twice.

The solution? Nest them!

```
>>> [each for each in
        (inner.upper() for inner in sorted("ba,dc".split(","), reverse=True))
        if each.startswith('D')]
['DC']
```

Which gets us back to all the initial problems with nested statements and manually having to check closing parentheses.

Compare it to this:

```
>>> processed = []
>>> parts = "ba,dc".split(",")
>>> for item in sorted(parts, reverse=True):
>>>     uppercases = item.upper()
>>>     if uppercased.startswith('D')
>>>         processed.append(uppercased)
```

With basic Python, this is as close as it gets for code to read in execution order. So that is usually what I end up doing.

But it has a huge drawback: It's not an expression - it's a bunch of statements. That makes it hard to combine and abstract over it with higher order methods or generators. To write it you are forced to invent names for intermediate variables that serve no documentation purpose, but force you to remember them while reading.

Plus (drumroll): parsing this still requires some backtracking and especially build up of mental state to read.

Oh well.

So let's return to this:

```
>>> (
    _("ba,dc")
    .split(",")
    .sorted(reverse=True)
    .map(str.upper)
    .filter(_.each.startswith('D')._)
    ._
)
('DC',)
```

Sure you are not used to this at first, but consider the advantages. The intermediate variable names are abstracted away - the data flows through the methods completely naturally. No jumping back and forth to parse this at all. It just reads and writes exactly in the order it is computed. As a bonus, there's no parentheses stack to keep track of. And it is shorter too!

So what is the essence of all of this?

Python is an object oriented language - but it doesn't really use what object orientation has taught us about how we can work with collections and higher order methods in the languages that came before it (I think of SmallTalk here, but more recently also Ruby). Why can't I make those beautiful fluent call chains that SmallTalk could do 30 years ago in Python?

Well, now I can and you can too.

1.2 Features

1.2.1 Importing the library

It is recommended to rename the library on import:

```
>>> import fluentpy as _
```

or

```
>>> import fluentpy as _f
```

I prefer `_` for small projects and `_f` for larger projects where `gettext` is used.

1.2.2 Super simple fluent chains

`_` is actually the function `wrap` in the `fluentpy` module, which is a factory function that returns a subclass of `Wrapper()`. This is the basic and main object of this library.

This does two things: First it ensures that every attribute access, item access or method call off of the wrapped object will also return a wrapped object. This means, once you wrap something, unless you unwrap it explicitly via `._` or `.unwrap` or `.to(a_type)` it stays wrapped - pretty much no matter what you do with it. The second thing this does is that it returns a subclass of Wrapper that has a specialized set of methods, depending on the type of what is wrapped. I envision this to expand in the future, but right now the most useful wrappers are: `IterableWrapper`, where we add all the Python collection functions (map, filter, zip, reduce, …), as well as a good batch of methods from `itertools` and a few extras for good measure. CallableWrapper, where we add `.curry()` and `.compose()` and TextWrapper, where most of the regex methods are added.

Some examples:

```
# View documentation on a symbol without having to wrap the whole line it in parantheses
>>> _([]).append.help()
Help on built-in function append:

append(object, /) method of builtins.list instance
    Append object to the end of the list.

# Introspect objects without awkward wrapping stuff in parantheses
>>> _(_).dir()
fluentpy.wrap(['CallableWrapper', 'EachWrapper', 'IterableWrapper', 'MappingWrapper',
↪'ModuleWrapper', 'SetWrapper', 'TextWrapper', 'Wrapper',
'_', '_0', '_1', '_2', '_3', '_4', '_5', '_6', '_7', '_8', '_9',
...
, '_args', 'each', 'lib', 'module', 'wrap'])
>>> _(_).IterableWrapper.dir()
fluentpy.wrap(['_',
...,
```

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```
'accumulate', 'all', 'any', 'call', 'combinations', 'combinations_with_replacement',
↪'delattr',
'dir', 'dropwhile', 'each', 'enumerate', 'filter', 'filterfalse', 'flatten', 'freeze',
↪'get',
'getattr', 'groupby', 'grouped', 'hasattr', 'help', 'iaccumulate', 'icombinations', '
icombinations_with_replacement', 'icycle', 'idropwhile', 'ieach', 'ienumerate', 'ifilter
↪',
'ifilterfalse', 'iflatten', 'igroupby', 'igrouped', 'imap', 'ipermutations', 'iproduct',
↪'ireshape',
'ireversed', 'isinstance', 'islice', 'isorted', 'issubclass', 'istar_map', 'istarmap',
↪'itee',
'iter', 'izip', 'join', 'len', 'map', 'max', 'min', 'permutations', 'pprint', 'previous',
↪ 'print',
'product', 'proxy', 'reduce', 'repr', 'reshape', 'reversed', 'self', 'setattr', 'slice',
↪'sorted',
'star_call', 'star_map', 'starmap', 'str', 'sum', 'to', 'type', 'unwrap', 'vars', 'zip'])

# Did I mention that I hate wrapping everything in parantheses?
>>> _([1,2,3]).len()
3
>>> _([1,2,3]).print()
[1,2,3]

# map over iterables and easily curry functions to adapt their signatures
>>> _(range(3)).map(_(dict).curry(id=_, delay=0)._)._
({'id': 0, 'delay': 0}, {'id': 1, 'delay': 0}, {'id': 2, 'delay': 0})
>>> _(range(10)).map(_.each * 3).filter(_.each < 10)._
(0, 3, 6, 9)
>>> _([3,2,1]).sorted().filter(_.each<=2)._
[1,2]

# Directly work with regex methods on strings
>>> _("foo,  bar,      baz").split(r",\s*")._
['foo', 'bar', 'baz']
>>> _("foo,  bar,      baz").findall(r'\w{3}')._
['foo', 'bar', 'baz']

# Embedd your own functions into call chains
>>> seen = set()
>>> def havent_seen(number):
...     if number in seen:
...         return False
...     seen.add(number)
...     return True
>>> (
...     _([1,3,1,3,4,5,4])
...     .dropwhile(havent_seen)
...     .print()
... )
(1, 3, 4, 5, 4)
```

And much more. Explore the method documentation for what you can do.

1.2.3 Imports as expressions

Import statements are (ahem) statements in Python. This is fine, but can be really annoying at times.

The `_.lib` object, which is a wrapper around the Python import machinery, allows to import anything that is accessible by import to be imported as an expression for inline use.

So instead of

```
>>> import sys
>>> input = sys.stdin.read()
```

You can do

```
>>> lines = _.lib.sys.stdin.readlines()._
```

As a bonus, everything imported via lib is already pre-wrapped, so you can chain off of it immediately.

1.2.4 Generating lambdas from expressions

`lambda` is great - it's often exactly what the doctor ordered. But it can also be annoying if you have to write it down every time you just want to get an attribute or call a method on every object in a collection. For Example:

```
>>> _([{'fnord':'foo'}, {'fnord':'bar'}]).map(lambda each: each['fnord'])._
('foo', 'bar')

>>> class Foo(object):
>>>     attr = 'attrvalue'
>>>     def method(self, arg): return 'method+'+arg
>>> _([Foo(), Foo()]).map(lambda each: each.attr)._
('attrvalue', 'attrvalue')

>>> _([Foo(), Foo()]).map(lambda each: each.method('arg'))._
('method+arg', 'method+arg')
```

Sure it works, but wouldn't it be nice if we could save a variable and do this a bit shorter?

Python does have `attrgetter`, `itemgetter` and `methodcaller` - they are just a bit inconvenient to use:

```
>>> from operator import itemgetter, attrgetter, methodcaller
>>> __([{'fnord':'foo'}, {'fnord':'bar'}]).map(itemgetter('fnord'))._
('foo', 'bar')
>>> _([Foo(), Foo()]).map(attrgetter('attr'))._
('attrvalue', 'attrvalue')

>>> _([Foo(), Foo()]).map(methodcaller('method', 'arg'))._
('method+arg', 'method+arg')

_([Foo(), Foo()]).map(methodcaller('method', 'arg')).map(str.upper)._
('METHOD+ARG', 'METHOD+ARG')
```

To ease this, `_.each` is provided. `each` exposes a bit of syntactic sugar for these (and the other operators). Basically, everything you do to `_.each` it will record and later 'play back' when you generate a callable from it by either unwrapping it, or applying an operator like `+ - * / <', which automatically call unwrap.

```
>>>  _([1,2,3]).map(_.each + 3)._
(4, 5, 6)

>>> _([1,2,3]).filter(_.each < 3)._
(1, 2)

>>> _([1,2,3]).map(- _.each)._
(-1, -2, -3)

>>> _([dict(fnord='foo'), dict(fnord='bar')]).map(_.each['fnord']._)._
('foo', 'bar')

>>> _([Foo(), Foo()]).map(_.each.attr._)._
('attrvalue', 'attrvalue')

>>> _([Foo(), Foo()]).map(_.each.method('arg')._)._
('method+arg', 'method+arg')

>>> _([Foo(), Foo()]).map(_.each.method('arg').upper()._)._
('METHOD+ARG', 'METHOD+ARG')
# Note that there is no second map needed to call `.upper()` here!
```

The rule is that you have to unwrap `._` the each object to generate a callable that you can then hand off to `.map()`, `.filter()` or wherever you would like to use it.

1.2.5 Chaining off of methods that return None

A major nuisance for using fluent interfaces are methods that return None. Sadly, many methods in Python return None, if they mostly exhibit a side effect on the object. Consider for example `list.sort()`. But also all methods that don't have a `return` statement return None. While this is way better than e.g. Ruby where that will just return the value of the last expression - which means objects constantly leak internals - it is very annoying if you want to chain off of one of these method calls.

Fear not though, Fluentpy has you covered. :)

Fluent wrapped objects will have a `self` property, that allows you to continue chaining off of the previous 'self' object.

```
>>> _([3,2,1]).sort().self.reverse().self.call(print)
```

Even though both `sort()` and `reverse()` return `None`.

Of course, if you unwrap at any point with `.unwrap` or `._` you will get the true return value of `None`.

1.2.6 Easy Shell Filtering with Python

It could often be super easy to achieve something on the shell, with a bit of Python. But, the backtracking (while writing) as well as the tendency of Python commands to span many lines (imports, function definitions, ...), makes this often just impractical enough that you won't do it.

That's why `fluentpy` is an executable module, so that you can use it on the shell like this:

```
$ echo 'HELLO, WORLD!' \
    | python3 -m fluentpy "lib.sys.stdin.readlines().map(str.lower).map(print)"
hello, world!
```

In this mode, the variables `lib`, `_` and `each` are injected into the namespace of of the `python` commands given as the first positional argument.

Consider this shell text filter, that I used to extract data from my beloved but sadly pretty legacy del.icio.us account. The format looks like this:

```
$ tail -n 200 delicious.html|head
<DT><A HREF="http://intensedebate.com/" ADD_DATE="1234043688" PRIVATE="0" TAGS="web2.0,
↪threaded,comments,plugin">IntenseDebate comments enhance and encourage conversation on␣
↪your blog or website</A>
<DD>Comments on static websites
<DT><A HREF="http://code.google.com/intl/de/apis/socialgraph/" ADD_DATE="1234003285"␣
↪PRIVATE="0" TAGS="api,foaf,xfn,social,web">Social Graph API - Google Code</A>
<DD>API to try to find metadata about who is a friend of who.
<DT><A HREF="http://twit.tv/floss39" ADD_DATE="1233788863" PRIVATE="0" TAGS="podcast,sun,
↪opensource,philosophy,floss">The TWiT Netcast Network with Leo Laporte</A>
<DD>Podcast about how SUN sees the society evolve from a hub and spoke to a mesh society␣
↪and how SUN thinks it can provide value and profit from that.
<DT><A HREF="http://www.xmind.net/" ADD_DATE="1233643908" PRIVATE="0" TAGS="mindmapping,
↪web2.0,opensource">XMind - Social Brainstorming and Mind Mapping</A>
<DT><A HREF="http://fun.drno.de/pics/What.jpg" ADD_DATE="1233505198" PRIVATE="0" TAGS=
↪"funny,filetype:jpg,media:image">What.jpg 480×640 pixels</A>
<DT><A HREF="http://fun.drno.de/pics/english/What_happens_to_your_body_if_you_stop_
↪smoking_right_now.gif" ADD_DATE="1233504659" PRIVATE="0" TAGS="smoking,stop,funny,
↪informative,filetype:gif,media:image">What_happens_to_your_body_if_you_stop_smoking_
↪right_now.gif 800×591 pixels</A>
<DT><A HREF="http://www.normanfinkelstein.com/article.php?pg=11&ar=2510" ADD_DATE=
↪"1233482064" PRIVATE="0" TAGS="propaganda,israel,nazi">Norman G. Finkelstein</A>

$ cat delicious.html | grep hosting \                                                    ␣
↪                            :(
   | python3  -c 'import sys,re; \
       print("\n".join(re.findall(r"HREF=\"([^\"]+)\"", sys.stdin.read())))'
https://uberspace.de/
https://gitlab.com/gitlab-org/gitlab-ce
https://www.docker.io/
```

Sure it works, but with all the backtracking problems I talked about already. Using `fluentpy` this could be much nicer to write and read:

```
 $ cat delicious.html | grep hosting \
     | python3 -m fluentpy 'lib.sys.stdin.read().findall(r"HREF=\"([^\"]+)\"").map(print)
↪'
https://uberspace.de/
https://gitlab.com/gitlab-org/gitlab-ce
https://www.docker.io/
```

1.3 Caveats and lessons learned

1.3.1 Start and end Fluentpy expressions on each line

If you do not end each fluent statement with a `._`, `.unwrap` or `.to(a_type)` operation to get a normal Python object back, the wrapper will spread in your runtime image like a virus, 'infecting' more and more objects causing strange side effects. So remember: Always religiously unwrap your objects at the end of a fluent statement, when using `fluentpy` in bigger projects.

```
>>> _('foo').uppercase().match('(foo)').group(0)._
```

It is usually a bad idea to commit wrapped objects to variables. Just unwrap instead. This is especially sensible, since fluent chains have references to all intermediate values, so unwrapping chains give the garbage collector the permission to release all those objects.

Forgetting to unwrap an expression generated from `_.each` may be a bit surprising, as every call on them just causes more expression generation instead of triggering their effect.

That being said, `str()` and `repr()` output of fluent wrapped objects is clearly marked, so this is easy to debug.

Also, not having to unwrap may be perfect for short scripts and especially 'one-off' shell commands. However: Use Fluentpys power wisely!

1.3.2 Split expression chains into multiple lines

Longer fluent call chains are best written on multiple lines. This helps readability and eases commenting on lines (as your code can become very terse this way).

For short chains one line might be fine.

```
_(open('day1-input.txt')).read().replace('\n','').call(eval)._
```

For longer chains multiple lines are much cleaner.

```
day1_input = (
    _(open('day1-input.txt'))
    .readlines()
    .imap(eval)
    ._
)

seen = set()
def havent_seen(number):
    if number in seen:
        return False
    seen.add(number)
    return True

(
    _(day1_input)
    .icycle()
    .iaccumulate()
    .idropwhile(havent_seen)
    .get(0)
```

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```
    .print()
)
```

1.3.3 Consider the performance implications of Fluentpy

This library works by creating another instance of its wrapper object for every attribute access, item get or method call you make on an object. Also those objects retain a history chain to all previous wrappers in the chain (to cope with functions that return `None`).

This means that in tight inner loops, where even allocating one more object would harshly impact the performance of your code, you probably don't want to use `fluentpy`.

Also (again) this means that you don't want to commit fluent objects to long lived variables, as that could be the source of a major memory leak.

And for everywhere else: go to town! Coding Python in a fluent way can be so much fun!

1.4 Famous Last Words

This library tries to do a little of what libraries like `underscore` or `lodash` or `jQuery` do for Javascript. Just provide the missing glue to make the standard library nicer and easier to use. Have fun!

I envision this library to be especially useful in short Python scripts and shell one liners or shell filters, where Python was previously just that little bit too hard to use and prevented you from doing so.

I also really like its use in notebooks or in a python shell to smoothly explore some library, code or concept.

CHAPTER TWO

FLUENTPY

To use this module just import it with a short custom name. I recommend:

```
>>> import fluentpy as _ # for scripts / projects that don't use gettext
>>> import fluentpy as _f # for everything else
```

If you want / need this to be less magical, you can import the main wrapper normally

```
>>> from fluentpy import wrap # or `_`, if you're not using gettext
```

Then to use the module, wrap any value and start chaining off of it. To get started lets try to introspect *fluentpy* using its own fluent interface:

```
$ python3 -m fluentpy '_(_).dir().print()'
$ python3 -m fluentpy '_(_).help()'
```

This is incidentally the second way to use this module, as a helper that makes it easier to write short shell filters quickly in python.:

```
$ echo "foo\nbar\nbaz" \
    | python3 -m fluentpy "lib.sys.stdin.readlines().map(each.call.upper()).map(print)"
```

Try to rewrite that in classical python (as a one line shell filter) and see which version spells out what happens in which order more clearly.

For further documentation and development see this documentation or the source at https://github.com/dwt/fluent

2.1 Functions

- *wrap()*: Factory method, wraps anything and returns the appropriate *Wrapper* subclass.

`fluentpy.wrap`(*wrapped*, **, *previous=None*)

Factory method, wraps anything and returns the appropriate *Wrapper* subclass.

This is the main entry point into the fluent wonderland. Wrap something and everything you call off of that will stay wrapped in the appropriate wrappers.

It is usually imported in one of the following ways:

```
>>> import fluentpy as _
>>> import fluentpy as _f
>>> from fluentpy import wrap
```

`wrap` is the original name of the function, though I rarely recommend to use it by this name.

2.2 Classes

- *Wrapper*: Universal wrapper.
- *ModuleWrapper*: The *Wrapper* for modules transforms attribute accesses into pre-wrapped imports of sub-modules.
- *CallableWrapper*: The *Wrapper* for callables adds higher order methods.
- *IterableWrapper*: The *Wrapper* for iterables adds iterator methods to any iterable.
- *MappingWrapper*: The *Wrapper* for mappings allows indexing into mappings via attribute access.
- *SetWrapper*: The *Wrapper* for sets is mostly like *IterableWrapper*.
- *TextWrapper*: The *Wrapper* for str adds regex convenience methods.
- *EachWrapper*: The *Wrapper* for expressions (see documentation for *each*).

class `fluentpy.Wrapper`(*wrapped*, **, *previous*)

Universal wrapper.

This class ensures that all function calls and attribute accesses (apart from such special CPython runtime accesses like `object.__getattribute__`, which cannot be intercepted) will be wrapped with the wrapper again. This ensures that the fluent interface will persist and everything that is returned is itself able to be chained from again.

All returned objects will be wrapped by this class or one of its sub classes, which add functionality depending on the type of the wrapped object. I.e. iterables will gain the collection interface, mappings will gain the mapping interface, strings will gain the string interface, etc.

If you want to access the actual wrapped object, you will have to unwrap it explicitly using `.unwrap` or `._`

Please note: Since most of the methods on these objects are actual standard library methods that are simply wrapped to rebind their (usually first) parameter to the object they where called on. So for example: `repr(something)` becomes `_(something).repr()`. This means that the (unchanged) documentation (often) still shows the original signature and refers to the original arguments. A little bit of common sense might therefore be required.

Inheritance

property unwrap

Returns the underlying wrapped value of this wrapper instance.

All other functions return wrappers themselves unless explicitly stated.

Alias: `_`

property previous

Returns the previous wrapper in the chain of wrappers.

This allows you to walk the chain of wrappers that where created in your expression. Mainly used internally but might be useful for introspection.

property self

Returns the previous wrapped object. This is especially usefull for APIs that return None.

For example `_([1,3,2]).sort().self.print()` will print the sorted list, even though `sort()` did return `None`.

This is simpler than using .previous as there are often multiple wrappers involved where you might expect only one. E.g. `_([2,1]).sort().self._ == [1,2]` but `_([2,1]).sort().previous._` will return the function `list.sort()` as the attrget and call are two steps of the call chain.

This eases chaining using APIs that where not designed with chaining in mind. (Inspired by SmallTalk's default behaviour)

property proxy

Allow access to shadowed attributes.

Breakout that allows access to attributes of the wrapped object that are shadowed by methods on the various wrapper classes. Wrapped of course.

```
>>> class UnfortunateNames(object):
>>>     def previous(self, *args):
>>>         return args
```

This raises TypeError, because Wrapper.previous() shadows UnfortunateNames.previous():

```
>>> _(UnfortunateNames()).previous('foo'))
```

This works as expected:

```
>>> _(UnfortunateNames()).proxy.previous('foo')._) == ('foo',)
```

call(*function*, **args*, ***kwargs*)

Call function with self as its first argument.

```
>>> _('foo').call(list)._ == list('foo')
>>> _('fnord').call(textwrap.indent, prefix='  ')._ == textwrap.indent('fnord',␣
↪prefix='  ')
```

Call is mostly usefull to insert normal functions that express some algorithm into the call chain. For example like this:

```
>>> seen = set()
>>> def havent_seen(number):
...     if number in seen:
...         return False
...     seen.add(number)
...     return True
>>> (
...     _([1,3,1,3,4,5,4])
...     .dropwhile(havent_seen)
...     .print()
... )
```

Less obvious, it can also be used as a decorator, however the result can be confusing, so maybe not as recomended:

```
>>> numbers = _(range(5))
>>> @numbers.call
... def items(numbers):
...     for it in numbers:
...         yield it
...         yield it
>>> items.call(list).print()
```

Note the difference from `.__call__()`. This applies `function(self, ...)` instead of `self(...)`.

`to`(*function*, **args*, ***kwargs*)
Like .call() but returns an unwrapped result.

This makes `.to()` really convenient to terminate a call chain by converting to a type that perhaps itself con.

`setattr`(*name*, *value*, */*)
Sets the named attribute on the given object to the specified value.

setattr(x, 'y', v) is equivalent to ``x.y = v''

`getattr`(*object*, *name*[, *default*]) → value
Get a named attribute from an object; getattr(x, 'y') is equivalent to x.y. When a default argument is given, it is returned when the attribute doesn't exist; without it, an exception is raised in that case.

`hasattr`(*name*, */*)
Return whether the object has an attribute with the given name.

This is done by calling getattr(obj, name) and catching AttributeError.

`delattr`(*name*, */*)
Deletes the named attribute from the given object.

delattr(x, 'y') is equivalent to ``del x.y''

`isinstance`(*class_or_tuple*, */*)
Return whether an object is an instance of a class or of a subclass thereof.

A tuple, as in `isinstance(x, (A, B, ...))`, may be given as the target to check against. This is equivalent to `isinstance(x, A) or isinstance(x, B) or ...` etc.

`issubclass`(*class_or_tuple*, */*)

Return whether 'cls' is a derived from another class or is the same class.

A tuple, as in `issubclass(x, (A, B, ...))`, may be given as the target to check against. This is equivalent to `issubclass(x, A) or issubclass(x, B) or ...` etc.

`dir`([*object*]) → list of strings

If called without an argument, return the names in the current scope. Else, return an alphabetized list of names comprising (some of) the attributes of the given object, and of attributes reachable from it. If the object supplies a method named __dir__, it will be used; otherwise the default dir() logic is used and returns:

for a module object: the module's attributes. for a class object: its attributes, and recursively the attributes

of its bases.

for any other object: its attributes, its class's attributes, and recursively the attributes of its class's base classes.

`vars`([*object*]) → dictionary

Without arguments, equivalent to locals(). With an argument, equivalent to object.__dict__.

`print`(*value*, *...*, *sep=' '*, *end='\n'*, *file=sys.stdout*, *flush=False*)

Prints the values to a stream, or to sys.stdout by default. Optional keyword arguments: file: a file-like object (stream); defaults to the current sys.stdout. sep: string inserted between values, default a space. end: string appended after the last value, default a newline. flush: whether to forcibly flush the stream.

`pprint`(*stream=None*, *indent=1*, *width=80*, *depth=None*, ***, *compact=False*)

Pretty-print a Python object to a stream [default is sys.stdout].

`help`

Define the built-in 'help'. This is a wrapper around pydoc.help (with a twist).

`type = <function type>`

`str = <function str>`

`repr`()

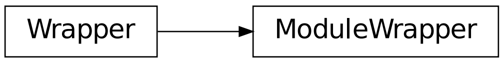
Return the canonical string representation of the object.

For many object types, including most builtins, eval(repr(obj)) == obj.

`class fluentpy.`**`ModuleWrapper`**(*wrapped*, ***, *previous*)

The `Wrapper` for modules transforms attribute accesses into pre-wrapped imports of sub-modules.

Inheritance



reload()

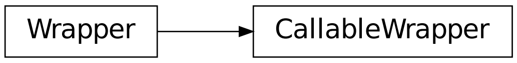
Reload the module and return it.

The module must have been successfully imported before.

class fluentpy.**CallableWrapper**(*wrapped*, *, *previous*)

The *Wrapper* for callables adds higher order methods.

Inheritance



curry(**default_args*, ***default_kwargs*)

Like functools.partial, but with a twist.

If you use `wrap` or `_` as a positional argument, upon the actual call, arguments will be left-filled for those placeholders.

```
>>> _(operator.add).curry(_, 'foo')('bar')._ == 'barfoo'
```

If you use wrap._$NUMBER (with $NUMBER < 10) you can take full control over the ordering of the arguments.

```
>>> _(a_function).curry(_._0, _._0, _.7)
```

This will repeat the first argument twice, then take the 8th and ignore all in between.

You can also mix numbered with generic placeholders, but since it can be hard to read, I would not advise it.

There is also `_._args` which is the placeholder for the `*args` variable argument list specifier. (Note that it is only supported in the last position of the positional argument list.)

```
>>> _(lambda x, y=3: x).curry(_._args)(1, 2)._ == (1, 2)
>>> _(lambda x, y=3: x).curry(x=_._args)(1, 2)._ == (1, 2)
```

compose(*outer*)

Compose two functions.

```
>>>  inner_function.compose(outer_function) \
...     == lambda *args, **kwargs: outer_function(inner_function(*args,␣
↪**kwargs))
```

class fluentpy.**IterableWrapper**(*wrapped*, *, *previous*)

The *Wrapper* for iterables adds iterator methods to any iterable.

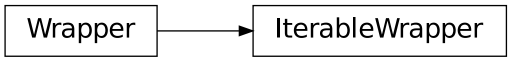
Most iterators in Python 3 return an iterator by default, which is very interesting if you want to build efficient processing pipelines, but not so hot for quick and dirty scripts where you have to wrap the result in a list() or tuple() all the time to actually get at the results (e.g. to print them) or to actually trigger the computation pipeline.

Thus all iterators on this class are by default immediate, i.e. they don't return the iterator but instead consume it immediately and return a tuple. Of course if needed, there is also an i{map,zip,enumerate,...} version for your enjoyment that returns the iterator.

Iterating over wrapped iterators yields unwrapped elements by design. This is neccessary to make `fluentpy` interoperable with the standard library. This means you will have to rewrap occasionally in handwritten iterator methods or when iterating over a wrapped iterator

Where methods return infinite iterators, the non i-prefixed method name is skipped. See `icycle` for an an example.

Inheritance



`iter`(*iterable*) → iterator
`iter`(*callable*, *sentinel*) → iterator
Get an iterator from an object. In the first form, the argument must supply its own iterator, or be a sequence. In the second form, the callable is called until it returns the sentinel.

`star_call`(*function*, **args*, ***kwargs*)
Calls `function(*self)`, but allows to prepend args and add kwargs.

`get`(*target_index*, *default=<object object>*)
Like `` `dict.get() `` but for IterableWrappers and able to deal with generators

`join`(*with_what=''*)
Like str.join, but the other way around. Bohoo!

Also calls str on all elements of the collection before handing it off to str.join as a convenience.

`freeze = <function tuple>`

`len`()
Just like len(), but also works for iterators.

Beware, that it has to consume the iterator to compute its length

`max`(*iterable*, *[, *default=obj*, *key=func*]) → value
`max`(*arg1*, *arg2*, **args*, *[, *key=func*]) → value
With a single iterable argument, return its biggest item. The default keyword-only argument specifies an object to return if the provided iterable is empty. With two or more arguments, return the largest argument.

`min`(*iterable*, *[, *default=obj*, *key=func*]) → value
`min`(*arg1*, *arg2*, **args*, *[, *key=func*]) → value
With a single iterable argument, return its smallest item. The default keyword-only argument specifies an object to return if the provided iterable is empty. With two or more arguments, return the smallest argument.

`sum`(*start=0*, */*)
Return the sum of a 'start' value (default: 0) plus an iterable of numbers

When the iterable is empty, return the start value. This function is intended specifically for use with numeric values and may reject non-numeric types.

any()

Return True if bool(x) is True for any x in the iterable.

If the iterable is empty, return False.

all()

Return True if bool(x) is True for all values x in the iterable.

If the iterable is empty, return True.

reduce(*function*, *sequence*[, *initial*]) → value

Apply a function of two arguments cumulatively to the items of a sequence, from left to right, so as to reduce the sequence to a single value. For example, reduce(lambda x, y: x+y, [1, 2, 3, 4, 5]) calculates ((((1+2)+3)+4)+5). If initial is present, it is placed before the items of the sequence in the calculation, and serves as a default when the sequence is empty.

ieach(*a_function*)

call `a_function` on each elment in self purely for the side effect, then yield the input element.

each(*a_function*)

call `a_function` on each elment in self purely for the side effect, then yield the input element.

imap = <function map>

map = <function map>

istar_map = <function starmap>

istarmap = <function starmap>

star_map = <function starmap>

starmap = <function starmap>

ifilter = <function filter>

filter = <function filter>

ienumerate = <function enumerate>

enumerate = <function enumerate>

ireversed = <function reversed>

reversed = <function reversed>

isorted(*, *key=None*, *reverse=False*)

Return a new list containing all items from the iterable in ascending order.

A custom key function can be supplied to customize the sort order, and the reverse flag can be set to request the result in descending order.

sorted(*, *key=None*, *reverse=False*)

Return a new list containing all items from the iterable in ascending order.

A custom key function can be supplied to customize the sort order, and the reverse flag can be set to request the result in descending order.

igrouped(*group_length*)

Cut self into tupels of length group_length s -> (s0,s1,s2,…sn-1), (sn,sn+1,sn+2,…s2n-1), (s2n,s2n+1,s2n+2,…s3n-1), …

grouped(*group_length*)
Cut self into tupels of length group_length s -> (s0,s1,s2,...sn-1), (sn,sn+1,sn+2,...s2n-1), (s2n,s2n+1,s2n+2,...s3n-1), ...

izip = <function zip>

zip = <function zip>

iflatten(*level=inf, stop_at_types=(<class 'str'>, <class 'bytes'>)*)
Modeled after rubys array.flatten @see http://ruby-doc.org/core-1.9.3/Array.html#method-i-flatten

Calling flatten on string likes would lead to infinity recursion, thus @arg stop_at_types. If you want to flatten those, use a combination of @arg level and @arg stop_at_types.

flatten(*level=inf, stop_at_types=(<class 'str'>, <class 'bytes'>)*)
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Calling flatten on string likes would lead to infinity recursion, thus @arg stop_at_types. If you want to flatten those, use a combination of @arg level and @arg stop_at_types.

ireshape(**spec*)
Creates structure from linearity.

Allows you to turn `(1,2,3,4)` into `((1,2),(3,4))`. Very much inspired by numpy.reshape. @see https://docs.scipy.org/doc/numpy/reference/generated/numpy.reshape.html

@argument spec integer of tuple of integers that give the spec for the dimensions of the returned structure. The last dimension is inferred as needed. For example:

```
>>> _([1,2,3,4]).reshape(2)._ == ((1,2),(3,4))
```

Please note that

```
>>> _([1,2,3,4]).reshape(2,2)._ == (((1,2),(3,4)),)
```

The extra tuple around this is due to the specification being, two tuples of two elements which is possible exactly once with the given iterable.

This iterator will *not* ensure that the shape you give it will generate fully 'rectangular'. This means that the last element in the generated sequnce the number of elements can be different! This tradeoff is made, so it works with infinite sequences.

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igroupby = <function groupby>

groupby(**args*, ***kwargs*)
See igroupby for most of the docs.

Correctly consuming an itertools.groupby is surprisingly hard, thus this non tuple returning version that does it correctly.

itee()
tee(iterable, n=2) –> tuple of n independent iterators.

islice = <function islice>

slice = <function islice>

icycle = <function cycle>

iaccumulate = <function accumulate>

accumulate = <function accumulate>

idropwhile = <function dropwhile>

dropwhile = <function dropwhile>

ifilterfalse = <function filterfalse>

filterfalse = <function filterfalse>

ipermutations = <function permutations>

permutations = <function permutations>

icombinations = <function combinations>

combinations = <function combinations>

icombinations_with_replacement = <function combinations_with_replacement>

combinations_with_replacement = <function combinations_with_replacement>

iproduct = <function product>

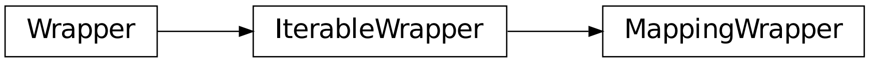
product = <function product>

class fluentpy.**MappingWrapper**(*wrapped*, *, *previous*)
The `Wrapper` for mappings allows indexing into mappings via attribute access.

Indexing into dicts like objects. As JavaScript can.

```
>>> _({ 'foo': 'bar: }).foo == 'bar
```

Inheritance

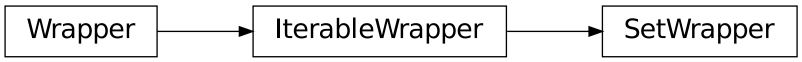


star_call(*function*, **args*, ***kwargs*)
Calls `function(**self)`, but allows to add args and set defaults for kwargs.

`class fluentpy.`**SetWrapper**(*wrapped*, ***, *previous*)
The `Wrapper` for sets is mostly like `IterableWrapper`.

Mostly like IterableWrapper

Inheritance

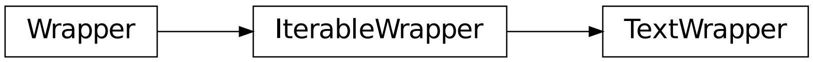


freeze = <function frozenset>

`class fluentpy.`**TextWrapper**(*wrapped*, ***, *previous*)
The `Wrapper` for str adds regex convenience methods.

Supports most of the regex methods as if they where native str methods

Inheritance



search(*string*, *flags=0*)
Scan through string looking for a match to the pattern, returning a match object, or None if no match was found.

match(*string*, *flags=0*)
Try to apply the pattern at the start of the string, returning a match object, or None if no match was found.

fullmatch(*string*, *flags=0*)
Try to apply the pattern at the start of the string, returning a match object, or None if no match was found.

split(*string*, *maxsplit=0*, *flags=0*)
Split the source string by the occurrences of the pattern, returning a list containing the resulting substrings. If capturing parentheses are used in pattern, then the text of all groups in the pattern are also returned as part of the resulting list. If maxsplit is nonzero, at most maxsplit splits occur, and the remainder of the string is returned as the final element of the list.

findall(*string*, *flags=0*)
Return a list of all non-overlapping matches in the string.

If one or more capturing groups are present in the pattern, return a list of groups; this will be a list of tuples if the pattern has more than one group.

Empty matches are included in the result.

finditer(*string*, *flags=0*)
Return an iterator over all non-overlapping matches in the string. For each match, the iterator returns a match object.

Empty matches are included in the result.

sub(*repl*, *string*, *count=0*, *flags=0*)
Return the string obtained by replacing the leftmost non-overlapping occurrences of the pattern in string by the replacement repl. repl can be either a string or a callable; if a string, backslash escapes in it are processed. If it is a callable, it's passed the match object and must return a replacement string to be used.

subn(*repl*, *string*, *count=0*, *flags=0*)
Return a 2-tuple containing (new_string, number). new_string is the string obtained by replacing the left-most non-overlapping occurrences of the pattern in the source string by the replacement repl. number is the number of substitutions that were made. repl can be either a string or a callable; if a string, backslash escapes in it are processed. If it is a callable, it's passed the match object and must return a replacement string to be used.

int = <function int>

float = <function float>

ord()
Return the Unicode code point for a one-character string.

class fluentpy.**EachWrapper**(*operation*, *name*)
The *Wrapper* for expressions (see documentation for *each*).

Inheritance

in_(*haystack*)
Implements a method version of the `in` operator.

So `_.each.in_('bar')` is roughly equivalent to `lambda each:  each in 'bar'` `not_in`(*haystack*)

Implements a method version of the `not in` operator.

So `_.each.not_in('bar')` is roughly equivalent to `lambda each:  each not in 'bar'`

2.3 Variables

- *lib*
- *each*
- *_0*
- *_1*
- *_2*
- *_3*
- *_4*
- *_5*
- *_6*
- *_7*
- *_8*
- *_9*
- *_args*

`fluentpy.lib`

Imports as expressions. Already pre-wrapped.

All attribute accesses to instances of this class are converted to an import statement, but as an expression that returns the wrapped imported object.

Example:

```
>>> lib.sys.stdin.read().map(print)
```

Is equivalent to

```
>>> import sys
>>> wrap(sys).stdin.read().map(print)
```

But of course without creating the intermediate symbol 'stdin' in the current namespace.

All objects returned from lib are pre-wrapped, so you can chain off of them immediately.

```
fluentpy.wrap('virtual root module')
```

`fluentpy.each`

Create functions from expressions.

Use `each.foo._` to create attrgetters, `each['foo']._` to create itemgetters, `each.foo()._` to create method-callers or `each == 'foo'` (with pretty much any operator) to create callable operators.

Many operations can be chained, to extract a deeper object by iterating a container. E.g.:

```
>>> each.foo.bar('baz')['quoox']._
```

creates a callable that will first get the attribute foo, then call the method bar('baz') on the result and finally applies gets the item 'quoox' from the result. For this reason, all callables need to be unwrapped before they are used, as the actual application would just continue to build up the chain on the original callable otherwise.

Apply an operator like each < 3 to generate a callable that applies that operator. Different to all other cases, applying any binary operator auto terminates the expression generator, so no unwrapping is neccessary.

Note: The generated functions never wrap their arguments or return values.

```
fluentpy.wrap(each)
```

fluentpy._0
Placeholder for *CallableWrapper.curry()* to access argument at index 0.

```
fluentpy.wrap(0)
```

fluentpy._1
Placeholder for *CallableWrapper.curry()* to access argument at index 1.

```
fluentpy.wrap(1)
```

fluentpy._2
Placeholder for *CallableWrapper.curry()* to access argument at index 2.

```
fluentpy.wrap(2)
```

fluentpy._3
Placeholder for *CallableWrapper.curry()* to access argument at index 3.

```
fluentpy.wrap(3)
```

fluentpy._4
Placeholder for *CallableWrapper.curry()* to access argument at index 4.

```
fluentpy.wrap(4)
```

fluentpy._5
Placeholder for *CallableWrapper.curry()* to access argument at index 5.

```
fluentpy.wrap(5)
```

fluentpy._6
Placeholder for *CallableWrapper.curry()* to access argument at index 6.

```
fluentpy.wrap(6)
```

fluentpy._7
Placeholder for *CallableWrapper.curry()* to access argument at index 7.

```
fluentpy.wrap(7)
```

fluentpy._8
Placeholder for *CallableWrapper.curry()* to access argument at index 8.

```
fluentpy.wrap(8)
```

`fluentpy._9`

Placeholder for *CallableWrapper.curry()* to access argument at index 9.

```
fluentpy.wrap(9)
```

`fluentpy._args`

The *Wrapper* for str adds regex convenience methods.

Supports most of the regex methods as if they where native str methods

```
fluentpy.wrap('*')
```

CHAPTER

THREE

INTEGRATION WITH OTHER LIBRARIES

Integration of other libraries or just your own custom functions, typically involves `.call()`.

Lets take the shell integration library sh as an example. This library adds a function like interface to shell callouts like this: `ifconfig()`, `sed('s/^/>> /', _in='foo\nbar\baz')`. This is problematic, as function call chains want callables, that get one input argument - in our case stdin, or the `_in` parameter. To support this library, you can manually curry what you need, or create a small adapter object, that does this currying:

```
#!/usr/bin/env python

import typing
import sh

import fluentpy as _

class SHWrapper(object):
    def __getattr__(self, command):

        def _prepare_stdin(stdin):
            if isinstance(stdin, (typing.Text, sh.RunningCommand)):
                return stdin  # use immediately
            elif isinstance(stdin, typing.Iterable):
                return _(stdin).map(str).join('\n')._
            else:
                return str(stdin)  # just assume the caller wants to process it as string

        def command_wrapper(*args, **kwargs):
            def command_with_arguments_wrapper(stdin):
                return getattr(sh, command)(*args, **kwargs, _in=_prepare_stdin(stdin))
            return command_with_arguments_wrapper

        return command_wrapper

pipe = SHWrapper()

_(range(10)).call(pipe.sed('s/^/>> /')).call(pipe.sort('-r')).print()
```

This library is wrapped in the `SHWrapper`object, that a) adapting the way stdin is handled, to adapt various input types to serve as `stdin`, as well as b) adapt the interface to create simple callables in two steps via currying, instead of requiring stdin in the same call that defines the arguments.

With that `.call()` can be used, to insert sh callouts in call chains:

```
_(range(10)).call(pipe.sed('s/^/>> /')).call(pipe.sort('-r')).print()
```

So to summarize: If you want to adapt your own libraries to serve inside of call chains:

- If the interface is allready plain callables, you are in luck, just use them.
- If not, you might need to adapt the interface of the library to single input functions.

CHAPTER

FOUR

TODOS AND FUTURE DIRECTIONS

This is where I assemble my thinking about future directions of this library. I also highly welcome discussion (and pull requests, after a short discussion) for everything mentioned in this document.

4.1 Before next release

- Rework documentation
  - rework all documentation to be in markdown
  - Adopt Diátaxis and start separating out Tutorials, How Tos, Explanation and Reference
    - Some HowTos I envision: How to use fluentpy in shell one liners
    - How to explore an API with fluentpy
    - How to explore an API with fluentpy, Rich and objexplore
    - How to embedd your own free functions into fluent pipelines
    - How to integrate shell scripts into fluent pipelines
  - look at rxpy https://github.com/ReactiveX/RxPY
- Add tryout ideas that https://github.com/rochacbruno/learndynaconf is using
- look at https://toolz.readthedocs.io/en/latest/ as it seems to do similar thinigs to what I do
- travis and backport to pythons it's easy to backport
- integrate introspection methods better CallableWrapper.signature(), …
- would really like to have a helper that gives me the type structure of someting, to make it easier to reason about
  - i.e. {0: [[func1, func2], [func1,funce]]} -> dict[int, list[list[function]]]
- would be cool to have a way to get from _.each to *(*.each) to be able to chain from there. Not sure how that would / should be terminated though.
- Simplify curry, so it mostly only does what functools.partial does, and factor out the wild reordering stuff into it's own method `.adapt_signature` or something similar. This should also simplify / allow porting to python 3.5
- Ideally, curry will return a new wrapping function that knows what it wraps and still has most of the metadata
- consider to split curry into a straight functools.partial port and a more sophisticated curry / signature_adapter. Maybe foregoing too complicated signature adaption by just using a lambda for complicated adaptions. Not sure how to best express that fluently though

- consider if there is a way to make it easier to debug that you forgot to terminate an _.each expression before handing it of to one of the wrapped iteration methods
- consider to have something on _.each that allows to turn it into a Wrapper to chain off of (as this would allow to use .call() to call it as the argument of something)

4.2 Bunch of Ideas

- Ask the guy who wrote a book about fluentpy if I can use his examples as a tutorial
- Consider adding support for `|` as an alternative shorthand to `.call()`. That would allow `_(1) | float | print`. Not yet entirely sure this is a good idea - as it might even be an entirely diffferent syntax by which to use fluentpy. But is it really so helpfull? For example, how do you convert that pipe stream back to a normal object without enclosing the whole thing in parantheses?

Consider allowing curry to take expressions as baked arguments that allow to transform arguments via _.each expressions?

get mybinder tutorial going so users can more easily explore fluentpy

```
No problem. If you are curious about Spark, the high-level idea is that if you have a␣
↪lot of data, you want to break your problem across multiple machines to speed up␣
↪computation. I used Spark as an example as that's one of the most popular distributed␣
↪computing frameworks. On a day to day basis, I actually use Apache Dask, which is␣
↪basically the same thing as Spark.  Both Spark and Dask are lazy (like a generator). I␣
↪looked at the source code of FluentPy, and it seems some parts of lazy (ie uses yield)␣
↪and some parts are eager (ie uses return). If you are curious, take a look at this␣
↪Dask syntax. It looks very similar to fluentpy: https://github.com/dask/dask-tutorial/
↪blob/master/02_bag.ipynb In Dask, all the transformations (map/filter/reduce/etc) are␣
↪lazy until you use .compute(), which triggers actual computation.  Also here's a neat␣
↪tool: https://mybinder.org/    Mybinder gives you a Jupyter notebook to run in your␣
↪browser for free--behind the scenes, it's just a container that clones a repo and␣
↪installs the library. Hence, you can run the Dask tutorial by going to https://
↪mybinder.org/v2/gh/dask/dask-tutorial/HEAD If you want, you can consider adding a␣
↪tutorial notebook in your fluentpy repo, so then users can simply go to https://
↪mybinder.org/v2/gh/dwt/fluent/HEAD to run the code all through the browser.   I think␣
↪the fluent interface is a very cool thing that most Python programmers are not aware␣
↪about, so when I show them for the first time, they are amazed! I remember when I␣
↪first saw it in Java (and it was just a quick screenshot since I actually don't␣
↪program in Java), I was thinking, wow this is amazing.  Hope that helps, Eugene
```

allow each._ or something similar to continue with a wrapped version of each

There should be a way to wrap and unwrap an object when chaining off of _.each

There should be a way to express negation when chaining off of _.each

can I have an `.assign(something)` method that treats self as an lvalue and assigns to it?

`python -m fluentpy` could invoke a repl with fluentpy premported? Would it even make sense to have every object pre-wrapped? Not even sure how to do this.

Consider what a monkey patch to object would look like that added `._` as an accessor to get at a wrapped object.

Consider chainging Wrapper.to() to return the target type unwrapped, to have a shorter way to terminate chains for common usecases

Better Each: allow [{‘foo’: ‘bar’},{‘foo’:’baz’}].map(each.foo) find a way to allow something like map(_.each.foo, _.each.bar) or .map(.each[‘foo’, ‘bar’]) Rework _.each.call.foo(bar) so ‘call’ is no longer a used-up symbol on each. Also _.each.call.method(. . .) has a somewhat different meaning as the .call method on callable could *.each.method(*, . . .) work when auto currying is enabled? Consider if auto chaining opens up the possibility to express all of fluent lazily, i.e. always build up expressions and then call them on unwrap? That way perhaps using iterators internally and returning tuples on .unwrap makes sense? (Could allow to get rid of the i- prefixed iterators)

Make the narrative documentation more compact

Support IterableWrapper.**getitem**

Consider to change return types of functions that are explicitly wrapped but always return None to return .previous

Enhance Wrapper.call() to allow to specify where ‘self’ is inserted into the arguments. Like wrapped() does.

Get on python-ideas and understand why there is no operator for x in y, x not in y, *x and **y

IterableWrapper.list(), IterableWrapper.tuple(), IterableWrapper.dict(), IterableWrapper.set() instead of the somewhat arbitrary tuplify(), dictify(), . . . Perhaps do Wrapper.to(a_typer) to convert to any type? Would be identical to Wrapper.call(a_type), but maybe clearer/shorter?

consider if it is possible to monkey-patch object to add a ‘_’ property to start chaining off of it?

Docs Check all methods have a docstring (especially, why do some stdlib ones do not have docstrings?) Check all the methods from itertools are forwarded where sensible Consider using http://www.sphinx-doc.org/en/master/usage/extensions/napoleon.html for more readable docstrings Use doctest to keep the code examples healthy When wrapping methods with documentation, prepend the argument mapping to that documentation to make it easier to read. consider to add the curried arg spec to the help / repr() output of a curried function. Something like: This documentation comes from foo.bar.baz, when called from a wrapped object the wrapped object is inserted as the $nth parameter Understand why @functools.wraps sometimes causes the first parameter to ber removed from the documentation

Consider .forget() method that ‘forgets’ the history of the chain, so python can reclaim the memory of all those intermediate results without one having to terminate the chain. Not sure what this would give us? Maybe better on wrap as a keyword only argumnet like (forget_history=True)

Set build server with different python versions on one of the public build server plattforms

Curry: consider supporting turning keyword argumnents into positional arguments (the other way around already works)

Consider Number wrapper that allows calling stuff like itertools.count, construct ranges, stuff like that consider numeric type to do stuff like wrap(3).times(. . .) or wrap([1,2,3]).call(len).times(yank_me)

Consider bool wrapper, that allows creating operator versions of if_(), else_(), elsif_(), not_(), . . .

add CallableWrapper.vectorize() similar to how it works in numpy - not sure this is actually sensible? Interesting experiment

```
# vectorize is much like curry
# possible to reuse placeholders
# if wanted, could integrate vectorization in curry
# own method might be cleaner?
# could save signature transformation and execute it in call
# or just wrap a specialized wrapped callable?
# signature transformation specification?
# should allow to describe as much of the broadcasting rules of numpy
# ideally compatible to the point where a vectorization can meaningfully work with np.
↪vectorize
#
```

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```
# _.map()?
# def vectorize(self, *args, **kwargs):
#     pass
```

Consider replacing all placeholders by actually unique objects

Allow setting new attributes on wrapped objects through the wrapper -> test_creating_new_attributes_should_create_attribute_on_wrapped_object This needs solving that the objects themselves need to create attributes while the module is parsed, but they need to be 'closed' after the module has finished parsing.

add .unwrapped (or something similar) to have .unwrap as a higher order function this should allow using .curry() in contexts where the result cannot be

Roundable (for all numeric needs?) round, times, repeat, if_true, if_false, else_ if_true, etc. are pretty much like conditional versions of .tee() I guess. .if_true(function_to_call).else_(other_function_to_call) allow to make ranges by _(1).range(10) support _.if()

example why list comprehension is really bad (Found in zope unit tests)

```
def u7(x):
    stuff = [i + j for toplevel, in x for i, j in toplevel]
    assert stuff == [3, 7]
```

add itertools and collections methods where it makes sense

Would be really nice to allow inputting the chain into a list comprehension in a readable way

consider what it takes to allow reloading wpy itself. This is not so super easy, as the executable module caches all the old values on the function (functools.wraps does that). So afterwards all manner of instance checks don't work anymore. Therefore, just defining **getattr** on the instance method doesn't quite work

consider typing all the methods for better autocompletion?

CHAPTER

FIVE

HOW TO WORK ON FLUENPTY

5.1 Execute the unit tests

```
./setup.py test -q
```

or `pytest` or `tox` (to test all supported python versions).

5.2 Generate the documentation

```
cd docs; make clean html
```

or

```
sphinx-autobuild doc doc/_build/html
```

to work on it while it live updates

5.3 Send patches

Pull requests with unit tests please. Bonus points if you add release notes.

Please note that this project practices Semantic Versioning and Dependable API Evolution

5.4 Release checklist

- Tests run at least in all supported versions of python. Use `tox`
- Increment version
- Update Changelog
- build with $ ./setup.py sdist bdist_wheel
- upload to testpypi as required $ twine upload –repository testpypi dist/fluentpy-*
- Test install and check the new version from pypi
- Tag release
- Push git tags

- upload to pypi as required $ twine upload dist/fluentpy-*

CHAPTER

SIX

CHANGELOG

6.1 Development

- Added `TextWrapper.{int, float, ord}()`, to convert strings to numbers.
- Document integration of external libraries

6.2 2.1.1

- Fix typo in operator **ror** that prevented it from working.

6.3 2.1

- `Wrapper.self` will now always go back in the chain to the base of the last call, instead of onyl when the last callable returned `None`. This should fix the possible behaviour change when methods sometimes return None and sometimes a usefull value.
- Fixed inconsistencies on how `CallableWrapper.curry()` deals with too many arguments. In Python this leads to a `TypeError` - and now it does here too.
- Fixed bug that `_._args` behaved differently than documented. The documentation stated that `_(lambda x, y=3: x).curry(_._args)(1, 2)._ == (1, 2)` but it did instead return `tuple(1)`
- Add `__rmul__` and friends support on `_._each`to allow expressions like `4 % _._each` to work.

6.4 2.0

6.4.1 Breaking changes

- `IterableWrapper.iter()` now returns unwrapped instances. This was changed for uniformity, as all other ways to iterate through a wrapped `IterableWrapper` returned unwrapped instances.
- Removed `Wrapper.tee()` and `Itertools.tee()` as `_(something).tee(a_function)` is easily replicable by `_(something).call(a_function).previous` and `IterableWrapper.tee()` prevented me from providing `itertools.tee`.
- `Wrapper.type()` returns a wrapped type for consistency.

- `Wrapper.{tuplify,listify,dictify,setify}` have been removed, use `Wrapper.call(a_type)` for a wrapped or `Wrapper.to(a_type)` for an unwrapped result instead.
- `_.each` now supports auto chaining of operations. That means you can type `_.each.foo['bar'].baz('quoox')._` to generate a function that applies all of these operations in order. This also means that all functions generated from `_.each` need to be unwrapped (`._`) before usage!
- `_.each.call` is removed, as `_.each.method('arg')` now works as expected, so `_.each.call` is not neccessary any more.

6.4.2 Notable Changes

- `CallableWrapper.curry()` now supports converting positional arguments to keyword arguments.
- `IterableWrapper.each()` to apply a function to every element just for the side effect while chaining off of the original value.
- `EachWrapper.in_(haystack)` and `EachWrapper.not_in(haystack)` support to mimik `lambda each: each in haystack`.
- All the top level classes have been renamed to have a common `-Wrapper` suffix for consistency and debuggability.
- Added new method `.to(a_type, *args, **kwargs)` that calls `a_type(self, **args, **kwars)` but returns an unwrapped result, to more smothely terminate call chains in common scenarios.

CHAPTER SEVEN

PROJECT MATTERS

- Project Homepage: https://github.com/dwt/fluent/
- Bugs: https://github.com/dwt/fluent/issues
- Documentation: https://fluentpy.readthedocs.io/en/latest/
- Build Server: https://circleci.com/gh/dwt/fluent

CHAPTER

EIGHT

WHAT PROBLEM DOES FLUENTPY SOLVE

This library is a syntactic sugar library for Python. It allows you to write more things as expressions, which traditionally require statements in Python. The goal is to allow writing beautiful fluent code with the standard library or your classes, as defined at https://en.wikipedia.org/wiki/Fluent_interface.

CHAPTER

NINE

QUICK START

Fluent is a powerful library, that allows you to use existing libraries through a fluent interface. This is especially useful since most of the Python standard library was written in a way that makes it hard to be used in this style.

This makes `fluentpy` really usefull to write small Python shell filters, to do something that Python is good at, for example finding stuff with regexes:

```
$ python3 -m fluentpy "lib.sys.stdin.read().findall(r'(foo|bar)*').print()"
```

Or whatever other function from the standard lib or any library you would like to use. The Idea here is that while this is perfectly possible without fluent, it is just that little bit easier, to make it actually become fun and practical.

In this context you have basically three extra symbols `wrap` or `_`, `lib` and `each`

`wrap` is the factory for the object specific wrapper types. Every wrapped object has the fluent behaviour, i.e. every accessed property is also wrapped, while also gaining some type dependent special methods like regex methods on str like `.findall()` `.map()`, `.join()`, etc. on list, etc.

`lib` is a wrapper that allows to use any symbol that is anywhere in the standard library (or accessible via an import) by attribute access. For Example:

```
import sys
sys.stdin.read()
```

becomes

```
lib.sys.stdin.read()
```

`each` you probably best think as a convenience lambda generator. It is meant to be a little bit more compact to write down operations you want to execute on every element in a collection.

```
print(map(lambda x: x * 2, range(1,10)))
```

becomes

```
wrap(range(1, 10)).map(each * 2).print()
```

Here `each * 2` is the same as `lambda x: x * 2`. `each['foo']` becomes `lambda each: each['foo']`, `each.bar` becomes `lambda each: each.bar`. `each.call.foo('bar')` becomes `lambda each: each.foo('bar')` (Sorry about the `.call.` there, but I haven't found a way to get rid of it, pull requests welcome).

I suggest you use `.dir()` and `.help()` on the objects of this library to quickly get to know what they do.

CHAPTER

TEN

USAGE IN SHORT SCRIPTS OR BIGGER PROJECTS

Just import fluent under the name you would like to use it. For short scripts I prefer `_` but for projects where gettext is used, I prefer `_f`.

```
import fluent as _
_(range(10)).map(_.each * 3)
```

`each` and `lib` are available as symbols on `_`, or you can import them directly from fluent

```
from fluent import wrap as _, lib, each
_(range(10)).map(each * 3)
```

CHAPTER ELEVEN

FURTHER INFORMATION

Read up on the *Narrative Documentation*, browse the *API Documentation* or take a look at some Live Example Code.

And most important of all: Have phun!

PYTHON MODULE INDEX

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