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# **libearth Documentation**

***Release 0.4.0***

**Hong Minhee**

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<b>1</b>	<b>Compatibility &amp; portability</b>	<b>3</b>
<b>2</b>	<b>Installation</b>	<b>5</b>
<b>3</b>	<b>References</b>	<b>7</b>
3.1	libearth — The shared common library for Earth Reader apps . . . . .	7
3.1.1	libearth.codecs — Common codecs . . . . .	7
3.1.2	libearth.compat — Compatibility layer . . . . .	8
3.1.3	libearth.compat.etree — ElementTree compatibility layer . . . . .	8
3.1.4	libearth.xml.compat.clrxmlreader — XML parser implementation for CLR . .	9
3.1.5	libearth.compat.parallel — Threading-related compatibility layer . . . . .	9
3.1.6	libearth.compat.xmlpullreader — Pulling SAX parser . . . . .	10
3.1.7	libearth.crawler — Crawler . . . . .	11
3.1.8	libearth.defaults — Default data for initial state of apps . . . . .	12
3.1.9	libearth.feed — Feeds . . . . .	12
3.1.10	libearth.parser — Parsing various RSS formats . . . . .	18
3.1.11	libearth.repository — Repositories . . . . .	22
3.1.12	libearth.sanitizer — Sanitize HTML tags . . . . .	25
3.1.13	libearth.schema — Declarative schema for pulling DOM parser of XML . . . . .	26
3.1.14	libearth.session — Isolate data from other installations . . . . .	38
3.1.15	libearth.stage — Staging updates and transactions . . . . .	41
3.1.16	libearth.subscribe — Subscription list . . . . .	45
3.1.17	libearth.tz — Basic timezone implementations . . . . .	48
3.1.18	libearth.version — Version data . . . . .	49
<b>4</b>	<b>Additional notes</b>	<b>51</b>
4.1	Goal . . . . .	51
4.2	Core concepts . . . . .	51
4.2.1	Schema . . . . .	52
4.2.2	Read-time merge . . . . .	52
4.2.3	Repository . . . . .	52
4.2.4	Session . . . . .	52
4.2.5	Stage . . . . .	53
4.3	How to contribute . . . . .	53
4.3.1	License agreement . . . . .	53
4.3.2	Coding style . . . . .	53
4.3.3	Tests . . . . .	53
4.4	Libearth Changelog . . . . .	54

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4.4.1	Version 0.4.0	54
4.4.2	Version 0.3.3	55
4.4.3	Version 0.3.2	55
4.4.4	Version 0.3.1	55
4.4.5	Version 0.3.0	55
4.4.6	Version 0.2.1	57
4.4.7	Version 0.2.0	57
4.4.8	Version 0.1.2	57
4.4.9	Version 0.1.1	57
4.4.10	Version 0.1.0	58
<b>5</b>	<b>Open source</b>	<b>59</b>
	<b>Python Module Index</b>	<b>61</b>

Libearth is the shared common library for various [Earth Reader](#) apps. Earth Reader try to support many platforms as possible (e.g. [web](#), mobile apps, desktop apps), so there must be a large part of common concepts and implementations they share like subscription lists, synchronization through cloud storages between several devices, and crawler, that libearth actually implements.



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## Compatibility & portability

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Libearth officially supports the following Python implementations:

- Python 2.6, 2.7, 3.3—3.5
- CPython, PyPy, IronPython

For environments `setuptools` not available, it has no required dependencies.

See also `tox.ini` file and [CI](#) builds.





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### Installation

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You can install it using **pip**:

```
$ pip install libearth
```

See [PyPI](#) as well.



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## References

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### 3.1 libearth — The shared common library for Earth Reader apps

#### 3.1.1 libearth.codecs — Common codecs

This module provides commonly used codecs to parse RSS-related standard formats.

**class** `libearth.codecs.Boolean` (*true='true', false='false', default\_value=None*)

Codec to interpret boolean representation in strings e.g. 'true', 'no', and encode `bool` values back to string.

**Parameters**

- **true** (*str, tuple*) – text to parse as True. 'true' by default
- **false** (*str, tuple*) – text to parse as False. 'false' by default
- **default\_value** (*bool*) – default value when it cannot be parsed

**class** `libearth.codecs.Enum` (*values*)

Codec that accepts only predefined fixed types of values:

```
gender = Enum(['male', 'female'])
```

Actually it doesn't any encoding nor decoding, but it simply *validates* all values from XML and Python both.

Note that values have to consist of only strings.

**Parameters values** (*collections.Iterable*) – any iterable that yields all possible values

**class** `libearth.codecs.Integer`

Codec to encode and decode integer numbers.

**class** `libearth.codecs.Rfc3339` (*prefer\_utc=False*)

Codec to store `datetime.datetime` values to **RFC 3339** format.

**Parameters prefer\_utc** (*bool*) – normalize all timezones to UTC. False by default

**PATTERN** = `<_sre.SRE_Pattern object at 0x17ff180>`

(*re.RegexObject*) The regular expression pattern that matches to valid **RFC 3339** date time string.

**class** `libearth.codecs.Rfc822` (*microseconds=False*)

Codec to encode/decode `datetime.datetime` values to/from **RFC 822** format.

**Parameters microseconds** (*bool*) – whether to preserve and parse microseconds as well.  
False by default since it's not standard compliant

New in version 0.3.0: Added `microseconds` option.

### 3.1.2 libearth.compat — Compatibility layer

This module provides several subtle things to support multiple Python versions (2.6, 2.7, 3.3—3.5) and VM implementations (CPython, PyPy).

`libearth.compat.IRON_PYTHON = False`  
(bool) Whether it is IronPython or not.

`libearth.compat.PY3 = False`  
(bool) Whether it is Python 3.x or not.

`libearth.compat.UNICODE_BY_DEFAULT = False`  
(bool) Whether the Python VM uses Unicode strings by default. It must be `True` if `PY3` or IronPython.

`libearth.compat.binary(string, var=None)`  
Makes string to `str` in Python 2. Makes string to `bytes` in Python 3 or IronPython.

#### Parameters

- **string** (bytes, str, unicode) – a string to cast it to `binary_type`
- **var** (str) – an optional variable name to be used for error message

`libearth.compat.binary_type`  
(type) Type for representing binary data. `str` in Python 2 and `bytes` in Python 3.  
alias of `str`

`libearth.compat.encode_filename(filename)`  
If filename is a `text_type`, encode it to `binary_type` according to filesystem's default encoding.

`libearth.compat.file_types = (<class 'io.RawIOBase'>, <type 'file'>)`  
(type, tuple) Types for file objects that have `fileno()`.

`libearth.compat.string_type`  
(type) Type for text data. `basestring` in Python 2 and `str` in Python 3.  
alias of `basestring`

`libearth.compat.text(string)`  
Makes string to `str` in Python 3 or IronPython. Does nothing in Python 2.

**Parameters** **string** (bytes, str, unicode) – a string to cast it to `text_type`

`libearth.compat.text_type`  
(type) Type for representing Unicode textual data. `unicode` in Python 2 and `str` in Python 3.  
alias of `unicode`

**class** `libearth.compat.xrange(stop) → xrange object`  
The `xrange()` function. Alias for `range()` in Python 3.

### 3.1.3 libearth.compat.etree — ElementTree compatibility layer

This proxy module offers a compatibility layer between several ElementTree implementations.

- If there's installed `lxml` module, use `lxml.etree`.
- If `xml.etree.cElementTree` is available, use it.
- If IronPython, use `xml.etree.ElementTree` with `libearth.compat.clrxmlreader.TreeBuilder`.

- Otherwise, use `xml.etree.ElementTree`.

It provides the following two functions:

`libearth.compat.etree.fromstring(string)`

Parse the given XML string.

**Parameters** `string` (`str`, `bytes`, `basestring`) – xml string to parse

**Returns** the element tree object

`libearth.compat.etree.fromstringlist(iterable)`

Parse the given chunks of XML string.

**Parameters** `iterable` (`collections.Iterable`) – chunks of xml string to parse

**Returns** the element tree object

`libearth.compat.etree.tostring(tree)`

Generate an XML string from the given element tree.

**Parameters** `tree` – an element tree object to serialize

**Returns** an xml string

**Return type** `str`, `bytes`

### 3.1.4 libearth.xml.compat.clrxmlreader — XML parser implementation for CLR

Python `xml.sax` parser implementation and `ElementTree` builder using CLR `System.Xml.XmlReader`.

See also:

- [XmlReader Class](#)
- [Comparing XmlReader to SAX Reader](#)

`libearth.compat.clrxmlreader.XMLNS_XMLNS = 'http://www.w3.org/2000/xmlns/'`  
(`str`) The reserved namespace URI for XML namespace.

**class** `libearth.compat.clrxmlreader.IteratorStream(iterable)`

`System.IO.Stream` implementation that takes a Python iterable and then transforms it into CLR stream.

**Parameters** `iterable` (`collections.Iterable`) – a Python iterable to transform

**class** `libearth.compat.clrxmlreader.TreeBuilder`

`ElementTree` builder using `System.Xml.XmlReader`.

**class** `libearth.compat.clrxmlreader.XmlReader`

SAX [PullParser](#) implementation using CLR `System.Xml.XmlReader`.

`libearth.compat.clrxmlreader.create_parser()`

Create a new [XmlReader\(\)](#) parser instance.

**Returns** a new parser instance

**Return type** [XmlReader](#)

### 3.1.5 libearth.compat.parallel — Threading-related compatibility layer

`libearth.compat.parallel.cpu_count()`

Get the number of CPU cores.

**Returns** the number of cpu cores

**Return type** `numbers.Integral`

`libearth.compat.parallel.parallel_map` (*pool\_size*, *function*, *iterable*, *\*iterables*)

Parallel version of builtin `map()` except of some differences:

- It takes a more argument at first: `pool_size`.
- The function applications will be done in parallel.
- The order of arguments to results are not maintained. You should treat these as a set.
- The result is a lazy iterable. Although the function immediately returns an iterable, it might block if some results are not completely ready when it's iterated.

**Parameters**

- **`pool_size`** (`numbers.Integral`) – the number of workers
- **`function`** (`collections.Callable`) – the function to apply iterables as its arguments
- **`iterable`** (`collections.Iterable`) – function argument values

**Returns** a promise iterable to future results

**Return type** `collections.Iterable`

Changed in version 0.1.1: Errored values are raised at the latest.

### 3.1.6 `libearth.compat.xmlpullreader` — Pulling SAX parser

**class** `libearth.compat.xmlpullreader.PullReader`

SAX parser interface which provides similar but slightly less power than `IncrementalParser`.

`IncrementalParser` can feed arbitrary length of bytes while it can't determine how long bytes to feed.

**`close()`**

This method is called when the entire XML document has been passed to the parser through the `feed` method, to notify the parser that there are no more data. This allows the parser to do the final checks on the document and empty the internal data buffer.

The parser will not be ready to parse another document until the `reset` method has been called.

`close()` may raise `SAXException`.

**Raises** `xml.sax.SAXException` – when something goes wrong

**`feed()`**

This method makes the parser to parse the next step node, emitting the corresponding events.

`feed()` may raise `SAXException`.

**Returns** whether the stream buffer is not empty yet

**Return type** `bool`

**Raises** `xml.sax.SAXException` – when something goes wrong

**`prepareParser`** (*iterable*)

This method is called by the parse implementation to allow the SAX 2.0 driver to prepare itself for parsing.

**Parameters** **`iterable`** (`collections.Iterable`) – iterable of `bytes`

**reset ()**

This method is called after close has been called to reset the parser so that it is ready to parse new documents. The results of calling parse or feed after close without calling reset are undefined.

### 3.1.7 libearth.crawler — Crawler

Crawl feeds.

`libearth.crawler.DEFAULT_TIMEOUT = 10`

(`numbers.Integral`) The default timeout for connection attempts. 10 seconds.

New in version 0.3.0.

**exception libearth.crawler.CrawlError** (*feed\_uri, \*args, \*\*kwargs*)

Error which rises when crawling given url failed.

New in version 0.3.0: Added `feed_uri` parameter and corresponding `feed_uri` attribute.

**feed\_uri = None**

(`str`) The errored feed uri.

**class libearth.crawler.CrawlResult** (*url, feed, hints, icon\_url=None*)

The result of each crawl of a feed.

It mimics triple of (*url, feed, hints*) for backward compatibility to below 0.3.0, so you can still take these values using tuple unpacking, though it's not recommended way to get these values anymore.

New in version 0.3.0.

**add\_as\_subscription** (*subscription\_set*)

Add it as a subscription to the given `subscription_set`.

**Parameters** `subscription_set` (`SubscriptionSet`) – a subscription list or category to add a new subscription

**Returns** the created subscription object

**Return type** `Subscription`

**feed = None**

(`Feed`) The crawled feed.

**hints = None**

(`collections.Mapping`) The extra hints for the crawler e.g. `skipHours`, `skipMinutes`, `skipDays`. It might be `None`.

**icon\_url = None**

(`str`) The favicon url of the `feed` if exists. It might be `None`.

**url = None**

(`str`) The crawled `feed` url.

`libearth.crawler.crawl` (*feed\_urls, pool\_size, timeout=10*)

Crawl feeds in feed list using thread.

**Parameters**

- **feed\_urls** – feed urls to crawl
- **pool\_size** (`numbers.Integral`) – the number of concurrent workers
- **timeout** (`numbers.Integral`) – optional timeout for connection attempts. `DEFAULT_TIMEOUT` is used if omitted

**Returns** a set of *CrawlResult* objects

**Return type** `collections.Iterable`

Changed in version 0.3.0: It became to return a set of *CrawlResults* instead of `tuples`.

Changed in version 0.3.0: The parameter `feeds` was renamed to `feed_urls`.

New in version 0.3.0: Added optional `timeout` parameter.

### 3.1.8 libearth.defaults — Default data for initial state of apps

New in version 0.4.0.

This module provides small utilities and default data to fill initial state of Earth Reader apps.

**class** `libearth.defaults.BlogrollLinkParser`

HTML parser that find all blogroll links.

`libearth.defaults.get_default_subscriptions` (*blogroll\_url*='http://earthreader.org/')

Suggest the default set of subscriptions. The blogroll database will be remotely downloaded from [Earth Reader website](http://earthreader.org/).

```
>>> subs = get_default_subscriptions()
>>> subs
<libearth.subscribe.SubscriptionList
  'Feeds related to the Earth Reader project'
  of Earth Reader Team <earthreader@librelist.com>>
```

**Parameters** `blogroll_url` (`str`) – the url to download blogroll opml. default is the official website of earth reader

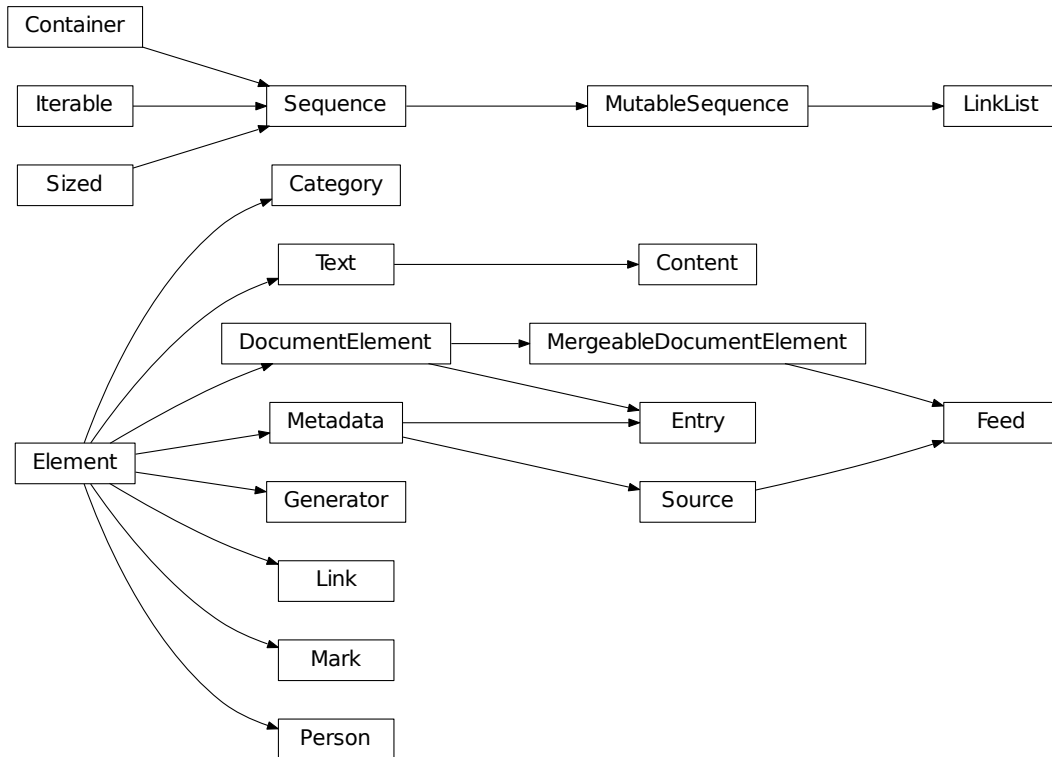
**Returns** the default subscription list

**Return type** *SubscriptionList*

### 3.1.9 libearth.feed — Feeds

*libearth* internally stores archive data as Atom format. It's exactly not a complete set of [RFC 4287](https://tools.ietf.org/html/rfc4287), but a subset of the most of that. Since it's not intended for crawling but internal representation, it does not follow robustness principle or such thing. It simply treats stored data are all valid and well-formed.





`libearth.feed.ATOM_XMLNS = 'http://www.w3.org/2005/Atom'`

(`str`) The XML namespace name used for Atom ([RFC 4287](#)).

`libearth.feed.MARK_XMLNS = 'http://earthreader.org/mark/'`

(`str`) The XML namespace name used for Earth Reader *Mark* metadata.

**class** `libearth.feed.Category` (`_parent=None`, `**attributes`)

Bases: `libearth.schema.Element`

Category element defined in [RFC 4287#section-4.2.2](#) (section 4.2.2).

**label**

(`str`) The optional human-readable label for display in end-user applications. It corresponds to `label` attribute of [RFC 4287#section-4.2.2.3](#) (section 4.2.2.3).

**scheme\_uri**

(`str`) The URI that identifies a categorization scheme. It corresponds to `scheme` attribute of [RFC 4287#section-4.2.2.2](#) (section 4.2.2.2).

**See also:**

- [Tag Scheme?](#) by Tim Bray
- [Representing tags in Atom](#) by Edward O'Connor

**term**

(`str`) The required machine-readable identifier string of the category. It corresponds to `term` attribute of

**RFC 4287#section-4.2.2.1** (section 4.2.2.1).

**class** `libearth.feed.Content` (*\_parent=None*, *\*\*attributes*)

Bases: `libearth.feed.Text`

Content construct defined in **RFC 4287#section-4.1.3** (section 4.1.3).

**MIMETYPE\_PATTERN** = `<_sre.SRE_Pattern object>`

(`re.RegexObject`) The regular expression pattern that matches with valid MIME type strings.

**TYPE\_MIMETYPE\_MAP** = `{'text': 'text/plain', 'xhtml': 'application/xhtml+xml', 'html': 'text/html'}`

(`collections.Mapping`) The mapping of type string (e.g. `'text'`) to the corresponding MIME type (e.g. `text/plain`).

**mimetype**

(`str`) The mimetype of the content.

**source\_uri**

(`str`) An optional remote content URI to retrieve the content.

**class** `libearth.feed.Entry` (*\_parent=None*, *\*\*kwargs*)

Bases: `libearth.schema.DocumentElement`, `libearth.feed.Metadata`

Represent an individual entry, acting as a container for metadata and data associated with the entry. It corresponds to `atom:entry` element of **RFC 4287#section-4.1.2** (section 4.1.2).

**content**

(`Content`) It either contains or links to the content of the entry.

It corresponds to `atom:content` element of **RFC 4287#section-4.1.3** (section 4.1.3).

**published\_at**

(`datetime.datetime`) The tz-aware `datetime` indicating an instant in time associated with an event early in the life cycle of the entry. Typically, `published_at` will be associated with the initial creation or first availability of the resource. It corresponds to `atom:published` element of **RFC 4287#section-4.2.9** (section 4.2.9).

**read**

(`Mark`) Whether and when it's read or unread.

**source**

(`Source`) If an entry is copied from one feed into another feed, then the source feed's metadata may be preserved within the copied entry by adding `source` if it is not already present in the entry, and including some or all of the source feed's metadata as the `source`'s data.

It is designed to allow the aggregation of entries from different feeds while retaining information about an entry's source feed.

It corresponds to `atom:source` element of **RFC 4287#section-4.2.10** (section 4.2.10).

**starred**

(`Mark`) Whether and when it's starred or unstarred.

**summary**

(`Text`) The text field that conveys a short summary, abstract, or excerpt of the entry. It corresponds to `atom:summary` element of **RFC 4287#section-4.2.13** (section 4.2.13).

**class** `libearth.feed.EntryList`

Bases: `_abcoll.MutableSequence`

Element list mixin specialized for `Entry`.

**sort\_entries** ()

Sort entries in time order.

**class** `libearth.feed.Feed` (`_parent=None`, `**kwargs`)

Bases: `libearth.session.MergeableDocumentElement`, `libearth.feed.Source`

Atom feed document, acting as a container for metadata and data associated with the feed.

It corresponds to `atom:feed` element of [RFC 4287#section-4.1.1](#) (section 4.1.1).

#### **entries**

(`collections.MutableSequence`) The list of `Entry` objects that represent an individual entry, acting as a container for metadata and data associated with the entry. It corresponds to `atom:entry` element of [RFC 4287#section-4.1.2](#) (section 4.1.2).

**class** `libearth.feed.Generator` (`_parent=None`, `**attributes`)

Bases: `libearth.schema.Element`

Identify the agent used to generate a feed, for debugging and other purposes. It's corresponds to `atom:generator` element of [RFC 4287#section-4.2.4](#) (section 4.2.4).

#### **uri**

(`str`) A URI that represents something relevant to the agent.

#### **value**

(`str`) The human-readable name for the generating agent.

#### **version**

(`str`) The version of the generating agent.

**class** `libearth.feed.Link` (`_parent=None`, `**attributes`)

Bases: `libearth.schema.Element`

Link element defined in [RFC 4287#section-4.2.7](#) (section 4.2.7).

#### **byte\_size**

(`numbers.Integral`) The optional hint for the length of the linked content in octets. It corresponds to `length` attribute of [RFC 4287#section-4.2.7.6](#) (section 4.2.7.6).

#### **html**

(`bool`) Whether its `mimetype` is HTML (or XHTML).

New in version 0.2.0.

#### **language**

(`str`) The language of the linked content. It corresponds to `hreflang` attribute of [RFC 4287#section-4.2.7.4](#) (section 4.2.7.4).

#### **mimetype**

(`str`) The optional hint for the MIME media type of the linked content. It corresponds to `type` attribute of [RFC 4287#section-4.2.7.3](#) (section 4.2.7.3).

#### **relation**

(`str`) The relation type of the link. It corresponds to `rel` attribute of [RFC 4287#section-4.2.7.2](#) (section 4.2.7.2).

#### **See also:**

**Existing rel values — Microformats Wiki** This page contains tables of known HTML `rel` values from specifications, formats, proposals, brainstorm, and non-trivial [POSH](#) usage in the wild. In addition, dropped and rejected values are listed at the end for comprehensiveness.

#### **title**

(`str`) The title of the linked resource. It corresponds to `title` attribute of [RFC 4287#section-4.2.7.5](#) (section 4.2.7.5).

**uri**

(*str*) The link's required URI. It corresponds to href attribute of [RFC 4287#section-4.2.7.1](#) (section 4.2.7.1).

**class** libearth.feed.**LinkList**

Bases: `_abcoll.MutableSequence`

Element list mixin specialized for *Link*.

**favicon**

(*Link*) Find the link to a favicon, also known as a shortcut or bookmark icon, if it exists.

New in version 0.3.0.

**filter\_by\_mimetype** (*pattern*)

Filter links by their *mimetype* e.g.:

```
links.filter_by_mimetype('text/html')
```

pattern can include wildcards (\*) as well e.g.:

```
links.filter_by_mimetype('application/xml+*')
```

**Parameters** *pattern* (*str*) – the mimetype pattern to filter

**Returns** the filtered links

**Return type** *LinkList*

**permalink**

(*Link*) Find the permalink from the list. The following list shows precedence of lookup conditions:

- 1.*html*, and *relation* is 'alternate'
- 2.*html*
- 3.*relation* is 'alternate'
- 4.No permalink: return None

New in version 0.2.0.

**class** libearth.feed.**Mark** (*\_parent=None, \*\*attributes*)

Bases: *libearth.schema.Element*

Represent whether the entry is read, starred, or tagged by user. It's not a part of [RFC 4287](#) Atom standard, but extension for Earth Reader.

**marked**

(*bool*) Whether it's marked or not.

**updated\_at**

(*datetime.datetime*) Updated time.

**class** libearth.feed.**Metadata** (*\_parent=None, \*\*attributes*)

Bases: *libearth.schema.Element*

Common metadata shared by *Source*, *Entry*, and *Feed*.

**authors**

(*collections.MutableSequence*) The list of *Person* objects which indicates the author of the entry or feed. It corresponds to atom:author element of [RFC 4287#section-4.2.1](#) (section 4.2.1).

**categories**

(`collections.MutableSequence`) The list of *Category* objects that conveys information about categories associated with an entry or feed. It corresponds to `atom:category` element of [RFC 4287#section-4.2.2](#) (section 4.2.2).

**contributors**

(`collections.MutableSequence`) The list of *Person* objects which indicates a person or other entity who contributed to the entry or feed. It corresponds to `atom:contributor` element of [RFC 4287#section-4.2.3](#) (section 4.2.3).

**id**

(`str`) The URI that conveys a permanent, universally unique identifier for an entry or feed. It corresponds to `atom:id` element of [RFC 4287#section-4.2.6](#) (section 4.2.6).

**links**

(*LinkList*) The list of *Link* objects that define a reference from an entry or feed to a web resource. It corresponds to `atom:link` element of [RFC 4287#section-4.2.7](#) (section 4.2.7).

**rights**

(*Text*) The text field that conveys information about rights held in and of an entry or feed. It corresponds to `atom:rights` element of [RFC 4287#section-4.2.10](#) (section 4.2.10).

**title**

(*Text*) The human-readable title for an entry or feed. It corresponds to `atom:title` element of [RFC 4287#section-4.2.14](#) (section 4.2.14).

**updated\_at**

(`datetime.datetime`) The tz-aware `datetime` indicating the most recent instant in time when the entry was modified in a way the publisher considers significant. Therefore, not all modifications necessarily result in a changed `updated_at` value. It corresponds to `atom:updated` element of [RFC 4287#section-4.2.15](#) (section 4.2.15).

**class** `libearth.feed.Person` (`_parent=None`, `**attributes`)

Bases: `libearth.schema.Element`

Person construct defined in [RFC 4287#section-3.2](#) (section 3.2).

**email**

(`str`) The optional email address associated with the person. It corresponds to `atom:email` element of [RFC 4287#section-3.2.3](#) (section 3.2.3).

**name**

(`str`) The human-readable name for the person. It corresponds to `atom:name` element of [RFC 4287#section-3.2.1](#) (section 3.2.1).

**uri**

(`str`) The optional URI associated with the person. It corresponds to `atom:uri` element of [RFC 4287#section-3.2.2](#) (section 3.2.2).

**class** `libearth.feed.Source` (`_parent=None`, `**attributes`)

Bases: `libearth.feed.Metadata`

All metadata for *Feed* excepting *Feed.entries*. It corresponds to `atom:source` element of [RFC 4287#section-4.2.10](#) (section 4.2.10).

**generator**

(*Generator*) Identify the agent used to generate a feed, for debugging and other purposes. It corresponds to `atom:generator` element of [RFC 4287#section-4.2.4](#) (section 4.2.4).

**icon**

(`str`) URI that identifies an image that provides iconic visual identification for a feed. It corresponds to

atom:icon element of [RFC 4287#section-4.2.5](#) (section 4.2.5).

#### logo

(*str*) URI that identifies an image that provides visual identification for a feed. It corresponds to atom:logo element of [RFC 4287#section-4.2.8](#) (section 4.2.8).

#### subtitle

(*Text*) A text that conveys a human-readable description or subtitle for a feed. It corresponds to atom:subtitle element of [RFC 4287#section-4.2.12](#) (section 4.2.12).

**class** libearth.feed.**Text** (*\_parent=None, \*\*attributes*)

Bases: *libearth.schema.Element*

Text construct defined in [RFC 4287#section-3.1](#) (section 3.1).

**get\_sanitized\_html** (*base\_uri=None*)

Get the secure HTML string of the text. If it's a plain text, this returns entity-escaped HTML string (for example, '<Hello>' becomes '&lt;Hello&gt;'), and if it's a HTML text, the value is sanitized (for example, '<script>alert(1);</script><p>Hello</p>' comes '<p>Hello</p>').

New in version 0.4.0.

#### sanitized\_html

Get the secure HTML string of the text. If it's a plain text, this returns entity-escaped HTML string (for example, '<Hello>' becomes '&lt;Hello&gt;'), and if it's a HTML text, the value is sanitized (for example, '<script>alert(1);</script><p>Hello</p>' comes '<p>Hello</p>').

New in version 0.4.0.

#### type

(*str*) The type of the text. It could be one of 'text' or 'html'. It corresponds to [RFC 4287#section-3.1.1](#) (section 3.1.1).

#### value

(*str*) The content of the text. Interpretation for this has to differ according to its *type*. It corresponds to [RFC 4287#section-3.1.1.1](#) (section 3.1.1.1) if *type* is 'text', and [RFC 4287#section-3.1.1.2](#) (section 3.1.1.2) if *type* is 'html'.

## 3.1.10 libearth.parser — Parsing various RSS formats

### libearth.parser.atom — Atom parser

Parsing Atom feed. Atom specification is [RFC 4287](#)

libearth.parser.atom.**ATOM\_XMLNS\_SET** = frozenset(['http://purl.org/atom/ns#', 'http://www.w3.org/2005/Atom'])  
(*frozenset*) The set of XML namespaces for Atom format.

**class** libearth.parser.atom.**AtomSession** (*xml\_base, element\_ns*)

The session class used for parsing the Atom feed.

**element\_ns** = None

(*str*) The feed namespace to get the element attribute id.

**xml\_base** = None

(*str*) The xml:base to retrieve the full uri if an relative uri is given in the element.

libearth.parser.atom.**XML\_XMLNS** = 'http://www.w3.org/XML/1998/namespace'

(*str*) The XML namespace for the predefined xml: prefix.

libearth.parser.atom.**get\_xml\_base** (*data, default*)

Extract the xml:base in the element. If the element does not have xml:base, it returns the default value.

`libearth.parser.atom.parse_atom(xml, feed_url, need_entries=True)`

Atom parser. It parses the Atom XML and returns the feed data as internal representation.

#### Parameters

- **xml** (*str*) – target atom xml to parse
- **feed\_url** (*str*) – the url used to retrieve the atom feed. it will be the base url when there are any relative urls without `xml:base` attribute
- **need\_entries** (*bool*) – whether to parse inner items as well. it's useful to ignore items when retrieve `<source>` in rss 2.0. True by default.

**Returns** a pair of (*Feed*, crawler hint)

**Return type** *tuple*

Changed in version 0.4.0: The `parse_entries` parameter was renamed to `need_entries`.

### libearth.parser.autodiscovery — Autodiscovery

This module provides functions to autodiscovery feed url in document.

`libearth.parser.autodiscovery.ATOM_TYPE = 'application/atom+xml'`

(*str*) The MIME type of Atom format (*application/atom+xml*).

`libearth.parser.autodiscovery.RSS_TYPE = 'application/rss+xml'`

(*str*) The MIME type of RSS 2.0 format (*application/rss+xml*).

`libearth.parser.autodiscovery.TYPE_TABLE = {<function parse_rss1 at 0x7fe6f8b749b0>: 'application/rss+xml', <f`

(*collections.Mapping*) The mapping table of feed types

**class** `libearth.parser.autodiscovery.AutoDiscovery`

Parse the given HTML and try finding the actual feed urls from it.

Changed in version 0.3.0: It became to find icon links as well, and `find_feed_url()` method (that returned only feed links) was gone, instead `find()` (that return a pair of feed links and icon links) was introduced.

**class** `libearth.parser.autodiscovery.FeedLink` (*type, url*)

Namedtuple which is a pair of `type` and `url`

**type**

Alias for field number 0

**url**

Alias for field number 1

**exception** `libearth.parser.autodiscovery.FeedUrlNotFoundError` (*msg*)

Exception raised when feed url cannot be found in html.

`libearth.parser.autodiscovery.autodiscovery` (*document, url*)

If the given url refers an actual feed, it returns the given url without any change.

If the given url is a url of an ordinary web page (i.e. *text/html*), it finds the urls of the corresponding feed. It returns feed urls in feed types' lexicographical order.

If autodiscovery failed, it raise *FeedUrlNotFoundError*.

#### Parameters

- **document** (*str*) – html, or xml strings
- **url** (*str*) – the url used to retrieve the document. if feed url is in html and represented in relative url, it will be rebuilt on top of the `url`

**Returns** list of *FeedLink* objects

**Return type** `collections.MutableSequence`

`libearth.parser.autodiscovery.get_format(document)`

Guess the syndication format of an arbitrary document.

**Parameters** `document` (`str`, `bytes`) – document string to guess

**Returns** the function possible to parse the given document

**Return type** `collections.Callable`

Changed in version 0.2.0: The function was in `libearth.parser.heuristic` module (which is removed now) before 0.2.0, but now it's moved to `libearth.parser.autodiscovery`.

## `libearth.parser.base` — Base Parser

Common interfaces used in both Atom parser and RSS2 parser.

**class** `libearth.parser.base.ParserBase` (`parser=None`)

The `ParserBase` object purposes to define parsers. Defined parsers take an XML element, and then return a parsed `Element` object. Every parser is defined together with a path(e.g. `'channel/item'`) of elements to take through `path()` decorator.

Every decorated function becomes to a *child* parser of the parser that decorates it.

```
rss2_parser = Parser()

@rss2_parser.path('channel')
def channel_parser(element, session):
    # ...

@channel_parser.path('item')
def item_parser(element, session):
    # ...
```

**path** (`element_name`, `namespace_set=None`, `attr_name=None`)

The decorator function to define a parser in the top of parser hierarchy or its children parsers.

### Parameters

- **element\_name** (`str`) – The element id. It consists of an xml namespace and an element name. The parser should return a :class: `~libearth.feed.Element` matches it.
- **attr\_name** – The descriptor attribute name of the parent :class: `~libearth.feed.Element` for the designated *Element*

**class** `libearth.parser.base.SessionBase`

The additional data which are needed for parsing the elements. For example, an `xml:base` is needed to retrieve the full uri when an relative uri is given in the Atom element. A session object is passed from root parser to its children parsers, and A change of the session only affects in the parser where the change occurs and its children parsers.

`libearth.parser.base.get_element_id(name_space, element_name)`

Returns combined string of the `name_space` and `element_name`. The return value is `'{name-space}element_name'`



### libearth.parser.rss1 — RSS 1.0 parser

Parsing RSS 1.0 feed.

`libearth.parser.rss1.DC_NAMESPACE = 'http://purl.org/dc/elements/1.1/'`  
(*str*) The XML namespace for the predefined `dc:` prefix.

`libearth.parser.rss1.RSS1_XMLNS = 'http://purl.org/rss/1.0/'`  
(*str*) The XML namespace used in RSS1 feed.

`libearth.parser.rss1.parse_rss1(xml, feed_url=None, parse_entry=True)`  
Parse RSS 1.0 XML and translate it into Atom.

if `dc:identifier` is not present in channel or item elements, the uri in the link element would become the id of them.

`dc:date` can be used as `updated` element in Atom, but if not present, it uses other elements' `dc:date` or parsing time is used to fill the `updated` element.

#### Parameters

- **xml** (*str*) – rss 1.0 xml string to parse
- **parse\_item** (*bool*) – whether to parse items (entries) as well. it's useful when to ignore items when retrieve `<source>`. True by default

**Returns** a pair of (*Feed*, None)

**Return type** *tuple*

New in version 0.4.0.

### libearth.parser.rss2 — RSS 2.0 parser

Parsing RSS 2.0 feed.

`libearth.parser.rss2.parse_rss2(xml, feed_url=None, parse_entry=True)`  
Parse RSS 2.0 XML and translate it into Atom.

To make the feed data valid in Atom format, `id` and `link[rel=self]` fields would become the url of the feed.

If `pubDate` is not present, `updated` field will be from the latest entry's `updated` time, or the time it's crawled instead.

#### Parameters

- **xml** (*str*) – rss 2.0 xml string to parse
- **parse\_item** (*bool*) – whether to parse items (entries) as well. it's useful when to ignore items when retrieve `<source>`. True by default

**Returns** a pair of (*Feed*, crawler hint)

**Return type** *tuple*

### libearth.parser.rss\_base — Commonly used objects in RSS1 and RSS2

RSS1 and RSS2 are naive compared to Atom feed. So there are several things such as namespace or parsing logic that can be used to parse both feeds. This module contains those common things.

`libearth.parser.rss_base.CONTENT_XMLNS = 'http://purl.org/rss/1.0/modules/content/'`  
(`str`) The XML namespace for the predefined `content`: prefix.

**class** `libearth.parser.rss_base.RSSSession` (*feed\_url*, *default\_tz\_info*)

The session class used for parsing the RSS2.0 feed.

**default\_tz\_info** = `None`

(`str`) The default time zone name to set the `tzinfo` of parsed :class: `datetime.datetime` object.

**feed\_url** = `None`

(`str`) The url of the feed to make :class: `~libearth.feed.Link` object of which relation is self in the feed.

`libearth.parser.rss_base.guess_default_tzinfo` (*root*, *url*)

Guess what time zone is implied in the feed by seeing the TLD of the url and its `<language>` tag.

### `libearth.parser.util` — Utilities for feed parsing

New in version 0.3.0.

`libearth.parser.util.normalize_xml_encoding` (*document*)

Normalize the given XML document's encoding to UTF-8 to workaround `xml.etree.ElementTree` module's [encoding detection bug](#).

New in version 0.3.0.

## 3.1.11 `libearth.repository` — Repositories

*Repository* abstracts storage backend e.g. filesystem. There might be platforms that have no chance to directly access file system e.g. iOS, and in that case the concept of repository makes you to store data directly to [Dropbox](#) or [Google Drive](#) instead of filesystem. However in the most cases we will simply use *FileSystemRepository* even if data are synchronized using Dropbox or **rsync**.

In order to make the repository highly configurable it provides the way to lookup and instantiate the repository from url. For example, the following url will load *FileSystemRepository* which sets *path* to `/home/dahlia/.earthreader/`:

```
file:///home/dahlia/.earthreader/
```

For extensibility every repository class has to implement `from_url()` and `to_url()` methods, and register it as an [entry point](#) of `libearth.repositories` group e.g.:

```
[libearth.repositories]
file = libearth.repository.FileSystemRepository
```

Note that the entry point name (`file` in the above example) becomes the url scheme to lookup the corresponding repository class (`libearth.repository.FileSystemRepository` in the above example).

**class** `libearth.repository.FileIterator` (*path*, *buffer\_size*)

Read a file through `Iterator` protocol, with automatic closing of the file when it ends.

#### Parameters

- **path** (`str`) – the path of file
- **buffer\_size** (`numbers.Integral`) – the size of bytes that would be produced each step

**exception** `libearth.repository.FileNotFoundError`

Raised when a given path does not exist.

**class** `libearth.repository.FileSystemRepository` (*path*, *mkdir=True*, *atomic=False*)  
 Builtin implementation of *Repository* interface which uses the ordinary file system.

#### Parameters

- **path** (*str*) – the directory path to store keys
- **mkdir** (*bool*) – create the directory if it doesn't exist yet. `True` by default
- **atomic** – make the update invisible until it's complete. `False` by default

#### Raises

- **FileNotFoundError** – when the path doesn't exist
- **NotADirectoryError** – when the path is not a directory

**path** = `None`

(*str*) The path of the directory to read and write data files. It should be readable and writable.

**exception** `libearth.repository.NotADirectoryError`

Raised when a given path is not a directory.

**class** `libearth.repository.Repository`

Repository interface agnostic to its underlying storage implementation. *Stage* objects can deal with documents to be stored using the interface.

Every content in repositories is accessible using *keys*. It actually abstracts out “filenames” in “file systems”, hence keys share the common concepts with filenames. Keys are hierarchical, like file paths, so consists of multiple sequential strings e.g. [`'dir'`, `'subdir'`, `'key'`]. You can *list()* all subkeys in the upper key as well e.g.:

```
repository.list(['dir', 'subdir'])
```

**exists** (*key*)

Return whether the key exists or not. It returns `False` if it doesn't exist instead of raising *RepositoryKeyError*.

**Parameters** **key** (`collections.Sequence`) – the key to find whether it exists

**Returns** `True` only if the given key exists, or `False` if not exists

**Return type** `bool`

---

**Note:** Every subclass of *Repository* has to override *exists()* method to implement details.

---

**classmethod** `from_url` (*url*)

Create a new instance of the repository from the given *url*. It's used for configuring the repository in plain text e.g. `*.ini`.

---

**Note:** Every subclass of *Repository* has to override *from\_url()* static/class method to implement details.

---

**Parameters** **url** (`urllib.parse.ParseResult`) – the parsed url tuple

**Returns** a new repository instance

**Return type** *Repository*

**Raises** **ValueError** – when the given url is not invalid

**list** (*key*)

List all subkeys in the key.

**Parameters** **key** (`collections.Sequence`) – the incomplete key that might have subkeys**Returns** the set of subkeys (set of strings, not set of string lists)**Return type** `collections.Set`**Raises** **RepositoryKeyError** – the key cannot be found in the repository, or it's not a directory

---

**Note:** Every subclass of `Repository` has to override `list()` method to implement details.

---

**read** (*key*)

Read the content from the key.

**Parameters** **key** (`collections.Sequence`) – the key which stores the content to read**Returns** byte string chunks**Return type** `collections.Iterable`**Raises** **RepositoryKeyError** – the key cannot be found in the repository, or it's not a file

---

**Note:** Every subclass of `Repository` has to override `read()` method to implement details.

---

**to\_url** (*scheme*)Generate a url that `from_url()` can accept. It's used for configuring the repository in plain text e.g. `*.ini`. URL scheme is determined by caller, and given through argument.

---

**Note:** Every subclass of `Repository` has to override `to_url()` method to implement details.

---

**Parameters** **scheme** – a determined url scheme**Returns** a url that `from_url()` can accept**Return type** `str`**write** (*key*, *iterable*)Write the `iterable` into the key.**Parameters**

- **key** (`collections.Sequence`) – the key to stores the `iterable`
- **iterable** (`collections.Iterable`) – the iterable object yields chunks of the whole content. every chunk has to be a byte string

---

**Note:** Every subclass of `Repository` has to override `write()` method to implement details.

---

**exception** `libearth.repository.RepositoryKeyError` (*key*, *\*args*, *\*\*kwargs*)

Exception which rises when the requested key cannot be found in the repository.

**key = None**(`collections.Sequence`) The requested key.

`libearth.repository.from_url(url)`

Load the repository instance from the given configuration url.

---

**Note:** If `setuptools` is not installed it will only support `file://` scheme and `FileSystemRepository`.

---

**Parameters** `url` (`str`, `urllib.parse.ParseResult`) – a repository configuration url

**Returns** the loaded repository instance

**Return type** `Repository`

**Raises**

- **LookupError** – when the corresponding repository type to the given url scheme cannot be found
- **ValueError** – when the given url is invalid

### 3.1.12 libearth.sanitizer — Sanitize HTML tags

**class** `libearth.sanitizer.HtmlSanitizer(base_uri)`

HTML parser that is internally used by `sanitize_html()` function.

**DISALLOWED\_SCHEMES** = `frozenset(['about', 'jscript', 'livescript', 'javascript', 'mocha', 'vbscript', 'data'])`  
(`collections.Set`) The set of disallowed URI schemes e.g. `javascript:.`

**DISALLOWED\_STYLE\_PATTERN** = `<_sre.SRE_Pattern object at 0x17956c0>`  
(`re.RegexObject`) The regular expression pattern that matches to disallowed CSS properties.

**class** `libearth.sanitizer.MarkupTagCleaner`

HTML parser that is internally used by `clean_html()` function.

`libearth.sanitizer.clean_html(html)`

Strip *all* markup tags from html string. That means, it simply makes the given html document a plain text.

**Parameters** `html` (`str`) – html string to clean

**Returns** cleaned plain text

**Return type** `str`

`libearth.sanitizer.sanitize_html(html, base_uri=None)`

Sanitize the given html string. It removes the following tags and attributes that are not secure nor useful for RSS reader layout:

- `<script>` tags
- `display: none; styles`
- JavaScript event attributes e.g. `onclick`, `onload`
- `href` attributes that start with `javascript:`, `jscript:`, `livescript:`, `vbscript:`, `data:`, `about:`, or `mocha:`.

Also, it rebases all links on the `base_uri` if it's given.

**Parameters**

- `html` (`str`) – html string to sanitize

- **base\_uri** (*str*) – an optional base url to be used throughout the document for relative url addresses

**Returns** cleaned plain text

**Return type** *str*

New in version 0.4.0: The `base_uri` parameter.

### 3.1.13 libearth.schema — Declarative schema for pulling DOM parser of XML

There are well-known two ways to parse XML:

**Document Object Model** It reads the whole XML and then makes a tree in memory. You can easily traverse the document as a tree, but the parsing can't be streamed. Moreover it uses memory for data you don't use.

**Simple API for XML** It's an event-based sequential access parser. It means you need to listen events from it and then utilize its still unstructured data by yourself. In other words, you don't need to pay memory to data you never use if you simply do nothing for them when you listen the event.

Pros and cons between these two ways are obvious, but there could be another way to parse XML: *mix them*.

The basic idea of this pulling DOM parser (which this module implements) is that the parser can consume the stream just in time when you actually reach the child node. There should be an assumption for that: parsed XML has a schema for it. If the document is schema-free, this heuristic approach loses the most of its efficiency.

So the parser should have the information about the schema of XML document it'd parser, and we can declare the schema by defining classes. It's a thing like ORM for XML. For example, suppose there is a small XML document:

```
<?xml version="1.0"?>
<person version="1.0">
  <name>Hong Minhee</name>
  <url>http://dahlia.kr</url>
  <url>https://github.com/dahlia</url>
  <url>https://bitbucket.org/dahlia</url>
  <dob>1988-08-04</dob>
</person>
```

You can declare the schema for this like the following class definition:

```
class Person(DocumentElement):
    __tag__ = 'person'
    format_version = Attribute('version')
    name = Text('name')
    url = Child('url', URL, multiple=True)
    dob = Child('dob', Date)
```

`libearth.schema.PARSER_LIST = []`  
(`collections.Sequence`) The list of `xml.sax` parser implementations to try to import.

`libearth.schema.SCHEMA_XMLNS = 'http://earthreader.org/schema/'`  
(*str*) The XML namespace name used for schema metadata.

**class** `libearth.schema.Attribute` (*name*, *codec=None*, *xmlns=None*, *required=False*, *default=None*,  
*encoder=None*, *decoder=None*)  
Declare possible element attributes as a descriptor.

**Parameters**

- **name** (*str*) – the XML attribute name

- **codec** (*Codec*, *collections.Callable*) – an optional codec object to use. if it's callable and not an instance of *Codec*, its return value will be used instead. it means this can take class object of *Codec* subtype that is not instantiated yet unless the constructor require any arguments
- **xmlns** (*str*) – an optional XML namespace URI
- **required** (*bool*) – whether the child is required or not. *False* by default
- **default** (*collections.Callable*) – an optional function that returns default value when the attribute is not present. the function takes an argument which is an *Element* instance
- **encoder** (*collections.Callable*) – an optional function that encodes Python value into XML text value e.g. *str()*. the encoder function has to take an argument
- **decoder** (*collections.Callable*) – an optional function that decodes XML text value into Python value e.g. *int()*. the decoder function has to take a string argument

Changed in version 0.2.0: The *default* option becomes to accept only callable objects. Below 0.2.0, *default* is not a function but a value which is simply used as it is.

#### **default = None**

(*collections.Callable*) The function that returns default value when the attribute is not present. The function takes an argument which is an *Element* instance.

Changed in version 0.2.0: It becomes to accept only callable objects. Below 0.2.0, *default* attribute is not a function but a value which is simply used as it is.

#### **key\_pair = None**

(*tuple*) The pair of (*xmlns*, *name*).

#### **name = None**

(*str*) The XML attribute name.

#### **required = None**

(*bool*) Whether it is required for the element.

#### **xmlns = None**

(*str*) The optional XML namespace URI.

```
class libearth.schema.Child(tag, element_type, xmlns=None, required=False, multiple=False,
                             sort_key=None, sort_reverse=None)
```

Declare a possible child element as a descriptor.

In order to have *Child* of the element type which is not defined yet (or self-referential) pass the class name of the element type to contain. The name will be lazily evaluated e.g.:

```
class Person(Element):
    '''Everyone can have their children, that also are a Person.'''

    children = Child('child', 'Person', multiple=True)
```

#### **Parameters**

- **tag** (*str*) – the tag name
- **xmlns** (*str*) – an optional XML namespace URI
- **element\_type** (*type*, *str*) – the type of child element(s). it has to be a subtype of *Element*. if it's a string it means referring the class name which is going to be lazily evaluated

- **required** (*bool*) – whether the child is required or not. it's exclusive to *multiple*. *False* by default
- **multiple** (*bool*) – whether the child can be multiple. it's exclusive to *required*. *False* by default
- **sort\_key** (*collections.Callable*) – an optional function to be used for sorting multiple child elements. it has to take a child as *Element* and return a value for sort key. it is the same to *key* option of *sorted()* built-in function. note that *it doesn't guarantee that all elements must be sorted in runtime*, but all elements become sorted when it's written using *write()* function. it's available only when *multiple* is *True*. use *sort\_reverse* for descending order.
- **sort\_reverse** (*bool*) – whether to reverse elements when they become sorted. it is the same to *reverse* option of *sorted()* built-in function. it's available only when *sort\_key* is present

**element\_type**

(*type*) The class of this child can contain. It must be a subtype of *Element*.

**class** libearth.schema.Codec

Abstract base class for codecs to serialize Python values to be stored in XML and deserialize XML texts to Python values.

In most cases encoding and decoding are implementation details of *format* which is well-defined, so these two functions could be paired. The interface rely on that idea.

To implement a codec, you have to subclass *Codec* and override a pair of methods: *encode()* and *decode()*.

Codec objects are acceptable by *Attribute*, *Text*, and *Content* (all they subclass *CodecDescriptor*).

**decode** (*text*)

Decode the given XML text to Python value.

**Parameters** *text* (*str*) – XML text to decode

**Returns** the decoded Python value

**Raises** **DecodeError** – when decoding the given XML text goes wrong

---

**Note:** Every *Codec* subtype has to override this method.

---

**encode** (*value*)

Encode the given Python value into XML text.

**Parameters** *value* – Python value to encode

**Returns** the encoded XML text

**Return type** *str*

**Raises** **EncodeError** – when encoding the given value goes wrong

---

**Note:** Every *Codec* subtype has to override this method.

---

**class** libearth.schema.CodecDescriptor (*codec=None, encoder=None, decoder=None*)

Mixin class for descriptors that provide *decoder()* and *encoder()*.



*Attribute*, *Content* and *Text* can take encoder and decoder functions for them. It's used for encoding from Python values to XML string and decoding raw values from XML to natural Python representations.

It can take a codec, or encode and decode separately. (Of course they all can be present at a time.) In most cases, you'll need only codec parameter that encoder and decoder are coupled:

```
Text('dob', Rfc3339(prefer_utc=True))
```

Encoders can be specified using encoder parameter of descriptor's constructor, or *encoder()* decorator.

Decoders can be specified using decoder parameter of descriptor's constructor, or *decoder()* decorator:

```
class Person(DocumentElement):
    __tag__ = 'person'
    format_version = Attribute('version')
    name = Text('name')
    url = Child('url', URL, multiple=True)
    dob = Text('dob',
               encoder=datetime.date.strftime.isoformat,
               decoder=lambda s: datetime.date.strptime(s, '%Y-%m-%d'))

    @format_version.encoder
    def format_version(self, value):
        return '.'.join(map(str, value))

    @format_version.decoder
    def format_version(self, value):
        return tuple(map(int, value.split('.')))
```

### Parameters

- **codec** (*Codec*, collections.Callable) – an optional codec object to use. if it's callable and not an instance of *Codec*, its return value will be used instead. it means this can take class object of *Codec* subtype that is not instantiated yet unless the constructor require any arguments
- **encoder** (collections.Callable) – an optional function that encodes Python value into XML text value e.g. `str()`. the encoder function has to take an argument
- **decoder** (collections.Callable) – an optional function that decodes XML text value into Python value e.g. `int()`. the decoder function has to take a string argument

**decode** (*text*, *instance*)

Decode the given text as it's programmed.

### Parameters

- **text** (*str*) – the raw text to decode. xml attribute value or text node value in most cases
- **instance** (*Element*) – the instance that is associated with the descriptor

**Returns** decoded value

---

**Note:** Internal method.

---

**decoder** (*function*)

Decorator which sets the decoder to the decorated function:

```
import datetime

class Person(DocumentElement):
    '''Person.dob will be a datetime.date instance.'''

    __tag__ = 'person'
    dob = Text('dob')

    @dob.decoder
    def dob(self, dob_text):
        return datetime.date.strptime(dob_text, '%Y-%m-%d')
```

```
>>> p = Person('<person><dob>1987-07-26</dob></person>')
>>> p.dob
datetime.date(1987, 7, 26)
```

If it's applied multiple times, all decorated functions are piped in the order:

```
class Person(Element):
    '''Person.age will be an integer.'''

    age = Text('dob', decoder=lambda text: text.strip())

    @age.decoder
    def age(self, dob_text):
        return datetime.date.strptime(dob_text, '%Y-%m-%d')

    @age.decoder
    def age(self, dob):
        now = datetime.date.today()
        d = now.month < dob.month or (now.month == dob.month and
                                     now.day < dob.day)

        return now.year - dob.year - d
```

```
>>> p = Person('<person>\n\t<dob>\n\t\t1987-07-26\n\t</dob>\n</person>')
>>> p.age
26
>>> datetime.date.today()
datetime.date(2013, 7, 30)
```

---

**Note:** This creates a copy of the descriptor instance rather than manipulate itself in-place.

---

#### **encoder** (function)

Decorator which sets the encoder to the decorated function:

```
import datetime

class Person(DocumentElement):
    '''Person.dob will be written to ISO 8601 format'''

    __tag__ = 'person'
    dob = Text('dob')

    @dob.encoder
    def dob(self, dob):
        if not isinstance(dob, datetime.date):
            raise TypeError('expected datetime.date')
```

```
return dob.strftime('%Y-%m-%d')
```

```
>>> isinstance(p, Person)
True
>>> p.dob
datetime.date(1987, 7, 26)
>>> ''.join(write(p, indent='', newline=''))
'<person><dob>1987-07-26</dob></person>'
```

If it's applied multiple times, all decorated functions are piped in the order:

```
class Person(Element):
    '''Person.email will have mailto: prefix when it's written
    to XML.

    '''

    email = Text('email', encoder=lambda email: 'mailto:' + email)

    @age.encoder
    def email(self, email):
        return email.strip()

    @email.encoder
    def email(self, email):
        login, host = email.split('@', 1)
        return login + '@' + host.lower()
```

```
>>> isinstance(p, Person)
True
>>> p.email
' earthreader@librelist.com '
>>> ''.join(write(p, indent='', newline=''))
>>> '<person><email>mailto:earthreader@librelist.com</email></person>'
```

---

**Note:** This creates a copy of the descriptor instance rather than manipulate itself in-place.

---

### exception libearth.schema.CodecError

Rise when encoding/decoding between Python values and XML data goes wrong.

### class libearth.schema.Content(codec=None, encoder=None, decoder=None)

Declare possible text nodes as a descriptor.

#### Parameters

- **codec** (*Codec*, collections.Callable) – an optional codec object to use. if it's callable and not an instance of *Codec*, its return value will be used instead. it means this can take class object of *Codec* subtype that is not instantiated yet unless the constructor require any arguments
- **encoder** (collections.Callable) – an optional function that encodes Python value into XML text value e.g. `str()`. the encoder function has to take an argument
- **decoder** (collections.Callable) – an optional function that decodes XML text value into Python value e.g. `int()`. the decoder function has to take a string argument

#### read(element, value)

Read raw value from XML, decode it, and then set the attribute for content of the given element to the

decoded value.

---

**Note:** Internal method.

---

**class** `libearth.schema.ContentHandler` (*document*)

Event handler implementation for SAX parser.

It maintains the stack that contains parsing contexts of what element is lastly open, what descriptor is associated to the element, and the buffer for chunks of content characters the element has. Every context is represented as the namedtuple `ParserContext`.

Each time its events (`startElement()`, `characters()`, and `endElement()`) are called, it forwards the data to the associated descriptor. *Descriptor* subtypes implement `start_element()` method and `end_element()`.

**exception** `libearth.schema.DecodeError`

Rise when decoding XML data to Python values goes wrong.

**class** `libearth.schema.Descriptor` (*tag*, *xmlns=None*, *required=False*, *multiple=False*,  
*sort\_key=None*, *sort\_reverse=None*)

Abstract base class for *Child* and *Text*.

**end\_element** (*reserved\_value*, *content*)

Abstract method that is invoked when the parser meets an end of an element related to the descriptor. It will be called by *ContentHandler*.

#### Parameters

- **reserved\_value** – the value `start_element()` method returned
- **content** (*str*) – the content text of the read element

**key\_pair** = `None`

(*tuple*) The pair of (*xmlns*, *tag*).

**multiple** = `None`

(*bool*) Whether it can be zero or more for the element. If it's `True` *required* has to be `False`.

**required** = `None`

(*bool*) Whether it is required for the element. If it's `True` *multiple* has to be `False`.

**sort\_key** = `None`

(*collections.Callable*) An optional function to be used for sorting multiple elements. It has to take an element and return a value for sort key. It is the same to *key* option of `sorted()` built-in function.

It's available only when *multiple* is `True`.

Use *sort\_reverse* for descending order.

---

**Note:** It doesn't guarantee that all elements must be sorted in runtime, but all elements become sorted when it's written using `write()` function.

---

**sort\_reverse** = `None`

(*bool*) Whether to reverse elements when they become sorted. It is the same to *reverse* option of `sorted()` built-in function.

It's available only when *sort\_key* is present.

**start\_element** (*element*, *attribute*)

Abstract method that is invoked when the parser meets a start of an element related to the descriptor. It will be called by *ContentHandler*.

#### Parameters

- **element** (*Element*) – the parent element of the read element
- **attribute** (*str*) – the attribute name of the descriptor

**Returns** a value to reserve. it will be passed to *reserved\_value* parameter of *end\_element()*

**tag = None**

(*str*) The tag name.

**xmlns = None**

(*str*) The optional XML namespace URI.

**exception** *libearth.schema.DescriptorConflictError*

Error which rises when a schema has duplicate descriptors more than one for the same attribute, the same child element, or the text node.

**class** *libearth.schema.DocumentElement* (*\_parent=None*, *\*\*kwargs*)

The root element of the document.

**\_\_tag\_\_**

(*str*) Every *DocumentElement* subtype has to define this attribute to the root tag name.

**\_\_xmlns\_\_**

(*str*) A *DocumentElement* subtype may define this attribute to the XML namespace of the document element.

**class** *libearth.schema.Element* (*\_parent=None*, *\*\*attributes*)

Represent an element in XML document.

It provides the default constructor which takes keywords and initializes the attributes by given keyword arguments. For example, the following code that uses the default constructor:

```
assert issubclass(Person, Element)

author = Person(
    name='Hong Minhee',
    url='http://dahlia.kr/'
)
```

is equivalent to the following code:

```
author = Person()
author.name = 'Hong Minhee'
author.url = 'http://dahlia.kr/'
```

**classmethod** **\_\_coerce\_from\_\_** (*value*)

Cast a value which isn't an instance of the element type to the element type. It's useful when a boxed element type could be more naturally represented using builtin type.

For example, *Mark* could be represented as a boolean value, and *Text* also could be represented as a string.

The following example shows how the element type can be automatically casted from string by implementing **\_\_coerce\_from\_\_()** class method:

```
@classmethod
def __coerce_from__(cls, value):
    if isinstance(value, str):
        return Text(value=value)
    raise TypeError('expected a string or Text')
```

**\_\_entity\_id\_\_()**

Identify the entity object. It returns the entity object itself by default, but should be overridden.

**Returns** any value to identify the entity object

**\_\_merge\_entities\_\_(other)**

Merge two entities (*self* and *other*). It can return one of the two, or even a new entity object. This method is used by *Session* objects to merge conflicts between concurrent updates.

**Parameters** *other* (*Element*) – other entity to merge. it's guaranteed that it's older session's (note that it doesn't mean this entity is older than *self*, but the session's last update is)

**Returns** on of the two, or even an new entity object that merges two entities

**Return type** *Element*

---

**Note:** The default implementation simply returns *self*. That means the entity of the newer session will always win unless the method is overridden.

---

**class** libearth.schema.**ElementList** (*element, descriptor, value\_type=None*)

List-like object to represent multiple children. It makes the parser to lazily consume the buffer when an element of a particular offset is requested.

You can extend methods or properties for a particular element type using *element\_list\_for()* class decorator e.g.:

```
@element_list_for(Link)
class LinkList(collections.Sequence):
    '''Specialized ElementList for Link elements.'''

    def filter_by_mimetype(self, mimetype):
        '''Filter links by their mimetype.'''
        return [link for link in self if link.mimetype == mimetype]
```

Extended methods/properties can be used for element lists for the type:

```
assert isinstance(feed.links, LinkList)
assert isinstance(feed.links, ElementList)
feed.links.filter_by_mimetype('text/html')
```

**consume\_buffer()**

Consume the buffer for the parser. It returns a generator, so can be stopped using *break* statement by caller.

---

**Note:** Internal method.

---

**classmethod** **register\_specialized\_type** (*value\_type, specialized\_type*)

Register specialized *collections.Sequence* type for a particular *value\_type*.

An imperative version of *:func'element\_list\_for()'* class decorator.

**Parameters**

- **value\_type** (*type*) – a particular element type that *specialized\_type* would be used for instead of default *ElementList* class. it has to be a subtype of *Element*
- **specialized\_type** (*type*) – a *collections.Sequence* type which extends methods and properties for *value\_type*

**specialized\_types** = {<class 'libearth.feed.Link'>: (<class 'libearth.feed.LinkList'>, None), <class 'libearth.feed.Ent  
(*collections.MutableMapping*) The internal table for specialized subtypes used by *register\_specialized\_type()* method and *element\_list\_for()* class decorator.

**exception libearth.schema.EncodeError**

Rise when encoding Python values into XML data goes wrong.

**exception libearth.schema.IntegrityError**

Rise when an element is invalid according to the schema.

**exception libearth.schema.SchemaError**

Error which rises when a schema definition has logical errors.

**class libearth.schema.Text** (*tag*, *codec=None*, *xmlns=None*, *required=False*, *multiple=False*, *encoder=None*, *decoder=None*, *sort\_key=None*, *sort\_reverse=None*)

Descriptor that declares a possible child element that only consists of character data. All other attributes and child nodes are ignored.

#### Parameters

- **tag** (*str*) – the XML tag name
- **codec** (*Codec*, *collections.Callable*) – an optional codec object to use. if it's callable and not an instance of *Codec*, its return value will be used instead. it means this can take class object of *Codec* subtype that is not instantiated yet unless the constructor require any arguments
- **xmlns** (*str*) – an optional XML namespace URI
- **required** (*bool*) – whether the child is required or not. it's exclusive to *multiple*. False by default
- **multiple** (*bool*) – whether the child can be multiple. it's exclusive to *required*. False by default
- **encoder** (*collections.Callable*) – an optional function that encodes Python value into XML text value e.g. *str()*. the encoder function has to take an argument
- **decoder** (*collections.Callable*) – an optional function that decodes XML text value into Python value e.g. *int()*. the decoder function has to take a string argument
- **sort\_key** (*collections.Callable*) – an optional function to be used for sorting multiple child elements. it has to take a child as *Element* and return a value for sort key. it is the same to *key* option of *sorted()* built-in function. note that *it doesn't guarantee that all elements must be sorted in runtime*, but all elements become sorted when it's written using *write()* function. it's available only when *multiple* is True. use *sort\_reverse* for descending order.
- **sort\_reverse** (*bool*) – whether to reverse elements when they become sorted. it is the same to *reverse* option of *sorted()* built-in function. it's available only when *sort\_key* is present

**libearth.schema.complete** (*element*)

Completely load the given element.

**Parameters** *element* (*Element*) – an element loaded by *read()*

`class libearth.schema.element_list_for(value_type)`

Class decorator which registers specialized *ElementList* subclass for a particular value\_type e.g.:

```
@element_list_for(Link)
class LinkList(collections.Sequence):
    '''Specialized ElementList for Link elements.'''

    def filter_by_mimetype(self, mimetype):
        '''Filter links by their mimetype.'''
        return [link for link in self if link.mimetype == mimetype]
```

**Parameters** `value_type` (*type*) – a particular element type that specialized\_type would be used for instead of default *ElementList* class. it has to be a subtype of *Element*

`libearth.schema.index_descriptors(element_type)`

Index descriptors of the given element\_type to make them easy to be looked up by their identifiers (pairs of XML namespace URI and tag name).

**Parameters** `element_type` (*type*) – a subtype of *Element* to index its descriptors

---

**Note:** Internal function.

---

`libearth.schema.inspect_attributes(element_type)`

Get the dictionary of *Attribute* descriptors of the given element\_type.

**Parameters** `element_type` (*type*) – a subtype of *Element* to inspect

**Returns** a dictionary of attribute identifiers (pairs of xml namespace uri and xml attribute name) to pairs of instance attribute name and associated *Attribute* descriptor

**Return type** `collections.Mapping`

---

**Note:** Internal function.

---

`libearth.schema.inspect_child_tags(element_type)`

Get the dictionary of *Descriptor* objects of the given element\_type.

**Parameters** `element_type` (*type*) – a subtype of *Element* to inspect

**Returns** a dictionary of child node identifiers (pairs of xml namespace uri and tag name) to pairs of instance attribute name and associated *Descriptor*

**Return type** `collections.Mapping`

---

**Note:** Internal function.

---

`libearth.schema.inspect_content_tag(element_type)`

Gets the *Content* descriptor of the given element\_type.

**Parameters** `element_type` (*type*) – a subtype of *Element* to inspect

**Returns** a pair of instance attribute name and associated *Content* descriptor

**Return type** `tuple`



---

**Note:** Internal function.

---

`libearth.schema.inspect_xmlns_set(element_type)`

Get the set of XML namespaces used in the given `element_type`, recursively including all child elements.

**Parameters** `element_type` (*type*) – a subtype of *Element* to inspect

**Returns** a set of uri strings of used all xml namespaces

**Return type** `collections.Set`

---

**Note:** Internal function.

---

`libearth.schema.is_partially_loaded(element)`

Return whether the given element is not completely loaded by `read()` yet.

**Parameters** `element` (*Element*) – an element

**Returns** whether True if the given element is partially loaded

**Return type** `bool`

`libearth.schema.read(cls, iterable)`

Initialize a document in read mode by opening the iterable of XML string.

```
with open('doc.xml', 'rb') as f:
    read(Person, f)
```

Returned document element is not fully read but partially loaded into memory, and then lazily (and eventually) loaded when these are actually needed.

**Parameters**

- `cls` (*type*) – a subtype of *DocumentElement*
- `iterable` (`collections.Iterable`) – chunks of XML string to read

**Returns** initialized document element in read mode

**Return type** *DocumentElement*

`libearth.schema.validate(element, recurse=True, raise_error=True)`

Validate the given element according to the schema.

```
from libearth.schema import IntegrityError, validate

try:
    validate(element)
except IntegrityError:
    print('the element {0!r} is invalid!'.format(element))
```

**Parameters**

- `element` (*Element*) – the element object to validate
- `recurse` (`bool`) – recursively validate the whole tree (child nodes). True by default
- `raise_error` (`bool`) – raise exception when the element is invalid. if it's False it returns False instead of raising an exception. True by default

**Returns** True if the element is valid. False if the element is invalid and `raise_error` option is False `

**Raises** `IntegrityError` – when the element is invalid and `raise_error` option is True

**class** `libearth.schema.write`(*document*, *validate=True*, *indent=' '*, *newline='n'*, *canonical\_order=False*, *hints=True*, *as\_bytes=None*)

Write the given document to XML string. The return value is an iterator that yields chunks of an XML string.

```
with open('doc.xml', 'w') as f:
    for chunk in write(document):
        f.write(chunk)
```

#### Parameters

- **document** (*DocumentElement*) – the document element to serialize
- **validate** (*bool*) – whether validate the document or not. True by default
- **indent** (*str*) – an optional string to be used for indent. default is four spaces (' ')
- **newline** (*str*) – an optional character to be used for newline. default is '\n'
- **canonical\_order** (*bool*) – make the order of attributes and child nodes consistent to any python versions and implementations. useful for testing. False by default
- **hints** (*bool*) – export hint values as well. hints improves efficiency of `read()`. True by default
- **as\_bytes** – return chunks as `bytes` (*str* in Python 2) if True. return chunks as *str* (unicode in Python 3) if False. return chunks as default string type (*str*) by default

**Returns** chunks of an XML string

**Return type** `collections.Iterable`

### 3.1.14 libearth.session — Isolate data from other installations

This module provides merging facilities to avoid conflict between concurrent updates of the same document/entity from different devices (installations). There are several concepts here.

*Session* abstracts installations on devices. For example, if you have a laptop, a tablet, and a mobile phone, and two apps are installed on the laptop, then there have to be four sessions: *laptop-1*, *laptop-2*, *table-1*, and *phone-1*. You can think of it as branch if you are familiar with DVCS.

*Revision* abstracts timestamps of updated time. An important thing is that it preserves its session as well.

Base revisions (`MergeableDocumentElement.__base_revisions__`) show what revisions the current revision is built on top of. In other words, what revisions were merged into the current revision. *RevisionSet* is a dictionary-like data structure to represent them.

`libearth.session.SESSION_XMLNS = 'http://earthreader.org/session/'`

(*str*) The XML namespace name used for session metadata.

**class** `libearth.session.MergeableDocumentElement` (*\_parent=None*, *\*\*kwargs*)

Document element which is mergeable using *Session*.

**class** `libearth.session.Revision` (*session*, *updated\_at*)

The named tuple type of (*Session*, `datetime.datetime`) pair.

**session**

Alias for field number 0

**updated\_at**

Alias for field number 1

**class** libearth.session.RevisionCodec

Codec to encode/decode *Revision* pairs.

```
>>> from libearth.tz import utc
>>> session = Session('test-identifier')
>>> updated_at = datetime.datetime(2013, 9, 22, 3, 43, 40, tzinfo=utc)
>>> rev = Revision(session, updated_at)
>>> RevisionCodec().encode(rev)
'test-identifier 2013-09-22T03:43:40Z'
```

**RFC3339\_CODEC = <libearth.codecs.Rfc3339 object>**

(Rfc3339) The internally used codec to encode *Revision.updated\_at* time to **RFC 3339** format.

**class** libearth.session.RevisionParserHandler

SAX content handler that picks session metadata (`__revision__` and `__base_revisions__`) from the given document element.

Parsed result goes *revision* and *base\_revisions*.

Used by *parse\_revision()*.

**done = None**

(*bool*) Represents whether the parsing is complete.

**revision = None**

(*Revision*) The parsed `__revision__`. It might be None.

**class** libearth.session.RevisionSet (*revisions=[]*)

Set of *Revision* pairs. It provides dictionary-like mapping protocol.

**Parameters** *revisions* (*collections.Iterable*) – the iterable of (*Session*, *datetime.datetime*) pairs

**contains** (*revision*)

Find whether the given *revision* is already merged to the revision set. In other words, return True if the *revision* doesn't have to be merged to the revision set anymore.

**Parameters** *revision* (*Revision*) – the revision to find whether it has to be merged or not

**Returns** True if the *revision* is included in the revision set, or False

**Return type** *bool*

**copy** ()

Make a copy of the set.

**Returns** a new equivalent set

**Return type** *RevisionSet*

**items** ()

The list of (*Session*, *datetime.datetime*) pairs.

**Returns** the list of *Revision* instances

**Return type** *collections.ItemsView*

**merge** (*\*sets*)

Merge two or more *RevisionSets*. The latest time remains for the same session.

**Parameters** *\*sets* – one or more *RevisionSet* objects to merge

**Returns** the merged set

**Return type** `RevisionSet`

**class** `libearth.session.RevisionSetCodec`

Codec to encode/decode multiple `Revision` pairs.

```
>>> from datetime import datetime
>>> from libearth.tz import utc
>>> revs = RevisionSet([
...     (Session('a'), datetime(2013, 9, 22, 16, 58, 57, tzinfo=utc)),
...     (Session('b'), datetime(2013, 9, 22, 16, 59, 30, tzinfo=utc)),
...     (Session('c'), datetime(2013, 9, 22, 17, 0, 30, tzinfo=utc))
... ])
>>> encoded = RevisionSetCodec().encode(revs)
>>> encoded
'c 2013-09-22T17:00:30Z,\nb 2013-09-22T16:59:30Z,\na 2013-09-22T16:58:57Z'
>>> RevisionSetCodec().decode(encoded)
libearth.session.RevisionSet([
    Revision(session=libearth.session.Session('b'),
              updated_at=datetime.datetime(2013, 9, 22, 16, 59, 30,
                                             tzinfo=libearth.tz.Utc()),
    Revision(session=libearth.session.Session('c'),
              updated_at=datetime.datetime(2013, 9, 22, 17, 0, 30,
                                             tzinfo=libearth.tz.Utc()),
    Revision(session=libearth.session.Session('a'),
              updated_at=datetime.datetime(2013, 9, 22, 16, 58, 57,
                                             tzinfo=libearth.tz.Utc()))
])
```

**SEPARATOR\_PATTERN** = < `sre.SRE_Pattern` object >

(`re.RegexObject`) The regular expression pattern that matches to separator substrings between revision pairs.

**class** `libearth.session.Session`

The unit of device (more abstractly, *installation*) that updates the same document (e.g. *Feed*). Every session must have its own unique *identifier* to avoid conflict between concurrent updates from different sessions.

**Parameters** *identifier* (`str`) – the unique identifier. automatically generated using `uuid` if not present

**IDENTIFIER\_PATTERN** = < `sre.SRE_Pattern` object >

(`re.RegexObject`) The regular expression pattern that matches to allowed identifiers.

**static** `get_default_name()`

Create default session name.

**Returns** Default session name formatted as “Hostname-UUID”.

**Return type** `str`

**identifier** = `None`

(`str`) The session identifier. It has to be distinguishable from other devices/apps, but consistent for the same device/app.

**interns** = {}

(`collections.MutableMapping`) The pool of interned sessions. It’s for maintaining single sessions for the same identifiers.

**merge** (*a*, *b*, *force=False*)

Merge the given two documents and return new merged document. The given documents are not manipulated in place. Two documents must have the same type.

**Parameters**

- **a** (*MergeableDocumentElement*) – the first document to be merged
- **b** (*MergeableDocumentElement*) – the second document to be merged
- **force** – by default (`False`) it doesn't merge but simply pull a or b if one already contains other. if `force` is `True` it always merge two. it assumes b is newer than a

**pull** (*document*)

Pull the document (of possibly other session) to the current session.

**Parameters** **document** (*MergeableDocumentElement*) – the document to pull from the possibly other session to the current session

**Returns** the clone of the given document with the replaced `__revision__`. note that the *Revision.updated\_at* value won't be revised. it could be the same object to the given document object if the session is the same

**Return type** *MergeableDocumentElement*

**revise** (*document*)

Mark the given document as the latest revision of the current session.

**Parameters** **document** (*MergeableDocumentElement*) – mergeable document to mark

`libearth.session.ensure_revision_pair(pair, force_cast=False)`

Check the type of the given pair and error unless it's a valid revision pair (*Session*, *datetime.datetime*).

**Parameters**

- **pair** (*collections.Sequence*) – a value to check
- **force\_cast** (*bool*) – whether to return the casted value to *Revision* named tuple type

**Returns** the revision pair

**Return type** *Revision*, *collections.Sequence*

`libearth.session.parse_revision(iterable)`

Efficiently parse only `__revision__` and `__base_revisions__` from the given iterable which contains chunks of XML. It reads only head of the given document, and `iterable` will be not completely consumed in most cases.

Note that it doesn't validate the document.

**Parameters** **iterable** (*collections.Iterable*) – chunks of bytes which contains a *MergeableDocumentElement* element

**Returns** a pair of (`__revision__`, `__base_revisions__`). it might be `None` if the document is not stamped

**Return type** *collections.Sequence*

### 3.1.15 libearth.stage — Staging updates and transactions

Stage is a similar concept to Git's one. It's a unit of updates, so every change to the repository should be done through a stage.

It also does more than Git's stage: *Route*. Routing system hides how document should be stored in the repository, and provides the natural object-mapping interface instead.

Stage also provides transactions. All operations on staged documents should be done within a transaction. You can open and close a transaction using `with` statement e.g.:

```
with stage:
    subs = stage.subscriptions
    stage.subscriptions = some_operation(subs)
```

Transaction will merge all simultaneous updates if there are multiple updates when it's committed. You can easily achieve thread safety using transactions.

Note that it however doesn't guarantee data integrity between multiple processes, so *you have to use different session ids when there are multiple processes*.

**class** `libearth.stage.BaseStage` (*session, repository*)

Base stage class that routes nothing yet. It should be inherited to route document types. See also [Route](#) class.

It's a context manager, which is possible to be passed to `with` statement. The context maintains a transaction, that is required for all operations related to the stage:

```
with stage:
    v = stage.some_value
    stage.some_value = operate(v)
```

If any ongoing transaction is not present while the operation requires it, it will raise [TransactionError](#).

#### Parameters

- **session** ([Session](#)) – the current session to stage
- **repository** ([Repository](#)) – the repository to stage

**SESSION\_DIRECTORY\_KEY** = ['.sessions']

(`collections.Sequence`) The repository key of the directory where session list are stored.

**get\_current\_transaction** (*pop=False*)

Get the current ongoing transaction. If any transaction is not begun yet, it raises [TransactionError](#).

**Returns** the dirty buffer that should be written when the transaction is committed

**Return type** [DirtyBuffer](#)

**Raises** **TransactionError** – if not any transaction is not begun yet

**read** (*document\_type, key*)

Read a document of *document\_type* by the given *key* in the staged [repository](#).

#### Parameters

- **document\_type** (*type*) – the type of document to read. it has to be a subclass of [MergeableDocumentElement](#)
- **key** (`collections.Sequence`) – the key to find the document in the [repository](#)

**Returns** found document instance

**Return type** [MergeableDocumentElement](#)

**Raises** [libearth.repository.RepositoryKeyError](#) – when the key cannot be found

---

**Note:** This method is intended to be internal. Use routed properties rather than this. See also [Route](#).

---

**repository = None**

(*Repository*) The staged repository.

**session = None**

(*Session*) The current session of the stage.

**sessions**

(*collections.Set*) List all sessions associated to the *repository*. It includes the session of the current stage.

**touch()**

Touch the latest staged time of the current *session* into the *repository*.

---

**Note:** This method is intended to be internal.

---

**transactions = None**

(*collections.MutableMapping*) Ongoing transactions. Keys are the context identifier (that *get\_current\_context\_id()* returns), and values are pairs of the *DirtyBuffer* that should be written when the transaction is committed, and stack information.

**write(key, document, merge=True)**

Save the document to the key in the staged *repository*.

#### Parameters

- **key** (*collections.Sequence*) – the key to be stored
- **document** (*MergeableDocumentElement*) – the document to save
- **merge** (*bool*) – merge with the previous revision of the same session (if exists). True by default

**Returns** actually written document

**Return type** *MergeableDocumentElement*

---

**Note:** This method is intended to be internal. Use routed properties rather than this. See also *Route*.

---

**class** *libearth.stage.Directory* (*stage, document\_type, key\_spec, indices, key*)

Mapping object which represents hierarchy of routed key path.

#### Parameters

- **stage** (*BaseStage*) – the current stage
- **document\_type** (*type*) – the same to *Route.document\_type*
- **key\_spec** (*collections.Sequence*) – the same to *Route.key\_spec* value
- **indices** (*collections.Sequence*) – the upper indices that are already completed
- **key** (*collections.Sequence*) – the upper key that are already completed

---

**Note:** The constructor is intended to be internal, so don't instantiate it *directory*. Use *Route* instead.

---

**class** *libearth.stage.DirtyBuffer* (*repository, lock*)

Memory-buffered proxy for the repository. It's used for transaction buffer which maintains updates to be written until the ongoing transaction is committed.

### Parameters

- **repository** (*Repository*) – the bare repository where the buffer will *flush()* to
- **lock** (*threading.RLock*) – the common lock shared between dirty buffers of the same stage

---

**Note:** This class is intended to be internal.

---

**flush** (*\_dictionary=None, \_key=None*)  
Flush all buffered updates to the *repository*.

**repository = None**  
(*Repository*) The bare repository where the buffer will *flush()* to.

**class** libearth.stage.**Route** (*document\_type, key\_spec*)

Descriptor that routes a *document\_type* to a particular key path pattern in the repository.

*key\_spec* could contain some format strings. Format strings can take a keyword (*session*) and zero or more positional arguments.

For example, if you route a document type without any positional arguments in *key\_spec* format:

```
class Stage(BaseStage):
    '''Stage example.'''

    metadata = Route(
        Metadata,
        ['metadata', '{session.identifier}.xml']
    )
```

Stage instance will has a *metadata* attribute that simply holds *Metadata* document instance (in the example):

```
>>> stage.metadata # ['metadata', 'session-id.xml']
<Metadata ...>
```

If you route something with one or more positional arguments in *key\_spec* format, then it works in some different way:

```
class Stage(BaseStage):
    '''Stage example.'''

    seating_chart = Route(
        Student,
        ['students', 'col-{0}', 'row-{1}', '{session.identifier}.xml']
    )
```

In the above routing, two positional arguments were used. It means that the *seating\_chart* property will return two-dimensional mapping object (*Directory*):

```
>>> stage.seating_chart # ['students', ...]
<libearth.directory.Directory ['students']>
>>> list(stage.seating_chart)
['A', 'B', 'C', 'D']
>>> b = stage.seating_chart['B'] # ['students', 'col-B', ...]
<libearth.directory.Directory ['students', 'col-B']>
>>> list(stage.seating_chart['B'])
['1', '2', '3', '4', '5', '6']
>>> stage.seating_chart['B']['6'] \
```



```
... # ['students', 'col-B', 'row-6', 'session-id.xml']
<Student B6>
```

### Parameters

- **document\_type** (*type*) – the type of document to route. it has to be a subclass of *MergeableDocumentElement*
- **key\_spec** (*collections.Sequence*) – the repository key pattern that might contain some format strings e.g. `['docs', '{0}', '{session.identifier}.xml']`. positional values are used for directory indices (if present), and `'session'` keyword value is used for identifying sessions

**document\_type = None**

(*type*) The type of the routed document. It is a subtype of *MergeableDocumentElement*.

**key\_spec = None**

(*collections.Sequence*) The repository key pattern that might contain some format strings.

**class libearth.stage.Stage** (*session, repository*)

Staged documents of Earth Reader.

**feeds**

(*collections.MutableMapping*) The map of feed ids to *Feed* objects.

**subscriptions**

(*SubscriptionList*) The set of subscriptions.

**exception libearth.stage.TransactionError**

The error that rises if there's no ongoing transaction while it's needed to update the stage, or if there's already begun ongoing transaction when the new transaction get tried to begin.

**libearth.stage.compile\_format\_to\_pattern** (*format\_string*)

Compile a *format\_string* to regular expression pattern. For example, `'string{0}like{1}this{{2}}'` will be compiled to `/^string(.*)like(.*)this\{2\}$/`.

**Parameters** *format\_string* (*str*) – format string to compile

**Returns** compiled pattern object

**Return type** *re.RegexObject*

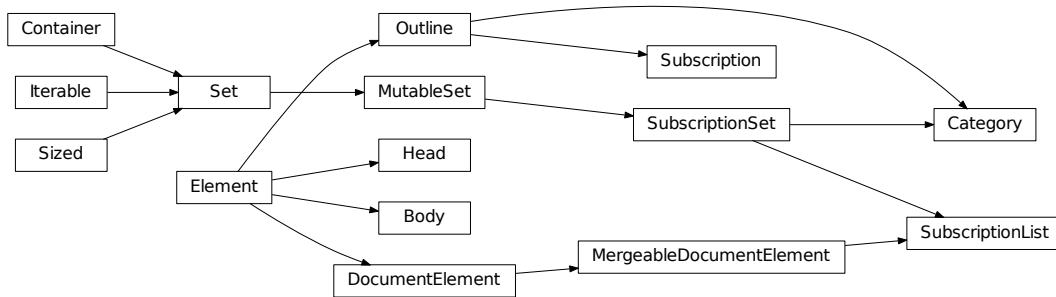
**libearth.stage.get\_current\_context\_id** ()

Identifies which context it is (greenlet, stackless, or thread).

**Returns** the identifier of the current context

## 3.1.16 libearth.subscribe — Subscription list

Maintain the subscription list using *OPML* format, which is de facto standard for the purpose.



```
class libearth.subscribe.Body(_parent=None, **attributes)
```

Bases: `libearth.schema.Element`

Represent body element of OPML document.

**children**

(`collections.MutableSequence`) Child `Outline` objects.

```
class libearth.subscribe.Category(_parent=None, **attributes)
```

Bases: `libearth.subscribe.Outline`, `libearth.subscribe.SubscriptionSet`

Category which groups `Subscription` objects or other `Category` objects. It implements `collections.MutableSet` protocol.

**children**

(`collections.MutableSequence`) The list of child `Outline` elements. It's for internal use.

```
class libearth.subscribe.CommaSeparatedList
```

Bases: `libearth.schema.Codec`

Encode strings e.g. `['a', 'b', 'c']` into a comma-separated list e.g. `'a,b,c'`, and decode it back to a Python list. Whitespaces between commas are ignored.

```
>>> codec = CommaSeparatedList()
>>> codec.encode(['technology', 'business'])
'technology,business'
>>> codec.decode('technology, business')
['technology', 'business']
```

```
class libearth.subscribe.Head(_parent=None, **attributes)
```

Bases: `libearth.schema.Element`

Represent head element of OPML document.

**owner\_email**

(`str`) The owner's email.

**owner\_name**

(`str`) The owner's name.

**owner\_uri**

(`str`) The owner's website url.

**title**

(`str`) The title of the subscription list.

```
class libearth.subscribe.Outline(_parent=None, **attributes)
    Bases: libearth.schema.Element

    Represent outline element of OPML document.

    created_at
        (datetime.datetime) The created time.

    deleted
        (bool) Whether it is deleted (archived) or not.

        New in version 0.3.0.

    deleted_at
        (datetime.datetime) The archived time, if deleted ever. It could be None as well if it's never
        deleted. Note that it doesn't have enough information about whether it's actually deleted or not. For that
        you have to use deleted property instead.

        New in version 0.3.0.

    label
        (str) The human-readable text of the outline.

    type
        (str) Internally-used type identifier.

class libearth.subscribe.Subscription(_parent=None, **attributes)
    Bases: libearth.subscribe.Outline

    Subscription which holds referring feed_uri.

    feed_id
        (str) The feed identifier to be used for lookup. It's intended to be SHA1 digest of Feed.id value (which
        is UTF-8 encoded).

    feed_uri
        (str) The feed url.

    alternate_uri
        (str) The web page url.

    icon_uri
        (str) Optional favicon url.

        New in version 0.3.0.

class libearth.subscribe.SubscriptionList(_parent=None, **kwargs)
    Bases: libearth.session.MergeableDocumentElement, libearth.subscribe.SubscriptionSet

    The set (exactly, tree) of subscriptions. It consists of Subscriptions and Category objects for grouping.
    It implements collections.MutableSet protocol.

    owner
        (Person) The owner of the subscription list.

    title
        (str) The title of the subscription list.

    version
        (distutils.version.StrictVersion) The OPML version number.

class libearth.subscribe.SubscriptionSet
    Bases: _abcoll.MutableSet
```

Mixin for *SubscriptionList* and *Category*, both can group *Subscription* object and other *Category* objects, to implement `collections.MutableSet` protocol.

**categories**

(`collections.Mapping`) Label to *Category* instance mapping.

**children**

(`collections.MutableSequence`) Child *Outline* objects.

---

**Note:** Every subclass of *SubscriptionSet* has to override *children* property to implement details.

---

**contains** (*outline*, *recursively=False*)

Determine whether the set contains the given outline. If *recursively* is `False` (which is by default) it works in the same way to `in` operator.

**Parameters**

- **outline** (*Outline*) – the subscription or category to find
- **recursively** (`bool`) – if it's `True` find the outline in the whole tree, or if `False` find it in only its direct children. `False` by default

**Returns** `True` if the set (or tree) contains the given outline, or `False`

**Return type** `bool`

New in version 0.2.0.

**subscribe** (*feed*, *icon\_uri=None*)

Add a subscription from *Feed* instance. Prefer this method over `add()` method.

**Parameters**

- **feed** (*Feed*) – feed to subscribe
- **icon\_uri** (`str`) – optional favicon url of the feed

**Returns** the created subscription object

**Return type** *Subscription*

New in version 0.3.0: Optional `icon_url` parameter was added.

**subscriptions**

(`collections.Set`) The subset which consists of only *Subscription* instances.

### 3.1.17 libearth.tz — Basic timezone implementations

Almost of this module is from the official documentation of `datetime` module in Python standard library.

**libearth.tz.utc**

(*Utc*, `datetime.timezone`) The `tzinfo` instance that represents UTC. It's an instance of *Utc* in Python 2 (which provide no built-in fixed-offset `tzinfo` implementation), and an instance of `timezone` with zero offset in Python 3.

**class libearth.tz.FixedOffset** (*offset*, *name=None*)

Fixed offset in minutes east from UTC.

```
>>> kst = FixedOffset(9 * 60, name='Asia/Seoul') # KST +09:00
>>> current = now()
>>> current
datetime.datetime(2013, 8, 15, 3, 18, 37, 404562, tzinfo=libearth.tz.Utc())
>>> current.astimezone(kst)
datetime.datetime(2013, 8, 15, 12, 18, 37, 404562,
                    tzinfo=<libearth.tz.FixedOffset Asia/Seoul>)
```

**class** `libearth.tz.Utc`  
UTC.

In most cases, it doesn't need to be directly instantiated: there's already the `utc` value.

`libearth.tz.guess_tzinfo_by_locale` (*language*, *country*=None)

Guess the most commonly used time zone from the given locale.

**Parameters**

- **language** (*str*) – the language code e.g. ko, JA
- **country** (*str*) – optional country code e.g. kr, JP

**Returns** the most commonly used time zone, or None if can't guess

**Return type** `datetime.tzinfo`

New in version 0.3.0.

`libearth.tz.now` ()

Return the current `datetime` with the proper `tzinfo` setting.

```
>>> now()
datetime.datetime(2013, 8, 15, 3, 17, 11, 892272, tzinfo=libearth.tz.Utc())
>>> now()
datetime.datetime(2013, 8, 15, 3, 17, 17, 532483, tzinfo=libearth.tz.Utc())
```

### 3.1.18 libearth.version — Version data

`libearth.version.VERSION` = '0.4.0'

(*str*) The version string e.g. '1.2.3'.

`libearth.version.VERSION_INFO` = (0, 4, 0)

(*tuple*) The triple of version numbers e.g. (1, 2, 3).



---

## Additional notes

---

### 4.1 Goal

Earth Reader aims to decentralize feed reader ecosystem which had been highly centralized to Google Reader. Google Reader had changed the world of news readers, from desktop apps to web-based services.

However [Google Reader shut down on July 1, 2013](#). Everyone panicked, several new feed reader services were born, users had to migrate their data, and the most of alternative services were not able to import starred and read data, but just subscription list through OPML.

[Feed readers are actually desktop apps at first](#). A few years later some people had started to lose their data, because desktop apps had simply stored data to local disk. In those days there were already some web-based feed readers e.g. [Bloglines](#), Google Reader, but they provided worse experience than desktop apps (there were no Chrome, and JavaScript engines were way slower back then). Nevertheless people had gradually moved to web-based services from desktop apps, because they never (until the time at least) lost data, and were easily synchronized between multiple computers.

These feed reader services are enough convenient, but always have some risk that you can't control your own data. If the service you use suddenly shut down without giving you a chance to backup data, you would have to start everything from scratch. Your starred articles would be gone.

The goal of Earth Reader is to achieve the following subgoals at the same time:

- The whole data should be controlled by the owner. It means data will be tangible and reachable on the file system.
- It should be possible to synchronize data between multiple devices, without any conflict between simultaneous updates.
- The implementation and data format should be open and free.
- It could provide native apps for the most of major platforms.

### 4.2 Core concepts

To achieve the [goal](#) of Earth Reader, its design need to resolve the following subproblems:

1. Data should be stored in tangible format and more specifically, in plain text with well-structured directory layout. It would be much better if data can be easily read and parsed by other softwares.
2. Data should be possible to be synchronized through several existing utilities including [Dropbox](#), [Google Drive](#), and even [rsync](#), without any data corruption. In this docs we try to explain core concepts of libearth and what these concepts purpose to resolve.

### 4.2.1 Schema

All data libearth deals with are based on (de facto) standard formats. For example, it stores subscription list and its category hierarchy to an OPML file. OPML have been a de facto standard format to exchange subscription list by feed readers. It also stores all feed data to Atom format ([RFC 4287](#)).

Actually the most technologies related to RSS/syndication formats are from early 00's, and it means they had used XML instead of JSON today we use for the same purpose. OPML is an (though poorly structured) XML format, and Atom also is an XML format.

Since we need to deal with several XML data and not need any other formats, we decided to make something first-class model objects to XML like ORM to relational databases. You can find how it can be used for designing model objects at `libearth/feed.py` and `libearth/subscribe.py`. It looks similar to Django ORM and SQLAlchemy, and makes you to deal with XML documents in the same way you use plain Python objects.

Under the hood it does incremental parsing using SAX instead of DOM to reduce memory usage when the document is larger than a hundred megabytes.

See also:

Module `libearth.schema` Declarative schema for pulling DOM parser of XML

### 4.2.2 Read-time merge

Earth Reader data can be shared by multiple installations e.g. desktop apps, mobile apps, web apps. So there must be simultaneous updates between them that could conflict. An important constraint we have is synchronization isn't done by Earth Reader. We can't lock files nor do atomic operations on them.

Our solution to this is read-time merge. All data are not shared between installations at least in filesystem level. They have isolated files for the same entities, and libearth merges all of them when it's loaded into memory. Merged result doesn't affect to all replicas but only a replica that corresponds to the installation. You can understand the approach similar to DVCS (although there are actually many differences): installations are branches, and updates from others can be pulled to mine. If there are simultaneous changes, these are merged and then committed to mine. If there's no change for me, simply pull changes from others without merge. A big difference is that there's no push. You can only do pull others, or wait others to pull yours. It's because the most of existing synchronization utilities like Dropbox passively works in background. Moreover there could be offline.

### 4.2.3 Repository

`Repository` abstracts storage backend e.g. filesystem. There might be platforms that have no chance to directly access file system e.g. iOS, and in that case the concept of repository makes you to store data directly to Dropbox or Google Drive instead of filesystem. However in the most cases we will simply use `FilesystemRepository` even if data are synchronized using Dropbox or `rsync`.

See also:

Module `libearth.repository` Repositories

### 4.2.4 Session

`Session` abstracts installations. Every installation has its own session identifier. To be more exact it purposes to distinguish processes, hence every process has its unique identifier even if they are child processes of the same installation e.g. prefork workers.

Every session makes its own file for a document, for example, if there are two sessions identified *a* and *b*, two files for a document e.g. `doc.xml` will be made `doc.a.xml` and `doc.b.xml` respectively.



For each change a session merges all changes from other sessions when a document is being loaded (read-time merge).

**See also:**

Module `libearth.session` Isolate data from other installations

## 4.2.5 Stage

*Stage* is a unit of changes i.e. an atomic changes to be merged. It provides transactions for multi threaded environment. If there are simultaneous changes from other sessions or other transactions, these are automatically merged when the currently ongoing transaction is committed.

Stage also provides *Route*, a convenient interface to access documents. For example, you can read the subscription list by `stage.subscriptions`, and write it by `stage.subscriptions = new_subscriptions`. In the similar way you can read a feed by `stage.feeds[feed_id]`, and write it by `stage.feeds[feed_id] = new_feed`.

**See also:**

Module `libearth.stage` Staging updates and transactions

## 4.3 How to contribute

### 4.3.1 License agreement

All contributed codes have to be free software licensed under the terms of the [GNU General Public License Version 2](#) or any later version. We treat all pull requests imply agreement of it, but if a significant amount of code is involved, it is safest to mention in the pull request comments that you agree to let the patch be used under the GNU General Public License Version 2 or any later version as part of the libearth code.

### 4.3.2 Coding style

- Follow [PEP 8](#) except you can limit all lines to a maximum of 80 characters (not 79).
- Order `imports` in lexicographical order.
- Prefer relative `imports`.
- All functions, classes, methods, attributes, and modules should have the docstring.

### 4.3.3 Tests

- All code patches should contain one or more unit tests of the feature to add or regression tests of the bug to fix.
- Run the whole test suite on every Python VM using `tox` (except for IronPython).
- For IronPython use `ipy-test.sh` script.
- All commits will be tested by [Travis CI](#).

## Parser test suite

To make feed parser robust we have the parser test suite. The suite is in `tests/parsing/`, and consists of various real world feed XML files, and the expected parsing results of them. Each test case consists of two or three files:

**\$TEST\_NAME.xml (parser input)** An actual feed XML which get from the original url. Its format could be one of formats supported by parser.

**\$TEST\_NAME.out.xml** A serialized XML of the parsed result `Feed` object. Its format is Atom extended for libearth.

**\$TEST\_NAME.uri.txt (optional original url)** The original url of the parser input.

The whole parser test suite is run together when the unit tests runs. In order to run *only* parser test suite without any other unit tests filter tests by `parser_test`:

```
$ py.test -k parser_test
$ # or
$ tox -- -k parser_test
```

## Adding a new parser test

If you find a real world feed that libearth parser doesn't work, and you want to fix it, what you should do first is to add a new test case to the parser test suite.

Suppose the feed is `http://example.com/feed.xml`. You can download it using `curl` or `wget`. Name it an unique test suite name. We recommend to use the website name. Use `example` here.

```
$ curl -o tests/parsing/example.xml http://example.com/feed.xml
```

You also need to provide its original url.

```
$ echo http://example.com/feed.xml > tests/parsing/example.uri.txt
```

Lastly you also need to provide the expected parsing result. Building the expected XML tree is less likley to get by hand. You can create an initial skeleton using `tests/parsing_test.py` script.

```
$ python tests/parsing_test.py
There are 1 XML files that have no paired .out.xml files:
    example.xml
Do you want to create scaffold .out.xml files? y
```

## 4.4 Libearth Changelog

### 4.4.1 Version 0.4.0

To be released.

- Python 3.2 is no more supported since even pip 8.0.0 also dropped their support for Python 3.2.
- Parsing RSS 1.0 feed is available. [[issue #57](#)]
- Refactoring *parser* package. [[issue #54](#)]
  - Every single element parser can be specified using *ParserBase* and its decorator. When calling root element parser, the children elements are also parsed in hierarchical order.
  - Basic parsing information is stored in *SessionBase* and passed from parent parser to children parsers.

- Added `get_element_id()`. It returns the string consists of an XML namespace and an element tag that `xml.etree.ElementTree` can recognize when finding children elements.
- Support atom feed that `Text` with `xhtml` type.
- Introduced new `libearth.defaults` module. This module provides small utilities and default data to fill initial state of Earth Reader apps.
- HTML sanitizer now does rebase all links in the given document on the base uri. The `get_sanitized_html()` method was added to `Text` type. The `sanitize_html()` function became to additionally require `base_uri` parameter.
- Added `get_default_name()` for default session name.

### 4.4.2 Version 0.3.3

Released on November 6, 2014.

- Fixed a bug that `complete()` never terminates for documents `read()` from a single chunk.

### 4.4.3 Version 0.3.2

Released on November 5, 2014.

- Fixed a bug that `SubscriptionLists` having `Outlines` without their `created_at` attribute failed to be merged on Python 3. [issue #65]
- Fixed a bug that a `DocumentElement` in streamed read mode is not properly marked as complete even when it's completed by `complete()` function in some cases.

### 4.4.4 Version 0.3.1

Released on July 20, 2014.

- Fixed two backward compatibility breakages:
  - A bug that subcategory changes hadn't been detected when `SubscriptionLists` are merged.
  - A bug that all children outlines become wiped when a category is deleted.

### 4.4.5 Version 0.3.0

Released on July 12, 2014.

- Root `MergeableDocumentElements`' `__merge_entities__()` methods are not ignored anymore. Responsibility to merge two documents is now moved from `Session.merge()` method to `MergeableDocumentElement.__merge_entities__()` method.
- `crawl()` now return a set of `CrawlResult` objects instead of tuples.
- `feeds` parameter of `crawl()` function was renamed to `feed_urls`.
- Added `feed_uri` parameter and corresponding `feed_uri` attribute to `CrawlError` exception.
- Timeout option was added to crawler.
  - Added optional `timeout` parameter to `crawl()`.
  - Added optional `timeout` parameter to `get_feed()`.

- Added `DEFAULT_TIMEOUT` constant which is 10 seconds.
- Added `LinkList.favicon` property. [issue #49]
- `Link.relation` attribute which had been optional now becomes required
- `AutoDiscovery.find_feed_url()` method (that returned feed links) was gone. Instead `AutoDiscovery.find()` method (that returns a pair of feed links and favicon links) was introduced. [issue #49]
- `Subscription.icon_uri` attribute was introduced. [issue #49]
- Added an optional `icon_uri` parameter to `SubscriptionSet.subscribe()` method. [issue #49]
- Added `normalize_xml_encoding()` function to workaround `xml.etree.ElementTree` module's encoding detection bug. [issue #41]
- Added `guess_tzinfo_by_locale()` function. [issue #41]
- Added microseconds option to `Rfc822` codec.
- Fixed incorrect merge of subscription/category deletion.
  - Subscriptions are now archived rather than deleted.
  - `Outline` (which is a common superclass of `Subscription` and `Category`) now has `deleted_at` attribute and `deleted` property.
- Fixed several `rss2` parser bugs.
  - Now the parser accepts several malformed `<pubDate>` and `<lastBuildDate>` elements.
  - It become to guess the time zone according to its `<language>` and the ccTLD (if applicable) when the date time doesn't give any explicit time zone (which is also malformed). [issue #41]
  - It had ignored `<category>` elements other than the last one, now it become to accept as many as there are.
  - It had ignored `<comments>` links at all, now these become to be parsed to `Link` objects with `relation='discussion'`.
  - Some RSS 2 feeds put a URI into `<generator>`, so the parser now treat it as `uri` rather than `value` for such situation.
  - `<enclosure>` links had been parsed as `Link` object *without* `relation` attribute, but it becomes to properly set the attribute to `'enclosure'`.
  - Mixed `<link>` elements with Atom namespace also becomes to be parsed well.
- Fixed several `atom` parser bugs.
  - Now it accepts obsolete PURL Atom namespace.
  - Since some broken Atom feeds (e.g. Naver Blog) provide date time as **RFC 822** format which is incorrect according to **RFC 4287#section-3.3** (section 3.3), the parser becomes to accept **RFC 822** format as well.
  - Some broken Atom feeds (e.g. Naver Blog) use `<modified>` which is not standard instead of `<updated>` which is standard, so the parser now treats `<modified>` equivalent to `<updated>`.
  - `<content>` and `<summary>` can has `text/plain` and `text/html` in addition to `text` and `html`.
  - `<author>/<contributor>` becomes ignored if it hasn't any of `<name>`, `<uri>`, or `<email>`.
  - Fixed a parser bug that hadn't interpret omission of `link[rel]` attribute as `'alternate'`.
- Fixed the parser to work well even if there's any file separator characters (FS, `'\x1c'`).

### 4.4.6 Version 0.2.1

Released on July 12, 2014.

- Fixed `rss2` parsing error when any empty element occurs.
- Fixed a bug that `validate()` function errored when any subelement has `Text` descriptor.

### 4.4.7 Version 0.2.0

Released on April 22, 2014.

- Session files in `.sessions/` directory become to be touched only once at a transaction. [issue #43]
- Added `SubscriptionSet.contains()` method which provides `recursively=True` option. It's useful for determining that a subcategory or subscription is in the whole tree.
- `Attribute.default` option becomes to accept only callable objects. Below 0.2.0, `default` is not a function but a value which is simply used as it is.
- `libearth.parser.heuristic` module is gone; and `get_format()` function in the module is moved to `libearth.parser.autodiscovery` module: `get_format()`.
- Added `Link.html` property.
- Added `LinkList.permalink` property.
- Fixed a `FileSystemRepository` bug that conflicts reading buffer and emits broken mixed bytes when there are simultaneous readings and writings to the same key.
- Fixed broken functions related to repository urls on Windows.
- Fixed `libearth.compat.parallel.cpu_count()` function not to raise `NotImplementedError` in some cases.
- Fixed `Rfc822` to properly work also on non-English locales e.g. `ko_KR`.

### 4.4.8 Version 0.1.2

Released on January 19, 2014.

- XML elements in data files are written in canonical order. For example, `<title>` element of the feed was at the back before, but now is in front.
- `write()` becomes to store length hints of children that is multiple, and `read()` becomes aware of the hints. When hints are read `len()` for the `ElementList` is `O(1)`.
- Fixed a bug that `autodiscovery` raises `AttributeError` when the given HTML contains `<link>` to both `application/atom+xml` and `application/rss+xml`. [issue #40]
- Fill `<title>` to `<description>` if there's no `<title>` (`rss2`).
- Fill `<id>` to the feed URL if there's no `<id>` (`atom`).

### 4.4.9 Version 0.1.1

Released on January 2, 2014.

- Added a workaround for thread unsafety `time.strftime()` on CPython. See <http://bugs.python.org/issue7980> as well. [issue #32]

- Fixed `UnicodeDecodeError` which is raised when a feed title contains any non-ASCII characters. [issue #34 by Jae-Myoung Yu]
- Now `libearth.parser.rss2` fills `Entry.updated_at` if it's not given. [issue #35]
- Fixed `TypeError` which is raised when any `DocumentElement` with multiple `Child` elements is passed to `validate()` function.
- Fixed the race condition of two `FileSystemRepository` objects creating the same directory. [issue #36 by klutzy]
- `parallel_map()` becomes to raise exceptions at the last, if any errored. [issue #38]

#### 4.4.10 Version 0.1.0

Released on December 13, 2013. Initial alpha version.

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### Open source

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Libearth is an open source software written by [Hong Minhee](#) and the [Earth Reader team](#). See also the complete list of [contributors](#) as well. Libearth is free software licensed under the terms of the [GNU General Public License Version 2](#) or any later version, and you can find the code at [GitHub repository](#):

```
$ git clone git://github.com/earthreader/libearth.git
```

If you find any bugs, please report them to our [issue tracker](#). Pull requests are always welcome!

We discuss about libearth's development on IRC. Come [#earthreader](#) channel on [Ozinger](#) network. (We will make one on freenode as well soon!)





I

libearth, 7  
libearth.codecs, 7  
libearth.compat, 8  
libearth.compat.clrxmlreader, 9  
libearth.compat.etree, 8  
libearth.compat.parallel, 9  
libearth.compat.xmlpullreader, 10  
libearth.crawler, 11  
libearth.defaults, 12  
libearth.feed, 12  
libearth.parser, 18  
libearth.parser.atom, 18  
libearth.parser.autodiscovery, 19  
libearth.parser.base, 20  
libearth.parser.rss1, 20  
libearth.parser.rss2, 21  
libearth.parser.rss\_base, 21  
libearth.parser.util, 22  
libearth.repository, 22  
libearth.sanitizer, 25  
libearth.schema, 26  
libearth.session, 38  
libearth.stage, 41  
libearth.subscribe, 45  
libearth.tz, 48  
libearth.version, 49



## Symbols

`__coerce_from__()` (libearth.schema.Element class method), 33  
`__entity_id__()` (libearth.schema.Element method), 34  
`__merge_entities__()` (libearth.schema.Element method), 34  
`__tag__` (libearth.schema.DocumentElement attribute), 33  
`__xmlns__` (libearth.schema.DocumentElement attribute), 33

## A

`add_as_subscription()` (libearth.crawler.CrawlResult method), 11  
`alternate_uri` (libearth.subscribe.Subscription attribute), 47  
`ATOM_TYPE` (in module libearth.parser.autodiscovery), 19  
`ATOM_XMLNS` (in module libearth.feed), 13  
`ATOM_XMLNS_SET` (in module libearth.parser.atom), 18  
`AtomSession` (class in libearth.parser.atom), 18  
`Attribute` (class in libearth.schema), 26  
`authors` (libearth.feed.Metadata attribute), 16  
`AutoDiscovery` (class in libearth.parser.autodiscovery), 19  
`autodiscovery()` (in module libearth.parser.autodiscovery), 19

## B

`BaseStage` (class in libearth.stage), 42  
`binary()` (in module libearth.compat), 8  
`binary_type` (in module libearth.compat), 8  
`BlogrollLinkParser` (class in libearth.defaults), 12  
`Body` (class in libearth.subscribe), 46  
`Boolean` (class in libearth.codecs), 7  
`byte_size` (libearth.feed.Link attribute), 15

## C

`categories` (libearth.feed.Metadata attribute), 16

`categories` (libearth.subscribe.SubscriptionSet attribute), 48  
`Category` (class in libearth.feed), 13  
`Category` (class in libearth.subscribe), 46  
`Child` (class in libearth.schema), 27  
`children` (libearth.subscribe.Body attribute), 46  
`children` (libearth.subscribe.Category attribute), 46  
`children` (libearth.subscribe.SubscriptionSet attribute), 48  
`clean_html()` (in module libearth.sanitizer), 25  
`close()` (libearth.compat.xmlpullreader.PullReader method), 10  
`Codec` (class in libearth.schema), 28  
`CodecDescriptor` (class in libearth.schema), 28  
`CodecError`, 31  
`CommaSeparatedList` (class in libearth.subscribe), 46  
`compile_format_to_pattern()` (in module libearth.stage), 45  
`complete()` (in module libearth.schema), 35  
`consume_buffer()` (libearth.schema.ElementList method), 34  
`contains()` (libearth.session.RevisionSet method), 39  
`contains()` (libearth.subscribe.SubscriptionSet method), 48  
`Content` (class in libearth.feed), 14  
`Content` (class in libearth.schema), 31  
`content` (libearth.feed.Entry attribute), 14  
`CONTENT_XMLNS` (in module libearth.parser.rss\_base), 21  
`ContentHandler` (class in libearth.schema), 32  
`contributors` (libearth.feed.Metadata attribute), 17  
`copy()` (libearth.session.RevisionSet method), 39  
`cpu_count()` (in module libearth.compat.parallel), 9  
`crawl()` (in module libearth.crawler), 11  
`CrawlError`, 11  
`CrawlResult` (class in libearth.crawler), 11  
`create_parser()` (in module libearth.compat.clrxmlreader), 9  
`created_at` (libearth.subscribe.Outline attribute), 47

## D

`DC_NAMESPACE` (in module libearth.parser.rss1), 21

decode() (libearth.schema.Codec method), 28  
decode() (libearth.schema.CodecDescriptor method), 29  
DecodeError, 32  
decoder() (libearth.schema.CodecDescriptor method), 29  
default (libearth.schema.Attribute attribute), 27  
DEFAULT\_TIMEOUT (in module libearth.crawler), 11  
default\_tz\_info (libearth.parser.rss\_base.RSSSession attribute), 22  
deleted (libearth.subscribe.Outline attribute), 47  
deleted\_at (libearth.subscribe.Outline attribute), 47  
Descriptor (class in libearth.schema), 32  
DescriptorConflictError, 33  
Directory (class in libearth.stage), 43  
DirtyBuffer (class in libearth.stage), 43  
DISALLOWED\_SCHEMES  
    (libearth.sanitizer.HtmlSanitizer attribute), 25  
DISALLOWED\_STYLE\_PATTERN  
    (libearth.sanitizer.HtmlSanitizer attribute), 25  
document\_type (libearth.stage.Route attribute), 45  
DocumentElement (class in libearth.schema), 33  
done (libearth.session.RevisionParserHandler attribute), 39

## E

Element (class in libearth.schema), 33  
element\_list\_for (class in libearth.schema), 35  
element\_ns (libearth.parser.atom.AtomSession attribute), 18  
element\_type (libearth.schema.Child attribute), 28  
ElementList (class in libearth.schema), 34  
email (libearth.feed.Person attribute), 17  
encode() (libearth.schema.Codec method), 28  
encode\_filename() (in module libearth.compat), 8  
EncodeError, 35  
encoder() (libearth.schema.CodecDescriptor method), 30  
end\_element() (libearth.schema.Descriptor method), 32  
ensure\_revision\_pair() (in module libearth.session), 41  
entries (libearth.feed.Feed attribute), 15  
Entry (class in libearth.feed), 14  
EntryList (class in libearth.feed), 14  
Enum (class in libearth.codecs), 7  
exists() (libearth.repository.Repository method), 23

## F

favicon (libearth.feed.LinkList attribute), 16  
Feed (class in libearth.feed), 14  
feed (libearth.crawler.CrawlResult attribute), 11  
feed() (libearth.compat.xmlpullreader.PullReader method), 10  
feed\_id (libearth.subscribe.Subscription attribute), 47  
feed\_uri (libearth.crawler.CrawlError attribute), 11  
feed\_uri (libearth.subscribe.Subscription attribute), 47

feed\_url (libearth.parser.rss\_base.RSSSession attribute), 22  
FeedLink (class in libearth.parser.autodiscovery), 19  
feeds (libearth.stage.Stage attribute), 45  
FeedUrlNotFoundError, 19  
file\_types (in module libearth.compat), 8  
FileIterator (class in libearth.repository), 22  
FileNotFoundError, 22  
FileSystemRepository (class in libearth.repository), 22  
filter\_by\_mimetype() (libearth.feed.LinkList method), 16  
FixedOffset (class in libearth.tz), 48  
flush() (libearth.stage.DirtyBuffer method), 44  
from\_url() (in module libearth.repository), 24  
from\_url() (libearth.repository.Repository class method), 23  
fromstring() (in module libearth.compat.etree), 9  
fromstringlist() (in module libearth.compat.etree), 9

## G

Generator (class in libearth.feed), 15  
generator (libearth.feed.Source attribute), 17  
get\_current\_context\_id() (in module libearth.stage), 45  
get\_current\_transaction() (libearth.stage.BaseStage method), 42  
get\_default\_name() (libearth.session.Session static method), 40  
get\_default\_subscriptions() (in module libearth.defaults), 12  
get\_element\_id() (in module libearth.parser.base), 20  
get\_format() (in module libearth.parser.autodiscovery), 20  
get\_sanitized\_html() (libearth.feed.Text method), 18  
get\_xml\_base() (in module libearth.parser.atom), 18  
guess\_default\_tzinfo() (in module libearth.parser.rss\_base), 22  
guess\_tzinfo\_by\_locale() (in module libearth.tz), 49

## H

Head (class in libearth.subscribe), 46  
hints (libearth.crawler.CrawlResult attribute), 11  
html (libearth.feed.Link attribute), 15  
HtmlSanitizer (class in libearth.sanitizer), 25

## I

icon (libearth.feed.Source attribute), 17  
icon\_uri (libearth.subscribe.Subscription attribute), 47  
icon\_url (libearth.crawler.CrawlResult attribute), 11  
id (libearth.feed.Metadata attribute), 17  
identifier (libearth.session.Session attribute), 40  
IDENTIFIER\_PATTERN (libearth.session.Session attribute), 40  
index\_descriptors() (in module libearth.schema), 36  
inspect\_attributes() (in module libearth.schema), 36  
inspect\_child\_tags() (in module libearth.schema), 36

inspect\_content\_tag() (in module libearth.schema), 36  
 inspect\_xmlns\_set() (in module libearth.schema), 37  
 Integer (class in libearth.codecs), 7  
 IntegrityError, 35  
 interns (libearth.session.Session attribute), 40  
 IRON\_PYTHON (in module libearth.compat), 8  
 is\_partially\_loaded() (in module libearth.schema), 37  
 items() (libearth.session.RevisionSet method), 39  
 IteratorStream (class in libearth.compat.clrxmlreader), 9

## K

key (libearth.repository.RepositoryKeyError attribute), 24  
 key\_pair (libearth.schema.Attribute attribute), 27  
 key\_pair (libearth.schema.Descriptor attribute), 32  
 key\_spec (libearth.stage.Route attribute), 45

## L

label (libearth.feed.Category attribute), 13  
 label (libearth.subscribe.Outline attribute), 47  
 language (libearth.feed.Link attribute), 15  
 libearth (module), 7  
 libearth.codecs (module), 7  
 libearth.compat (module), 8  
 libearth.compat.clrxmlreader (module), 9  
 libearth.compat.etree (module), 8  
 libearth.compat.parallel (module), 9  
 libearth.compat.xmlpullreader (module), 10  
 libearth.crawler (module), 11  
 libearth.defaults (module), 12  
 libearth.feed (module), 12  
 libearth.parser (module), 18  
 libearth.parser.atom (module), 18  
 libearth.parser.autodiscovery (module), 19  
 libearth.parser.base (module), 20  
 libearth.parser.rss1 (module), 20  
 libearth.parser.rss2 (module), 21  
 libearth.parser.rss\_base (module), 21  
 libearth.parser.util (module), 22  
 libearth.repository (module), 22  
 libearth.sanitizer (module), 25  
 libearth.schema (module), 26  
 libearth.session (module), 38  
 libearth.stage (module), 41  
 libearth.subscribe (module), 45  
 libearth.tz (module), 48  
 libearth.version (module), 49  
 Link (class in libearth.feed), 15  
 LinkList (class in libearth.feed), 16  
 links (libearth.feed.Metadata attribute), 17  
 list() (libearth.repository.Repository method), 23  
 logo (libearth.feed.Source attribute), 18

## M

Mark (class in libearth.feed), 16

MARK\_XMLNS (in module libearth.feed), 13  
 marked (libearth.feed.Mark attribute), 16  
 MarkupTagCleaner (class in libearth.sanitizer), 25  
 merge() (libearth.session.RevisionSet method), 39  
 merge() (libearth.session.Session method), 40  
 MergeableDocumentElement (class in libearth.session), 38  
 Metadata (class in libearth.feed), 16  
 mimetype (libearth.feed.Content attribute), 14  
 mimetype (libearth.feed.Link attribute), 15  
 MIMETYPE\_PATTERN (libearth.feed.Content attribute), 14  
 multiple (libearth.schema.Descriptor attribute), 32

## N

name (libearth.feed.Person attribute), 17  
 name (libearth.schema.Attribute attribute), 27  
 normalize\_xml\_encoding() (in module libearth.parser.util), 22  
 NotADirectoryError, 23  
 now() (in module libearth.tz), 49

## O

Outline (class in libearth.subscribe), 46  
 owner (libearth.subscribe.SubscriptionList attribute), 47  
 owner\_email (libearth.subscribe.Head attribute), 46  
 owner\_name (libearth.subscribe.Head attribute), 46  
 owner\_uri (libearth.subscribe.Head attribute), 46

## P

parallel\_map() (in module libearth.compat.parallel), 10  
 parse\_atom() (in module libearth.parser.atom), 18  
 parse\_revision() (in module libearth.session), 41  
 parse\_rss1() (in module libearth.parser.rss1), 21  
 parse\_rss2() (in module libearth.parser.rss2), 21  
 PARSER\_LIST (in module libearth.schema), 26  
 ParserBase (class in libearth.parser.base), 20  
 path (libearth.repository.FileSystemRepository attribute), 23  
 path() (libearth.parser.base.ParserBase method), 20  
 PATTERN (libearth.codecs.Rfc3339 attribute), 7  
 permalink (libearth.feed.LinkList attribute), 16  
 Person (class in libearth.feed), 17  
 prepareParser() (libearth.compat.xmlpullreader.PullReader method), 10  
 published\_at (libearth.feed.Entry attribute), 14  
 pull() (libearth.session.Session method), 41  
 PullReader (class in libearth.compat.xmlpullreader), 10  
 PY3 (in module libearth.compat), 8

## R

read (libearth.feed.Entry attribute), 14  
 read() (in module libearth.schema), 37

`read()` (libearth.repository.Repository method), 24  
`read()` (libearth.schema.Content method), 31  
`read()` (libearth.stage.BaseStage method), 42  
`register_specialized_type()` (libearth.schema.ElementList class method), 34  
`relation` (libearth.feed.Link attribute), 15  
`Repository` (class in libearth.repository), 23  
`repository` (libearth.stage.BaseStage attribute), 42  
`repository` (libearth.stage.DirtyBuffer attribute), 44  
`RepositoryKeyError`, 24  
`required` (libearth.schema.Attribute attribute), 27  
`required` (libearth.schema.Descriptor attribute), 32  
`reset()` (libearth.compat.xmlpullreader.PullReader method), 10  
`revise()` (libearth.session.Session method), 41  
`Revision` (class in libearth.session), 38  
`revision` (libearth.session.RevisionParserHandler attribute), 39  
`RevisionCodec` (class in libearth.session), 39  
`RevisionParserHandler` (class in libearth.session), 39  
`RevisionSet` (class in libearth.session), 39  
`RevisionSetCodec` (class in libearth.session), 40  
`RFC`  
    RFC 3339, 7, 39  
    RFC 4287, 12, 13, 16, 18, 52  
    RFC 4287#section-3.1, 18  
    RFC 4287#section-3.1.1, 18  
    RFC 4287#section-3.1.1.1, 18  
    RFC 4287#section-3.1.1.2, 18  
    RFC 4287#section-3.2, 17  
    RFC 4287#section-3.2.1, 17  
    RFC 4287#section-3.2.2, 17  
    RFC 4287#section-3.2.3, 17  
    RFC 4287#section-3.3, 56  
    RFC 4287#section-4.1.1, 15  
    RFC 4287#section-4.1.2, 14, 15  
    RFC 4287#section-4.1.3, 14  
    RFC 4287#section-4.2.1, 16  
    RFC 4287#section-4.2.10, 14, 17  
    RFC 4287#section-4.2.12, 18  
    RFC 4287#section-4.2.13, 14  
    RFC 4287#section-4.2.14, 17  
    RFC 4287#section-4.2.15, 17  
    RFC 4287#section-4.2.2, 13, 17  
    RFC 4287#section-4.2.2.1, 14  
    RFC 4287#section-4.2.2.2, 13  
    RFC 4287#section-4.2.2.3, 13  
    RFC 4287#section-4.2.3, 17  
    RFC 4287#section-4.2.4, 15, 17  
    RFC 4287#section-4.2.5, 18  
    RFC 4287#section-4.2.6, 17  
    RFC 4287#section-4.2.7, 15, 17  
    RFC 4287#section-4.2.7.1, 16  
    RFC 4287#section-4.2.7.2, 15

    RFC 4287#section-4.2.7.3, 15  
    RFC 4287#section-4.2.7.4, 15  
    RFC 4287#section-4.2.7.5, 15  
    RFC 4287#section-4.2.7.6, 15  
    RFC 4287#section-4.2.8, 18  
    RFC 4287#section-4.2.9, 14  
    RFC 822, 7, 56  
`Rfc3339` (class in libearth.codecs), 7  
`RFC3339_CODEC` (libearth.session.RevisionCodec attribute), 39  
`Rfc822` (class in libearth.codecs), 7  
`rights` (libearth.feed.Metadata attribute), 17  
`Route` (class in libearth.stage), 44  
`RSS1_XMLNS` (in module libearth.parser.rss1), 21  
`RSS_TYPE` (in module libearth.parser.autodiscovery), 19  
`RSSSession` (class in libearth.parser.rss\_base), 22  
  
**S**  
`sanitize_html()` (in module libearth.sanitizer), 25  
`sanitized_html` (libearth.feed.Text attribute), 18  
`SCHEMA_XMLNS` (in module libearth.schema), 26  
`SchemaError`, 35  
`scheme_uri` (libearth.feed.Category attribute), 13  
`SEPARATOR_PATTERN`  
    (libearth.session.RevisionSetCodec attribute), 40  
`Session` (class in libearth.session), 40  
`session` (libearth.session.Revision attribute), 38  
`session` (libearth.stage.BaseStage attribute), 43  
`SESSION_DIRECTORY_KEY`  
    (libearth.stage.BaseStage attribute), 42  
`SESSION_XMLNS` (in module libearth.session), 38  
`SessionBase` (class in libearth.parser.base), 20  
`sessions` (libearth.stage.BaseStage attribute), 43  
`sort_entries()` (libearth.feed.EntryList method), 14  
`sort_key` (libearth.schema.Descriptor attribute), 32  
`sort_reverse` (libearth.schema.Descriptor attribute), 32  
`Source` (class in libearth.feed), 17  
`source` (libearth.feed.Entry attribute), 14  
`source_uri` (libearth.feed.Content attribute), 14  
`specialized_types` (libearth.schema.ElementList attribute), 35  
`Stage` (class in libearth.stage), 45  
`starred` (libearth.feed.Entry attribute), 14  
`start_element()` (libearth.schema.Descriptor method), 32  
`string_type` (in module libearth.compat), 8  
`subscribe()` (libearth.subscribe.SubscriptionSet method), 48  
`Subscription` (class in libearth.subscribe), 47  
`SubscriptionList` (class in libearth.subscribe), 47  
`subscriptions` (libearth.stage.Stage attribute), 45  
`subscriptions` (libearth.subscribe.SubscriptionSet attribute), 48  
`SubscriptionSet` (class in libearth.subscribe), 47

subtitle (libearth.feed.Source attribute), 18  
summary (libearth.feed.Entry attribute), 14

## T

tag (libearth.schema.Descriptor attribute), 33  
term (libearth.feed.Category attribute), 13  
Text (class in libearth.feed), 18  
Text (class in libearth.schema), 35  
text() (in module libearth.compat), 8  
text\_type (in module libearth.compat), 8  
title (libearth.feed.Link attribute), 15  
title (libearth.feed.Metadata attribute), 17  
title (libearth.subscribe.Head attribute), 46  
title (libearth.subscribe.SubscriptionList attribute), 47  
to\_url() (libearth.repository.Repository method), 24  
tostring() (in module libearth.compat.etree), 9  
touch() (libearth.stage.BaseStage method), 43  
TransactionError, 45  
transactions (libearth.stage.BaseStage attribute), 43  
TreeBuilder (class in libearth.compat.clrxmlreader), 9  
type (libearth.feed.Text attribute), 18  
type (libearth.parser.autodiscovery.FeedLink attribute), 19  
type (libearth.subscribe.Outline attribute), 47  
TYPE\_MIMETYPE\_MAP (libearth.feed.Content attribute), 14  
TYPE\_TABLE (in module libearth.parser.autodiscovery), 19

## U

UNICODE\_BY\_DEFAULT (in module libearth.compat), 8  
updated\_at (libearth.feed.Mark attribute), 16  
updated\_at (libearth.feed.Metadata attribute), 17  
updated\_at (libearth.session.Revision attribute), 39  
uri (libearth.feed.Generator attribute), 15  
uri (libearth.feed.Link attribute), 15  
uri (libearth.feed.Person attribute), 17  
url (libearth.crawler.CrawlResult attribute), 11  
url (libearth.parser.autodiscovery.FeedLink attribute), 19  
Utc (class in libearth.tz), 49  
utc (in module libearth.tz), 48

## V

validate() (in module libearth.schema), 37  
value (libearth.feed.Generator attribute), 15  
value (libearth.feed.Text attribute), 18  
VERSION (in module libearth.version), 49  
version (libearth.feed.Generator attribute), 15  
version (libearth.subscribe.SubscriptionList attribute), 47  
VERSION\_INFO (in module libearth.version), 49

## W

write (class in libearth.schema), 38

write() (libearth.repository.Repository method), 24  
write() (libearth.stage.BaseStage method), 43

## X

xml\_base (libearth.parser.atom.AtomSession attribute), 18  
XML\_XMLNS (in module libearth.parser.atom), 18  
xmlns (libearth.schema.Attribute attribute), 27  
xmlns (libearth.schema.Descriptor attribute), 33  
XMLNS\_XMLNS (in module libearth.compat.clrxmlreader), 9  
XmlReader (class in libearth.compat.clrxmlreader), 9  
xrange (class in libearth.compat), 8