Scrapy Documentation

Release 0.9

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Contents

This documentation contains everything you need to know about Scrapy.

CHAPTER 1

Getting help

Having trouble? We'd like to help!

- Try the FAQ – it's got answers to some common questions.
- Looking for specific information? Try the genindex or modindex.
- Search for information in the archives of the scrapy-users mailing list, or post a question.
- Ask a question in the #scrapy IRC channel.
- Report bugs with Scrapy in our ticket tracker.

CHAPTER 2

First steps

2.1 Scrapy at a glance

Scrapy a is an application framework for crawling web sites and extracting structured data which can be used for a wide range of useful applications, like data mining, information processing or historical archival.

Even though Scrapy was originally designed for screen scraping (more precisely, web scraping), it can also be used to extract data using APIs (such as Amazon Associates Web Services) or as a general purpose web crawler.

The purpose of this document is to introduce you to the concepts behind Scrapy so you can get an idea of how it works and decide if Scrapy is what you need.

When you're ready to start a project, you can *start with the tutorial*.

2.1.1 Pick a website

So you need to extract some information from a website, but the website doesn't provide any API or mechanism to access that info from a computer program. Scrapy can help you extract that information. Let's say we want to extract information about all torrent files added today in the mininova torrent site.

The list of all torrents added today can be found in this page:

> http://www.mininova.org/today

2.1.2 Write a Spider to extract the Items

Now we'll write a Spider which defines the start URL (http://www.mininova.org/today), the rules for following links and the rules for extracting the data from pages.

If we take a look at that page content we'll see that all torrent URLs are like http://www.mininova.org/tor/NUMBER where `NUMBER` is an integer. We'll use that to construct the regular expression for the links to follow: `/tor/\d+`.

For extracting data we'll use XPath to select the part of the document where the data is to be extracted. Let's take one of those torrent pages:

> http://www.mininova.org/tor/2657665

And look at the page HTML source to construct the XPath to select the data we want to extract which is: torrent name, description and size.

By looking at the page HTML source we can see that the file name is contained inside a `<h1>` tag:

```
<h1>Home[2009][Eng]XviD-ovd</h1>
```

An XPath expression to extract the name could be:

```
//h1/text()
```

And the description is contained inside a `<div>` tag with `id="description"`:

```
<h2>Description:</h2>

<div id="description">
"HOME" - a documentary film by Yann Arthus-Bertrand
<br/>
<br/>
***
<br/>
<br/>
"We are living in exceptional times. Scientists tell us that we have 10 years to change the way we li

...
```

An XPath expression to select the description could be:

```
//div[@id='description']
```

Finally, the file size is contained in the second `<p>` tag inside the `<div>` tag with `id=specifications`:

```
<div id="specifications">

<p>
<strong>Category:</strong>
<a href="/cat/4">Movies</a> &gt; <a href="/sub/35">Documentary</a>
</p>

<p>
<strong>Total size:</strong>
699.79 megabyte</p>
```

An XPath expression to select the description could be:

```
//div[@id='specifications']/p[2]/text()[2]
```

For more information about XPath see the XPath reference.

Finally, here's the spider code:

```
class MininovaSpider(CrawlSpider):

    name = 'mininova.org'
    allowed_domains = ['mininova.org']
    start_urls = ['http://www.mininova.org/today']
    rules = [Rule(SgmlLinkExtractor(allow=['/tor/\d+']), 'parse_torrent')]

    def parse_torrent(self, response):
        x = HtmlXPathSelector(response)

        torrent = TorrentItem()
        torrent['url'] = response.url
        torrent['name'] = x.select("//h1/text()").extract()
        torrent['description'] = x.select("//div[@id='description']").extract()
```

```
        torrent['size'] = x.select("//div[@id='info-left']/p[2]/text()[2]").extract()
        return torrent
```

For brevity sake, we intentionally left out the import statements and the Torrent class definition (which is included some paragraphs above).

2.1.3 Write a pipeline to store the items extracted

Now let's write an *Item Pipeline* that serializes and stores the extracted item into a file using pickle:

```
import pickle

class StoreItemPipeline(object):
    def process_item(self, spider, item):
        torrent_id = item['url'].split('/')[-1]
        f = open("torrent-%s.pickle" % torrent_id, "w")
        pickle.dump(item, f)
        f.close()
```

2.1.4 What else?

You've seen how to extract and store items from a website using Scrapy, but this is just the surface. Scrapy provides a lot of powerful features for making scraping easy and efficient, such as:

- Built-in support for *selecting and extracting* data from HTML and XML sources
- Built-in support for *exporting data* in multiple formats, including XML, CSV and JSON
- A media pipeline for *automatically downloading images* (or any other media) associated with the scraped items
- Support for *extending Scrapy* by plugging your own functionality using middlewares, extensions, and pipelines
- Wide range of built-in middlewares and extensions for handling of compression, cache, cookies, authentication, user-agent spoofing, robots.txt handling, statistics, crawl depth restriction, etc
- An *Interactive scraping shell console*, very useful for writing and debugging your spiders
- A builtin *Web service* for monitoring and controlling your bot
- A *Telnet console* for full unrestricted access to a Python console inside your Scrapy process, to introspect and debug your crawler
- Built-in facilities for *logging*, *collecting stats*, and *sending email notifications*

2.1.5 What's next?

The next obvious steps are for you to download Scrapy, read *the tutorial* and join the community. Thanks for your interest!

2.2 Installation guide

This document describes how to install Scrapy in Linux, Windows and Mac OS X systems and it consists on the following 3 steps:

- *Step 1. Install Python*

2.2.1 Requirements

- Python 2.5 or 2.6 (3.x is not yet supported)
- Twisted 2.5.0, 8.0 or above (Windows users: you'll need to install Zope.Interface and maybe pywin32 because of this Twisted bug)
- libxml2 (versions prior to 2.6.28 are known to have problems parsing certain malformed HTML, and have also been reported to contain leaks, so 2.6.28 or above is highly recommended)

Optional:

- pyopenssl (for HTTPS support, highly recommended)
- simplejson (for (de)serializing JSON)

2.2.2 Step 1. Install Python

Scrapy works with Python 2.5 or 2.6, you can get it at http://www.python.org/download/

2.2.3 Step 2. Install required libraries

The procedure for installing the required third party libraries depends on the platform and operating system you use.

Ubuntu/Debian

If you're running Ubuntu/Debian Linux run the following command as root:

```
apt-get install python-twisted python-libxml2
```

To install optional libraries:

```
apt-get install python-pyopenssl python-simplejson
```

Arch Linux

If you are running Arch Linux run the following command as root:

```
pacman -S twisted libxml2
```

To install optional libraries:

```
pacman -S pyopenssl python-simplejson
```

Mac OS X

First, download Twisted for Mac.

Mac OS X ships an `libxml2` version too old to be used by Scrapy. Also, by looking on the web it seems that installing `libxml2` on MacOSX is a bit of a challenge. Here is a way to achieve this, though not acceptable on the long run:

1. Fetch the following libxml2 and libxslt packages:

   ftp://xmlsoft.org/libxml2/libxml2-2.7.3.tar.gz

   ftp://xmlsoft.org/libxml2/libxslt-1.1.24.tar.gz

2. Extract, build and install them both with:

```
./configure --with-python=/Library/Frameworks/Python.framework/Versions/2.5/
make
sudo make install
```

   Replacing `/Library/Frameworks/Python.framework/Version/2.5/` with your current python framework location.

3. Install libxml2 Python bidings with:

```
cd libxml2-2.7.3/python
sudo make install
```

   The libraries and modules should be installed in something like /usr/local/lib/python2.5/site-packages. Add it to your `PYTHONPATH` and you are done.

4. Check the `libxml2` library was installed properly with:

```
python -c 'import libxml2'
```

Windows

Download and install:

1. Twisted for Windows - you may need to install pywin32 because of this Twisted bug
2. Install Zope.Interface (required by Twisted)
3. libxml2 for Windows
4. PyOpenSSL for Windows

2.2.4 Step 3. Install Scrapy

There are three ways to download and install Scrapy:

1. *Installing an official release*
2. *Installing with easy_install*
3. *Installing the development version*

Installing an official release

Download Scrapy from the Download page. Scrapy is distributed in two ways: a source code tarball (for Unix and Mac OS X systems) and a Windows installer (for Windows). If you downloaded the tarball you can install it as any Python package using `setup.py`:

```
tar zxf scrapy-X.X.X.tar.gz
cd scrapy-X.X.X
python setup.py install
```

If you downloaded the Windows installer, just run it.

> **Warning:** In Windows, you may need to add the `C:\Python25\Scripts` (or `C:\Python26\Scripts`) folder to the system path by adding that directory to the `PATH` environment variable from the Control Panel.

Installing with easy_install

You can install Scrapy running easy_install like this:

```
easy_install -U Scrapy
```

Installing the development version

> **Note:** If you use the development version of Scrapy, you should subscribe to the mailing lists to get notified of any changes to the API.

1. Check out the latest development code from the Mercurial repository (you need to install *Mercurial_* first):

```
hg clone http://hg.scrapy.org/scrapy scrapy-trunk
```

2. Add Scrapy to your Python path

   If you're on Linux, Mac or any Unix-like system, you can make a symbolic link to your system `site-packages` directory like this:

```
ln -s /path/to/scrapy-trunk/scrapy SITE-PACKAGES/scrapy
```

   Where `SITE-PACKAGES` is the location of your system `site-packages` directory. To find this out execute the following:

```
python -c "from distutils.sysconfig import get_python_lib; print get_python_lib()"
```

   Alternatively, you can define your `PYTHONPATH` environment variable so that it includes the `scrapy-trunk` directory. This solution also works on Windows systems, which don't support symbolic links. (Environment variables can be defined on Windows systems from the Control Panel).

   Unix-like example:

```
PYTHONPATH=/path/to/scrapy-trunk
```

   Windows example (from command line, but you should probably use the Control Panel):

```
set PYTHONPATH=C:\path\to\scrapy-trunk
```

3. Make the `scrapy-ctl.py` script available

   On Unix-like systems, create a symbolic link to the file `scrapy-trunk/bin/scrapy-ctl.py` in a directory on your system path, such as `/usr/local/bin`. For example:

```
ln -s `pwd`/scrapy-trunk/bin/scrapy-ctl.py /usr/local/bin
```

   This simply lets you type `scrapy-ctl.py` from within any directory, rather than having to qualify the command with the full path to the file.

On Windows systems, the same result can be achieved by copying the file `scrapy-trunk/bin/scrapy-ctl.py` to somewhere on your system path, for example `C:\Python25\Scripts`, which is customary for Python scripts.

2.3 Scrapy Tutorial

In this tutorial, we'll assume that Scrapy is already installed in your system. If that's not the case see *Installation guide*.

We are going to use Open directory project (dmoz) as our example domain to scrape.

This tutorial will walk you through through these tasks:

1. Creating a new Scrapy project
2. Defining the Items you will extract
3. Writing a *spider* to crawl a site and extract *Items*
4. Writing an *Item Pipeline* to store the extracted Items

Scrapy is written in Python. If you're new to the language you might want to start by getting an idea of what the language is like, to get the most out of Scrapy. If you're already familiar with other languages, and want to learn Python quickly, we recommend Dive Into Python. If you're new to programming and want to start with Python, take a look at this list of Python resources for non-programmers.

2.3.1 Creating a project

Before start scraping, you will have set up a new Scrapy project. Enter a directory where you'd like to store your code and then run:

```
python scrapy-ctl.py startproject dmoz
```

This will create a `dmoz` directory with the following contents:

```
dmoz/
    scrapy-ctl.py
    dmoz/
        __init__.py
        items.py
        pipelines.py
        settings.py
        spiders/
            __init__.py
            ...
```

These are basically:

- `scrapy-ctl.py`: the project's control script.
- `dmoz/`: the project's python module, you'll later import your code from here.
- `dmoz/items.py`: the project's items file.
- `dmoz/pipelines.py`: the project's pipelines file.
- `dmoz/settings.py`: the project's settings file.
- `dmoz/spiders/`: a directory where you'll later put your spiders.

2.3.2 Defining our Item

Items are containers that will be loaded with the scraped data, they work like simple python dicts but they offer some additional features like providing default values.

They are declared by creating an *scrapy.item.Item* class an defining its attributes as *scrapy.item.Field* objects, like you will in an ORM (don't worry if you're not familiar with ORM's, you will see that this is an easy task).

We begin by modeling the item that we will use to hold the sites data obtained from dmoz.org, as we want to capture the name, url and description of the sites, we define fields for each of these three attributes. To do that, we edit items.py, found in the dmoz directory. Our Item class looks like:

```
# Define here the models for your scraped items

from scrapy.item import Item, Field

class DmozItem(Item):
    title = Field()
    link = Field()
    desc = Field()
```

This may seem complicated at first, but defining the item allows you to use other handy components of Scrapy that need to know how your item looks like.

2.3.3 Our first Spider

Spiders are user written classes to scrape information from a domain (or group of domains).

They define an initial list of URLs to download, how to follow links, and how to parse the contents of those pages to extract *items*.

To create a Spider, you must subclass *scrapy.spider.BaseSpider*, and define the three main, mandatory, attributes:

- *name*: identifies the Spider. It must be unique, that is, you can't set the same name for different Spiders.
- *start_urls*: is a list of URLs where the Spider will begin to crawl from. So, the first pages downloaded will be those listed here. The subsequent URLs will be generated successively from data contained in the start URLs.
- *parse()* is a method of the spider, which will be called with the downloaded *Response* object of each start URL. The response is passed to the method as the first and only argument.

  This method is responsible for parsing the response data and extracting scraped data (as scraped items) and more URLs to follow.

  The *parse()* method is in charge of processing the response and returning scraped data (as *Item* objects) and more URLs to follow (as *Request* objects).

This is the code for our first Spider, save it in a file named `dmoz_spider.py` under the `dmoz/spiders` directory:

```
from scrapy.spider import BaseSpider

class DmozSpider(BaseSpider):
    name = "dmoz.org"
    allowed_domains = ["dmoz.org"]
    start_urls = [
        "http://www.dmoz.org/Computers/Programming/Languages/Python/Books/",
        "http://www.dmoz.org/Computers/Programming/Languages/Python/Resources/"
    ]
```

```
    def parse(self, response):
        filename = response.url.split("/")[-2]
        open(filename, 'wb').write(response.body)

SPIDER = DmozSpider()
```

Crawling

To put our spider to work, go to the project's top level directory and run:

```
python scrapy-ctl.py crawl dmoz.org
```

The `crawl dmoz.org` command runs the spider for the `dmoz.org` domain. You will get an output similar to this:

```
[-] Log opened.
[dmoz] INFO: Enabled extensions: ...
[dmoz] INFO: Enabled scheduler middlewares: ...
[dmoz] INFO: Enabled downloader middlewares: ...
[dmoz] INFO: Enabled spider middlewares: ...
[dmoz] INFO: Enabled item pipelines: ...
[dmoz.org] INFO: Spider opened
[dmoz.org] DEBUG: Crawled <http://www.dmoz.org/Computers/Programming/Languages/Python/Resources/> fr
[dmoz.org] DEBUG: Crawled <http://www.dmoz.org/Computers/Programming/Languages/Python/Books/> from <N
[dmoz.org] INFO: Spider closed (finished)
[-] Main loop terminated.
```

Pay attention to the lines containing `[dmoz.org]`, which corresponds to our spider (identified by the domain `"dmoz.org"`). You can see a log line for each URL defined in `start_urls`. Because these URLs are the starting ones, they have no referrers, which is shown at the end of the log line, where it says `from <None>`.

But more interesting, as our `parse` method instructs, two files have been created: *Books* and *Resources*, with the content of both URLs.

What just happened under the hood?

Scrapy creates *`scrapy.http.Request`* objects for each URL in the `start_urls` attribute of the Spider, and assigns them the `parse` method of the spider as their callback function.

These Requests are scheduled, then executed, and a *`scrapy.http.Response`* objects are returned and then fed back to the spider, through the *`parse()`* method.

Extracting Items

Introduction to Selectors

There are several ways to extract data from web pages, Scrapy uses a mechanism based on XPath expressions called *XPath selectors*. For more information about selectors and other extraction mechanisms see the *XPath selectors documentation*.

Here are some examples of XPath expressions and their meanings:

- `/html/head/title`: selects the `<title>` element, inside the `<head>` element of a HTML document
- `/html/head/title/text()`: selects the text inside the aforementioned `<title>` element.
- `//td`: selects all the `<td>` elements

- `//div[@class="mine"]`: selects all `div` elements which contain an attribute `class="mine"`

These are just a couple of simple examples of what you can do with XPath, but XPath expression are indeed much more powerful. To learn more about XPath we recommend this XPath tutorial.

For working with XPaths, Scrapy provides a *`XPathSelector`* class, which comes in two flavours, `HtmlXPatSelector` (for HTML data) and *`XmlXPathSelector`* (for XML data). In order to use them you must instantiate the desired class with a *`Response`* object.

You can see selectors as objects that represents nodes in the document structure. So, the first instantiated selectors are associated to the root node, or the entire document.

Selectors have three methods (click on the method to see the complete API documentation).

- `x()`: returns a list of selectors, each of them representing the nodes selected by the xpath expression given as argument.
- ***`extract()`*: returns a unicode string with** the data selected by the XPath selector.
- *`re()`*: returns a list unicode strings extracted by applying the regular expression given as argument.

Trying Selectors in the Shell

To illustrate the use of Selectors we're going to use the built-in *Scrapy shell*, which also requires IPython (an extended Python console) installed on your system.

To start a shell you must go to the project's top level directory and run:

```
python scrapy-ctl.py shell http://www.dmoz.org/Computers/Programming/Languages/Python/Books/
```

This is what the shell looks like:

```
[-] Log opened.
Welcome to Scrapy shell!
Fetching <http://www.dmoz.org/Computers/Programming/Languages/Python/Books/>...

------------------------------------------------------------------------------
Available Scrapy variables:
   xxs: <class 'scrapy.selector.XmlXPathSelector'>
   url: http://www.dmoz.org/Computers/Programming/Languages/Python/Books/
   spider: <class 'dmoz.spiders.dmoz.OpenDirectorySpider'>
   hxs: <class 'scrapy.selector.HtmlXPathSelector'>
   item: <class 'scrapy.item.Item'>
   response: <class 'scrapy.http.response.html.HtmlResponse'>
Available commands:
   get [url]: Fetch a new URL or re-fetch current Request
   shelp: Prints this help.
------------------------------------------------------------------------------
Python 2.6.1 (r261:67515, Dec  7 2008, 08:27:41)
Type "copyright", "credits" or "license" for more information.

IPython 0.9.1 -- An enhanced Interactive Python.
?         -> Introduction and overview of IPython's features.
%quickref -> Quick reference.
help      -> Python's own help system.
object?   -> Details about 'object'. ?object also works, ?? prints more.

In [1]:
```

After the shell loads, you will have the response fetched in a local `response` variable, so if you type `response.body` you will see the body of the response, or you can `response.headers` to see its headers.

The shell also instantiates two selectors, one for HTML (in the `hxs` variable) and one for XML (in the `xxs` variable)with this response. So let's try them:

```
In [1]: hxs.select('/html/head/title')
Out[1]: [<HtmlXPathSelector (title) xpath=/html/head/title>]

In [2]: hxs.select('/html/head/title').extract()
Out[2]: [u'<title>Open Directory - Computers: Programming: Languages: Python: Books</title>']

In [3]: hxs.select('/html/head/title/text()')
Out[3]: [<HtmlXPathSelector (text) xpath=/html/head/title/text()>]

In [4]: hxs.select('/html/head/title/text()').extract()
Out[4]: [u'Open Directory - Computers: Programming: Languages: Python: Books']

In [5]: hxs.select('/html/head/title/text()').re('(\w+):')
Out[5]: [u'Computers', u'Programming', u'Languages', u'Python']
```

Extracting the data

Now, let's try to extract some real information from those pages.

You could type `response.body` in the console, and inspect the source code to figure out the XPaths you need to use. However, inspecting the raw HTML code there could become a very tedious task. To make this an easier task, you can use some Firefox extensions like Firebug. For more information see *Using Firebug for scraping* and *Using Firefox for scraping*.

After inspecting the page source you'll find that the web sites information is inside a `<ul>` element, in fact the *second* `<ul>` element.

So we can select each `<li>` element belonging to the sites list with this code:

```
hxs.select('//ul[2]/li')
```

And from them, the sites descriptions:

```
hxs.select('//ul[2]/li/text()').extract()
```

The sites titles:

```
hxs.select('//ul[2]/li/a/text()').extract()
```

And the sites links:

```
hxs.select('//ul[2]/li/a/@href').extract()
```

As we said before, each `select()` call returns a list of selectors, so we can concatenate further `select()` calls to dig deeper into a node. We are going to use that property here, so:

```
sites = hxs.select('//ul[2]/li')
for site in sites:
    title = site.select('a/text()').extract()
    link = site.select('a/@href').extract()
    desc = site.select('text()').extract()
    print title, link, desc
```

Note: For a more detailed description of using nested selectors see *Nesting selectors* and *Working with relative XPaths* in *XPath Selectors* documentation

Let's add this code to our spider:

```
from scrapy.spider import BaseSpider
from scrapy.selector import HtmlXPathSelector

class DmozSpider(BaseSpider):
    name = "dmoz.org"
    allowed_domains = ["dmoz.org"]
    start_urls = [
        "http://www.dmoz.org/Computers/Programming/Languages/Python/Books/",
        "http://www.dmoz.org/Computers/Programming/Languages/Python/Resources/"
    ]

    def parse(self, response):
        hxs = HtmlXPathSelector(response)
        sites = hxs.select('//ul[2]/li')
        for site in sites:
            title = site.select('a/text()').extract()
            link = site.select('a/@href').extract()
            desc = site.select('text()').extract()
            print title, link, desc

SPIDER = DmozSpider()
```

Now try crawling the dmoz.org domain again and you'll see sites being printed in your output, run:

```
python scrapy-ctl.py crawl dmoz.org
```

Using our item

Item objects are custom python dict, you can access the values oftheir fields (attributes of the class we defined earlier) using the standard dict syntax like:

```
>>> item = DmozItem()
>>> item['title'] = 'Example title'
>>> item['title']
'Example title'
```

Spiders are expected to return their scraped data inside *Item* objects, so to actually return the data we've scraped so far, the code for our Spider should be like this:

```
from scrapy.spider import BaseSpider
from scrapy.selector import HtmlXPathSelector

from dmoz.items import DmozItem

class DmozSpider(BaseSpider):
    name = "dmoz.org"
    allowed_domains = ["dmoz.org"]
    start_urls = [
        "http://www.dmoz.org/Computers/Programming/Languages/Python/Books/",
        "http://www.dmoz.org/Computers/Programming/Languages/Python/Resources/"
    ]
```

```
    def parse(self, response):
        hxs = HtmlXPathSelector(response)
        sites = hxs.select('//ul[2]/li')
        items = []
        for site in sites:
            item = DmozItem()
            item['title'] = site.select('a/text()').extract()
            item['link'] = site.select('a/@href').extract()
            item['desc'] = site.select('text()').extract()
            items.append(item)
        return items

SPIDER = DmozSpider()
```

Now doing a crawl on the dmoz.org domain yields `DmozItem`'s:

```
[dmoz.org] DEBUG: Scraped DmozItem(desc=[u' - By David Mertz; Addison Wesley. Book in progress, full
[dmoz.org] DEBUG: Scraped DmozItem(desc=[u' - By Sean McGrath; Prentice Hall PTR, 2000, ISBN 0130211
```

2.3.4 Storing the data (using an Item Pipeline)

After an item has been scraped by a Spider, it is sent to the *Item Pipeline*.

The Item Pipeline is a group of user written Python classes that implement a simple method. They receive an Item and perform an action over it (for example: validation, checking for duplicates, or storing it in a database), and then decide if the Item continues through the Pipeline or it's dropped and no longer processed.

In small projects (like the one on this tutorial) we will use only one Item Pipeline that just stores our Items.

As with Items, a Pipeline placeholder has been set up for you in the project creation step, it's in `dmoz/pipelines.py` and looks like this:

```
# Define your item pipelines here

class DmozPipeline(object):
    def process_item(self, spider, item):
        return item
```

We have to override the `process_item` method in order to store our Items somewhere.

Here's a simple pipeline for storing the scraped items into a CSV (comma separated values) file using the standard library csv module:

```
import csv

class CsvWriterPipeline(object):

    def __init__(self):
        self.csvwriter = csv.writer(open('items.csv', 'wb'))

    def process_item(self, spider, item):
        self.csvwriter.writerow([item['title'][0], item['link'][0], item['desc'][0]])
        return item
```

Don't forget to enable the pipeline by adding it to the *ITEM_PIPELINES* setting in your settings.py, like this:

```
ITEM_PIPELINES = ['dmoz.pipelines.CsvWriterPipeline']
```

2.3.5 Finale

This tutorial covers only the basics of Scrapy, but there's a lot of other features not mentioned here. We recommend you continue reading the section *Scrapy 0.9 documentation*.

Scrapy at a glance Understand what Scrapy is and how it can help you.

Installation guide Get Scrapy installed on your computer.

Scrapy Tutorial Write your first Scrapy project.

CHAPTER 3

Scraping basics

3.1 Items

The main goal in scraping is to extract structured data from unstructured sources, typically, web pages. Scrapy provides the *Item* class for this purpose.

Item objects are simple containers used to collect the scraped data. They provide a dictionary-like API with a convenient syntax for declaring their available fields.

3.1.1 Declaring Items

Items are declared using a simple class definition syntax and *Field* objects. Here is an example:

```
from scrapy.item import Item, Field

class Product(Item):
    name = Field()
    price = Field()
    stock = Field(default=0)
    last_updated = Field()
```

Note: Those familiar with Django will notice that Scrapy Items are declared similar to Django Models, except that Scrapy Items are much simpler as there is no concept of different field types.

3.1.2 Item Fields

Field objects are used to specify metadata for each field. For example, the default value for the `stock` field illustrated in the example above.

You can specify any kind of metadata for each field. There is no restriction on the values accepted by *Field* objects. For this same reason, there isn't a reference list of all available metadata keys. Each key defined in *Field* objects could be used by a different components, and only those components know about it. You can also define and use any other *Field* key in your project too, for your own needs. The main goal of *Field* objects is to provide a way to define all field metadata in one place. Typically, those components whose behaviour depends on each field, use certain field keys to configure that behaviour. You must refer to their documentation to see which metadata keys are used by each component.

It's important to note that the *Field* objects used to declare the item do not stay assigned as class attributes. Instead, they can be accesed through the *Item.fields* attribute.

And that's all you need to know about declaring items.

3.1.3 Working with Items

Here are some examples of common tasks performed with items, using the `Product` item *declared above*. You will notice the API is very similar to the dict API.

Creating items

```
>>> product = Product(name='Desktop PC', price=1000)
>>> print product
Product(name='Desktop PC', price=1000)
```

Getting field values

```
>>> product['name']
Desktop PC
>>> product.get('name')
Desktop PC

>>> product['price']
1000

>>> product['stock'] # getting field with default value
0

>>> product['last_updated'] # getting field with no default value
Traceback (most recent call last):
    ...
KeyError: 'last_updated'

>>> product.get('last_updated', 'not set')
not set

>>> product['lala'] # getting unknown field
Traceback (most recent call last):
    ...
KeyError: 'lala'

>>> product.get('lala', 'unknown field')
'unknown field'

>>> 'name' in product  # is name field populated?
True

>>> 'last_updated' in product  # is last_updated populated?
False

>>> 'last_updated' in product.fields  # is last_updated a declared field?
True
```

```
>>> 'lala' in product.fields  # is lala a declared field?
False
```

Setting field values

```
>>> product['last_updated'] = 'today'
>>> product['last_updated']
today

>>> product['lala'] = 'test' # setting unknown field
Traceback (most recent call last):
    ...
KeyError: 'Product does not support field: lala'
```

Accesing all populated values

To access all populated values just use the typical dict API:

```
>>> product.keys()
['price', 'name']

>>> product.items()
[('price', 1000), ('name', 'Desktop PC')]
```

Other common tasks

Copying items:

```
>>> product2 = Product(product)
>>> print product2
Product(name='Desktop PC', price=1000)
```

Creating dicts from items:

```
>>> dict(product) # create a dict from all populated values
{'price': 1000, 'name': 'Desktop PC'}
```

Creating items from dicts:

```
>>> Product({'name': 'Laptop PC', 'price': 1500})
Product(price=1500, name='Laptop PC')

>>> Product({'name': 'Laptop PC', 'lala': 1500}) # warning: unknown field in dict
Traceback (most recent call last):
    ...
KeyError: 'Product does not support field: lala'
```

3.1.4 Default values

The only field metadata key supported by Items themselves is `default`, which specifies the default value to return when trying to access a field which wasn't populated before.

So, for the `Product` item declared above:

```
>>> product = Product()

>>> product['stock'] # field with default value
0

>>> product['name'] # field with no default value
Traceback (most recent call last):
...
KeyError: 'name'

>>> product.get('name') is None
True
```

3.1.5 Extending Items

You can extend Items (to add more fields or to change some metadata for some fields) by declaring a subclass of your original Item.

For example:

```
class DiscountedProduct(Product):
    discount_percent = Field(default=0)
    discount_expiration_date = Field()
```

You can also extend field metadata by using the previous field metadata and appending more values, or changing existing values, like this:

```
class SpecificProduct(Product):
    name = Field(Product.fields['name'], default='product')
```

That adds (or replaces) the `default` metadata key for the `name` field, keeping all the previously existing metadata values.

3.1.6 Item objects

class `scrapy.item.`**`Item`**`(`[*arg*]`)`

Return a new Item optionally initialized from the given argument.

Items replicate the standard dict API, including its constructor. The only additional attribute provided by Items is:

`fields`

A dictionary containing *all declared fields* for this Item, not only those populated. The keys are the field names and the values are the *`Field`* objects used in the *Item declaration*.

3.1.7 Field objects

class `scrapy.item.`**`Field`**`(`[*arg*]`)`

The *`Field`* class is just an alias to the built-in dict class and doesn't provide any extra functionality or attributes. In other words, *`Field`* objects are plain-old Python dicts. A separate class is used to support the *item declaration syntax* based on class attributes.

3.2 Spiders

Spiders are classes which define how a certain site (or domain) will be scraped, including how to crawl the site and how to extract scraped items from their pages. In other words, Spiders are the place where you define the custom behaviour for crawling and parsing pages for a particular site.

For spiders, the scraping cycle goes through something like this:

1. You start by generating the initial Requests to crawl the first URLs, and specify a callback function to be called with the response downloaded from those requests.

   The first requests to perform are obtained by calling the *start_requests()* method which (by default) generates *Request* for the URLs specified in the *start_urls* and the *parse* method as callback function for the Requests.

2. In the callback function you parse the response (web page) and return either *Item* objects, *Request* objects, or an iterable of both. Those Requests will also contain a callback (maybe the same) and will then be followed by downloaded by Scrapy and then their response handled to the specified callback.

3. In callback functions you parse the page contants, typically using *XPath Selectors* (but you can also use BeautifuSoup, lxml or whatever mechanism you prefer) and generate items with the parsed data.

4. Finally the items returned from the spider will be typically persisted in some Item pipeline.

Even though this cycles applies (more or less) to any kind of spider, there are different kind of default spiders bundled into Scrapy for different purposes. We will talk about those types here.

3.2.1 Built-in spiders reference

For the examples used in the following spiders reference we'll assume we have a `TestItem` declared in a `myproject.items` module, in your project:

```
from scrapy.item import Item

class TestItem(Item):
    id = Field()
    name = Field()
    description = Field()
```

BaseSpider

class `scrapy.spider.`**`BaseSpider`**

This is the simplest spider, and the one from which every other spider must inherit from (either the ones that come bundled with Scrapy, or the ones that you write yourself). It doesn't provide any special functionality. It just requests the given `start_urls`/`start_requests`, and calls the spider's method `parse` for each of the resulting responses.

`name`

A string which defines the name for this spider. The spider name is how the spider is located (and instantiated) by Scrapy, so it must be unique. However, nothing prevents you from instantiating more than one instance of the same spider. This is the most important spider attribute and it's required.

Is recommended to name your spiders after the domain that their crawl.

`allowed_domains`

An optional list of strings containing domains that this spider is allowed to crawl. Requests for URLs

not belonging to the domain names specified in this list won't be followed if *OffsiteMiddleware* is enabled.

start_urls
Is a list of URLs where the spider will begin to crawl from, when no particular URLs are specified. So, the first pages downloaded will be those listed here. The subsequent URLs will be generated successively from data contained in the start URLs.

start_requests()
This method must return an iterable with the first Requests to crawl for this spider.

This is the method called by Scrapy when the spider is opened for scraping when no particular URLs are specified. If particular URLs are specified, the *make_requests_from_url()* is used instead to create the Requests. This method is also called only once from Scrapy, so it's safe to implement it as a generator.

The default implementation uses *make_requests_from_url()* to generate Requests for each url in *start_urls*.

If you want to change the Requests used to start scraping a domain, this is the method to override. For example, if you need to start by login in using a POST request, you could do:

```
def start_requests(self):
    return [FormRequest("http://www.example.com/login",
                        formdata={'user': 'john', 'pass': 'secret'},
                        callback=self.logged_in)]

def logged_in(self, response):
    # here you would extract links to follow and return Requests for
    # each of them, with another callback
    pass
```

make_requests_from_url(*url*)
A method that receives a URL and returns a *Request* object (or a list of *Request* objects) to scrape. This method is used to construct the initial requests in the *start_requests()* method, and is typically used to convert urls to requests.

Unless overridden, this method returns Requests with the *parse()* method as their callback function, and with dont_filter parameter enabled (see *Request* class for more info).

parse(*response*)
This is the default callback used by Scrapy to process downloaded responses, when their requests don't specify a callback.

The `parse` method is in charge of processing the response and returning scraped data and/or more URLs to follow. Other Requests callbacks have the same requirements as the *BaseSpider* class.

This method, as well as any other Request callback, must return an iterable of `Item` objects.

Parameters **response** – the response to parse

log(*message*[, *level*, *component*])
Log a message using the *scrapy.log.msg()* function, automatically populating the spider argument with the *name* of this spider. For more information see *Logging*.

BaseSpider example

Let's see an example:

```
from scrapy import log # This module is useful for printing out debug information
from scrapy.spider import BaseSpider

class MySpider(BaseSpider):
    name = 'example.com'
    allowed_domains = ['example.com']
    start_urls = [
        'http://www.example.com/1.html',
        'http://www.example.com/2.html',
        'http://www.example.com/3.html',
    ]

    def parse(self, response):
        self.log('A response from %s just arrived!' % response.url)

SPIDER = MySpider()
```

Another example returning multiples Requests and Items from a single callback:

```
from scrapy.selector import HtmlXPathSelector
from scrapy.spider import BaseSpider
from scrapy.http import Request
from myproject.items import MyItem

class MySpider(BaseSpider):
    name = 'example.com'
    allowed_domains = ['example.com']
    start_urls = [
        'http://www.example.com/1.html',
        'http://www.example.com/2.html',
        'http://www.example.com/3.html',
    ]

    def parse(self, response):
        hxs = HtmlXPathSelector(response)
        for h3 in hxs.select('//h3').extract():
            yield MyItem(title=h3)

        for url in hxs.select('//a/@href').extract():
            yield Request(url, callback=self.parse)

SPIDER = MySpider()
```

CrawlSpider

class scrapy.contrib.spiders.**CrawlSpider**

This is the most commonly used spider for crawling regular websites, as it provides a convenient mechanism for following links by defining a set of rules. It may not be the best suited for your particular web sites or project, but it's generic enough for several cases, so you can start from it and override it as need more custom functionality, or just implement your own spider.

Apart from the attributes inherited from BaseSpider (that you must specify), this class supports a new attribute:

rules

Which is a list of one (or more) *Rule* objects. Each *Rule* defines a certain behaviour for crawling the site. Rules objects are described below .

Crawling rules

class scrapy.contrib.spiders.**Rule**(*link_extractor*, *callback=None*, *cb_kwargs=None*, *follow=None*, *process_links=None*)

link_extractor is a *Link Extractor* object which defines how links will be extracted from each crawled page.

callback is a callable or a string (in which case a method from the spider object with that name will be used) to be called for each link extracted with the specified link_extractor. This callback receives a response as its first argument and must return a list containing *Item* and/or *Request* objects (or any subclass of them).

cb_kwargs is a dict containing the keyword arguments to be passed to the callback function

follow is a boolean which specified if links should be followed from each response extracted with this rule. If callback is None follow defaults to True, otherwise it default to False.

process_links is a callable, or a string (in which case a method from the spider object with that name will be used) which will be called for each list of links extracted from each response using the specified link_extractor. This is mainly used for filtering purposes.

CrawlSpider example

Let's now take a look at an example CrawlSpider with rules:

```
from scrapy.contrib.spiders import CrawlSpider, Rule
from scrapy.contrib.linkextractors.sgml import SgmlLinkExtractor
from scrapy.selector import HtmlXPathSelector
from scrapy.item import Item

class MySpider(CrawlSpider):
    name = 'example.com'
    allowed_domains = ['example.com']
    start_urls = ['http://www.example.com']

    rules = (
        # Extract links matching 'category.php' (but not matching 'subsection.php')
        # and follow links from them (since no callback means follow=True by default).
        Rule(SgmlLinkExtractor(allow=('category\.php', ), deny=('subsection\.php', ))),

        # Extract links matching 'item.php' and parse them with the spider's method parse_item
        Rule(SgmlLinkExtractor(allow=('item\.php', )), callback='parse_item'),
    )

    def parse_item(self, response):
        self.log('Hi, this is an item page! %s' % response.url)

        hxs = HtmlXPathSelector(response)
        item = Item()
        item['id'] = hxs.select('//td[@id="item_id"]/text()').re(r'ID: (\d+)')
        item['name'] = hxs.select('//td[@id="item_name"]/text()').extract()
        item['description'] = hxs.select('//td[@id="item_description"]/text()').extract()
        return item

SPIDER = MySpider()
```

This spider would start crawling example.com's home page, collecting category links, and item links, parsing the latter with the parse_item method. For each item response, some data will be extracted from the HTML using XPath, and a *Item* will be filled with it.

XMLFeedSpider

class scrapy.contrib.spiders.**XMLFeedSpider**

XMLFeedSpider is designed for parsing XML feeds by iterating through them by a certain node name. The iterator can be chosen from: `iternodes`, `xml`, and `html`. It's recommended to use the `iternodes` iterator for performance reasons, since the `xml` and `html` iterators generate the whole DOM at once in order to parse it. However, using `html` as the iterator may be useful when parsing XML with bad markup.

For setting the iterator and the tag name, you must define the following class attributes:

iterator

A string which defines the iterator to use. It can be either:

- `'iternodes'` - a fast iterator based on regular expressions
- `'html'` - an iterator which uses HtmlXPathSelector. Keep in mind this uses DOM parsing and must load all DOM in memory which could be a problem for big feeds
- `'xml'` - an iterator which uses XmlXPathSelector. Keep in mind this uses DOM parsing and must load all DOM in memory which could be a problem for big feeds

It defaults to: `'iternodes'`.

itertag

A string with the name of the node (or element) to iterate in. Example:

```
itertag = 'product'
```

namespaces

A list of `(prefix, uri)` tuples which define the namespaces available in that document that will be processed with this spider. The `prefix` and `uri` will be used to automatically register namespaces using the *register_namespace()* method.

You can then specify nodes with namespaces in the *itertag* attribute.

Example:

```
class YourSpider(XMLFeedSpider):

    namespaces = [('n', 'http://www.sitemaps.org/schemas/sitemap/0.9')]
    itertag = 'n:url'
    # ...
```

Apart from these new attributes, this spider has the following overrideable methods too:

adapt_response(*response*)

A method that receives the response as soon as it arrives from the spider middleware and before start parsing it. It can be used used for modifying the response body before parsing it. This method receives a response and returns response (it could be the same or another one).

parse_node(*response*, *selector*)

This method is called for the nodes matching the provided tag name (`itertag`). Receives the response and an XPathSelector for each node. Overriding this method is mandatory. Otherwise, you spider won't work. This method must return either a *Item* object, a *Request* object, or an iterable containing any of them.

process_results(*response*, *results*)

This method is called for each result (item or request) returned by the spider, and it's intended to perform any last time processing required before returning the results to the framework core, for example setting the item IDs. It receives a list of results and the response which originated that results. It must return a list of results (Items or Requests).""”

XMLFeedSpider example

These spiders are pretty easy to use, let's have at one example:

```
from scrapy import log
from scrapy.contrib.spiders import XMLFeedSpider
from myproject.items import TestItem

class MySpider(XMLFeedSpider):
    name = 'example.com'
    allowed_domains = ['example.com']
    start_urls = ['http://www.example.com/feed.xml']
    iterator = 'iternodes' # This is actually unnecesary, since it's the default value
    itertag = 'item'

    def parse_node(self, response, node):
        log.msg('Hi, this is a <%s> node!: %s' % (self.itertag, ''.join(node.extract())))

        item = Item()
        item['id'] = node.select('@id').extract()
        item['name'] = node.select('name').extract()
        item['description'] = node.select('description').extract()
        return item

SPIDER = MySpider()
```

Basically what we did up there was creating a spider that downloads a feed from the given `start_urls`, and then iterates through each of its `item` tags, prints them out, and stores some random data in an *Item*.

CSVFeedSpider

class `scrapy.contrib.spiders.`**CSVFeedSpider**

This spider is very similar to the XMLFeedSpider, except that it iterates over rows, instead of nodes. The method that gets called in each iteration is *parse_row()*.

delimiter

A string with the separator character for each field in the CSV file Defaults to `','` (comma).

headers

A list of the rows contained in the file CSV feed which will be used for extracting fields from it.

parse_row(*response*, *row*)

Receives a response and a dict (representing each row) with a key for each provided (or detected) header of the CSV file. This spider also gives the opportunity to override `adapt_response` and `process_results` methods for pre and post-processing purposes.

CSVFeedSpider example

Let's see an example similar to the previous one, but using a *CSVFeedSpider*:

```
from scrapy import log
from scrapy.contrib.spiders import CSVFeedSpider
from myproject.items import TestItem

class MySpider(CSVFeedSpider):
    name = 'example.com'
```

```
    allowed_domains = ['example.com']
    start_urls = ['http://www.example.com/feed.csv']
    delimiter = ';'
    headers = ['id', 'name', 'description']

    def parse_row(self, response, row):
        log.msg('Hi, this is a row!: %r' % row)

        item = TestItem()
        item['id'] = row['id']
        item['name'] = row['name']
        item['description'] = row['description']
        return item

SPIDER = MySpider()
```

3.3 Link Extractors

LinkExtractors are objects whose only purpose is to extract links from web pages (*scrapy.http.Response* objects) which will be eventually followed.

There are two Link Extractors available in Scrapy by default, but you create your own custom Link Extractors to suit your needs by implanting a simple interface.

The only public method that every LinkExtractor have is `extract_links`, which receives a *Response* object and returns a list of links. Link Extractors are meant to be instantiated once and their `extract_links` method called several times with different responses, to extract links to follow.

Link extractors are used in the *CrawlSpider* class (available in Scrapy), through a set of rules, but you can also use it in your spiders even if you don't subclass from *CrawlSpider*, as its purpose is very simple: to extract links.

3.3.1 Built-in link extractors reference

All available link extractors classes bundled with Scrapy are provided in the *scrapy.contrib.linkextractors* module.

SgmlLinkExtractor

class scrapy.contrib.linkextractors.sgml.**SgmlLinkExtractor**(*allow=()*, *deny=()*, *allow_domains=()*, *deny_domains=()*, *restrict_xpaths()*, *tags=('a', 'area')*, *attrs=('href')*, *canonicalize=True*, *unique=True*, *process_value=None*)

The SgmlLinkExtractor extends the base *BaseSgmlLinkExtractor* by providing additional filters that you can specify to extract links, including regular expressions patterns that the links must match to be extracted. All those filters are configured through these constructor parameters:

Parameters

- **allow** (*str or list*) – a single regular expression (or list of regular expressions) that the (absolute) urls must match in order to be extracted. If not given (or empty), it will match all links.
- **deny** – a single regular expression (or list of regular expressions) that the (absolute) urls must match in order to be excluded (ie. not extracted). It has precedence over the `allow` parameter. If not given (or empty) it won't exclude any links.
- **allow_domains** – is single value or a list of string containing domains which will be considered for extracting the links
- **deny_domains** – is single value or a list of strings containing domains which which won't be considered for extracting the links
- **restrict_xpaths** (*str or list*) – is a XPath (or list of XPath's) which defines regions inside the response where links should be extracted from. If given, only the text selected by those XPath will be scanned for links. See examples below.
- **tags** (*str or list*) – a tag or a list of tags to consider when extracting links. Defaults to `('a', 'area')`.
- **attrs** (*boolean*) – list of attrbitues which should be considered when looking for links to extract (only for those tags specified in the `tags` parameter). Defaults to `('href',)`
- **canonicalize** (*boolean*) – canonicalize each extracted url (using scrapy.utils.url.canonicalize_url). Defaults to `True`.
- **unique** (*boolean*) – whether duplicate filtering should be applied to extracted links.
- **process_value** (*callable*) – see `process_value` argument of *BaseSgmlLinkExtractor* class constructor

BaseSgmlLinkExtractor

class scrapy.contrib.linkextractors.sgml.**BaseSgmlLinkExtractor**(*tag="a"*, *href="href"*, *unique=False*, *process_value=None*)

The purpose of this Link Extractor is only to serve as a base class for the *SgmlLinkExtractor*. You should use that one instead.

The constructor arguments are:

Parameters

- **tag** (*str or callable*) – either a string (with the name of a tag) or a function that receives a tag name and returns `True` if links should be extracted from those tag, or `False` if they shouldn't. Defaults to `'a'`. request (once its downloaded) as its first parameter. For more information see *Passing arguments to callback functions*.
- **attr** (*str or callable*) – either string (with the name of a tag attribute), or a function that receives a an attribute name and returns `True` if links should be extracted from it, or `False` if the shouldn't. Defaults to `href`.
- **unique** (*boolean*) – is a boolean that specifies if a duplicate filtering should be applied to links extracted.
- **process_value** (*callable*) – a function which receives each value extracted from the tag and attributes scanned and can modify the value and return a new one, or return `None` to ignore the link altogether. If not given, `process_value` defaults to `lambda x: x`.

For example, to extract links from this code:

```
<a href="javascript:goToPage('../other/page.html'); return false">Link text</a>
```

You can use the following function in `process_value`:

```
def process_value(value):
    m = re.search("javascript:goToPage\('(.*?)'", value)
    if m:
        return m.group(1)
```

3.4 XPath Selectors

When you're scraping web pages, the most common task you need to perform is to extract data from the HTML source. There are several libraries available to achieve this:

- BeautifulSoup is a very popular screen scraping library among Python programmers which constructs a Python object based on the structure of the HTML code and also deals with bad markup reasonable well, but it has one drawback: it's slow.
- lxml is a XML parsing library (which also parses HTML) with a pythonic API based on ElementTree (which is not part of the Python standard library).

Scrapy comes with its own mechanism for extracting data. They're called XPath selectors (or just "selectors", for short) because they "select" certain parts of the HTML document specified by XPath expressions.

XPath is a language for selecting nodes in XML documents, which can be used to with HTML.

Both lxml and Scrapy Selectors are built over the libxml2 library, which means they're very similar in speed and parsing accuracy.

This page explains how selectors work and describes their API which is very small and simple, unlike the lxml API which is much bigger because the lxml library can be use for many other tasks, besides selecting markup documents.

For a complete reference of the selectors API see the *XPath selector reference*.

3.4.1 Using selectors

Constructing selectors

There are two types of selectors bundled with Scrapy. Those are:

- *`HtmlXPathSelector`* - for working with HTML documents
- *`XmlXPathSelector`* - for working with XML documents

Both share the same selector API, and are constructed with a Response object as its first parameter. This is the Response they're gonna be "selecting".

Example:

```
hxs = HtmlXPathSelector(response) # a HTML selector
xxs = XmlXPathSelector(response) # a XML selector
```

Using selectors with XPaths

To explain how to use the selectors we'll use the *Scrapy shell* (which provides interactive testing) and an example page located in Scrapy documentation server:

http://doc.scrapy.org/_static/selectors-sample1.html

Here's its HTML code:

```
<html>
 <head>
  <base href='http://example.com/' />
  <title>Example website</title>
 </head>
 <body>
  <div id='images'>
   <a href='image1.html'>Name: My image 1 <br /><img src='image1_thumb.jpg' /></a>
   <a href='image2.html'>Name: My image 2 <br /><img src='image2_thumb.jpg' /></a>
   <a href='image3.html'>Name: My image 3 <br /><img src='image3_thumb.jpg' /></a>
   <a href='image4.html'>Name: My image 4 <br /><img src='image4_thumb.jpg' /></a>
   <a href='image5.html'>Name: My image 5 <br /><img src='image5_thumb.jpg' /></a>
  </div>
 </body>
</html>
```

First, let's open the shell:

```
scrapy-ctl.py shell http://doc.scrapy.org/_static/selectors-sample1.html
```

Then, after the shell loads, you'll have some selectors already instanced and ready to use.

Since we're dealing with HTML we'll be using the *HtmlXPathSelector* object which is found, by default, in the `hxs` shell variable.

So, by looking at the *HTML code* of that page let's construct an XPath (using an HTML selector) for selecting the text inside the title tag:

```
>>> hxs.select('//title/text()')
[<HtmlXPathSelector (text) xpath=//title/text()>]
```

As you can see, the select() method returns a XPathSelectorList, which is a list of new selectors. This API can be used quickly for extracting nested data.

To actually extract the textual data you must call the selector `extract()` method, as follows:

```
>>> hxs.select('//title/text()').extract()
[u'Example website']
```

Now we're going to get the base URL and some image links:

```
>>> hxs.select('//base/@href').extract()
[u'http://example.com/']

>>> hxs.select('//a[contains(@href, "image")]/@href').extract()
[u'image1.html',
 u'image2.html',
 u'image3.html',
 u'image4.html',
 u'image5.html']

>>> hxs.select('//a[contains(@href, "image")]/img/@src').extract()
```

```
[u'image1_thumb.jpg',
 u'image2_thumb.jpg',
 u'image3_thumb.jpg',
 u'image4_thumb.jpg',
 u'image5_thumb.jpg']
```

Using selectors with regular expressions

Selectors also have a `re()` method for extracting data using regular expressions. However, unlike using the `select()` method, the `re()` method does not return a list of *XPathSelector* objects, so you can't construct nested `.re()` calls.

Here's an example used to extract images names from the *HTML code* above:

```
>>> hxs.select('//a[contains(@href, "image")]/text()').re(r'Name:\s*(.*)')
[u'My image 1',
 u'My image 2',
 u'My image 3',
 u'My image 4',
 u'My image 5']
```

Nesting selectors

The `select()` selector method returns a list of selectors, so you can call the `select()` for those selectors too. Here's an example:

```
>>> links = hxs.select('//a[contains(@href, "image")]')
>>> links.extract()
[u'<a href="image1.html">Name: My image 1 <br><img src="image1_thumb.jpg"></a>',
 u'<a href="image2.html">Name: My image 2 <br><img src="image2_thumb.jpg"></a>',
 u'<a href="image3.html">Name: My image 3 <br><img src="image3_thumb.jpg"></a>',
 u'<a href="image4.html">Name: My image 4 <br><img src="image4_thumb.jpg"></a>',
 u'<a href="image5.html">Name: My image 5 <br><img src="image5_thumb.jpg"></a>']

>>> for index, link in enumerate(links):
        args = (index, link.select('@href').extract(), link.select('img/@src').extract())
        print 'Link number %d points to url %s and image %s' % args

Link number 0 points to url [u'image1.html'] and image [u'image1_thumb.jpg']
Link number 1 points to url [u'image2.html'] and image [u'image2_thumb.jpg']
Link number 2 points to url [u'image3.html'] and image [u'image3_thumb.jpg']
Link number 3 points to url [u'image4.html'] and image [u'image4_thumb.jpg']
Link number 4 points to url [u'image5.html'] and image [u'image5_thumb.jpg']
```

Working with relative XPaths

Keep in mind that if you are nesting XPathSelectors and use an XPath that starts with `/`, that XPath will be absolute to the document and not relative to the `XPathSelector` you're calling it from.

For example, suppose you want to extract all `<p>` elements inside `<div>` elements. First you get would get all `<div>` elements:

```
>>> divs = hxs.select('//div')
```

At first, you may be tempted to use the following approach, which is wrong, as it actually extracts all <p> elements from the document, not only those inside elements:

```
>>> for p in divs.select('//p') # this is wrong - gets all <p> from the whole document
>>>     print p.extract()
```

This is the proper way to do it (note the dot prefixing the .//p XPath):

```
>>> for p in divs.select('.//p') # extracts all <p> inside
>>>     print p.extract()
```

Another common case would be to extract all direct <p> children:

```
>>> for p in divs.select('p')
>>>     print p.extract()
```

For more details about relative XPaths see the Location Paths section in the XPath specification.

3.4.2 Built-in XPath Selectors reference

There are two types of selectors bundled with Scrapy: *HtmlXPathSelector* and *XmlXPathSelector*. Both of them implement the same *XPathSelector* interface. The only different is that one is used to process HTML data and the other XML data.

XPathSelector objects

class scrapy.selector.**XPathSelector**(*response*)

A *XPathSelector* object is a wrapper over response to select certain parts of its content.

response is a *Response* object that will be used for selecting and extracting data

select(*xpath*)

Apply the given XPath relative to this XPathSelector and return a list of *XPathSelector* objects (ie. a *XPathSelectorList*) with the result.

xpath is a string containing the XPath to apply

re(*regex*)

Apply the given regex and return a list of unicode strings with the matches.

regex can be either a compiled regular expression or a string which will be compiled to a regular expression using re.compile(regex)

extract()

Return a unicode string with the content of this *XPathSelector* object.

extract_unquoted()

Return a unicode string with the content of this *XPathSelector* without entities or CDATA. This method is intended to be use for text-only selectors, like //h1/text() (but not //h1). If it's used for *XPathSelector* objects which don't select a textual content (ie. if they contain tags), the output of this method is undefined.

register_namespace(*prefix*, *uri*)

Register the given namespace to be used in this *XPathSelector*. Without registering namespaces you can't select or extract data from non-standard namespaces. See examples below.

__nonzero__()

Returns True if there is any real content selected by this *XPathSelector* or False otherwise. In other words, the boolean value of an XPathSelector is given by the contents it selects.

XPathSelectorList objects

class scrapy.selector.**XPathSelectorList**

The *XPathSelectorList* class is subclass of the builtin `list` class, which provides a few additional methods.

select(*xpath*)

Call the *XPathSelector.re()* method for all *XPathSelector* objects in this list and return their results flattened, as new *XPathSelectorList*.

`xpath` is the same argument as the one in `XPathSelector.x()`

XPathSelector.**re**(*regex*)

Call the *XPathSelector.re()* method for all *XPathSelector* objects in this list and return their results flattened, as a list of unicode strings.

`regex` is the same argument as the one in *XPathSelector.re()*

XPathSelector.**extract**()

Call the *XPathSelector.re()* method for all *XPathSelector* objects in this list and return their results flattened, as a list of unicode strings.

XPathSelector.**extract_unquoted**()

Call the `XPathSelector.extract_unoquoted()` method for all *XPathSelector* objects in this list and return their results flattened, as a list of unicode strings. This method should not be applied to all kinds of XPathSelectors. For more info see `XPathSelector.extract_unoquoted()`.

HtmlXPathSelector objects

class scrapy.selector.**HtmlXPathSelector**(*response*)

A subclass of *XPathSelector* for working with HTML content. It uses the libxml2 HTML parser. See the *XPathSelector* API for more info.

HtmlXPathSelector examples

Here's a couple of *HtmlXPathSelector* examples to illustrate several concepts. In all cases we assume there is already a `HtmlPathSelector` instanced with a *Response* object like this:

```
x = HtmlXPathSelector(html_response)
```

1. Select all `<h1>` elements from a HTML response body, returning a list of *XPathSelector* objects (ie. a *XPathSelectorList* object):

```
x.select("//h1")
```

2. Extract the text of all `<h1>` elements from a HTML response body, returning a list of unicode strings:

```
x.select("//h1").extract()         # this includes the h1 tag
x.select("//h1/text()").extract()  # this excludes the h1 tag
```

3. Iterate over all `<p>` tags and print their class attribute:

```
for node in x.select("//p"):
...     print node.select("@href")
```

4. Extract textual data from all `<p>` tags without entities, as a list of unicode strings:

```
    x.select("//p/text()").extract_unquoted()

    # the following line is wrong. extract_unquoted() should only be used
    # with textual XPathSelectors
    x.select("//p").extract_unquoted()  # it may work but output is unpredictable
```

XmlXPathSelector objects

class scrapy.selector.**XmlXPathSelector**(*response*)
A subclass of *XPathSelector* for working with XML content. It uses the libxml2 XML parser. See the *XPathSelector* API for more info.

XmlXPathSelector examples

Here's a couple of *XmlXPathSelector* examples to illustrate several concepts. In all cases we assume there is already a XmlPathSelector instanced with a *Response* object like this:

```
x = HtmlXPathSelector(xml_response)
```

1. Select all <product> elements from a XML response body, returning a list of *XPathSelector* objects (ie. a *XPathSelectorList* object):

```
    x.select("//h1")
```

2. Extract all prices from a Google Base XML feed which requires registering a namespace:

```
    x.register_namespace("g", "http://base.google.com/ns/1.0")
    x.select("//g:price").extract()
```

3.5 Item Loaders

Item Loaders provide a convenient mechanism for populating scraped *Items*. Even though Items can be populated using their own dictionary-like API, the Item Loaders provide a much more convenient API for populating them from a scraping process, by automating some common tasks like parsing the raw extracted data before assigning it.

In other words, *Items* provide the *container* of scraped data, while Item Loaders provide the mechanism for *populating* that container.

Item Loaders are designed to provide a flexible, efficient and easy mechanism for extending and overriding different field parsing rules, either by spider, or by source format (HTML, XML, etc) without becoming a nightmare to maintain.

3.5.1 Using Item Loaders to populate items

To use an Item Loader, you must first instantiate it. You can either instantiate it with an dict-like object (e.g. Item or dict) or without one, in which case an Item is automatically instantiated in the Item Loader constructor using the Item class specified in the *ItemLoader.default_item_class* attribute.

Then, you start collecting values into the Item Loader, typically using *XPath Selectors*. You can add more than one value to the same item field, the Item Loader will know how to "join" those values later using a proper processing function.

Here is a typical Item Loader usage in a *Spider*, using the *Product item* declared in the *Items chapter*:

```
from scrapy.contrib.loader import XPathItemLoader
from myproject.items import Product

def parse(self, response):
    l = XPathItemLoader(item=Product(), response=response)
    l.add_xpath('name', '//div[@class="product_name"]')
    l.add_xpath('name', '//div[@class="product_title"]')
    l.add_xpath('price', '//p[@id="price"]')
    l.add_xpath('stock', '//p[@id="stock"]')
    l.add_value('last_updated', 'today') # you can also use literal values
    return l.load_item()
```

By quickly looking at that code we can see the `name` field is being extracted from two different XPath locations in the page:

1. `//div[@class="product_name"]`
2. `//div[@class="product_title"]`

In other words, data is being collected by extracting it from two XPath locations, using the *`add_xpath()`* method. This is the data that will be assigned to the `name` field later.

Afterwards, similar calls are used for `price` and `stock` fields, and finally the `last_update` field is populated directly with a literal value (`today`) using a different method: *`add_value()`*.

Finally, when all data is collected, the *`ItemLoader.load_item()`* method is called which actually populates and returns the item populated with the data previously extracted and collected with the *`add_xpath()`* and *`add_value()`* calls.

3.5.2 Input and Output processors

An Item Loader contains one input processor and one output processor for each (item) field. The input processor processes the extracted data as soon as it's received (through the *`add_xpath()`* or *`add_value()`* methods) and the result of the input processor is collected and kept inside the ItemLoader. After collecting all data, the *`ItemLoader.load_item()`* method is called to populate and get the populated *`Item`* object. That's when the output processor is called with the data previously collected (and processed using the input processor). The result of the output processor is the final value that gets assigned to the item.

Let's see an example to illustrate how this input and output processors are called for a particular field (the same applies for any other field):

```
l = XPathItemLoader(Product(), some_xpath_selector)
l.add_xpath('name', xpath1) # (1)
l.add_xpath('name', xpath2) # (2)
l.add_value('name', 'test') # (3)
return l.load_item() # (4)
```

So what happens is:

1. Data from `xpath1` is extracted, and passed through the *input processor* of the `name` field. The result of the input processor is collected and kept in the Item Loader (but not yet assigned to the item).
2. Data from `xpath2` is extracted, and passed through the same *input processor* used in (1). The result of the input processor is appended to the data collected in (1) (if any).
3. This case is similar to the previous ones, except that the values to be collected is assigned directly, instead of being extracted from a XPath. However, the value is still passed through the input processors. In this case, since the value is not iterable it is converted to an iterable of a single element before passing it to the input processor, because input processor always receive iterables.

4. The data collected in (1) and (2) is passed through the *output processor* of the `name` field. The result of the output processor is the value assigned to the `name` field in the item.

It's worth noticing that processors are just callable objects, which are called with the data to be parsed, and return a parsed value. So you can use any function as input or output processor. They only requirement is that they must accept one (and only one) positional argument, which will be an iterator.

Note: Both input and output processors must receive an iterator as their first argument. The output of those functions can be anything. The result of input processors will be appended to an internal list (in the Loader) containing the collected values (for that field). The result of the output processors is the value that will be finally assigned to the item.

The other thing you need to keep in mind is that the values returned by input processors are collected internally (in lists) and then passed to output processors to populate the fields.

Last, but not least, Scrapy comes with some *commonly used processors* built-in for convenience.

3.5.3 Declaring Item Loaders

Item Loaders are declared like Items, by using a class definition syntax. Here is an example:

```
from scrapy.contrib.loader import ItemLoader
from scrapy.contrib.loader.processor import TakeFirst, MapCompose, Join

class ProductLoader(ItemLoader):

    default_output_processor = TakeFirst()

    name_in = MapCompose(unicode.title)
    name_out = Join()

    price_in = MapCompose(unicode.strip)

    # ...
```

As you can see, input processors are declared using the `_in` suffix while output processors are declared using the `_out` suffix. And you can also declare a default input/output processors using the *ItemLoader.default_input_processor* and *ItemLoader.default_output_processor* attributes.

3.5.4 Declaring Input and Output Processors

As seen in the previous section, input and output processors can be declared in the Item Loader definition, and it's very common to declare input processors this way. However, there is one more place where you can specify the input and output processors to use: in the *Item Field* metadata. Here is an example:

```
from scrapy.item import Item, Field
from scrapy.contrib.loader.processor import MapCompose, Join, TakeFirst

from scrapy.utils.markup import remove_entities
from myproject.utils import filter_prices

class Product(Item):
    name = Field(
        input_processor=MapCompose(remove_entities),
        output_processor=Join(),
```

```
    )
    price = Field(
        default=0,
        input_processor=MapCompose(remove_entities, filter_prices),
        output_processor=TakeFirst(),
    )
```

The precedence order, for both input and output processors, is as follows:

1. Item Loader field-specific attributes: `field_in` and `field_out` (most precedence)
2. Field metadata (`input_processor` and `output_processor` key)
3. Item Loader defaults: *ItemLoader.default_input_processor()* and *ItemLoader.default_output_processor()* (least precedence)

See also: *Reusing and extending Item Loaders*.

3.5.5 Item Loader Context

The Item Loader Context is a dict of arbitrary key/values which is shared among all input and output processors in the Item Loader. It can be passed when declaring, instantiating or using Item Loader. They are used to modify the behaviour of the input/output processors.

For example, suppose you have a function `parse_length` which receives a text value and extracts a length from it:

```
def parse_length(text, loader_context):
    unit = loader_context.get('unit', 'm')
    # ... length parsing code goes here ...
    return parsed_length
```

By accepting a `loader_context` argument the function is explicitly telling the Item Loader that is able to receive an Item Loader context, so the Item Loader passes the currently active context when calling it, and the processor function (`parse_length` in this case) can thus use them.

There are several ways to modify Item Loader context values:

1. By modifying the currently active Item Loader context (*context* attribute):

```
    loader = ItemLoader(product)
    loader.context['unit'] = 'cm'
```

2. On Item Loader instantiation (the keyword arguments of Item Loader constructor are stored in the Item Loader context):

```
    loader = ItemLoader(product, unit='cm')
```

3. On Item Loader declaration, for those input/output processors that support instatiating them with a Item Loader context. *MapCompose* is one of them:

```
    class ProductLoader(ItemLoader):
        length_out = MapCompose(parse_length, unit='cm')
```

3.5.6 ItemLoader objects

class `scrapy.contrib.loader.`**`ItemLoader`**(*[item]*, ***kwargs*)

Return a new Item Loader for populating the given Item. If no item is given, one is instantiated automatically using the class in *default_item_class*.

The item and the remaining keyword arguments are assigned to the Loader context (accesible through the *context* attribute).

get_value(*value*, **processors*, ***kwargs*)
Process the given `value` by the given `processors` and keyword arguments.

Available keyword arguments:

Parameters **re** (*str or compiled regex*) – a regular expression to use for extracting data from the given value using `extract_regex()` method, applied before processors

Examples:

```
>>> from scrapy.contrib.loader.processor import TakeFirst
>>> loader.get_value(u'name: foo', TakeFirst(), unicode.upper, re='name: (.+)')
'FOO`
```

add_value(*field_name*, *value*, **processors*, ***kwargs*)
Process and then add the given `value` for the given field.

The value is first passed through *get_value()* by giving the `processors` and `kwargs`, and then passed through the *field input processor* and its result appened to the data collected for that field. If the field already contains collected data, the new data is added.

The given `field_name` can be `None`, in which case values for multiple fields may be added. And the processed value should be a dict with field_name mapped to values.

Examples:

```
loader.add_value('name', u'Color TV')
loader.add_value('colours', [u'white', u'blue'])
loader.add_value('length', u'100')
loader.add_value('name', u'name: foo', TakeFirst(), re='name: (.+)')
loader.add_value(None, {'name': u'foo', 'sex': u'male'})
```

replace_value(*field_name*, *value*)
Similar to *add_value()* but replaces the collected data with the new value instead of adding it.

load_item()
Populate the item with the data collected so far, and return it. The data collected is first passed through the *output processors* to get the final value to assign to each item field.

get_collected_values(*field_name*)
Return the collected values for the given field.

get_output_value(*field_name*)
Return the collected values parsed using the output processor, for the given field. This method doesn't populate or modify the item at all.

get_input_processor(*field_name*)
Return the input processor for the given field.

get_output_processor(*field_name*)
Return the output processor for the given field.

item
The *Item* object being parsed by this Item Loader.

context
The currently active *Context* of this Item Loader.

default_item_class
An Item class (or factory), used to instantiate items when not given in the constructor.

default_input_processor
The default input processor to use for those fields which don't specify one.

default_output_processor
The default output processor to use for those fields which don't specify one.

class scrapy.contrib.loader.**XPathItemLoader**([*item*, *selector*, *response*], ***kwargs*)
The *XPathItemLoader* class extends the *ItemLoader* class providing more convenient mechanisms for extracting data from web pages using *XPath selectors*.

XPathItemLoader objects accept two more additional parameters in their constructors:

Parameters

- **selector** (*XPathSelector* object) – The selector to extract data from, when using the *add_xpath()* or *replace_xpath()* method.
- **response** (*Response* object) – The response used to construct the selector using the *default_selector_class*, unless the selector argument is given, in which case this argument is ignored.

get_xpath(*xpath*, **processors*, ***kwargs*)
Similar to *ItemLoader.get_value()* but receives an XPath instead of a value, which is used to extract a list of unicode strings from the selector associated with this *XPathItemLoader*.

Parameters

- **xpath** (*str*) – the XPath to extract data from
- **re** (*str or compiled regex*) – a regular expression to use for extracting data from the selected XPath region

Examples:

```
# HTML snippet: <p class="product-name">Color TV</p>
loader.get_xpath('//p[@class="product-name"]')
# HTML snippet: <p id="price">the price is $1200</p>
loader.get_xpath('//p[@id="price"]', TakeFirst(), re='the price is (.*)')
```

add_xpath(*field_name*, *xpath*, **processors*, ***kwargs*)
Similar to *ItemLoader.add_value()* but receives an XPath instead of a value, which is used to extract a list of unicode strings from the selector associated with this *XPathItemLoader*.

See *get_xpath()* for `kwargs`.

Parameters **xpath** (*str*) – the XPath to extract data from

Examples:

```
# HTML snippet: <p class="product-name">Color TV</p>
loader.add_xpath('name', '//p[@class="product-name"]')
# HTML snippet: <p id="price">the price is $1200</p>
loader.add_xpath('price', '//p[@id="price"]', re='the price is (.*)')
```

replace_xpath(*field_name*, *xpath*, **processors*, ***kwargs*)
Similar to *add_xpath()* but replaces collected data instead of adding it.

default_selector_class
The class used to construct the *selector* of this *XPathItemLoader*, if only a response is given in the constructor. If a selector is given in the constructor this attribute is ignored. This attribute is sometimes overridden in subclasses.

selector
The *XPathSelector* object to extract data from. It's either the selector given in the constructor or

one created from the response given in the constructor using the *default_selector_class*. This attribute is meant to be read-only.

3.5.7 Reusing and extending Item Loaders

As your project grows bigger and acquires more and more spiders, maintenance becomes a fundamental problem, specially when you have to deal with many different parsing rules for each spider, having a lot of exceptions, but also wanting to reuse the common processors.

Item Loaders are designed to ease the maintenance burden of parsing rules, without loosing flexibility and, at the same time, providing a convenient mechanism for extending and overriding them. For this reason Item Loaders support traditional Python class inheritance for dealing with differences of specific spiders (or group of spiders).

Suppose, for example, that some particular site encloses their product names in three dashes (ie. `---Plasma TV---`) and you don't want to end up scraping those dashes in the final product names.

Here's how you can remove those dashes by reusing and extending the default Product Item Loader (`ProductLoader`):

```
from scrapy.contrib.loader.processor import MapCompose
from myproject.ItemLoaders import ProductLoader

def strip_dashes(x):
    return x.strip('-')

class SiteSpecificLoader(ProductLoader):
    name_in = MapCompose(ProductLoader.name_in, strip_dashes)
```

Another case where extending Item Loaders can be very helpful is when you have multiple source formats, for example XML and HTML. In the XML version you may want to remove `CDATA` occurrences. Here's an example of how to do it:

```
from scrapy.contrib.loader.processor import MapCompose
from myproject.ItemLoaders import ProductLoader
from myproject.utils.xml import remove_cdata

class XmlProductLoader(ProductLoader):
    name_in = MapCompose(remove_cdata, ProductLoader.name_in)
```

And that's how you typically extend input processors.

As for output processors, it is more common to declare them in the field metadata, as they usually depend only on the field and not on each specific site parsing rule (as input processors do). See also: *Declaring Input and Output Processors*.

There are many other possible ways to extend, inherit and override your Item Loaders, and different Item Loaders hierarchies may fit better for different projects. Scrapy only provides the mechanism, it doesn't impose any specific organization of your Loaders collection - that's up to you and your project needs.

3.5.8 Available built-in processors

Even though you can use any callable function as input and output processors, Scrapy provides some commonly used processors, which are described below. Some of them, like the *MapCompose* (which is typically used as input processor) composes the output of several functions executed in order, to produce the final parsed value.

Here is a list of all built-in processors:

class scrapy.contrib.loader.processor.**Identity**
The simplest processor, which doesn't do anything. It returns the original values unchanged. It doesn't receive any constructor arguments nor accepts Loader contexts.

Example:

```
>>> from scrapy.contrib.loader.processor import Identity
>>> proc = Identity()
>>> proc(['one', 'two', 'three'])
['one', 'two', 'three']
```

class scrapy.contrib.loader.processor.**TakeFirst**
Return the first non null/empty value from the values to received, so it's typically used as output processor of single-valued fields. It doesn't receive any constructor arguments, nor accepts Loader contexts.

Example:

```
>>> from scrapy.contrib.loader.processor import TakeFirst
>>> proc = TakeFirst()
>>> proc(['', 'one', 'two', 'three'])
'one'
```

class scrapy.contrib.loader.processor.**Join**(*separator=u' '*)
Return the values joined with the separator given in the constructor, which defaults to `u' '`. It doesn't accept Loader contexts.

When using the default separator, this processor is equivalent to the function: `u' '.join`

Examples:

```
>>> from scrapy.contrib.loader.processor import Join
>>> proc = Join()
>>> proc(['one', 'two', 'three'])
u'one two three'
>>> proc = Join('<br>')
>>> proc(['one', 'two', 'three'])
u'one<br>two<br>three'
```

class scrapy.contrib.loader.processor.**Compose**(**functions*, ***default_loader_context*)
A processor which is constructed from the composition of the given functions. This means that each input value of this processor is passed to the first function, and the result of that function is passed to the second function, and so on, until the last function returns the output value of this processor.

By default, stop process on None value. This behaviour can be changed by passing keyword argument stop_on_none=False.

Example:

```
>>> from scrapy.contrib.loader.processor import Compose
>>> proc = Compose(lambda v: v[0], str.upper)
>>> proc(['hello', 'world'])
'HELLO'
```

Each function can optionally receive a `loader_context` parameter. For those which does this processor will pass the currently active *Loader context* through that parameter.

The keyword arguments passed in the constructor are used as the default Loader context values passed to each function call. However, the final Loader context values passed to functions are overridden with the currently active Loader context accessible through the `ItemLoader.context()` attribute.

class scrapy.contrib.loader.processor.**MapCompose**(**functions*, ***default_loader_context*)
A processor which is constructed from the composition of the given functions, similar to the *Compose* pro-

cessor. The difference with this processor is the way internal results are passed among functions, which is as follows:

The input value of this processor is *iterated* and each element is passed to the first function, and the result of that function (for each element) is concatenated to construct a new iterable, which is then passed to the second function, and so on, until the last function is applied for each value of the list of values collected so far. The output values of the last function are concatenated together to produce the output of this processor.

Each particular function can return a value or a list of values, which is flattened with the list of values returned by the same function applied to the other input values. The functions can also return `None` in which case the output of that function is ignored for further processing over the chain.

This processor provides a convenient way to compose functions that only work with single values (instead of iterables). For this reason the *`MapCompose`* processor is typically used as input processor, since data is often extracted using the *`extract()`* method of *selectors*, which returns a list of unicode strings.

The example below should clarify how it works:

```
>>> def filter_world(x):
...     return None if x == 'world' else x
...
>>> from scrapy.contrib.loader.processor import MapCompose
>>> proc = MapCompose(filter_world, unicode.upper)
>>> proc([u'hello', u'world', u'this', u'is', u'scrapy'])
[u'HELLO, u'THIS', u'IS', u'SCRAPY']
```

As with the Compose processor, functions can receive Loader contexts, and constructor keyword arguments are used as default context values. See *`Compose`* processor for more info.

3.6 Scrapy shell

The Scrapy shell is an interactive shell where you can try and debug your scraping code very quickly, without having to run the spider. It's meant to be used for testing data extraction code, but you can actually use it for testing any kind of code as it is also a regular Python shell.

The shell is used for testing XPath expressions and see how they work and what data they extract from the web pages you're trying to scrape. It allows you to interactively test your XPaths while you're writing your spider, without having to run the spider to test every change.

Once you get familiarized with the Scrapy shell you'll see that it's an invaluable tool for developing and debugging your spiders.

If you have IPython installed, the Scrapy shell will use it (instead of the standard Python console). The IPython console is a much more powerful and provides smart auto-completion and colorized output, among other things.

We highly recommend you to install IPython, specially if you're working on Unix systems (where IPython excels). See the IPython installation guide for more info.

3.6.1 Launch the shell

To launch the shell type:

```
scrapy-ctl.py shell <url>
```

Where the `<url>` is the URL you want to scrape.

3.6.2 Using the shell

The Scrapy shell is just a regular Python console (or *IPython* shell if you have it available) which provides some additional functions available by default (as shortcuts):

Built-in Shortcuts

- `shelp()` - print a help with the list of available objects and shortcuts
- `fetch(request_or_url)` - fetch a new response from the given request or URL and update all related objects accordingly.
- `view(response)` - open the given response in your local web browser, for inspection. This will add a <base> tag to the response body in order for external links (such as images and style sheets) to display properly. Note, however,that this will create a temporary file in your computer, which won't be removed automatically.

Built-in Objects

The Scrapy shell automatically creates some convenient objects from the downloaded page, like the *Response* object and the *XPathSelector* objects (for both HTML and XML content).

Those objects are:

- `url` - the URL being analyzed
- `spider` - the Spider which is known to handle the URL, or a *BaseSpider* object if there is no spider is found for the current URL
- `request` - a *Request* object of the last fetched page. You can modify this request using *replace()* fetch a new request (without leaving the shell) using the `fetch` shortcut.
- `response` - a *Response* object containing the last fetched page
- `hxs` - a *HtmlXPathSelector* object constructed with the last response fetched
- `xxs` - a *XmlXPathSelector* object constructed with the last response fetched

3.6.3 Example of shell session

Here's an example of a typical shell session where we start by scraping the http://scrapy.org page, and then proceed to scrape the http://slashdot.org page. Finally, we modify the (Slashdot) request method to POST and re-fetch it getting a HTTP 405 (method not allowed) error. We end the session by typing Ctrl-D (in Unix systems) or Ctrl-Z in Windows.

Keep in mind that the data extracted here may not be the same when you try it, as those pages are not static and could have changed by the time you test this. The only purpose of this example is to get you familiarized with how the Scrapy shell works.

First, we launch the shell:

```
python scrapy-ctl.py shell http://scrapy.org --nolog
```

Then, the shell fetches the url (using the Scrapy downloader) and prints the list of available objects and some help:

```
Fetching <http://scrapy.org>...
Available objects
=================

  xxs       : <XmlXPathSelector (http://scrapy.org) xpath=None>
```

```
  url       : http://scrapy.org
  request   : <http://scrapy.org>
  spider    : <scrapy.spider.models.BaseSpider object at 0x2bed9d0>
  hxs       : <HtmlXPathSelector (http://scrapy.org) xpath=None>
  item      : Item()
  response  : <http://scrapy.org>

Available shortcuts
===================

  shelp()           : Prints this help.
  fetch(req_or_url) : Fetch a new request or URL and update objects
  view(response)    : View response in a browser

Python 2.6.2 (release26-maint, Apr 19 2009, 01:58:18)
Type "help", "copyright", "credits" or "license" for more information.

>>>
```

After that, we can stary playing with the objects:

```
>>> hxs.select("//h2/text()").extract()[0]
u'Welcome to Scrapy'
>>> fetch("http://slashdot.org")
Fetching <http://slashdot.org>...
Done - use shelp() to see available objects
>>> hxs.select("//h2/text()").extract()
[u'News for nerds, stuff that matters']
>>> request = request.replace(method="POST")
>>> fetch(request)
Fetching <POST http://slashdot.org>...
2009-04-03 00:57:39-0300 [scrapybot] ERROR: Downloading <http://slashdot.org> from <None>: 405 Metho
>>>
```

3.6.4 Invoking the shell from spiders to inspect responses

Sometimes you want to inspect the responses that are being processed in a certain point of your spider, if only to check that response you expect is getting there.

This can be achieved by using the `scrapy.shell.inspect_response` function.

Here's an example of how you would call it from your spider:

```
class MySpider(BaseSpider):
    ...

    def parse(self, response):
        if response.url == 'http://www.example.com/products.php':
            from scrapy.shell import inspect_response
            inspect_response(response)

        # ... your parsing code ..
```

When you the spider you will get something similar to this:

```
2009-08-27 19:15:25-0300 [example.com] DEBUG: Crawled <http://www.example.com/> (referer: <None>)
2009-08-27 19:15:26-0300 [example.com] DEBUG: Crawled <http://www.example.com/products.php> (referer
```

```
Scrapy Shell
============

Inspecting: <http://www.example.com/products.php
Use shelp() to see available objects

Python 2.6.2 (release26-maint, Apr 19 2009, 01:58:18)
[GCC 4.3.3] on linux2
Type "help", "copyright", "credits" or "license" for more information.
(InteractiveConsole)
>>> response.url
'http://www.example.com/products.php'
```

Then, you can check if the extraction code is working:

```
>>> hxs.select('//h1')
[]
```

Nope, it doesn't. So you can open the response in your web browser and see if it's the response you were expecting:

```
>>> view(response)
>>>
```

Finally you hit Ctrl-D (or Ctrl-Z in Windows) to exit the shell and resume the crawling:

```
>>> ^D
2009-08-27 19:15:25-0300 [example.com] DEBUG: Crawled <http://www.example.com/product.php?id=1> (refe
2009-08-27 19:15:25-0300 [example.com] DEBUG: Crawled <http://www.example.com/product.php?id=2> (refe
# ...
```

Note that you can't use the `fetch` shortcut here since the Scrapy engine is blocked by the shell. However, after you leave the shell, the spider will continue crawling where it stopped, as shown above.

3.7 Item Pipeline

After an item has been scraped by a spider it is sent to the Item Pipeline which process it through several components that are executed sequentially.

Item pipeline are usually implemented on each project. Typical usage for item pipelines are:

- HTML cleansing
- validation
- persistence (storing the scraped item)

3.7.1 Writing your own item pipeline

Writing your own item pipeline is easy. Each item pipeline component is a single Python class that must define the following method:

`scrapy.contrib.pipeline.`**`process_item`**(*spider*, *item*)

Parameters

- **`spider`** (*`BaseSpider`* object) – the spider which scraped the item
- **`item`** (*`Item`* object) – the item scraped

This method is called for every item pipeline component and must either return a *Item* (or any descendant class) object or raise a *DropItem* exception. Dropped items are no longer processed by further pipeline components.

3.7.2 Item pipeline example

Let's take a look at following hypothetic pipeline that adjusts the `price` attribute for those items that do not include VAT (`price_excludes_vat` attribute), and drops those items which don't contain a price:

```
from scrapy.core.exceptions import DropItem

class PricePipeline(object):

    vat_factor = 1.15

    def process_item(self, spider, item):
        if item['price']:
            if item['price_excludes_vat']:
                item['price'] = item['price'] * self.vat_factor
            return item
        else:
            raise DropItem("Missing price in %s" % item)
```

3.7.3 Activating a Item Pipeline component

To activate an Item Pipeline component you must add its class to the *ITEM_PIPELINES* list, like in the following example:

```
ITEM_PIPELINES = [
    'myproject.pipeline.PricePipeline',
]
```

3.7.4 Item pipeline example with resources per spider

Sometimes you need to keep resources about the items processed grouped per spider, and delete those resource when a spider finish.

An example is a filter that looks for duplicate items, and drops those items that were already processed. Let say that our items has an unique id, but our spider returns multiples items with the same id:

```
from scrapy.xlib.pydispatch import dispatcher
from scrapy.core import signals
from scrapy.core.exceptions import DropItem

class DuplicatesPipeline(object):
    def __init__(self):
        self.duplicates = {}
        dispatcher.connect(self.spider_opened, signals.spider_opened)
        dispatcher.connect(self.spider_closed, signals.spider_closed)

    def spider_opened(self, spider):
        self.duplicates[spider] = set()

    def spider_closed(self, spider):
        del self.duplicates[spider]
```

```
    def process_item(self, spider, item):
        if item['id'] in self.duplicates[spider]:
            raise DropItem("Duplicate item found: %s" % item)
        else:
            self.duplicates[spider].add(item['id'])
            return item
```

3.7.5 Built-in Item Pipelines reference

Here is a list of item pipelines bundled with Scrapy.

File Export Pipeline

class `scrapy.contrib.pipeline.fileexport.`**`FileExportPipeline`**

This pipeline exports all scraped items into a file, using different formats.

It is simple but convenient wrapper to use Item Exporters as *Item Pipelines*. If you need more custom/advanced functionality you can write your own pipeline or subclass the Item Exporters .

It supports the following settings:

- *EXPORT_FORMAT* (mandatory)
- *EXPORT_FILE* (mandatory)
- *EXPORT_FIELDS*
- *EXPORT_EMPTY*
- *EXPORT_ENCODING*

If any mandatory setting is not set, this pipeline will be automatically disabled.

File Export Pipeline examples

Here are some usage examples of the File Export Pipeline.

To export all scraped items into a XML file:

```
EXPORT_FORMAT = 'xml'
EXPORT_FILE = 'scraped_items.xml'
```

To export all scraped items into a CSV file (with all fields in headers line):

```
EXPORT_FORMAT = 'csv'
EXPORT_FILE = 'scraped_items.csv'
```

To export all scraped items into a CSV file (with specific fields in headers line):

```
EXPORT_FORMAT = 'csv_headers'
EXPORT_FILE = 'scraped_items_with_headers.csv'
EXPORT_FIELDS = ['name', 'price', 'description']
```

File Export Pipeline settings

EXPORT_FORMAT The format to use for exporting. Here is a list of all available formats. Click on the respective Item Exporter to get more info.

- `xml`: uses a *XmlItemExporter*
- `csv`: uses a *CsvItemExporter*
- `csv_headers`: uses a *CsvItemExporter* with a the column headers on the first line. This format requires you to specify the fields to export using the *EXPORT_FIELDS* setting.
- `json`: uses a *JsonLinesItemExporter*
- `pickle`: uses a *PickleItemExporter*
- `pprint`: uses a *PprintItemExporter*

This setting is mandatory in order to use the File Export Pipeline.

EXPORT_FILE The name of the file where the items will be exported. This setting is mandatory in order to use the File Export Pipeline.

EXPORT_FIELDS Default: `None`

The name of the item fields that will be exported. This will be use for the *fields_to_export* Item Exporter attribute. If `None`, all fields will be exported.

EXPORT_EMPTY Default: `False`

Whether to export empty (non populated) fields. This will be used for the *export_empty_fields* Item Exporter attribute.

EXPORT_ENCODING Default: `'utf-8'`

The encoding to use for exporting. Ths will be used for the *encoding* Item Exporter attribute.

Items Define the data you want to scrape.

Spiders Write the rules to crawl your websites.

XPath Selectors Extract the data from web pages.

Scrapy shell Test your extraction code in an interactive environment.

Item Loaders Populate your items with the extracted data.

Item Pipeline Post-process and store your scraped data.

CHAPTER 4

Built-in services

4.1 Logging

Scrapy provides a logging facility which can be used through the *scrapy.log* module. The current underling implementation uses Twisted logging but this may change in the future.

Logging service must be explicitly started through the *scrapy.log.start()* function.

4.1.1 Log levels

Scrapy provides 5 logging levels:

1. *CRITICAL* - for critical errors
2. *ERROR* - for regular errors
3. *WARNING* - for warning messages
4. *INFO* - for informational messages
5. *DEBUG* - for debugging messages

4.1.2 How to set the log level

You can set the log level using the *–loglevel/-L* command line option, or using the *LOG_LEVEL* setting.

4.1.3 How to log messages

Here's a quick example of how to log a message using the `WARNING` level:

```
from scrapy import log
log.msg("This is a warning", level=log.WARNING)
```

4.1.4 Logging from Spiders

The recommended way to log from spiders is by using the Spider *log()* method, which already populates the `spider` argument of the *scrapy.log.msg()* function. The other arguments are passed directly to the *msg()* function.

4.1.5 scrapy.log module

scrapy.log.**log_level**
The current log level being used

scrapy.log.**started**
A boolean which is `True` is logging has been started or `False` otherwise.

scrapy.log.**start**(*logfile=None*, *loglevel=None*, *logstdout=None*)
Start the logging facility. This must be called before actually logging any messages. Otherwise, messages logged before this call will get lost.

Parameters

- **logfile** (*str*) – the file path to use for logging output. If omitted, the *LOG_FILE* setting will be used. If both are `None`, the log will be sent to standard error.
- **loglevel** – the minimum logging level to log. Availables values are: *CRITICAL*, *ERROR*, *WARNING*, *INFO* and *DEBUG*.
- **logstdout** (*boolean*) – if `True`, all standard output (and error) of your application will be logged instead. For example if you "print 'hello'" it will appear in the Scrapy log. If ommited, the *LOG_STDOUT* setting will be used.

scrapy.log.**msg**(*message*, *level=INFO*, *component=BOT_NAME*, *spider=None*)
Log a message

Parameters

- **message** (*str*) – the message to log
- **level** – the log level for this message. See *Log levels*.
- **component** (*str*) – the component to use for logging, it defaults to *BOT_NAME*
- **spider** (*BaseSpider* object) – the spider to use for logging this message. This parameter should always be used when logging things related to a particular spider.

scrapy.log.**exc**(*message*, *level=ERROR*, *component=BOT_NAME*, *spider=None*)
Log an exception. Similar to `msg()` but it also appends a stack trace report using *traceback.format_exc*.

It accepts the same parameters as the *msg()* function.

scrapy.log.**CRITICAL**
Log level for critical errors

scrapy.log.**ERROR**
Log level for errors

scrapy.log.**WARNING**
Log level for warnings

scrapy.log.**INFO**
Log level for informational messages (recommended level for production)

scrapy.log.**DEBUG**
Log level for debugging messages (recommended level for development)

4.1.6 Logging settings

These settings can be used to configure the logging:

- *LOG_ENABLED*

- *LOG_ENCODING*
- *LOG_FILE*
- *LOG_LEVEL*
- *LOG_STDOUT*

4.2 Stats Collection

4.2.1 Overview

Scrapy provides a convenient service for collecting stats in the form of key/values, both globally and per spider. It's called the Stats Collector, and it's a singleton which can be imported and used quickly, as illustrated by the examples in the *Common Stats Collector uses* section below.

The stats collection is enabled by default but can be disabled through the *STATS_ENABLED* setting.

However, the Stats Collector is always available, so you can always import it in your module and use its API (to increment or set new stat keys), regardless of whether the stats collection is enabled or not. If it's disabled, the API will still work but it won't collect anything. This is aimed at simplifying the stats collector usage: you should spend no more than one line of code for collecting stats in your spider, Scrapy extension, or whatever code you're using the Stats Collector from.

Another feature of the Stats Collector is that it's very efficient (when enabled) and extremely efficient (almost unnoticeable) when disabled.

The Stats Collector keeps one stats table per open spider and one global stats table. You can't set or get stats from a closed spider, but the spider-specific stats table is automatically opened when the spider is opened, and closed when the spider is closed.

4.2.2 Common Stats Collector uses

Import the stats collector:

```
from scrapy.stats import stats
```

Set global stat value:

```
stats.set_value('hostname', socket.gethostname())
```

Increment global stat value:

```
stats.inc_value('spiders_crawled')
```

Set global stat value only if greater than previous:

```
stats.max_value('max_items_scraped', value)
```

Set global stat value only if lower than previous:

```
stats.min_value('min_free_memory_percent', value)
```

Get global stat value:

```
>>> stats.get_value('spiders_crawled')
8
```

Get all global stats (ie. not particular to any spider):

```
>>> stats.get_stats()
{'hostname': 'localhost', 'spiders_crawled': 8}
```

Set spider specific stat value (spider stats must be opened first, but this task is handled automatically by the Scrapy engine):

```
stats.set_value('start_time', datetime.now(), spider=some_spider)
```

Where `some_spider` is a *BaseSpider* object.

Increment spider-specific stat value:

```
stats.inc_value('pages_crawled', spider=some_spider)
```

Set spider-specific stat value only if greater than previous:

```
stats.max_value('max_items_scraped', value, spider=some_spider)
```

Set spider-specific stat value only if lower than previous:

```
stats.min_value('min_free_memory_percent', value, spider=some_spider)
```

Get spider-specific stat value:

```
>>> stats.get_value('pages_crawled', spider=some_spider)
1238
```

Get all stats from a given spider:

```
>>> stats.get_stats('pages_crawled', spider=some_spider)
{'pages_crawled': 1238, 'start_time': datetime.datetime(2009, 7, 14, 21, 47, 28, 977139)}
```

4.2.3 Stats Collector API

There are several Stats Collectors available under the *scrapy.stats.collector* module and they all implement the Stats Collector API defined by the *StatsCollector* class (which they all inherit from).

class `scrapy.stats.collector.`**StatsCollector**

get_value(*key*, *default=None*, *spider=None*)
Return the value for the given stats key or default if it doesn't exist. If spider is `None` the global stats table is consulted, otherwise the spider specific one is. If the spider is not yet opened a `KeyError` exception is raised.

get_stats(*spider=None*)
Get all stats from the given spider (if spider is given) or all global stats otherwise, as a dict. If spider is not opened `KeyError` is raied.

set_value(*key*, *value*, *spider=None*)
Set the given value for the given stats key on the global stats (if spider is not given) or the spider-specific stats (if spider is given), which must be opened or a `KeyError` will be raised.

set_stats(*stats*, *spider=None*)
Set the given stats (as a dict) for the given spider. If the spider is not opened a `KeyError` will be raised.

inc_value(*key*, *count=1*, *start=0*, *spider=None*)
Increment the value of the given stats key, by the given count, assuming the start value given (when it's

not set). If spider is not given the global stats table is used, otherwise the spider-specific stats table is used, which must be opened or a `KeyError` will be raised.

max_value(*key*, *value*, *spider=None*)
Set the given value for the given key only if current value for the same key is lower than value. If there is no current value for the given key, the value is always set. If spider is not given the global stats table is used, otherwise the spider-specific stats table is used, which must be opened or a KeyError will be raised.

min_value(*key*, *value*, *spider=None*)
Set the given value for the given key only if current value for the same key is greater than value. If there is no current value for the given key, the value is always set. If spider is not given the global stats table is used, otherwise the spider-specific stats table is used, which must be opened or a KeyError will be raised.

clear_stats(*spider=None*)
Clear all global stats (if spider is not given) or all spider-specific stats if spider is given, in which case it must be opened or a `KeyError` will be raised.

iter_spider_stats()
Return a iterator over `(spider, spider_stats)` for each open spider currently tracked by the stats collector, where `spider_stats` is the dict containing all spider-specific stats.

Global stats are not included in the iterator. If you want to get those, use *`get_stats()`* method.

open_spider(*spider*)
Open the given spider for stats collection. This method must be called prior to working with any stats specific to that spider, but this task is handled automatically by the Scrapy engine.

close_spider(*spider*)
Close the given spider. After this is called, no more specific stats for this spider can be accessed. This method is called automatically on the *`spider_closed`* signal.

4.2.4 Available Stats Collectors

Besides the basic *`StatsCollector`* there are other Stats Collectors available in Scrapy which extend the basic Stats Collector. You can select which Stats Collector to use through the *`STATS_CLASS`* setting. The default Stats Collector is the *`MemoryStatsCollector`* is used.

When stats are disabled (through the *`STATS_ENABLED`* setting) the *`STATS_CLASS`* setting is ignored and the *`DummyStatsCollector`* is used.

MemoryStatsCollector

class `scrapy.stats.collector.`**MemoryStatsCollector**
A simple stats collector that keeps the stats of the last scraping run (for each spider) in memory, after they're closed. The stats can be accessed through the *`spider_stats`* attribute, which is a dict keyed by spider domain name.

This is the default Stats Collector used in Scrapy.

spider_stats
A dict of dicts (keyed by spider name) containing the stats of the last scraping run for each spider.

DummyStatsCollector

class `scrapy.stats.collector.`**DummyStatsCollector**
A Stats collector which does nothing but is very efficient. This is the Stats Collector used when stats are diabled (through the *`STATS_ENABLED`* setting).

SimpledbStatsCollector

class scrapy.stats.collector.simpledb.**SimpledbStatsCollector**

A Stats collector which persists stats to Amazon SimpleDB, using one SimpleDB item per scraping run (ie. it keeps history of all scraping runs). The data is persisted to the SimpleDB domain specified by the *STATS_SDB_DOMAIN* setting. The domain will be created if it doesn't exist.

In addition to the existing stats keys the following keys are added at persitance time:

- `spider`: the spider name (so you can use it later for querying stats for that spider)
- `timestamp`: the timestamp when the stats were persisited

Both the `spider` and `timestamp` are used for generating the SimpleDB item name in order to avoid overwriting stats of previous scraping runs.

As required by SimpleDB, datetime's are stored in ISO 8601 format and numbers are zero-padded to 16 digits. Negative numbers are not currently supported.

This Stats Collector requires the boto library.

This Stats Collector can be configured through the following settings:

STATS_SDB_DOMAIN

Default: `'scrapy_stats'`

A string containing the SimpleDB domain to use in the *SimpledbStatsCollector*.

STATS_SDB_ASYNC

Default: `False`

If `True` communication with SimpleDB will be performed asynchronously. If `False` blocking IO will be used instead. This is the default as using asynchronous communication can result in the stats not being persisted if the Scrapy engine is shut down in the middle (for example, when you run only one spider in a process and then exit).

4.2.5 Stats signals

The Stats Collector provides some signals for extending the stats collection functionality:

scrapy.stats.signals.**stats_spider_opened**(*spider*)

Sent right after the stats spider is opened. You can use this signal to add startup stats for spider (example: start time).

Parameters **spider** (*str*) – the stats spider just opened

scrapy.stats.signals.**stats_spider_closing**(*spider*, *reason*)

Sent just before the stats spider is closed. You can use this signal to add some closing stats (example: finish time).

Parameters

- **spider** (*str*) – the stats spider about to be closed
- **reason** (*str*) – the reason why the spider is being closed. See *spider_closed* signal for more info.

scrapy.stats.signals.**stats_spider_closed**(*spider*, *reason*, *spider_stats*)

Sent right after the stats spider is closed. You can use this signal to collect resources, but not to add any more stats as the stats spider has already been close (use *stats_spider_closing* for that instead).

Parameters

- **spider** (*str*) – the stats spider just closed
- **reason** (*dict*) – the reason why the spider was closed. See *spider_closed* signal for more info.
- **spider_stats** – the stats of the spider just closed.

4.3 Sending e-mail

Although Python makes sending e-mails relatively easy via the smtplib library, Scrapy provides its own facility for sending e-mails which is very easy to use and it's implemented using Twisted non-blocking IO, to avoid interfering with the non-blocking IO of the crawler. It also provides a simple API for sending attachments and it's very easy to configure, with a few settings <topics-email-settings.

4.3.1 Quick example

Here's a quick example of how to send an e-mail (without attachments):

```
from scrapy.mail import MailSender

mailer = MailSender()
mailer.send(to=["someone@example.com"], subject="Some subject", body="Some body", cc=["another@exampl
```

4.3.2 MailSender class reference

MailSender is the preferred class to use for sending emails from Scrapy, as it uses Twisted non-blocking IO, like the rest of the framework.

MailSender(smtphost=None, mailfrom=None, smtpuser=None, smtppass=None, smtpport=None):

Parameters

- **smtphost** (*str*) – the SMTP host to use for sending the emails. If omitted, the *MAIL_HOST* setting will be used.
- **mailfrom** (*str*) – the address used to send emails (in the `From:` header). If omitted, the *MAIL_FROM* setting will be used.
- **smtpuser** – the SMTP user. If omitted, the *MAIL_USER* setting will be used. If not given, no SMTP authentication will be performed.
- **smtppass** (*str*) – the SMTP pass for authetnication.
- **smtpport** (*int*) – the SMTP port to connect to

scrapy.mail.**send**(*to*, *subject*, *body*, *cc=None*, *attachs=()*)

Send email to the given recipients. Emits the *mail_sent* signal.

If *MAIL_DEBUG* is enabled the *mail_sent* signal will be emmited and no actual email will be sent.

Parameters

- **to** (*list*) – the e-mail recipients
- **subject** (*str*) – the subject of the e-mail
- **cc** (*list*) – the e-mails to CC
- **body** (*str*) – the e-mail body
- **attachs** (*iterable*) – an iterable of tuples `(attach_name, mimetype, file_object)` where `attach_name` is a string with the name that will appear on the e-mail's attachment, `mimetype` is the mimetype of the attachment and `file_object` is a readable file object with the contents of the attachment

4.3.3 Mail settings

These settings define the default constructor values of the `MailSender` class, and can be used to configure e-mail notifications in your project without writing any code (for those extensions and code that uses `MailSender`).

MAIL_FROM

Default: `'scrapy@localhost'`

Sender email to use (`From:` header) for sending emails.

MAIL_HOST

Default: `'localhost'`

SMTP host to use for sending emails.

MAIL_PORT

Default: `25`

SMTP port to use for sending emails.

MAIL_USER

Default: `None`

User to use for SMTP authentication. If disabled no SMTP authentication will be performed.

MAIL_PASS

Default: `None`

Password to use for SMTP authentication, along with *MAIL_USER*.

MAIL_DEBUG

Default: `False`

Whether to enable the debugging mode.

4.3.4 Mail signals

scrapy.mail.**mail_sent**(*to*, *subject*, *body*, *cc*, *attachs*, *msg*)
Emitted by `MailSender.send()` after an email has been sent.

Parameters

- **to** (*list*) – the e-mail recipients
- **subject** (*str*) – the subject of the e-mail
- **cc** (*list*) – the e-mails to CC
- **body** (*str*) – the e-mail body
- **attachs** (*iterable*) – an iterable of tuples `(attach_name, mimetype, file_object)` where `attach_name` is a string with the name that will appear on the e-mail's attachment, `mimetype` is the mimetype of the attachment and `file_object` is a readable file object with the contents of the attachment
- **msg** (`MIMEMultipart` or `MIMENonMultipart`) – the generated message

4.4 Telnet Console

Scrapy comes with a built-in telnet console for inspecting and controlling a Scrapy running process. The telnet console is just a regular python shell running inside the Scrapy process, so you can do literally anything from it.

The telnet console is a *built-in Scrapy extension* which comes enabled by default, but you can also disable it if you want. For more information about the extension itself see *Telnet console extension*.

4.4.1 How to access the telnet console

The telnet console listens in the TCP port defined in the *TELNETCONSOLE_PORT* setting, which defaults to `6023`. To access the console you need to type:

```
telnet localhost 6023
>>>
```

You need the telnet program which comes installed by default in Windows, and most Linux distros.

4.4.2 Available variables in the telnet console

The telnet console is like a regular Python shell running inside the Scrapy process, so you can do anything from it including importing new modules, etc.

However, the telnet console comes with some default variables defined for convenience:

Shortcut	Description
`engine`	the Scrapy engine object (`scrapy.core.engine.scrapyengine`)
`manager`	the Scrapy manager object (`scrapy.core.manager.scrapymanager`)
`extensions`	the extensions object (`scrapy.extension.extensions`)
`stats`	the Scrapy stats object (`scrapy.stats.stats`)
`settings`	the Scrapy settings object (`scrapy.conf.settings`)
`est`	print a report of the current engine status
`prefs`	for memory debugging (see *Debugging memory leaks*)
`p`	a shortcut to the pprint.pprint function
`hpy`	for memory debugging (see *Debugging memory leaks*)

4.4.3 Some example of using the telnet console

Here are some example tasks you can do with the telnet console:

View engine status

You can use the `st()` method of the Scrapy engine to quickly show its state using the telnet console:

```
telnet localhost 6023
>>> est()
Execution engine status

datetime.now()-self.start_time                  : 0:00:09.051588
self.is_idle()                                  : False
self.scheduler.is_idle()                        : False
len(self.scheduler.pending_requests)            : 1
self.downloader.is_idle()                       : False
len(self.downloader.sites)                      : 1
self.downloader.has_capacity()                  : True
self.pipeline.is_idle()                         : False
len(self.pipeline.domaininfo)                   : 1
len(self._scraping)                             : 1

example.com
  self.domain_is_idle(domain)                         : False
  self.closing.get(domain)                            : None
  self.scheduler.domain_has_pending_requests(domain)  : True
  len(self.scheduler.pending_requests[domain])        : 97
  len(self.downloader.sites[domain].queue)            : 17
  len(self.downloader.sites[domain].active)           : 25
  len(self.downloader.sites[domain].transferring)     : 8
  self.downloader.sites[domain].closing               : False
  self.downloader.sites[domain].lastseen              : 2009-06-23 15:20:16.563675
  self.pipeline.domain_is_idle(domain)                : True
  len(self.pipeline.domaininfo[domain])               : 0
  len(self._scraping[domain])                         : 0
```

Pause, resume and stop Scrapy engine

To pause:

```
telnet localhost 6023
>>> engine.pause()
>>>
```

To resume:

```
telnet localhost 6023
>>> engine.unpause()
>>>
```

To stop:

```
telnet localhost 6023
>>> engine.stop()
Connection closed by foreign host.
```

4.4.4 Telnet Console signals

`scrapy.management.telnet.`**`update_telnet_vars`**(*telnet_vars*)

Sent just before the telnet console is opened. You can hook up to this signal to add, remove or update the variables that will be available in the telnet local namespace. In order to do that, you need to update the `telnet_vars` dict in your handler.

Parameters **`telnet_vars`** (*dict*) – the dict of telnet variables

4.5 Web Service

Scrapy comes with a built-in web service for monitoring and controlling a running crawler. The service exposes most resources using the JSON-RPC 2.0 protocol, but there are also other (read-only) resources which just output JSON data.

Provides an extensible web service for managing a Scrapy process. It's enabled by the *WEBSERVICE_ENABLED* setting. The web server will listen in the port specified in *WEBSERVICE_PORT*, and will log to the file specified in *WEBSERVICE_LOGFILE*.

The web service is a *built-in Scrapy extension* which comes enabled by default, but you can also disable it if you're running tight on memory.

4.5.1 Web service resources

The web service contains several resources, defined in the `WEBSERVICE_RESOURCES` setting. Each resource provides a different functionality. See *Available JSON-RPC resources* for a list of resources available by default.

Althought you can implement your own resources using any protocol, there are two kinds of resources bundled with Scrapy:

- Simple JSON resources - which are read-only and just output JSON data
- JSON-RPC resources - which provide direct access to certain Scrapy objects using the JSON-RPC 2.0 protocol

Available JSON-RPC resources

These are the JSON-RPC resources available by default in Scrapy:

Execution Manager JSON-RPC resource

class `scrapy.contrib.webservice.manager.`**`ManagerResource`**
Provides access to the Execution Manager that controls the crawler.

Available by default at: http://localhost:6080/manager

Stats Collector JSON-RPC resource

class `scrapy.contrib.webservice.stats.`**`StatsResource`**
Provides access to the Stats Collector used by the crawler.

Available by default at: http://localhost:6080/stats

Spider Manager JSON-RPC resource

class `scrapy.contrib.webservice.spiders.`**`SpidersResource`**
Provides access to the Spider Manager used by the crawler.

Available by default at: http://localhost:6080/spiders

Extension Manager JSON-RPC resource

class `scrapy.contrib.webservice.extensions.`**`ExtensionsResource`**
Provides access to the Extension Manager used by the crawler.

Available by default at: http://localhost:6080/extensions

Available JSON resources

These are the JSON resources available by default:

Extension Manager JSON-RPC resource

class `scrapy.contrib.webservice.enginestatus.`**`EngineStatusResource`**
Provides access to the Extension Manager used by the crawler.

Available by default at: http://localhost:6080/enginestatus

4.5.2 Web service settings

These are the settings that control the web service behaviour:

WEBSERVICE_ENABLED

Default: `True`

A boolean which specifies if the web service will be enabled (provided its extension is also enabled).

WEBSERVICE_LOGFILE

Default: `None`

A file to use for logging HTTP requests made to the web service. If unset web the log is sent to standard scrapy log.

WEBSERVICE_PORT

Default: `6080`

The port to use for the web service. If set to `None` or `0`, a dynamically assigned port is used.

WEBSERVICE_RESOURCES

Default: `{}`

The list of web service resources enabled for your project. See *Web service resources*. These are added to the ones available by default in Scrapy, defined in the `WEBSERVICE_RESOURCES_BASE` setting.

WEBSERVICE_RESOURCES_BASE

Default:

```
{
    'scrapy.contrib.webservice.manager.ManagerResource': 1,
    'scrapy.contrib.webservice.enginestatus.EngineStatusResource': 1,
    'scrapy.contrib.webservice.extensions.ExtensionsResource': 1,
    'scrapy.contrib.webservice.spiders.SpidersResource': 1,
    'scrapy.contrib.webservice.stats.StatsResource': 1,
}
```

The list of web service resources available by default in Scrapy. You shouldn't change this setting in your project, change `WEBSERVICE_RESOURCES` instead. If you want to disable some resource set its value to `None` in `WEBSERVICE_RESOURCES`.

4.5.3 Writing a web service resource

Web service resources are implemented using the Twisted Web API. See this Twisted Web guide for more information on Twisted web and Twisted web resources.

To write a web service resource you should subclass the `JsonResource` or `JsonRpcResource` classes and implement the `renderGET` method.

class `scrapy.webservice.`**`JsonResource`**

A subclass of twisted.web.resource.Resource that implements a JSON web service resource. See

`ws_name`

The name by which the Scrapy web service will known this resource, and also the path wehere this resource will listen. For example, assuming Scrapy web service is listening on http://localhost:6080/ and the `ws_name` is `'resource1'` the URL for that resource will be:

http://localhost:6080/resource1/

class scrapy.webservice.**JsonRpcResource**(*target=None*)

This is a subclass of JsonResource for implementing JSON-RPC resources. JSON-RPC resources wrap Python (Scrapy) objects around a JSON-RPC API. The resource wrapped must be returned by the *get_target()* method, which returns the target passed in the constructor by default

get_target()

Return the object wrapped by this JSON-RPC resource. By default, it returns the object passed on the constructor.

4.5.4 Examples of web service resources

StatsResource (JSON-RPC resource)

```
from scrapy.webservice import JsonRpcResource
from scrapy.stats import stats

class StatsResource(JsonRpcResource):

    ws_name = 'stats'

    def __init__(self, _stats=stats):
        JsonRpcResource.__init__(self)
        self._target = _stats
```

EngineStatusResource (JSON resource)

```
from scrapy.webservice import JsonResource
from scrapy.core.manager import scrapymanager
from scrapy.utils.engine import get_engine_status

class EngineStatusResource(JsonResource):

    ws_name = 'enginestatus'

    def __init__(self, spider_name=None, _manager=scrapymanager):
        JsonResource.__init__(self)
        self._spider_name = spider_name
        self.isLeaf = spider_name is not None
        self._manager = _manager

    def render_GET(self, txrequest):
        status = get_engine_status(self._manager.engine)
        if self._spider_name is None:
            return status
        for sp, st in status['spiders'].items():
            if sp.name == self._spider_name:
                return st

    def getChild(self, name, txrequest):
        return EngineStatusResource(name, self._manager)
```

4.5.5 Example of web service client

scrapy-ws.py script

```
#!/usr/bin/env python
"""
Example script to control and monitor Scrapy using its web service. It only
provides a reduced functionality as its main purpose is to illustrate how to
write a web service client. Feel free to improve or write you own.
"""

import sys, optparse, urllib
from urlparse import urljoin

from scrapy.utils.jsonrpc import jsonrpc_client_call, JsonRpcError
from scrapy.utils.py26 import json

def get_commands():
    return {
        'help': cmd_help,
        'run': cmd_run,
        'stop': cmd_stop,
        'list-available': cmd_list_available,
        'list-running': cmd_list_running,
        'list-resources': cmd_list_resources,
        'list-extensions': cmd_list_extensions,
        'get-global-stats': cmd_get_global_stats,
        'get-spider-stats': cmd_get_spider_stats,
    }

def cmd_help(args, opts):
    """help - list available commands"""
    print "Available commands:"
    for _, func in sorted(get_commands().items()):
        print "  ", func.__doc__

def cmd_run(args, opts):
    """run <spider_name> - schedule spider for running"""
    jsonrpc_call(opts, 'manager/queue', 'append_spider_name', args[0])

def cmd_stop(args, opts):
    """stop <spider> - stop a running spider"""
    jsonrpc_call(opts, 'manager/engine', 'close_spider', args[0])

def cmd_list_running(args, opts):
    """list-running - list running spiders"""
    for x in json_get(opts, 'manager/engine/open_spiders'):
        print x

def cmd_list_available(args, opts):
    """list-available - list name of available spiders"""
    for x in jsonrpc_call(opts, 'spiders', 'list'):
        print x

def cmd_list_resources(args, opts):
    """list-resources - list available web service resources"""
    for x in json_get(opts, '')['resources']:
        print x
```

```
def cmd_list_extensions(args, opts):
    """list-extensions - list enabled extensions"""
    for x in jsonrpc_call(opts, 'extensions/enabled', 'keys'):
        print x

def cmd_get_spider_stats(args, opts):
    """get-spider-stats <spider> - get stats of a running spider"""
    stats = jsonrpc_call(opts, 'stats', 'get_stats', args[0])
    for name, value in stats.items():
        print "%-40s %s" % (name, value)

def cmd_get_global_stats(args, opts):
    """get-global-stats - get global stats"""
    stats = jsonrpc_call(opts, 'stats', 'get_stats')
    for name, value in stats.items():
        print "%-40s %s" % (name, value)

def get_wsurl(opts, path):
    return urljoin("http://%s:%s/"% (opts.host, opts.port), path)

def jsonrpc_call(opts, path, method, *args, **kwargs):
    url = get_wsurl(opts, path)
    return jsonrpc_client_call(url, method, *args, **kwargs)

def json_get(opts, path):
    url = get_wsurl(opts, path)
    return json.loads(urllib.urlopen(url).read())

def parse_opts():
    usage = "%prog [options] <command> [arg] ..."
    description = "Scrapy web service control script. Use '%prog help' " \
        "to see the list of available commands."
    op = optparse.OptionParser(usage=usage, description=description)
    op.add_option("-H", dest="host", default="localhost", \
        help="Scrapy host to connect to")
    op.add_option("-P", dest="port", type="int", default=6080, \
        help="Scrapy port to connect to")
    opts, args = op.parse_args()
    if not args:
        op.print_help()
        sys.exit(2)
    cmdname, cmdargs, opts = args[0], args[1:], opts
    commands = get_commands()
    if cmdname not in commands:
        sys.stderr.write("Unknown command: %s\n\n" % cmdname)
        cmd_help(None, None)
        sys.exit(1)
    return commands[cmdname], cmdargs, opts

def main():
    cmd, args, opts = parse_opts()
    try:
        cmd(args, opts)
    except IndexError:
        print cmd.__doc__
    except JsonRpcError, e:
        print str(e)
        if e.data:
```

```
            print "Server Traceback below:"
            print e.data


if __name__ == '__main__':
    main()
```

Logging Understand the simple logging facility provided by Scrapy.

Stats Collection Collect statistics about your scraping crawler.

Sending e-mail Send email notifications when certain events occur.

Telnet Console Inspect a running crawler using a built-in Python console.

Web Service Monitor and control a crawler using a web service.

CHAPTER 5

Solving specific problems

5.1 Frequently Asked Questions

5.1.1 How does Scrapy compare to BeautifulSoul or lxml?

BeautifulSoup and lxml are libraries for parsing HTML and XML. Scrapy is an application framework for writing web spiders that crawl web sites and extract data from them.

Scrapy provides a built-in mechanism for extracting data (called *selectors*) but you can easily use BeautifulSoup (or lxml) instead, if you feel more comfortable working with them. After all, they're just parsing libraries which can be imported and used from any Python code.

In other words, comparing BeautifulSoup or lxml to Scrapy is like comparing urllib or urlparse to Django (a popular Python web application framework).

5.1.2 Does Scrapy work with Python 3.0?

No, and there are no plans to port Scrapy to Python 3.0 yet. At the moment Scrapy works with Python 2.5 or 2.6.

5.1.3 Did Scrapy "steal" X from Django?

Probably, but we don't like that word. We think Django is a great open source project and an example to follow, so we've used it as an inspiration for Scrapy.

We believe that, if something is already done well, there's no need to reinvent it. This concept, besides being one of the foundations for open source and free software, not only applies to software but also to documentation, procedures, policies, etc. So, instead of going through each problem ourselves, we choose to copy ideas from those projects that have already solved them properly, and focus on the real problems we need to solve.

We'd be proud if Scrapy serves as an inspiration for other projects. Feel free to steal from us!

5.1.4 Does Scrapy work with HTTP proxies?

Yes. Support for HTTP proxies is provided (since Scrapy 0.8) through the HTTP Proxy downloader middleware. See `HttpProxyMiddleware`.

5.1.5 Scrapy crashes with: ImportError: No module named win32api

You need to install pywin32 because of this Twisted bug.

5.1.6 How can I simulate a user login in my spider?

See *Using FormRequest.from_response() to simulate a user login*.

5.1.7 Can I crawl in depth-first order instead of breadth-first order?

Yes, there's a setting for that: *SCHEDULER_ORDER*.

5.1.8 My Scrapy crawler has memory leaks. What can I do?

See *Debugging memory leaks*.

5.1.9 Can I use Basic HTTP Authentication in my spiders?

Yes, see *HttpAuthMiddleware*.

5.1.10 Why does Scrapy download pages in English instead of my native language?

Try changing the default Accept-Language request header by overriding the *DEFAULT_REQUEST_HEADERS* setting.

5.1.11 Where can I find some example code using Scrapy?

Scrapy comes with a built-in, fully functional project to scrape the Google Directory. You can find it in the `examples/googledir` directory of the Scrapy distribution.

Also, there is a public repository of spiders called Community Spiders.

Finally, you can find some example code for performing not-so-trivial tasks in the Scrapy Recipes page.

5.1.12 Can I run a spider without creating a project?

Yes. You can use the `runspider` command. For example, if you have a spider written in a `my_spider.py` file you can run it with:

```
scrapy-ctl.py runspider my_spider.py
```

5.1.13 I get "Filtered offsite request" messages. How can I fix them?

Those messages (logged with `DEBUG` level) don't necessarily mean there is a problem, so you may not need to fix them.

Those message are thrown by the Offsite Spider Middleware, which is a spider middleware (enabled by default) whose purpose is to filter out requests to domains outside the ones covered by the spider.

For more info see: *OffsiteMiddleware*.

5.1.14 How can I make Scrapy consume less memory?

There's a whole documentation section about this subject, please see: *Debugging memory leaks*.

Also, Python has a builtin memory leak issue which is described in *Leaks without leaks*.

5.1.15 What is the recommended way to deploy a Scrapy crawler in production?

Scrapy comes with a built-in service based on Twisted Application Framework which can be launched through the twistd command. The `scrapy.tac` file can be found in the `extras/` directory.

If you're running Ubuntu 9.10 or above, you can just use the official APT repos for installing Scrapy in your servers. The Debian package automatically deploys the service in the right place and leaves it ready to be started, running as the `scrapy` user. It also provides an *upstart* script for controlling the service.

For a practical example see this guide on how to deploy a Scrapy crawler on Amazon EC2.

5.2 Using Firefox for scraping

Here is a list of tips and advice on using Firefox for scraping, along with a list of useful Firefox add-ons to ease the scraping process.

5.2.1 Caveats with inspecting the live browser DOM

Since Firefox add-ons operate on a live browser DOM, what you'll actually see when inspecting the page source is not the original HTML, but a modified one after applying some browser clean up and executing Javascript code. Firefox, in particular, is known for adding `<tbody>` elements to tables. Scrapy, on the other hand, does not modify the original page HTML, so you won't be able to extract any data if you use `<tbody` in your XPath expressions.

Therefore, you should keep in mind the following things when working with Firefox and XPath:

- Disable Firefox Javascript while inspecting the DOM looking for XPaths to be used in Scrapy
- Never use full XPath paths, use relative and clever ones based on attributes (such as `id`, `class`, `width`, etc) or any identifying features like `contains(@href, 'image')`.
- Never include `<tbody>` elements in your XPath expressions unless you really know what you're doing

5.2.2 Useful Firefox add-ons for scraping

Firebug

Firebug is a widely known tool among web developers and it's also very useful for scraping. In particular, its Inspect Element feature comes very handy when you need to construct the XPaths for extracting data because it allows you to view the HTML code of each page element while moving your mouse over it.

See *Using Firebug for scraping* for a detailed guide on how to use Firebug with Scrapy.

XPather

XPather allows you to test XPath expressions directly on the pages.

XPath Checker

XPath Checker is another Firefox add-on for testing XPaths on your pages.

Tamper Data

Tamper Data is a Firefox add-on which allows you to view and modify the HTTP request headers sent by Firefox. Firebug also allows to view HTTP headers, but not to modify them.

Firecookie

Firecookie makes it easier to view and manage cookies. You can use this extension to create a new cookie, delete existing cookies, see a list of cookies for the current site, manage cookies permissions and a lot more.

5.3 Using Firebug for scraping

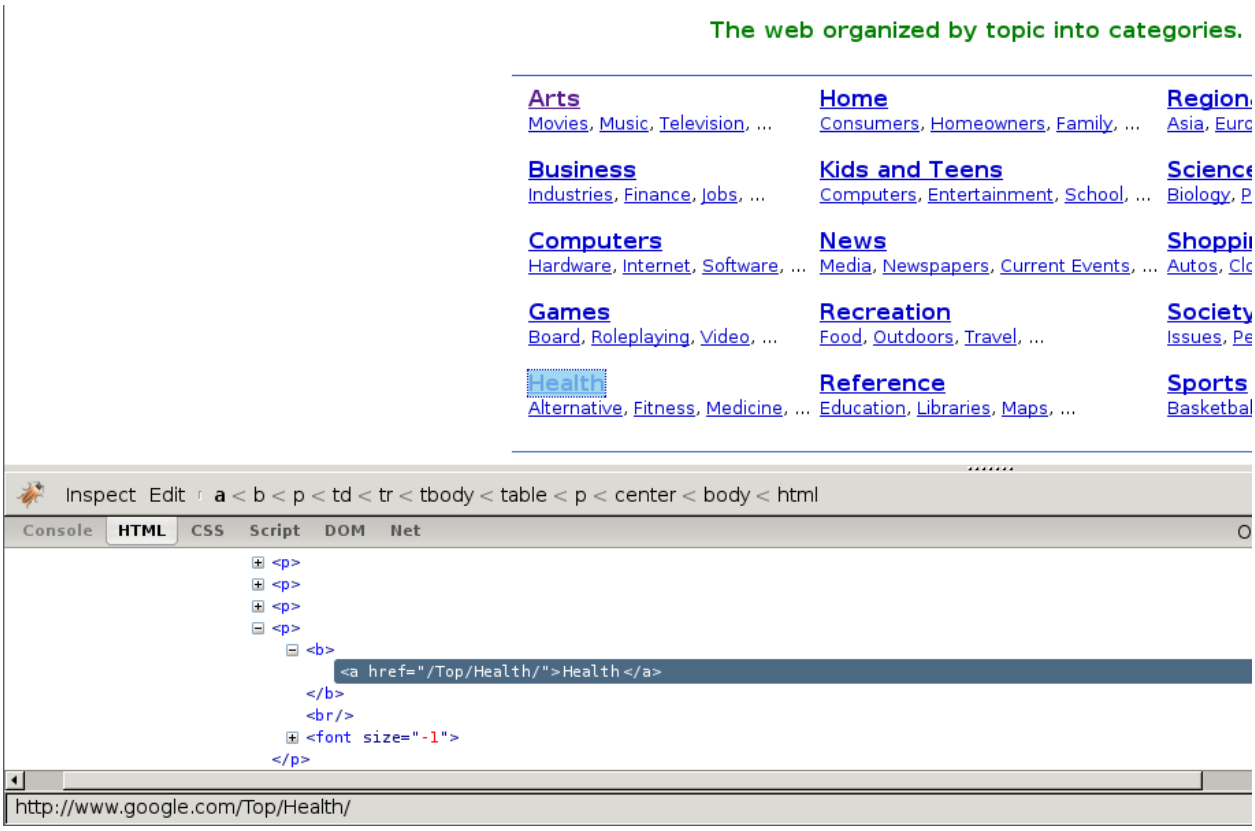
5.3.1 Introduction

This document explains how to use Firebug (a Firefox add-on) to make the scraping process easier and more fun. For other useful Firefox add-ons see *Useful Firefox add-ons for scraping*. There are some caveats with using Firefox add-ons to inspect pages, see *Caveats with inspecting the live browser DOM*.

In this example, we'll show how to use Firebug to scrape data from the Google Directory, which contains the same data as the Open Directory Project used in the *tutorial* but with a different face.

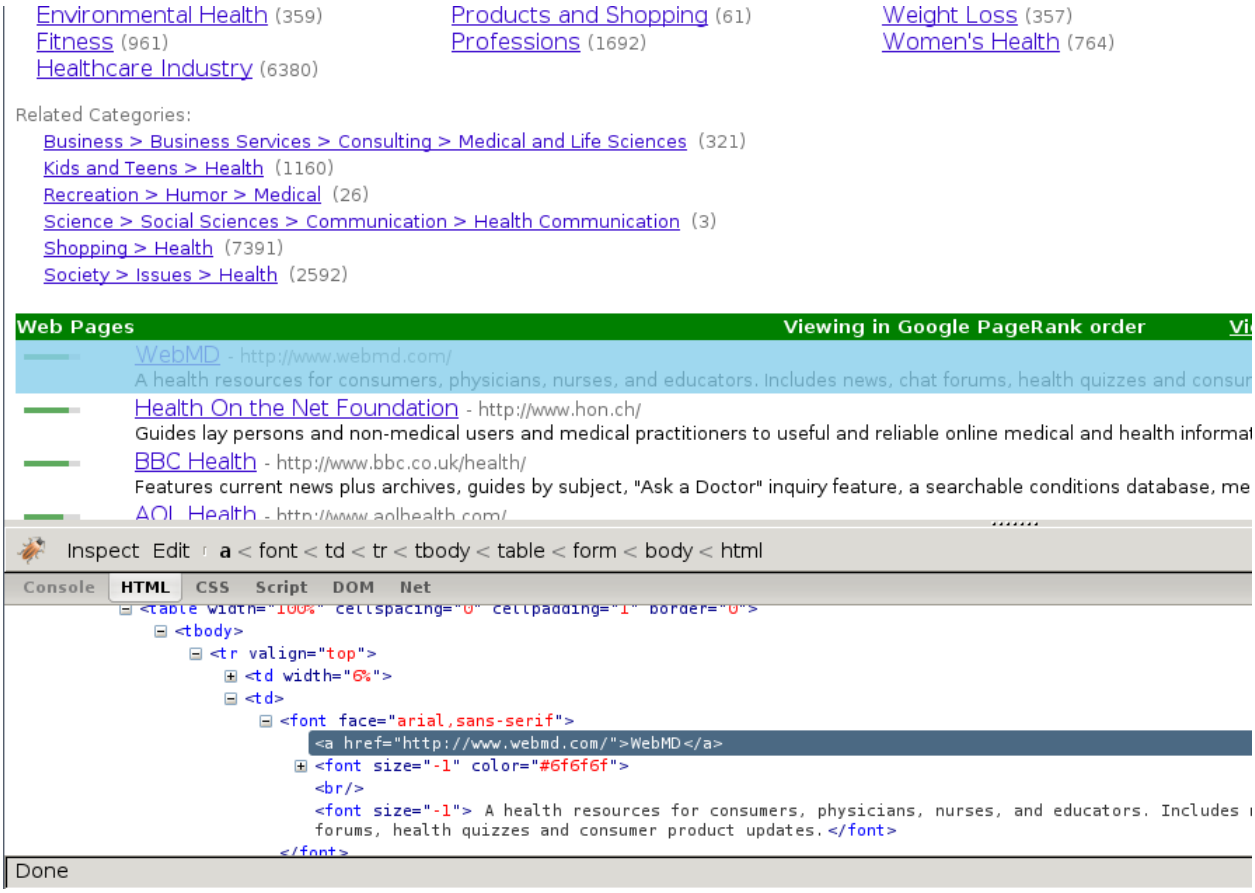
Firebug comes with a very useful feature called Inspect Element which allows you to inspect the HTML code of the different page elements just by hovering your mouse over them. Otherwise you would have to search for the tags manually through the HTML body which can be a very tedious task.

In the following screenshot you can see the Inspect Element tool in action.



At first sight, we can see that the directory is divided in categories, which are also divided in subcategories.

However, it seems that there are more subcategories than the ones being shown in this page, so we'll keep looking:



As expected, the subcategories contain links to other subcategories, and also links to actual websites, which is the purpose of the directory.

5.3.2 Getting links to follow

By looking at the category URLs we can see they share a pattern:

> http://directory.google.com/Category/Subcategory/Another_Subcategory

Once we know that, we are able to construct a regular expression to follow those links. For example, the following one:

```
directory\.google\.com/[A-Z][a-zA-Z_/]+$
```

So, based on that regular expression we can create the first crawling rule:

```
Rule(SgmlLinkExtractor(allow='directory.google.com/[A-Z][a-zA-Z_/]+$', ),
    'parse_category',
    follow=True,
),
```

The *Rule* object instructs *CrawlSpider* based spiders how to follow the category links. `parse_category` will be a method of the spider which will process and extract data from those pages.

This is how the spider would look so far:

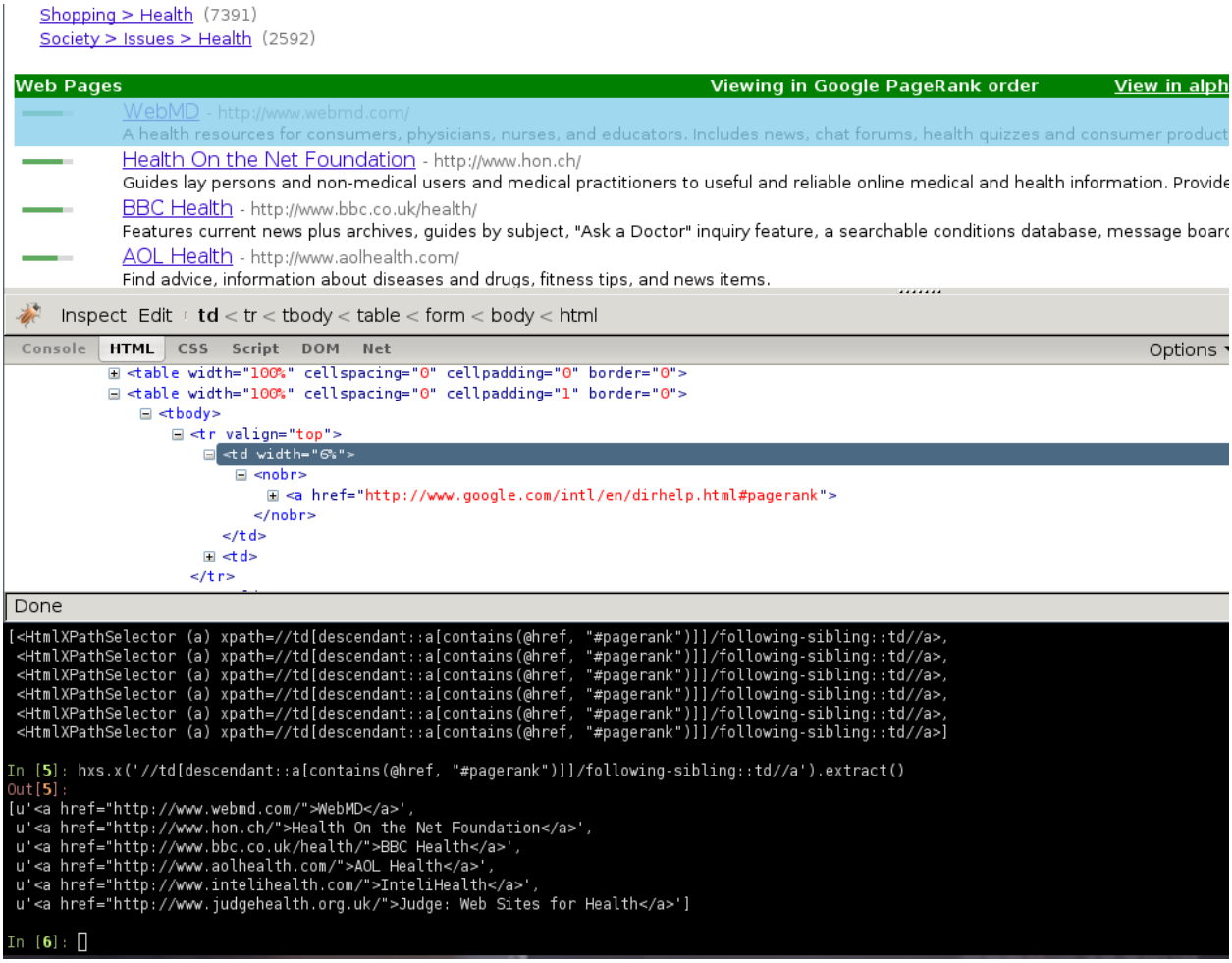
```
from scrapy.contrib.linkextractors.sgml import SgmlLinkExtractor
from scrapy.contrib.spiders import CrawlSpider, Rule
```

```
class GoogleDirectorySpider(CrawlSpider):
    name = 'directory.google.com'
    allowed_domains = ['directory.google.com']
    start_urls = ['http://directory.google.com/']

    rules = (
        Rule(SgmlLinkExtractor(allow='directory\.google\.com/[A-Z][a-zA-Z_/]+$'),
            'parse_category', follow=True,
        ),
    )

    def parse_category(self, response):
        # write the category page data extraction code here
        pass

SPIDER = GoogleDirectorySpider()
```

5.3.3 Extracting the data

Now we're going to write the code to extract data from those pages.

With the help of Firebug, we'll take a look at some page containing links to websites (say http://directory.google.com/Top/Arts/Awards/) and find out how we can extract those links using *XPath selectors*. We'll also use the *Scrapy shell* to test those XPath's and make sure they work as we expect.



As you can see, the page markup is not very descriptive: the elements don't contain `id`, `class` or any attribute that clearly identifies them, so we''ll use the ranking bars as a reference point to select the data to extract when we construct our XPaths.

After using FireBug, we can see that each link is inside a `td` tag, which is itself inside a `tr` tag that also contains the link's ranking bar (in another `td`).

So we can select the ranking bar, then find its parent (the `tr`), and then finally, the link's `td` (which contains the data we want to scrape).

This results in the following XPath:

```
//td[descendant::a[contains(@href, "#pagerank")]]/following-sibling::td//a
```

It's important to use the *Scrapy shell* to test these complex XPath expressions and make sure they work as expected.

Basically, that expression will look for the ranking bar's `td` element, and then select any `td` element who has a descendant `a` element whose `href` attribute contains the string `#pagerank`"

Of course, this is not the only XPath, and maybe not the simpler one to select that data. Another approach could be, for example, to find any `font` tags that have that grey colour of the links,

Finally, we can write our `parse_category()` method:

```
def parse_category(self, response):
    hxs = HtmlXPathSelector(response)
```

```
    # The path to website links in directory page
    links = hxs.select('//td[descendant::a[contains(@href, "#pagerank")]]/following-sibling::td/font

    for link in links:
        item = DirectoryItem()
        item['name'] = link.select('a/text()').extract()
        item['url'] = link.select('a/@href').extract()
        item['description'] = link.select('font[2]/text()').extract()
        yield item
```

Be aware that you may find some elements which appear in Firebug but not in the original HTML, such as the typical case of <tbody> elements.

or tags which Therefer in page HTML sources may on Firebug inspects the live DOM

5.4 Debugging memory leaks

In Scrapy, objects such as Requests, Responses and Items have a finite lifetime: they are created, used for a while, and finally destroyed.

From all those objects the Request is probably the one with the longest lifetime, as it stays waiting in the Scheduler queue until it's time to process it. For more info see *Architecture overview*.

As these Scrapy objects have a (rather long) lifetime there is always the risk accumulated them in memory without releasing them properly and thus causing what is known as a "memory leak".

To help debugging memory leaks, Scrapy provides a built-in mechanism for tracking objects references called *trackref*, and you can also use a third-party library called *Guppy* for more advanced memory debugging (see below for more info). Both mechanisms must be used from the *Telnet Console*.

5.4.1 Common causes of memory leaks

It happens quite often (sometimes by accident, sometimes on purpose) that the Scrapy developer passes objects referenced in Requests (for example, using the `meta` attribute or the request callback function) and that effectively bounds the lifetime of those referenced objects to the lifetime of the Request. This is, by far, the most common cause of memory leaks in Scrapy projects, and a quite difficult one to debug for newcomers.

In big projects, the spiders are typically written by different people and some of those spiders could be "leaking" and thus affecting the rest of the other (well-written) spiders when they get to run concurrently which, in turn, affects the whole crawling process.

At the same time, it's hard to avoid the reasons that causes these leaks without restricting the power of the framework, so we have decided not to restrict the functionally but provide useful tools for debugging these leaks, which quite often consists in answer the question: *which spider is leaking?*.

The leak could also come from a custom middleware, pipeline or extension that you have written, if you are not releasing the (previously allocated) resources properly. For example, if you're allocating resources on `spider_opened` but not releasing them on `spider_closed`.

5.4.2 Debugging memory leaks with `trackref`

`trackref` is a module provided by Scrapy to debug the most common cases of memory leaks. It basically tracks the references to all live Requests, Responses, Item and Selector objects.

To activate the `trackref` module, enable the `TRACK_REFS` setting. It only imposes a minor performance impact so it should be OK for use it, even in production environments.

Once you have `trackref` enabled you can enter the telnet console and inspect how many objects (of the classes mentioned above) are currently alive using the `prefs()` function which is an alias to the *`print_live_refs()`* function:

```
telnet localhost 6023

>>> prefs()
Live References

ExampleSpider                       1   oldest: 15s ago
HtmlResponse                       10   oldest: 1s ago
XPathSelector                       2   oldest: 0s ago
FormRequest                       878   oldest: 7s ago
```

As you can see, that report also shows the "age" of the oldest object in each class.

If you do have leaks, chances are you can figure out which spider is leaking by looking at the oldest request or response. You can get the oldest object of each class using the *`get_oldest()`* function like this (from the telnet console).

Which objects are tracked?

The objects tracked by `trackrefs` are all from these classes (and all its subclasses):

- `scrapy.http.Request`
- `scrapy.http.Response`
- `scrapy.item.Item`
- `scrapy.selector.XPathSelector`
- `scrapy.spider.BaseSpider`
- `scrapy.selector.document.Libxml2Document`

A real example

Let's see a concrete example of an hypothetical case of memory leaks.

Suppose we have some spider with a line similar to this one:

```
return Request("http://www.somenastyspider.com/product.php?pid=%d" % product_id,
    callback=self.parse, meta={referer: response}")
```

That line is passing a response reference inside a request which effectively ties the response lifetime to the requests one, and that's would definitely cause memory leaks.

Let's see how we can discover which one is the nasty spider (without knowing it a-priori, of course) by using the `trackref` tool.

After the crawler is running for a few minutes and we notice its memory usage has grown a lot, we can enter its telnet console and check the live references:

```
>>> prefs()
Live References

SomenastySpider                     1   oldest: 15s ago
HtmlResponse                     3890   oldest: 265s ago
```

```
XPathSelector                       2   oldest: 0s ago
Request                          3878   oldest: 250s ago
```

The fact that there are so many live responses (and that they're so old) is definitely suspicious, as responses should have a relatively short lifetime compared to Requests. So let's check the oldest response:

```
>>> from scrapy.utils.trackref import get_oldest
>>> r = get_oldest('HtmlResponse')
>>> r.url
'http://www.somenastyspider.com/product.php?pid=123'
```

There it is. By looking at the URL of the oldest response we can see it belongs to the `somenastyspider.com` spider. We can now go and check the code of that spider to discover the nasty line that is generating the leaks (passing response references inside requests).

If you want to iterate over all objects, instead of getting the oldest one, you can use the `iter_all()` function:

```
>>> from scrapy.utils.trackref import iter_all
>>> [r.url for r in iter_all('HtmlResponse')]
['http://www.somenastyspider.com/product.php?pid=123',
 'http://www.somenastyspider.com/product.php?pid=584',
...
```

Too many spiders?

If your project has too many spiders, the output of `prefs()` can be difficult to read. For this reason, that function has a `ignore` argument which can be used to ignore a particular class (and all its subclases). For example, using:

```
>>> from scrapy.spider import BaseSpider
>>> prefs(ignore=BaseSpider)
```

Won't show any live references to spiders.

scrapy.utils.trackref module

Here are the functions available in the *trackref* module.

class `scrapy.utils.trackref.`**object_ref**
Inherit from this class (instead of object) if you want to track live instances with the `trackref` module.

`scrapy.utils.trackref.`**print_live_refs**(*class_name*, *ignore=NoneType*)
Print a report of live references, grouped by class name.

Parameters **ignore** (*class or classes tuple*) – if given, all objects from the specified class (or tuple of classes) will be ignored.

`scrapy.utils.trackref.`**get_oldest**(*class_name*)
Return the oldest object alive with the given class name, or `None` if none is found. Use *print_live_refs()* first to get a list of all tracked live objects per class name.

`scrapy.utils.trackref.`**iter_all**(*class_name*)
Return an iterator over all objects alive with the given class name, or `None` if none is found. Use *print_live_refs()* first to get a list of all tracked live objects per class name.

5.4.3 Debugging memory leaks with Guppy

`trackref` provides a very convenient mechanism for tracking down memory leaks, but it only keeps track of the objects that are more likely to cause memory leaks (Requests, Responses, Items, and Selectors). However, there are other cases where the memory leaks could come from other (more or less obscure) objects. If this is your case, and you can't find your leaks using `trackref` you still have another resource: the Guppy library.

If you use `setuptools`, you can install Guppy with the following command:

```
easy_install guppy
```

The telnet console also comes with a built-in shortcut (`hpy`) for accessing Guppy heap objects. Here's an example to view all Python objects available in the heap using Guppy:

```
>>> x = hpy.heap()
>>> x.bytype
Partition of a set of 297033 objects. Total size = 52587824 bytes.
 Index  Count   %     Size   % Cumulative  % Type
     0  22307   8 16423880  31  16423880  31 dict
     1 122285  41 12441544  24  28865424  55 str
     2  68346  23  5966696  11  34832120  66 tuple
     3    227   0  5836528  11  40668648  77 unicode
     4   2461   1  2222272   4  42890920  82 type
     5  16870   6  2024400   4  44915320  85 function
     6  13949   5  1673880   3  46589200  89 types.CodeType
     7  13422   5  1653104   3  48242304  92 list
     8   3735   1  1173680   2  49415984  94 _sre.SRE_Pattern
     9   1209   0   456936   1  49872920  95 scrapy.http.headers.Headers
<1676 more rows. Type e.g. '_.more' to view.>
```

You can see that most space is used by dicts. Then, if you want to see from which attribute those dicts are referenced you could do:

```
>>> x.bytype[0].byvia
Partition of a set of 22307 objects. Total size = 16423880 bytes.
 Index  Count   %     Size   % Cumulative  % Referred Via:
     0  10982  49  9416336  57   9416336  57 '.__dict__'
     1   1820   8  2681504  16  12097840  74 '.__dict__', '.func_globals'
     2   3097  14  1122904   7  13220744  80
     3    990   4   277200   2  13497944  82 "['cookies']"
     4    987   4   276360   2  13774304  84 "['cache']"
     5    985   4   275800   2  14050104  86 "['meta']"
     6    897   4   251160   2  14301264  87 '[2]'
     7      1   0   196888   1  14498152  88 "['moduleDict']", "['modules']"
     8    672   3   188160   1  14686312  89 "['cb_kwargs']"
     9     27   0   155016   1  14841328  90 '[1]'
<333 more rows. Type e.g. '_.more' to view.>
```

As you can see, the Guppy module is very powerful, but also requires some deep knowledge about Python internals. For more info about Guppy, refer to the Guppy documentation.

5.4.4 Leaks without leaks

Sometimes, you may notice that the memory usage of your Scrapy process will only increase, but never decrease. Unfortunately, this could happen even though neither Scrapy nor your project are leaking memory. This is due to a (not so well) known problem of Python, which may not return released memory to the operating system in some cases. For more information on this issue see:

- Python Memory Management
- Python Memory Management Part 2
- Python Memory Management Part 3

The improvements proposed by Evan Jones, which are detailed in this paper, got merged in Python 2.5, but the only reduce the problem, it doesn't fixes it completely. To quote the paper:

> *Unfortunately, this patch can only free an arena if there are no more objects allocated in it anymore. This means that fragmentation is a large issue. An application could have many megabytes of free memory, scattered throughout all the arenas, but it will be unable to free any of it. This is a problem experienced by all memory allocators. The only way to solve it is to move to a compacting garbage collector, which is able to move objects in memory. This would require significant changes to the Python interpreter.*

This problem will be fixed in future Scrapy releases, where we plan to adopt a new process model and run spiders in a pool of recyclable sub-processes.

5.5 Downloading Item Images

Scrapy provides an item pipeline for downloading images attached to a particular item, for example, when you scrape products and also want to download their images locally.

This pipeline, called the Images Pipeline and implemented in the *ImagesPipeline* class, provides a convenient way for downloading and storing images locally with some additional features:

- Convert all downloaded images to a common format (JPG) and mode (RGB)
- Avoid re-downloading images which were downloaded recently
- Thumbnail generation
- Check images width/height to make sure they meet a minimum constraint

This pipeline also keeps an internal queue of those images which are currently being scheduled for download, and connects those items that arrive containing the same image, to that queue. This avoids downloading the same image more than once when it's shared by several items.

The Python Imaging Library is used for thumbnailing and normalizing images to JPEG/RGB format, so you need to install that library in order to use the images pipeline.

5.5.1 Using the Images Pipeline

The typical workflow, when using the *ImagesPipeline* goes like this:

1. In a Spider, you scrape an item and put the URLs of its images into a pre-defined field, for example `image_urls`.
2. The item is returned from the spider and goes to the item pipeline.
3. When the item reaches the *ImagesPipeline*, the URLs in the `image_urls` attribute are scheduled for download using the standard Scrapy scheduler and downloader (which means the scheduler and downloader middlewares are reused), but with a higher priority, processing them before other pages are scraped. The item remains "locked" at that particular pipeline stage until the images have finish downloading (or fail for some reason).
4. When the images finish downloading (or fail for some reason) another field gets populated with their path, for example, `image_paths`. This attribute is a list of dictionaries containing information about the images downloaded, such as the downloaded path, and the original scraped url. The images in the list of the `image_paths`

field will retain the same order of the original `image_urls` field, which is useful if you decide to use the first image in the list as the primary image.

5.5.2 Implementing your Images Pipeline

Here are the methods that you should override in your custom Images Pipeline:

class `scrapy.contrib.pipeline.images.`**`ImagesPipeline`**

`get_media_requests`(*item*, *info*)

As seen on the workflow, the pipeline will get the URLs of the images to download from the item. In order to do this, you must override the *`get_media_requests()`* method and return a Request for each image URL:

```
def get_media_requests(self, item, info):
    for image_url in item['image_urls']:
        yield Request(image_url)
```

Those requests will be processed by the pipeline and, when they have finished downloading, the results will be sent to the *`item_completed()`* method, as a list of 2-element tuples. Each tuple will contain `(success, image_info_or_failure)` where:

- `success` is a boolean which is `True` if the image was downloaded successfully or `False` if it failed for some reason
- `image_info_or_error` is a dict containing the following keys (if success is `True`) or a Twisted Failure if there was a problem.
  - `url` - the url where the image was downloaded from. This is the url of the request returned from the *`get_media_requests()`* method.
  - `path` - the path (relative to *`IMAGES_STORE`*) where the image was stored
  - `checksum` - a MD5 hash of the image contents

The list of tuples received by *`item_completed()`* is guaranteed to retain the same order of the requests returned from the *`get_media_requests()`* method.

Here's a typical value of the `results` argument:

```
[(True,
  {'checksum': '2b00042f7481c7b056c4b410d28f33cf',
   'path': 'full/7d97e98f8af710c7e7fe703abc8f639e0ee507c4.jpg',
   'url': 'http://www.example.com/images/product1.jpg'}),
 (True,
  {'checksum': 'b9628c4ab9b595f72f280b90c4fd093d',
   'path': 'full/1ca5879492b8fd606df1964ea3c1e2f4520f076f.jpg',
   'url': 'http://www.example.com/images/product2.jpg'}),
 (False,
  Failure(...))]
```

By default the *`get_media_requests()`* method returns `None` which means there are no images to download for the item.

`item_completed`(*results*, *items*, *info*)

The *`ImagesPipeline.item_completed()`* method called when all image requests for a single item have completed (either finshed downloading, or failed for some reason).

The *`item_completed()`* method must return the output that will be sent to subsequent item pipeline stages, so you must return (or drop) the item, as you would in any pipeline.

Here is an example of the *item_completed()* method where we store the downloaded image paths (passed in results) in the image_paths item field, and we drop the item if it doesn't contain any images:

```
from scrapy.core.exceptions import DropItem

def item_completed(self, results, item, info):
    image_paths = [info['path'] for success, info in results if success]
    if not image_paths:
        raise DropItem("Item contains no images")
    item['image_paths'] = image_paths
    return item
```

By default, the *item_completed()* method returns the item.

5.5.3 Full Example

Here is a full example of the Images Pipeline whose methods are examplified above:

```
from scrapy.contrib.pipeline.images import ImagesPipeline
from scrapy.core.exceptions import DropItem
from scrapy.http import Request

class MyImagesPipeline(ImagesPipeline):

    def get_media_requests(self, item, info):
        for image_url in item['image_urls']:
            yield Request(image_url)

    def item_completed(self, results, item, info):
        image_paths = [info['path'] for success, info in results if success]
        if not image_paths:
            raise DropItem("Item contains no images")
        item['image_paths'] = image_paths
        return item
```

5.5.4 Enabling your Images Pipeline

To enable your images pipeline you must first add it to your project *ITEM_PIPELINES* setting:

```
ITEM_PIPELINES = ['myproject.pipelines.MyImagesPipeline']
```

And set the *IMAGES_STORE* setting to a valid directory that will be used for storing the downloaded images. Otherwise the pipeline will remain disabled, even if you include it in the *ITEM_PIPELINES* setting.

For example:

```
IMAGES_STORE = '/path/to/valid/dir'
```

5.5.5 Images Storage

File system is currently the only officially supported storage, but there is also (undocumented) support for Amazon S3.

File system storage

The images are stored in files (one per image), using a SHA1 hash of their URLs for the file names.

For example, the following image URL:

```
http://www.example.com/image.jpg
```

Whose *SHA1 hash* is:

```
3afec3b4765f8f0a07b78f98c07b83f013567a0a
```

Will be downloaded and stored in the following file:

```
<IMAGES_STORE>/full/3afec3b4765f8f0a07b78f98c07b83f013567a0a.jpg
```

Where:

- `<IMAGES_STORE>` is the directory defined in *IMAGES_STORE* setting
- `full` is a sub-directory to separate full images from thumbnails (if used). For more info see *Thumbnail generation*.

5.5.6 Additional features

Image expiration

The Image Pipeline avoids downloading images that were downloaded recently. To adjust this retention delay use the *IMAGES_EXPIRES* setting, which specifies the delay in number of days:

```
# 90 days of delay for image expiration
IMAGES_EXPIRES = 90
```

Thumbnail generation

The Images Pipeline can automatically create thumbnails of the downloaded images. In order use this feature, you must set *IMAGES_THUMBS* to a dictionary where the keys are the thumbnail names and the values are their dimensions.

For example:

```
IMAGES_THUMBS = {
    'small': (50, 50),
    'big': (270, 270),
}
```

When you use this feature, the Images Pipeline will create thumbnails of the each specified size with this format:

```
<IMAGES_STORE>/thumbs/<size_name>/<image_id>.jpg
```

Where:

- `<size_name>` is the one specified in the *IMAGES_THUMBS* dictionary keys (`small`, `big`, etc)
- `<image_id>` is the SHA1 hash of the image url

Example of image files stored using `small` and `big` thumbnail names:

```
<IMAGES_STORE>/full/63bbfea82b8880ed33cdb762aa11fab722a90a24.jpg
<IMAGES_STORE>/thumbs/small/63bbfea82b8880ed33cdb762aa11fab722a90a24.jpg
<IMAGES_STORE>/thumbs/big/63bbfea82b8880ed33cdb762aa11fab722a90a24.jpg
```

The first one is the full image, as downloaded from the site.

Filtering out small images

You can drop images which are too small, by specifying the minimum allowed size in the *IMAGES_MIN_HEIGHT* and *IMAGES_MIN_WIDTH* settings.

For example:

```
IMAGES_MIN_HEIGHT = 110
IMAGES_MIN_WIDTH = 110
```

Note: these size constraints don't affect thumbnail generation at all.

By default, there are no size constraints, so all images are processed.

Frequently Asked Questions Get answers to most frequently asked questions.

Using Firefox for scraping Learn how to scrape with Firefox and some useful add-ons.

Using Firebug for scraping Learn how to scrape efficiently using Firebug.

Debugging memory leaks Learn how to find and get rid of memory leaks in your crawler.

Downloading Item Images Download static images associated with your scraped items.

CHAPTER 6

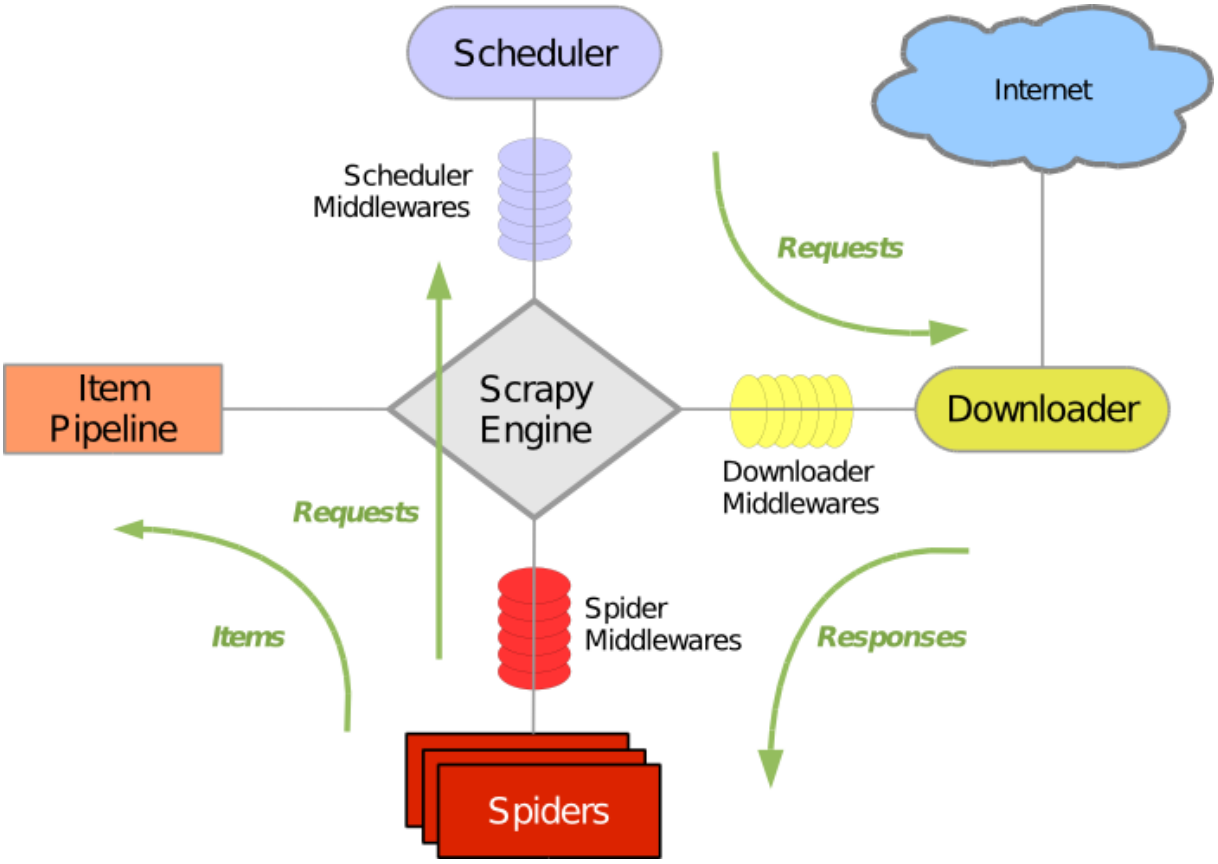
Extending Scrapy

6.1 Architecture overview

This document describes the architecture of Scrapy and how its components interact.

6.1.1 Overview

The following diagram shows an overview of the Scrapy architecture with its components and an outline of the data flow that takes place inside the system (shown by the green arrows). A brief description of the components is included below with links for more detailed information about them. The data flow is also described below.



6.1.2 Components

Scrapy Engine

The engine is responsible for controlling the data flow between all components of the system, and triggering events when certain actions occur. See the Data Flow section below for more details.

Scheduler

The Scheduler receives requests from the engine and enqueues them for feeding them later (also to the engine) when the engine requests them.

Downloader

The Downloader is responsible for fetching web pages and feeding them to the engine which, in turn, feeds them to the spiders.

Spiders

Spiders are custom classes written by Scrapy users to parse responses and extract items (aka scraped items) from them or additional URLs (requests) to follow. Each spider is able to handle a specific domain (or group of domains). For more information see *Spiders*.

Item Pipeline

The Item Pipeline is responsible for processing the items once they have been extracted (or scraped) by the spiders. Typical tasks include cleansing, validation and persistence (like storing the item in a database). For more information see *Item Pipeline*.

Downloader middlewares

Downloader middlewares are specific hooks that sit between the Engine and the Downloader and process requests when they pass from the Engine to the Downloader, and responses that pass from Downloader to the Engine. They provide a convenient mechanism for extending Scrapy functionality by plugging custom code. For more information see *Downloader Middleware*.

Spider middlewares

Spider middlewares are specific hooks that sit between the Engine and the Spiders and are able to process spider input (responses) and output (items and requests). They provide a convenient mechanism for extending Scrapy functionality by plugging custom code. For more information see *Spider Middleware*.

Scheduler middlewares

Scheduler middlewares are specific hooks that sit between the Engine and the Scheduler and process requests when they pass from the Engine to the Scheduler and vice-versa. They provide a convenient mechanism for extending Scrapy functionality by plugging custom code.

6.1.3 Data flow

The data flow in Scrapy is controlled by the Engine, and goes like this:

1. The Engine opens a domain, locates the Spider that handles that domain, and asks the spider for the first URLs to crawl.
2. The Engine gets the first URLs to crawl from the Spider and schedules them in the Scheduler, as Requests.
3. The Engine asks the Scheduler for the next URLs to crawl.
4. The Scheduler returns the next URLs to crawl to the Engine and the Engine sends them to the Downloader, passing through the Downloader Middleware (request direction).
5. Once the page finishes downloading the Downloader generates a Response (with that page) and sends it to the Engine, passing through the Downloader Middleware (response direction).
6. The Engine receives the Response from the Downloader and sends it to the Spider for processing, passing through the Spider Middleware (input direction).
7. The Spider processes the Response and returns scraped Items and new Requests (to follow) to the Engine.
8. The Engine sends scraped Items (returned by the Spider) to the Item Pipeline and Requests (returned by spider) to the Scheduler
9. The process repeats (from step 2) until there are no more requests from the Scheduler, and the Engine closes the domain.

6.1.4 Event-driven networking

Scrapy is written with Twisted, a popular event-driven networking framework for Python. Thus, it's implemented using a non-blocking (aka asynchronous) code for concurrency.

For more information about asynchronous programming and Twisted see these links:

- Asynchronous Programming with Twisted
- Twisted - hello, asynchronous programming

6.2 Downloader Middleware

The downloader middleware is a framework of hooks into Scrapy's request/response processing. It's a light, low-level system for globally altering Scrapy's requests and responses.

6.2.1 Activating a downloader middleware

To activate a downloader middleware component, add it to the *DOWNLOADER_MIDDLEWARES* setting, which is a dict whose keys are the middleware class paths and their values are the middleware orders.

Here's an example:

```
DOWNLOADER_MIDDLEWARES = {
    'myproject.middlewares.CustomDownloaderMiddleware': 543,
}
```

The *DOWNLOADER_MIDDLEWARES* setting is merged with the *DOWNLOADER_MIDDLEWARES_BASE* setting defined in Scrapy (and not meant to be overridden) and then sorted by order to get the final sorted list of enabled middlewares: the first middleware is the one closer to the engine and the last is the one closer to the downloader.

To decide which order to assign to your middleware see the *DOWNLOADER_MIDDLEWARES_BASE* setting and pick a value according to where you want to insert the middleware. The order does matter because each middleware performs a different action and your middleware could depend on some previous (or subsequent) middleware being applied.

If you want to disable a built-in middleware (the ones defined in *DOWNLOADER_MIDDLEWARES_BASE* and enabled by default) you must define it in your project's *DOWNLOADER_MIDDLEWARES* setting and assign *None* as its value. For example, if you want to disable the off-site middleware:

```
DOWNLOADER_MIDDLEWARES = {
    'myproject.middlewares.CustomDownloaderMiddleware': 543,
    'scrapy.contrib.downloadermiddleware.useragent.UserAgentMiddleware': None,
}
```

Finally, keep in mind that some middlewares may need to be enabled through a particular setting. See each middleware documentation for more info.

6.2.2 Writing your own downloader middleware

Writing your own downloader middleware is easy. Each middleware component is a single Python class that defines one or more of the following methods:

class `scrapy.contrib.downloadermiddleware.`**DownloaderMiddleware**

process_request(*request*, *spider*)

This method is called for each request that goes through the download middleware.

process_request() should return either `None`, a *Response* object, or a *Request* object.

If it returns `None`, Scrapy will continue processing this request, executing all other middlewares until, finally, the appropriate downloader handler is called the request performed (and its response downloaded).

If it returns a *Response* object, Scrapy won't bother calling ANY other request or exception middleware, or the appropriate download function; it'll return that Response. Response middleware is always called on every Response.

If it returns a *Request* object, the returned request will be rescheduled (in the Scheduler) to be downloaded in the future. The callback of the original request will always be called. If the new request has a callback it will be called with the response downloaded, and the output of that callback will then be passed to the original callback. If the new request doesn't have a callback, the response downloaded will be just passed to the original request callback.

If it returns an *IgnoreRequest* exception, the entire request will be dropped completely and its callback never called.

Parameters

- **request** (*Request* object) – the request being processed
- **spider** (*BaseSpider* object) – the spider for which this request is intended

process_response(*request*, *response*, *spider*)

process_response() should return a *Response* object or raise a *IgnoreRequest* exception.

If it returns a *Response* (it could be the same given response, or a brand-new one), that response will continue to be processed with the *process_response()* of the next middleware in the pipeline.

If it returns an *IgnoreRequest* exception, the response will be dropped completely and its callback never called.

Parameters

- **request** (is a *Request* object) – the request that originated the response
- **reponse** – the response being processed
- **spider** (*BaseSpider* object) – the spider for which this response is intended

process_download_exception(*request*, *exception*, *spider*)

Scrapy calls *process_download_exception()* when a download handler or a *process_request()* (from a downloader middleware) raises an exception.

process_download_exception() should return either `None`, *Response* or *Request* object.

If it returns `None`, Scrapy will continue processing this exception, executing any other exception middleware, until no middleware is left and the default exception handling kicks in.

If it returns a *Response* object, the response middleware kicks in, and won't bother calling any other exception middleware.

If it returns a *Request* object, the returned request is used to instruct an immediate redirection. The original request won't finish until the redirected request is completed. This stops the *process_download_exception()* middleware the same as returning Response would do.

Parameters

- **request** (is a *Request* object) – the request that generated the exception
- **exception** (an `Exception` object) – the raised exception
- **spider** (*BaseSpider* object) – the spider for which this request is intended

6.2.3 Built-in downloader middleware reference

This page describes all downloader middleware components that come with Scrapy. For information on how to use them and how to write your own downloader middleware, see the *downloader middleware usage guide*.

For a list of the components enabled by default (and their orders) see the *DOWNLOADER_MIDDLEWARES_BASE* setting.

CookiesMiddleware

class `scrapy.contrib.downloadermiddleware.cookies.`**CookiesMiddleware**

This middleware enables working with sites that need cookies.

DefaultHeadersMiddleware

class `scrapy.contrib.downloadermiddleware.defaultheaders.`**DefaultHeadersMiddleware**

This middleware sets all default requests headers specified in the *DEFAULT_REQUEST_HEADERS* setting.

HttpAuthMiddleware

class `scrapy.contrib.downloadermiddleware.httpauth.`**HttpAuthMiddleware**

This middleware authenticates all requests generated from certain spiders using Basic access authentication (aka. HTTP auth).

To enable HTTP authentication from certain spiders, set the `http_user` and `http_pass` attributes of those spiders.

Example:

```
class SomeIntranetSiteSpider(CrawlSpider):

    http_user = 'someuser'
    http_pass = 'somepass'
    name = 'intranet.example.com'

    # .. rest of the spider code omitted ...
```

HttpCacheMiddleware

class `scrapy.contrib.downloadermiddleware.httpcache.`**`HttpCacheMiddleware`**

This middleware provides low-level cache to all HTTP requests and responses. Every request and its corresponding response are cached. When the same request is seen again, the response is returned without transferring anything from the Internet.

The HTTP cache is useful for testing spiders faster (without having to wait for downloads every time) and for trying your spider offline, when you don't have an Internet connection.

File system storage

By default, the *`HttpCacheMiddleware`* uses a file system storage with the following structure:

Each request/response pair is stored in a different directory containing the following files:

- `request_body` - the plain request body
- `request_headers` - the request headers (in raw HTTP format)
- `response_body` - the plain response body
- `response_headers` - the request headers (in raw HTTP format)
- `meta` - some metadata of this cache resource in Python `repr()` format (grep-friendly format)
- `pickled_meta` - the same metadata in `meta` but pickled for more efficient deserialization

The directory name is made from the request fingerprint (see `scrapy.utils.request.fingerprint`), and one level of subdirectories is used to avoid creating too many files into the same directory (which is inefficient in many file systems). An example directory could be:

```
/path/to/cache/dir/example.com/72/72811f648e718090f041317756c03adb0ada46c7
```

The cache storage backend can be changed with the *`HTTPCACHE_STORAGE`* setting, but no other backend is provided with Scrapy yet.

Settings

The *`HttpCacheMiddleware`* can be configured through the following settings:

HTTPCACHE_DIR Default: `''` (empty string)

The directory to use for storing the (low-level) HTTP cache. If empty, the HTTP cache will be disabled.

HTTPCACHE_EXPIRATION_SECS Default: `0`

Number of seconds to use for HTTP cache expiration. Requests that were cached before this time will be re-downloaded. If zero, cached requests will always expire. A negative number means requests will never expire.

HTTPCACHE_IGNORE_MISSING Default: `False`

If enabled, requests not found in the cache will be ignored instead of downloaded.

HTTPCACHE_STORAGE Default: `'scrapy.contrib.downloadermiddleware.httpcache.FilesystemCacheSt`

The class which implements the cache storage backend.

HttpCompressionMiddleware

class `scrapy.contrib.downloadermiddleware.httpcompression.`**`HttpCompressionMiddleware`**
This middleware allows compressed (gzip, deflate) traffic to be sent/received from web sites.

HttpProxyMiddleware

New in version 0.8.

class `scrapy.contrib.downloadermiddleware.httpproxy.`**`HttpProxyMiddleware`**
This middleware sets the HTTP proxy to use for requests, by setting the `proxy` meta value to *`Request`* objects.

Like the Python standard library modules urllib and urllib2, it obeys the following enviroment variables:

- `http_proxy`
- `https_proxy`
- `no_proxy`

RedirectMiddleware

class `scrapy.contrib.downloadermiddleware.redirect.`**`RedirectMiddleware`**
This middlware handles redirection of requests based on response status and meta-refresh html tag.

The *`RedirectMiddleware`* can be configured through the following settings (see the settings documentation for more info):

- *`REDIRECT_MAX_METAREFRESH_DELAY`* - Maximum meta-refresh delay that a page is allowed to have for redirection.
- *`REDIRECT_MAX_TIMES`* - Maximum number of redirects to perform on a request.
- *`REDIRECT_PRIORITY_ADJUST`* - Adjusts the redirected request priority by this amount.

RetryMiddleware

class `scrapy.contrib.downloadermiddleware.retry.`**`RetryMiddleware`**
A middlware to retry failed requests that are potentially caused by temporary problems such as a connection timeout or HTTP 500 error.

Failed pages are collected on the scraping process and rescheduled at the end, once the spider has finished crawling all regular (non failed) pages. Once there are no more failed pages to retry, this middleware sends a signal (retry_complete), so other extensions could connect to that signal.

The *RetryMiddleware* can be configured through the following settings (see the settings documentation for more info):

- `RETRY_TIMES` - how many times to retry a failed page
- `RETRY_HTTP_CODES` - which HTTP response codes to retry

About HTTP errors to consider:

You may want to remove 400 from RETRY_HTTP_CODES, if you stick to the HTTP protocol. It's included by default because it's a common code used to indicate server overload, which would be something we want to retry.

RobotsTxtMiddleware

class `scrapy.contrib.downloadermiddleware.robotstxt.`**`RobotsTxtMiddleware`**

This middleware filters out requests forbidden by the robots.txt exclusion standard.

To make sure Scrapy respects robots.txt make sure the middleware is enabled and the *ROBOTSTXT_OBEY* setting is enabled.

> **Warning:** Keep in mind that, if you crawl using multiple concurrent requests per domain, Scrapy could still download some forbidden pages if they were requested before the robots.txt file was downloaded. This is a known limitation of the current robots.txt middleware and will be fixed in the future.

DownloaderStats

class `scrapy.contrib.downloadermiddleware.stats.`**`DownloaderStats`**

Middleware that stores stats of all requests, responses and exceptions that pass through it.

To use this middleware you must enable the *DOWNLOADER_STATS* setting.

UserAgentMiddleware

class `scrapy.contrib.downloadermiddleware.useragent.`**`UserAgentMiddleware`**

Middleware that allows spiders to override the default user agent.

In order for a spider to override the default user agent, its *user_agent* attribute must be set.

6.3 Spider Middleware

The spider middleware is a framework of hooks into Scrapy's spider processing mechanism where you can plug custom functionality to process the requests that are sent to *Spiders* for processing and to process the responses and item that are generated from spiders.

6.3.1 Activating a spider middleware

To activate a spider middleware component, add it to the *SPIDER_MIDDLEWARES* setting, which is a dict whose keys are the middleware class path and their values are the middleware orders.

Here's an example:

```
SPIDER_MIDDLEWARES = {
    'myproject.middlewares.CustomSpiderMiddleware': 543,
}
```

The *SPIDER_MIDDLEWARES* setting is merged with the *SPIDER_MIDDLEWARES_BASE* setting defined in Scrapy (and not meant to be overridden) and then sorted by order to get the final sorted list of enabled middlewares: the first middleware is the one closer to the engine and the last is the one closer to the spider.

To decide which order to assign to your middleware see the *SPIDER_MIDDLEWARES_BASE* setting and pick a value according to where you want to insert the middleware. The order does matter because each middleware performs a different action and your middleware could depend on some previous (or subsequent) middleware being applied.

If you want to disable a builtin middleware (the ones defined in *SPIDER_MIDDLEWARES_BASE*, and enabled by default) you must define it in your project *SPIDER_MIDDLEWARES* setting and assign *None* as its value. For example, if you want to disable the off-site middleware:

```
SPIDER_MIDDLEWARES = {
    'myproject.middlewares.CustomSpiderMiddleware': 543,
    'scrapy.contrib.spidermiddleware.offsite.OffsiteMiddleware': None,
}
```

Finally, keep in mind that some middlewares may need to be enabled through a particular setting. See each middleware documentation for more info.

6.3.2 Writing your own spider middleware

Writing your own spider middleware is easy. Each middleware component is a single Python class that defines one or more of the following methods:

class `scrapy.contrib.spidermiddleware.`**SpiderMiddleware**

process_spider_input(*response*, *spider*)

This method is called for each response that goes through the spider middleware and into the spider, for processing.

process_spider_input() should return `None` or raise and exception.

If it returns `None`, Scrapy will continue processing this response, executing all other middlewares until, finally, the response is handled to the spider for processing.

If it raises an exception, Scrapy won't bother calling any other spider middleware *process_spider_input()* and will call the request errback. The output of the errback is chained back in the other direction for *process_spider_output()* to process it, or *process_spider_exception()* if it raised an exception.

Parameters

- **reponse** – the response being processed
- **spider** (*BaseSpider* object) – the spider for which this response is intended

process_spider_output(*response*, *result*, *spider*)
This method is called with the results returned from the Spider, after it has processed the response.

process_spider_output() must return an iterable of *Request* or *Item* objects.

Parameters

- **response** (class:~*scrapy.http.Response* object) – the response which generated this output from the spider
- **result** (an iterable of *Request* or *Item* objects) – the result returned by the spider
- **spider** (BaseSpider object) – the spider whose result is being processed

process_spider_exception(*response*, *exception*, *spider*)
This method is called when when a spider or :meth:process_spider_input: method (from other spider middleware) raises an exception.

process_spider_exception() should return either None or an iterable of *Response* or *Item* objects.

If it returns None, Scrapy will continue processing this exception, executing any other *process_spider_exception()* in the following middleware components, until no middleware components are left and the exception reaches the engine (where it's logged and discarded).

If it returns an iterable the *process_spider_output()* pipeline kicks in, and no other *process_spider_exception()* will be called.

Parameters

- **response** (*Response* object) – the response being processed when the exception was raised
- **exception** (Exception object) – the exception raised
- **spider** (*scrapy.spider.BaseSpider* object) – the spider which raised the exception

6.3.3 Built-in spider middleware reference

This page describes all spider middleware components that come with Scrapy. For information on how to use them and how to write your own spider middleware, see the *spider middleware usage guide*.

For a list of the components enabled by default (and their orders) see the *SPIDER_MIDDLEWARES_BASE* setting.

DepthMiddleware

class scrapy.contrib.spidermiddleware.depth.**DepthMiddleware**
DepthMiddleware is a scrape middleware used for tracking the depth of each Request inside the site being scraped. It can be used to limit the maximum depth to scrape or things like that.

The *DepthMiddleware* can be configured through the following settings (see the settings documentation for more info):

- *DEPTH_LIMIT* - The maximum depth that will be allowed to crawl for any site. If zero, no limit will be imposed.
- *DEPTH_STATS* - Whether to collect depth stats.

HttpErrorMiddleware

class scrapy.contrib.spidermiddleware.httperror.**HttpErrorMiddleware**
Filter out unsuccessful (erroneous) HTTP responses so that spiders don't have to deal with them, which (most of the times) imposes an overhead, consumes more resources, and makes the spider logic more complex.

According to the HTTP standard, successful responses are those whose status codes are in the 200-300 range.

If you still want to process response codes outside that range, you can specify which response codes the spider is able to handle using the `handle_httpstatus_list` spider attribute.

For example, if you want your spider to handle 404 responses you can do this:

```
class MySpider(CrawlSpider):
    handle_httpstatus_list = [404]
```

Keep in mind, however, that it's usually a bad idea to handle non-200 responses, unless you really know what you're doing.

For more information see: HTTP Status Code Definitions.

OffsiteMiddleware

class scrapy.contrib.spidermiddleware.offsite.**OffsiteMiddleware**
Filters out Requests for URLs outside the domains covered by the spider.

This middleware filters out every request whose host names aren't in the spider's *allowed_domains* attribute.

When your spider returns a request for a domain not belonging to those covered by the spider, this middleware will log a debug message similar to this one:

```
DEBUG: Filtered offsite request to 'www.othersite.com': <GET http://www.othersite.com/some/page.
```

To avoid filling the log with too much noise, it will only print one of these messages for each new domain filtered. So, for example, if another request for `www.othersite.com` is filtered, no log message will be printed. But if a request for `someothersite.com` is filtered, a message will be printed (but only for the first request filtred).

RefererMiddleware

class scrapy.contrib.spidermiddleware.referer.**RefererMiddleware**
Populates Request referer field, based on the Response which originated it.

RequestLimitMiddleware

class scrapy.contrib.spidermiddleware.requestlimit.**RequestLimitMiddleware**
Limits the maximum number of requests in the scheduler for each spider. When a spider tries to schedule more than the allowed amount of requests, the new requests (returned by the spider) will be dropped.

The *RequestLimitMiddleware* can be configured through the following settings (see the settings documentation for more info):

- *REQUESTS_QUEUE_SIZE* - If non zero, it will be used as an upper limit for the amount of requests that can be scheduled per domain. Can be set per spider using `requests_queue_size` attribute.

UrlFilterMiddleware

class scrapy.contrib.spidermiddleware.urlfilter.**UrlFilterMiddleware**
Canonicalizes URLs to filter out duplicated ones

UrlLengthMiddleware

class scrapy.contrib.spidermiddleware.urllength.**UrlLengthMiddleware**
Filters out requests with URLs longer than URLLENGTH_LIMIT

The *UrlLengthMiddleware* can be configured through the following settings (see the settings documentation for more info):

- *URLLENGTH_LIMIT* - The maximum URL length to allow for crawled URLs.

6.4 Extensions

The extensions framework provides a mechanism for inserting your own custom functionality into Scrapy.

Extensions are just regular classes that are instantiated at Scrapy startup, when extensions are initialized.

6.4.1 Extension settings

Extensions use the *Scrapy settings* to manage their settings, just like any other Scrapy code.

It is customary for extensions to prefix their settings with their own name, to avoid collision with existing (and future) extensions. For example, an hypothetic extension to handle Google Sitemaps would use settings like *GOOGLESITEMAP_ENABLED*, *GOOGLESITEMAP_DEPTH*, and so on.

6.4.2 Loading & activating extensions

Extensions are loaded and activated at startup by instantiating a single instance of the extension class. Therefore, all the extension initialization code must be performed in the class constructor (__init__ method).

To make an extension available, add it to the *EXTENSIONS* setting in your Scrapy settings. In *EXTENSIONS*, each extension is represented by a string: the full Python path to the extension's class name. For example:

```
EXTENSIONS = {
    'scrapy.contrib.corestats.CoreStats': 500,
    'scrapy.webservice.WebService': 500,
    'scrapy.telnet.TelnetConsole': 500,
}
```

As you can see, the *EXTENSIONS* setting is a dict where the keys are the extension paths, and their values are the orders, which define the extension *loading* order. Extensions orders are not as important as middleware orders though, and they are typically irrelevant, ie. it doesn't matter in which order the extensions are loaded because they don't depend on each other [1].

However, this feature can be exploited if you need to add an extension which depends on other extensions already loaded.

[1] This is is why the *EXTENSIONS_BASE* setting in Scrapy (which contains all built-in extensions enabled by default) defines all the extensions with the same order (500).

6.4.3 Available, enabled and disabled extensions

Not all available extensions will be enabled. Some of them usually depend on a particular setting. For example, the HTTP Cache extension is available by default but disabled unless the *HTTPCACHE_DIR* setting is set. Both enabled and disabled extensions can be accessed through the *Extension Manager*.

6.4.4 Accessing enabled extensions

Even though it's not usually needed, you can access extension objects through the *Extension Manager* which is populated when extensions are loaded. For example, to access the `WebService` extension:

```
from scrapy.extension import extensions
webservice_extension = extensions.enabled['WebService']
```

6.4.5 Writing your own extension

Writing your own extension is easy. Each extension is a single Python class which doesn't need to implement any particular method.

All extension initialization code must be performed in the class constructor (`__init__` method). If that method raises the *NotConfigured* exception, the extension will be disabled. Otherwise, the extension will be enabled.

Let's take a look at the following example extension which just logs a message every time a domain/spider is opened and closed:

```
from scrapy.xlib.pydispatch import dispatcher
from scrapy.core import signals

class SpiderOpenCloseLogging(object):

    def __init__(self):
        dispatcher.connect(self.spider_opened, signal=signals.spider_opened)
        dispatcher.connect(self.spider_closed, signal=signals.spider_closed)

    def spider_opened(self, spider):
        log.msg("opened spider %s" % spider.name)

    def spider_closed(self, spider):
        log.msg("closed spider %s" % spider.name)
```

6.4.6 Extension Manager

The Extension Manager is responsible for loading and keeping track of installed extensions and it's configured through the *EXTENSIONS* setting which contains a dictionary of all available extensions and their order similar to how you *configure the downloader middlewares*.

class `scrapy.extension.`**ExtensionManager**

The Extension Manager is a singleton object, which is instantiated at module loading time and can be accessed like this:

```
from scrapy.extension import extensions
```

loaded

A boolean which is True if extensions are already loaded or False if they're not.

enabled
A dict with the enabled extensions. The keys are the extension class names, and the values are the extension objects. Example:

```
>>> from scrapy.extension import extensions
>>> extensions.load()
>>> print extensions.enabled
{'CoreStats': <scrapy.contrib.corestats.CoreStats object at 0x9e272ac>,
 'WebService': <scrapy.management.telnet.TelnetConsole instance at 0xa05670c>,
...
```

disabled
A dict with the disabled extensions. The keys are the extension class names, and the values are the extension class paths (because objects are never instantiated for disabled extensions). Example:

```
>>> from scrapy.extension import extensions
>>> extensions.load()
>>> print extensions.disabled
{'MemoryDebugger': 'scrapy.contrib.memdebug.MemoryDebugger',
 'MyExtension': 'myproject.extensions.MyExtension',
...
```

load()
Load the available extensions configured in the *EXTENSIONS* setting. On a standard run, this method is usually called by the Execution Manager, but you may need to call it explicitly if you're dealing with code outside Scrapy.

reload()
Reload the available extensions. See *load()*.

6.4.7 Built-in extensions reference

General purpose extensions

Core Stats extension

class scrapy.contrib.corestats.corestats.**CoreStats**

Enable the collection of core statistics, provided the stats collection is enabled (see *Stats Collection*).

Web service extension

class scrapy.webservice.**WebService**

See *topics-webservice*.

Telnet console extension

class scrapy.telnet.**TelnetConsole**

Provides a telnet console for getting into a Python interpreter inside the currently running Scrapy process, which can be very useful for debugging.

The telnet console must be enabled by the *TELNETCONSOLE_ENABLED* setting, and the server will listen in the port specified in *TELNETCONSOLE_PORT*.

Memory usage extension

class scrapy.contrib.memusage.**MemoryUsage**

Note: This extension does not work in Windows.

Allows monitoring the memory used by a Scrapy process and:

1, send a notification e-mail when it exceeds a certain value 2. terminate the Scrapy process when it exceeds a certain value

The notification e-mails can be triggered when a certain warning value is reached (*MEMUSAGE_WARNING_MB*) and when the maximum value is reached (*MEMUSAGE_LIMIT_MB*) which will also cause the Scrapy process to be terminated.

This extension is enabled by the *MEMUSAGE_ENABLED* setting and can be configured with the following settings:

- *MEMUSAGE_LIMIT_MB*
- *MEMUSAGE_WARNING_MB*
- *MEMUSAGE_NOTIFY_MAIL*
- *MEMUSAGE_REPORT*

Memory debugger extension

class scrapy.contrib.memdebug.**MemoryDebugger**

A memory debugger which collects some info about objects uncollected by the garbage collector and libxml2 memory leaks. To enable this extension, turn on the *MEMDEBUG_ENABLED* setting. The report will be printed to standard output. If the *MEMDEBUG_NOTIFY* setting contains a list of e-mails the report will also be sent to those addresses.

Close spider extension

class scrapy.contrib.closespider.**CloseSpider**

Closes a spider automatically when some conditions are met, using a specific closing reason for each condition.

The conditions for closing a spider can be configured through the following settings. Other conditions will be supported in the future.

CLOSESPIDER_TIMEOUT Default: 0

An integer which specifies a number of seconds. If the spider remains open for more than that number of second, it will be automatically closed with the reason closespider_timeout. If zero (or non set), spiders won't be closed by timeout.

CLOSESPIDER_ITEMPASSED Default: 0

An integer which specifies a number of items. If the spider scrapes more than that amount if items and those items are passed by the item pipeline, the spider will be closed with the reason closespider_itempassed. If zero (or non set), spiders won't be closed by number of passed items.

StatsMailer extension

class scrapy.contrib.statsmailer.**StatsMailer**

This simple extension can be used to send a notification e-mail every time a domain has finished scraping, including the Scrapy stats collected. The email will be sent to all recipients specified in the *STATSMAILER_RCPTS* setting.

Debugging extensions

Stack trace dump extension

class scrapy.contrib.debug.**StackTraceDump**

Dumps the stack trace of a runnning Scrapy process when a SIGUSR2 signal is received. After the stack trace is dumped, the Scrapy process continues running normally.

The stack trace is sent to standard output.

This extension only works on POSIX-compliant platforms (ie. not Windows).

Debugger extension

class scrapy.contrib.debug.**Debugger**

Invokes a Python debugger inside a running Scrapy process when a SIGUSR2 signal is received. After the debugger is exited, the Scrapy process continues running normally.

For more info see *Debugging in Python*.

This extension only works on POSIX-compliant platforms (ie. not Windows).

Architecture overview Understand the Scrapy architecture.

Downloader Middleware Customize how pages get requested and downloaded.

Spider Middleware Customize the input and output of your spiders.

Extensions Add any custom functionality using signals and the Scrapy API

CHAPTER 7

Reference

7.1 scrapy-ctl.py

Scrapy is controlled through the `scrapy-ctl.py` control script. The script provides several commands, for different purposes. Each command supports its own particular syntax. In other words, each command supports a different set of arguments and options.

This page doesn't describe each command and its syntax, but provides an introduction to how the `scrapy-ctl.py` script is used. After you learn how to use it, you can get help for each particular command using the same `scrapy-ctl.py` script.

7.1.1 Global and project-specific `scrapy-ctl.py`

There is one global `scrapy-ctl.py` script shipped with Scrapy and another `scrapy-ctl.py` script automatically created inside your Scrapy project. The project-specific `scrapy-ctl.py` is just a thin wrapper around the global `scrapy-ctl.py` which populates the settings of your project, so you don't have to specify them every time through the `--settings` argument.

7.1.2 Using the `scrapy-ctl.py` script

The first thing you would do with the `scrapy-ctl.py` script is create your Scrapy project:

```
scrapy-ctl.py startproject myproject
```

That will create a Scrapy project under the `myproject` directory and will put a new `scrapy-ctl.py` inside that directory.

So, you go inside the new project directory:

```
cd myproject
```

And you're ready to use your project's `scrapy-ctl.py`. For example, to create a new spider:

```
python scrapy-ctl.py genspider mydomain mydomain.com
```

This is the same as using the global `scrapy-ctl.py` script and passing the project settings module in the `--settings` argument:

```
scrapy-ctl.py --settings=myproject.settings genspider mydomain mydomain.com
```

You'll typically use the project-specific `scrapy-ctl.py`, for convenience.

See all available commands

To see all available commands type:

```
scrapy-ctl.py -h
```

That will print a summary of all available Scrapy commands.

The first line will print the currently active project (if any).

Example (active project):

```
Scrapy X.X.X - project: myproject

Usage
=====

...
```

Example (no active project):

```
Scrapy X.X.X - no active project

Usage
=====

...
```

Get help for a particular command

To get help about a particular command, including its description, usage and available options type:

```
scrapy-ctl.py <command> -h
```

Example:

```
scrapy-ctl.py crawl -h
```

7.1.3 Using `scrapy-ctl.py` outside your project

Not all commands must be run from "inside" a Scrapy project. You can, for example, use the `fetch` command to download a page (using Scrapy built-in downloader) from outside a project. Other commands that can be used outside a project are `startproject` (obviously) and `shell`, to launch a *Scrapy Shell*.

7.2 Requests and Responses

Scrapy uses *`Request`* and *`Response`* objects for crawling web sites.

Typically, *`Request`* objects are generated in the spiders and pass across the system until they reach the Downloader, which executes the request and returns a *`Response`* object which travels back to the spider that issued the request.

Both *`Request`* and *`Response`* classes have subclasses which adds additional functionality not required in the base classes. These are described below in *Request subclasses* and *Response subclasses*.

7.2.1 Request objects

class `scrapy.http.`**Request**(*url*[, *method='GET'*, *body*, *headers*, *cookies*, *meta*, *encoding='utf-8'*, *priority=0.0*, *dont_filter=False*, *callback*, *errback*])

A *Request* object represents an HTTP request, which is usually generated in the Spider and executed by the Downloader, and thus generating a *Response*.

Parameters

- **url** (*string*) – the URL of this request
- **method** (*string*) – the HTTP method of this request. Defaults to `'GET'`.
- **meta** (*dict*) – the initial values for the *Request.meta* attribute. If given, the dict passed in this parameter will be shallow copied.
- **body** (*str or unicode*) – the request body. If a `unicode` is passed, then it's encoded to `str` using the *encoding* passed (which defaults to `utf-8`). If `body` is not given,, an empty string is stored. Regardless of the type of this argument, the final value stored will be a `str` ' (never `unicode` or `None`).
- **headers** (*dict*) – the headers of this request. The dict values can be strings (for single valued headers) or lists (for multi-valued headers).
- **cookies** (*dict*) – the request cookies. Example:

```
request_with_cookies = Request(url="http://www.example.com",
                               cookies={currency: 'USD', country: 'UY'})
```

When some site returns cookies (in a response) those are stored in the cookies for that domain and will be sent again in future requests. That's the typical behaviour of any regular web browser. However, if, for some reason, you want to avoid merging with existing cookies you can instruct Scrapy to do so by setting the `dont_merge_cookies` item in the *Request.meta*.

Example of request without merging cookies:

```
request_with_cookies = Request(url="http://www.example.com",
                               cookies={currency: 'USD', country: 'UY'},
                               meta={'dont_merge_cookies': True})
```

- **encoding** (*int or float*) – the encoding of this request (defaults to `'utf-8'`). This encoding will be used to percent-encode the URL and to convert the body to `str` (if given as `unicode`).
- **priority** – the priority of this request (defaults to `0.0`). The priority is used by the scheduler to define the order used to return requests. It can also be used to feed priorities externally, for example, using an offline long-term scheduler.
- **dont_filter** (*boolean*) – indicates that this request should not be filtered by the scheduler. This is used when you want to perform an identical request multiple times, to ignore the duplicates filter. Use it with care, or you will get into crawling loops. Default to `False`.
- **callback** (*callable*) – the function that will be called with the response of this request (once its downloaded) as its first parameter. For more information see *Passing arguments to callback functions* below. If a Request doesn't specify a callback, the spider's *parse()* method will be used.

- **errback** (*callable*) – a function that will be called if any exception was raised while processing the request. This includes pages that failed with 404 HTTP errors and such. It receives a Twisted Failure instance as first parameter.

url
A string containing the URL of this request. Keep in mind that this attribute contains the escaped URL, so it can differ from the URL passed in the constructor.

method
A string representing the HTTP method in the request. This is guaranteed to be uppercase. Example: `"GET"`, `"POST"`, `"PUT"`, etc

headers
A dictionary-like object which contains the request headers.

body
A str that contains the request body

meta
A dict that contains arbitrary metadata for this request. This dict is empty for new Requests, and is usually populated by different Scrapy components (extensions, middlewares, etc). So the data contained in this dict depends on the extensions you have enabled.

This dict is shallow copied when the request is cloned using the `copy()` or `replace()` methods.

copy()
Return a new Request which is a copy of this Request. See also: *Passing arguments to callback functions*.

replace([*url*, *callback*, *method*, *headers*, *body*, *cookies*, *meta*, *encoding*, *dont_filter*])
Return a Request object with the same members, except for those members given new values by whichever keyword arguments are specified. The attribute *Request.meta* is copied by default (unless a new value is given in the `meta` argument). See also *Passing arguments to callback functions*.

Caveats with copying Requests and callbacks

When you copy a request using the *Request.copy()* or *Request.replace()* methods the callback of the request is not copied by default. This is because of legacy reasons along with limitations in the underlying network library, which doesn't allow sharing Twisted deferreds.

For example:

```
request = Request("http://www.example.com", callback=myfunc)
request2 = request.copy() # doesn't copy the callback
request3 = request.replace(callback=request.callback)
```

In the above example, `request2` is a copy of `request` but it has no callback, while `request3` is a copy of `request` and also contains the callback.

Passing arguments to callback functions

The callback of a request is a function that will be called when the response of that request is downloaded. The callback function will be called with the *Response* object downloaded as its first argument.

Example:

```
def parse_page1(self, response):
    request = Request("http://www.example.com/some_page.html",
                      callback=self.parse_page2)
```

```
def parse_page2(self, response):
    # this would log http://www.example.com/some_page.html
    self.log("Visited %s" % response.url)
```

In some cases you may be interested in passing arguments to those callback functions so you can receive those arguments later, when the response is downloaded. There are two ways for doing this:

1. using a lambda function (or any other function/callable)
2. using the *Request.meta* attribute.

Here's an example of logging the referer URL of each page using each mechanism. Keep in mind, however, that the referer URL could be accessed easier via `response.request.url`).

Using lambda function:

```
def parse_page1(self, response):
    myarg = response.url
    request = Request("http://www.example.com/some_page.html",
                      callback=lambda r: self.parse_page2(r, myarg))

def parse_page2(self, response, referer_url):
    self.log("Visited page %s from %s" % (response.url, referer_url))
```

Using Request.meta:

```
def parse_page1(self, response):
    request = Request("http://www.example.com/some_page.html",
                      callback=self.parse_page2)
    request.meta['referer_url'] = response.url

def parse_page2(self, response):
    referer_url = response.request.meta['referer_url']
    self.log("Visited page %s from %s" % (response.url, referer_url))
```

7.2.2 Request subclasses

Here is the list of built-in *Request* subclasses. You can also subclass it to implement your own custom functionality.

FormRequest objects

The FormRequest class extends the base *Request* with functionality for dealing with HTML forms. It uses the ClientForm library (bundled with Scrapy) to pre-populate form fields with form data from *Response* objects.

class `scrapy.http.`**`FormRequest`**(*url*[, *formdata*, ...])

The *FormRequest* class adds a new argument to the constructor. The remaining arguments are the same as for the *Request* class and are not documented here.

Parameters **`formdata`** (*dict or iterable of tuples*) – is a dictionary (or iterable of (key, value) tuples) containing HTML Form data which will be url-encoded and assigned to the body of the request.

The *FormRequest* objects support the following class method in addition to the standard *Request* methods:

classmethod **`from_response`**(*response*[, *formnumber=0*, *formdata=None*, *clickdata=None*, *dont_click=False*, ...])

Returns a new *FormRequest* object with its form field values pre-populated with those found in

the HTML <form> element contained in the given response. For an example see *Using FormRequest.from_response() to simulate a user login*.

Keep in mind that this method is implemented using ClientForm whose policy is to automatically simulate a click, by default, on any form control that looks clickable, like a a <input type="submit">. Even though this is quite convenient, and often the desired behaviour, sometimes it can cause problems which could be hard to debug. For example, when working with forms that are filled and/or submitted using javascript, the default *from_response()* (and ClientForm) behaviour may not be the most appropiate. To disable this behaviour you can set the dont_click argument to True. Also, if you want to change the control clicked (instead of disabling it) you can also use the clickdata argument.

Parameters

- **response** (*Response* object) – the response containing a HTML form which will be used to pre-populate the form fields
- **formnumber** (*integer*) – the number of form to use, when the response contains multiple forms. The first one (and also the default) is 0.
- **formdata** (*dict*) – fields to override in the form data. If a field was already present in the response <form> element, its value is overridden by the one passed in this parameter.
- **clickdata** (*dict*) – Arguments to be passed directly to ClientForm click_request_data() method. See ClientForm homepage for more info.
- **dont_click** (*boolean*) – If True the form data will be sumbitted without clicking in any element.

The other parameters of this class method are passed directly to the *FormRequest* constructor.

Request usage examples

Using FormRequest to send data via HTTP POST

If you want to simulate a HTML Form POST in your spider, and send a couple of key-value fields you could return a *FormRequest* object (from your spider) like this:

```
return [FormRequest(url="http://www.example.com/post/action",
                    formdata={'name': 'John Doe', age: '27'},
                    callback=self.after_post)]
```

Using FormRequest.from_response() to simulate a user login

It is usual for web sites to provide pre-populated form fields through <input type="hidden"> elements, such as session related data or authentication tokens (for login pages). When scraping, you'll want these fields to be automatically pre-populated and only override a couple of them, such as the user name and password. You can use the *FormRequest.from_response()* method for this job. Here's an example spider which uses it:

```
class LoginSpider(BaseSpider):
    name = 'example.com'
    start_urls = ['http://www.example.com/users/login.php']

    def parse(self, response):
        return [FormRequest.from_response(response,
                    formdata={'username': 'john', 'password': 'secret'},
                    callback=self.after_login)]
```

```
    def after_login(self, response):
        # check login succeed before going on
        if "authentication failed" in response.body:
            self.log("Login failed", level=log.ERROR)
            return

        # continue scraping with authenticated session...
```

7.2.3 Response objects

class scrapy.http.**Response**(*url*[, *status=200*, *headers*, *body*, *meta*, *flags*])

A *Response* object represents an HTTP response, which is usually downloaded (by the Downloader) and fed to the Spiders for processing.

Parameters

- **url** (*string*) – the URL of this response
- **headers** (*dict*) – the headers of this response. The dict values can be strings (for single valued headers) or lists (for multi-valued headers).
- **status** (*integer*) – the HTTP status of the response. Defaults to 200.
- **body** (*str*) – the response body. It must be str, not unicode, unless you're using a encoding-aware *Response subclass*, such as *TextResponse*.
- **meta** (*dict*) – the initial values for the *Response.meta* attribute. If given, the dict will be shallow copied.
- **flags** (*list*) – is a list containing the initial values for the *Response.flags* attribute. If given, the list will be shallow copied.

url

A string containing the URL of the response.

status

An integer representing the HTTP status of the response. Example: 200, 404.

headers

A dictionary-like object which contains the response headers.

body

A str containing the body of this Response. Keep in mind that Reponse.body is always a str. If you want the unicode version use *TextResponse.body_as_unicode()* (only available in *TextResponse* and subclasses).

request

The *Request* object that generated this response. This attribute is assigned in the Scrapy engine, after the response and request has passed through all *Downloader Middlewares*. In particular, this means that:

•HTTP redirections will cause the original request (to the URL before redirection) to be assigned to the redirected response (with the final URL after redirection).

•Response.request.url doesn't always equals Response.url

•This attribute is only available in the spider code, and in the *Spider Middlewares*, but not in Downloader Middlewares (although you have the Request available there by other means) and handlers of the *response_downloaded* signal.

meta
A dict that contains arbitrary metadata for this response, similar to the *Request.meta* attribute. See the *Request.meta* attribute for more info.

flags
A list that contains flags for this response. Flags are labels used for tagging Responses. For example: *'cached'*, *'redirected'*, etc. And they're shown on the string representation of the Response (*__str__* method) which is used by the engine for logging.

copy()
Return a new Response which is a copy of this Response.

replace([*url*, *status*, *headers*, *body*, *meta*, *flags*, *cls*])
Return a Response object with the same members, except for those members given new values by whichever keyword arguments are specified. The attribute *Response.meta* is copied by default (unless a new value is given in the `meta` argument).

7.2.4 Response subclasses

Here is the list of available built-in Response subclasses. You can also subclass the Response class to implement your own functionality.

TextResponse objects

class `scrapy.http.`**TextResponse**(*url*[, *encoding*[, ...]])
TextResponse objects adds encoding capabilities to the base *Response* class, which is meant to be used only for binary data, such as images, sounds or any media file.

TextResponse objects support a new constructor arguments, in addition to the base *Response* objects. The remaining functionality is the same as for the *Response* class and is not documented here.

Parameters **encoding** (*string*) – is a string which contains the encoding to use for this response. If you create a *TextResponse* object with a unicode body it will be encoded using this encoding (remember the body attribute is always a string). If `encoding` is `None` (default value), the encoding will be looked up in the response headers anb body instead.

TextResponse objects support the following attributes in addition to the standard *Response* ones:

encoding
A string with the encoding of this response. The encoding is resolved by trying the following mechanisms, in order:

1. the encoding passed in the constructor *encoding* argument
2. the encoding declared in the Content-Type HTTP header. If this encoding is not valid (ie. unknown), it is ignored and the next resolution mechanism is tried.
3. the encoding declared in the response body. The TextResponse class doesn't provide any special functionality for this. However, the *HtmlResponse* and *XmlResponse* classes do.
4. the encoding inferred by looking at the response body. This is the more fragile method but also the last one tried.

TextResponse objects support the following methods in addition to the standard *Response* ones:

body_as_unicode()
Returns the body of the response as unicode. This is equivalent to:

```
response.body.decode(response.encoding)
```

But **not** equivalent to:

```
unicode(response.body)
```

Since, in the latter case, you would be using you system default encoding (typically *ascii*) to convert the body to uniode, instead of the response encoding.

HtmlResponse objects

class `scrapy.http.`**`HtmlResponse`**(*url*[, ...])
The *`HtmlResponse`* class is a subclass of *`TextResponse`* which adds encoding auto-discovering support by looking into the HTML meta http-equiv attribute. See *`TextResponse.encoding`*.

XmlResponse objects

class `scrapy.http.`**`XmlResponse`**(*url*[, ...])
The *`XmlResponse`* class is a subclass of *`TextResponse`* which adds encoding auto-discovering support by looking into the XML declaration line. See *`TextResponse.encoding`*.

7.3 Settings

The Scrapy settings allows you to customize the behaviour of all Scrapy components, including the core, extensions, pipelines and spiders themselves.

The infrastructure of setting provides a global namespace of key-value mappings that the code can use to pull configuration values from. The settings can be populated through different mechanisms, which are described below.

The settings is also the mechanism for selecting the currently active Scrapy project (in case you have many).

For a list of available built-in settings see: *Built-in settings reference*.

7.3.1 Designating the settings

When you use Scrapy, you have to tell it which settings you're using. You can do this by using an environment variable, `SCRAPY_SETTINGS_MODULE`, or the `--settings` argument of the scrapy-ctl.py script.

The value of `SCRAPY_SETTINGS_MODULE` should be in Python path syntax, e.g. `myproject.settings`. Note that the settings module should be on the Python import search path.

7.3.2 Populating the settings

Settings can be populated using different mechanisms, each of which having a different precedence. Here is the list of them in decreasing order of precedence:

1. Global overrides (most precedence)
2. Environment variables
3. scrapy_settings
4. Default settings per-command

5. Default global settings (less precedence)

This mechanisms are described with more detail below.

1. Global overrides

Global overrides are the ones that takes most precedence, and are usually populated by command line options.

Example::

```
>>> from scrapy.conf import settings
>>> settings.overrides['LOG_ENABLED'] = True
```

You can also override one (or more) settings from command line using the `--set` command line argument.

Example:

```
scrapy-ctl.py crawl domain.com --set LOG_FILE=scrapy.log
```

2. Environment variables

You can populate settings using environment variables prefixed with `SCRAPY_`. For example, to change the log file location un Unix systems:

```
$ export SCRAPY_LOG_FILE=scrapy.log
$ scrapy-ctl.py crawl example.com
```

In Windows systems, you can change the environment variables from the Control Panel following these guidelines.

3. scrapy_settings

scrapy_settings is the standard configuration file for your Scrapy project. It's where most of your custom settings will be populated.

4. Default settings per-command

Each scrapy-ctl.py command can have its own default settings, which override the global default settings. Those custom command settings are located inside the `scrapy.conf.commands` module, or you can specify custom settings to override per-comand inside your project, by writing them in the module referenced by the *COMMANDS_SETTINGS_MODULE* setting. Those settings will take more

5. Default global settings

The global defaults are located in scrapy.conf.default_settings and documented in the *Built-in settings reference* section.

7.3.3 How to access settings

Here's an example of the simplest way to access settings from Python code:

```
>>> from scrapy.conf import settings
>>> print settings['LOG_ENABLED']
True
```

In other words, settings can be accesed like a dict, but it's usually preferred to extract the setting in the format you need it to avoid type errors. In order to do that you'll have to use one of the following methods:

class `scrapy.conf.`**Settings**
The Settings object is automatically instantiated when the *scrapy.conf* module is loaded, and it's usually accessed like this:

```
>>> from scrapy.conf import settings
```

`Settings.`**get**(*name*, *default=None*)
Get a setting value without affecting its original type.

`name` is a string with the setting name

`default` is the value to return if no setting is found

`Settings.`**getbool**(*name*, *default=False*)
Get a setting value as a boolean. For example, both `1` and `'1'`, and `True` return `True`, while `0`, `'0'`, `False` and `None` return `False``

For example, settings populated through environment variables set to `'0'` will return `False` when using this method.

`name` is a string with the setting name

`default` is the value to return if no setting is found

`Settings.`**getint**(*name*, *default=0*)
Get a setting value as an int

`name` is a string with the setting name

`default` is the value to return if no setting is found

`Settings.`**getfloat**(*name*, *default=0.0*)
Get a setting value as a float

`name` is a string with the setting name

`default` is the value to return if no setting is found

`Settings.`**getlist**(*name*, *default=None*)
Get a setting value as a list. If the setting original type is a list it will be returned verbatim. If it's a string it will be splitted by ",".

For example, settings populated through environment variables set to `'one,two'` will return a list ['one', 'two'] when using this method.

`name` is a string with the setting name

`default` is the value to return if no setting is found

7.3.4 Rationale for setting names

Setting names are usually prefixed with the component that they configure. For example, proper setting names for a fictional robots.txt extension would be `ROBOTSTXT_ENABLED`, `ROBOTSTXT_OBEY`, `ROBOTSTXT_CACHEDIR`, etc.

7.3.5 Built-in settings reference

Here's a list of all available Scrapy settings, in alphabetical order, along with their default values and the scope where they apply.

The scope, where available, shows where the setting is being used, if it's tied to any particular component. In that case the module of that component will be shown, typically an extension, middleware or pipeline. It also means that the component must be enabled in order for the setting to have any effect.

BOT_NAME

Default: `scrapybot`

The name of the bot implemented by this Scrapy project (also known as the project name). This will be used to construct the User-Agent by default, and also for logging.

It's automatically populated with your project name when you create your project with the scrapy-ctl.py `startproject` command.

BOT_VERSION

Default: `1.0`

The version of the bot implemented by this Scrapy project. This will be used to construct the User-Agent by default.

COMMANDS_MODULE

Default: `''` (empty string)

A module to use for looking for custom Scrapy commands. This is used to add custom command for your Scrapy project.

Example:

```
COMMANDS_MODULE = 'mybot.commands'
```

COMMANDS_SETTINGS_MODULE

Default: `''` (empty string)

A module to use for looking for custom Scrapy command settings.

Example:

```
COMMANDS_SETTINGS_MODULE = 'mybot.conf.commands'
```

CONCURRENT_ITEMS

Default: `100`

Maximum number of concurrent items (per response) to process in parallel in the Item Processor (also known as the *Item Pipeline*).

CONCURRENT_REQUESTS_PER_SPIDER

Default: `8`

Specifies how many concurrent (ie. simultaneous) requests will be performed per open spider.

CONCURRENT_SPIDERS

Default: `8`

Maximum number of spiders to scrape in parallel.

COOKIES_DEBUG

Default: `False`

Enable debugging message of Cookies Downloader Middleware.

DEFAULT_ITEM_CLASS

Default: `'scrapy.item.Item'`

The default class that will be used for instantiating items in the *the Scrapy shell*.

DEFAULT_REQUEST_HEADERS

Default:

```
{
    'Accept': 'text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8',
    'Accept-Language': 'en',
}
```

The default headers used for Scrapy HTTP Requests. They're populated in the *DefaultHeadersMiddleware*.

DEFAULT_RESPONSE_ENCODING

Default: `'ascii'`

The default encoding to use for *TextResponse* objects (and subclasses) when no encoding is declared and no encoding could be inferred from the body.

DEPTH_LIMIT

Default: `0`

The maximum depth that will be allowed to crawl for any site. If zero, no limit will be imposed.

DEPTH_STATS

Default: `True`

Whether to collect depth stats.

DOWNLOADER_DEBUG

Default: `False`

Whether to enable the Downloader debugging mode.

DOWNLOADER_MIDDLEWARES

Default:: `{}`

A dict containing the downloader middlewares enabled in your project, and their orders. For more info see *Activating a downloader middleware*.

DOWNLOADER_MIDDLEWARES_BASE

Default:

```
{
    'scrapy.contrib.downloadermiddleware.robotstxt.RobotsTxtMiddleware': 100,
    'scrapy.contrib.downloadermiddleware.httpauth.HttpAuthMiddleware': 300,
    'scrapy.contrib.downloadermiddleware.useragent.UserAgentMiddleware': 400,
    'scrapy.contrib.downloadermiddleware.retry.RetryMiddleware': 500,
    'scrapy.contrib.downloadermiddleware.defaultheaders.DefaultHeadersMiddleware': 550,
    'scrapy.contrib.downloadermiddleware.redirect.RedirectMiddleware': 600,
    'scrapy.contrib.downloadermiddleware.cookies.CookiesMiddleware': 700,
    'scrapy.contrib.downloadermiddleware.httpproxy.HttpProxyMiddleware': 750,
    'scrapy.contrib.downloadermiddleware.httpcompression.HttpCompressionMiddleware': 800,
    'scrapy.contrib.downloadermiddleware.stats.DownloaderStats': 850,
    'scrapy.contrib.downloadermiddleware.httpcache.HttpCacheMiddleware': 900,
}
```

A dict containing the downloader middlewares enabled by default in Scrapy. You should never modify this setting in your project, modify *DOWNLOADER_MIDDLEWARES* instead. For more info see *Activating a downloader middleware*.

DOWNLOADER_STATS

Default: `True`

Whether to enable downloader stats collection.

DOWNLOAD_DELAY

Default: `0`

The amount of time (in secs) that the downloader should wait before downloading consecutive pages from the same spider. This can be used to throttle the crawling speed to avoid hitting servers too hard. Decimal numbers are supported. Example:

```
DOWNLOAD_DELAY = 0.25    # 250 ms of delay
```

This setting is also affected by the *RANDOMIZE_DOWNLOAD_DELAY* setting (which is enabled by default). By default, Scrapy doesn't wait a fixed amount of time between requests, but uses a random interval between 0.5 and 1.5 * *DOWNLOAD_DELAY*.

Another way to change the download delay (per spider, instead of globally) is by using the `download_delay` spider attribute, which takes more precedence than this setting.

DOWNLOAD_TIMEOUT

Default: `180`

The amount of time (in secs) that the downloader will wait before timing out.

DUPEFILTER_CLASS

Default: `'scrapy.contrib.dupefilter.RequestFingerprintDupeFilter'`

The class used to detect and filter duplicate requests.

The default (`RequestFingerprintDupeFilter`) filters based on request fingerprint (using `scrapy.utils.request.request_fingerprint`) and grouping per domain.

ENCODING_ALIASES

Default: `{}`

A mapping of custom encoding aliases for your project, where the keys are the aliases (and must be lower case) and the values are the encodings they map to.

This setting extends the *ENCODING_ALIASES_BASE* setting which contains some default mappings.

ENCODING_ALIASES_BASE

Default:

```
{
    # gb2312 is superseded by gb18030
    'gb2312': 'gb18030',
    'chinese': 'gb18030',
    'csiso58gb231280': 'gb18030',
    'euc- cn': 'gb18030',
    'euccn': 'gb18030',
    'eucgb2312-cn': 'gb18030',
    'gb2312-1980': 'gb18030',
    'gb2312-80': 'gb18030',
    'iso- ir-58': 'gb18030',
    # gbk is superseded by gb18030
    'gbk': 'gb18030',
    '936': 'gb18030',
    'cp936': 'gb18030',
    'ms936': 'gb18030',
    # latin_1 is a subset of cp1252
    'latin_1': 'cp1252',
    'iso-8859-1': 'cp1252',
    'iso8859-1': 'cp1252',
    '8859': 'cp1252',
    'cp819': 'cp1252',
    'latin': 'cp1252',
    'latin1': 'cp1252',
    'l1': 'cp1252',
```

```
    # others
    'zh-cn': 'gb18030',
    'win-1251': 'cp1251',
    'macintosh' : 'mac_roman',
    'x-sjis': 'shift_jis',
}
```

The default encoding aliases defined in Scrapy. Don't override this setting in your project, override *ENCODING_ALIASES* instead.

The reason why ISO-8859-1 (and all its aliases) are mapped to CP1252 is due to a well known browser hack. For more information see: Character encodings in HTML.

EXTENSIONS

Default:: `{}`

A dict containing the extensions enabled in your project, and their orders.

EXTENSIONS_BASE

Default:

```
{
    'scrapy.contrib.corestats.CoreStats': 0,
    'scrapy.webservice.WebService': 0,
    'scrapy.telnet.TelnetConsole': 0,
    'scrapy.contrib.memusage.MemoryUsage': 0,
    'scrapy.contrib.memdebug.MemoryDebugger': 0,
    'scrapy.contrib.closedomain.CloseDomain': 0,
}
```

The list of available extensions. Keep in mind that some of them need need to be enabled through a setting. By default, this setting contains all stable built-in extensions.

For more information See the *extensions user guide* and the *list of available extensions*.

GROUPSETTINGS_ENABLED

Default: `False`

Whether to enable group settings where spiders pull their settings from.

GROUPSETTINGS_MODULE

Default: `''` (empty string)

The module to use for pulling settings from, if the group settings is enabled.

ITEM_PIPELINES

Default: `[]`

The item pipelines to use (a list of classes).

Example:

```
ITEM_PIPELINES = [
    'mybot.pipeline.validate.ValidateMyItem',
    'mybot.pipeline.validate.StoreMyItem'
]
```

LOG_ENABLED

Default: `True`

Whether to enable logging.

LOG_ENCODING

Default: `'utf-8'`

The encoding to use for logging.

LOG_FILE

Default: `None`

File name to use for logging output. If None, standard error will be used.

LOG_LEVEL

Default: `'DEBUG'`

Minimum level to log. Available levels are: CRITICAL, ERROR, WARNING, INFO, DEBUG. For more info see *Logging*.

LOG_STDOUT

Default: `False`

If `True`, all standard output (and error) of your process will be redirected to the log. For example if you `print 'hello'` it will appear in the Scrapy log.

MEMDEBUG_ENABLED

Default: `False`

Whether to enable memory debugging.

MEMDEBUG_NOTIFY

Default: `[]`

When memory debugging is enabled a memory report will be sent to the specified addresses if this setting is not empty, otherwise the report will be written to the log.

Example:

```
MEMDEBUG_NOTIFY = ['user@example.com']
```

MEMUSAGE_ENABLED

Default: `False`

Scope: `scrapy.contrib.memusage`

Whether to enable the memory usage extension that will shutdown the Scrapy process when it exceeds a memory limit, and also notify by email when that happened.

See *Memory usage extension*.

MEMUSAGE_LIMIT_MB

Default: `0`

Scope: `scrapy.contrib.memusage`

The maximum amount of memory to allow (in megabytes) before shutting down Scrapy (if MEMUSAGE_ENABLED is True). If zero, no check will be performed.

See *Memory usage extension*.

MEMUSAGE_NOTIFY_MAIL

Default: `False`

Scope: `scrapy.contrib.memusage`

A list of emails to notify if the memory limit has been reached.

Example:

```
MEMUSAGE_NOTIFY_MAIL = ['user@example.com']
```

See *Memory usage extension*.

MEMUSAGE_REPORT

Default: `False`

Scope: `scrapy.contrib.memusage`

Whether to send a memory usage report after each domain has been closed.

See *Memory usage extension*.

MEMUSAGE_WARNING_MB

Default: `0`

Scope: `scrapy.contrib.memusage`

The maximum amount of memory to allow (in megabytes) before sending a warning email notifying about it. If zero, no warning will be produced.

NEWSPIDER_MODULE

Default: `''`

Module where to create new spiders using the `genspider` command.

Example:

```
NEWSPIDER_MODULE = 'mybot.spiders_dev'
```

RANDOMIZE_DOWNLOAD_DELAY

Default: `True`

If enabled, Scrapy will wait a random amount of time (between 0.5 and 1.5 * *DOWNLOAD_DELAY*) while fetching requests from the same spider.

This randomization decreases the chance of the crawler being detected (and subsequently blocked) by sites which analyze requests looking for statistically significant similarities in the time between their times.

The randomization policy is the same used by wget `--random-wait` option.

If *DOWNLOAD_DELAY* is zero (default) this option has no effect.

REDIRECT_MAX_TIMES

Default: `20`

Defines the maximun times a request can be redirected. After this maximun the request's response is returned as is. We used Firefox default value for the same task.

REDIRECT_MAX_METAREFRESH_DELAY

Default: `100`

Some sites use meta-refresh for redirecting to a session expired page, so we restrict automatic redirection to a maximum delay (in seconds)

REDIRECT_PRIORITY_ADJUST

Default: `+2`

Adjust redirect request priority relative to original request. A negative priority adjust means more priority.

REQUEST_HANDLERS

Default: `{}`

A dict containing the request downloader handlers enabled in your project. See *REQUEST_HANDLERS_BASE* for example format.

REQUEST_HANDLERS_BASE

Default:

```
{
    'file': 'scrapy.core.downloader.handlers.file.download_file',
    'http': 'scrapy.core.downloader.handlers.http.download_http',
    'https': 'scrapy.core.downloader.handlers.http.download_http',
}
```

A dict containing the request download handlers enabled by default in Scrapy. You should never modify this setting in your project, modify *REQUEST_HANDLERS* instead.

REQUESTS_QUEUE_SIZE

Default: `0`

Scope: `scrapy.contrib.spidermiddleware.limit`

If non zero, it will be used as an upper limit for the amount of requests that can be scheduled per domain.

ROBOTSTXT_OBEY

Default: `False`

Scope: `scrapy.contrib.downloadermiddleware.robotstxt`

If enabled, Scrapy will respect robots.txt policies. For more information see *RobotsTxtMiddleware*

SCHEDULER

Default: `'scrapy.core.scheduler.Scheduler'`

The scheduler to use for crawling.

SCHEDULER_ORDER

Default: `'DFO'`

Scope: `scrapy.core.scheduler`

The order to use for the crawling scheduler. Available orders are:

- `'BFO'`: Breadth-first order - typically consumes more memory but reaches most relevant pages earlier.
- `'DFO'`: Depth-first order - typically consumes less memory than but takes longer to reach most relevant pages.

SCHEDULER_MIDDLEWARES

Default:: `{}`

A dict containing the scheduler middlewares enabled in your project, and their orders.

SCHEDULER_MIDDLEWARES_BASE

Default:

```
SCHEDULER_MIDDLEWARES_BASE = {
    'scrapy.contrib.schedulermiddleware.duplicatesfilter.DuplicatesFilterMiddleware': 500,
}
```

A dict containing the scheduler middlewares enabled by default in Scrapy. You should never modify this setting in your project, modify *SCHEDULER_MIDDLEWARES* instead.

SPIDER_MIDDLEWARES

Default:: `{}`

A dict containing the spider middlewares enabled in your project, and their orders. For more info see *Activating a spider middleware*.

SPIDER_MIDDLEWARES_BASE

Default:

```
{
    'scrapy.contrib.spidermiddleware.httperror.HttpErrorMiddleware': 50,
    'scrapy.contrib.itemsampler.ItemSamplerMiddleware': 100,
    'scrapy.contrib.spidermiddleware.requestlimit.RequestLimitMiddleware': 200,
    'scrapy.contrib.spidermiddleware.offsite.OffsiteMiddleware': 500,
    'scrapy.contrib.spidermiddleware.referer.RefererMiddleware': 700,
    'scrapy.contrib.spidermiddleware.urllength.UrlLengthMiddleware': 800,
    'scrapy.contrib.spidermiddleware.depth.DepthMiddleware': 900,
}
```

A dict containing the spider middlewares enabled by default in Scrapy. You should never modify this setting in your project, modify *SPIDER_MIDDLEWARES* instead. For more info see *Activating a spider middleware*.

SPIDER_MODULES

Default: `[]`

A list of modules where Scrapy will look for spiders.

Example:

```
SPIDER_MODULES = ['mybot.spiders_prod', 'mybot.spiders_dev']
```

STATS_CLASS

Default: `'scrapy.stats.collector.MemoryStatsCollector'`

The class to use for collecting stats (must implement the Stats Collector API, or subclass the StatsCollector class).

STATS_DUMP

Default: `False`

Dump (to log) domain-specific stats collected when a domain is closed, and all global stats when the Scrapy process finishes (ie. when the engine is shutdown).

STATS_ENABLED

Default: `True`

Enable stats collection.

STATSMAILER_RCPTS

Default: `[]` (empty list)

Send Scrapy stats after domains finish scrapy. See `StatsMailer` for more info.

TELNETCONSOLE_ENABLED

Default: `True`

Scope: `scrapy.management.telnet`

A boolean which specifies if the telnet management console will be enabled (provided its extension is also enabled).

TELNETCONSOLE_PORT

Default: `6023`

The port to use for the telnet console. If set to `None` or `0`, a dynamically assigned port is used. For more info see *Telnet Console*.

TEMPLATES_DIR

Default: `templates` dir inside scrapy module

The directory where to look for template when creating new projects with scrapy-ctl.py startproject command.

URLLENGTH_LIMIT

Default: `2083`

Scope: `contrib.spidermiddleware.urllength`

The maximum URL length to allow for crawled URLs. For more information about the default value for this setting see: http://www.boutell.com/newfaq/misc/urllength.html

USER_AGENT

Default: `"%s/%s" % (BOT_NAME, BOT_VERSION)`

The default User-Agent to use when crawling, unless overrided.

7.4 Signals

Scrapy uses signals extensively to notify when certain actions occur. You can catch some of those signals in your Scrapy project or extension to perform additional tasks or extend Scrapy to add functionality not provided out of the box.

Even though signals provide several arguments, the handlers which catch them don't have to receive all of them.

For more information about working when see the documentation of pydispatcher (library used to implement signals).

7.4.1 Built-in signals reference

Here's a list of signals used in Scrapy and their meaning, in alphabetical order.

engine_started

`scrapy.core.signals.`**`engine_started`**`()`
Sent when the Scrapy engine is started (for example, when a crawling process has started).

engine_stopped

`scrapy.core.signals.`**`engine_stopped`**`()`
Sent when the Scrapy engine is stopped (for example, when a crawling process has finished).

item_scraped

`scrapy.core.signals.`**`item_scraped`**`(`*item*, *spider*, *response*`)`
Sent when the engine receives a new scraped item from the spider, and right before the item is sent to the *Item Pipeline*.

Parameters

- **`item`** (*`Item`* object) – is the item scraped
- **`spider`** (*`BaseSpider`* object) – the spider which scraped the item
- **`response`** (*`Response`* object) – the response from which the item was scraped

item_passed

`scrapy.core.signals.`**`item_passed`**`(`*item*, *spider*, *output*`)`
Sent after an item has passed all the *Item Pipeline* stages without being dropped.

Parameters

- **`item`** (*`Item`* object) – the item which passed the pipeline
- **`spider`** (*`BaseSpider`* object) – the spider which scraped the item
- **`output`** – the output of the item pipeline. This is typically the same *`Item`* object received in the `item` parameter, unless some pipeline stage created a new item.

item_dropped

scrapy.core.signals.**item_dropped**(*item*, *spider*, *exception*)

Sent after an item has been dropped from the *Item Pipeline* when some stage raised a *DropItem* exception.

Parameters

- **item** (*Item* object) – the item dropped from the *Item Pipeline*
- **spider** (*BaseSpider* object) – the spider which scraped the item
- **exception** (*DropItem* exception) – the exception (which must be a *DropItem* subclass) which caused the item to be dropped

spider_closed

scrapy.core.signals.**spider_closed**(*spider*, *reason*)

Sent after a spider has been closed. This can be used to release per-spider resources reserved on *spider_opened*.

Parameters

- **spider** (*BaseSpider* object) – the spider which has been closed
- **reason** (*str*) – a string which describes the reason why the spider was closed. If it was closed because the spider has completed scraping, it the reason is `'finished'`. Otherwise, if the spider was manually closed by calling the `close_spider` engine method, then the reason is the one passed in the `reason` argument of that method (which defaults to `'cancelled'`). If the engine was shutdown (for example, by hitting Ctrl-C to stop it) the reason will be `'shutdown'`.

spider_opened

scrapy.core.signals.**spider_opened**(*spider*)

Sent after a spider has been opened for crawling. This is typically used to reserve per-spider resources, but can be used for any task that needs to be performed when a spider is opened.

Parameters **spider** (*BaseSpider* object) – the spider which has been opened

spider_idle

scrapy.core.signals.**spider_idle**(*spider*)

Sent when a spider has gone idle, which means the spider has no further:

•requests waiting to be downloaded

•requests scheduled

•items being processed in the item pipeline

If the idle state persists after all handlers of this signal have finished, the engine starts closing the spider. After the spider has finished closing, the *spider_closed* signal is sent.

You can, for example, schedule some requests in your *spider_idle* handler to prevent the spider from being closed.

Parameters **spider** (*BaseSpider* object) – the spider which has gone idle

request_received

scrapy.core.signals.**request_received**(*request*, *spider*)
Sent when the engine receives a *Request* from a spider.

Parameters

- **request** (*Request* object) – the request received
- **spider** (*BaseSpider* object) – the spider which generated the request

request_uploaded

scrapy.core.signals.**request_uploaded**(*request*, *spider*)
Sent right after the download has sent a *Request*.

Parameters

- **request** (*Request* object) – the request uploaded/sent
- **spider** (*BaseSpider* object) – the spider which generated the request

response_received

scrapy.core.signals.**response_received**(*response*, *spider*)

Parameters

- **response** (*Response* object) – the response received
- **spider** (*BaseSpider* object) – the spider for which the response is intended

Sent when the engine receives a new *Response* from the downloader.

response_downloaded

scrapy.core.signals.**response_downloaded**(*response*, *spider*)
Sent by the downloader right after a `HTTPResponse` is downloaded.

Parameters

- **response** (*Response* object) – the response downloaded
- **spider** (*BaseSpider* object) – the spider for which the response is intended

7.5 Exceptions

7.5.1 Built-in Exceptions reference

Here's a list of all exceptions included in Scrapy and their usage.

DropItem

exception scrapy.core.exceptions.**DropItem**

The exception that must be raised by item pipeline stages to stop processing an Item. For more information see *Item Pipeline*.

IgnoreRequest

exception scrapy.core.exceptions.**IgnoreRequest**

This exception can be raised by the Scheduler or any downloader middleware to indicate that the request should be ignored.

NotConfigured

exception scrapy.core.exceptions.**NotConfigured**

This exception can be raised by some components to indicate that they will remain disabled. Those components include:

- Extensions
- Item pipelines
- Downloader middlwares
- Spider middlewares

The exception must be raised in the component constructor.

NotSupported

exception scrapy.core.exceptions.**NotSupported**

This exception is raised to indicate an unsupported feature.

7.6 Item Exporters

Once you have scraped your Items, you often want to persist or export those items, to use the data in some other application. That is, after all, the whole purpose of the scraping process.

For this purpose Scrapy provides a collection of Item Exporters for different output formats, such as XML, CSV or JSON.

7.6.1 Using Item Exporters

If you are in a hurry, and just want to use an Item Exporter as an Item Pipeline see the *File Export Pipeline*. Otherwise, if you want to know how Item Exporters work or need more custom functionality (not covered by the *File Export Pipeline*), continue reading below.

In order to use an Item Exporter, you must instantiate it with its required args. Each Item Exporter requires different arguments, so check each exporter documentation to be sure, in *Built-in Item Exporters reference*. After you have instantiated you exporter, you have to:

1. call the method *start_exporting()* in order to signal the beginning of the exporting process

2. call the *export_item()* method for each item you want to export

3. and finally call the *finish_exporting()* to signal the end of the exporting process

Here you can see an Item Pipeline which uses an Item Exporter to export scraped items to different files, one per spider:

```
from scrapy.xlib.pydispatch import dispatcher
from scrapy.core import signals
from scrapy.contrib.exporter import XmlItemExporter

class XmlExportPipeline(object):

    def __init__(self):
        dispatcher.connect(self.spider_opened, signals.spider_opened)
        dispatcher.connect(self.spider_closed, signals.spider_closed)
        self.files = {}

    def spider_opened(self, spider):
        file = open('%s_products.xml' % spider.name, 'w+b')
        self.files[spider] = file
        self.exporter = XmlItemExporter(file)
        self.exporter.start_exporting()

    def spider_closed(self, spider):
        self.exporter.finish_exporting()
        file = self.files.pop(spider)
        file.close()

    def process_item(self, spider, item):
        self.exporter.export_item(item)
        return item
```

7.6.2 Serialization of item fields

By default, the field values are passed unmodified to the underlying serialization library, and the decision of how to serialize them is delegated to each particular serialization library.

However, you can customize how each field value is serialized *before it is passed to the serialization library*.

There are two ways to customize how a field will be serialized, which are described next.

1. Declaring a serializer in the field

You can declare a serializer in the *field metadata*. The serializer must be a callable which receives a value and returns its serialized form.

Example:

```
from scrapy.item import Item, Field

def serialize_price(value):
   return '$ %s' % str(value)

class Product(Item):
```

```
    name = Field()
    price = Field(serializer=serialize_price)
```

2. Overriding the serialize_field() method

You can also override the `serialize()` method to customize how your field value will be exported.

Make sure you call the base class `serialize()` method after your custom code.

Example:

```
from scrapy.contrib.exporter import XmlItemExporter

class ProductXmlExporter(XmlItemExporter):

    def serialize_field(self, field, name, value):
        if field == 'price':
            return '$ %s' % str(value)
        return super(Product, self).serialize_field(field, name, value)
```

7.6.3 Built-in Item Exporters reference

Here is a list of the Item Exporters bundled with Scrapy. Some of them contain output examples, which assume you're exporting these two items:

```
Item(name='Color TV', price='1200')
Item(name='DVD player', price='200')
```

BaseItemExporter

class scrapy.contrib.exporter.**BaseItemExporter**(*fields_to_export=None*, *export_empty_fields=False*, *encoding='utf-8'*)

This is the (abstract) base class for all Item Exporters. It provides support for common features used by all (concrete) Item Exporters, such as defining what fields to export, whether to export empty fields, or which encoding to use.

These features can be configured through the constructor arguments which populate their respective instance attributes: *fields_to_export*, *export_empty_fields*, *encoding*.

export_item(*item*)

Exports the given item. This method must be implemented in subclasses.

serialize_field(*field*, *name*, *value*)

Return the serialized value for the given field. You can override this method (in your custom Item Exporters) if you want to control how a particular field or value will be serialized/exported.

By default, this method looks for a serializer *declared in the item field* and returns the result of applying that serializer to the value. If no serializer is found, it returns the value unchanged except for `unicode` values which are encoded to `str` using the encoding declared in the *encoding* attribute.

Parameters

- **field** (*Field* object) – the field being serialized
- **name** (*str*) – the name of the field being serialized

- **value** – the value being serialized

start_exporting()
Signal the beginning of the exporting process. Some exporters may use this to generate some required header (for example, the *XmlItemExporter*). You must call this method before exporting any items.

finish_exporting()
Signal the end of the exporting process. Some exporters may use this to generate some required footer (for example, the *XmlItemExporter*). You must always call this method after you have no more items to export.

fields_to_export
A list with the name of the fields that will be exported, or None if you want to export all fields. Defaults to None.

Some exporters (like *CsvItemExporter*) respect the order of the fields defined in this attribute.

export_empty_fields
Whether to include empty/unpopulated item fields in the exported data. Defaults to `False`. Some exporters (like *CsvItemExporter*) ignore this attribute and always export all empty fields.

encoding
The encoding that will be used to encode unicode values. This only affects unicode values (which are always serialized to str using this encoding). Other value types are passed unchanged to the specific serialization library.

XmlItemExporter

class scrapy.contrib.exporter.**XmlItemExporter**(*file*, *item_element='item'*, *root_element='items'*, ***kwargs*)
Exports Items in XML format to the specified file object.

Parameters

- **file** – the file-like object to use for exporting the data.
- **root_element** (*str*) – The name of root element in the exported XML.
- **item_element** (*str*) – The name of each item element in the exported XML.

The additional keyword arguments of this constructor are passed to the *BaseItemExporter* constructor.

A typical output of this exporter would be:

```
<?xml version="1.0" encoding="utf-8"?>
<items>
  <item>
    <name>Color TV</name>
    <price>1200</price>
 </item>
  <item>
    <name>DVD player</name>
    <price>200</price>
 </item>
</items>
```

Unless overriden in the `serialize_field()` method, multi-valued fields are exported by serializing each value inside a `<value>` element. This is for convenience, as multi-valued fields are very common.

For example, the item:

```
Item(name=['John', 'Doe'], age='23')
```

Would be serialized as:

```
<?xml version="1.0" encoding="utf-8"?>
<items>
  <item>
    <name>
      <value>John</value>
      <value>Doe</value>
    </name>
    <age>23</age>
  </item>
</items>
```

CsvItemExporter

class scrapy.contrib.exporter.**CsvItemExporter**(*file*, *include_headers_line=True*, ***kwargs*)

Exports Items in CSV format to the given file-like object. If the `fields_to_export` attribute is set, it will be used to define the CSV columns and their order. The `export_empty_fields` attribute has no effect on this exporter.

Parameters

- **file** – the file-like object to use for exporting the data.
- **include_headers_line** (*boolean*) – If enabled, makes the exporter output a header line with the field names taken from *BaseItemExporter.fields_to_export* or the first exported item fields.

The additional keyword arguments of this constructor are passed to the *BaseItemExporter* constructor, and the leftover arguments to the csv.writer constructor, so you can use any *csv.writer* constructor argument to customize this exporter.

A typical output of this exporter would be:

```
product,price
Color TV,1200
DVD player,200
```

PickleItemExporter

class scrapy.contrib.exporter.**PickleItemExporter**(*file*, *protocol=0*, ***kwargs*)

Exports Items in pickle format to the given file-like object.

Parameters

- **file** – the file-like object to use for exporting the data.
- **protocol** (*int*) – The pickle protocol to use.

For more information, refer to the pickle module documentation.

The additional keyword arguments of this constructor are passed to the *BaseItemExporter* constructor.

Pickle isn't a human readable format, so no output examples are provided.

PprintItemExporter

class scrapy.contrib.exporter.**PprintItemExporter**(*file*, ***kwargs*)
Exports Items in pretty print format to the specified file object.

Parameters **file** – the file-like object to use for exporting the data.

The additional keyword arguments of this constructor are passed to the *BaseItemExporter* constructor.

A typical output of this exporter would be:

```
{'name': 'Color TV', 'price': '1200'}
{'name': 'DVD player', 'price': '200'}
```

Longer lines (when present) are pretty-formatted.

JsonLinesItemExporter

class scrapy.contrib.exporter.jsonlines.**JsonLinesItemExporter**(*file*, ***kwargs*)
Exports Items in JSON format to the specified file-like object, writing one JSON-encoded item per line. The additional constructor arguments are passed to the BaseItemExporter constructor, and the leftover arguments to the JSONEncoder constructor, so you can use any JSONEncoder constructor argument to customize this exporter.

Parameters **file** – the file-like object to use for exporting the data.

A typical output of this exporter would be:

```
{"name": "Color TV", "price": "1200"}
{"name": "DVD player", "price": "200"}
```

scrapy-ctl.py Understand the command used to control your Scrapy project.

Requests and Responses Understand the classes used to represent HTTP requests and responses.

Settings Learn how to configure Scrapy and see all *available settings*.

Signals See all available signals and how to work with them.

Exceptions See all available exceptions and their meaning.

Item Exporters Quickly export your scraped items to a file (XML, CSV, etc).

CHAPTER 8

All the rest

8.1 Contributing to Scrapy

There are many ways to contribute to Scrapy. Here are some of them:

- Blog about Scrapy. Tell the world how you're using Scrapy. This will help newcomers with more examples and the Scrapy project to increase its visibility.
- Report bugs and request features in our ticket tracker, trying to follow the guidelines detailed in *Reporting bugs* below.
- Submit patches for new functionality and/or bug fixes. Please read *Submitting patches* below for details on how to submit a patch.
- Join the scrapy-developers mailing list and share your ideas on how to improve Scrapy. We're always open to suggestions.

8.1.1 Reporting bugs

Well-written bug report are very helpful, so keep in mind the following guidelines when reporting a new bug.

- check the *FAQ* first to see if your issue is addressed in a well-known question
- *search the issue tracker* to see if your issues has already been reported. If it has, don't dismiss the report but check the ticket history and comments, you may have additional useful information to contribute.
- search the *scrapy-users* list to see if it has been discussed there, or if you're not sure if what you're seeing is a bug. You can also ask in the *#scrapy* IRC channel.
- write complete, reproducible, specific bug reports. The smaller the test case, the better. Remember that other developers won't have your project to reproduce the bug, so please include all relevant files required to reproduce it.

8.1.2 Submitting patches

The better written a patch is, the higher chance that it'll get accepted and the sooner that will be merged.

Well-written patches should:

- contain the minimum amount of code required for the specific change. Small patches are easier to review and merge. So, if you're doing more than one change (or bug fix), please consider submitting one patch per change. Do not collapse multiple changes into a single patch. For big changes consider using a patch queue.

- pass all unit-tests. See *Running tests* below.
- include one (or more) test cases that check the bug fixed or the new functionality added. See *Writing tests* below.
- if you're adding or changing a public (documented) API, please include the proper update to the documentation. See *Documentation policies* below.

To submit patches, you can follow any of these mechanisms:

- create appropriate tickets in the issue tracker and attach the patches to those tickets. The patches can be generated using `hg diff`.
- send the patches to the *scrapy-developers* list, along with a comment explaining what was fixed or the new functionality (what it is, why it's needed, etc). The more info you include, the easier will be for core developers to understand and accept your patch.
- fork the Github mirror and send a pull request when you're done working on the patch
- clone the Bitbucket mirror and send a pull request when you're done working on the patch

You can also discuss the new functionality (or bug fix) in *scrapy-developers* first, before creating the patch, but it's always good to have a patch ready to illustrate your arguments and show that you have put some additional thought into the subject.

8.1.3 Coding style

Please follow these coding conventions when writing code for inclusion in Scrapy:

- Unless otherwise specified, follow **PEP 8**.
- It's OK to use lines longer than 80 chars if it improves the code readability.
- Please don't put your name in the code you contribute. Our policy is to keep contributor's name in `AUTHORS` file distributed with Scrapy.

8.1.4 Documentation policies

- **Don't** use docstrings for documenting classes, or methods which are already documented in the official (sphinx) documentation. For example, the `ItemLoader.add_value()` method should be documented in the sphinx documentation and not its docstring.
- **Do** use docstrings for documenting functions not present in the official (sphinx) documentation, such as functions from `scrapy.utils` package and sub-modules.

8.1.5 Tests

Tests are implemented using the *Twisted unit-testing framework* called `trial`.

Running tests

To run all tests go to the root directory of Scrapy source code and run:

`bin/runtests.sh` (on unix)

`bin/runtests.bat` (on windows)

To run a specific test (say `scrapy.tests.test_contrib_loader`) use:

`bin/runtests.sh scrapy.tests.test_contrib_loader` (on unix)

`bin/runtests.bat scrapy.tests.test_contrib_loader` (on windows)

Writing tests

All functionality (including new features and bug fixes) must include a test case to check it, so please include tests for your patches if you want them to get accepted sooner.

Scrapy uses unit-tests, which are located in the `scrapy.tests` package (`scrapy/tests` directory). Their module name typically resembles the full path of the module they're testing. For example, the item loaders code is in:

```
scrapy.contrib.loader
```

And their unit-tests are in:

```
scrapy.tests.test_contrib_loader
```

8.2 Versioning and API Stability

API stability is one of Scrapy major goals.

8.2.1 Versioning

When Scrapy reaches 1.0, each release will consist of three version numbers:

- major - big, backwards-incompatible changes
- minor - new features and backwards-compatible changes
- micro - bug fixes only

Until Scrapy reaches 1.0, minor releases (0.7, 0.8, etc) will follow the same policy as major releases.

Sometimes the micro version can be omitted, for brevity, when it's not relevant.

8.2.2 API Stability

Methods or functions that start with a single dash (_) are private and should never be relied as stable. Besides those, the plan is to stabilize and document the entire API, as we approach the 1.0 release.

Also, keep in mind that stable doesn't mean complete: stable APIs could grow new methods or functionality but the existing methods should keep working the same way.

8.3 Experimental features

This section documents experimental Scrapy features that may become stable in future releases, but whose API is not yet stable. Use them with caution, and subscribe to the mailing lists to get notified of any changes.

Since it's not revised so frequently, this section may contain documentation which is outdated, incomplete or overlapping with stable documentation (until it's properly merged) . Use at your own risk.

Warning: This documentation is a work in progress. Use at your own risk.

8.3.1 DjangoItem

`DjangoItem` is a class of item that gets its fields definition from a Django model, you simply create a `DjangoItem` and specify what Django model it relates to.

Besides of getting the model fields defined on your item, `DjangoItem` provides a method to create and populate a Django model instance with the item data.

Using DjangoItem

`DjangoItem` works much like ModelForms in Django, you create a subclass and define its `django_model` atribute to ve a valid Django model. With this you will get an item with a field for each Django model field.

In addition, you can define fields that aren't present in the model and even override fields that are present in the model defining them in the item.

Let's see some examples:

Django model for the examples:

```
class Person(models.Model):
    name = models.CharField(max_length=255)
    age = models.IntegerField()
```

Defining a basic `DjangoItem`:

```
class PersonItem(DjangoItem):
    django_model = Person
```

`DjangoItem` work just like *Item*:

```
p = PersonItem()
p['name'] = 'John'
p['age'] = '22'
```

To obtain the Django model from the item, we call the extra method `save()` of the `DjangoItem`:

```
>>> person = p.save()
>>> person.name
'John'
>>> person.age
'22'
>>> person.id
1
```

As you see the model is already saved when we call `save()`, we can prevent this by calling it with `commit=False`. We can use `commit=False` in `save()` method to obtain an unsaved model:

```
>>> person = p.save(commit=False)
>>> person.name
'John'
>>> person.age
'22'
>>> person.id
None
```

As said before, we can add other fields to the item:

```
class PersonItem(DjangoItem):
    django_model = Person
    sex = Field()

p = PersonItem()
p['name'] = 'John'
p['age'] = '22'
p['sex'] = 'M'
```

Note: fields added to the item won't be taken into account when doing a `save()`

And we can override the fields of the model with your own:

```
class PersonItem(DjangoItem):
    django_model = Person
    name = Field(default='No Name')
```

This is usefull to provide properties to the field, like a default or any other property that your project uses.

8.3.2 Scheduler middleware

The scheduler middleware is a framework of hooks in the Scrapy scheduling mechanism where you can plug custom functionality to process requests being enqueued.

Activating a scheduler middleware

To activate a scheduler middleware component, add it to the *SCHEDULER_MIDDLEWARES* setting, which is a dict whose keys are the middleware class path and their values are the middleware orders.

Here's an example:

```
SCHEDULER_MIDDLEWARES = {
    'myproject.middlewares.CustomSchedulerMiddleware': 543,
}
```

The *SCHEDULER_MIDDLEWARES* setting is merged with the *SCHEDULER_MIDDLEWARES_BASE* setting defined in Scrapy (and not meant to be overridden) and then sorted by order to get the final sorted list of enabled middlewares: the first middleware is the one closer to the engine and the last is the one closer to the scheduler.

To decide which order to assign to your middleware see the *SCHEDULER_MIDDLEWARES_BASE* setting and pick a value according to where you want to insert the middleware. The order does matter because each middleware performs a different action and your middleware could depend on some previous (or subsequent) middleware being applied.

If you want to disable a builtin middleware (the ones defined in *SCHEDULER_MIDDLEWARES_BASE*, and enabled by default) you must define it in your project *SCHEDULER_MIDDLEWARES* setting and assign *None* as its value. For example, if you want to disable the duplicates filter middleware:

```
SCHEDULER_MIDDLEWARES = {
    'myproject.middlewares.CustomSchedulerMiddleware': 543,
    'scrapy.contrib.schedulermiddleware.duplicatesfilter.DuplicatesFilterMiddleware: None,
}
```

Finally, keep in mind that some middlewares may need to be enabled through a particular setting. See each middleware documentation for more info.

Writing your own scheduler middleware

Writing your own scheduler middleware is easy. Each middleware component is a single Python class that defines one or more of the following methods:

class scrapy.contrib.schedulermiddleware.**SchedulerMiddleware**

enqueue_request(*spider*, *request*)
Process the given request which is being enqueued. This method can return None to avoid the request from being scheduled.

enqueue_request() should return either None, a *Response* object or a Deferred.

Parameters

- **spider** (*BaseSpider* object) – the spider originating the request
- **requests** – the request to be enqueued

Built-in scheduler middleware reference

This page describes all scheduler middleware components that come with Scrapy.

For a list of the components enabled by default (and their orders) see the *SCHEDULER_MIDDLEWARES_BASE* setting.

DuplicatesFilterMiddleware

class scrapy.contrib.schedulermiddleware.duplicatesfilter.**DuplicatesFilterMiddleware**
Filter out already visited urls.

The *DuplicatesFilterMiddleware* can be configured through the following settings (see the settings documentation for more info):

- *DUPEFILTER_CLASS* - The class that implements the duplicate filtering policy.

8.3.3 CrawlSpider v2

Introduction

TODO: introduction

Rules Matching

TODO: describe purpose of rules

Request Extractors & Processors

TODO: describe purpose of extractors & processors

Examples

TODO: plenty of examples

Reference

CrawlSpider

TODO: describe crawlspider

class scrapy.contrib_exp.crawlspider.spider.**CrawlSpider**
TODO: describe class

Rules

TODO: describe spider rules

class scrapy.contrib_exp.crawlspider.rules.**Rule**
TODO: describe Rules class

Request Extractors

TODO: describe extractors purpose

class scrapy.contrib_exp.crawlspider.reqext.**BaseSgmlRequestExtractor**
TODO: describe base extractor

class scrapy.contrib_exp.crawlspider.reqext.**SgmlRequestExtractor**
TODO: describe sgml extractor

class scrapy.contrib_exp.crawlspider.reqext.**XPathRequestExtractor**
TODO: describe xpath request extractor

Request Processors

TODO: describe request processors

class scrapy.contrib_exp.crawlspider.reqproc.**Canonicalize**
TODO: describe proc

class scrapy.contrib_exp.crawlspider.reqproc.**Unique**
TODO: describe unique

class scrapy.contrib_exp.crawlspider.reqproc.**FilterDomain**
TODO: describe filter domain

class scrapy.contrib_exp.crawlspider.reqproc.**FilterUrl**
TODO: describe filter url

Request/Response Matchers

TODO: describe matchers

class scrapy.contrib_exp.crawlspider.matchers.**BaseMatcher**
TODO: describe base matcher

class scrapy.contrib_exp.crawlspider.matchers.**UrlMatcher**
TODO: describe url matcher

class scrapy.contrib_exp.crawlspider.matchers.**UrlRegexMatcher**
TODO: describe UrlListMatcher

class scrapy.contrib_exp.crawlspider.matchers.**UrlListMatcher**
TODO: describe url list matcher

Contributing to Scrapy Learn how to contribute to the Scrapy project.

Versioning and API Stability Understand Scrapy versioning and API stability.

Experimental features Learn about bleeding-edge features.

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