Python爬虫项目班

第5课 – Scrapy及相关应用

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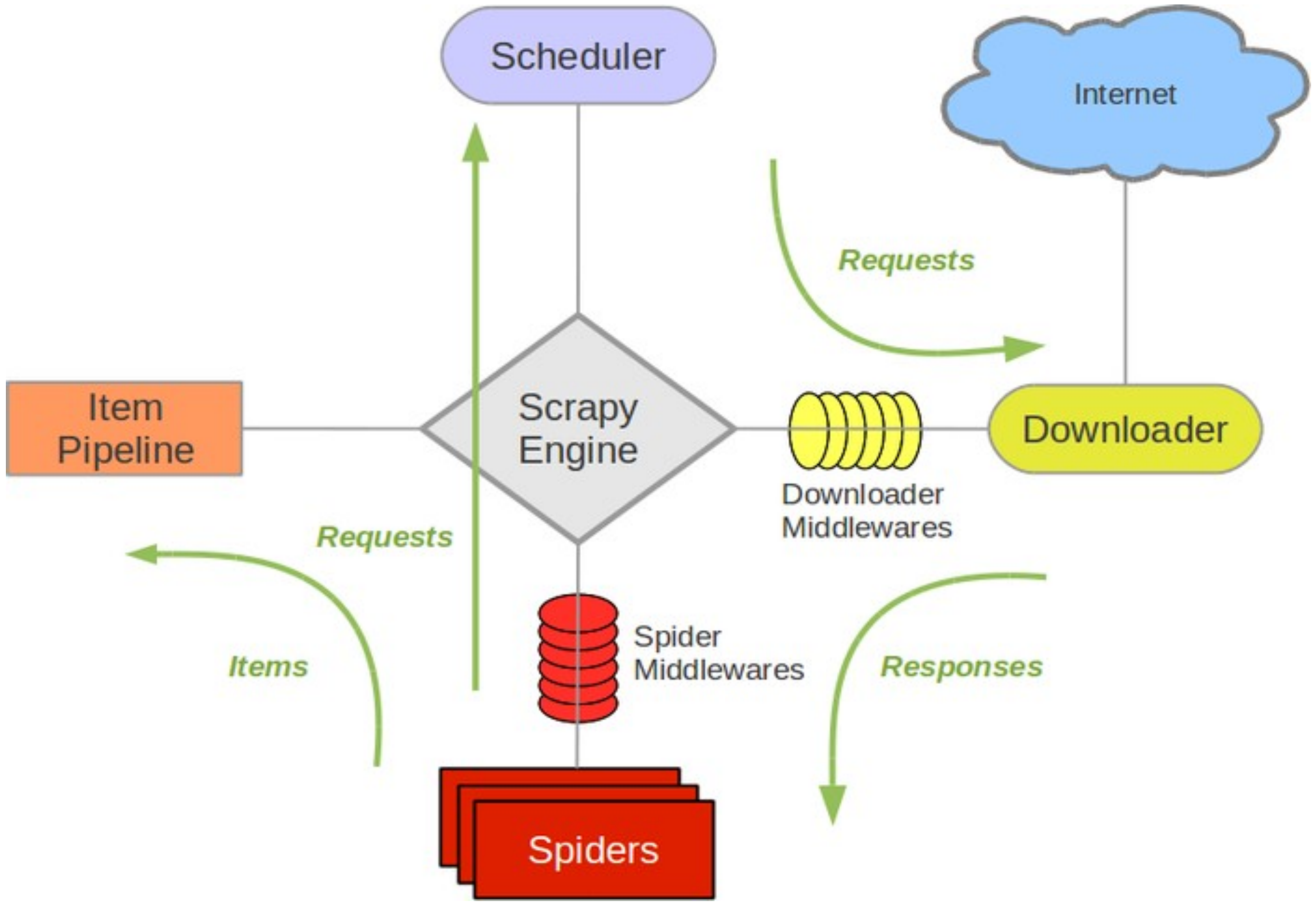
Scrapy

An open source and collaborative framework for extracting the data you need from websites. In a fast, simple, yet extensible way.

https://doc.scrapy.org/en/master/intro/overview.html

Scrapy结构



https://doc.scrapy.org/en/master/topics/architecture.html

Scrapy结构

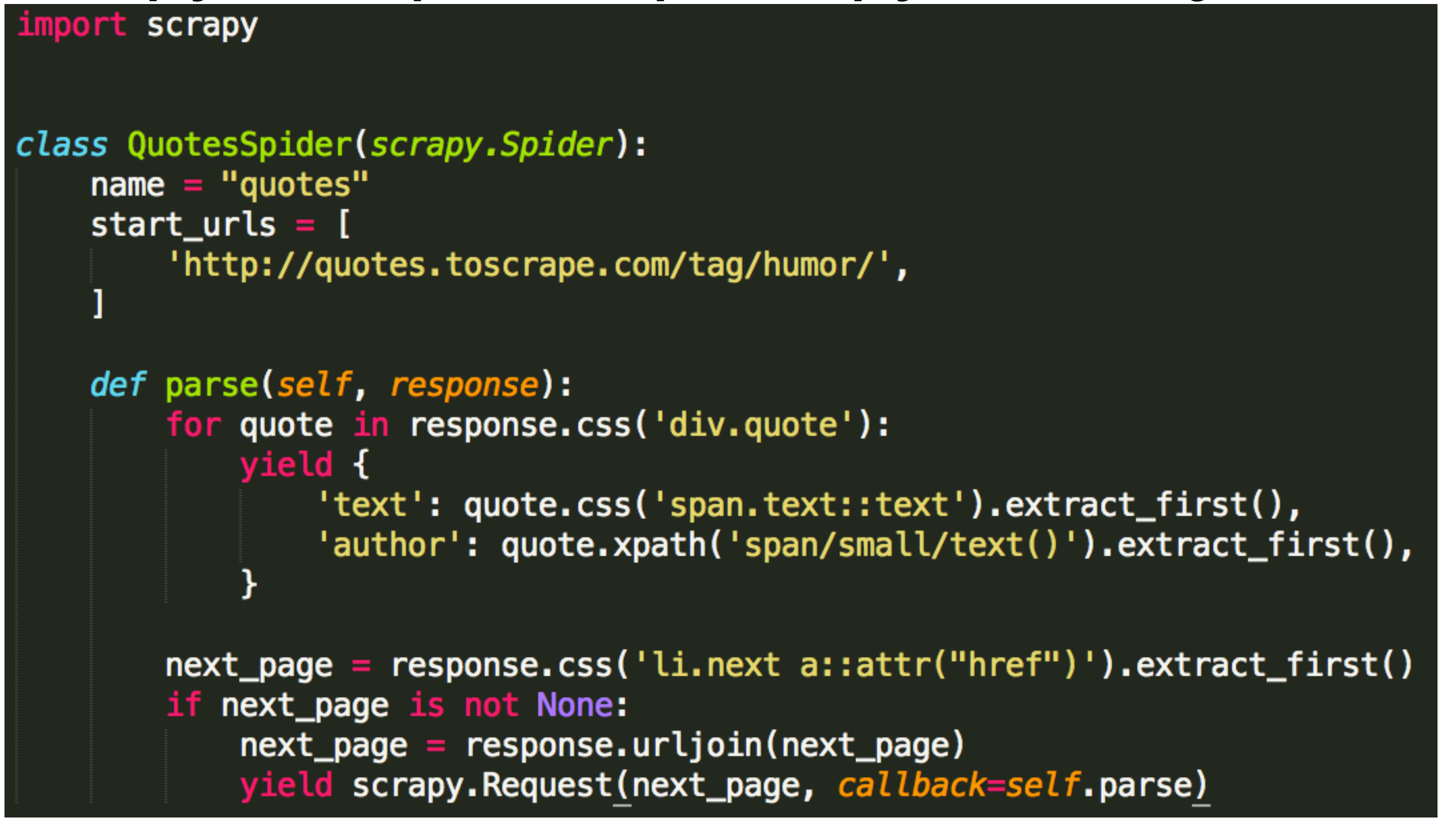
- 引擎(Scrapy Engine)
- 调度器(Scheduler)
- 下载器(Downloader)
- 蜘蛛(Spiders)
- 项目管道(Item Pipeline)
- 下载器中间件(Downloader Middlewares)
- 蜘蛛中间件(Spider Middlewares)
- 调度中间件(Scheduler Middlewares)

Scrapy工作方式

- 绿线是数据流向
  - 从初始URL开始，Scheduler会将其交给Downloader进行下载
  - 下载之后会交给Spider进行分析
  - Spider分析出来的结果有两种
    - 一种是需要进一步抓取的链接，如“下一页”的链接，它们会被传回Scheduler；
    - 另一种是需要保存的数据，它们被送到Item Pipeline里，进行后期处理（详细分析、过滤、存储等）。
  - 在数据流动的通道里还可以安装各种中间件，进行必要的处理。

组件spider与简单爬取

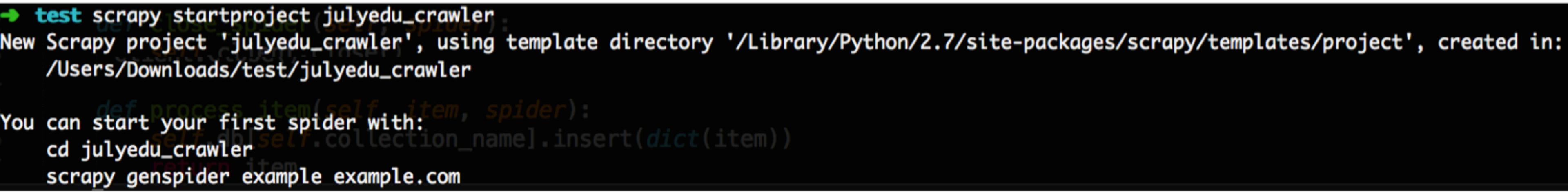
- scrapy runspider spider.py –o xxx.json



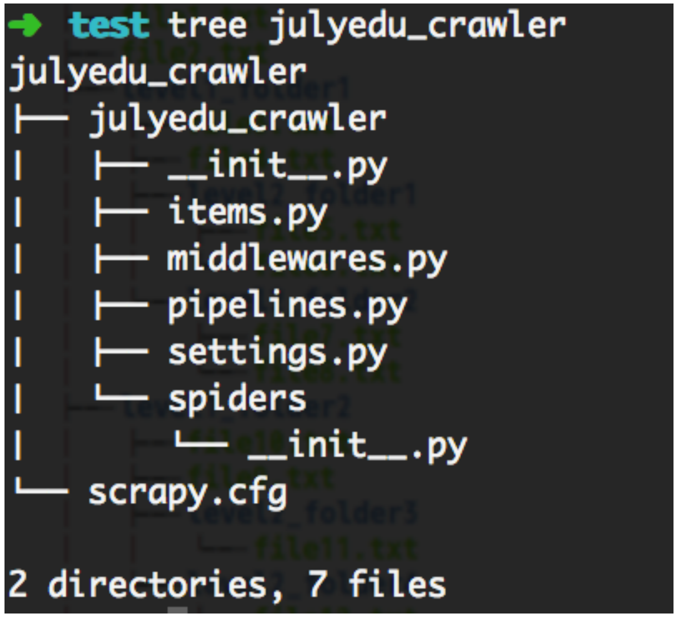
```python
import scrapy


class QuotesSpider(scrapy.Spider):
    name = "quotes"
    start_urls = [
        'http://quotes.toscrape.com/tag/humor/',
    ]

    def parse(self, response):
        for quote in response.css('div.quote'):
            yield {
                'text': quote.css('span.text::text').extract_first(),
                'author': quote.xpath('span/small/text()').extract_first(),
            }

        next_page = response.css('li.next a::attr("href")').extract_first()
        if next_page is not None:
            next_page = response.urljoin(next_page)
            yield scrapy.Request(next_page, callback=self.parse)
```

- 推荐json、xml、csv格式，方便导入数据库

Scrapy项目创建



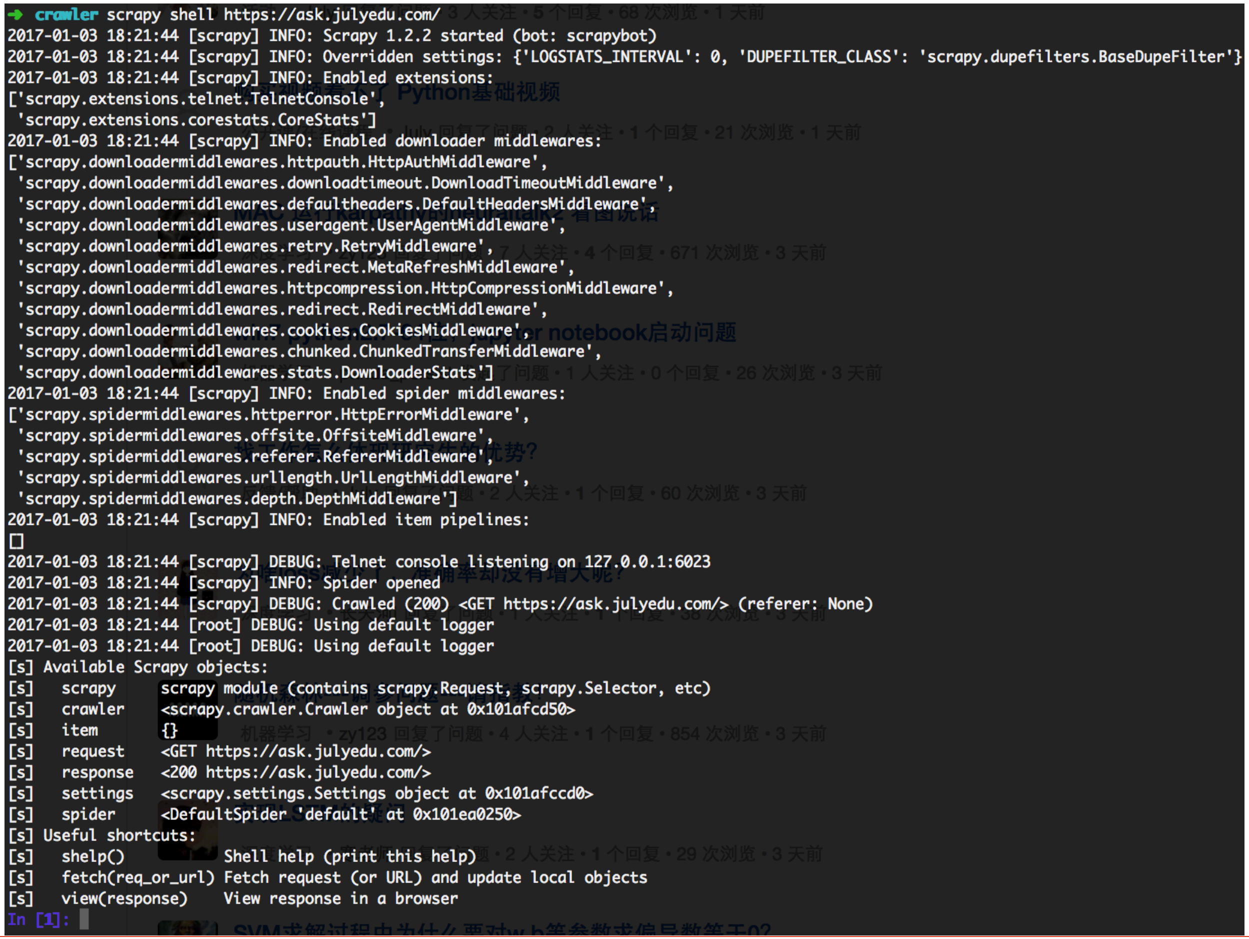
```
➜  test scrapy startproject julyedu_crawler
New Scrapy project 'julyedu_crawler', using template directory '/Library/Python/2.7/site-packages/scrapy/templates/project', created in:
    /Users/Downloads/test/julyedu_crawler

You can start your first spider with:
    cd julyedu_crawler
    scrapy genspider example example.com
```



```
➜  test tree julyedu_crawler
julyedu_crawler
├── julyedu_crawler
│   ├── __init__.py
│   ├── items.py
│   ├── middlewares.py
│   ├── pipelines.py
│   ├── settings.py
│   └── spiders
│       └── __init__.py
└── scrapy.cfg

2 directories, 7 files
```

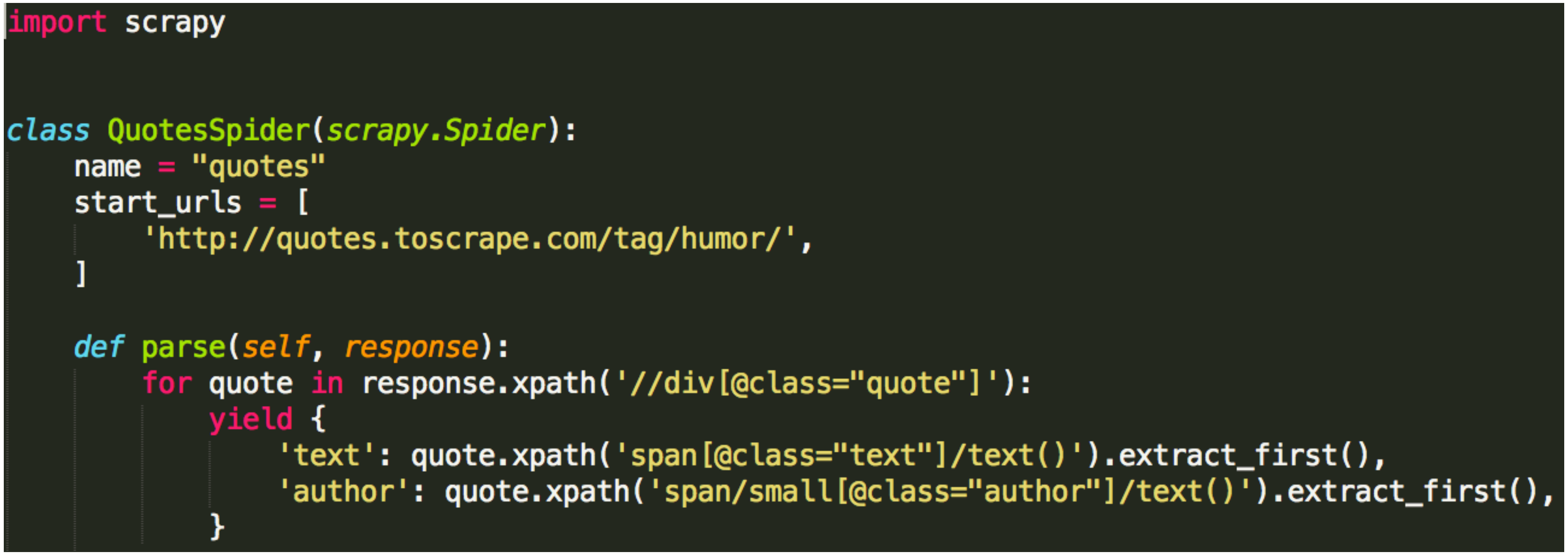
scrapy shell

- scrapy shell http://你要调试xpath的网址



```
➜ crawler scrapy shell https://ask.julyedu.com/
2017-01-03 18:21:44 [scrapy] INFO: Scrapy 1.2.2 started (bot: scrapybot)
2017-01-03 18:21:44 [scrapy] INFO: Overridden settings: {'LOGSTATS_INTERVAL': 0, 'DUPEFILTER_CLASS': 'scrapy.dupefilters.BaseDupeFilter'}
2017-01-03 18:21:44 [scrapy] INFO: Enabled extensions:
['scrapy.extensions.telnet.TelnetConsole',
 'scrapy.extensions.corestats.CoreStats']
2017-01-03 18:21:44 [scrapy] INFO: Enabled downloader middlewares:
['scrapy.downloadermiddlewares.httpauth.HttpAuthMiddleware',
 'scrapy.downloadermiddlewares.downloadtimeout.DownloadTimeoutMiddleware',
 'scrapy.downloadermiddlewares.defaultheaders.DefaultHeadersMiddleware',
 'scrapy.downloadermiddlewares.useragent.UserAgentMiddleware',
 'scrapy.downloadermiddlewares.retry.RetryMiddleware',
 'scrapy.downloadermiddlewares.redirect.MetaRefreshMiddleware',
 'scrapy.downloadermiddlewares.httpcompression.HttpCompressionMiddleware',
 'scrapy.downloadermiddlewares.redirect.RedirectMiddleware',
 'scrapy.downloadermiddlewares.cookies.CookiesMiddleware',
 'scrapy.downloadermiddlewares.chunked.ChunkedTransferMiddleware',
 'scrapy.downloadermiddlewares.stats.DownloaderStats']
2017-01-03 18:21:44 [scrapy] INFO: Enabled spider middlewares:
['scrapy.spidermiddlewares.httperror.HttpErrorMiddleware',
 'scrapy.spidermiddlewares.offsite.OffsiteMiddleware',
 'scrapy.spidermiddlewares.referer.RefererMiddleware',
 'scrapy.spidermiddlewares.urllength.UrlLengthMiddleware',
 'scrapy.spidermiddlewares.depth.DepthMiddleware']
2017-01-03 18:21:44 [scrapy] INFO: Enabled item pipelines:
[]
2017-01-03 18:21:44 [scrapy] DEBUG: Telnet console listening on 127.0.0.1:6023
2017-01-03 18:21:44 [scrapy] INFO: Spider opened
2017-01-03 18:21:44 [scrapy] DEBUG: Crawled (200) <GET https://ask.julyedu.com/> (referer: None)
2017-01-03 18:21:44 [root] DEBUG: Using default logger
2017-01-03 18:21:44 [root] DEBUG: Using default logger
[s] Available Scrapy objects:
[s]   scrapy     scrapy module (contains scrapy.Request, scrapy.Selector, etc)
[s]   crawler    <scrapy.crawler.Crawler object at 0x101afcd50>
[s]   item       {}
[s]   request    <GET https://ask.julyedu.com/>
[s]   response   <200 https://ask.julyedu.com/>
[s]   settings   <scrapy.settings.Settings object at 0x101afccd0>
[s]   spider     <DefaultSpider 'default' at 0x101ea0250>
[s] Useful shortcuts:
[s]   shelp()           Shell help (print this help)
[s]   fetch(req_or_url) Fetch request (or URL) and update local objects
[s]   view(response)    View response in a browser
In [1]:
```

scrapy组件spider



```python
import scrapy


class QuotesSpider(scrapy.Spider):
    name = "quotes"
    start_urls = [
        'http://quotes.toscrape.com/tag/humor/',
    ]

    def parse(self, response):
        for quote in response.xpath('//div[@class="quote"]'):
            yield {
                'text': quote.xpath('span[@class="text"]/text()').extract_first(),
                'author': quote.xpath('span/small[@class="author"]/text()').extract_first(),
            }
```

scrapy组件spider

- 爬取流程
  - 先初始化请求URL列表，并指定下载后处理response的回调函数。
  - 在parse回调中解析response并返回字典,Item对象,Request对象或它们的迭代对象。
  - 在回调函数里面，使用选择器解析页面内容，并生成解析后的结果Item。
  - 最后返回的这些Item通常会被持久化到数据库中(使用Item Pipeline)或者使用Feed exports将其保存到文件中。

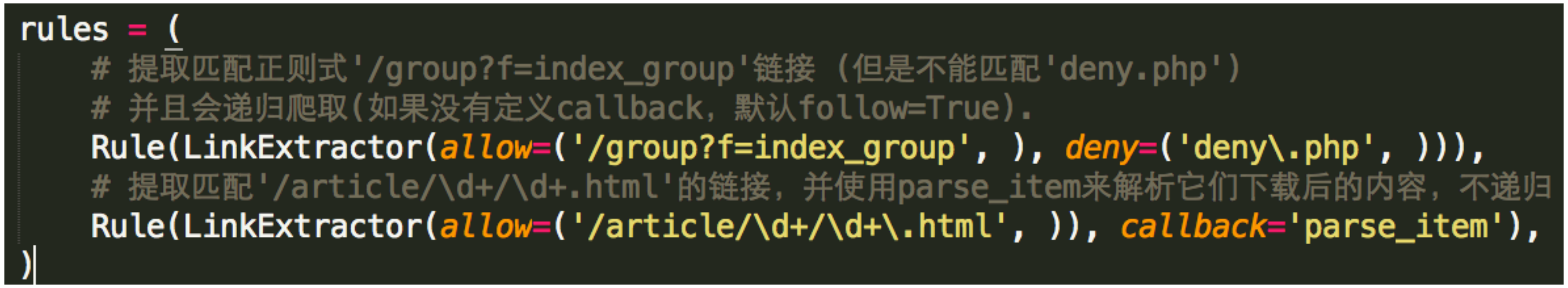
scrapy spider几种爬取方式

- 爬取1页内容
- 按照给定列表爬取多页
- “下一页”类型
- 按照链接进行爬取

见课上代码讲解

不同类型spider

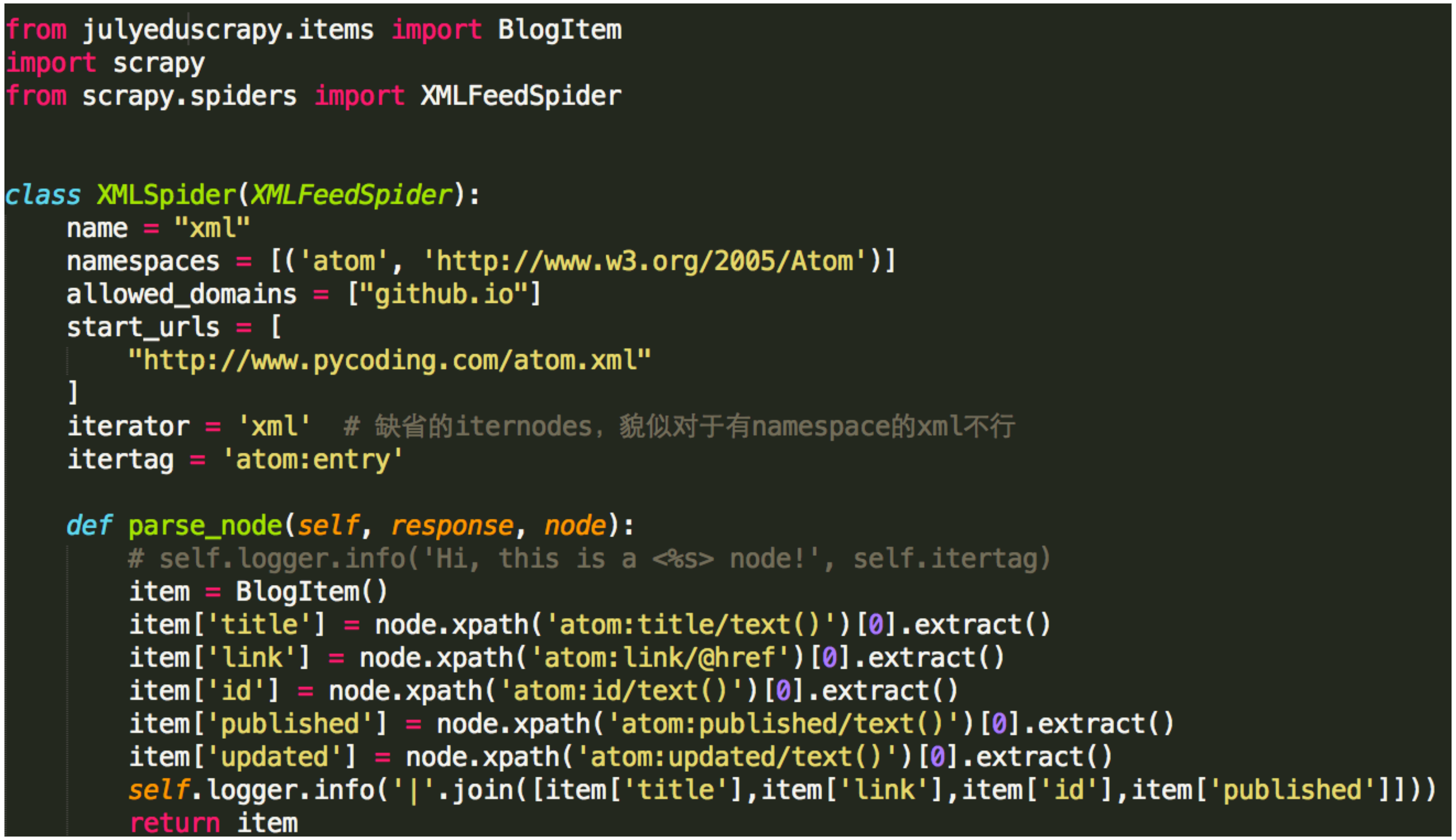
- CrawlSpider
  - 链接爬取蜘蛛
  - 属性rules：Rule对象列表，定义规则



```
rules = (
    # 提取匹配正则式'/group?f=index_group'链接 (但是不能匹配'deny.php')
    # 并且会递归爬取(如果没有定义callback，默认follow=True).
    Rule(LinkExtractor(allow=('/group?f=index_group', ), deny=('deny\.php', ))),
    # 提取匹配'/article/\d+/\d+.html'的链接，并使用parse_item来解析它们下载后的内容，不递归
    Rule(LinkExtractor(allow=('/article/\d+/\d+\.html', )), callback='parse_item'),
)
```

不同类型spider

- XMLFeedSpider
  - XML订阅蜘蛛，通过某个指定的节点来遍历

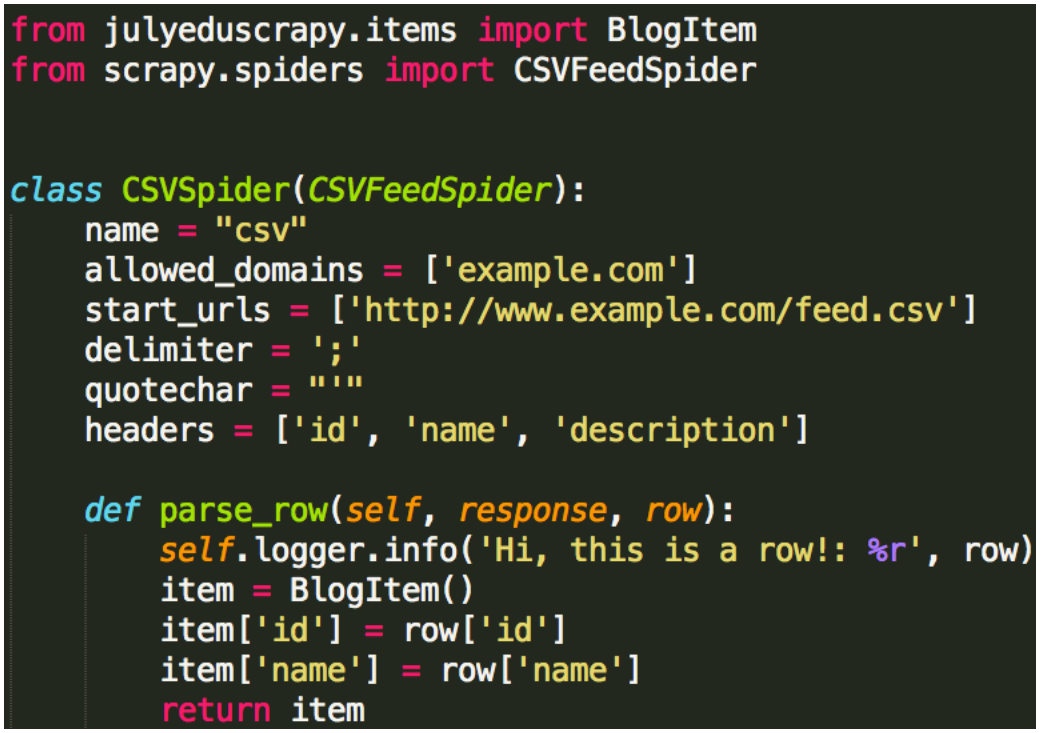


```
from julyeduscrapy.items import BlogItem
import scrapy
from scrapy.spiders import XMLFeedSpider


class XMLSpider(XMLFeedSpider):
    name = "xml"
    namespaces = [('atom', 'http://www.w3.org/2005/Atom')]
    allowed_domains = ["github.io"]
    start_urls = [
        "http://www.pycoding.com/atom.xml"
    ]
    iterator = 'xml'  # 缺省的iternodes，貌似对于有namespace的xml不行
    itertag = 'atom:entry'

    def parse_node(self, response, node):
        # self.logger.info('Hi, this is a <%s> node!', self.itertag)
        item = BlogItem()
        item['title'] = node.xpath('atom:title/text()')[0].extract()
        item['link'] = node.xpath('atom:link/@href')[0].extract()
        item['id'] = node.xpath('atom:id/text()')[0].extract()
        item['published'] = node.xpath('atom:published/text()')[0].extract()
        item['updated'] = node.xpath('atom:updated/text()')[0].extract()
        self.logger.info('|'.join([item['title'],item['link'],item['id'],item['published']]))
        return item
```

不同类型spider

CSVFeedSpider

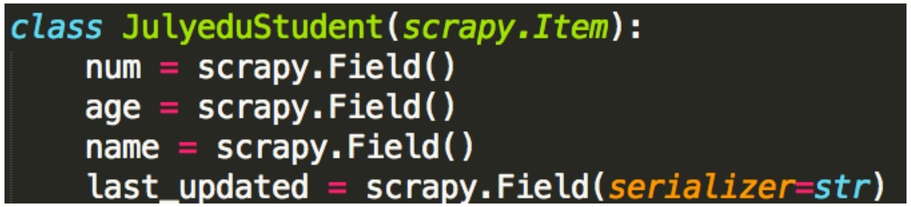
- 类似XML订阅蜘蛛
- 逐行迭代，调用parse_row()解析



```python
from julyeduscrapy.items import BlogItem
from scrapy.spiders import CSVFeedSpider


class CSVSpider(CSVFeedSpider):
    name = "csv"
    allowed_domains = ['example.com']
    start_urls = ['http://www.example.com/feed.csv']
    delimiter = ';'
    quotechar = "'"
    headers = ['id', 'name', 'description']

    def parse_row(self, response, row):
        self.logger.info('Hi, this is a row!: %r', row)
        item = BlogItem()
        item['id'] = row['id']
        item['name'] = row['name']
        return item
```

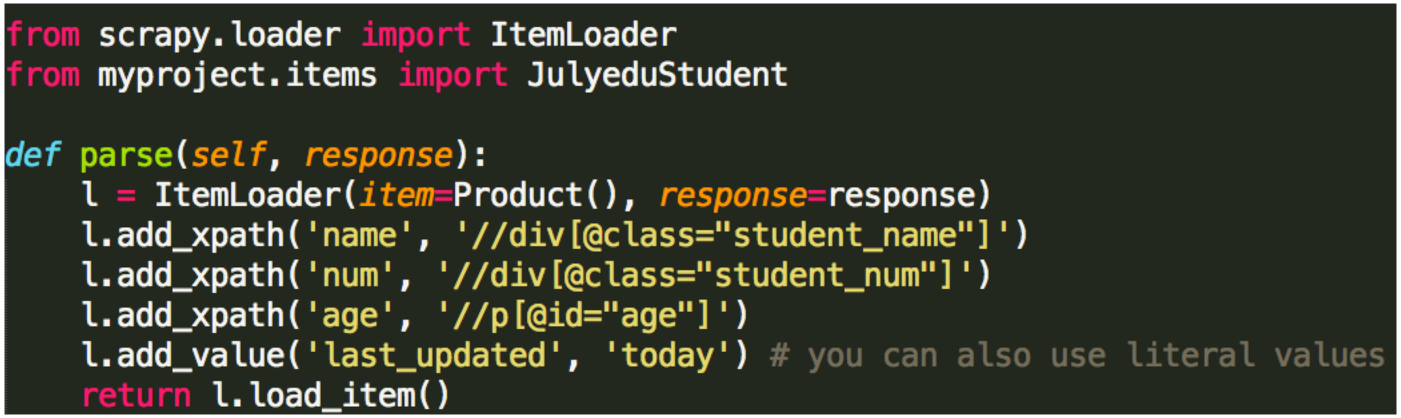
Scrapy组件Item

- 保存数据的地方



```python
class JulyeduStudent(scrapy.Item):
    num = scrapy.Field()
    age = scrapy.Field()
    name = scrapy.Field()
    last_updated = scrapy.Field(serializer=str)
```

- Item Loader可方便填充



```python
from scrapy.loader import ItemLoader
from myproject.items import JulyeduStudent

def parse(self, response):
    l = ItemLoader(item=Product(), response=response)
    l.add_xpath('name', '//div[@class="student_name"]')
    l.add_xpath('num', '//div[@class="student_num"]')
    l.add_xpath('age', '//p[@id="age"]')
    l.add_value('last_updated', 'today') # you can also use literal values
    return l.load_item()
```

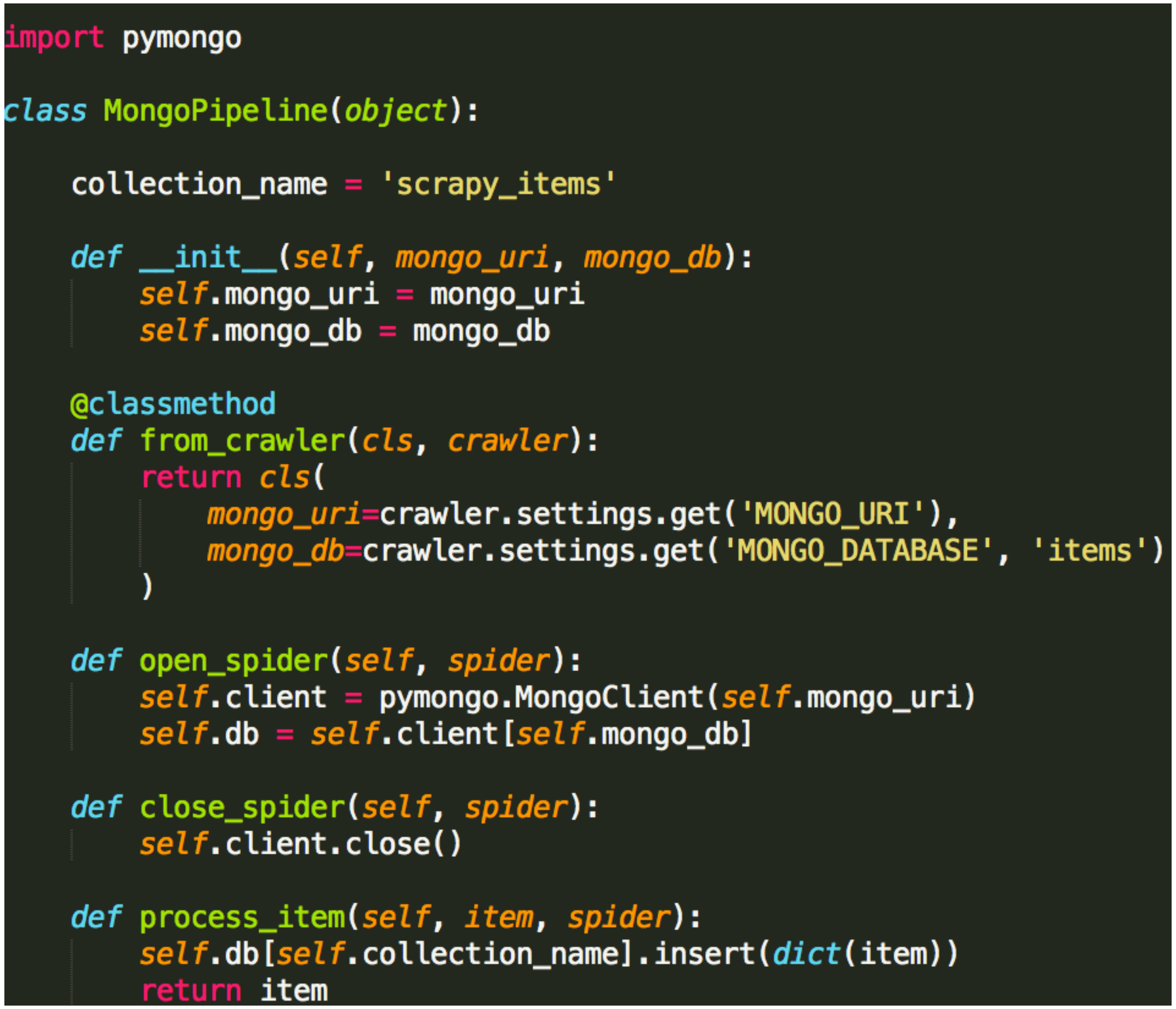
Scrapy组件Item Pipeline

- 当一个item被蜘蛛爬取到之后会被发送给Item Pipeline，然后多个组件按照顺序处理这个item
- Item Pipeline常用场景
  - 清理HTML数据
  - 验证被抓取的数据(检查item是否包含某些字段)
  - 重复性检查(然后丢弃)
  - 将抓取的数据存储到数据库中

Scrapy组件Item Pipeline

- 定义一个Python类，实现方法process_item(self, item, spider)即可，返回一个字典或Item，或者抛出DropItem异常丢弃这个Item。
- 经常会实现以下的方法：
  - open_spider(self, spider) 蜘蛛打开的时执行
  - close_spider(self, spider) 蜘蛛关闭时执行
  - from_crawler(cls, crawler) 可访问核心组件比如配置和信号，并注册钩子函数到Scrapy中

Scrapy组件Item Pipeline



```python
import pymongo

class MongoPipeline(object):

    collection_name = 'scrapy_items'

    def __init__(self, mongo_uri, mongo_db):
        self.mongo_uri = mongo_uri
        self.mongo_db = mongo_db

    @classmethod
    def from_crawler(cls, crawler):
        return cls(
            mongo_uri=crawler.settings.get('MONGO_URI'),
            mongo_db=crawler.settings.get('MONGO_DATABASE', 'items')
        )

    def open_spider(self, spider):
        self.client = pymongo.MongoClient(self.mongo_uri)
        self.db = self.client[self.mongo_db]

    def close_spider(self, spider):
        self.client.close()

    def process_item(self, item, spider):
        self.db[self.collection_name].insert(dict(item))
        return item
```

代码与示例

请参考课上示例

感谢大家！

恳请大家批评指正！