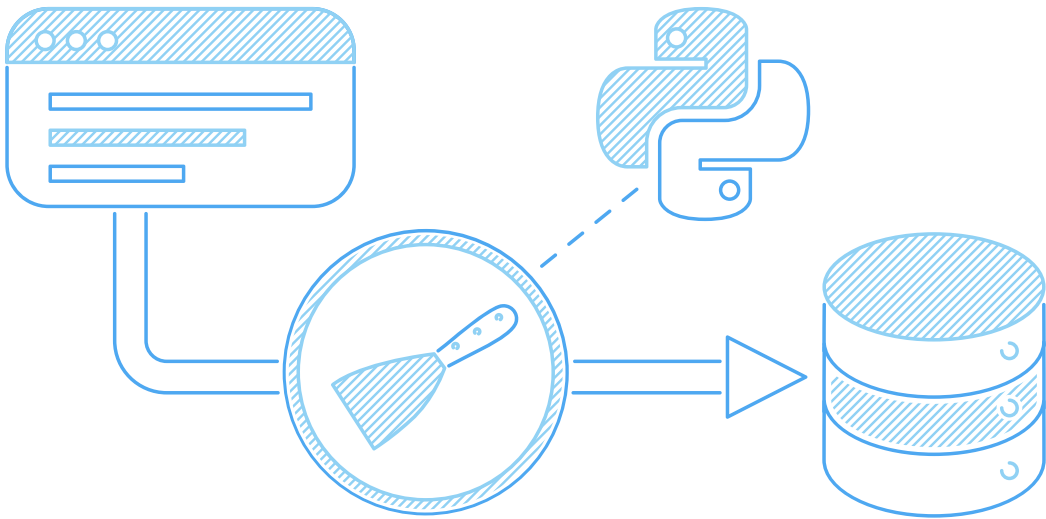


Web Scraping With Scrapy: The Complete Guide in 2025

by Bernardas Ališauskas Jan 21, 2025 [#Python](#) [#scrapy](#) [#Scraping Frameworks](#) [#XPath](#) [#Scraping Introduction](#)



Scrapy is the most popular web scraping framework out there. It earns this name as it's a highly performant, easily accessible and extendible framework.

In this Python web scraping tutorial, we'll explain how to scrape with Scrapy. We'll start by introducing ourselves to Scrapy, its related components, and some common tips and tricks. Finally, we will apply all the details we mention through an example web scraping project with Scrapy. Let's get started!

What is Scrapy?

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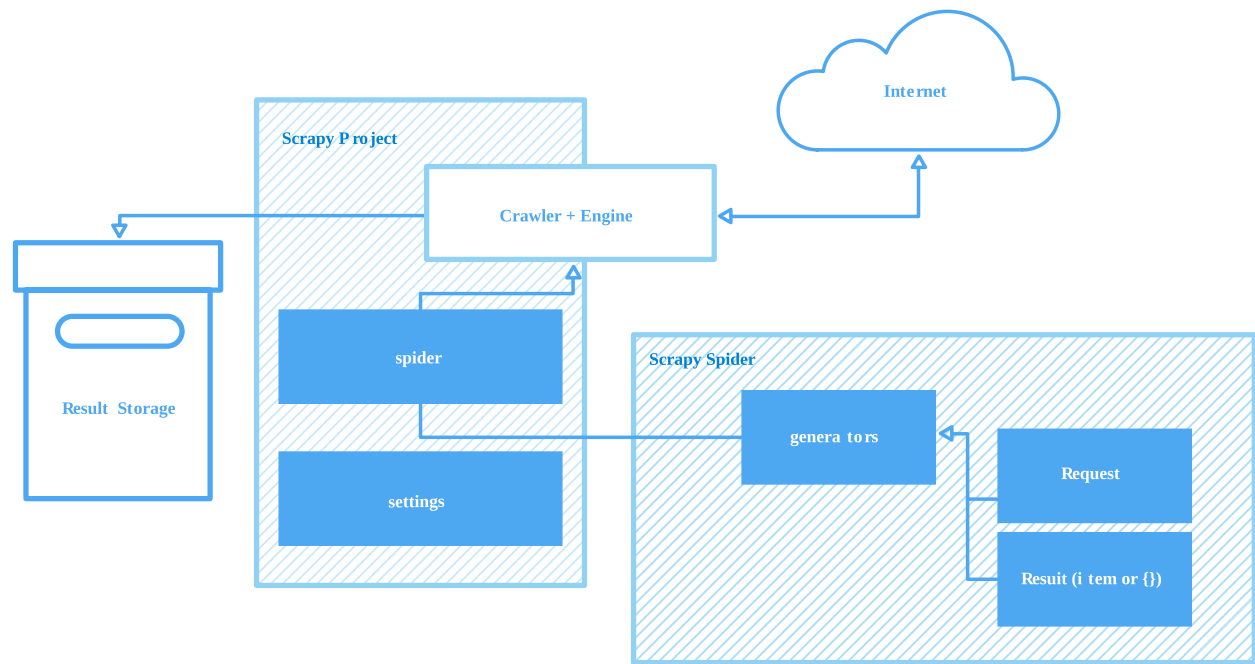
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What is Scrapy?

Scrapy is a Python web scraping framework built around [Twisted](#), an asynchronous networking engine. This means that it doesn't use the standard [asynchronous Python](#) approach. Instead, it uses an event-driven networking infrastructure, allowing for more efficiency and scalability.

That being said, we don't have to interact with the underlying architecture. Scrapy abstracts it away with its own interface. From the development perspective, we'll mostly deal with the equivalent logic in callbacks and generators.



Simplified relation between Scrapy's Crawler and project's Spiders

The above illustration explains the Scrapy architecture in simple terms. Scrapy comes with an engine called **Crawler** (light blue). It handles the low-level logic, such as the HTTP connection, scheduling and the entire execution flow.

On the other hand, the high-level logic (dark blue) is missing. It's called **Spider**, which handles the scraping logic and how to perform it. In simple terms, **we must provide the Crawler with a Spider object to generate the requests, parse and retrieve the data to store.**

Now before we create our first Spider to web scrape with Scrapy. Let's start off by defining common Scrapy terms:

- **Callback**

Scrapy is an asynchronous framework. Therefore, most of the actions are executed in the background, which allows for highly concurrent and efficient logic. In this context, a callback is a function that's attached to a background task, which called upon the successful finish of this task.

- **Errorback**

A similar function to the callback, but it is triggered when a task fails instead of when it succeeds.

Generator

In Python, generators are functions that return results one at a time instead of all at once like a list.

- **Settings**

Scrapy's central configuration object, called settings and it's located in the `settings.py` file of the project.

It's essential to visualize this architecture, as it's the core working principle of all Scrapy web scrapers. We'll write generators that generate either requests with callbacks or results that will be saved to storage.

How to Install Scrapy?

Scrapy can be installed using `pip`. It will add a convenient `scrapy` terminal command for managing the Project:

```
pip install scrapy
```

Installing Scrapy for other systems, such as Anaconda and Ubuntu, can be complex. For detailed instructions, refer to the [official Scrapy installation guide](#).

Web Scraping With Scrapy

In this section, we'll explain using Scrapy for web scraping through an example project. We'll be scraping product data from [web-scraping.dev](#). We'll write a scraper that will:

- 1. Go to product directory listing (e.g. [https:](#))
- 2. Find product URLs (e.g. [web-scraping.dev/product/1](#))
- 3. Go to every product URL.
- 4. Extract product's title, price, description and image.

Start Scrapy Project

This `scrapy` command has two possible contexts: global context and project context. In this Scrapy tutorial, we'll focus on using project context. Therefore, we must create a Scrapy project first:

```
$ scrapy startproject webscrapingdev webscrapingdev-scraper
#           ^ name           ^ project directory
$ cd webscrapingdev-scraper
$ tree
.
├── webscrapingdev
│   ├── __init__.py
│   ├── items.py
│   ├── middlewares.py
│   ├── pipelines.py
│   ├── settings.py
│   └── spiders
│       └── __init__.py
└── scrapy.cfg
```

We can see that the `startproject` command created a project in the illustrated structure. However, running the `scrapy --help` command in the newly created directory will result in a few new commands as we are in the project context:

```
$ scrapy --help
Scrapy 1.8.1 - project: webscrapingdev

Usage:
  scrapy <command> [options] [args]

Available commands:
  bench          Run quick benchmark test
  check          Check spider contracts
  crawl          Run a spider
  edit           Edit spider
  fetch          Fetch a URL using the Scrapy downloader
  genspider      Generate new spider using pre-defined templates
  list           List available spiders
  parse          Parse URL (using its spider) and print the results
  runspider      Run a self-contained spider (without creating a project)
  settings       Get settings values
  shell          Interactive scraping console
  startproject   Create new project
  version        Print Scrapy version
  view           Open URL in browser, as seen by Scrapy
```

Creating Spiders

At the moment, our Scrapy project doesn't include any Spiders. Running the `scrapy list` command will return nothing. So, let's create our first Spider:

```
$ scrapy genspider products web-scraping.dev
#           ^ name   ^ host we'll be scraping
Created spider 'products' using template 'basic' in module:
  webscrapingdev.spiders.products
$ tree
.
├── webscrapingdev
│   ├── __init__.py
│   ├── items.py
│   ├── middlewares.py
│   ├── pipelines.py
│   ├── settings.py
│   └── spiders
│       ├── __init__.py
│       └── products.py <--- New spider
└── scrapy.cfg
$ scrapy list
products
# 1 spider has been found!
```

The generated spider doesn't provide much except for a starting boilerplate:

```
# /spiders/products.py
import scrapy

class ProductsSpider(scrapy.Spider):
    name = "products"
    allowed_domains = ["web-scraping.dev"]
    start_urls = ["https://web-scraping.dev"]

    def parse(self, response):
        pass
```

Let's break down the above idioms:

- `name` is used as a reference to this spider for `scrapy` commands such as `scrapy crawl <name>`, which would run this scraper.

- `allowed_domains` is a safety feature that restricts this spider to crawling only particular domains. It's not very useful in this example, but it's a good practice to have it configured. It reduces accidental errors where the spider could wander off and scrape some other domains accidentally.
- `start_urls` indicates the spider starting point, where `parse()` is the first callback. It represents a callback to execute the following instructions.

Adding Crawling Logic

As per our example logic, we want the `start_urls` to be the starting point of our scraping logic. Next, the scraper should call the `parse()` function to find all the product links to schedule them for scraping as well:

As per our example logic, we want the `start_urls` to be some topic directories (like <https://www.producthunt.com/topics/developer-tools>) and in our `parse()` callback method we want to find all product links and schedule them to be scraped:

```
# /spiders/products.py
import scrapy
from scrapy.http import Response, Request

class ProductsSpider(scrapy.Spider):
    name = 'products'
    allowed_domains = ['web-scraping.dev']
    start_urls = [
        'https://web-scraping.dev/products',
    ]

    def parse(self, response: Response):
        product_urls = response.xpath(
            "//div[@class='row product']/div/h3/a/@href"
        ).getall()
        for url in product_urls:
            yield Request(url, callback=self.parse_product)
        # or shortcut in scrapy >2.0
        # yield from response.follow_all(product_urls, callback=self.parse_product)

    def parse_product(self, response: Response):
        print(response)
```

We've updated our `start_urls` with the main page containing the product URLs. Further, we've updated our `parse()` callback with some crawling logic: we find product URLs using the XPath selector, and for each one of them, we generate another request that calls back to the `parse_product()` method.

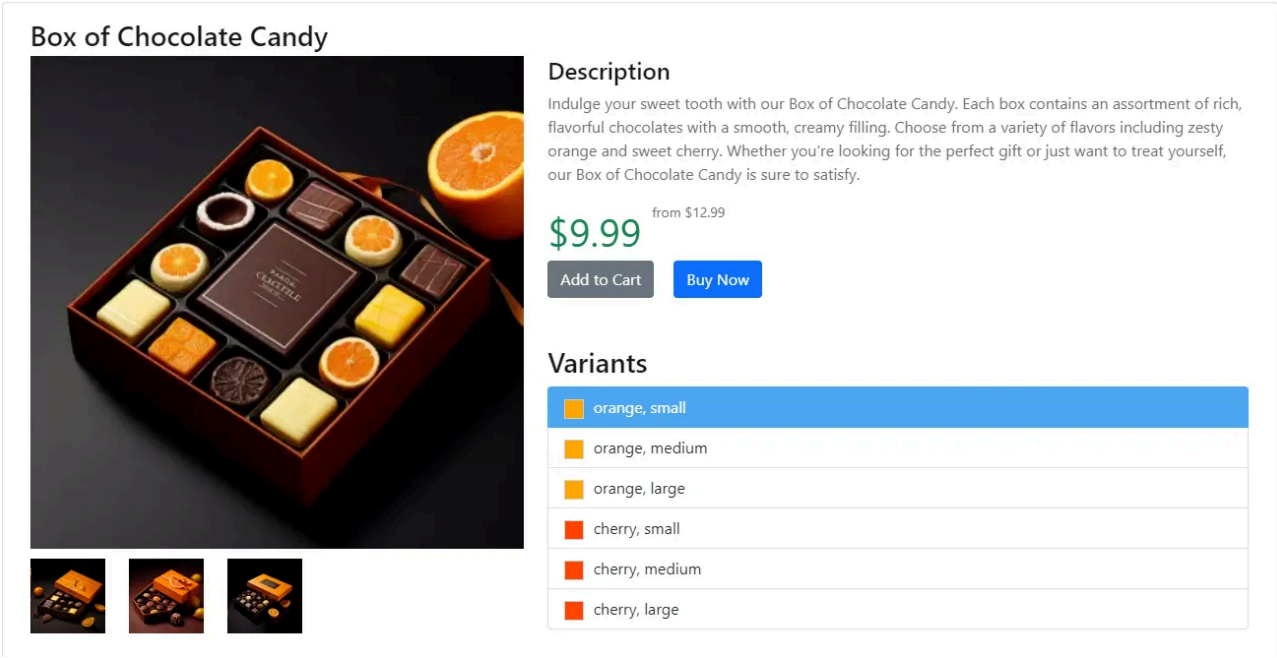
Parsing HTML with Xpath

For more details on the XPath selector and how to use it while web scraping, refer to our extensive article.



Adding Parsing Logic

With our basic crawling logic complete, let's proceed with the parsing logic. For the products, we want to extract specific fields: title, price, image and description:



Product page on web-scraping.dev

Let's populate our `parse_product()` callback with the equivalent parsing logic:

```
# /spiders/products.py
...

def parse_product(self, response: Response):
    yield {
        "title": response.xpath("//h3[contains(@class, 'product-
title')]/text()").get(),
        "price": response.xpath("//span[contains(@class, 'product-
price')]/text()").get(),
        "image": response.xpath("//div[contains(@class, 'product-
image')]/img/@src").get(),
        "description": response.xpath("//p[contains(@class,
'description')]/text()").get()
    }
```

Here, we used a few clever XPaths to select the desired fields on the HTML. Our Scrapy scraper can scrape the above fields using the `scrapy crawl products` command. However, let's have a look at the default settings, as it might get in our way.

Basic Settings

By default, Scrapy doesn't include many settings and relies on the built-in defaults, which aren't always optimal. Let's take a look at the basic recommended settings:

```
# settings.py
# will ignore /robots.txt rules that might prevent scraping
ROBOTSTXT_OBEY = False
# will cache all request to /httpcache directory which makes running spiders in
development much quicker
# tip: to refresh cache just delete /httpcache directory
HTTPCACHE_ENABLED = True
# while developing we want to see debug logs
LOG_LEVEL = "DEBUG" # or "INFO" in production

# to avoid basic bot detection we want to set some basic headers
DEFAULT_REQUEST_HEADERS = {
    # we should use headers
    'User-Agent': "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36
(KHTML, like Gecko) Chrome/96.0.4664.110 Safari/537.36",
    'Accept':
'text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,image/apng,*/*;q=0.8
',
    'Accept-Language': 'en',
}
```


With the above settings adjusted, we are ready to execute our scraper!


Running Spiders

There are two ways to run Scrapy spiders: either through the `scrapy` command or by explicitly calling Scrapy via a Python script. It is generally recommended to use the Scrapy CLI tool, as Scrapy is a complex system, and it is safer to provide it with a dedicated Python process.

Let's run our `products` spider through the `scrapy crawl products` command:

```
$ scrapy crawl products
...
2024-02-16 19:05:16 [scrapy.core.engine] DEBUG: Crawled (200) <GET https://web-scraping.dev/product/4> (referer: https://web-scraping.dev/products)
2024-02-16 19:05:16 [scrapy.core.scrapers] DEBUG: Scraped from <200 https://web-scraping.dev/product/3>
{'title': 'Teal Energy Potion', 'price': '$4.99', 'image': 'https://web-scraping.dev/assets/products/teal-potion.webp', 'description': "Experience a surge of vitality with our 'Teal Potion', an exceptional energy drink designed for the gaming community. With its intriguing teal color and a flavor that keeps you asking for more, this potion is your best companion during those long gaming nights. Every sip is an adventure - let the quest begin!"}
```

Scrapy provides brilliant logs that log everything that the Scrapy engine is performing, as well as logging the returned results. Moreover, Scrapy attaches some useful scrape statistics, such as how many items were scraped, how long it took for our scraper to finish, etc.

 Running Scrapy using Python script is a bit more complicated and we recommend following the official recipe.

Saving Results

We have a spider that scrapes product data successfully and logs the results. To save to a file, we can update our 'scrapy crawl' command with an output flag:

```
$ scrapy crawl products --output results.json
```

Here is a sample output to the results we got:

```
[
  {
    "title": "Blue Energy Potion",
    "price": "$4.99",
    "image": "https://web-scraping.dev/assets/products/blue-potion.webp",
    "description": "Ignite your gaming sessions with our 'Blue Energy Potion', a premium energy drink crafted for dedicated gamers. Inspired by the classic video game potions, this energy drink provides a much-needed boost to keep you focused and energized. It's more than just an energy drink - it's an ode to the gaming culture, packaged in an aesthetically pleasing potion-like bottle that'll make you feel like you're in your favorite game world. Drink up and game on!"
  },
  ...
]
```

Alternatively, we can configure the `FEEDS` setting, which will automatically store all data in a file:

```
# settings.py
FEEDS = {
    # location where to save results
    'producthunt.json': {
        # file format like json, jsonlines, xml and csv
        'format': 'json',
        # use unicode text encoding:
        'encoding': 'utf8',
        # whether to export empty fields
        'store_empty': False,
        # we can also restrict to export only specific fields like: title and votes:
        'fields': ["title", "price"],
        # every run will create new file, if False is set every run will append
        # results to the existing ones
        'overwrite': True,
    },
}
```

This setting allows for configuring multiple output storages for the scraped data in great detail. Scrapy supports different feed exporters by default, such as Amazon's S3 and Google Cloud Storage. However, many community extensions support many other data storage services and types.

 For more on scrapy exporters see the [official feed exporter docs](#)

How to Extend Scrapy?

Scrapy is a very configurable framework, as it provides a wide space for various extensions through middlewares, pipelines and general extension slots. Let's have a quick look at how we can improve our Scrapy web scraping project with some custom extensions.

Adding Scrapy Middlewares

Scrapy offers various convenient interception points for different actions performed by the web scraping engine. For example, downloader middleware allows for the pre-processing of outgoing requests and the post-processing of incoming responses. We can use this to design custom connection logic, such as retrying requests, dropping others or implementing connection [caching](#).

For example, let's update our Product spider with a middleware that drops and modifies the responses. If we open up the generated `middlewares.py` file, we can already see that the `scrapy startproject` has generated a template.


```
# middlewares.py
...
class WebscrapingdevDownloaderMiddleware:
    # Not all methods need to be defined. If a method is not defined,
    # scrapy acts as if the downloader middleware does not modify the
    # passed objects.

    @classmethod
    def from_crawler(cls, crawler):
        # This method is used by Scrapy to create your spiders.
        s = cls()
        crawler.signals.connect(s.spider_opened, signal=signals.spider_opened)
        return s

    def process_request(self, request, spider):
        # Called for each request that goes through the downloader
        # middleware.

        # Must either:
        # - return None: continue processing this request
        # - or return a Response object
        # - or return a Request object
        # - or raise IgnoreRequest: process_exception() methods of
        #   installed downloader middleware will be called
        return None

    def process_response(self, request, response, spider):
        # Called with the response returned from the downloader.

        # Must either;
        # - return a Response object
        # - return a Request object
        # - or raise IgnoreRequest
        return response

    def process_exception(self, request, exception, spider):
        # Called when a download handler or a process_request()
        # (from other downloader middleware) raises an exception.

        # Must either:
        # - return None: continue processing this exception
        # - return a Response object: stops process_exception() chain
        # - return a Request object: stops process_exception() chain
        pass

    def spider_opened(self, spider):
        spider.logger.info("Spider opened: %s" % spider.name)
```

So, to process all requests spider makes we use `process_request()` method and likewise for responses we use `process_response()` . Let's drop scraping of all products that starts with the id `1` :

```
def process_request(self, request, spider):
    if 'product/1' in request.url.lower():
        raise IgnoreRequest(f'skipping product with the ID "1" {request.url}')
    return None
```

For example, we can drop the responses for the products that contain the word `expired` in the URL:

```
def process_response(self, request, response, spider):
    if 'product/expires' in response.url.lower():
        raise IgnoreRequest(f'skipping expired product: {request.url}')
    return response
```

With our middleware ready, the last step is to activate it in our settings:

```
# settings.py
DOWNLOADER_MIDDLEWARES = {
    "webscrapingdev.middlewares.WebscrapingdevDownloaderMiddleware": 543,
}
```

The above setting contains a dictionary of middleware paths and their priority levels - which are usually specified as integers from 0 to 1000. The priority level is necessary to handle interaction between multiple middlewares as Scrapy, by default, already comes with over 10 middlewares enabled!

Typically, we want to include our middleware somewhere in the *middle* - before the 550 `RetryMiddleware` which handles common connection retries. That being said, it's recommended to familiarize with default middlewares for finding that efficient sweet spot where your middleware can produce stable results. You can find the list of default middlewares in the [official settings documentation page](#).

Middlewares provide us with a lot of power when it comes to controlling the flow of our connections, likewise pipelines can provide us with a lot of power when controlling our data output - let's take a look at them!

Pipelines

Pipelines are essentially data post-processors. Whenever our spider generates some results, they are piped through registered pipelines, and the final output is sent to our feed (be it a log or a feed export).

Let's add an example pipeline to our Product spider, which will drop low price products:

```
# pipelines.py
class WebscrapingdevPipeline:
    def process_item(self, item, spider):
        if float(item.get('price', 0).replace('$', '')) < 5:
            raise DropItem(f"dropped item of price: {item.get('price')}")
        return item
```

As with middlewares, we also need to activate our pipelines in the settings file:

```
# settings.py
ITEM_PIPELINES = {
    'producthunt.pipelines.ProducthuntPipeline': 300,
}
```

Since Scrapy doesn't include any default pipelines, in this case we can set extension score to any value, but it's a good practice to keep in the same 0 to 1000 range. With this pipeline every time we run `scrapy crawl products` all generated results will be filtered through our votes filtering logic before they are being transported to the final output.

We've taken a look at the two most common ways of extending Scrapy: downloader middlewares, which allows us to control requests and responses, and pipelines, which allow us to control the output.

These are very powerful tools that provide an elegant way of solving common web scraping challenges, so let's take a look at some of these challenges and the existing solutions that are out there.

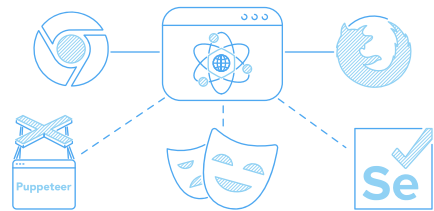
Scrapy Limitations

While scrapy is a big framework it focuses on performance and robust set of core features which often means we need to solve common web scraping challenges either through community or custom extensions.

The most common challenge when web scraping is scraper **blocking**. For this, Scrapy community provides various plugins for proxy management like [scrapy-rotating-proxies](#) and [scrapy-fake-useragent](#) for randomizing user agent headers. Additionally, there are extensions which provide browser emulation like [scrapy-playwright](#) and [scrapy-selenium](#).

How to Scrape Dynamic Websites Using Headless Web Browsers

For more on browser automation see our extensive article which examines and compares major browser automation libraries such as Selenium, Playwright and Puppeteer

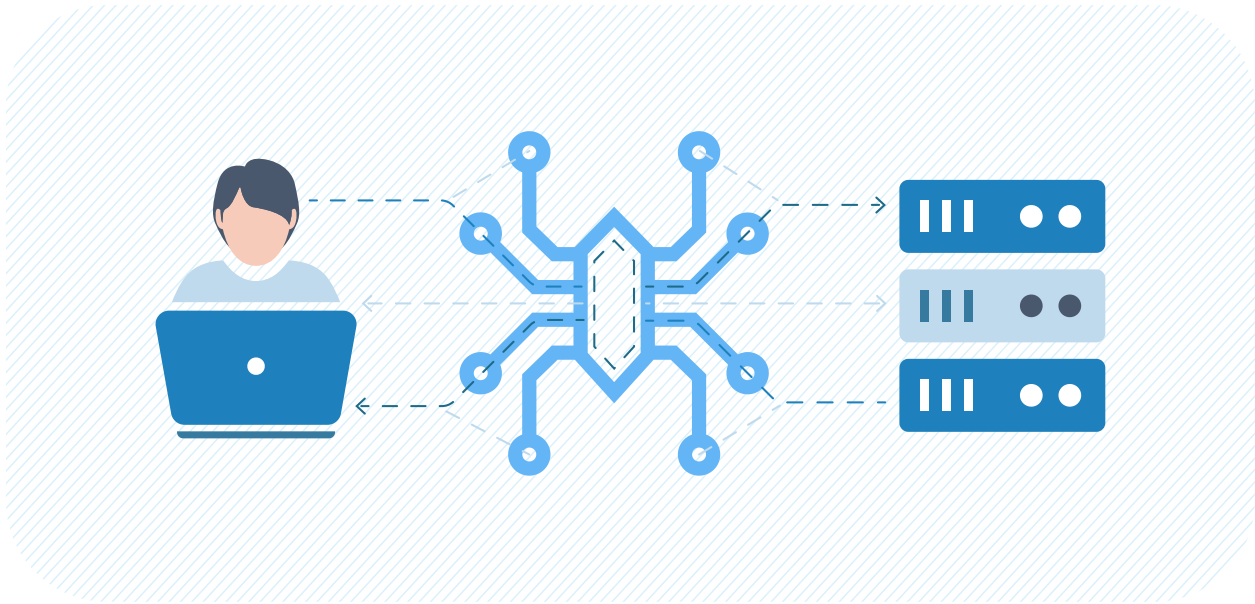


For **scaling**, there are various task distribution extensions such as [scrapy-redis](#) and [scrapy-cluster](#) which allows scaling huge scraping projects through `redis` and `kafka` services as well as [scrapy-deltafetch](#) which provides an easy persistent connection caching for optimizing repeated scrapes.

Finally, for **monitoring** Scrapy has integrations with major monitoring services such as [sentry](#) via [scrapy-sentry](#) or general monitoring util [scrapy-spidermon](#).

Scrapy + ScrapFly

While scrapy is a very powerful and accessible web scraping framework, it doesn't help much with solving the biggest web scraping problem of all - **access blocking**.



ScrapFly provides [web scraping](#), [screenshot](#), and [extraction](#) APIs for data collection at scale.

- [Anti-bot protection bypass](#) - scrape web pages without blocking!
- [Rotating residential proxies](#) - prevent IP address and geographic blocks.
- [JavaScript rendering](#) - scrape dynamic web pages through cloud browsers.

- [Full browser automation](#) - control browsers to scroll, input and click on objects.
- [Format conversion](#) - scrape as HTML, JSON, Text, or Markdown.
- [Python](#) and [Typescript](#) SDKs, as well as [Scrapy](#) and [no-code tool integrations](#).

To migrate to ScrapFly's scrapy integration all we have to do is replace base `Spider` object with `ScrapflySpider` and yield `ScrapflyScrapyRequest` objects instead of scrapy's `Requests`.

Let's see how our Producthunt scraper would look like in ScrapFly's SDK:

```
# /spiders/products.py

from scrapfly import ScrapeConfig
from scrapfly.scrapy import ScrapflyScrapyRequest, ScrapflySpider,
ScrapflyScrapyResponse

class ProductsSpider(ScrapflySpider):
    name = 'products'
    allowed_domains = ['web-scraping.dev']
    start_urls = [
        ScrapeConfig(url='https://web-scraping.dev/products')
    ]

    def parse(self, response: ScrapflyScrapyResponse):
        product_urls = response.xpath(
            "//div[@class='row product']/div/h3/a/@href"
        ).getall()
        for url in product_urls:
            yield ScrapflyScrapyRequest(
                scrape_config=ScrapeConfig(
                    url=response.urljoin(url),
                    # we can render javascript via browser automation
                    render_js=True,
                    # we can get around anti bot protection
                    asp=True,
                    # we can a specific proxy country
                    country='us',
                ),
                callback=self.parse_report
            )

    def parse_product(self, response: ScrapflyScrapyResponse):
        yield {
            "title": response.xpath("//h3[contains(@class, 'product-
title')]/text()").get(),
            "price": response.xpath("//span[contains(@class, 'product-
price')]/text()").get(),
            "image": response.xpath("//div[contains(@class, 'product-
image')]/img/@src").get(),
            "description": response.xpath("//p[contains(@class,
'description')]/text()").get()
        }

# settings.py
SCRAPFLY_API_KEY = 'YOUR API KEY'
CONCURRENT_REQUESTS = 2
```

We've got all the benefits of ScrapFly service just by replacing these few scrapy classes with the ones of ScrapFly SDK! We can even toggle which features we want to apply to each individual request by configuring keyword arguments in `ScrapflyScrapyRequest` object.

For more see our [ScrapFly + Scrapy docs](#)

FAQ

Before we wrap up this guide. Let's take a look at some frequently asked questions about using Scrapy for web scraping.

Can I use Selenium with Scrapy?

Selenium is a popular web browser automation framework in Python, however because of differing architectures making scrapy and selenium work together is tough.

Check out these open source attempts [scrapy-selenium](#) and [scrapy-headless](#).

Alternatively, we recommend taking a look at scrapy + splash extension [scrapy-splash](#).

How to scrape dynamic web pages with Scrapy?

We can use browser automation tools like Selenium though it's hard to make them work well with Scrapy. ScrapFly's scrapy extension also offers a [javascript rendering](#) feature.

Alternatively, a lot of dynamic web page data is actually hidden in the web body, for more see [How to Scrape Hidden Web Data](#).

Web Scraping With Scrapy Summary

In this Scrapy tutorial, we started with a quick architecture overview: what are callbacks, errorbacks and the whole asynchronous ecosystem.

To get the hang of Scrapy spiders we started an example scrapy project for [web-scraping.dev/products/](#) product listings. We covered scrapy project basics - how to start a project, create spiders and how to parse HTML content using XPath selectors.

We have also explained the two main ways of extending Scrapy. The first one is downloader middleware, which processes outgoing requests and incoming responses. The second one is - pipelines, which process the scraped results.

Finally, we wrapped everything up with some highlights of great scrapy extensions and ScrapFly's own integration which solves major access issues a performant web-scraper might encounter. For more we recommend referring to [official scrapy's documentation](#) and for community help we recommend very helpful [#scrapy tag on stackoverflow](#).

Check out ScrapFly Python SDK

Try ScrapFly for FREE!

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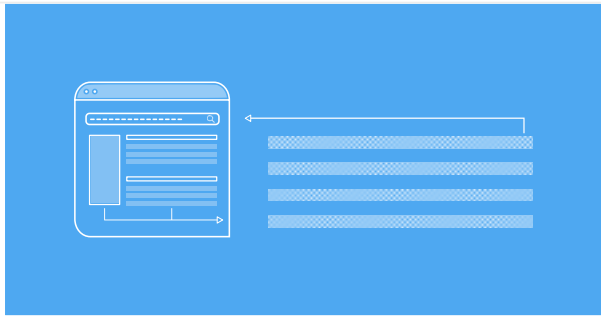
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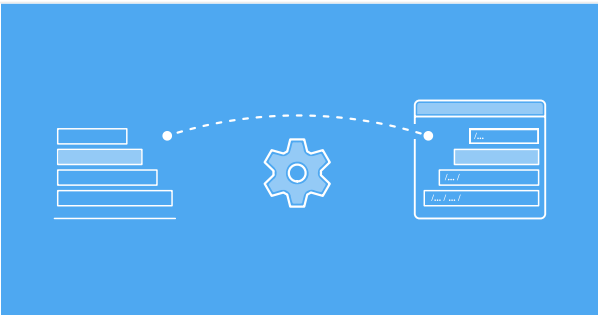


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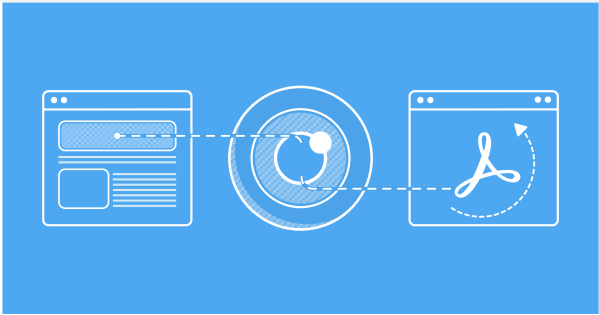


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SCREENSHOTS PYTHON
NODEJS

Company

- Careers
- Terms of service
- Privacy Policy
- Data Processing Agreement
- KYC Compliance
- Status

Integrations

Zapier

Make
N8n
LlamaIndex
LangChain

Social



Tools

Convert cURL commands to Python code
JA3/TLS Fingerprint
HTTP2 Fingerprint
Xpath/CSS Selector Tester

Resources

API Documentation
Web Scraping Academy
Is Web Scraping Legal?
Web Scraping Tools
FAQ

Learn Web Scraping

Web Scraping with Python
Web Scraping with PHP
Web Scraping with Ruby
Web Scraping with R
Web Scraping with NodeJS
Web Scraping with Python Scrapy
How to Scrape without getting blocked tutorial
Web Scraping with Python and BeautifulSoup
Web Scraping with Nodejs and Puppeteer
How To Scrape Graphql
Best Proxies for Web Scraping
Top 5 Best Residential Proxies

Usage

What is Web Scraping used for?
Web Scraping for AI Training
Web Scraping for Compliance
Web Scraping for eCommerce
Web Scraping for Finance
Web Scraping for Fraud Detection
Web Scraping for Jobs
Web Scraping for Lead Generation
Web Scraping for News & Media
Web Scraping for Real Estate
Web Scraping for SERP & SEO
Web Scraping for Social Media
Web Scraping for Travel