



Web Scraping



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- Web scraping is a general term for techniques involving automating the gathering of data from a website.
- In this section we will learn how to use Python to conduct web scraping tasks, such as downloading images or information off a website.



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- In order to web scrape with Python we need to understand the basic concepts of how a website works.
- When a browser loads a website, the user gets to see what is known as the “front-end” of the website.



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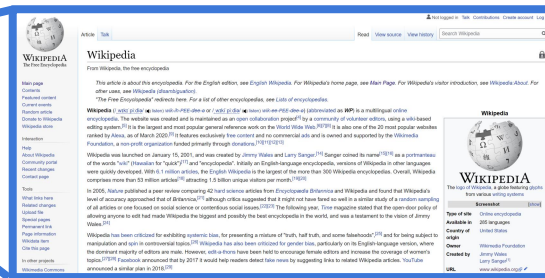


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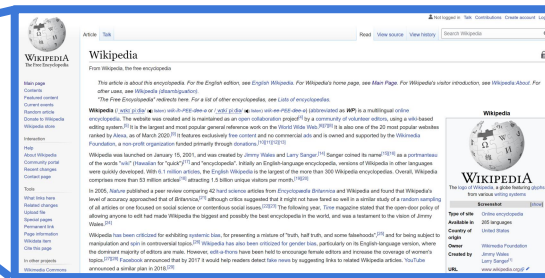
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```
<!DOCTYPE html>
<html>
  <head>
    <title>Title on
Browser Tab</title>
  </head>
  <body>
    <h1> Website
Header </h1>
    <p> Some
Paragraph </p>
  </body>
</html>
```





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```
<!DOCTYPE html>
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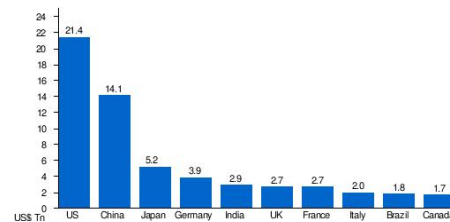
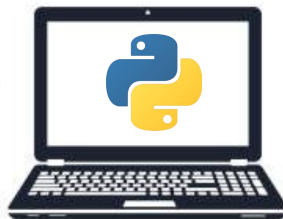


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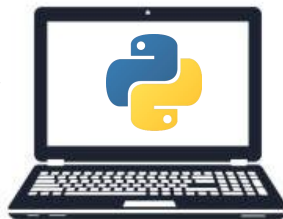
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  <body>
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    <p> Some
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  </body>
</html>
```



["Germany", "France", "Spain"]



Complete Python Bootcamp

- Main things we need to understand
 - Rules of Web Scraping
 - Limitations of Web Scraping
 - Basic HTML and CSS



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- Rules of Web Scraping
 - Always try to get permission before scraping!
 - If you make too many scraping attempts or requests your IP Address could get blocked!
 - Some sites automatically block scraping software.



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- Limitations of Web Scraping
 - In general every website is unique, which means every web scraping script is unique.
 - A slight change or update to a website may completely break your web scraping script.



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Main front end components of a website

```
<!DOCTYPE html>
<html>
  <head>
    <title>Title on Browser
    Tab</title>
  </head>
  <body>
    <h1> Website Header </h1>
    <p> Some Paragraph </p>
  </body>
</html>
```

HTML



```
p{
  color: red;
  font-family: courier;
  font-size: 160%;
}
.someclass{
  color: green;
  font-family: verdana;
  font-size: 300%;
}
#someid{
  color: blue;
}
```

CSS



```
var values = ["Volvo", "Saab",
              "Fiat"];

var person = {
  firstName: "John",
  lastName: "Doe",
  age: 50,
  eyeColor: "blue"
};
```

JS





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- When viewing a website, the browser doesn't show you all the source code behind the website, instead it shows you the HTML and some CSS and JS that the website sends to your browser.



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- HTML is used to create the basic structure and content of a webpage
- CSS is used for the design and style of a web page, where elements are placed and how it looks
- JavaScript is used to define the interactive elements of a webpage



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- For effective basic web scraping we only need to have a basic understanding of HTML and CSS.
- Python can view these HTML and CSS elements programmatically, and then extract information from the website.
- Let's explore HTML and CSS in more detail.



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- HTML is Hypertext Markup Language and is present on every website on the internet.
- You can right-click on a website and select “View Page Source” to get an example.
- Let’s see a small example of HTML code.



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```
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```

```
<html>
```

```
  <head>
```

```
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```

```
  </head>
```

```
  <body>
```

```
    <h1> Website Header </h1>
```

```
    <p> Some Paragraph </p>
```

```
  </body>
```

```
</html>
```



Complete Python Bootcamp

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<html>
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  </head>
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  <body>
```

```
    <h1> Website Header </h1>
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```
    <p> Some Paragraph </p>
```

```
  </body>
```

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</html>
```



Complete Python Bootcamp

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```
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```
  </head>
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```
  <body>
```

```
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    <p> Some Paragraph </p>
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```
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```
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Complete Python Bootcamp

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  <head>
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    <title>Title on Browser Tab</title>
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```
  </head>
```

```
  <body>
```

```
    <h1> Website Header </h1>
```

```
    <p> Some Paragraph </p>
```

```
  </body>
```

```
</html>
```



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- CSS stands for Cascading Style Sheets.
- CSS gives “style” to a website, such as changing colors and fonts.
- CSS uses tags to define what html elements will be styled.



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```
<!DOCTYPE html>
<html>
    <head>
        <link rel="stylesheet" href="styles.css">
        <title>Some Title</title>
    </head>
    <body>
        <p id='para2'> Some Text </p>
    </body>
</html>
```



Complete Python Bootcamp

```
<!DOCTYPE html>
```

```
<html>
```

```
<head>
```

```
<link rel="stylesheet" href="styles.css">
```

```
<title>Some Title</title>
```

```
</head>
```

```
<body>
```

```
<p id='para2'> Some Text </p>
```

```
</body>
```

```
</html>
```



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```
<!DOCTYPE html>
<html>
    <head>
        <link rel="stylesheet" href="styles.css">
        <title>Some Title</title>
    </head>
    <body>
        <p id='para2'> Some Text </p>
    </body>
</html>
```



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Example of the style.css file:

```
#para2 {  
    color: red;  
}
```



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```
<!DOCTYPE html>
```

```
<html>
```

```
    <head>
```

```
    <link rel="stylesheet" href="styles.css">
```

```
    <title>Some Title</title>
```

```
  </head>
```

```
  <body>
```

```
    <p class='cool'> Some Text </p>
```

```
  </body>
```

```
</html>
```



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Example of the style.css file:

```
.cool {  
    color: red;  
    font-family: verdana;  
}
```




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```
p{
    color: red;
    font-family: courier;
    font-size: 160%;
}

.someclass{
    color: green;
    font-family: verdana;
    font-size: 300%;
}

#someid{
    color: blue;
}
```



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- Don't worry about memorizing this! We'll see lots of examples, main ideas to note:
 - HTML contains the information
 - CSS contains the styling
 - We can use HTML and CSS tags to locate specific information on a page



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- To web scrape with Python we can use the BeautifulSoup and requests libraries.
- These are external libraries outside of Python so you need to install them with either conda or pip at your command line.



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- Directly at your command line use:
 - `pip install requests`
 - `pip install lxml`
 - `pip install bs4`
- Or for Anaconda distributions, use `conda install` instead of `pip install`.



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- Let's work through some examples of web scraping with Python!



Setting Up For Web Scraping



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- Install the necessary libraries
- Explore how to inspect elements and view source of a webpage
- Note: We will suggest you use Chrome so you can follow along exactly as we do, but these tools are available in all major browsers.



Grabbing a Page Title



Grabbing All Elements of a Class



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- We previously mentioned a big part of web scraping with the BeautifulSoup library is figuring out what string syntax to pass into the `soup.select()` method.
- Let's go through a table with some common examples (these make a lot of sense if you know CSS syntax)



Syntax	Match Results
<code>soup.select('div')</code>	All elements with 'div' tag
<code>soup.select('#some_id')</code>	Elements containing <code>id='some_id'</code>
<code>soup.select('.some_class')</code>	Elements containing <code>class = 'some_class'</code>
<code>soup.select('div span')</code>	Any elements named span within a div element.
<code>soup.select('div > span')</code>	Any elements named span directly within a div element, with nothing in between.



Grabbing an Image



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- Now that we understand how to grab text information based on tags and element names, let's explore how to grab images from a website.
- Images on a website typically have their own URL link (ending in .jpg or .png)



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- BeautifulSoup can scan a page, locate the `` tags and grab these URLs.
- Then we can download the URLs as images and write them to the computer.
- Note: You should always check copyright permission before downloading and using an image from a website.



Working with Multiple Pages and Items



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- We've seen how to grab elements one at a time, but realistically, we want to be able to grab multiple elements, most likely across multiple pages.
- This is where we can combine our prior python knowledge with the web scraping libraries to create powerful scripts!



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- We will use a site specifically designed to practice web scraping: www.toscrape.com
- We will practice grabbing elements across multiple pages.
- Let's get started!



Working with Multiple Pages



Web Scraping Exercises Overview



Web Scraping Exercises Solutions



Web Scraping Exercises Solutions - Part Two