Selenium

Using XPath and Selenium to Find ment in HTML Page

4 months ago • by Shahriar Shovon

XPath, also known as XML Path Language, is a language for selecting elements from an XML document. As HTML and XML follow the same document structure, XPath can also be used to select elements from a web page.

Locating and selecting elements from the web page is the key to web scraping with Selenium. For locating and selecting elements from the web page, you can use XPath selectors in Selenium.

In this article, I am going to show you how to locate and select elements from web pages using XPath se

Prerequisites:

mples of this article, you must have,

Ubuntu) installed on your computer.
nputer.
ter.
stalled on your computer.
5. Mozilla Firefox or Google Chrome web browsers installed on your computer.
6. Must know how to install the Firefox Gecko Driver or Chrome Web Driver.

To fulfilling the requirements 4, 5, and 6, read my article **Introduction to Selenium in** les on the other topics on LinuxHint.com. Be sure to check them out if you need any assistance.

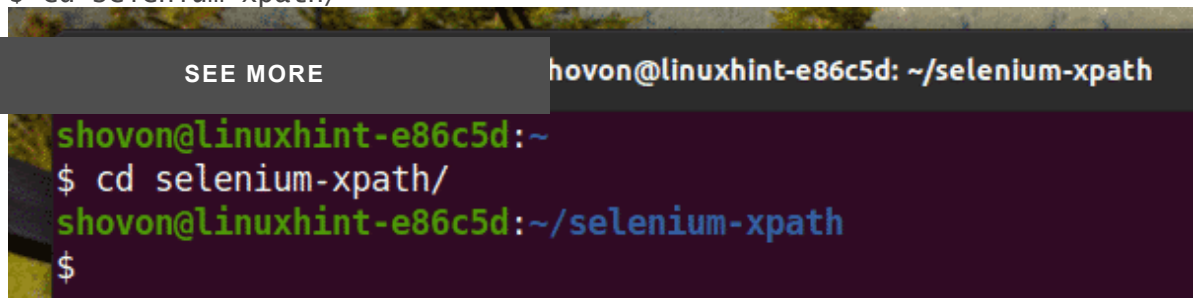
Setting Up a Project Directory:

To keep everything organized, create a new project directory **selenium-xpath/** as follows:

```
$ mkdir -pv selenium-xpath/drivers
```

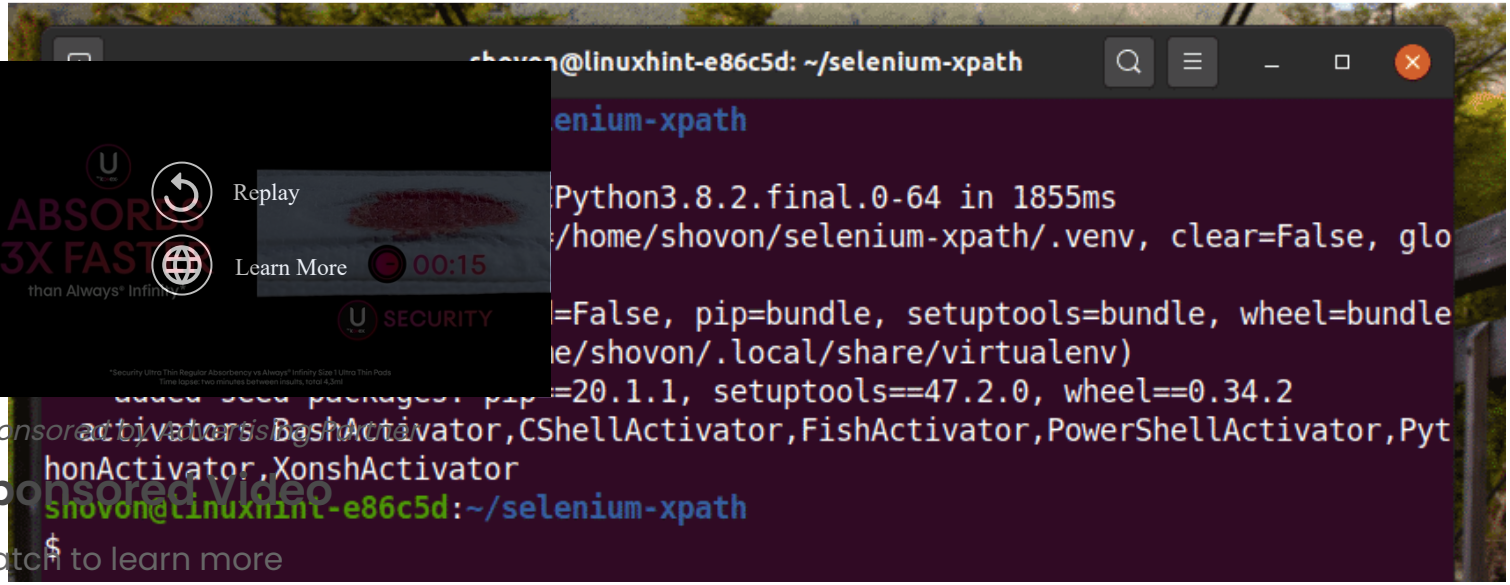
Navigate to the **selenium-xpath/** project directory as follows:

```
$ cd selenium-xpath/
```



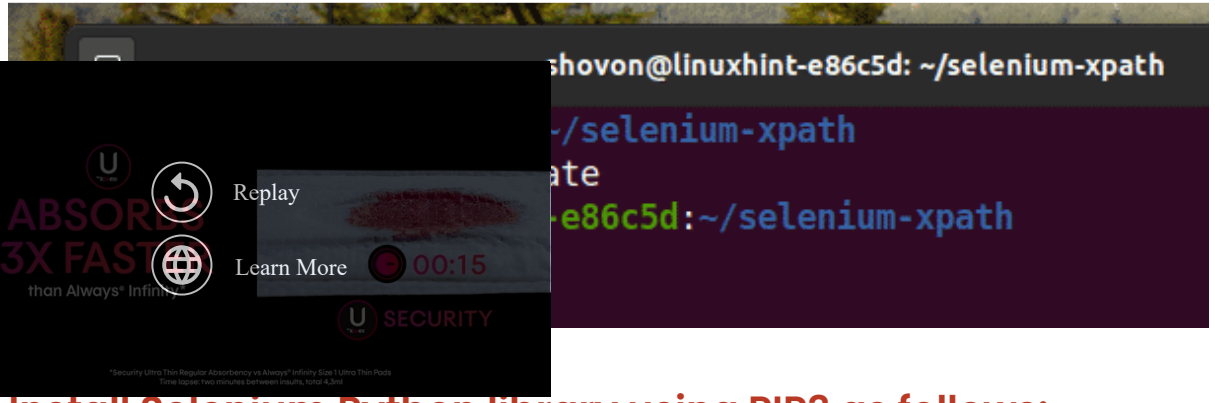
Create a Python virtual environment in the project directory as follows:

```
$ virtualenv .venv
```



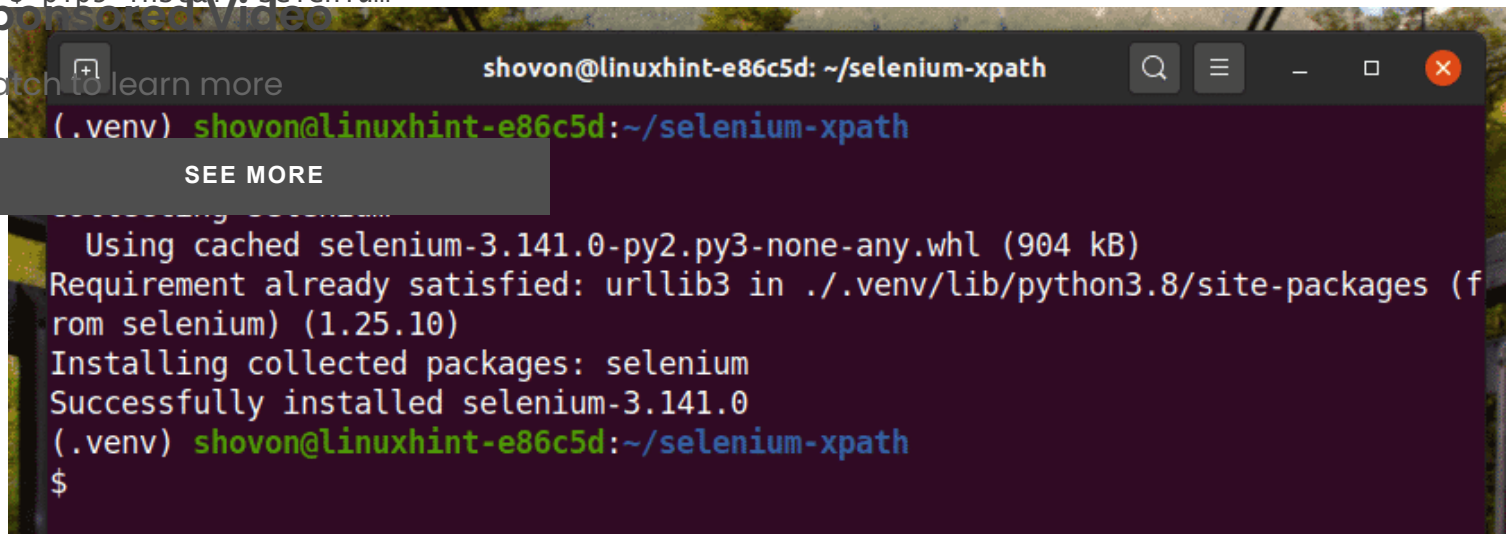
Activate the virtual environment as follows:

```
$ source .venv/bin/activate
```



Install Selenium Python library using PIP3 as follows:

```
$ pip3 install selenium
```



Download and install all the required web driver in the **drivers/** directory of the project. I have explained the process of downloading and installing web drivers in my article **Introduction to Selenium in Python 3**.

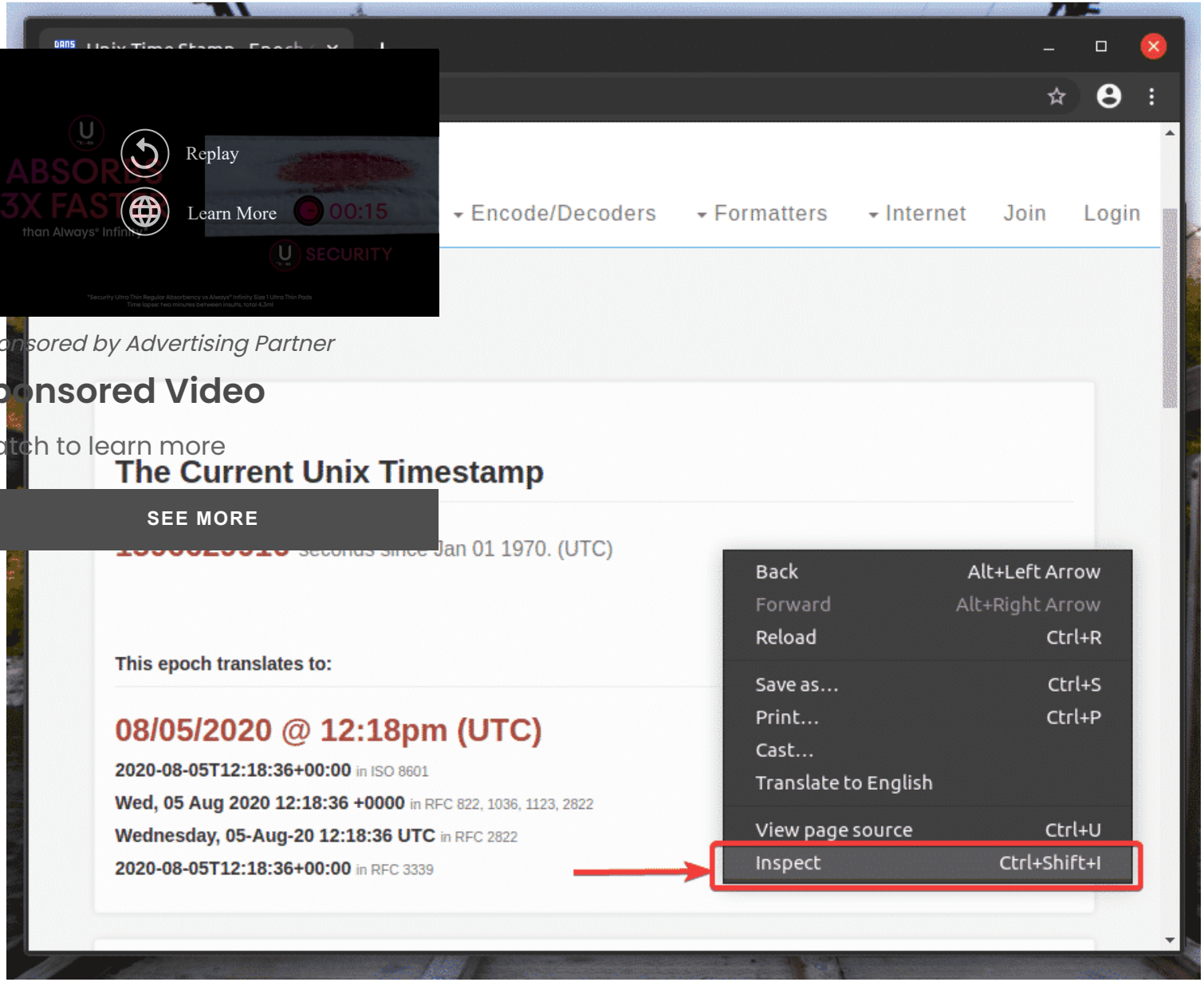
Get the XPath Selector using Chrome Developer Tool:

In this section, I am going to show you how to find the XPath selector of the web page element you want to select with Selenium using the built-in Developer Tool of the Google

To get the XPath selector using the Google Chrome web browser, open Google Chrome, and visit the web site from which you want to extract data. Then, press the right mouse button

(RMB) on an empty area of the page and click on **Inspect** to open the **Chrome Developer**

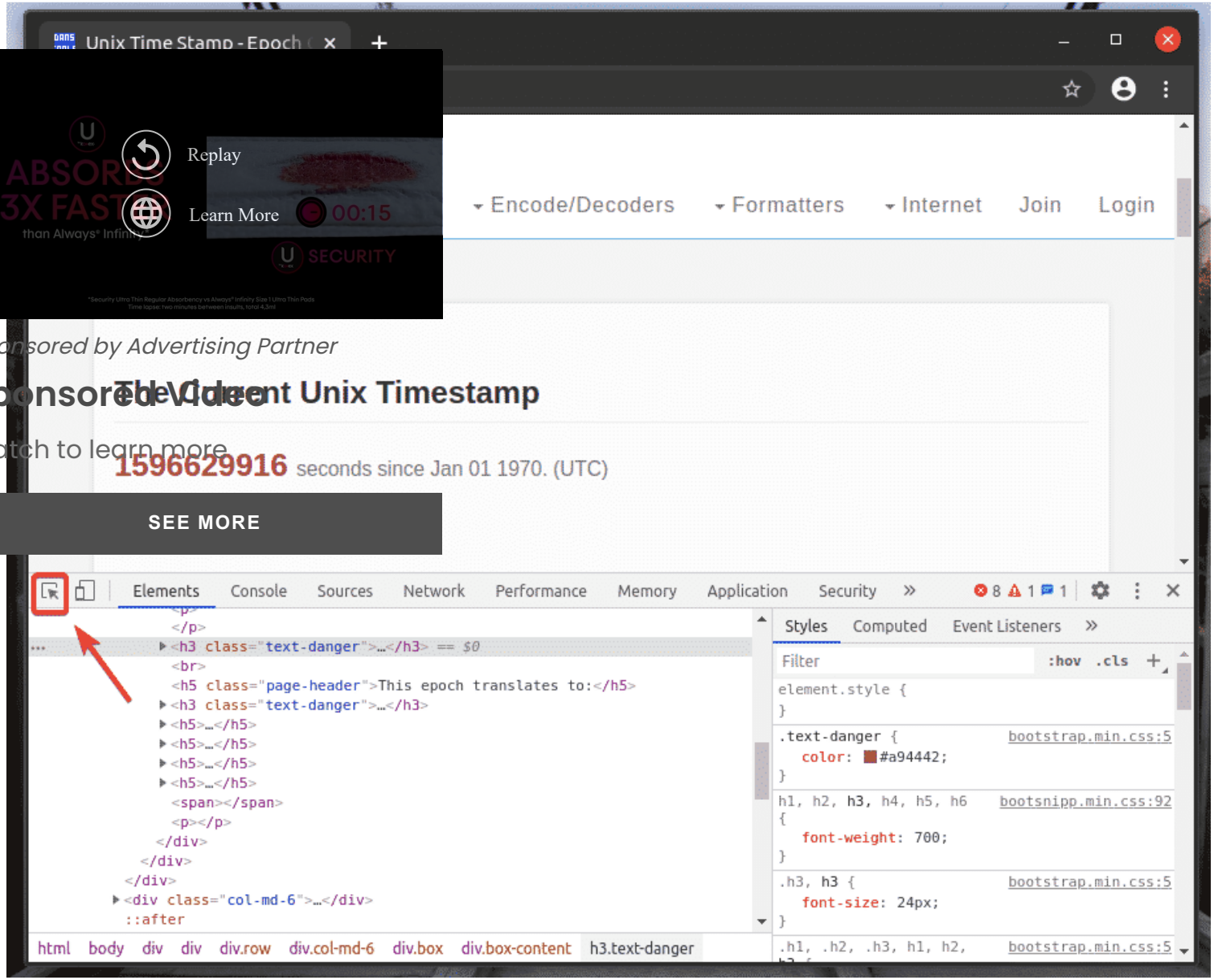
+ I to open the **Chrome Developer Tool**.



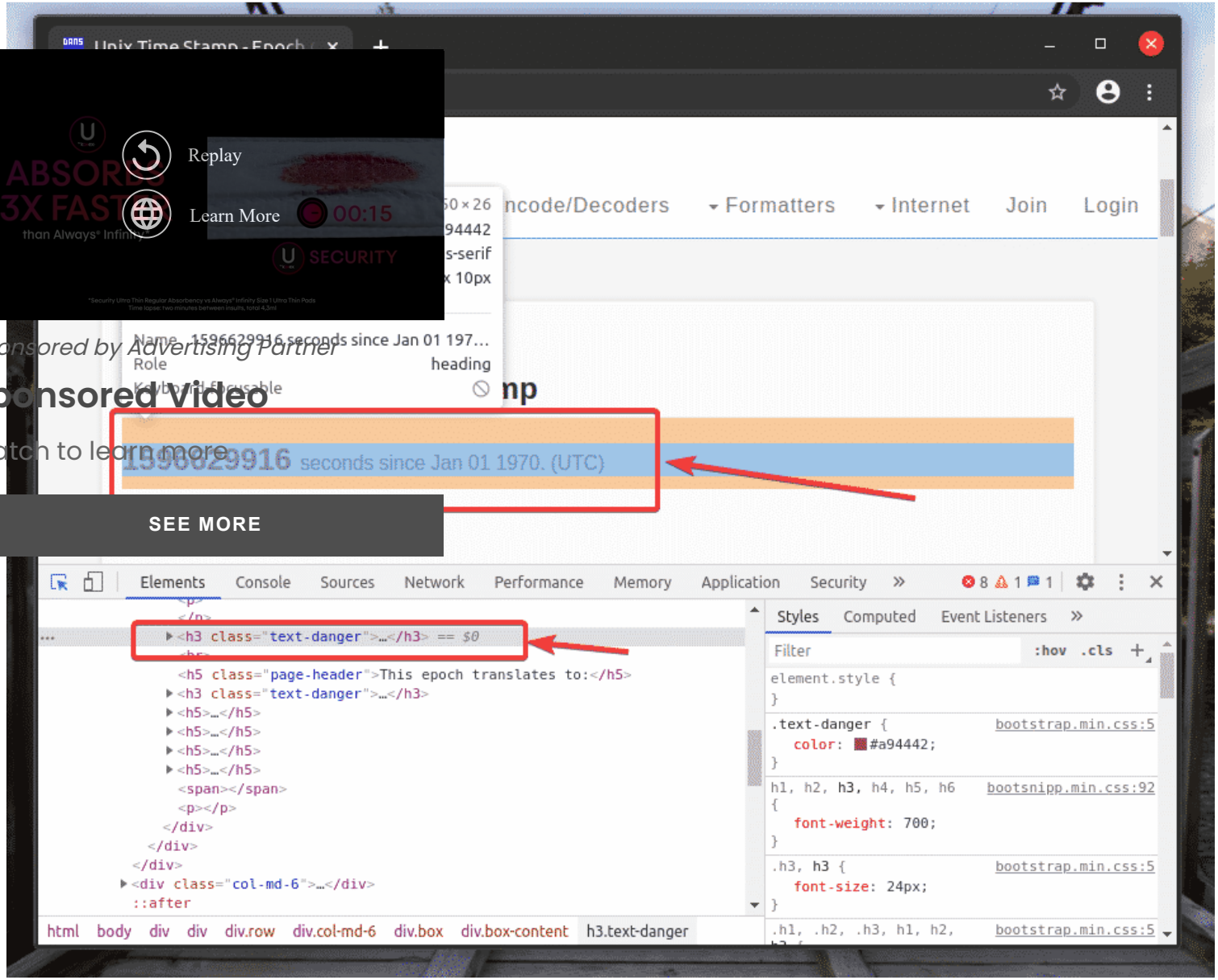
Chrome Developer Tool should be opened.

To find the HTML representation of your desired web page element, click on the **Inspect**(

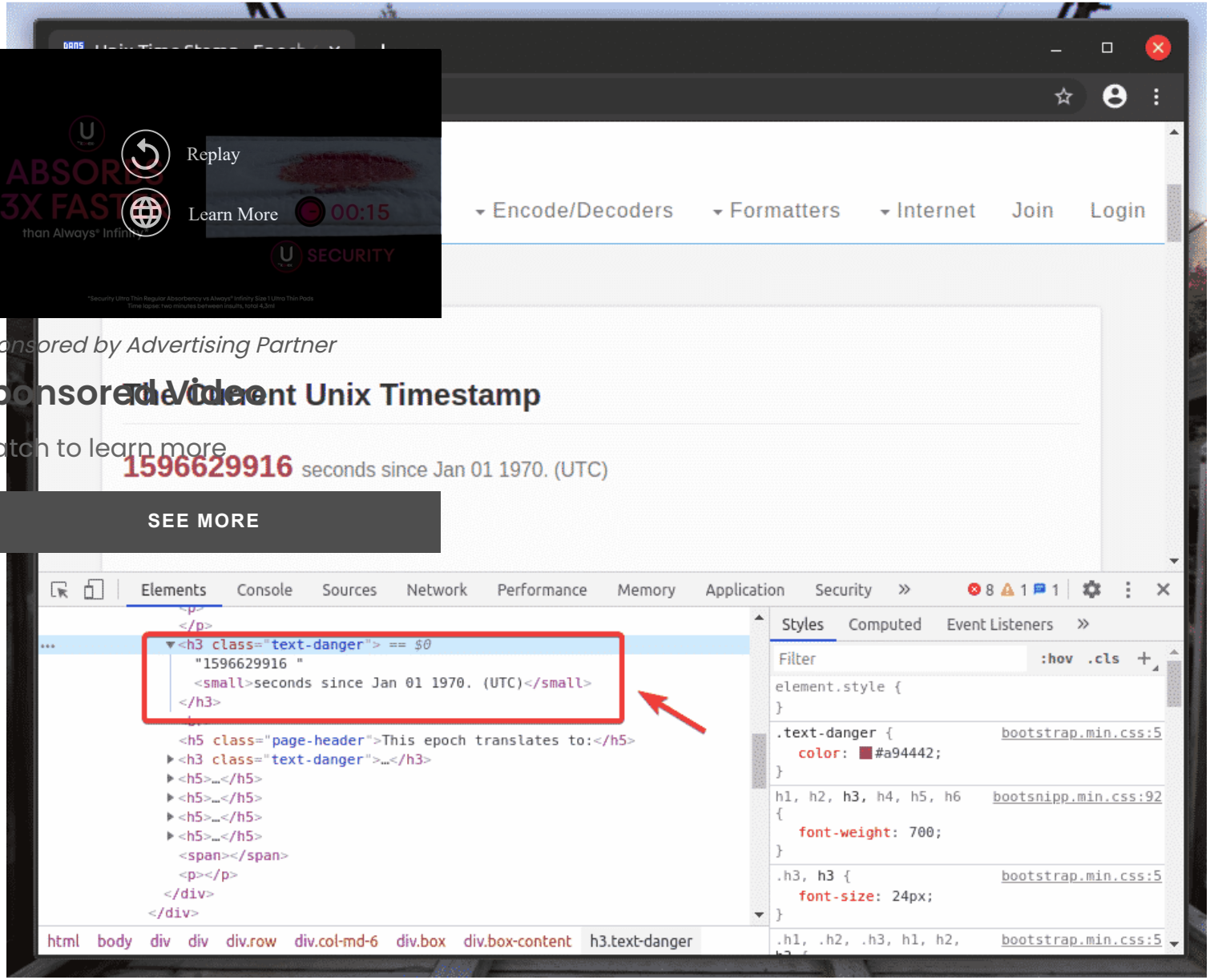
ot below.



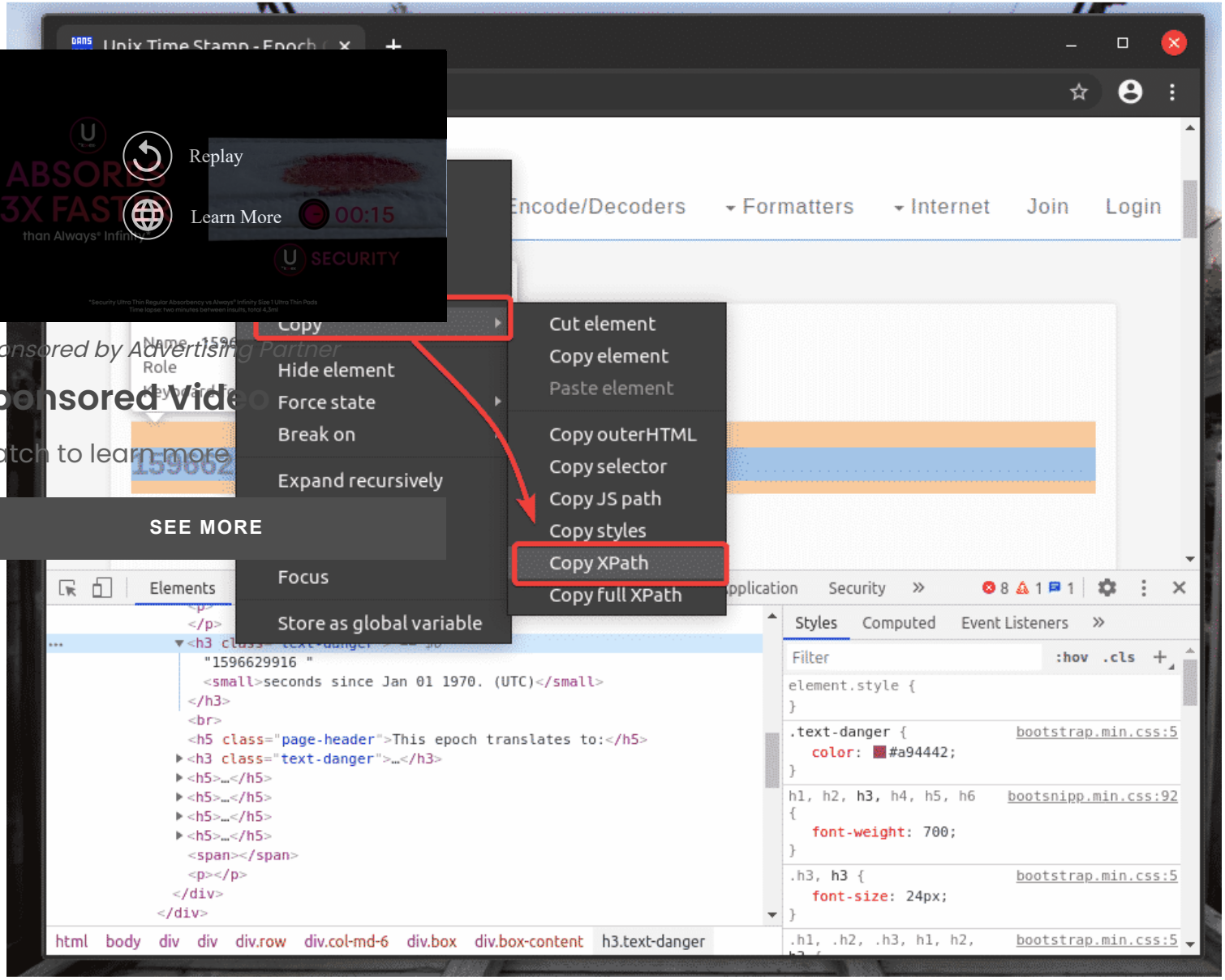
Then, hover over your desired web page element and press the left mouse button (LMB) to select it.



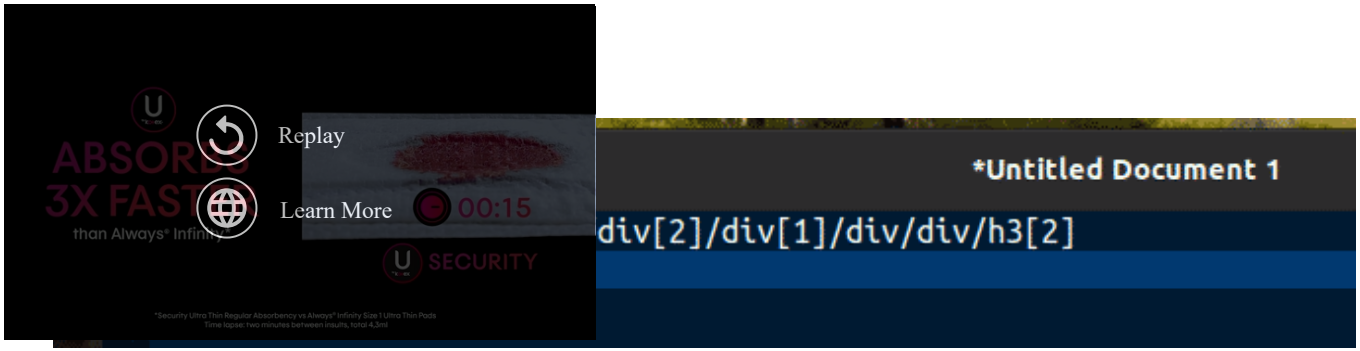
The HTML representation of the web element you have selected will be highlighted in the **Elements** tab of the **Chrome Developer Tool,** as you can see in the screenshot below.



To get the XPath selector of your desired element, select the element from the **Elements** tab of **Chrome Developer Tool** and right-click (RMB) on it. Then, select **Copy** > **Copy XPath**, as marked in the screenshot below.



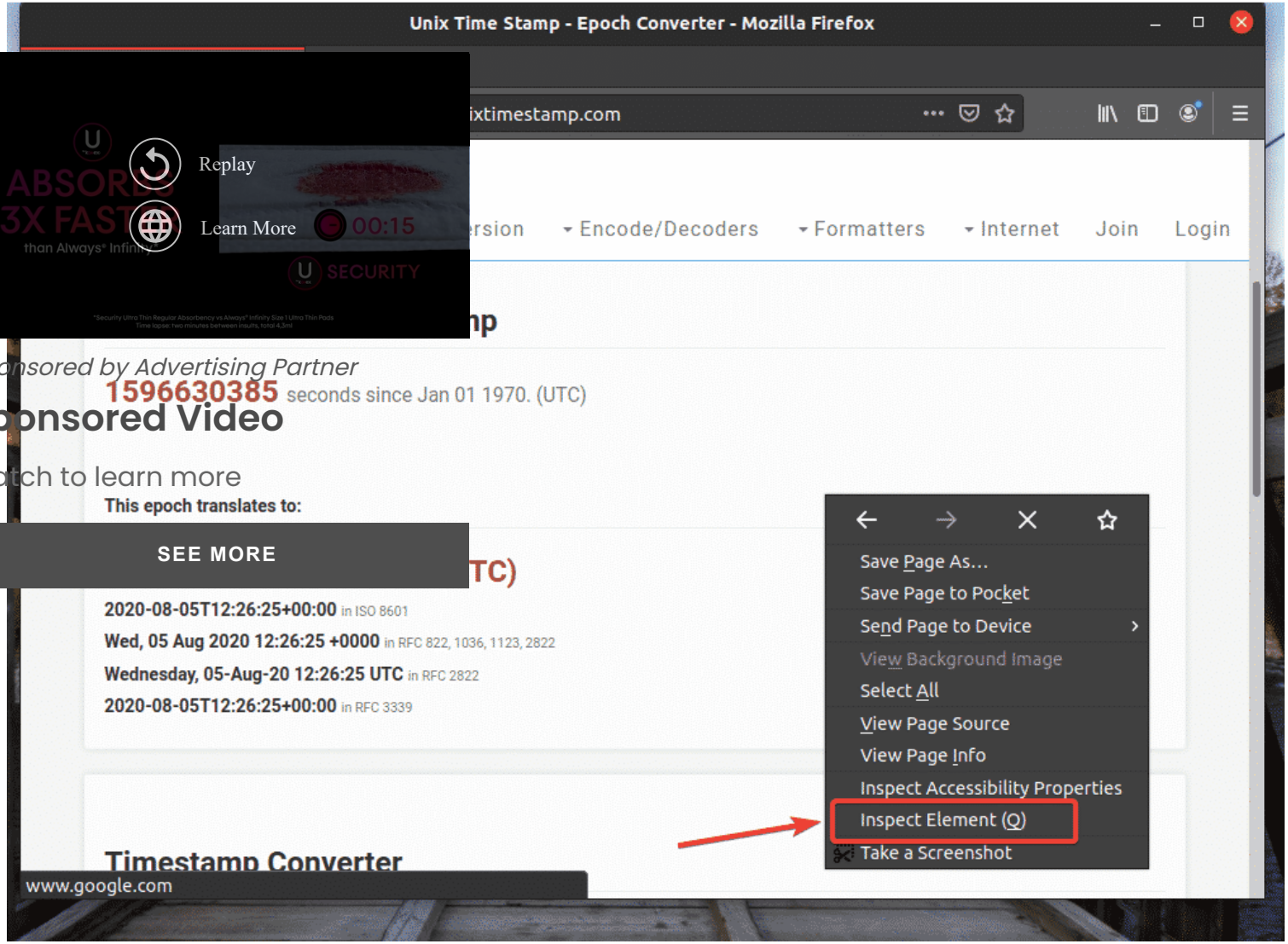
I have pasted the XPath selector in a text editor. The XPath selector looks as shown in the



Get the XPath Selector using Firefox Developer Tool:

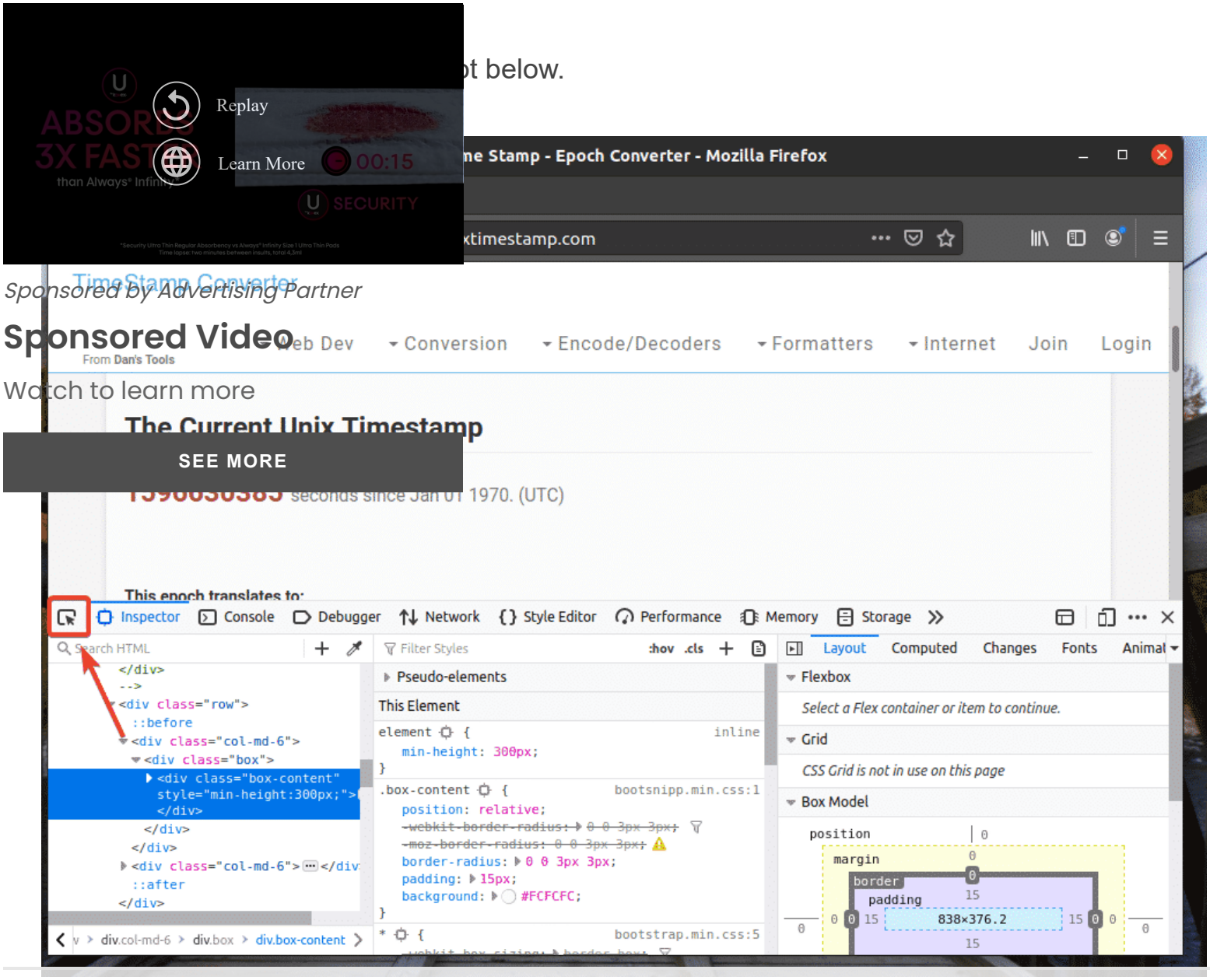
In this section, I am going to show you how to find the XPath selector of the web page element you want to select with Selenium using the built-in Developer Tool of the Mozilla

To get the XPath selector using the Firefox web browser, open Firefox and visit the web site from which you want to extract data. Then, press the right mouse button (RMB) on an empty area of the page and click on **Inspect Element (Q)** to open the **Firefox Developer Tool**.



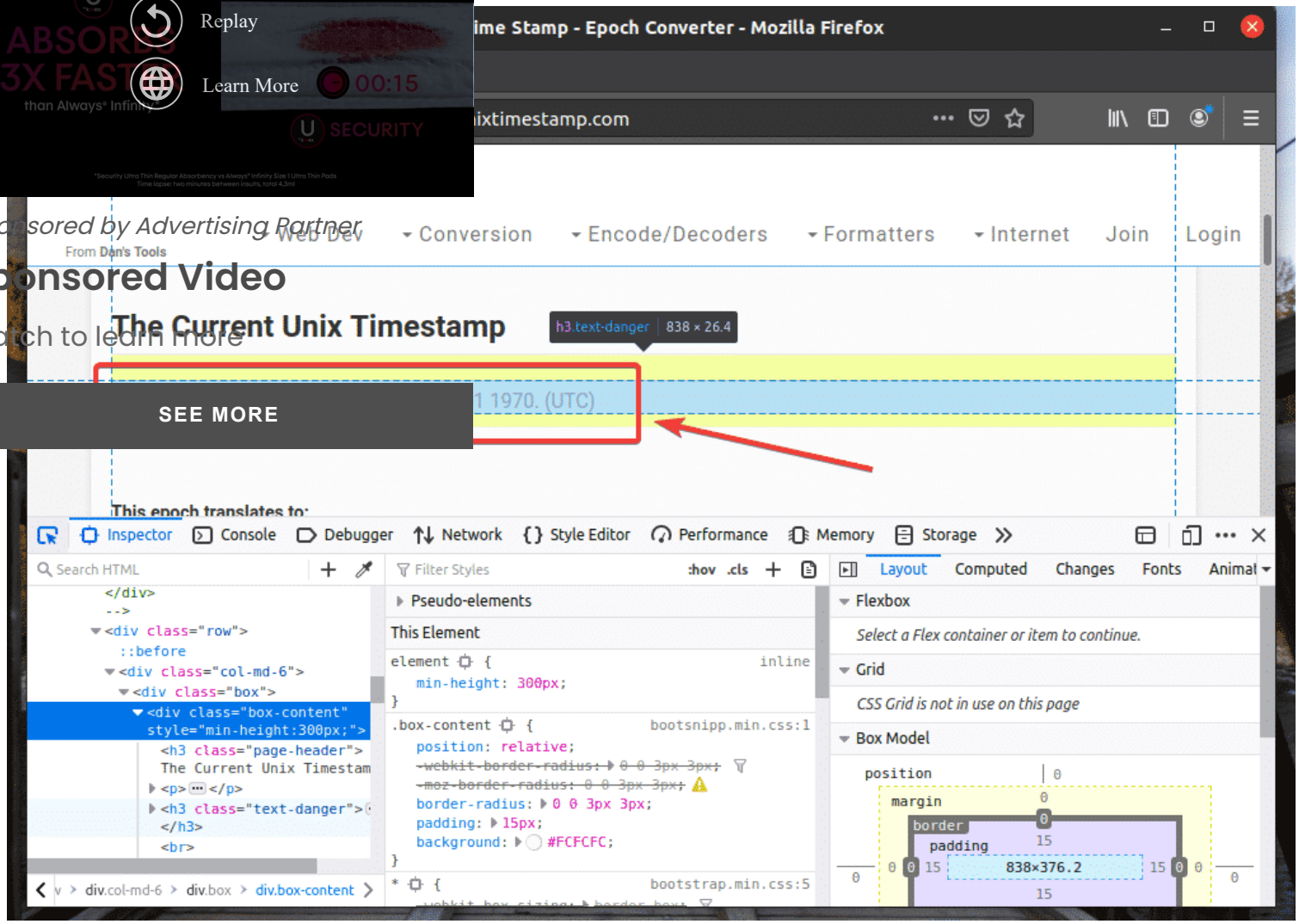
Firefox Developer Tool should be opened.

To find the HTML representation of your desired web page element, click on the **Inspect**(

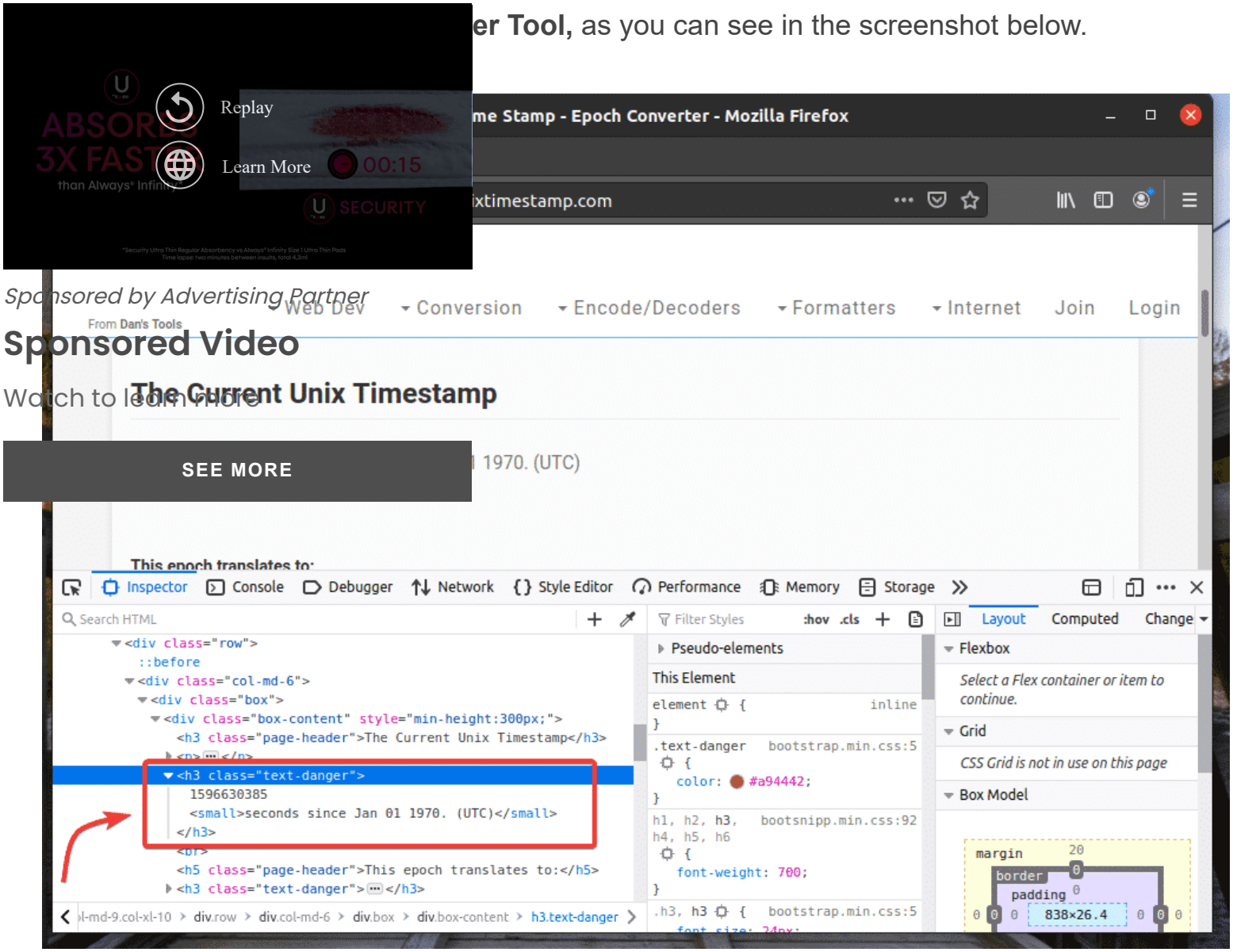


ot below.

Then, hover over your desired web page element and press the left mouse button (LMB) to

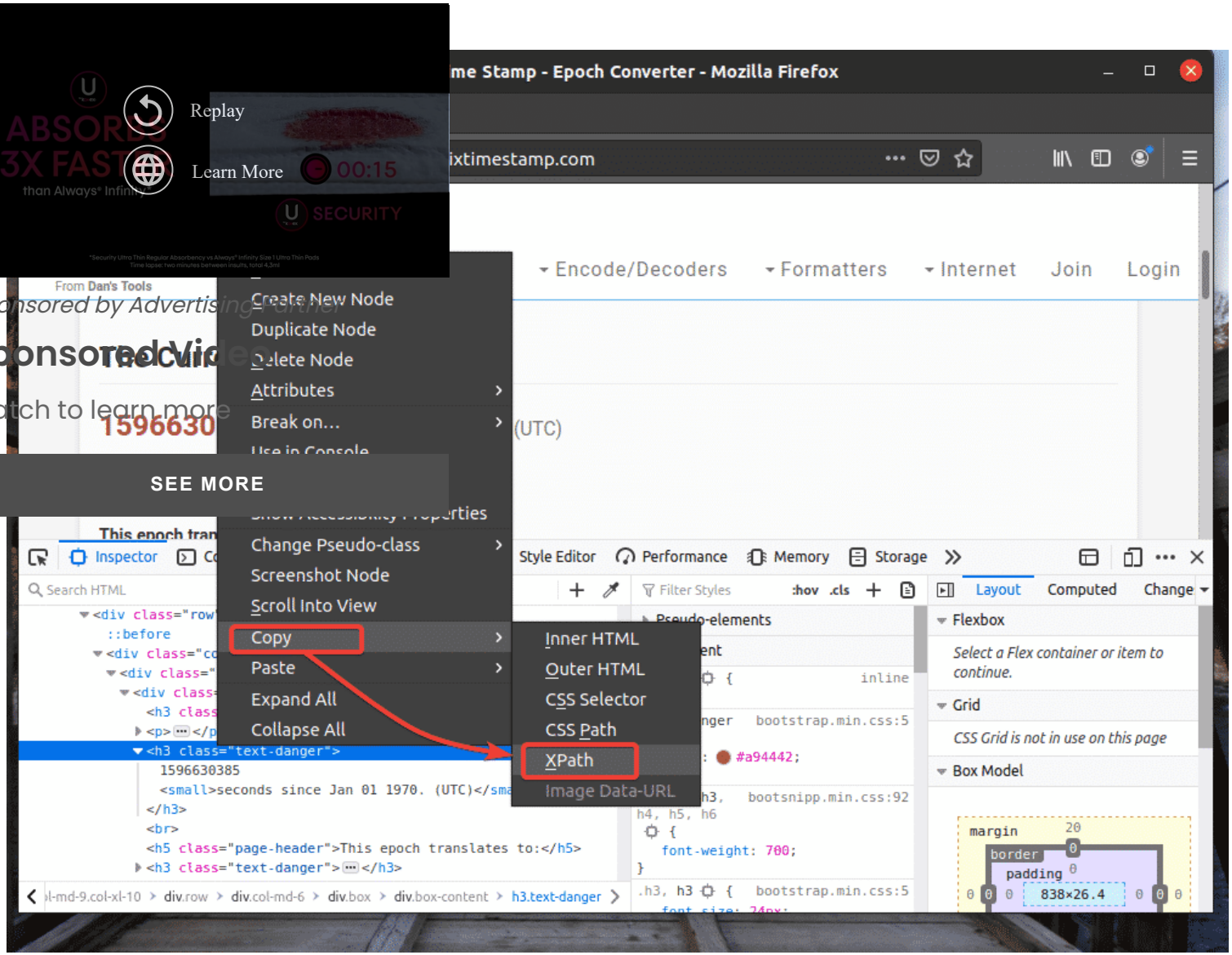


The HTML representation of the web element you have selected will be highlighted in the **er Tool,** as you can see in the screenshot below.

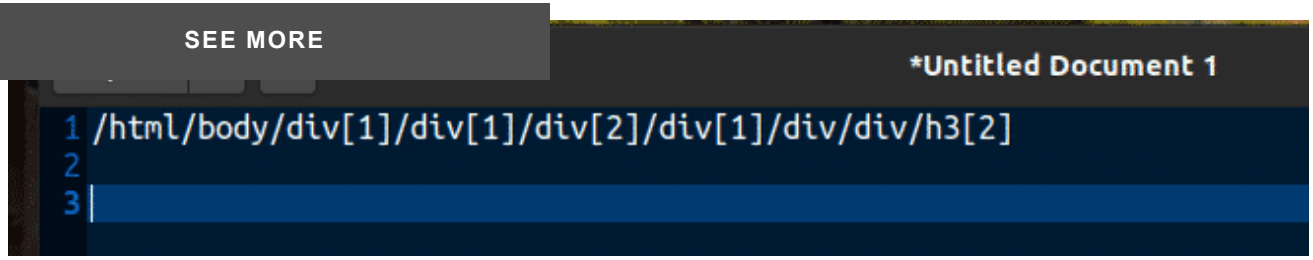


To get the XPath selector of your desired element, select the element from the **Inspector** tab of **Firefox Developer Tool** and right-click (RMB) on it. Then, select **Copy** > **XPath** as marked

in the screenshot below.



The XPath selector of your desired element should look something like this.



Extracting Data from Web Pages using XPath Selector:

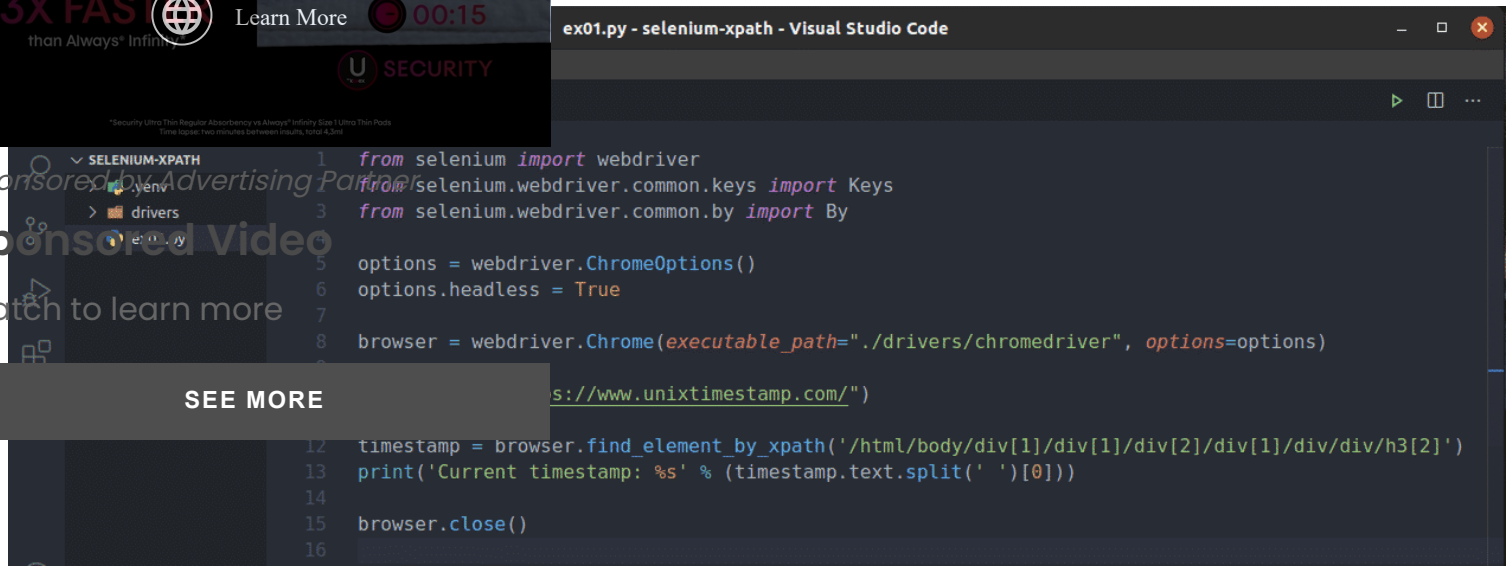
In this section, I am going to show you how to select web page elements and extract data from them using XPath selectors with the Selenium Python library.

First, create a new Python script **ex01.py** and type in the following lines of codes.

```
from selenium import webdriver
from selenium.webdriver.common.keys import Keys
from selenium.webdriver.common.by import By
options = webdriver.ChromeOptions()
options.headless = True
browser = webdriver.Chrome(executable_path="./drivers/chromedriver",
options=options)
```

```
browser.get("https://www.unixtimestamp.com/")
timestamp = browser.find_element_by_xpath('/html/body/div[1]/div[1]
                                          (timestamp.text.split(' ')[0]))
```

py Python script.



Line 1-3 imports all the required Selenium components.


```
er
on.keys import Keys
on.by import By
```

object, and line 6 enables headless mode for the Chrome


```
options = webdriver.ChromeOptions()
options.headless = True
```

object using the **chromedriver** binary from the **drivers/** directory of the project.

```
browser = webdriver.Chrome(executable_path="./drivers/chromedriver", options=options)
```

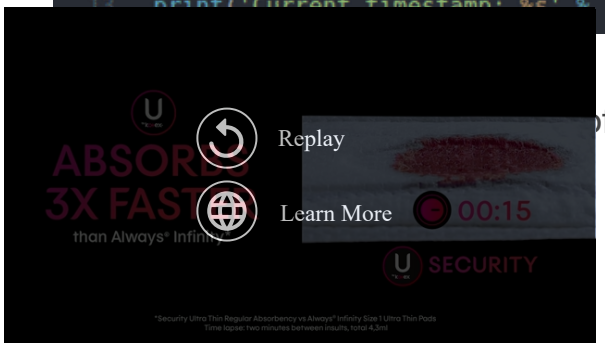
Line 10 tells the browser to load the website unixtimestamp.com.

```
browser.get("https://www.unixtimestamp.com/")
```

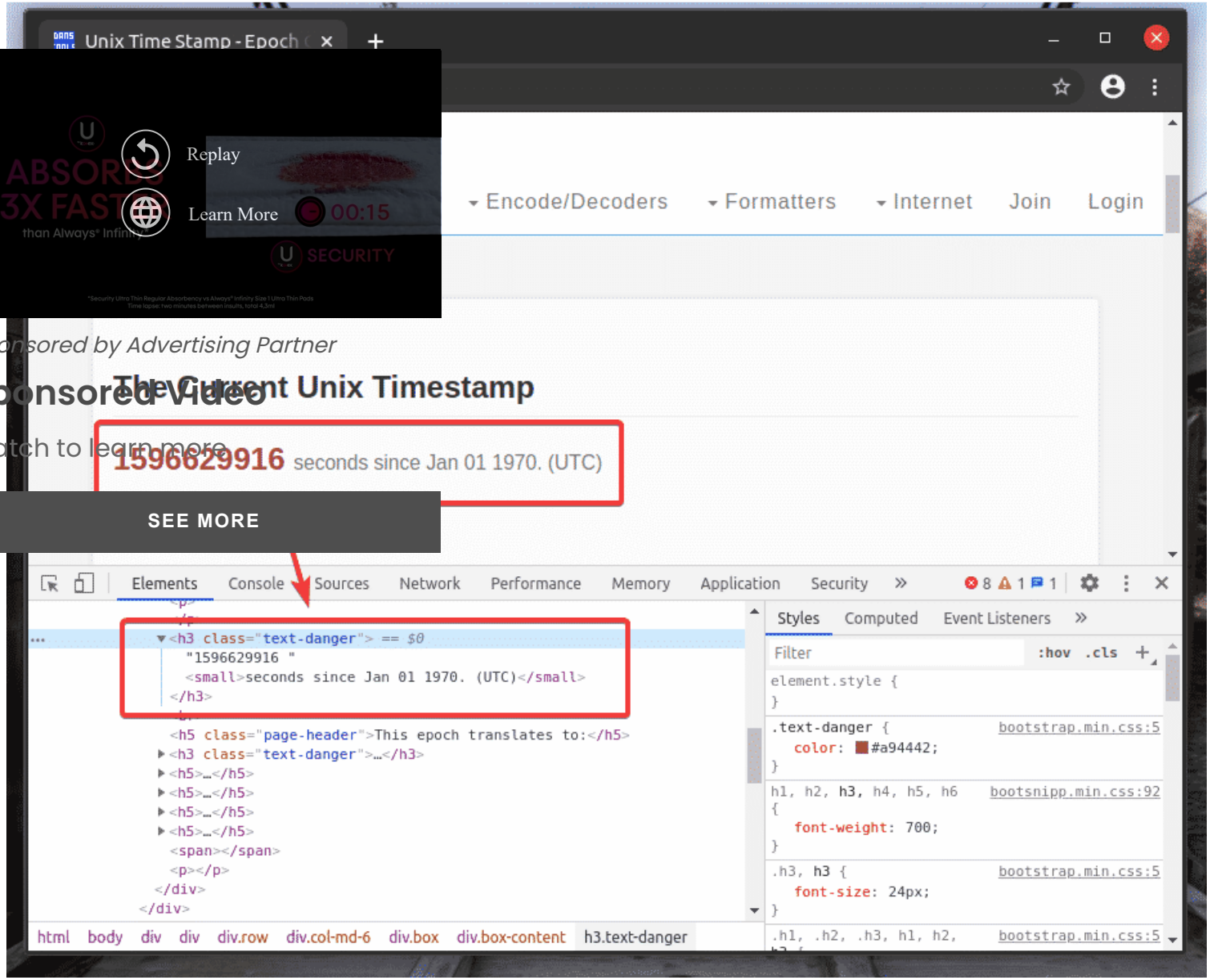
Line 12 finds the element that has the timestamp data from the page using the XPath selector and stores it in the **timestamp** variable.

Line 13 parses the timestamp data from the element and prints it on the console.

```
timestamp = browser.find_element_by_xpath('/html/body/div[1]/div[1]/div[2]/div[1]/div/div/h3[2]')
print('Current timestamp: %s' % (timestamp.text.split(' ')[0]))
```



f the marked **h2** element from **unixtimestamp.com** using

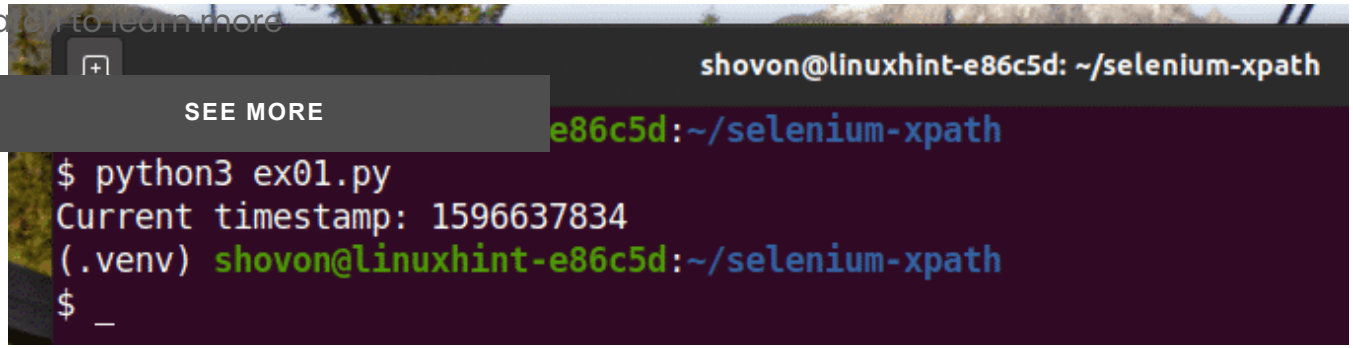


Line 14 closes the browser.

```
15  browser.close()
```

Run the Python script **ex01.py** as follows:

As you can see, the timestamp data is printed on the screen.

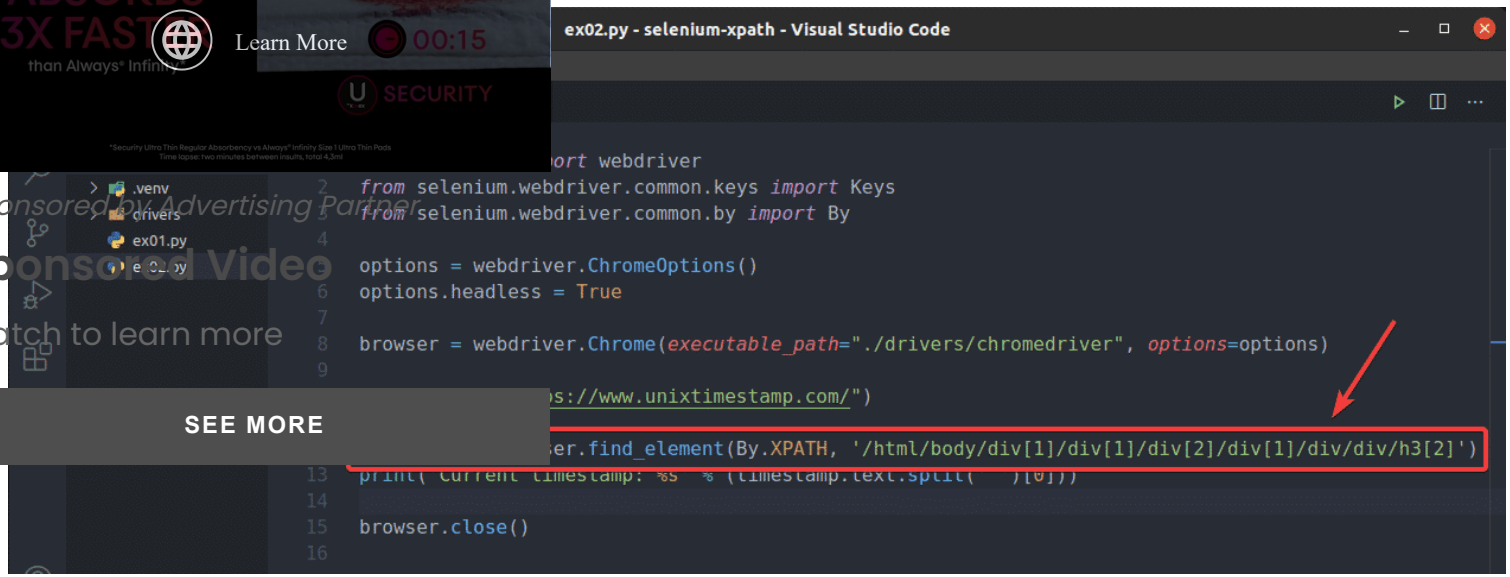


Here, I have used the **browser.find_element_by_xpath(selector)** method. The only parameter of this method is the **selector,** which is the XPath selector of the element.

Instead of **browser.find_element_by_xpath()** method, you can also use **browser.find_element(By, selector)** method. This method needs two parameters. The first parameter **By** will be **By.XPATH** as we will be using the XPath selector, and the second parameter **selector** will be the XPath selector itself. The result will be the same.

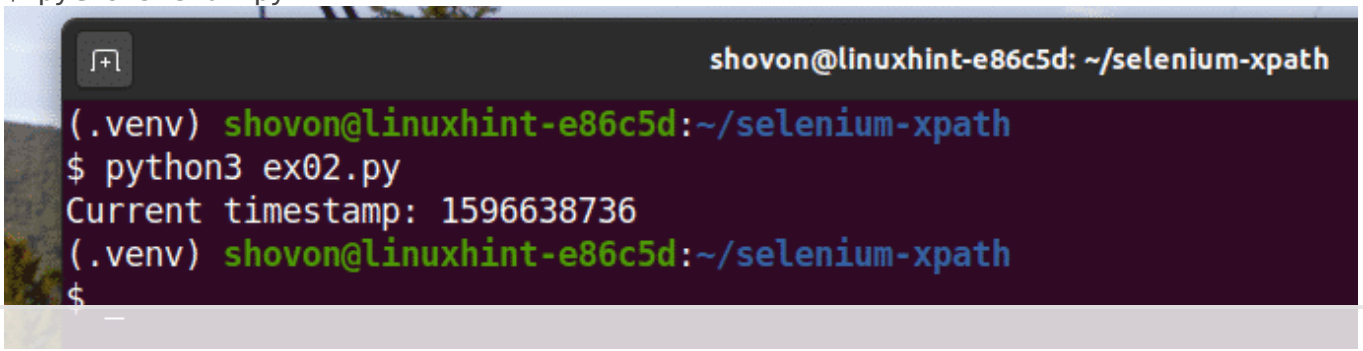
To see how **browser.find_element()** method works for XPath selector, create a new Python

the lines from **ex01.py** to **ex02.py** and change **line 12** as



As you can see, the Python script **ex02.py** gives the same result as **ex01.py**.

```
$ python3 ex02.py
```



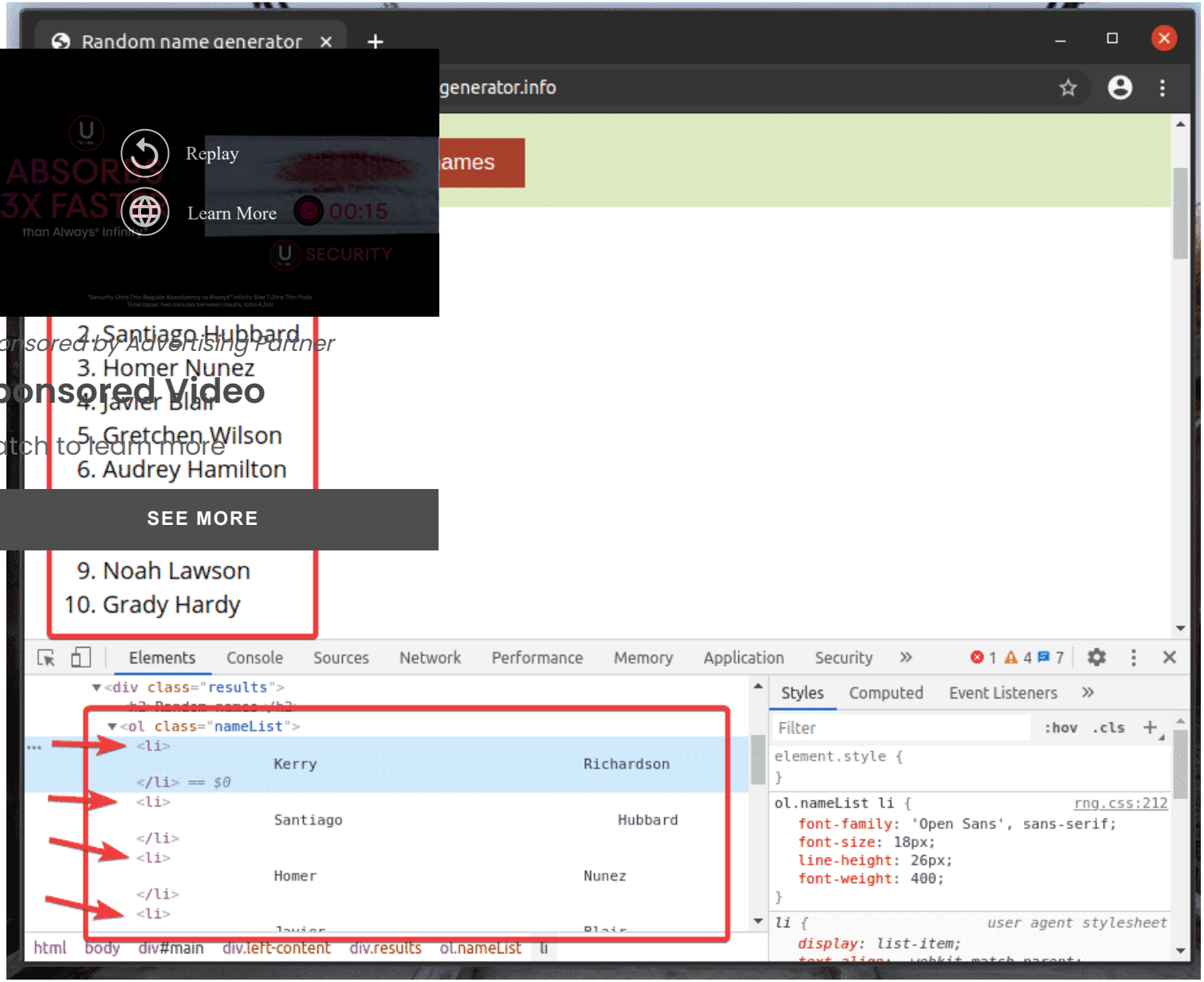
The **browser.find_element_by_xpath()** and **browser.find_element()** methods are used to om web pages. If you want to find and select multiple hen you have to use **browser.find_elements_by_xpath()** ods.

xpath() method takes the same argument as the **()** method.

The **browser.find_elements()** method takes the same arguments as the **browser.find_element()** method.

a list of names using XPath selector from **random-name-generator.info** with the Selenium Python library.

The unordered list (**ol** tag) has a 10 **li** tags inside each containing a random name. The XPath to select all the **li** tags inside the **ol** tag in this case is **//*[@id="main"]/div[3]/div[2]/ol//li**



Let's go through an example of selecting multiple elements from the web page using XPath selectors.

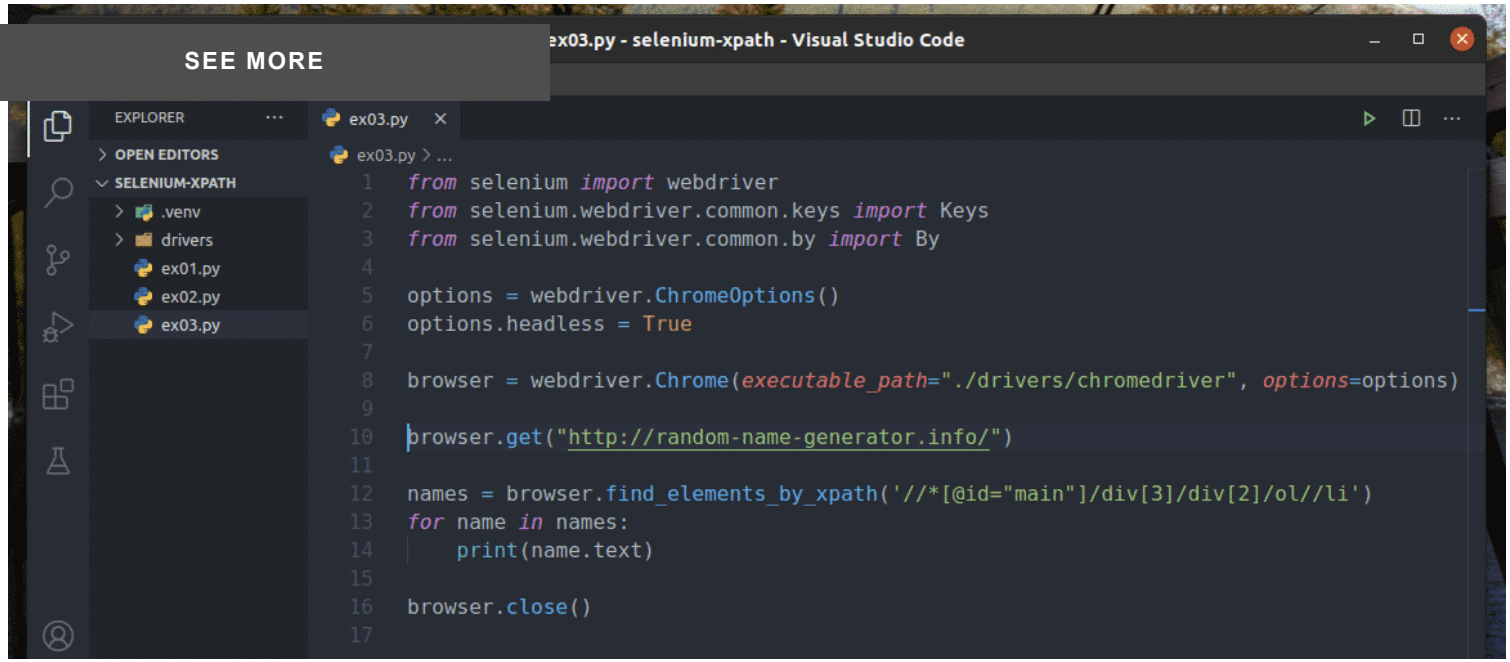
Create a new Python script **ex03.py** and type in the following lines of codes in it.


```
ys import Keys
 import By
()

table_path="./drivers/chromedriver",

generator.info/")
xpath('<a id="post-66482-_Hlk47564274">
/ol//li')
for name in names:
    print(name.text)
browser.close()
```

Once you're done, save the **ex03.py** Python script.



Line 1-8 is the same as in **ex01.py** Python script. So, I am not going to explain them here again.

```
from selenium import webdriver
from selenium.webdriver.common.keys import Keys
from selenium.webdriver.common.by import By

options = webdriver.ChromeOptions()

browser = webdriver.Chrome(executable_path="./drivers/chromedriver", options=options)
```


Line 10 tells the browser to load the website random-name-generator.info.

```
browser.get("http://random-name-generator.info/")
```

Line 12 finds the name list using the **browser.find_elements_by_xpath()** method. This method uses the XPath selector **//*[@id=”main”]/div[3]/div[2]/ol//li** to find the name list. Then, the name list is stored in the **names** variable.

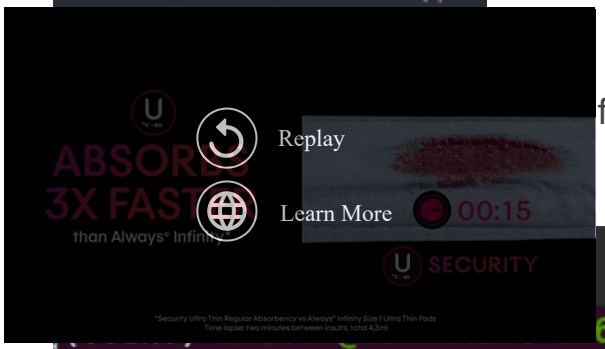
```
names = browser.find_elements_by_xpath('//*[@id="main"]/div[3]/div[2]/ol//li')
```

In lines 13 and 14, a **for** loop is used to iterate through the **names** list and print the names on the console.

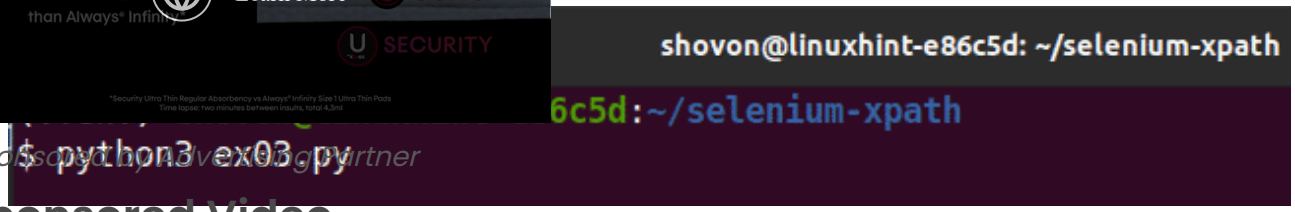
```
for name in names:
    print(name.text)
```

Line 16 closes the browser.

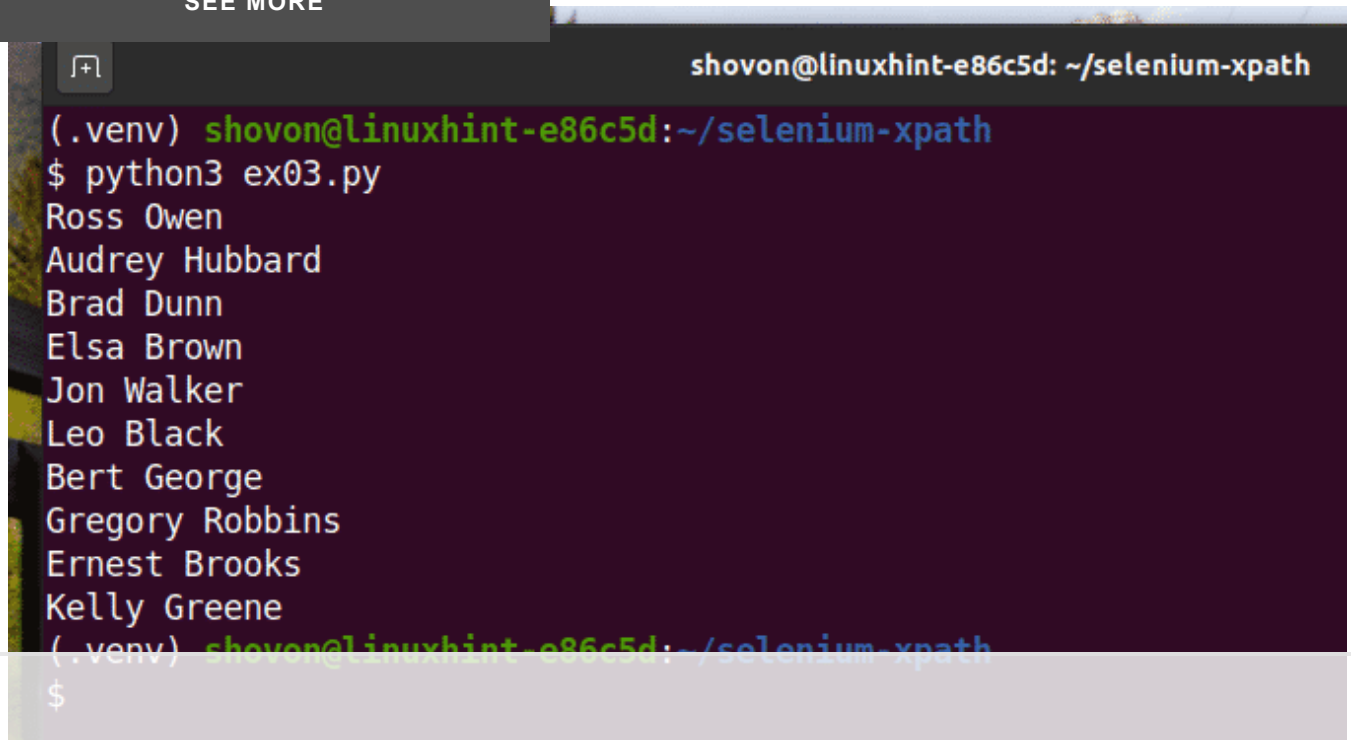
```
16  browser.close()
```



follows:

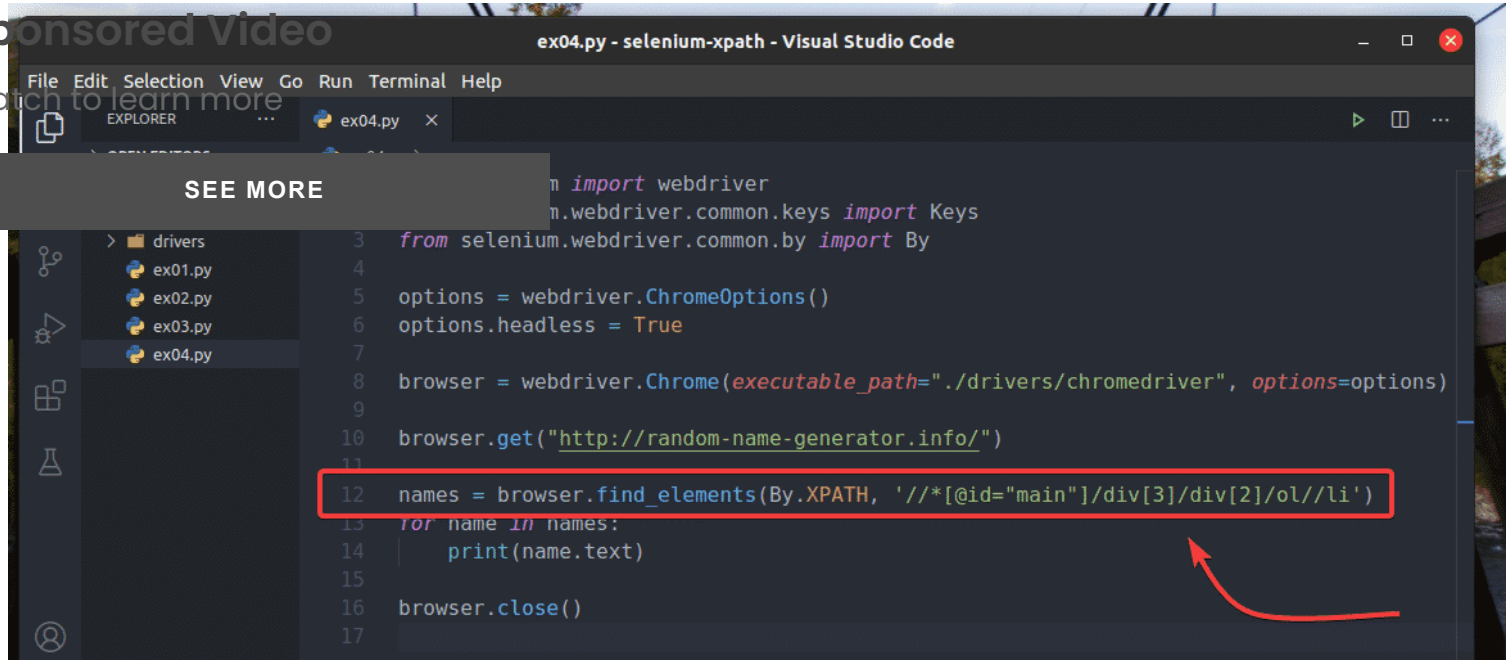


As you can see, the names are extracted from the web page and printed on the console.



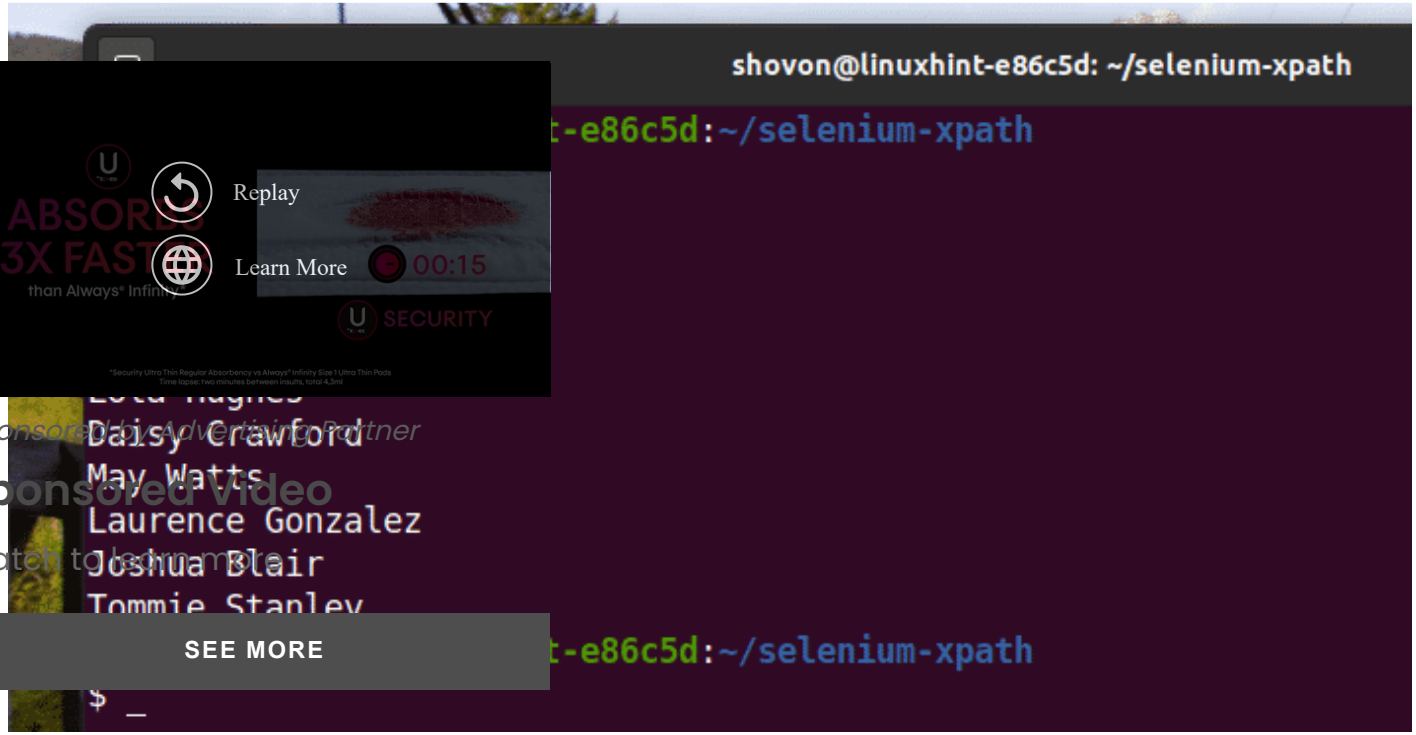
Instead of using the **browser.find_elements_by_xpath()** method, you can also use the as before. The first argument of this method is **By.XPATH,** Path selector.

elements() method, create a new Python script **ex04.py**, **ex04.py**, and change line 12 as marked in the screenshot



You should get the same result as before.

```
$ python3 ex04.py
```

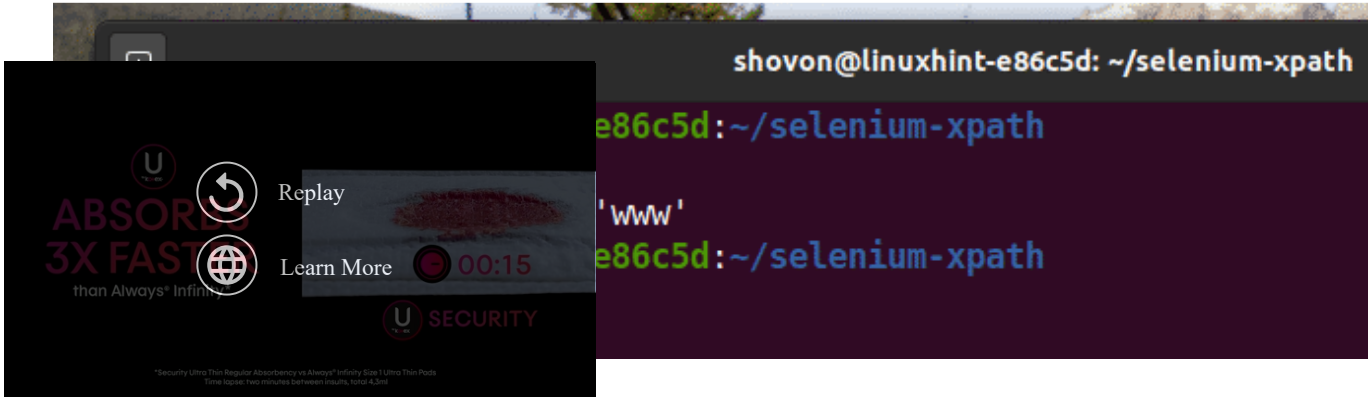


Basics of XPath Selector:

The Developer Tool of Firefox or Google Chrome web browser does generate XPath selector automatically. But these XPath selectors are sometimes not sufficient for your project. In that case, you must know what a certain XPath selector does to build your XPath selector. In this section, I am going to show you the basics of XPath selectors. Then, you should be able to build your own XPath selector.

Create a new directory **www/** in your project directory as follows:

```
$ mkdir -v www
```



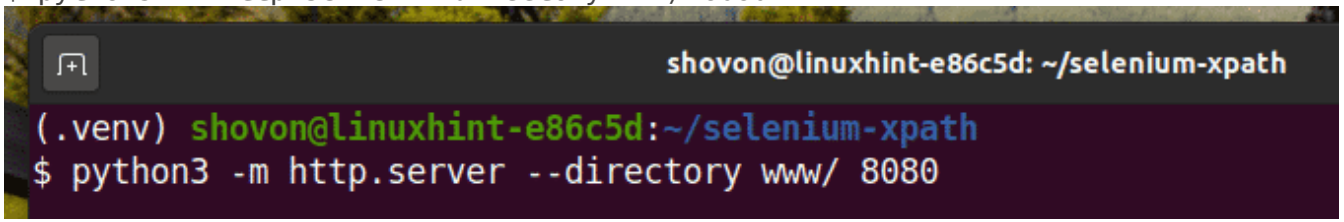
Create a new file **web01.html** in the **www/** directory and type in the following lines in that file.

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="width=device-width, initial-scale=1.0">
    <title>Basic HTML Document</title>
</head>
<body>
    <h1>Hello World</h1>
</body>
</html>
```

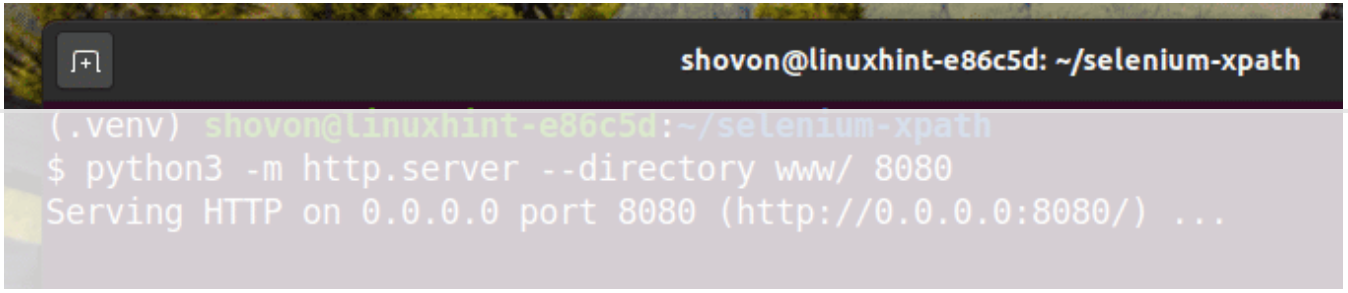
Once you're done, save the **web01.html** file.

Run a simple HTTP server on port 8080 using the following command:

```
$ python3 -m http.server --directory www/ 8080
```



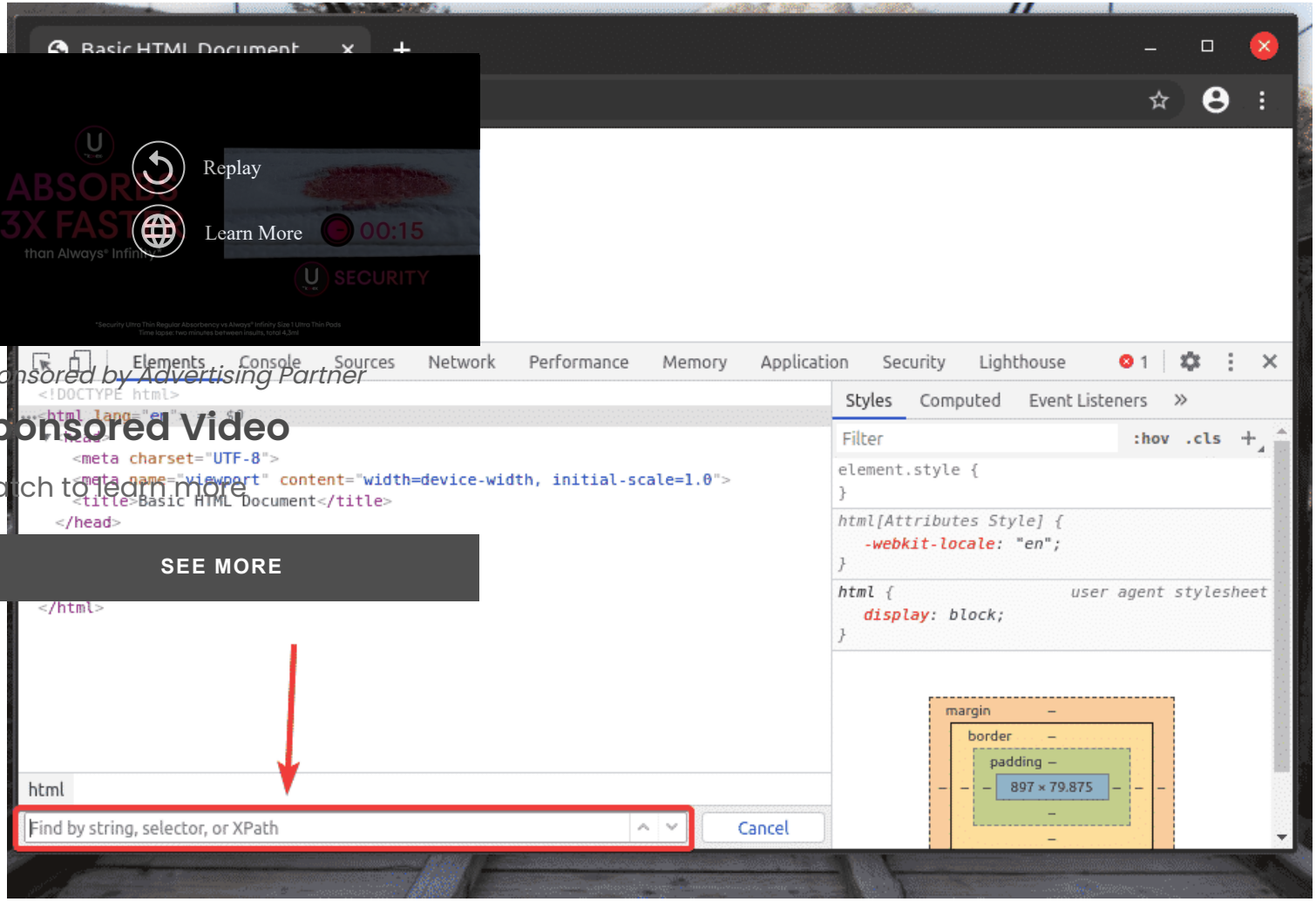
The HTTP server should start.



You should be able to access the **web01.html** file using the URL

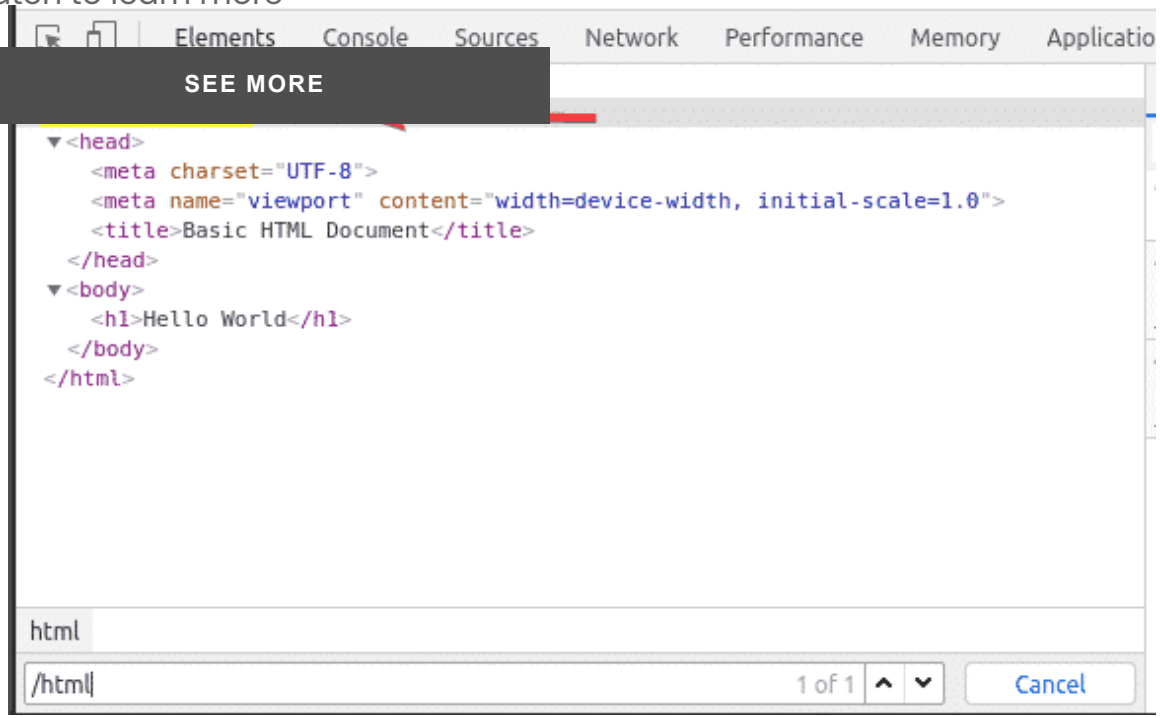
as you can see in the screenshot below.

While the Firefox or Chrome Developer Tool is opened, press **<Ctrl>** + **F** to open the search box. You can type in your XPath selector here and see what it selects very easily. I am going to use this tool throughout this section.

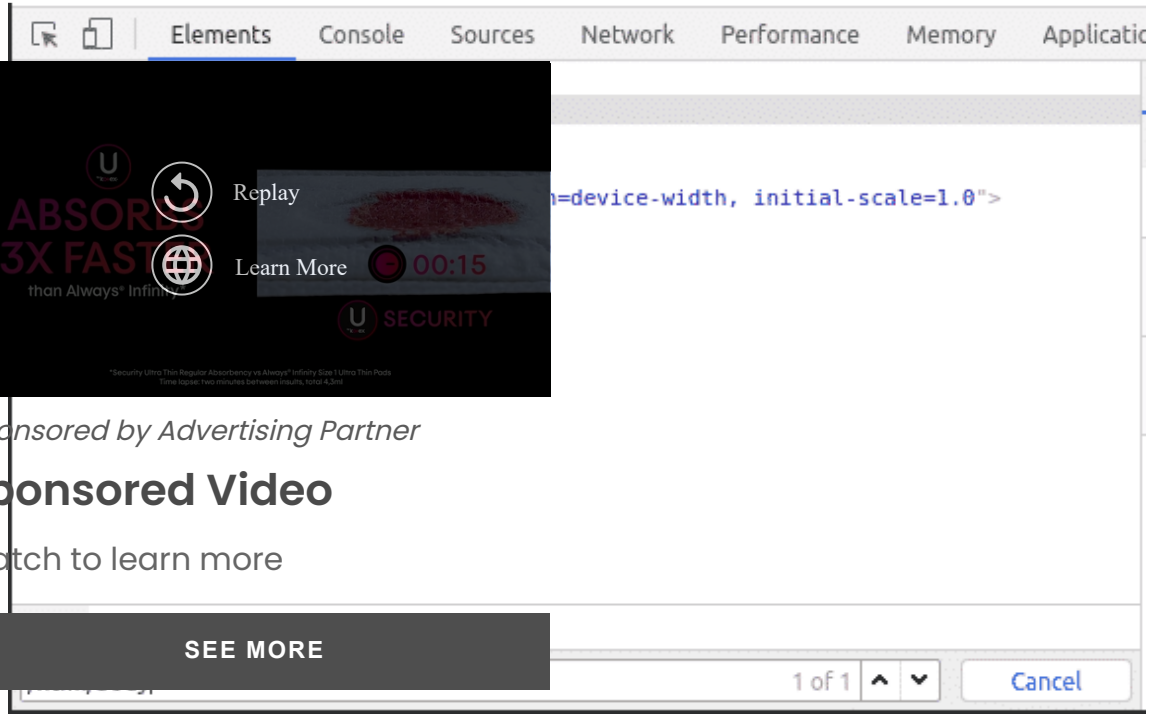


An XPath selector starts with a **forward slash (/)** most of the time. It's like a Linux directory tree. The */* is the root of all elements on the web page.

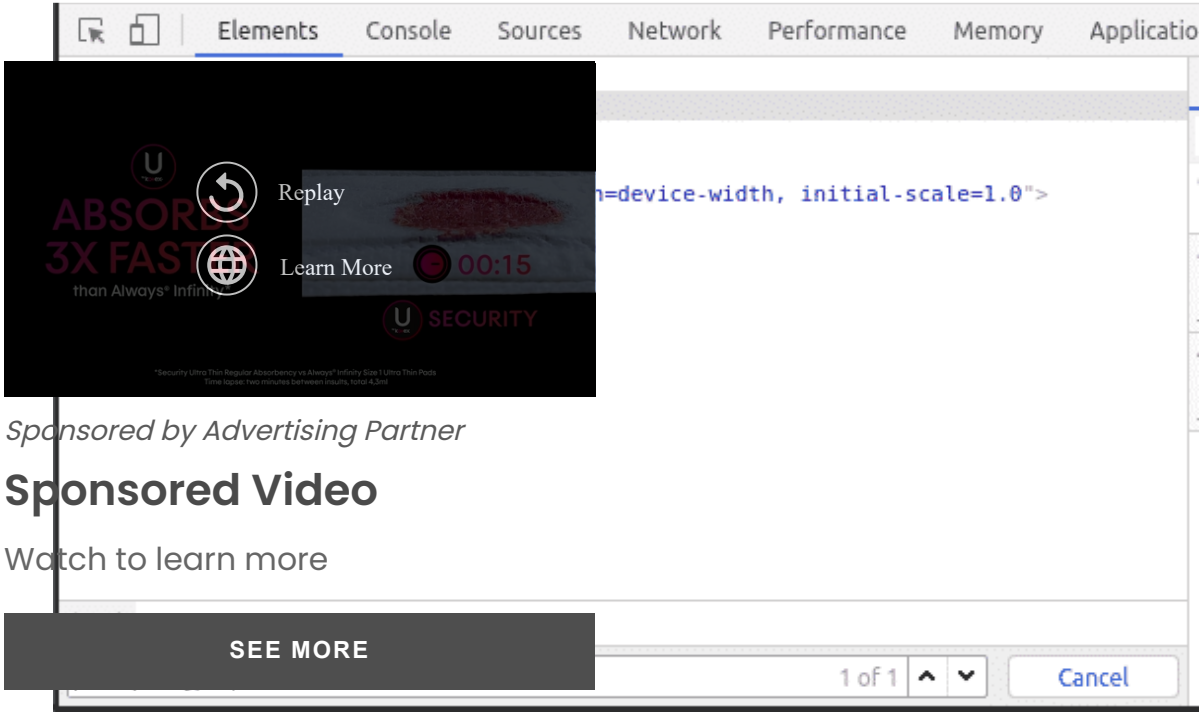
The first element is the **html**. So, the XPath selector **/html** selects the entire **html** tag.



Inside the **html** tag, we have a **body** tag. The **body** tag can be selected with the XPath selector **/html/body**



The **h1** header is inside the **body** tag. The **h1** header can be selected with the XPath selector **/html/body/h1**



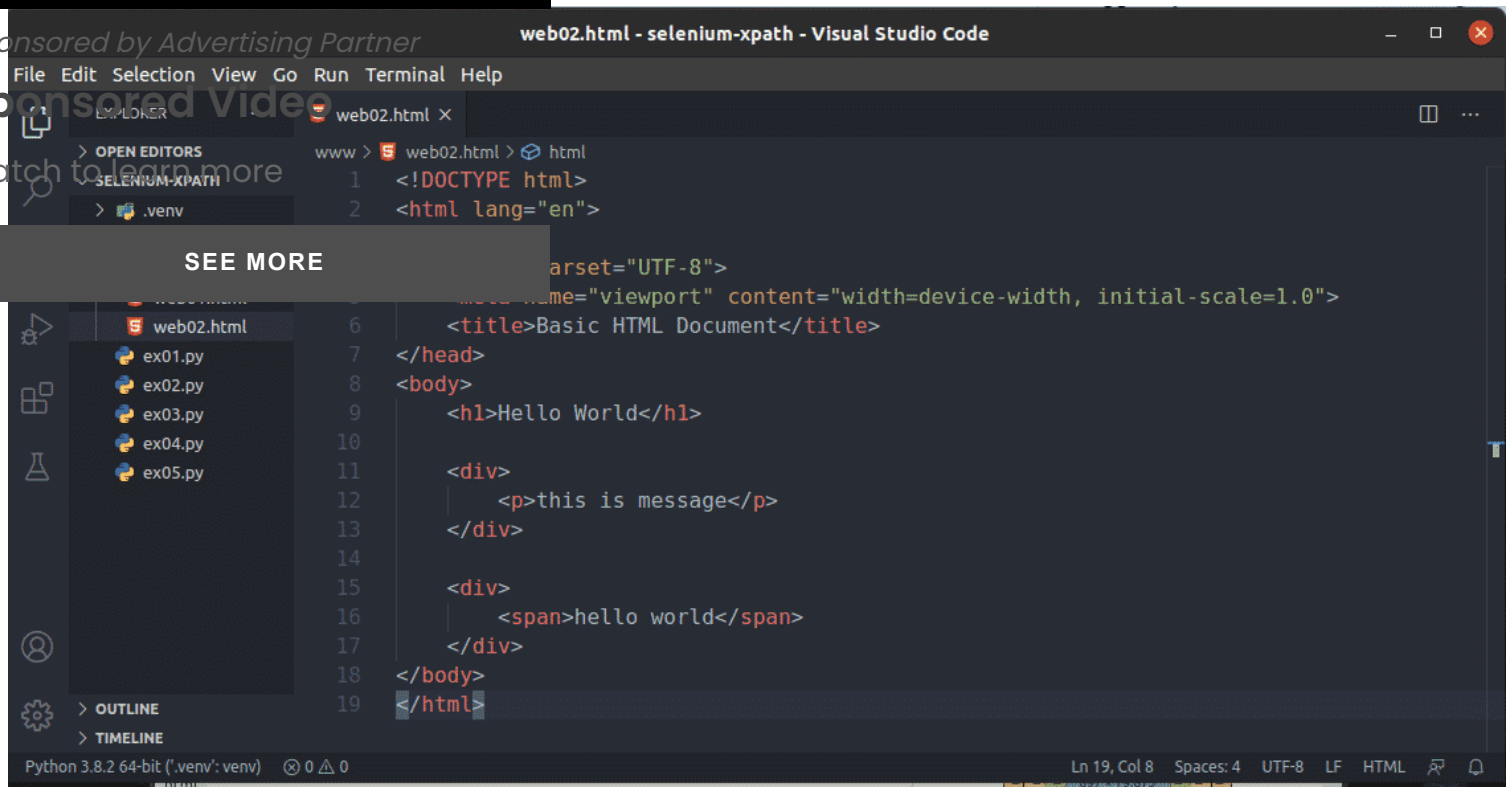
This type of XPath selector is called an absolute path selector. In absolute path selector, you must traverse the web page from the root (/) of the page. The disadvantage of an absolute path selector is that even a slight change to the web page structure may make your XPath selector invalid. The solution to this problem is a relative or partial XPath selector.

To see how relative path or partial path works, create a new file **web02.html** in the **www/** directory and type in the following lines of codes in it.

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Basic HTML Document</title>
</head>
<body>
    <h1>Hello World</h1>
```

```
<div>
```

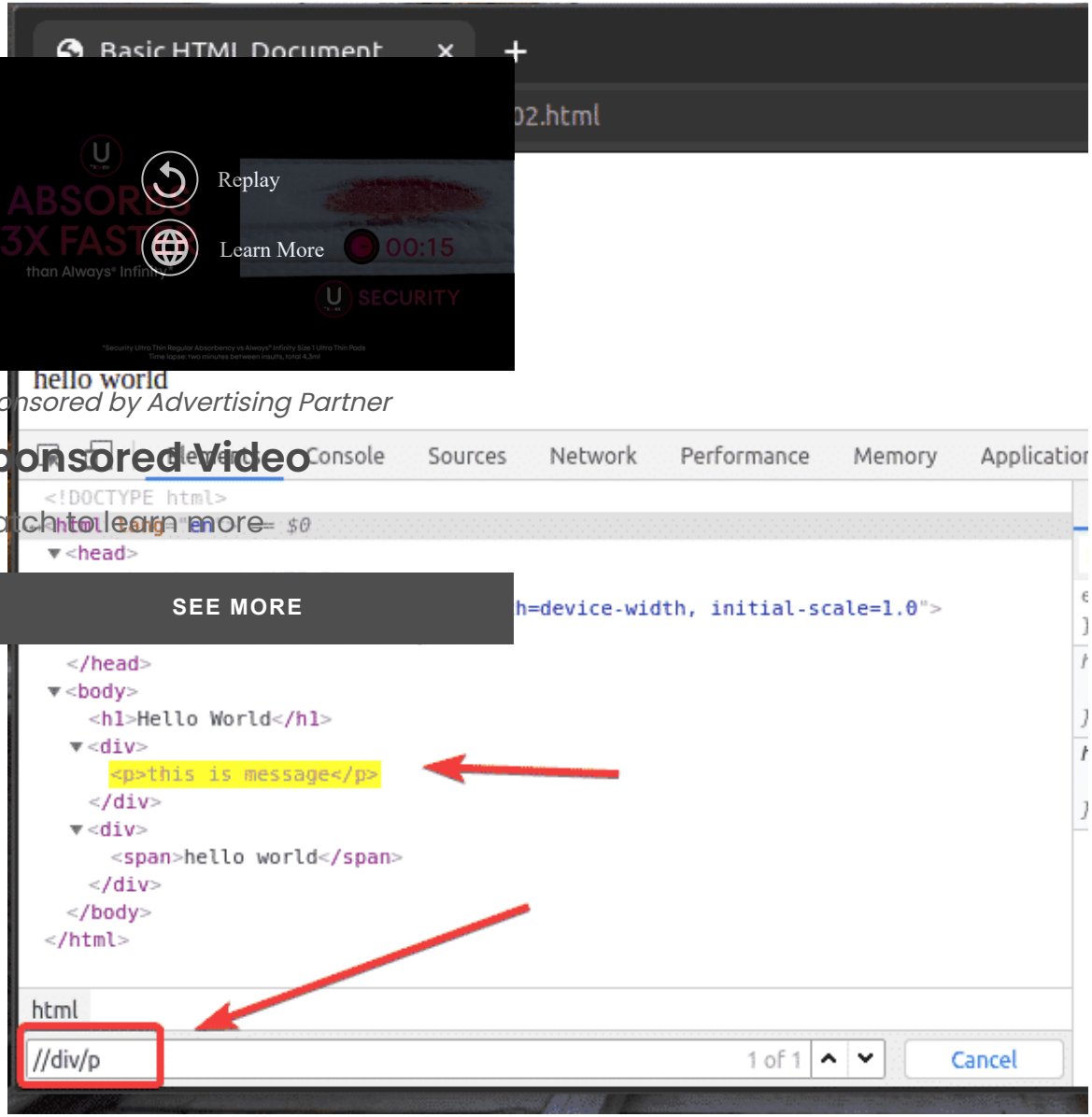

2.html file and load it in your web browser.



As you can see, the XPath selector **//div/p** selects the **p** tag inside the **div** tag. This is an example of a relative XPath selector.

Relative XPath selector starts with **//**. Then you specify the structure of the element you want

ment inside a **div** element, does not matter what comes

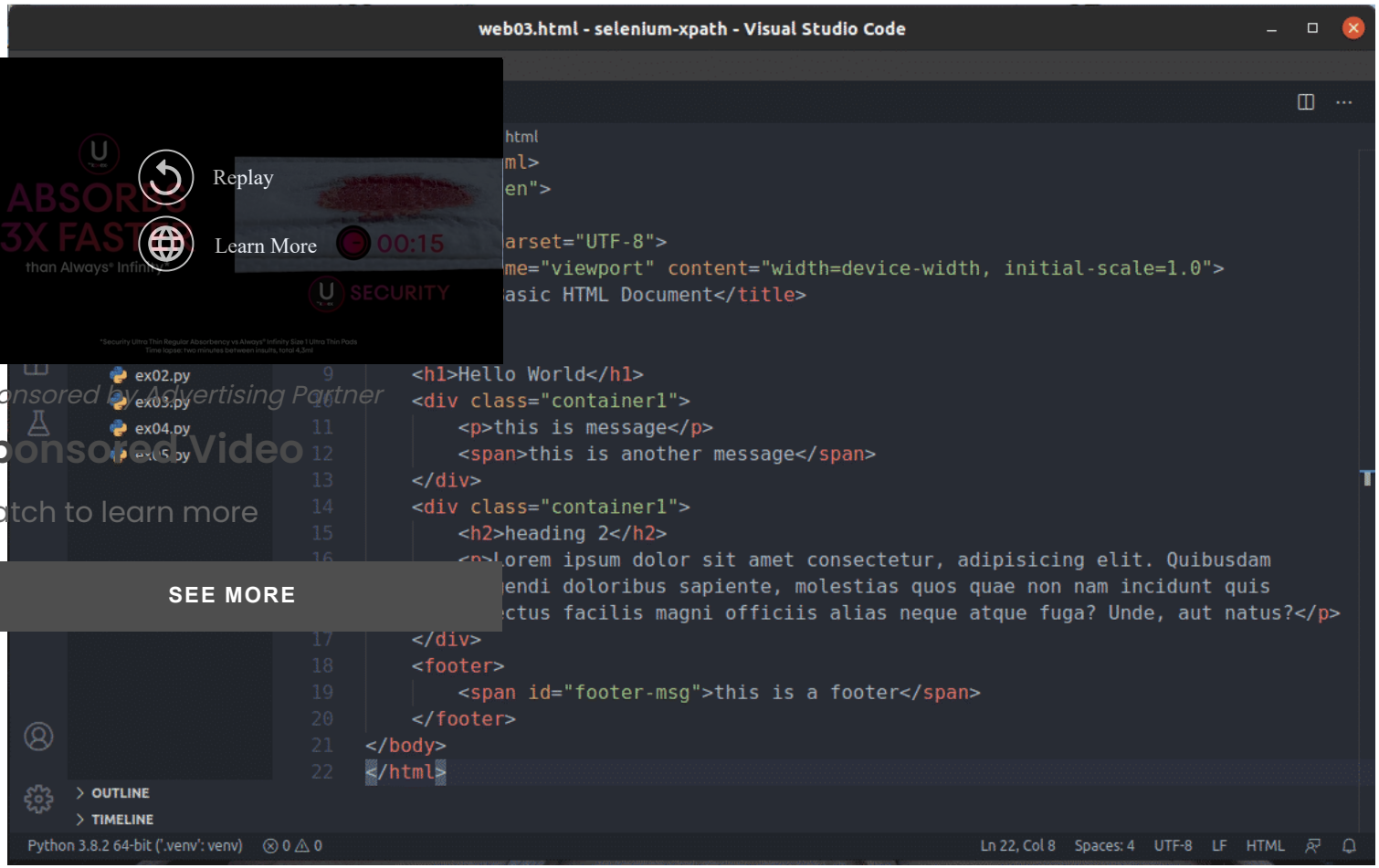


You can also select elements by different attributes like **id**, **class**, **type,** etc. using XPath selector. Let's see how to do that.

Create a new file **web03.html** in the **www/** directory and type in the following lines of codes in

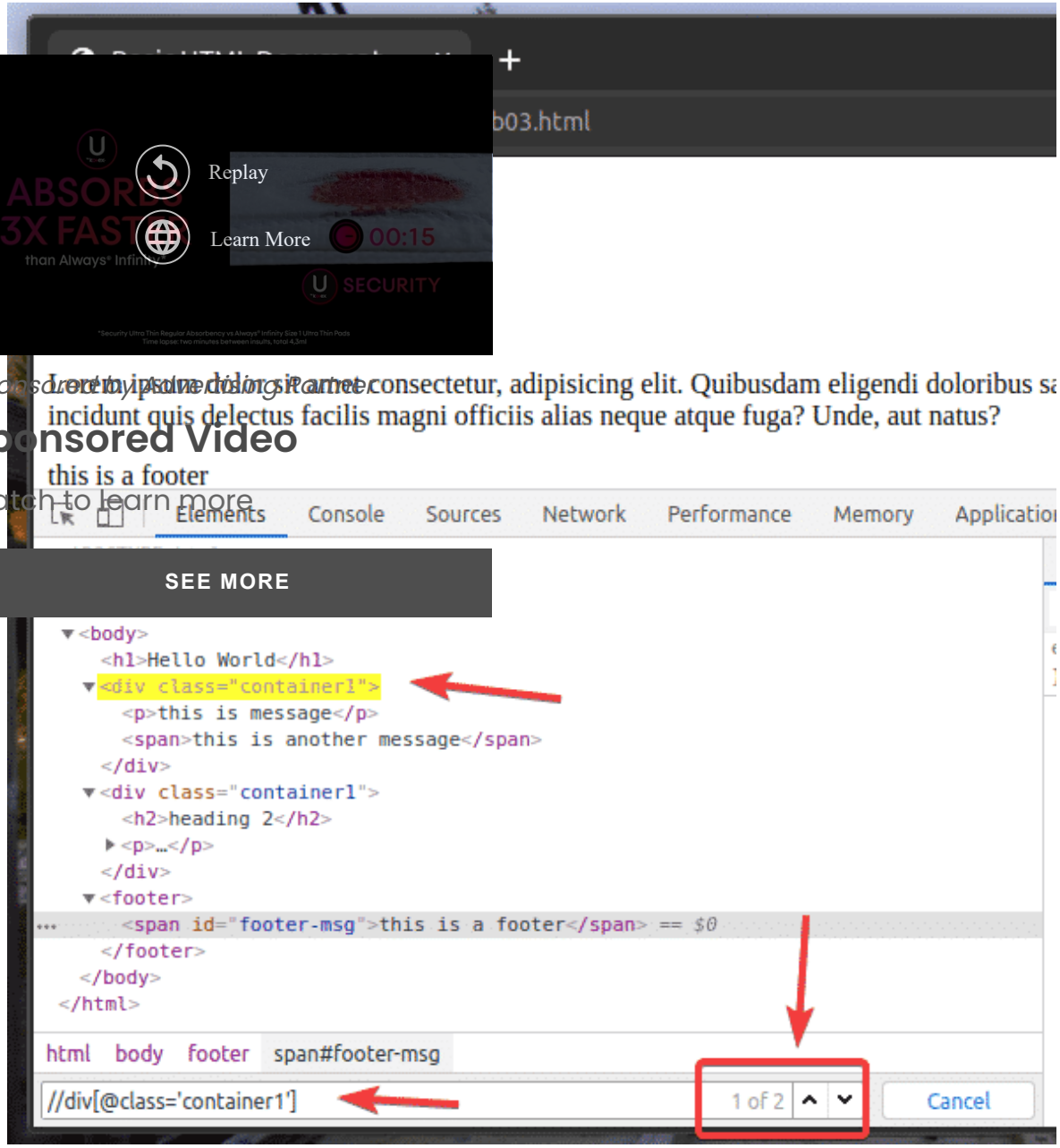

```
<html>
<head>
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title></title>
</head>
<body>
    <h1>Hello world</h1>
    <div class="container1">
        <p>this is message</p>
        <span>this is another message</span>
    </div>
    <div class="container1">
        <h2>heading 2</h2>
        <p>Lorem ipsum dolor sit amet consectetur, adipisicing elit. Quibusdam
            estias quos quae non nam incidunt quis delectus
            ue atque fuga? Unde, aut natus?</p>
    </div>
    <footer>
        <span id="footer-msg">this is a footer</span>
    </footer>
</body>
</html>
```

Once you’re done, save the **web03.html** file and load it in your web browser.



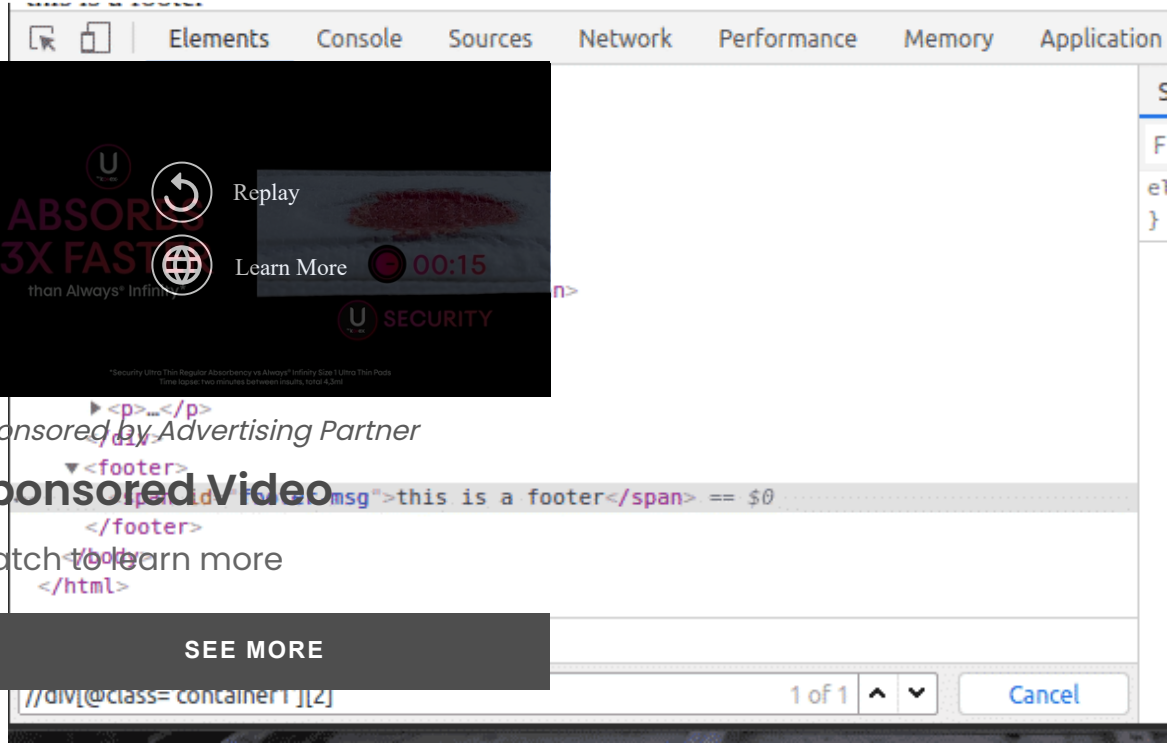
Let's say you want to select all the **div** elements which have the **class** name **container1**. To do that, you can use the XPath selector **//div[@class='container1']**

As you can see, I have 2 elements which match the XPath selector **//div[@class='container1']**



To select the first **div** element with the **class** name **container1**, add **[1]** at the end of the XPath select, as shown in the screenshot below.

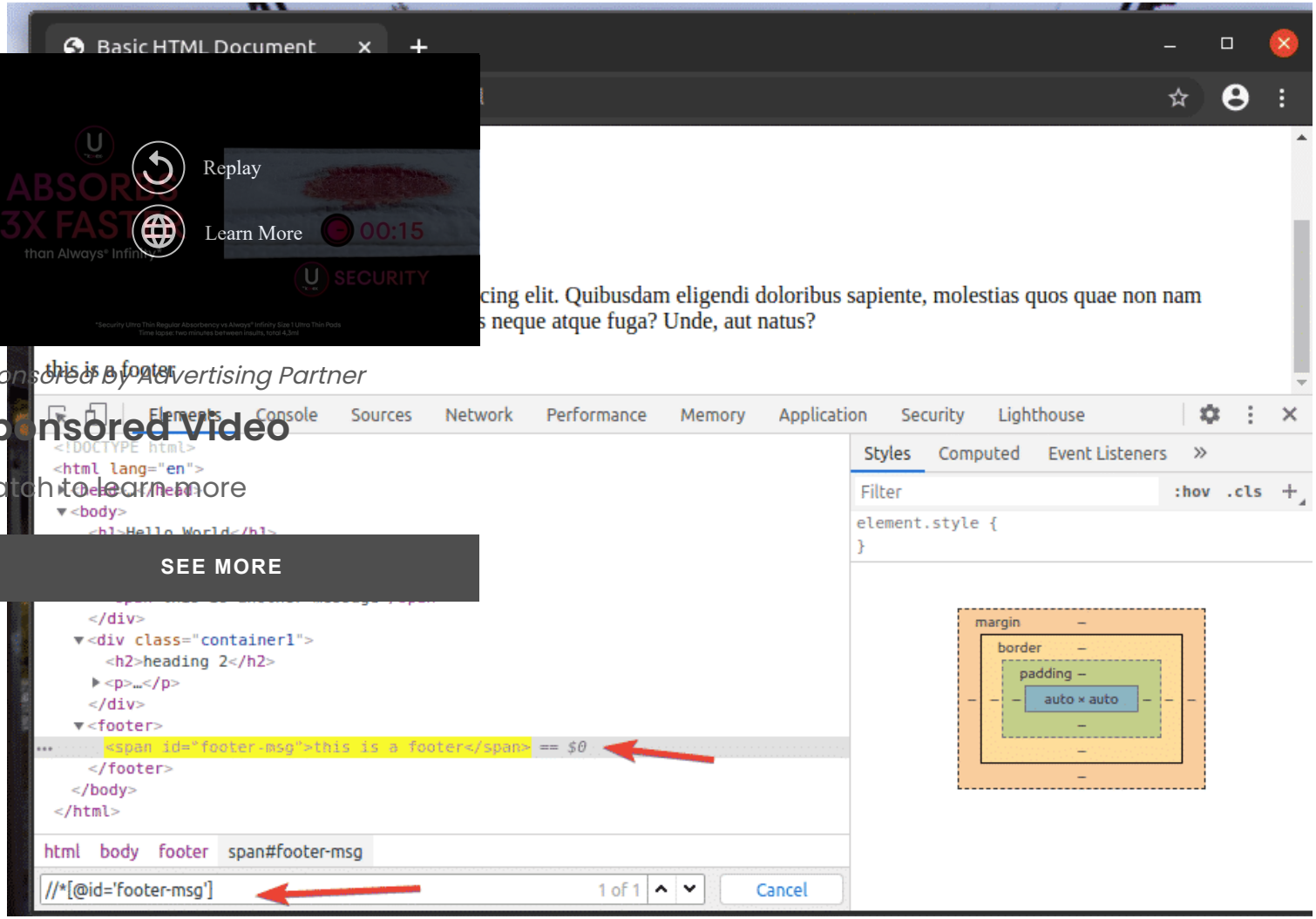
The same way, you can select the second **div** element with the **class** name **container1** using the XPath selector **//div[@class='container1'][2]**



You can select elements by **id** as well.

For example, to select the element which has the **id** of **footer-msg**, you can use the XPath selector **//*[@id='footer-msg']**

Here, the * before **[@id='footer-msg']** is used to select any element regardless of their tag.



That's the basics of the XPath selector. Now, you should be able to create your own XPath selector for your Selenium projects.

Conclusion:

In this article, I have shown you how to find and select elements from web pages using the XPath selector with the Selenium Python library. I have also discussed the most common

XPath selectors. After reading this article, you should feel pretty confident selecting elements
selector with the Selenium Python library.

ABOUT THE AUTHOR

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