[320] Web 1: Selenium

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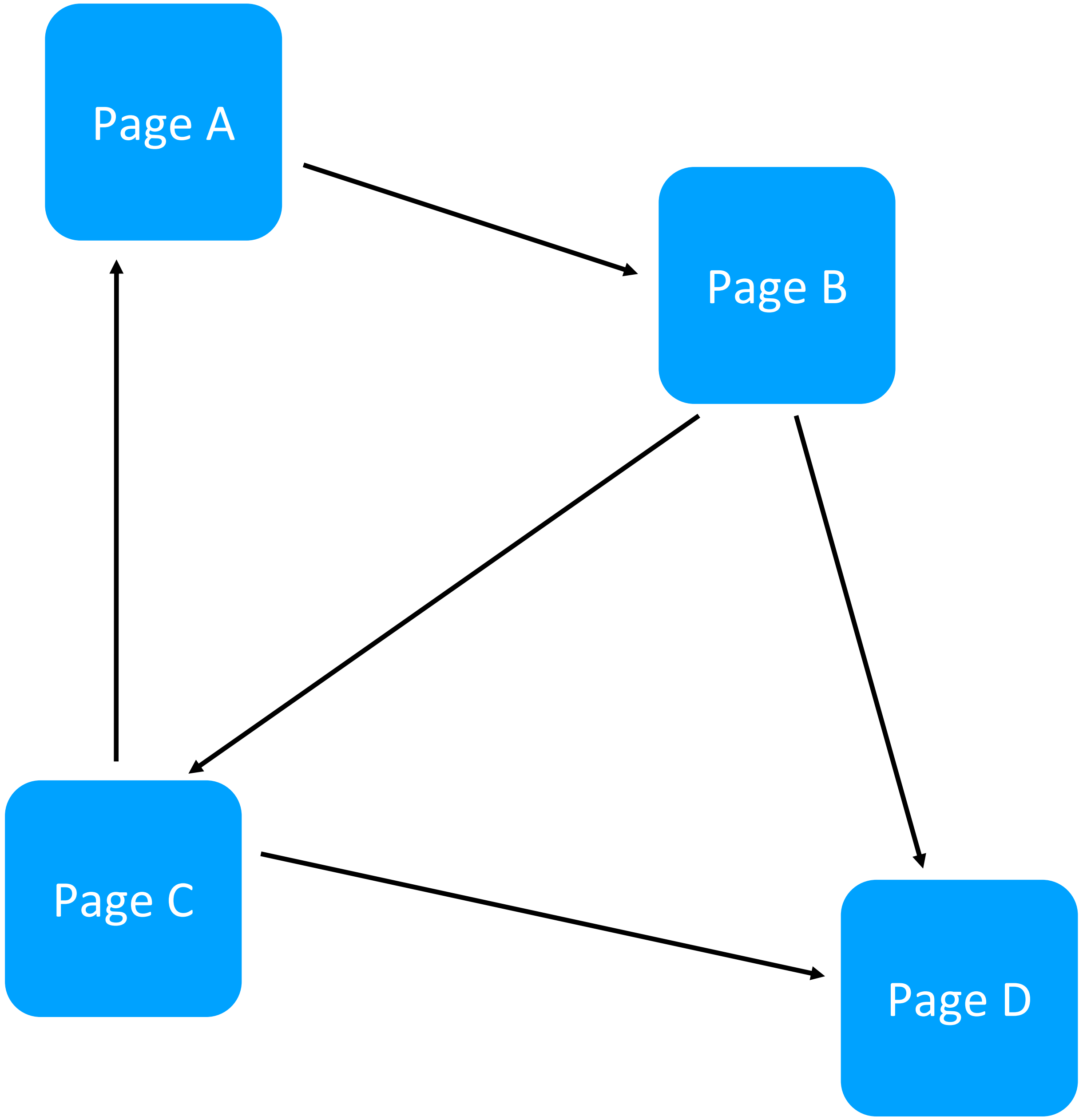
how to scrape a webpage graph?

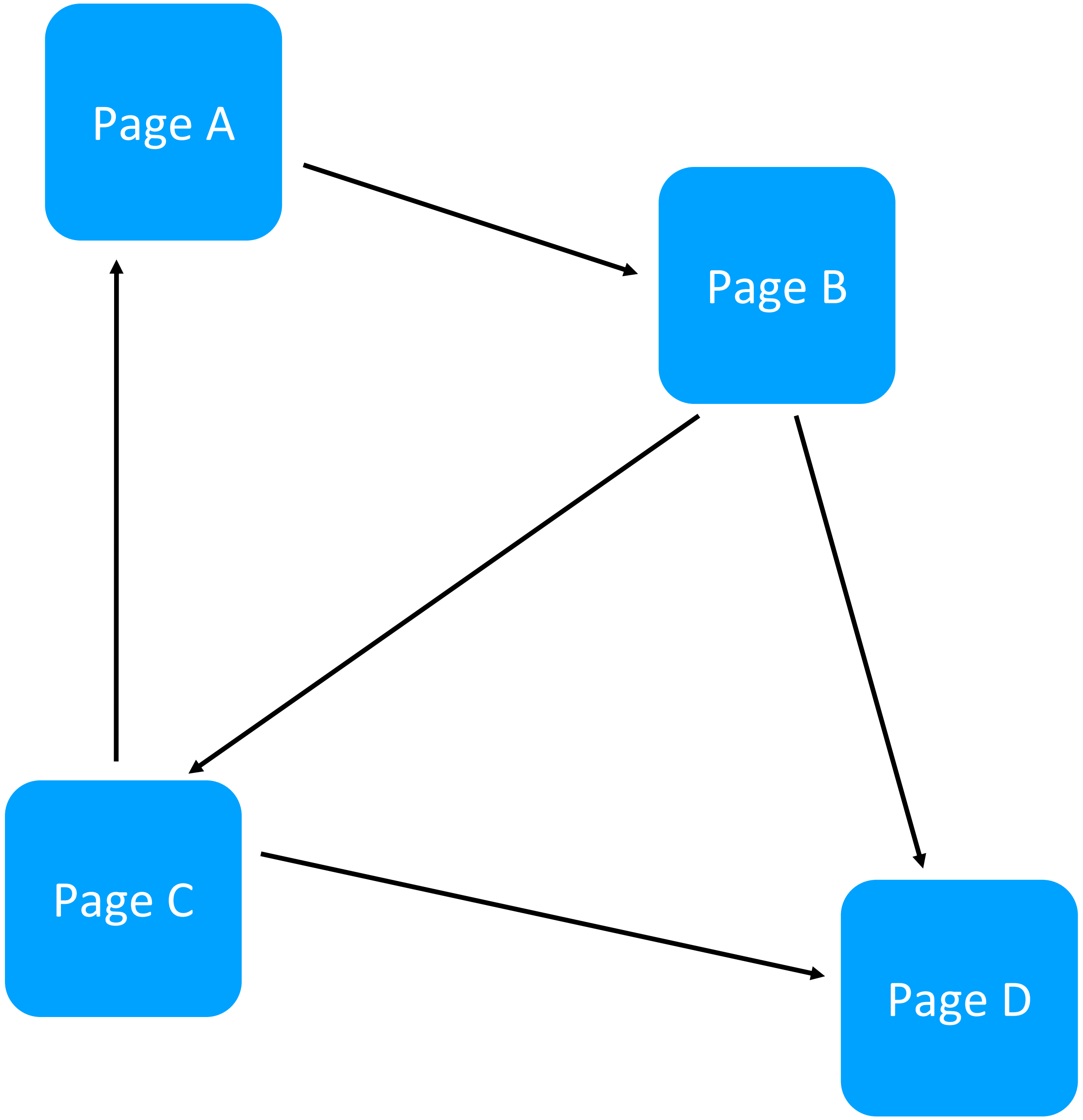
how to scrape a complicated page?



how to scrape a webpage graph?

how to scrape a complicated page?

- requests module (220)
- selenium module (320)



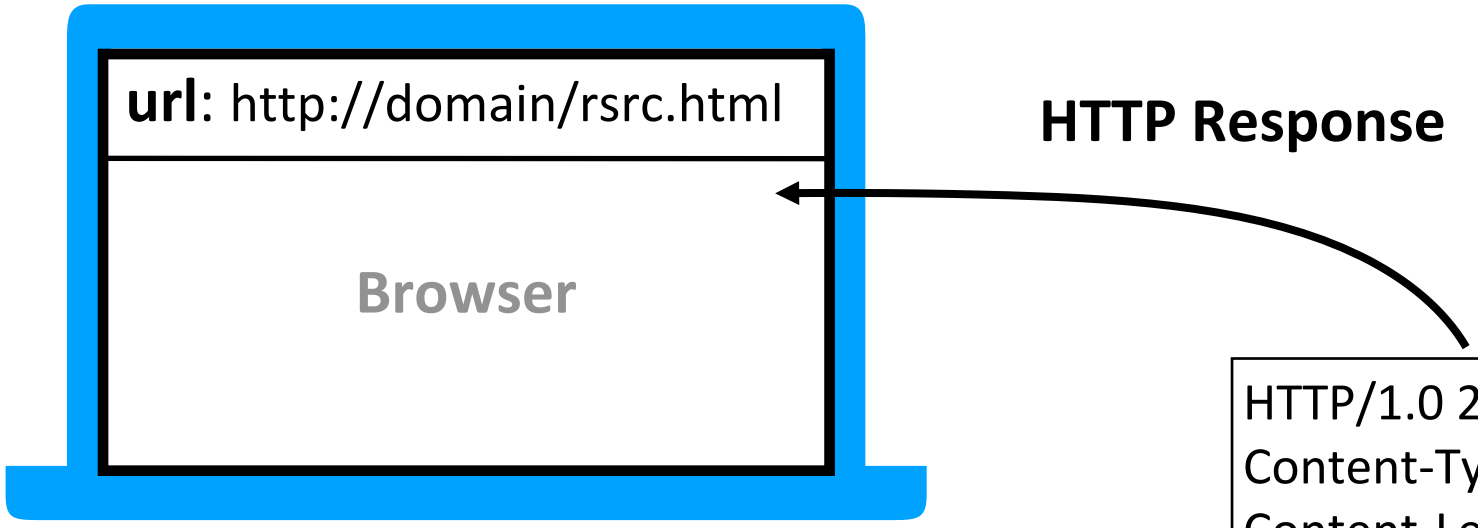
Document Object Model:

Every Webpage is a Tree

What does a web browser do when it gets some HTML in an HTTP response?

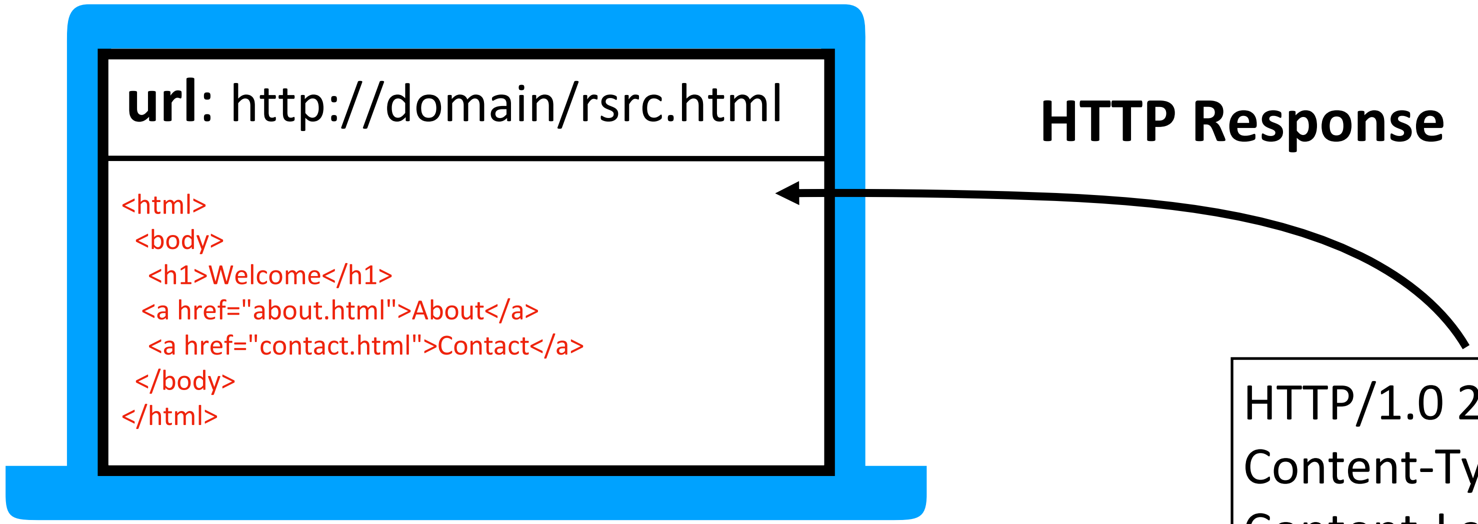
(hyper-text
markup language)

(hyper-text
transfer protocol)



```
HTTP/1.0 200 OK
Content-Type: text/html; charset=utf-8
Content-Length: 74

<html>
  <head><script>...</script></head>
  <body>
    <h1>Welcome</h1>
    <a href="about.html">About</a>
    <a href="contact.html">Contact</a>
  </body>
</html>
```



url: http://domain/rsrc.html

```
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HTTP Response

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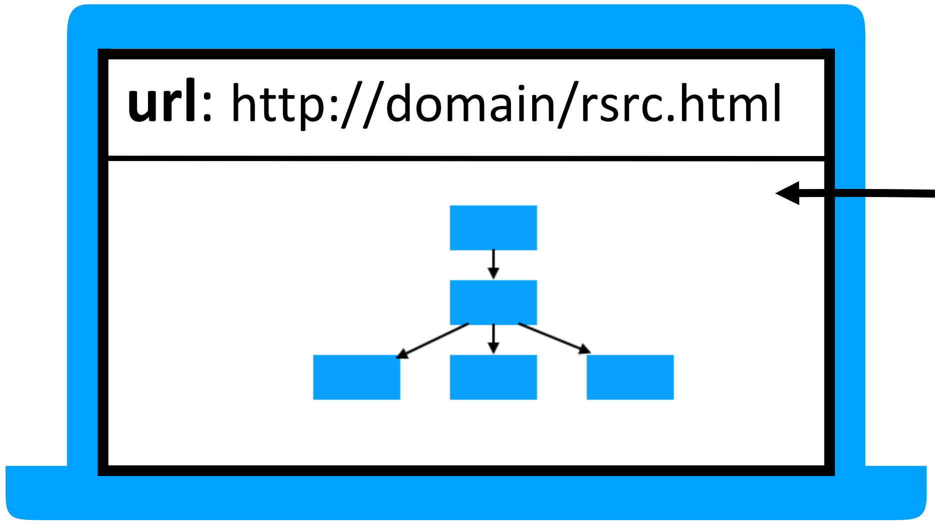

HTTP Response

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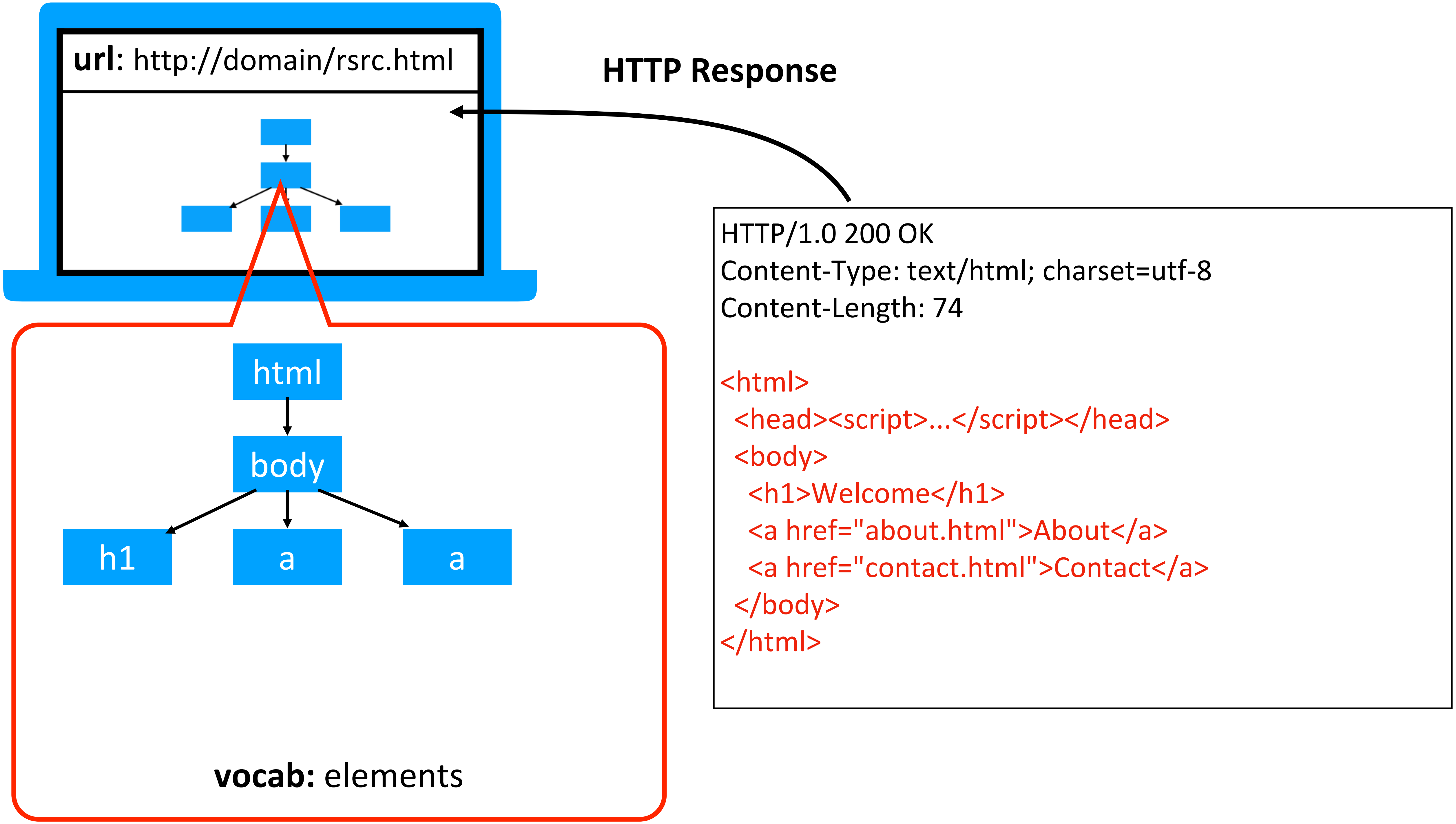
before displaying a page, the browser
uses HTML to generate a
Document Object Model (DOM Tree)



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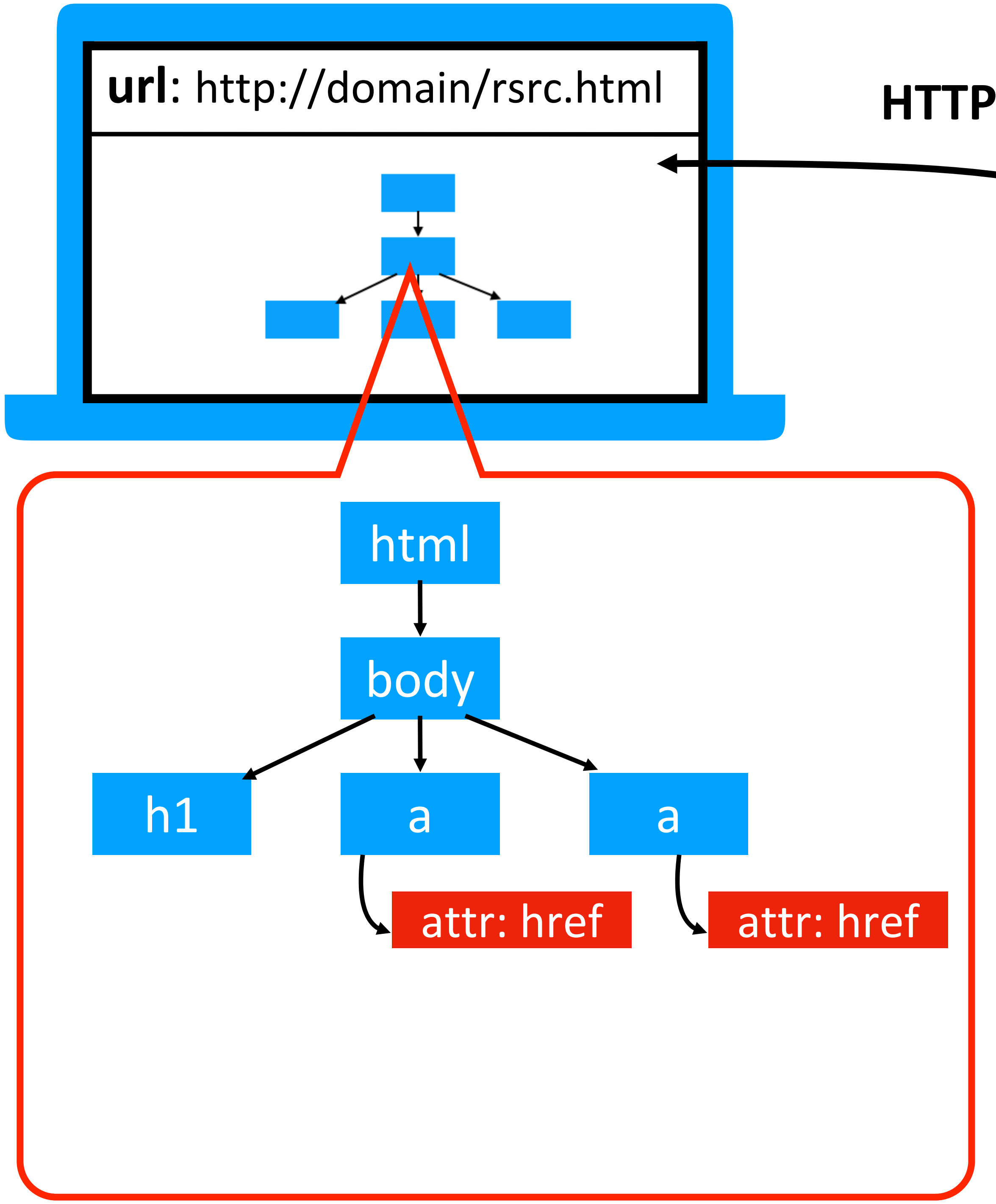
Elements may contain

- attributes



HTTP Response

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</html>
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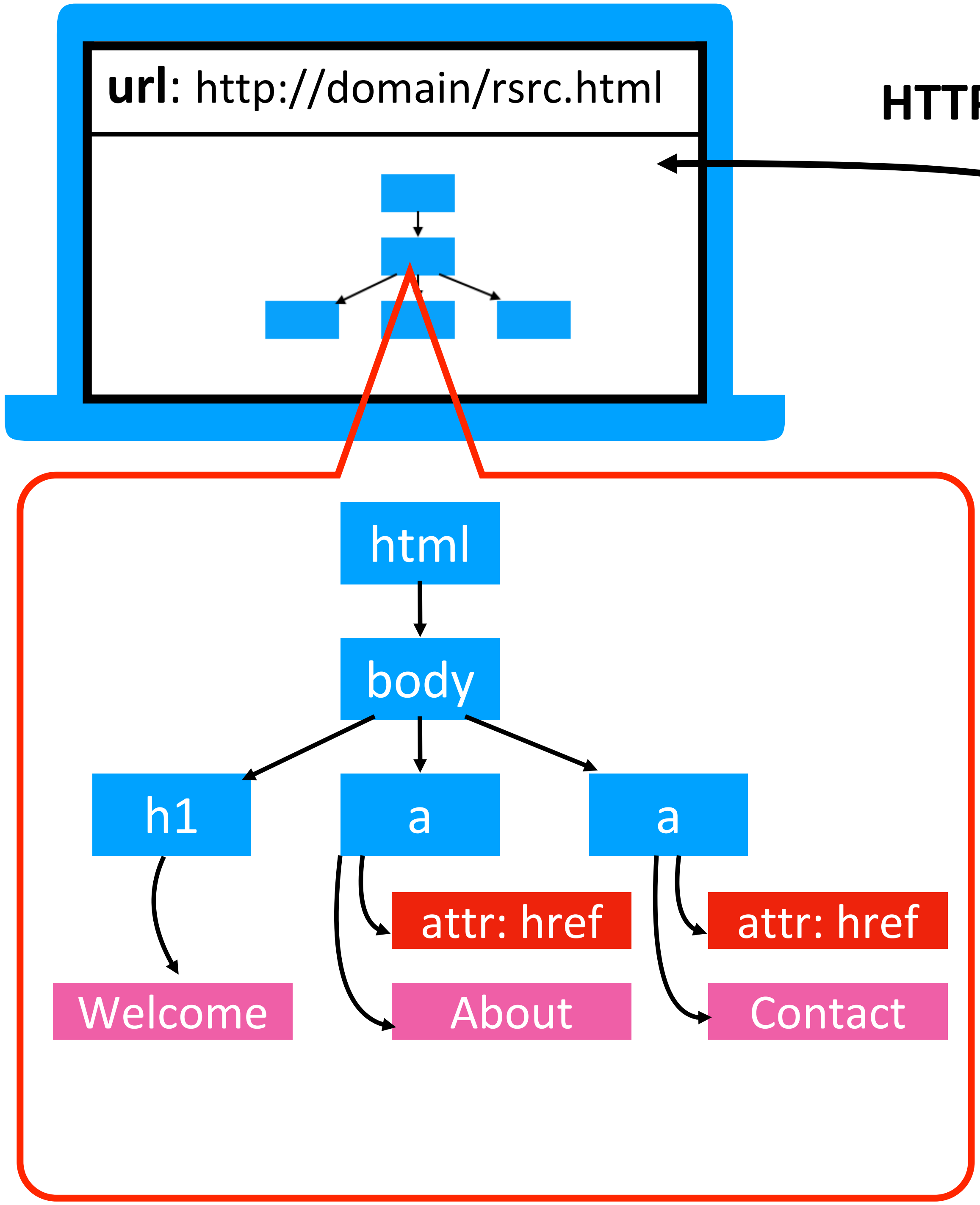
Elements may contain

- attributes
- text



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HTTP/1.0 200 OK
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Content-Length: 74

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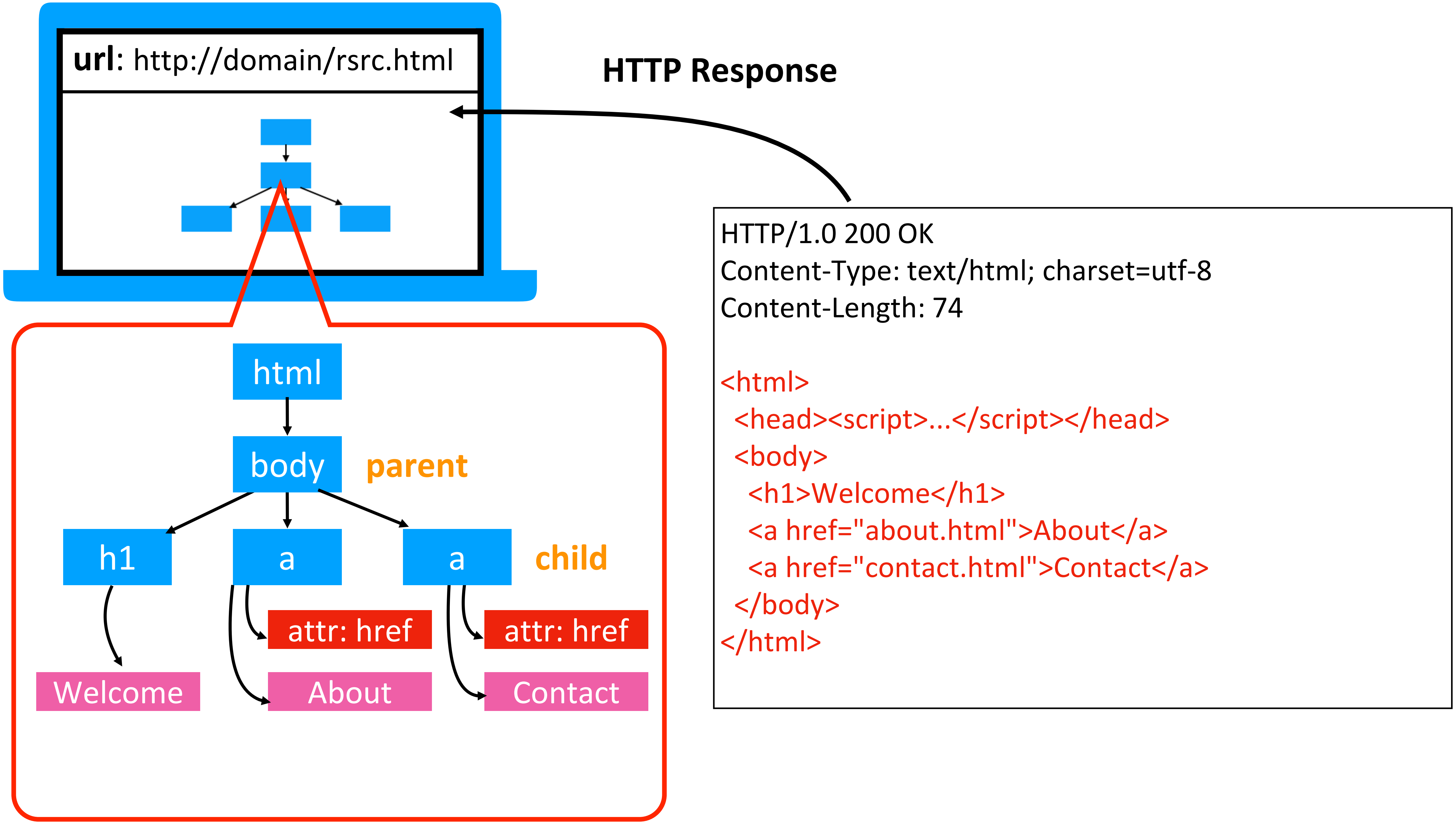
  </body>
</html>
```

Elements may contain

- attributes
- text
- other elements



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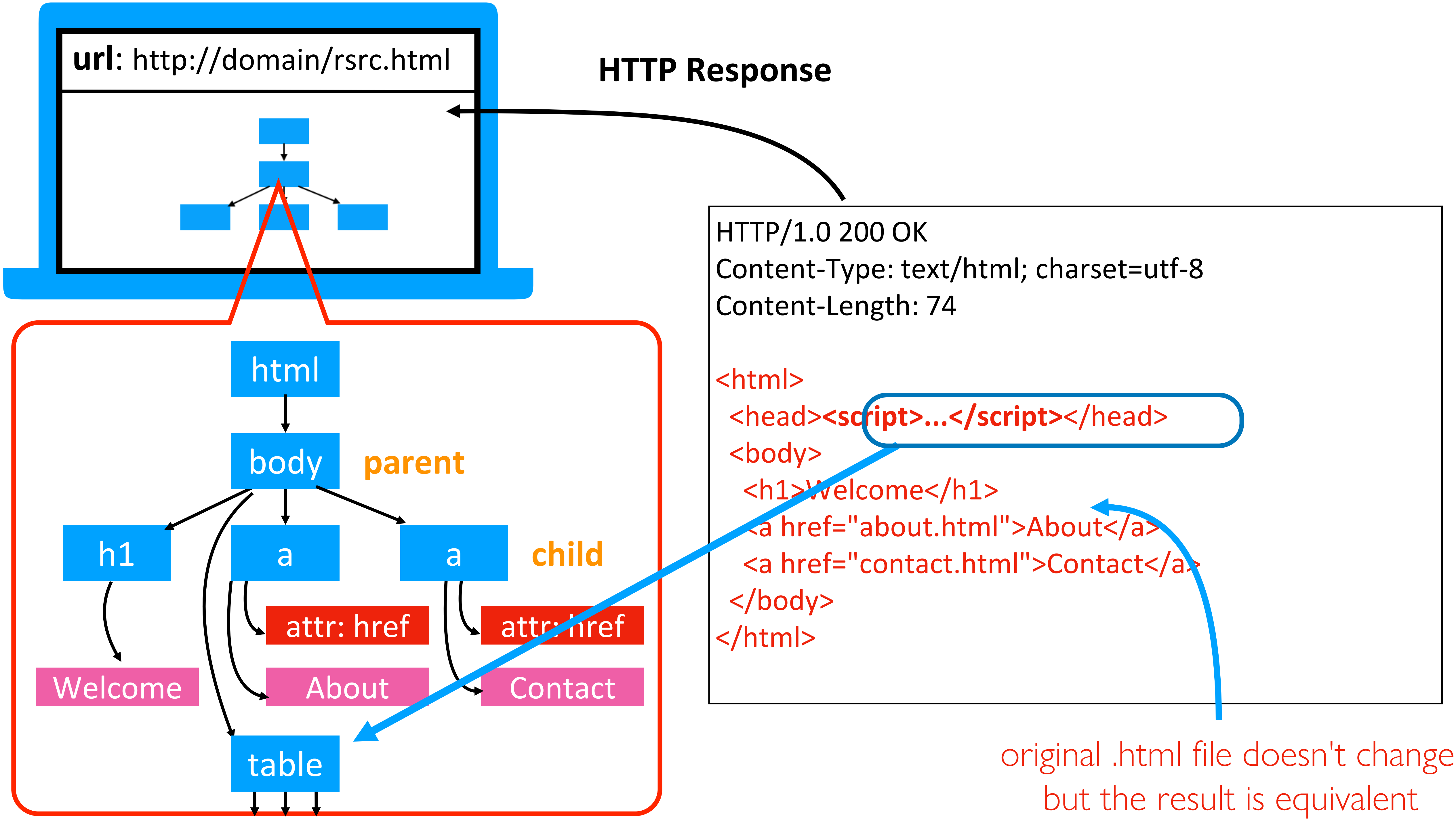
```

JavaScript (if there's an engine to execute it) may directly edit the DOM!



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HTTP/1.0 200 OK
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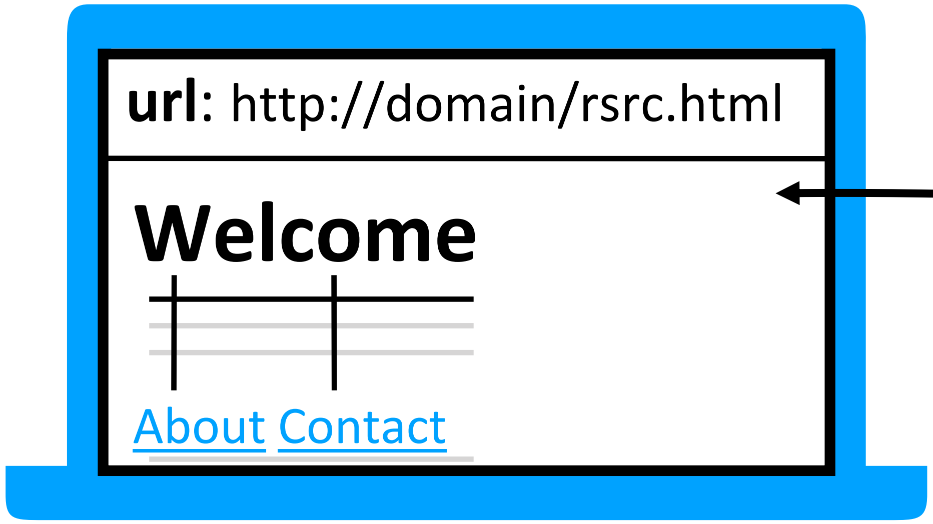
 </body>
</html>
```

original .html file doesn't change,
but the result is equivalent

we need a JavaScript engine so we can scrape the generated table



browser renders (displays) the DOM tree, based on original file and any JavaScript changes

HTTP Response

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```

Web Scraping: Simple and Complicated

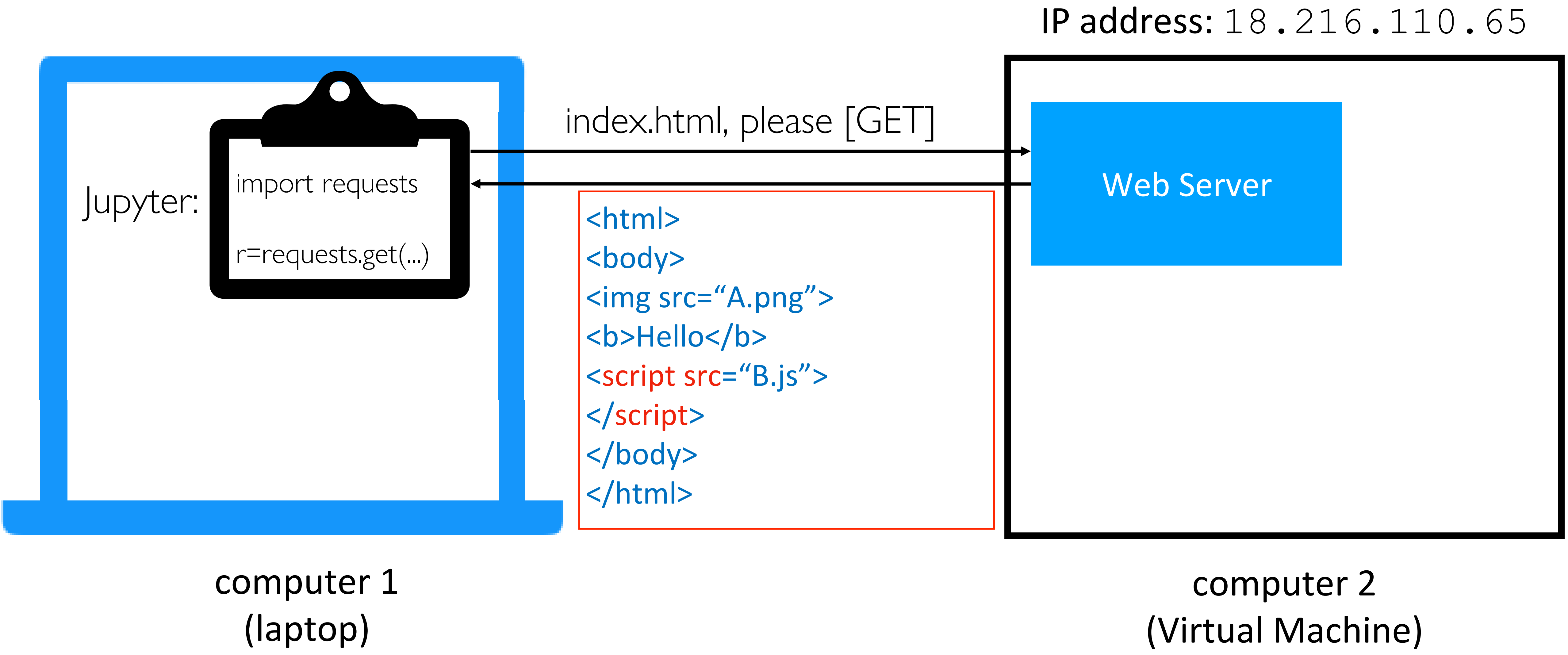
requests vs. Selenium

requests module (FAST!)

- can fetch .html, .js, .etc file

Selenium

- can fetch .html, .js, .etc file
- can run a .js file in browser
- can grab HTML version of DOM after JavaScript has modified it



```
import requests

r=requests.get(...)
```

```
<html>
<body>
<img src="A.png">
<b>Hello</b>
<script src="B.js">
</script>
</body>
</html>
```

requests vs. Selenium

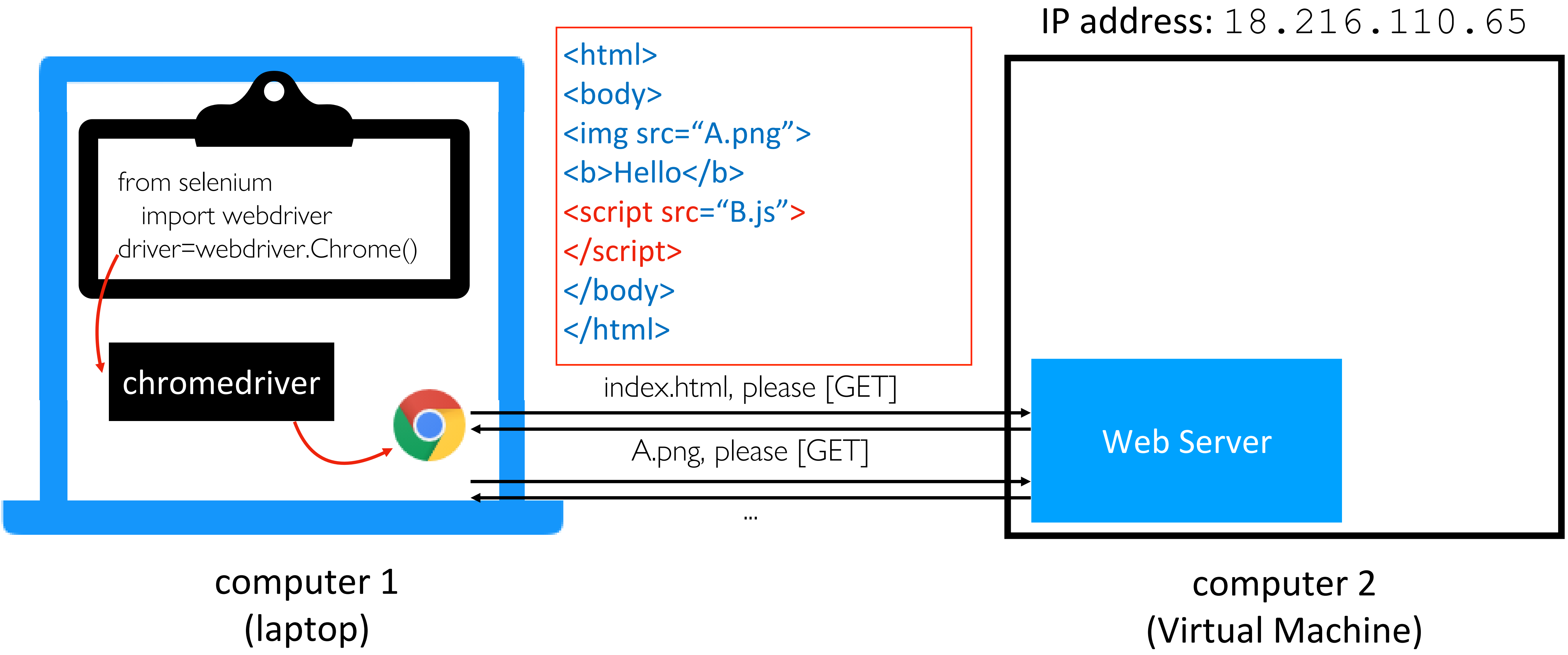
requests module (FAST!)

- can fetch .html, .js, .etc file

Selenium

- can fetch .html, .js, .etc file
- can run a .js file in browser
- can grab HTML version of DOM after JavaScript has modified it

note: Selenium is most commonly used for testing websites, but it works great for tricky scraping too



```
from selenium
  import webdriver
driver=webdriver.Chrome()
```

```
<html>
<body>
<img src="A.png">
<b>Hello</b>
<script src="B.js">
</script>
</body>
</html>
```

Installing: Selenium, Chrome, Driver

Selenium Install (Ubuntu 20.04)

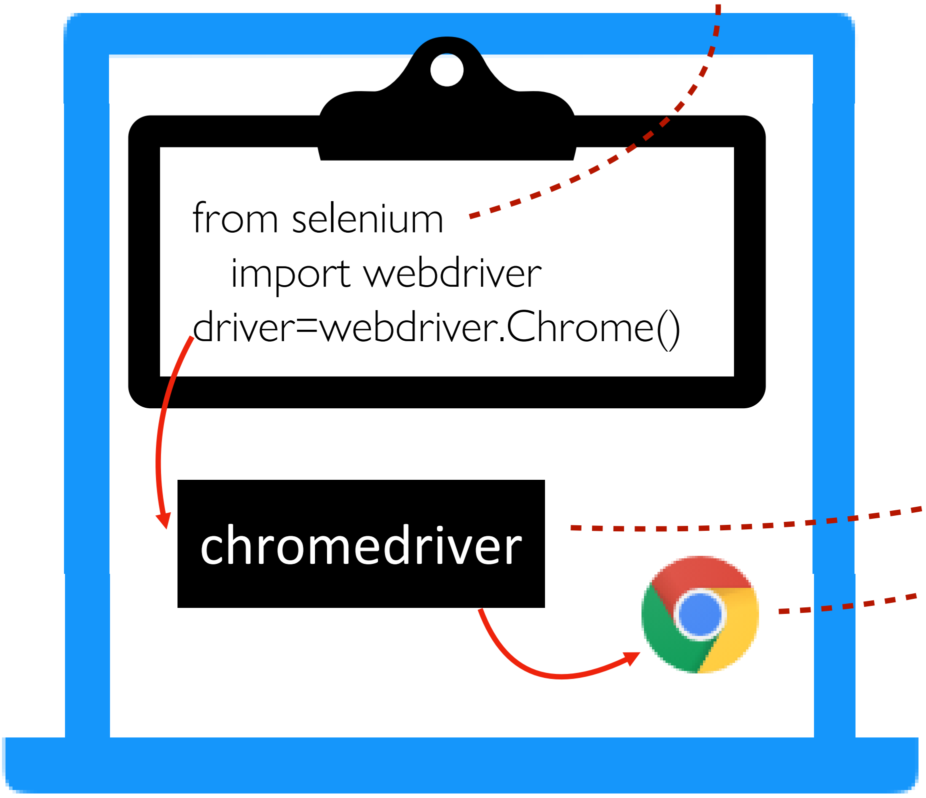
Follow the instructions of Lab1 and P3 for the installations.

For the installation on your VM, you don't need to worry about matching the version of chromedriver and chromium-browser.

For this course, you do not need to install chromedriver and chromium-browser on your personal laptop/desktop. However, if you want to install them on your laptop, then make sure both of them have the same version. You can check their version by running the following commands on the terminal/powershell:

```
chromium-browser --version
chromium.chromedriver --version
```

pip3 install selenium



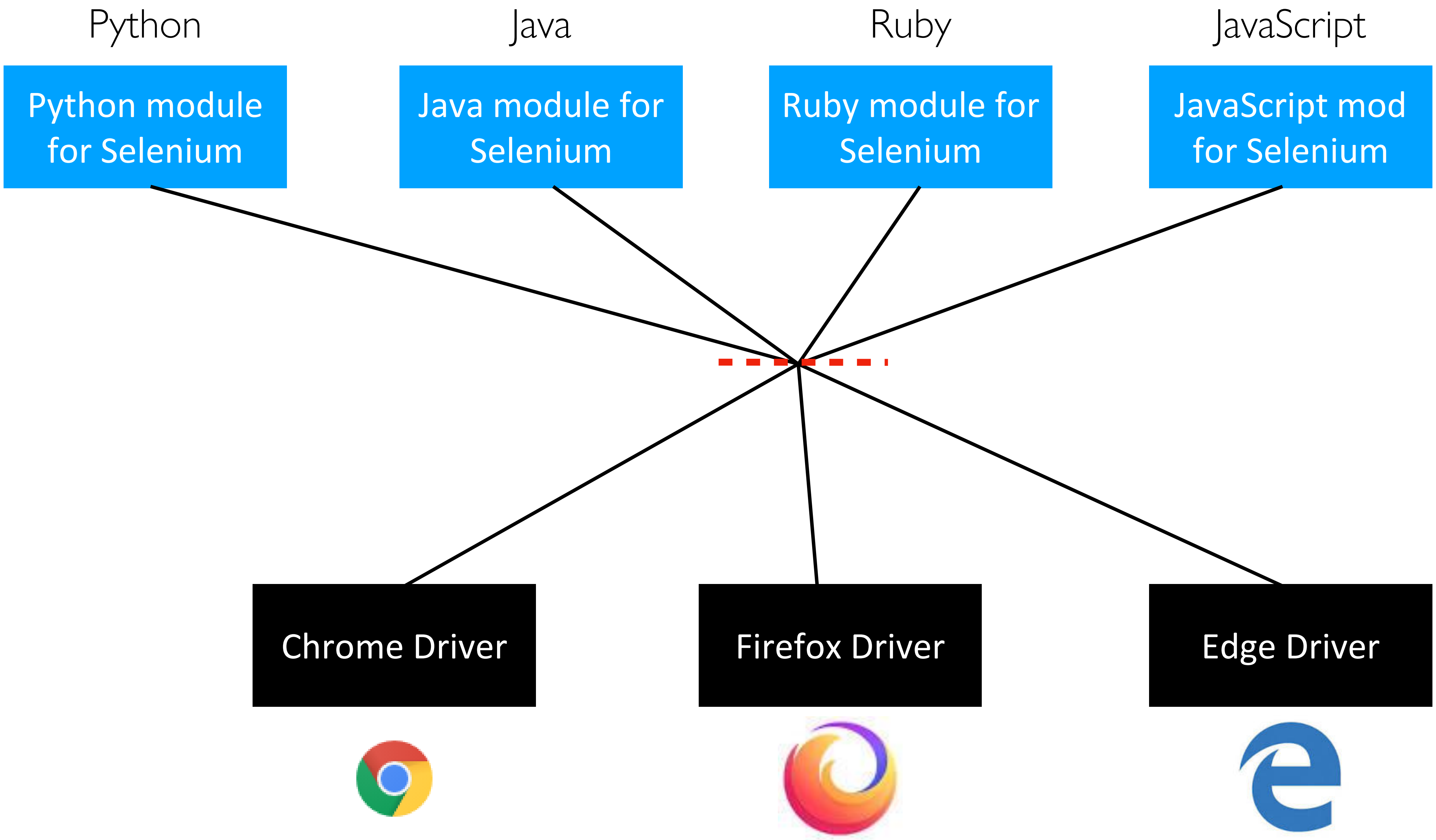
```
from selenium
   import webdriver
driver=webdriver.Chrome()
```

chromedriver

sudo apt -y install chromium-browser

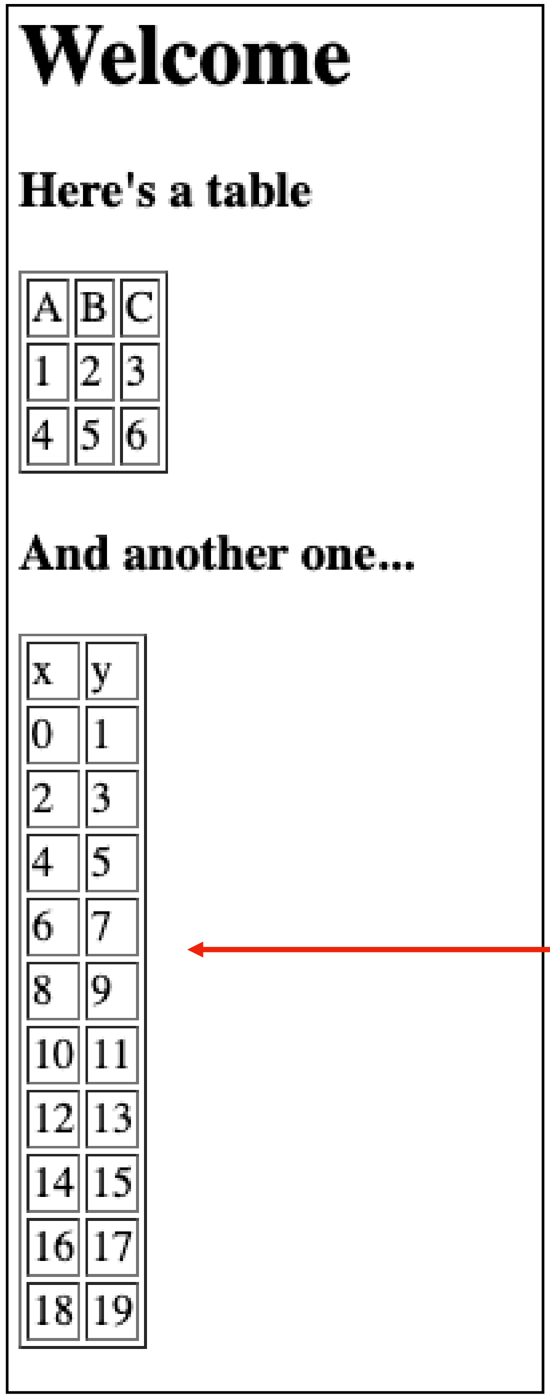
computer 1
(laptop)

Why Drivers?


Python
Java
Ruby
JavaScript
Python module for Selenium
Java module for Selenium
Ruby module for Selenium
JavaScript mod for Selenium
Chrome Driver
Firefox Driver
Edge Driver

Examples

Example 1a: Late Loading Table (page1.html)



Welcome

Here's a table

A	B	C
1	2	3
4	5	6

And another one...

x	y
0	1
2	3
4	5
6	7
8	9
10	11
12	13
14	15
16	17
18	19

added after 1 second

Example 1b: Headless Mode and Screenshots

```
from selenium import webdriver
from selenium.webdriver.chrome.options import Options
from selenium.common.exceptions import NoSuchElementException

options = Options()
options.headless = True
b = webdriver.Chrome(options=options)

b.get(????)

from IPython.core.display import Image
b.save_screenshot("out.png")
Image("out.png")

b.close()
```

Example 2: Auto-Clicking Buttons

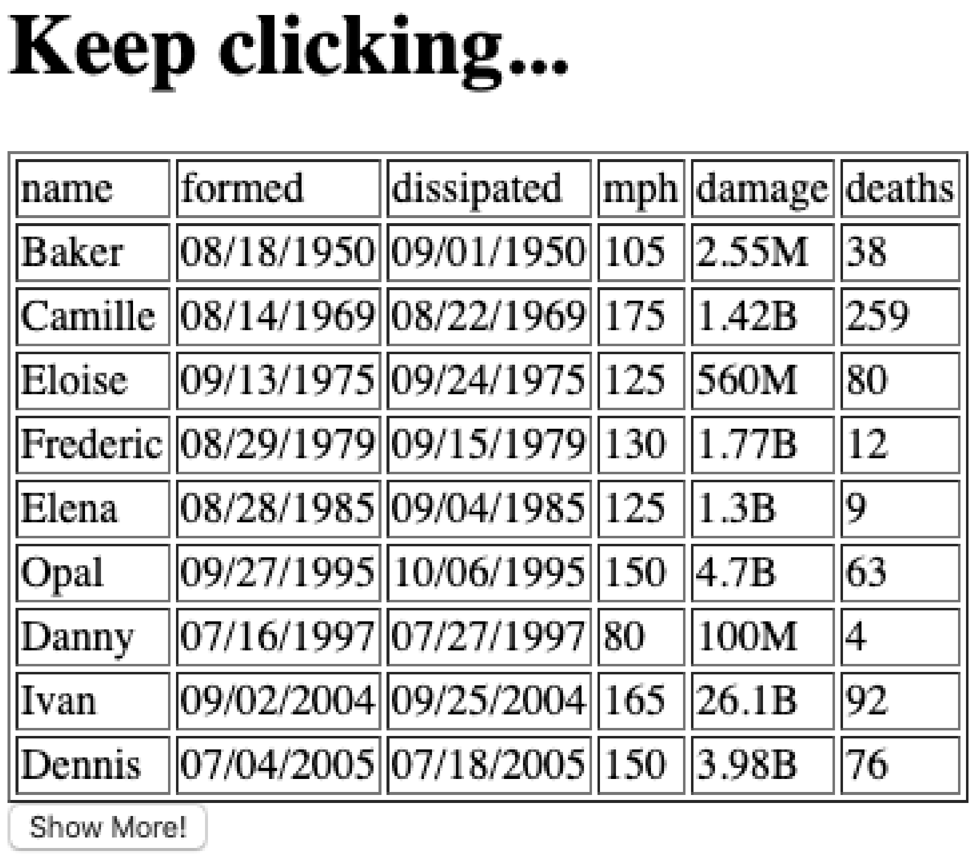
```
from selenium import webdriver
from selenium.webdriver.chrome.options import Options
from selenium.common.exceptions import NoSuchElementException

options = Options()
options.headless = True
b = webdriver.Chrome(options=options)

b.get(????)

btn = b.find_element_by_id("BTN_ID")
btn.click()

b.close()
```



Keep clicking...

name	formed	dissipated	mph	damage	deaths
Baker	08/18/1950	09/01/1950	105	2.55M	38
Camille	08/14/1969	08/22/1969	175	1.42B	259
Eloise	09/13/1975	09/24/1975	125	560M	80
Frederic	08/29/1979	09/15/1979	130	1.77B	12
Elena	08/28/1985	09/04/1985	125	1.3B	9
Opal	09/27/1995	10/06/1995	150	4.7B	63
Danny	07/16/1997	07/27/1997	80	100M	4
Ivan	09/02/2004	09/25/2004	165	26.1B	92
Dennis	07/04/2005	07/18/2005	150	3.98B	76

auto click

Example 3: Entering Passwords

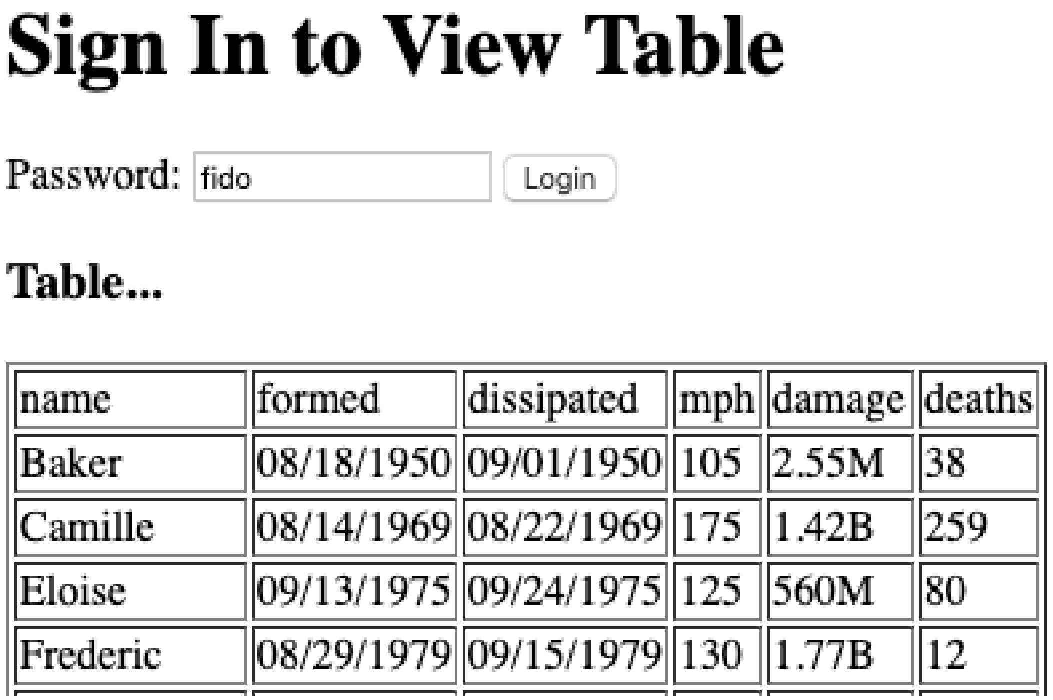
```
from selenium import webdriver
from selenium.webdriver.chrome.options import Options
from selenium.common.exceptions import NoSuchElementException

options = Options()
options.headless = True
b = webdriver.Chrome(options=options)

b.get(????)

pw = b.find_element_by_id("pw")
pw.send_keys("fido")

b.close()
```



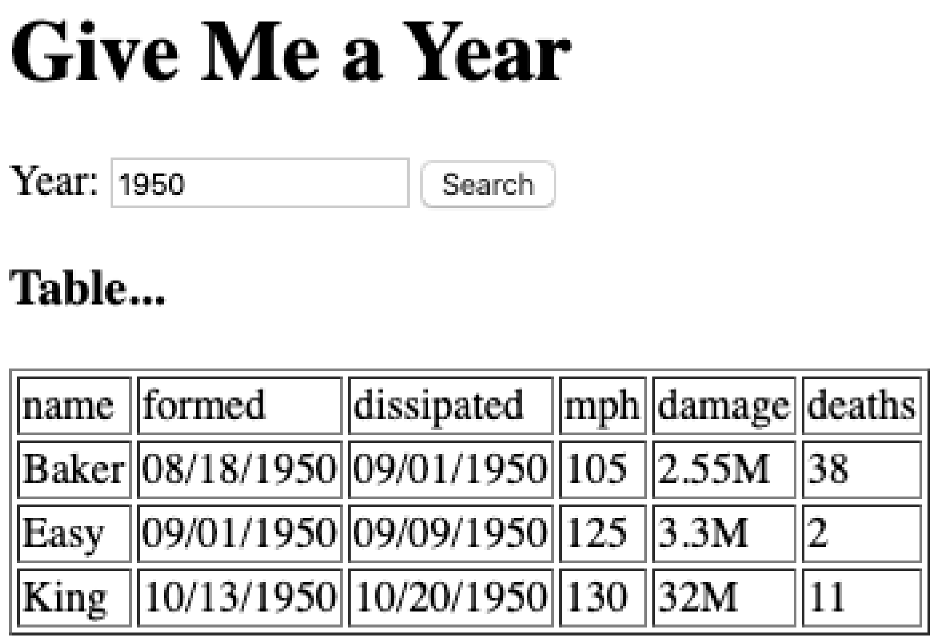
Sign In to View Table

Password: fido

Table...

name	formed	dissipated	mph	damage	deaths
Baker	08/18/1950	09/01/1950	105	2.55M	38
Camille	08/14/1969	08/22/1969	175	1.42B	259
Eloise	09/13/1975	09/24/1975	125	560M	80
Frederic	08/29/1979	09/15/1979	130	1.77B	12

Example 4: Many Queries

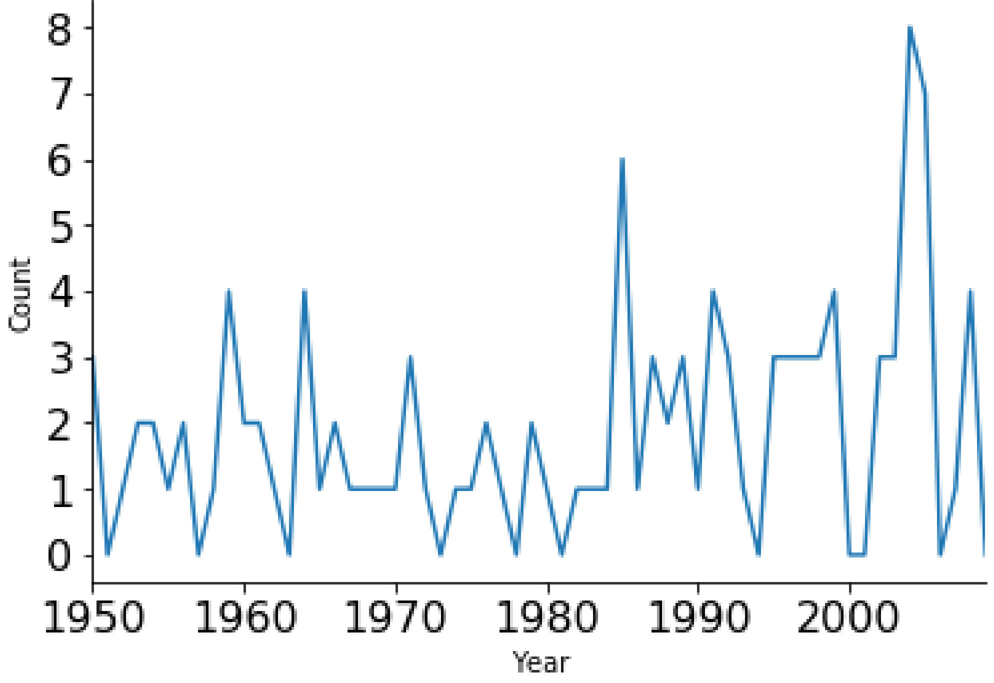


Give Me a Year

Year: 1950 Search

Table...

name	formed	dissipated	mph	damage	deaths
Baker	08/18/1950	09/01/1950	105	2.55M	38
Easy	09/01/1950	09/09/1950	125	3.3M	2
King	10/13/1950	10/20/1950	130	32M	11


Count
Year