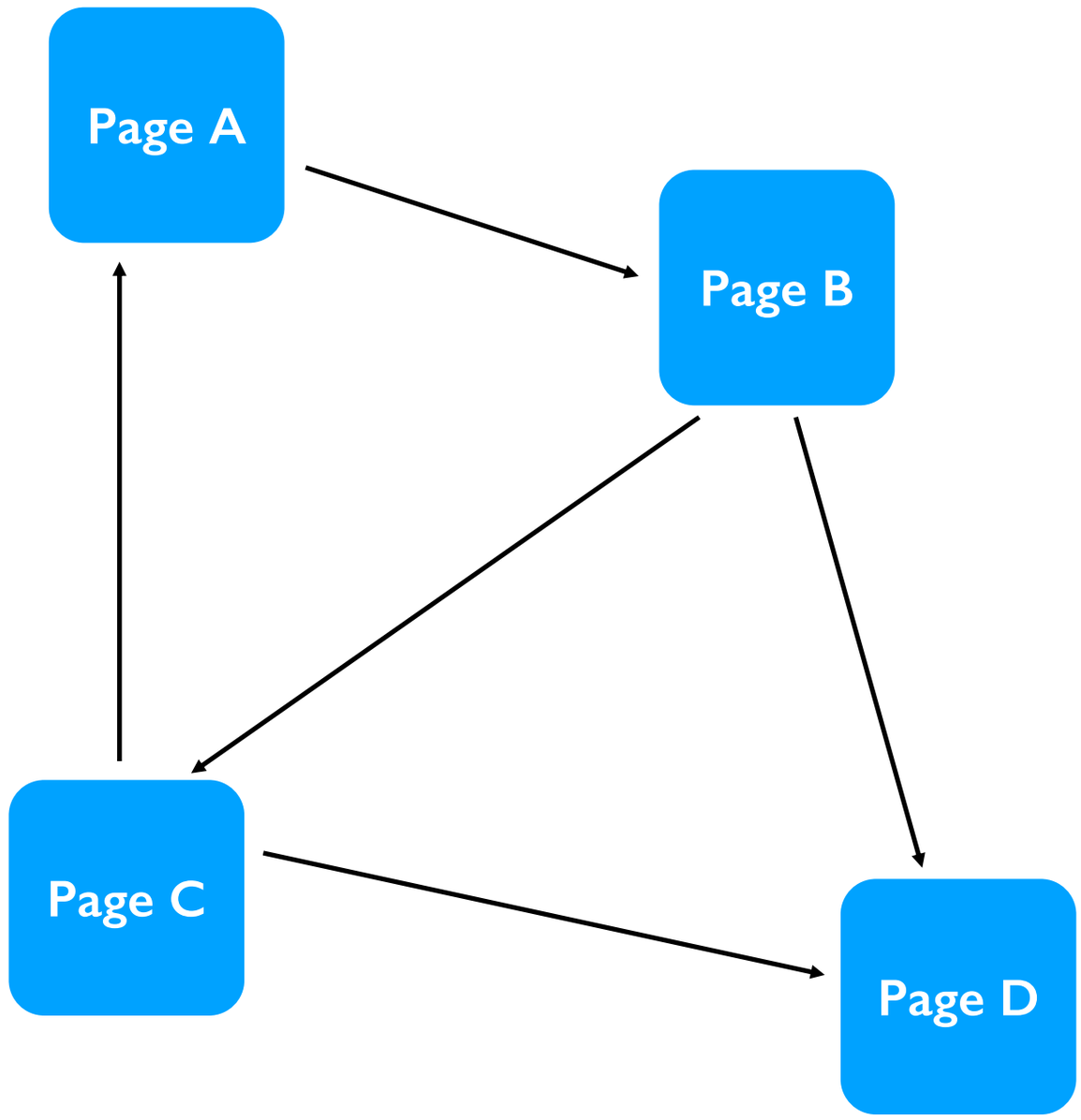
[320] Web 1: Selenium

Meenakshi Syamkumar

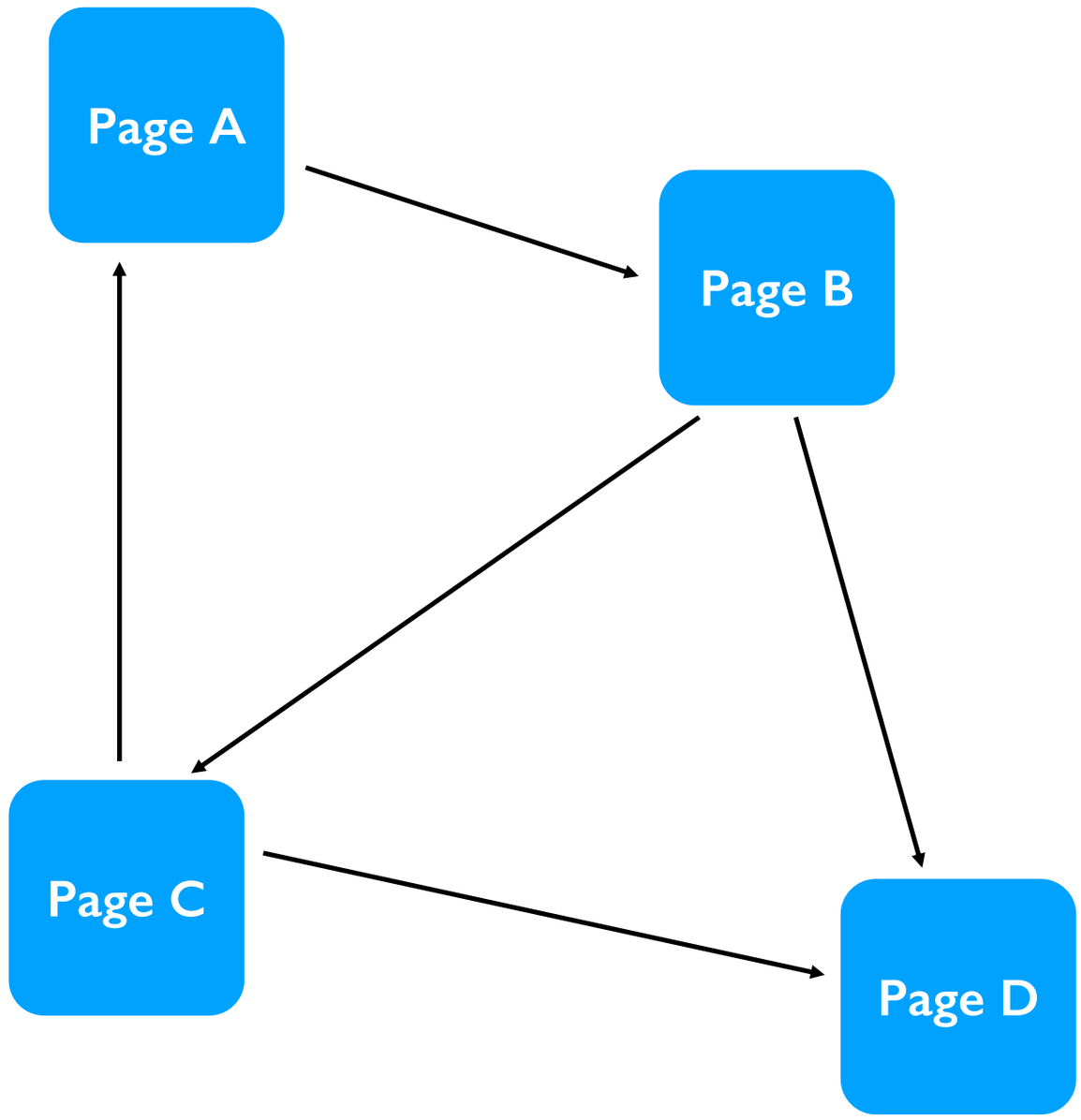
how to scrape a webpage graph?

how to scrape a complicated page?



how to scrape a webpage graph?

how to scrape a complicated page? → requests module (220)
→ selenium module (320)



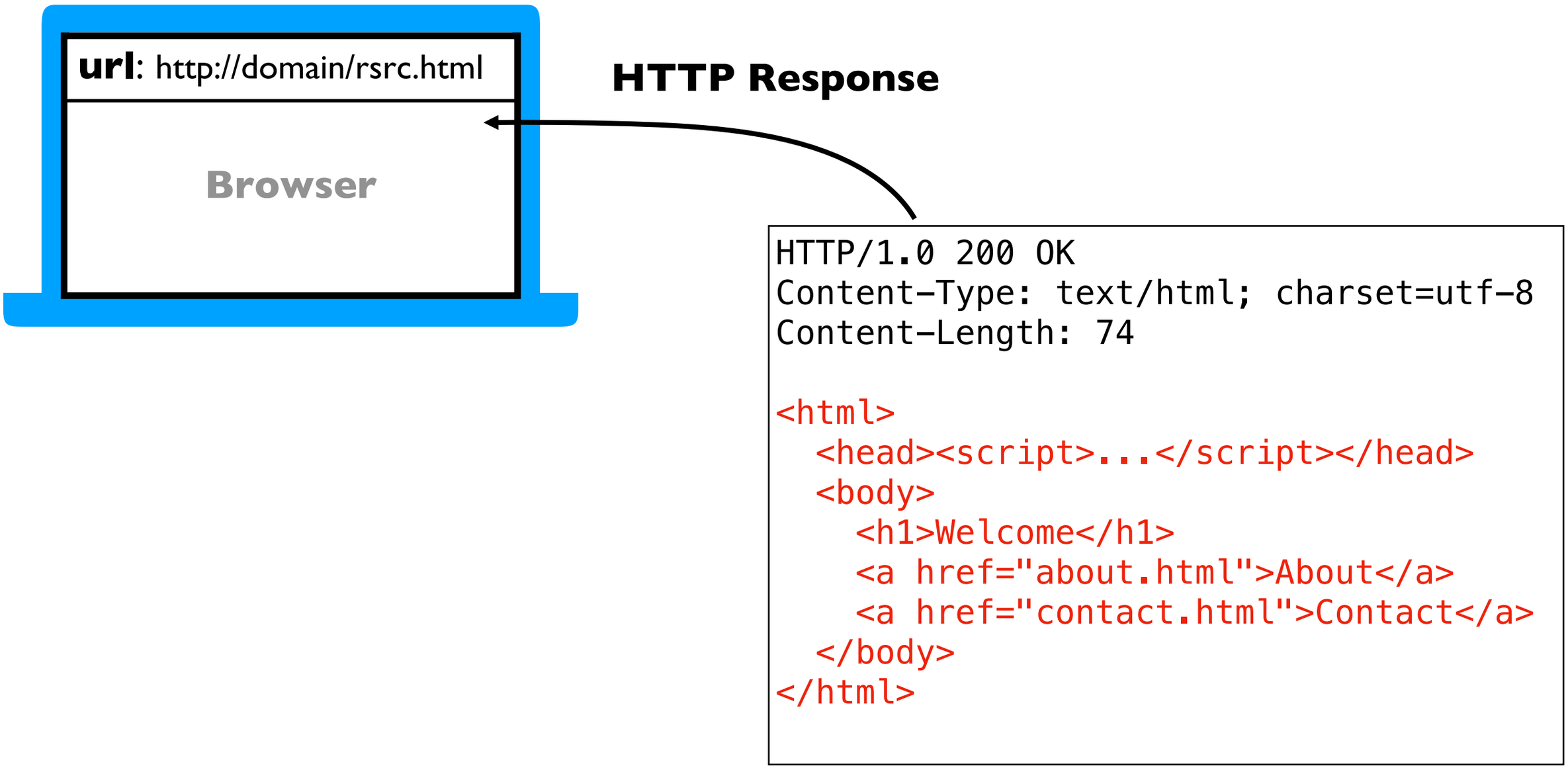
Document Object Model:

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)



url: http://domain/rsrc.html

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

HTTP Response

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

<html>
  <head><script>...</script></head>
  <body>
    <h1>Welcome</h1>
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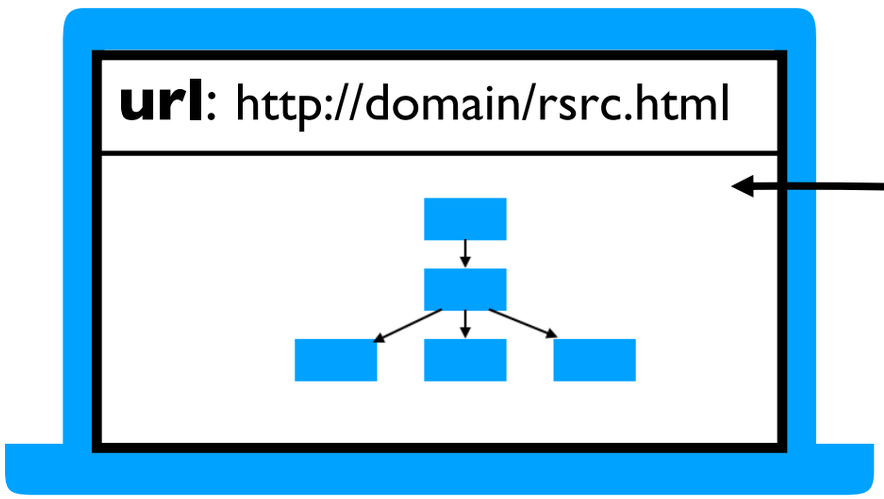

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```
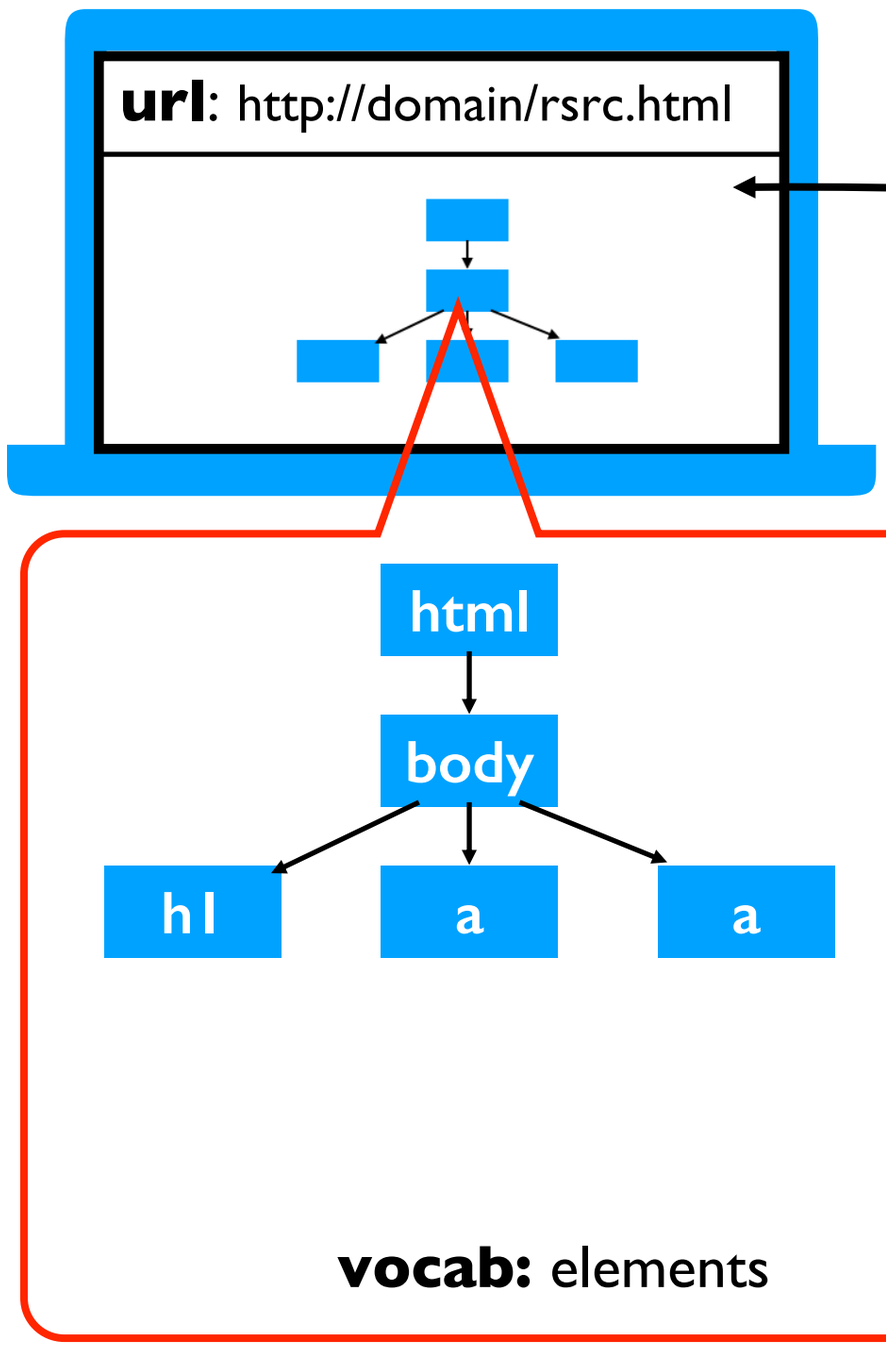

before displaying a page, the browser
uses HTML to generate a
Document Object Model (DOM Tree)



vocab: elements

HTTP Response

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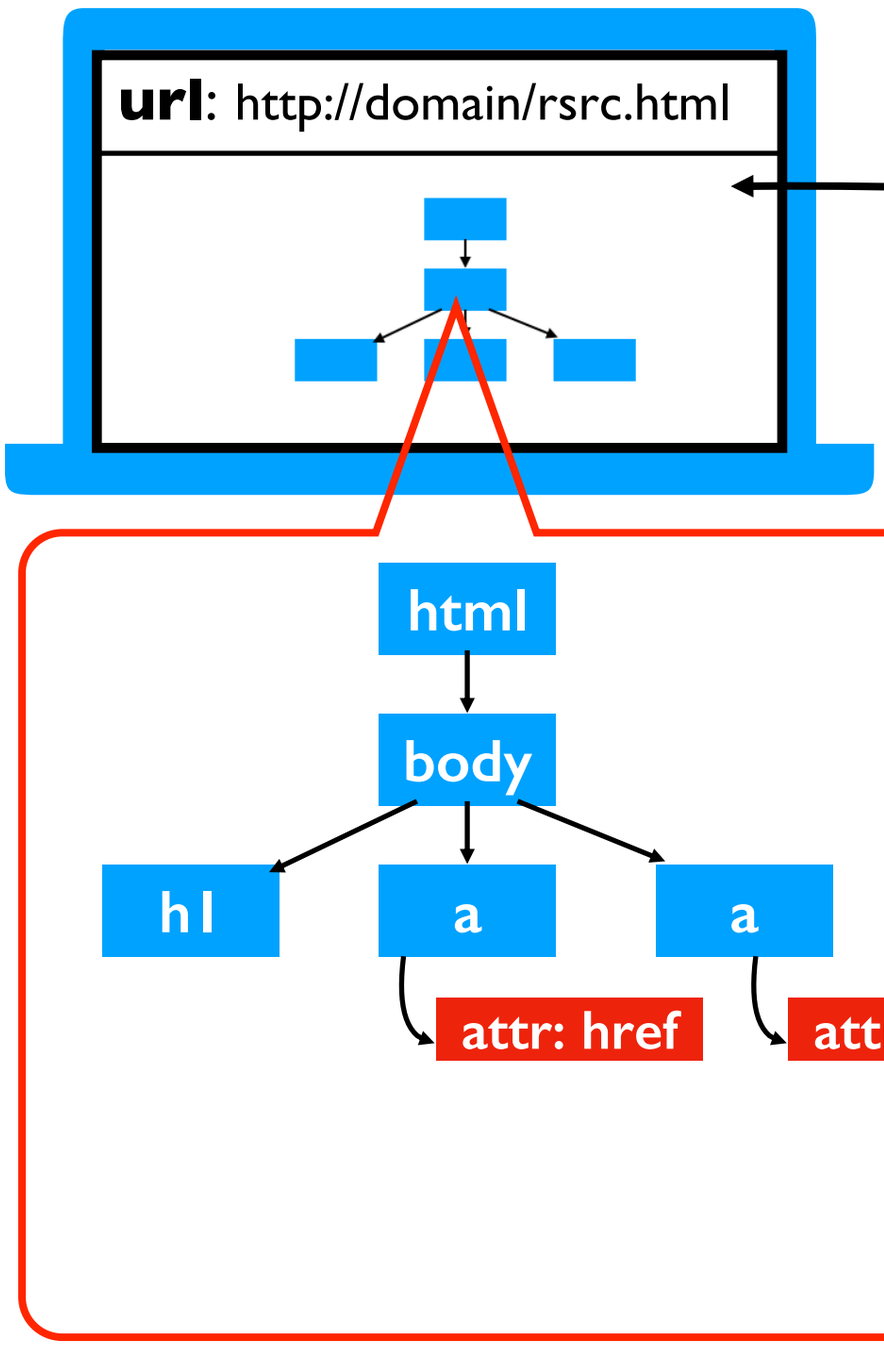
```

Elements may contain

- attributes



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    <a href="about.html">About</a>
    <a href="contact.html">Contact</a>
  </body>
</html>
```
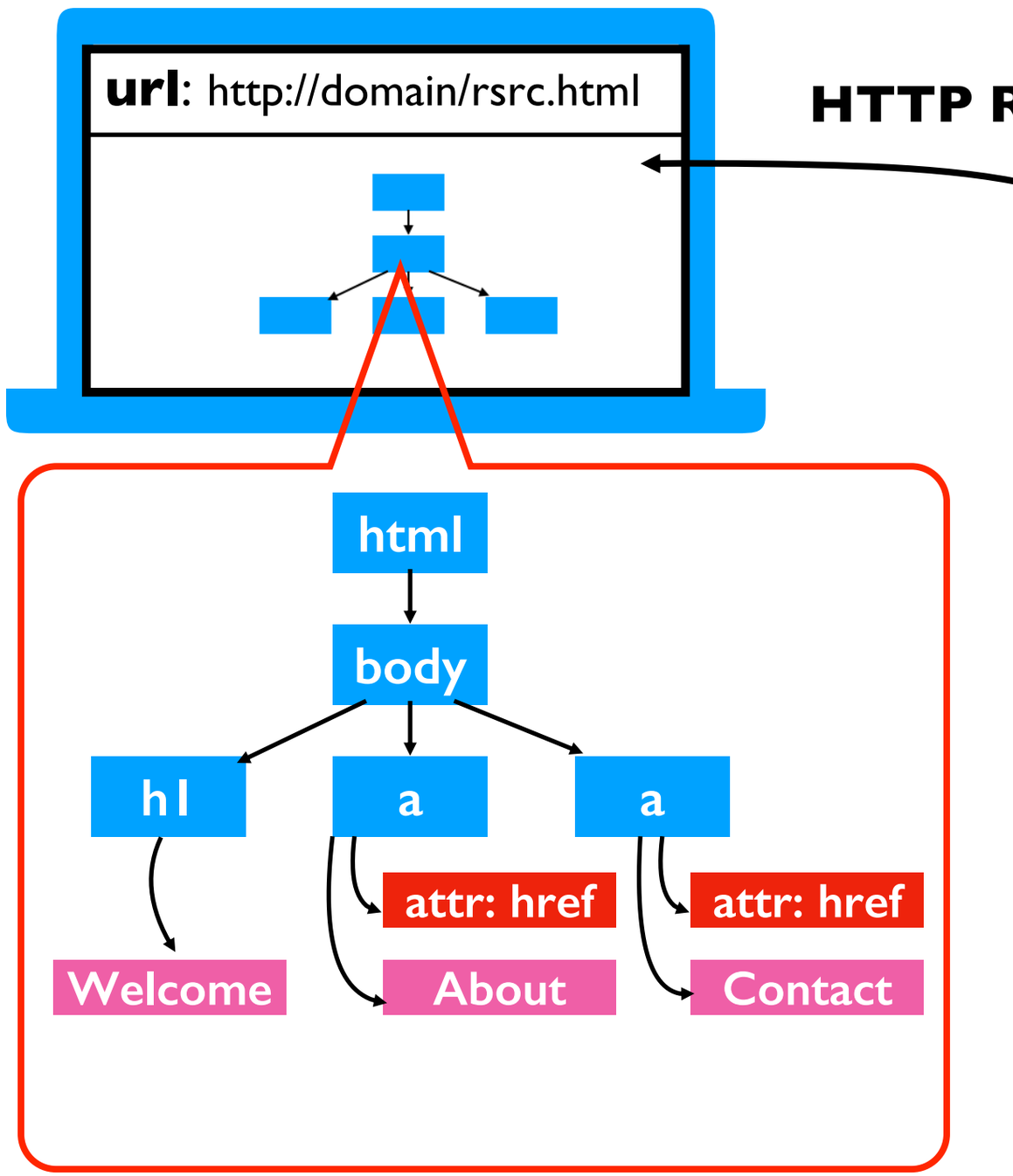
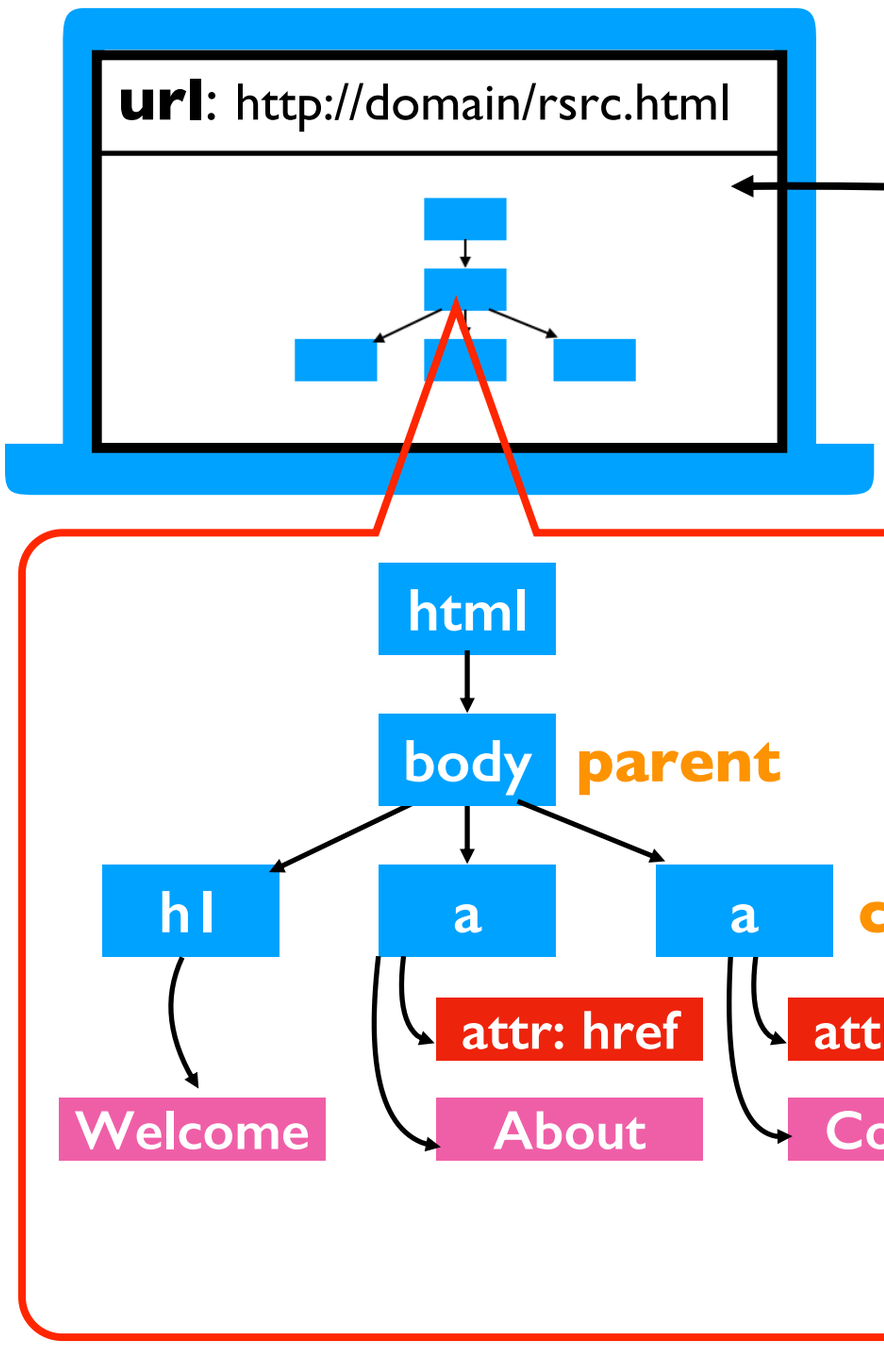

Elements may contain

- attributes
- text

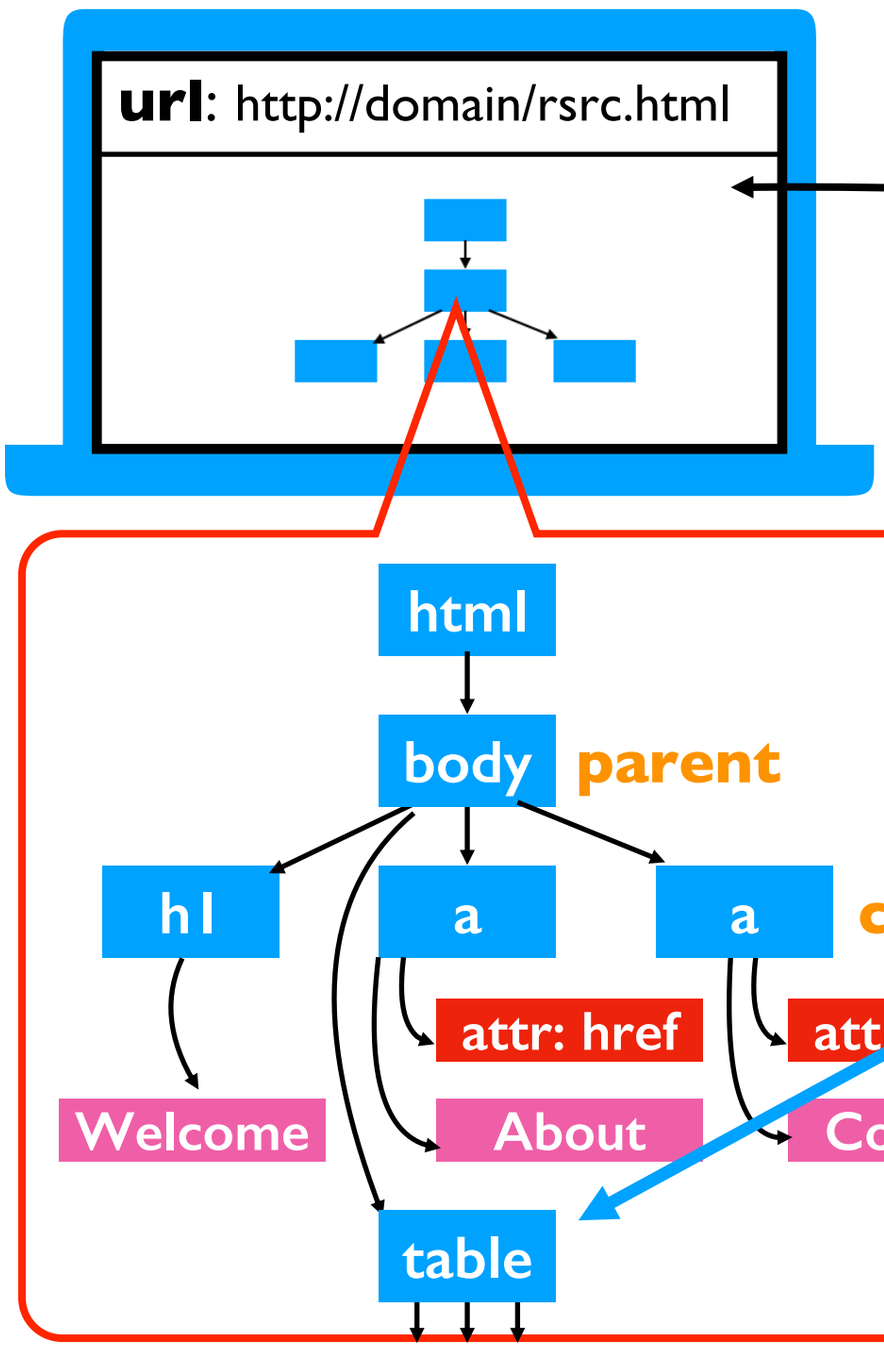


Elements may contain

- attributes
- text
- other elements



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



HTTP Response

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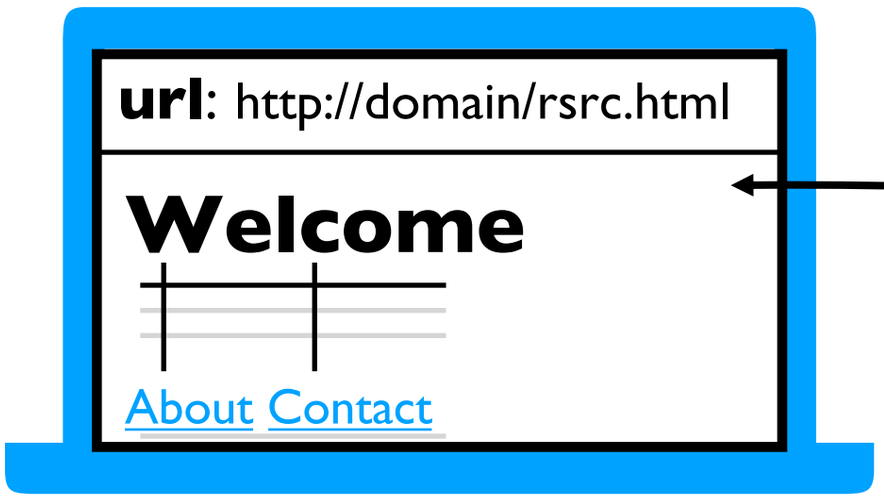
```


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

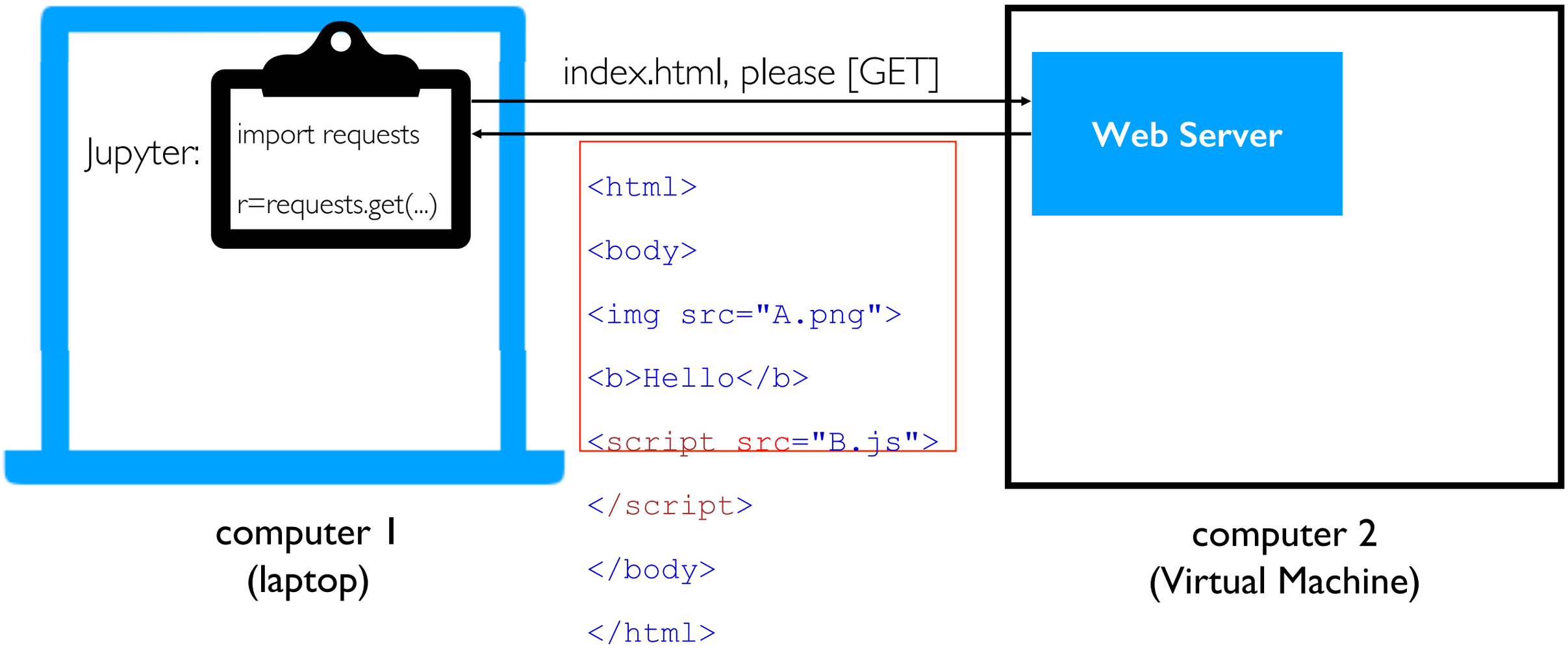
requests vs. Selenium

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

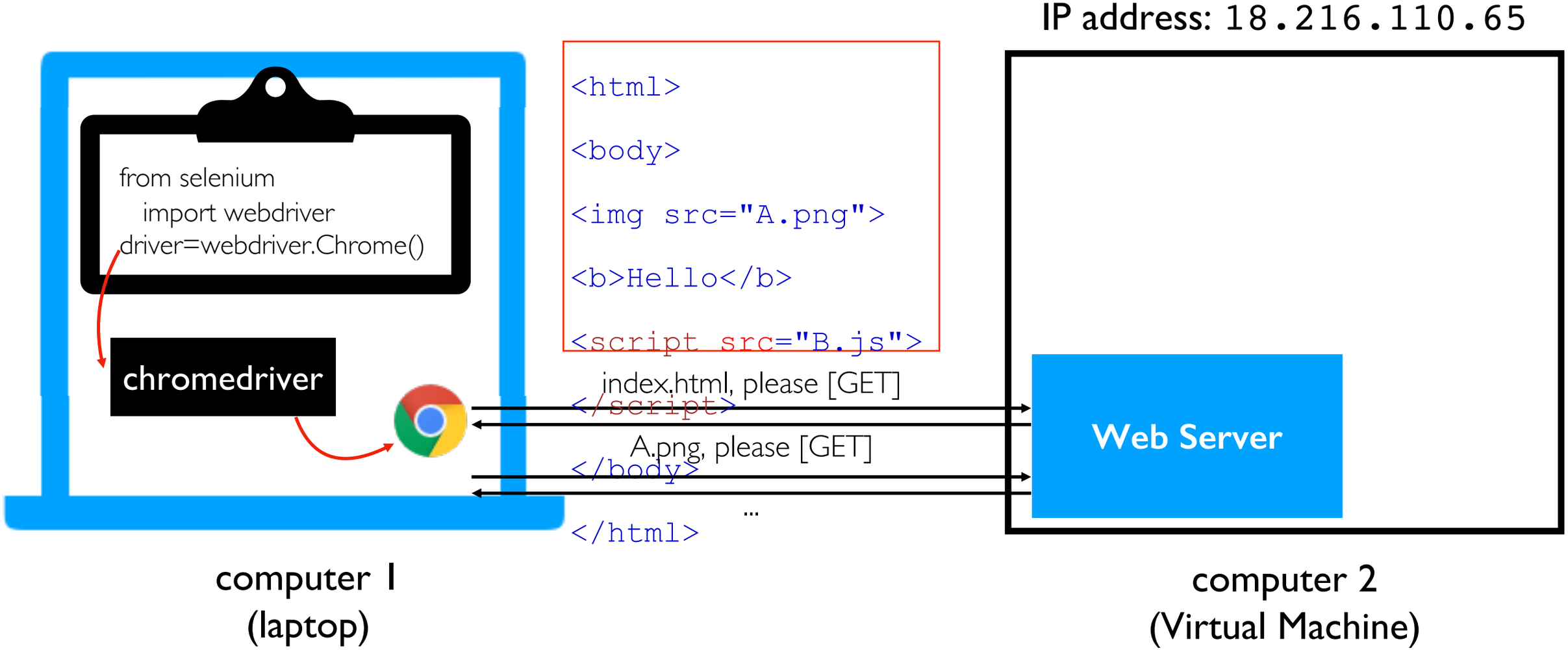


requests vs. Selenium

requests module (FAST!)
- can fetch .html, .js, .etc file

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

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

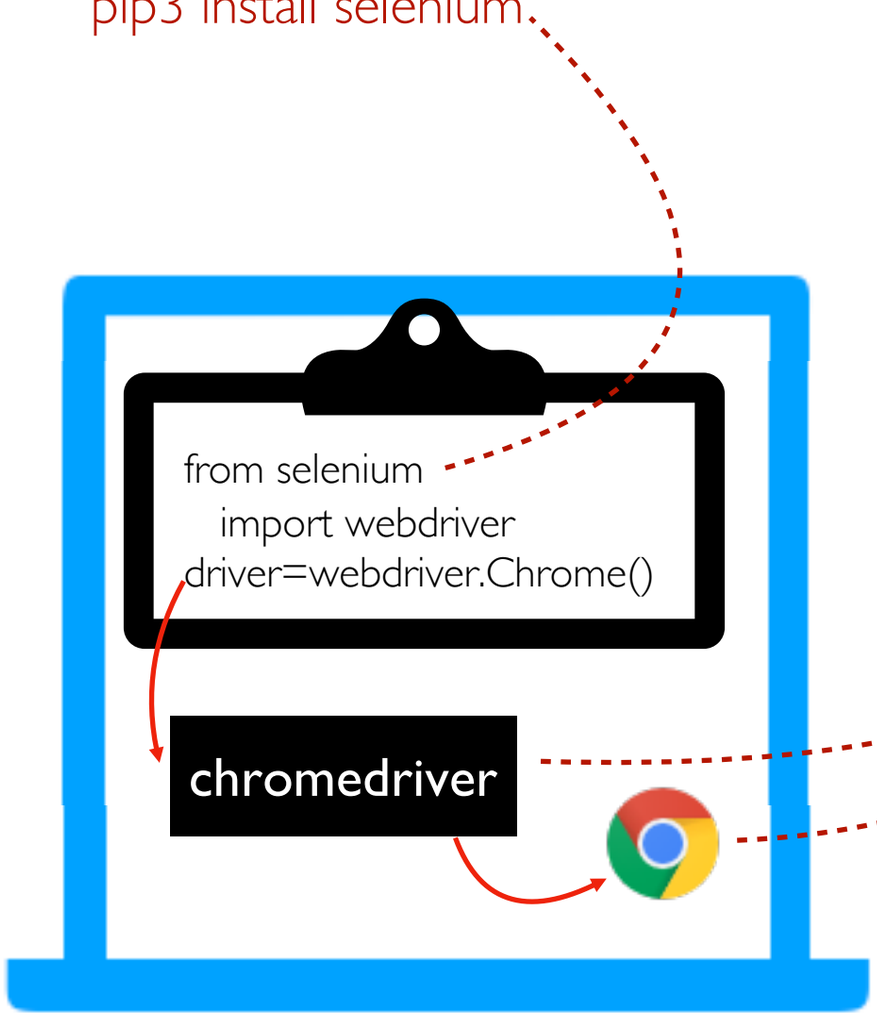


Installing: Selenium, Chrome, Driver

Selenium Install (Ubuntu 20.04)

https://github.com/cs320-wisc/f22/tree/main/p3#part-3-web-crawling-websearcher

pip3 install selenium.



computer 1
(laptop)

on some systems, chromedriver is installed separately

https://chromedriver.chromium.org/downloads

Current Releases

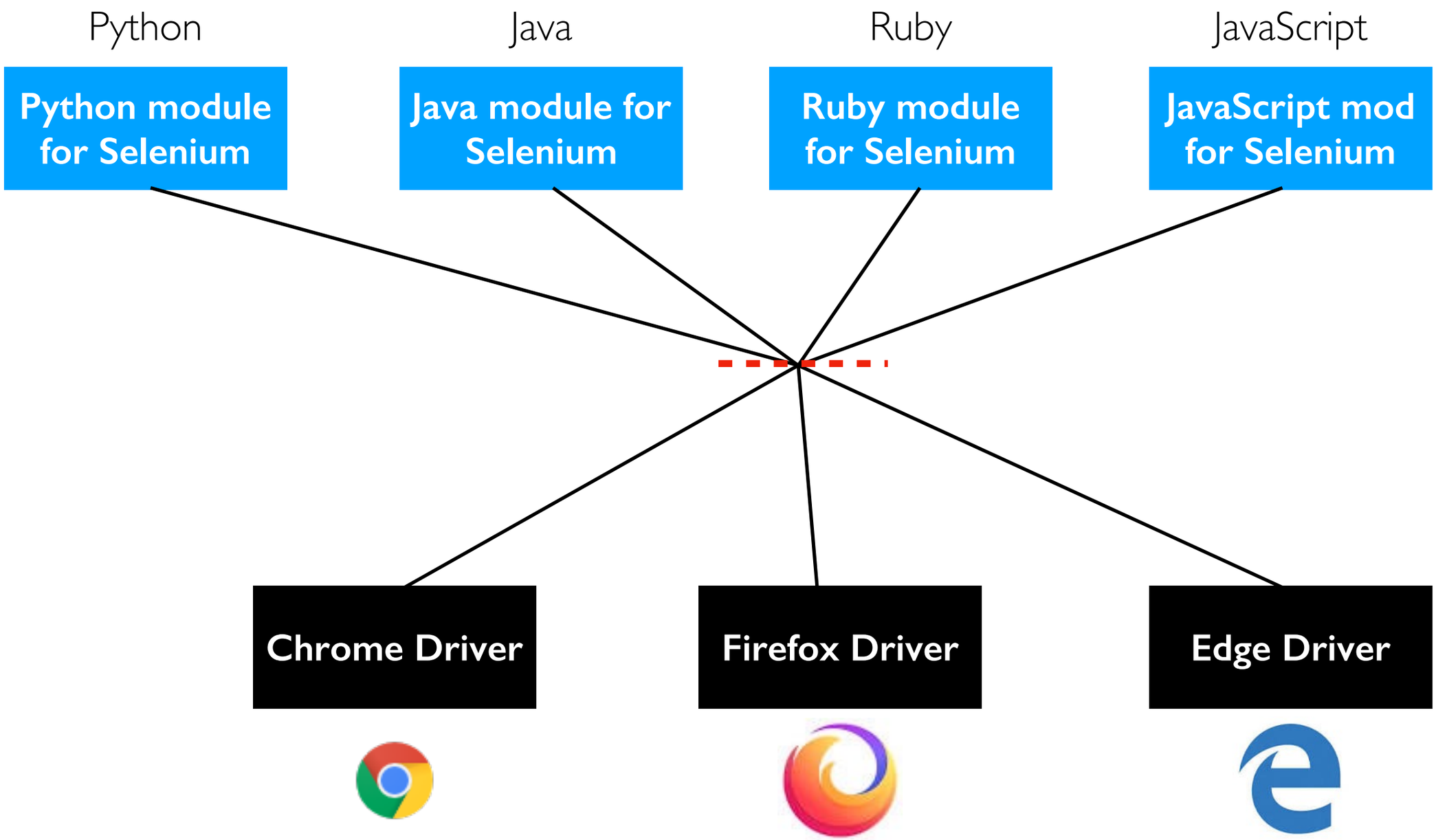
- If you are using Chrome version 86, please download ChromeDriver 86.0.4240.22
- If you are using Chrome version 85, please download ChromeDriver 85.0.4183.87
- If you are using Chrome version 84, please download ChromeDriver 84.0.4147.30
- For older version of Chrome, please see below for the version of ChromeDriver that supports it.

sudo apt -y install chromium-browser

Check...

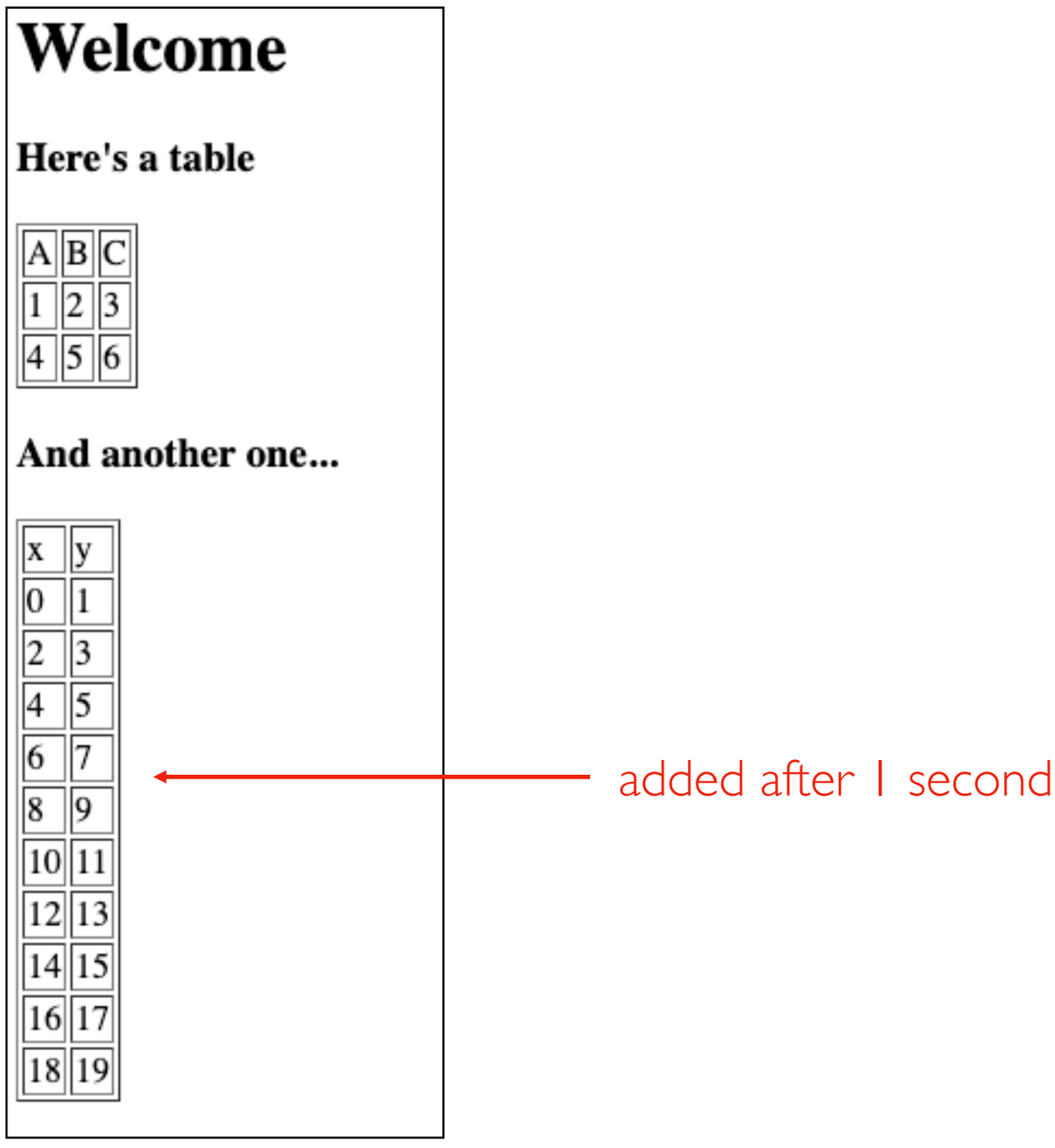
```
trh@instance-1:~$ chromium-browser --version
/usr/bin/chromium-browser: 12: xdg-settings: not found
Chromium 94.0.4606.81 snap
trh@instance-1:~$ chromium.chromedriver --version
ChromeDriver 94.0.4606.81 (5a03c5f1033171d5ee1671d219a...
```

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)



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

Show More!

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 Login

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