Exercise Using Selenium

"Scrape" URLs from a page of search results

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Selenium

Browser automation.

Not just testing.

`https://selenium.dev/`

We will use Selenium WebDriver

- programmatically control a web browser

Selenium Example

Goal:

Use duckduckgo.com to find links to Kasertsart U.

Print the top 10 links.

Software Needed

- Python 3.x
- Selenium WebDriver: `pip install selenium`
- Driver for the Web browser you use:

  Firefox driver, called "geckodriver"

  https://github.com/mozilla/geckodriver/releases

  Chrome & Chromium driver *(brittle)*:

  https://sites.google.com/chromium.org/driver/

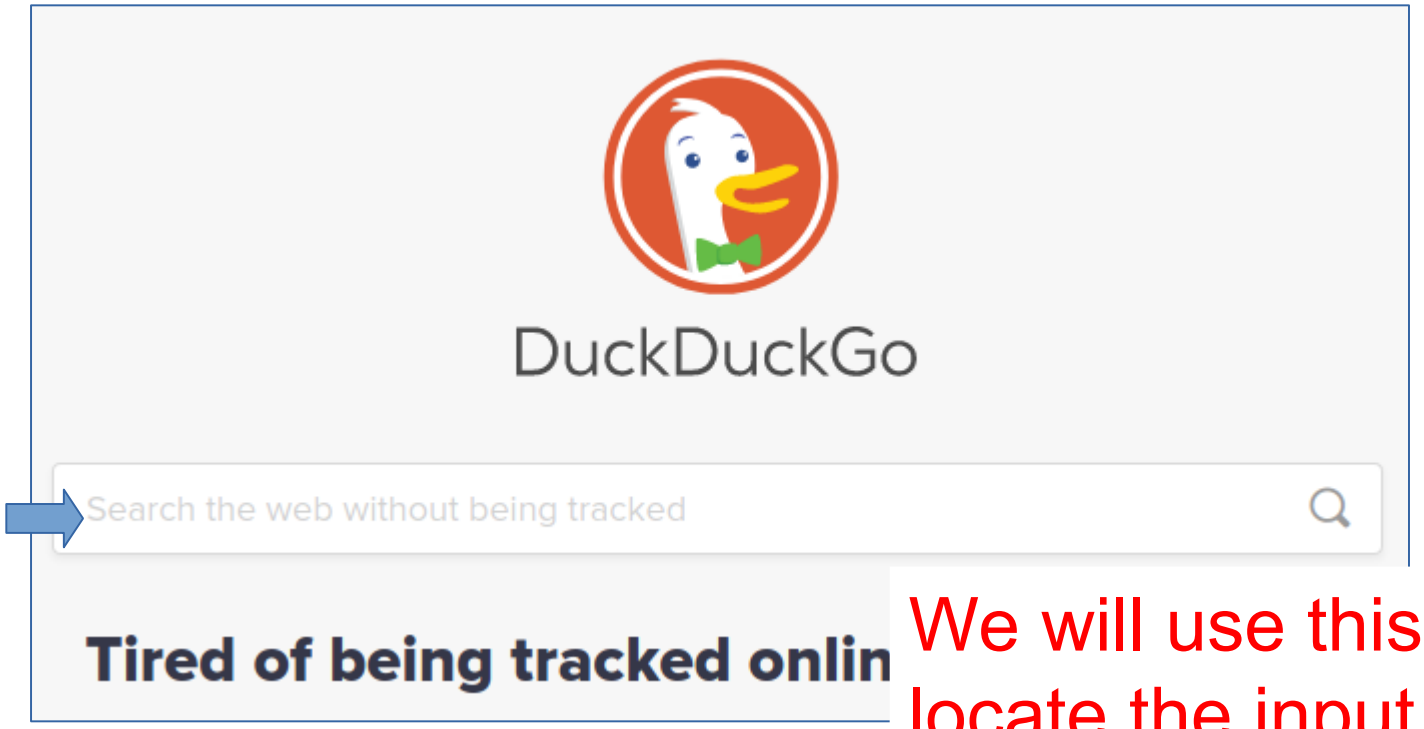
  Safari driver: already in `/usr/bin/safaridriver`

Try it! Get a web page

```
from selenium import webdriver


# get the duckduckgo search page
url = "https://duckduckgo.com"
# browser: a WebDriver object
browser = webdriver.Firefox()
# or: browser = webdriver.Chrome()
browser.get( url )
```

Get the id of the search input box



We will use this "id" to locate the input field

Firefox: right-click in search box -> "Inspect Element".

```
<input id='search_form_input_homepage' name="q"
    type="text" ...>
```

Find the input field & send data

```
from selenium.webdriver.common.by import By
from selenium.webdriver.common.keys import Keys
# Find an "element" for the search box
element_id = 'search_form_input_homepage'
element = browser.find_element(By.ID,
                               element_id)
# Enter the search text & press ENTER
element.send_keys("Kasetsart Univer")
element.send_keys(Keys.ENTER)
# Run It! (if you are using a script)
# the browser should display results
```

Inspect the Page & Identify Links

We need a way for Selenium to "find" the hyperlinks on the results page.

`browser.find_element`(by=_____, "value to find")

`By.CLASS_NAME`	`By.NAME`
`By.ID`	`By.TAG_NAME`
`By.LINK_TEXT`	`By.PARTIAL_LINK_TEXT`
`By.CSS_SELECTOR`	

You can omit the parameter name (**`"by="`**)

Inspect one search result

Select a search result. Right Click -> Inspect.

The source looks like:

```
<div class="ikg2IXiCD14iVX7AdZo1">
<h2 class="LnpumSThxEWMIsDdAT17 CXMyPcQ6nDv47DKFeywM">
<a href="https://www.ku.ac.th/en/community-home"
rel="noopener" target="_self"
class="eVNpHGjtxRBq_gLOfGDr LQNqh2U1kzYxREs65IJu" data-
testid="result-title-a" data-handled-by-react="true">
<span class="EKtkFWMYpwzMKOYr0GYm
LQVY1Jpkk8nyJ6HBWKAk">News and Activities - Kasetsart
University</span>
</a></h2>
</div>
```

The `class` *names are random. Nothing we can reliably search.*

Find all the "a" tags

```
# Find all "a" elements on page
links = browser.find_elements(
                        By.TAG_NAME, "a")
len(links)
107

# Too many! Find links with text "Kaset.."
match = browser.find_elements(
         By.PARTIAL_LINK_TEXT, "Kasetsart")
len(match)
17
```

Getting Data from a WebElement

`browser.find_element` and **`browser.find_elements`** returns **`WebElements`** that are parts of the page DOM.

You can:

- get "attributes" or text from each WebElement
- search its child WebElements - the DOM is a tree

Print value of the "href=" attribute of the first matches.

```
>>> match[0].get_attribute('href')
'https://duckduckgo.com/?q=Kasetsart
  %20University&t=h_'    (not what we want)
>>> match[2].get_attribute('href')
'https://en.wikipedia.org/wiki/
  Kasetsart_University'  (yes!)
```

"Click" on elements

When you locate a "clickable" web element like a button or hyperlink, you can click to activate it.

```
>>> match[2].click()
```

The browser should open the link you clicked.

Exercise: print first 10 URLs

Print the URLs of the first 10 hyperlinks on the DuckDuckGo search results page.

- omit hyperlinks that refer to duckduckgo.com
- some "a" tags may not have an "href" attribute.

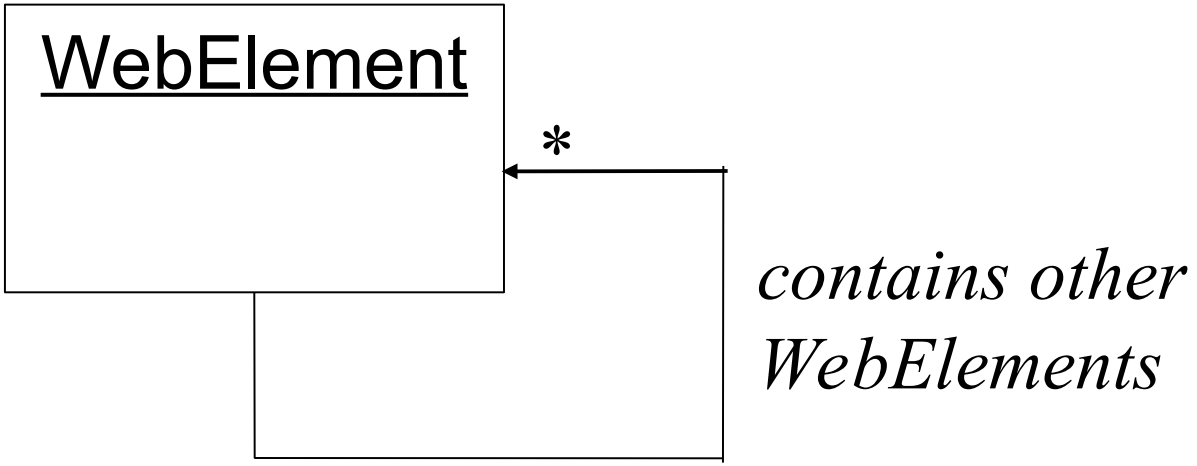
  Use try - except to catch this.

Composite Design Pattern

`WebElement` is the primary object for interacting with a web page using Selenium.

`WebElement` may contain other `WebElements`.

`WebDriver` contains many of the same methods as WebElement



Headless Browsing

You can use a browser without opening the U.I. window.

This is called *headless mode*.

Headless mode is needed when running tests on a C.I. server, like Github Actions.

Headless mode is *faster*, too.

https://developer.mozilla.org/en-US/docs/Mozilla/Firefox/Headless_mode

References

Good Selenium Tutorial in Python

Uses the previous version of selenium, so some methods may no longer work.

https://blog.testproject.io/2019/07/16/web-ui-testing-python-pytest-selenium-webdriver

The same author has other good testing tutorials:

https://blog.testproject.io/2019/07/16/

Exercise

Write a unit test for this:

When I search DuckDuckGo for Kasetsart University,

then at least 1 of the top-10 search results contains a link to `https://www.ku.ac.th/`*`(anything)`*

1. Use `setUp` to create the browser instance.
2. Write a unit test method go perform the test above.

Wrong: testing for exact match of "https://www.ku.ac.th/", because KU's home page could change.

3. Once your test works, add headless mode to setUp and rerun. My intro to Selenium shows how to.