SELENIUM WEBDRIVER QUICK REFERENCE

Browser automation, element interaction, waits, and assertions

Setup

Install

```
pip install selenium webdriver-manager
# webdriver-manager auto-downloads browser drivers
```

Basic Driver Setup

```
from selenium import webdriver
from selenium.webdriver.chrome.service import Service
from webdriver_manager.chrome import ChromeDriverManager
driver = webdriver.Chrome(
    service=Service(ChromeDriverManager().install()))
```

Headless Mode

```
options = webdriver.ChromeOptions()
options.add_argument("--headless=new")
options.add_argument("--no-sandbox")
driver = webdriver.Chrome(options=options)
```

Supported Browsers

`webdriver.Chrome()`	Google Chrome / Chromium
`webdriver.Firefox()`	Mozilla Firefox (GeckoDriver)
`webdriver.Edge()`	Microsoft Edge (Chromium)
`webdriver.Safari()`	Apple Safari (macOS only)

Browser & Navigation

Navigation

```
driver.get("https://example.com")
driver.back()                # browser back
driver.forward()             # browser forward
driver.refresh()             # reload page
```

Browser Properties

`driver.title`	Current page title
`driver.current_url`	Current page URL
`driver.page_source`	Full page HTML source
`driver.get_cookies()`	List all cookies

Window Management

```
driver.set_window_size(1920, 1080)
driver.maximize_window()
driver.minimize_window()
driver.quit()                # close all windows, end session
```

Finding Elements

Locator Strategies

```
from selenium.webdriver.common.by import By
driver.find_element(By.ID, "login-btn")
driver.find_element(By.CLASS_NAME, "nav-item")
driver.find_element(By.CSS_SELECTOR, "div.card > h2")
driver.find_element(By.XPATH, "//input[@name='q']")
```

By Strategies

`By.ID`	Match element id attribute
`By.NAME`	Match element name attribute
`By.CLASS_NAME`	Match CSS class (single class)
`By.TAG_NAME`	Match HTML tag name
`By.CSS_SELECTOR`	CSS selector (most flexible)
`By.XPATH`	XPath expression
`By.LINK_TEXT`	Exact anchor text
`By.PARTIAL_LINK_TEXT`	Partial anchor text match

Find Multiple

```
items = driver.find_elements(By.CSS_SELECTOR, "li.item")
for item in items:
    print(item.text)
# Returns empty list if none found (no exception)
```

Interacting

Click & Type

```
elem = driver.find_element(By.ID, "search")
elem.clear()                 # clear existing text
elem.send_keys("selenium python")
elem.submit()                # submit parent form
```

Dropdowns

```
from selenium.webdriver.support.ui import Select
select = Select(driver.find_element(By.ID, "country"))
select.select_by_visible_text("Canada")
select.select_by_value("ca")
select.select_by_index(2)
```

Element Properties

`.text`	Visible text content
`.get_attribute('href')`	HTML attribute value
`.is_displayed()`	True if element is visible
`.is_enabled()`	True if element is interactive
`.is_selected()`	True if checkbox/radio is selected
`.tag_name`	HTML tag (e.g. 'input', 'div')
`.value_of_css_property('color')`	Computed CSS property value

Waits

Explicit Wait

```
from selenium.webdriver.support.ui import WebDriverWait
from selenium.webdriver.support import expected_conditions as EC
elem = WebDriverWait(driver, 10).until(
    EC.presence_of_element_located((By.ID, "result")))
```

Expected Conditions

`presence_of_element_located`	Element exists in DOM
`visibility_of_element_located`	Element is visible on page
`element_to_be_clickable`	Element is visible and enabled
`text_to_be_present_in_element`	Element contains expected text
`alert_is_present`	JavaScript alert is showing
`staleness_of`	Element is no longer in DOM
`title_contains`	Page title contains text

Implicit Wait

```
driver.implicitly_wait(10)  # seconds, applies globally
# Explicit waits are preferred — more precise control
```

Frames & Windows

Frames

```
driver.switch_to.frame("frame-name")    # by name/id
driver.switch_to.frame(0)                # by index
driver.switch_to.frame(elem)             # by element
driver.switch_to.default_content()       # back to main
```

Windows & Tabs

```
original = driver.current_window_handle
driver.switch_to.new_window("tab")       # open new tab
driver.switch_to.window(original)        # switch back
driver.close()                           # close current tab
```

Alerts

```
alert = driver.switch_to.alert
print(alert.text)
alert.accept()     # click OK
alert.dismiss()    # click Cancel
alert.send_keys("input text")
```

Screenshots

Capture Screenshots

```
driver.save_screenshot("page.png")       # full page
elem = driver.find_element(By.ID, "chart")
elem.screenshot("chart.png")             # single element
```

Screenshot as Base64

```
b64 = driver.get_screenshot_as_base64()
png = driver.get_screenshot_as_png()     # bytes
```

Actions

Action Chains

```
from selenium.webdriver.common.action_chains import ActionChains
actions = ActionChains(driver)
actions.move_to_element(menu).click().perform()
```

Keyboard Actions

```
from selenium.webdriver.common.keys import Keys
elem.send_keys(Keys.ENTER)
elem.send_keys(Keys.CONTROL, "a")       # select all
actions.key_down(Keys.SHIFT).click(elem).perform()
```

Mouse Actions

`.click(elem)`	Click element
`.double_click(elem)`	Double-click element
`.context_click(elem)`	Right-click element
`.move_to_element(elem)`	Hover over element
`.drag_and_drop(src, dst)`	Drag source to destination
`.click_and_hold(elem)`	Press and hold mouse button
`.release()`	Release mouse button

Assertions

Common Assertions (pytest)

```
assert "Dashboard" in driver.title
assert driver.find_element(By.ID, "msg").text == "Done"
assert driver.current_url.endswith("/home")
assert len(driver.find_elements(By.CSS_SELECTOR, "tr")) > 0
```

Wait-Based Assertions

```
WebDriverWait(driver, 5).until(              # appears
    EC.visibility_of_element_located((By.ID, "success")))
WebDriverWait(driver, 5).until(              # disappears
    EC.invisibility_of_element_located((By.ID, "spinner")))
```

JavaScript Execution

```
result = driver.execute_script("return document.title")
driver.execute_script(
    "arguments[0].scrollIntoView(true);", elem)
```

Common Patterns

Page Object Pattern

```
class LoginPage:
    URL = "/login"
    user_loc = (By.ID, "username")
    def login(self, drv, user, pwd):
        drv.find_element(*self.user_loc).send_keys(user)
```

Context Manager

```
from selenium import webdriver
with webdriver.Chrome() as driver:
    driver.get("https://example.com")
    print(driver.title)
# driver.quit() called automatically
```

Retry & Cleanup

```
try:
    driver.get("https://example.com")
    WebDriverWait(driver, 10).until(
        EC.element_to_be_clickable((By.ID, "btn")))
finally: driver.quit()
```