What's new and good in Selenium

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@imalittletester
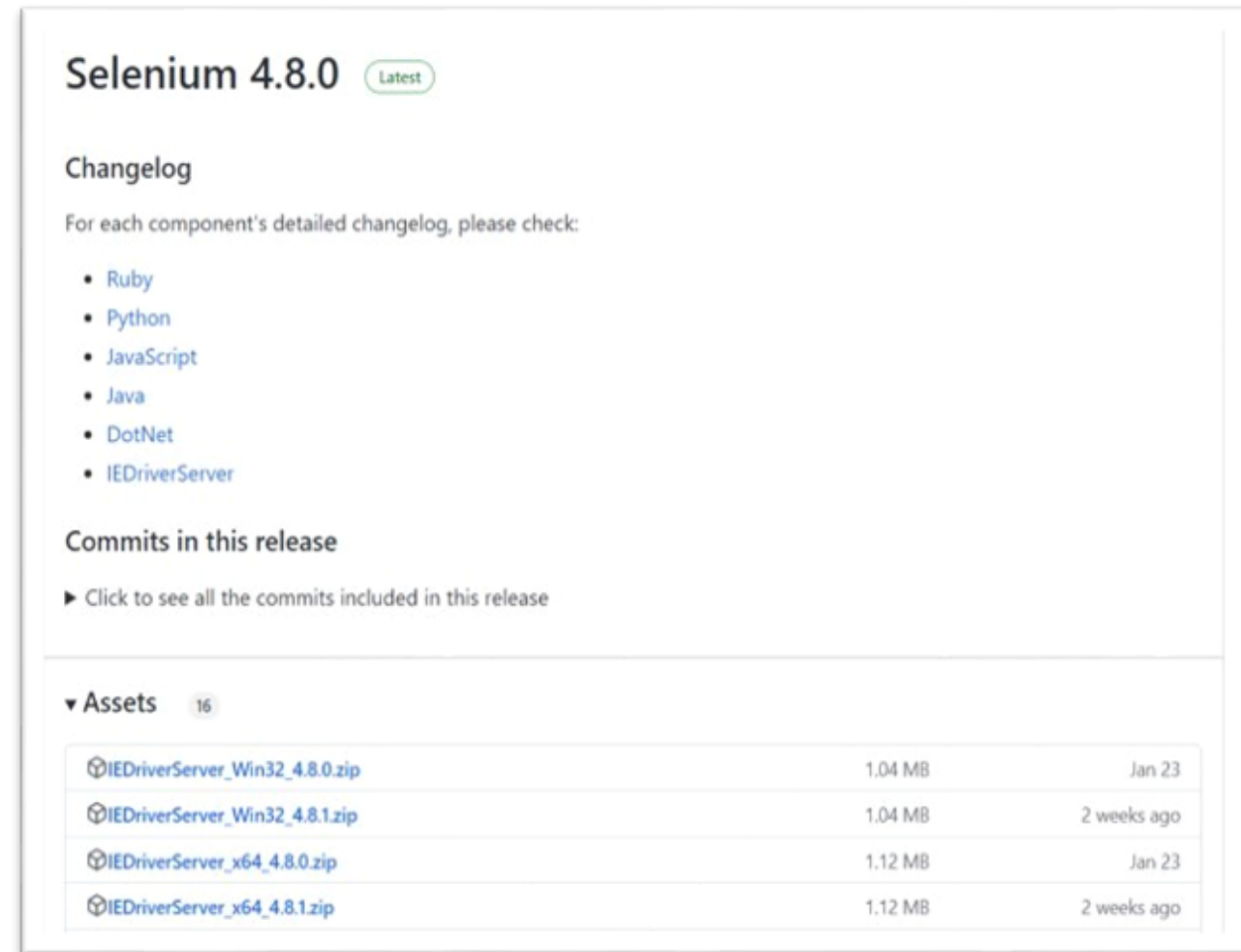https://imalittletester.com/
https://github.com/iamalittletester

Find out for yourself

- Find releases in GitHub:

https://github.com/SeleniumHQ/selenium/releases

- Find releases on official page: https://www.selenium.dev/downloads/#bindings

- And the blog: https://www.selenium.dev/blog/

What's included in recent releases?

- New features

- Latest browser support – need to support latest Chrome DevTools; fallback exists

- Remove deprecated code: due to not being used anymore; internal code; deprecation first, removal of code after a few releases

- Bug fixes per priority

- Consistent features across all bindings

What can you do to get a bug fixed faster?

- Add clear reproduction steps after making sure it really is a Selenium bug

- If bug already exists, 'upvote' for visibility

- Help the project by creating a pull request and fixing the bug :) Fix a bug, become a committer !

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Still using Selenium < 4 ?

- https://www.selenium.dev/documentation/webdriver/getting_started/upgrade_to_selenium_4/

- DesiredCapabilities replaced by Options

- Removal of internal 'findbys' Java methods (e.g. 'findElement(s)ById')

- Wait timeout parameter now 'Duration'

- Some browser legacy code removed

New way to set Chrome headless

- Due to new Chrome headless implementation (v >109), convenience method is removed

- Instead create ChromeOptions and addArguments:

```
ChromeOptions options = new ChromeOptions();
options.setHeadless(true);

--> options.addArguments("--headless=new");
WebDriver driver = new ChromeDriver(options);
```

Wheel input scrolling

- On Chromium browsers (e.g. Chrome, Edge, Opera)

- Element represents a WebElement

```
Actions actions = new Actions(driver);


actions.scrollToElement(element).perform();

actions.scrollByAmount(0, 500).perform(); -> DOWN

actions.scrollByAmount(0, -500).perform(); -> UP
```

Wheel input scrolling

```
WheelInput.ScrollOrigin scrollOrigin =

WheelInput.ScrollOrigin.fromElement(element);
actions.scrollFromOrigin(scrollOrigin, 0, 500)
        .perform();
```

```
WheelInput.ScrollOrigin scrollOrigin =

WheelInput.ScrollOrigin.fromElement(element, 0, -50);
actions.scrollFromOrigin(scrollOrigin, 0, 500)
        .perform();
```

Wheel input scrolling

```
WheelInput.ScrollOrigin scrollOrigin =

                WheelInput.ScrollOrigin.fromViewport(10, 10);
actions.scrollFromOrigin(scrollOrigin, 0, 500).perform();
```

(https://www.selenium.dev/documentation/webdriver/actions_api/wheel/)

Minimize window and fullscreen

driver.manage().window().minimize();

driver.manage().window().fullscreen();

(https://www.selenium.dev/documentation/webdriver/interactions/windows/)

Open new empty window or tab

```
driver.switchTo().newWindow(WindowType.TAB);


driver.switchTo().newWindow(WindowType.WINDOW);
```

(https://www.selenium.dev/documentation/webdriver/interactions/windows/)

Shadow DOM

```
WebElement shadowHost =
        driver.findElement(By.cssSelector(selectorOfShadowHost));
SearchContext shadowRoot = shadowHost.getShadowRoot();
```
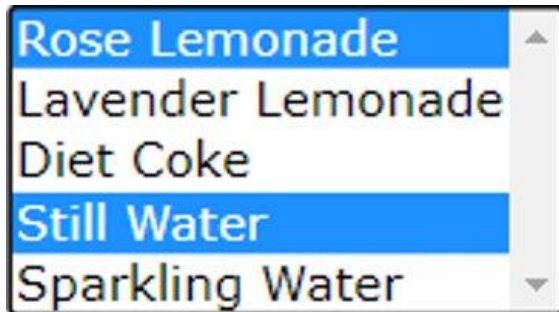
- For latest Chromium based browsers

https://developer.mozilla.org/en-US/docs/Web/Web_Components/Using_shadow_DOM

Element screenshot

```
FileUtils.copyFile(element.getScreenshotAs(OutputType.FILE),
                          new File(newScreenshotLocation));
```
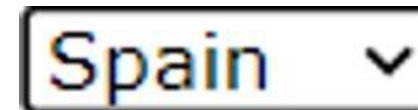
Full page screenshot in Firefox

```
FirefoxDriver firefoxDriver = new FirefoxDriver(); …

FileUtils.copyFile(
    firefoxDriver.getFullPageScreenshotAs(OutputType.FILE),
    new File(newFileLocation));
```

Relative locators

- https://www.selenium.dev/documentation/webdriver/elements/locators/#relative-locators

- Uses https://developer.mozilla.org/en-US/docs/Web/API/Element/getBoundingClientRect to identify elements

- Does not work with @FindBy

Relative locators

```
driver.findElement(RelativeLocator.with(By.cssSelector("a")).
        toLeftOf(By.cssSelector("[type=\"text\"]"))).getText()
--> Link
```
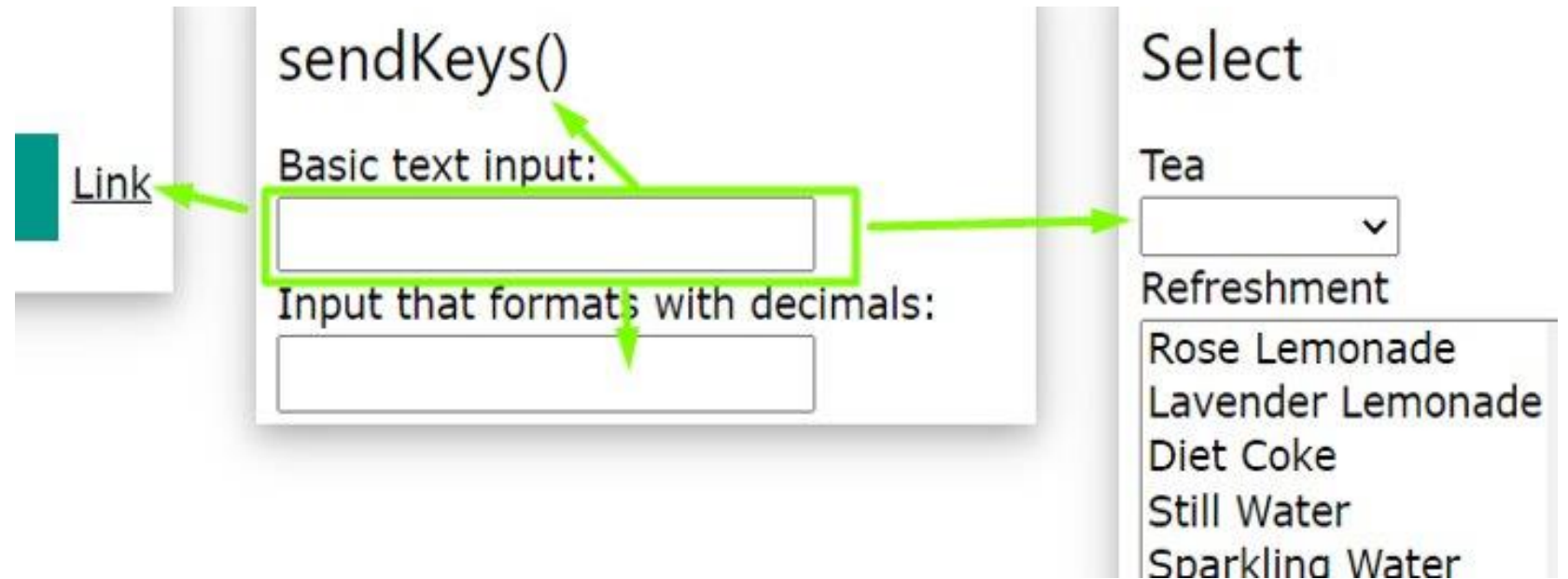

Also: toRightOf, above, below

Selenium Manager

- No more need to set path to driver executable (e.g. 'webdriver.chrome.driver'); except if you want to override

- Default: download latest driver for installed browser (in a dedicated cache)

- Recent work: download the actual browser if it is not installed

- Track progress here: https://github.com/orgs/SeleniumHQ/projects/5

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BiDi

- Cross browser means of bi-directional communication

- https://w3c.github.io/webdriver-bidi/

- https://www.selenium.dev/documentation/webdriver/bidirectional/bidirectional_w3c/

- Browsing context (e.g. navigate,
open window): https://www.selenium.dev/documentation/webdriver/bidirectional/bidirectional_w3c/browsing_context/

- Log: https://www.selenium.dev/documentation/webdriver/bidirectional/bidirectional_w3c/log/

BiDi/CDP

- While BiDi is still in progress, you can use the CDP protocol for some tasks

- Some details on the protocol: https://chromedevtools.github.io/devtools-protocol/

- What can you do with CDP: https://www.selenium.dev/documentation/webdriver/bidirectional/bidi_api

- Status of BiDi implementation by the browser vendors: https://wpt.fyi/results/webdriver/tests/bidi?label=experimental&label=master&aligned&view=subtest

HttpClient

- Used for communication with browser, BiDi and Grid modules

- Currently used client not in development

- Plans to upgrade Selenium project to higher Java versions -> incompatibility

- Dedicated selenium-http-jdk-client: https://www.selenium.dev/blog/2022/using-java11-httpclient ht/ (also helps fix issue with CORS header in Chrome 111+)

Virtual Authenticator

- Support for passwordless, public-key authentication (WebAuthentication) using an authenticator

- Spec: https://www.w3.org/TR/webauthn-2/

- Examples: https://github.com/SeleniumHQ/selenium/blob/trunk/java/test/org/openqa/selenium/virtualauthenticator/VirtualAuthenticatorTest.java

- Documentation: https://www.selenium.dev/documentation/webdriver/interactions/virtual_authenticator/

InvalidSelectorException

- InvalidSelectorException now extends WebDriverException instead of NoSuchElementException.

- https://www.selenium.dev/blog/2023/invalid-selector-exception-has-changed/

Grid and observability

- New architecture in Grid 4: components (e.g. Router, Session Queue, etc). See https://www.selenium.dev/documentation/grid/components/

- Various run modes: standalone, hub, distributed

- To understand what is going on during the test: observability

- https://www.selenium.dev/documentation/grid/advanced_features/observability/

Testing beta and dev browser channels

- Docker and Grid: https://www.selenium.dev/blog/2022/dev-and-beta-channel-browsers-via-docker-selenium/

docker-compose-v3-beta-channel.yml:

```
# To execute this docker-compose yml file use `docker-compose -f docker-compose-v3-beta-chann
# Add the `-d` flag at the end for detached execution
# To stop the execution, hit Ctrl+C, and then `docker-compose -f docker-compose-v3-beta-chann
version: "3"
services:
  chrome:
    image: selenium/node-chrome:beta
    shm_size: 2gb
    depends_on:
      - selenium-hub
    environment:
      - SE_EVENT_BUS_HOST=selenium-hub
      - SE_EVENT_BUS_PUBLISH_PORT=4442
      - SE_EVENT_BUS_SUBSCRIBE_PORT=4443
```

Thank you!

@imalittletester
https://imalittletester.com/
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