**Basic Syntax of XPath**

bash

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//tagname[@attribute='value']

//tagname[text()='text\_value']

//tagname[contains(@attribute, 'partial\_value')]

**Types of XPath**

**1. Absolute XPath**

* This XPath starts from the root element (HTML tag) and navigates through every element to the target element.
* **Syntax**: /html/body/div[1]/div[2]/form/input
* **Example**:

xpath

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/html/body/div[1]/form/input[1]

* **Note**: Absolute XPath is less recommended because changes in the structure can break the XPath.

**2. Relative XPath**

* This XPath starts from anywhere in the DOM structure and is more flexible.
* **Syntax**: //tagname[@attribute='value']
* **Example**:

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//input[@id='username']

**XPath Axes**

You can navigate through the DOM hierarchy using various axes like parent, child, sibling, ancestor, descendant, etc.

**Common Axes:**

1. **Select a Child Element**
   * **Syntax**: //parentTag/childTag
   * **Example**:

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//div/input

* + Selects the input element inside a div.

1. **Select a Parent Element**
   * **Syntax**: //childTag/parent::parentTag
   * **Example**:

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//input[@id='username']/parent::div

* + Selects the parent div of the input element.

1. **Select Sibling Elements**
   * **Syntax**: //element/following-sibling::siblingTag
   * **Example**:

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//h3/following-sibling::p

* + Selects the paragraph (p) that is a sibling of h3.

**XPath Functions**

1. **contains()**:
   * Finds elements that contain part of a value.
   * **Syntax**: //tagname[contains(@attribute, 'partial\_value')]
   * **Example**:

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//input[contains(@id, 'user')]

* + Selects any input element where the id contains "user".

1. **text()**:
   * Selects elements based on their inner text.
   * **Syntax**: //tagname[text()='text\_value']
   * **Example**:

xpath

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//button[text()='Submit']

* + Selects a button with the exact text "Submit".

1. **starts-with()**:
   * Finds elements where an attribute starts with a specific value.
   * **Syntax**: //tagname[starts-with(@attribute, 'starting\_value')]
   * **Example**:

xpath

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//input[starts-with(@id, 'user')]

* + Selects any input element where the id starts with "user".

**Examples of XPath Expressions**

1. **Locate an Element by Attribute**
   * Example: Finding an element with the attribute id="submitBtn".

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//button[@id='submitBtn']

1. **Locate an Element by Text**
   * Example: Finding a button with text "Login".

xpath

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//button[text()='Login']

1. **Using contains()**
   * Example: Finding an element whose class contains "form-control".

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//input[contains(@class, 'form-control')]

1. **Find Element Using Multiple Conditions**
   * Example: Finding an element where both id and type match specific values.

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//input[@id='username' and @type='text']

1. **Select Element by Index**
   * Example: Selecting the second input field in a form.

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(//input)[2]

**Advanced XPath Techniques**

1. **Use Wildcards to Ignore Tag Names**:
   * Use \* to match any tag.
   * **Example**: Selecting any tag with the class attribute set to "submit":

xpath

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//\*[@class='submit']

1. **Selecting the Last Element**:
   * **Example**: Selecting the last div in the document:

xpath

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(//div)[last()]

1. **Select Based on Ancestor**:
   * **Example**: Selecting a specific input field inside a form:

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//form[@id='loginForm']//input[@type='text']

**Common XPath Use Cases**

1. **Select Checkboxes**

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//input[@type='checkbox']

1. **Select Links with Specific Text**

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//a[text()='Click Here']

1. **Selecting Table Rows**:

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//table[@id='employeeTable']/tbody/tr

1. **Select Button with Partial Text**:

xpath

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//button[contains(text(),'Sign In')]

**Testing XPath**

You can test your XPath in **Chrome DevTools** by doing the following:

1. Right-click on the page and select **Inspect**.
2. Open the **Console** tab.
3. Type:

javascript

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$x("//input[@id='username']")

This will evaluate the XPath and highlight the corresponding element(s).

**Best Practices for Writing XPath:**

* **Prefer Relative XPath** over Absolute XPath for more flexibility and reliability.
* **Use specific attributes** (e.g., id, name, class) to make your XPath more robust.
* **Avoid using long or overly complex XPaths** as they may break if the page structure changes.
* **Use XPath functions like contains() and text()** to handle dynamic content.