9. XML Based Test Automation

IT6206 – Software Quality Assurance

Level III - Semester 6

Overview

- Selenium is a popular tool for automating web browsers, and it supports using XPath to locate elements on a web page.
- XPath is used for navigating and selecting elements in XML and HTML documents.
- XPath expressions can be written using various syntaxes, including absolute or relative paths, axis specifiers, and various functions for selecting or manipulating elements.
- It's important to write XPath expressions that are specific and reliable, since the structure and content of web pages can change frequently and unexpectedly, which can cause XPath expressions to fail.

Intended Learning Outcomes

At the end of this lesson, you will be able to;

- Understand syntax and structure of XPath expressions
- Understand the difference between absolute path and relative path.
- Use XPath expressions to select elements on a web page based on their attributes, relationships, or position in the document hierarchy.
- Understand how to expressions that are specific, reliable and efficient.

List of sub topics

9.1 Introduction to XML Path in Selenium

9.2 Absolute XPath

9.3 Relative XPath

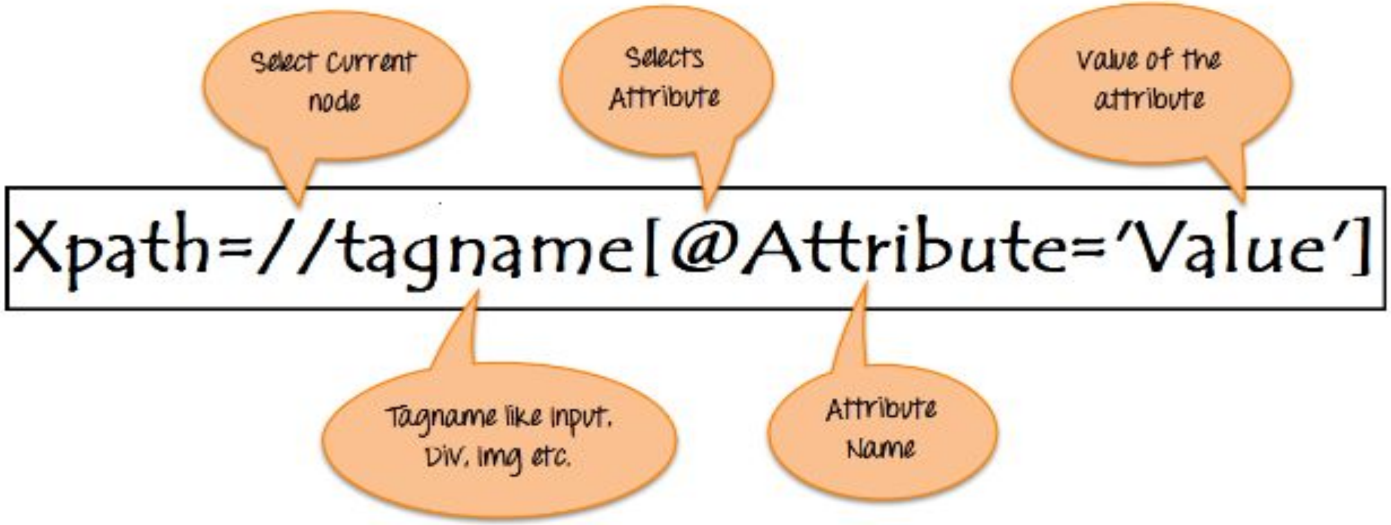
9.4 Finding Elements using Attributes with XPath

9.1 Introduction to XML Path in Selenium

- **XML Path (XPath) in Selenium** is an XML path used for navigation through the HTML structure of the page.
- It is a syntax or language for finding any element on a web page using XML path expression.
- It's used to find the location of any element on a webpage using the HTML DOM structure.
- In Selenium automation, if the elements are not found by the general locators such as *id, class, name etc.* then **XPath** is used to find an element on the web page

9.1 Introduction to XML Path in Selenium

- **XPath Syntax**
  - XPath contains the path of the element situated at the web page
- The basic format of XPath in selenium:



Source: https://www.guru99.com/images/3 2016/032816_0758_XPathinSele1.png

9.1 Introduction to XML Path in Selenium

To find the element on web pages accurately there are different types of locators.

XPath Locators	Find elements on web page
ID	To find the element by ID of the element
Classname	To find the element by Classname of the element
Name	To find the element by name of the element
Link text	To find the element by text of the link
XPath	XPath required for finding the dynamic element and traverse between various elements of the web page
CSS path	CSS path also locates elements having no name, class or ID.

9.1 Introduction to XML Path in Selenium

Types of XPath

- Absolute XPath
  - The complete path to an element on a web page starting from the root node.
- Relative XPath
  - A shorter, more flexible path to an element on a web page that starts from an element in the DOM, rather than from the root node.

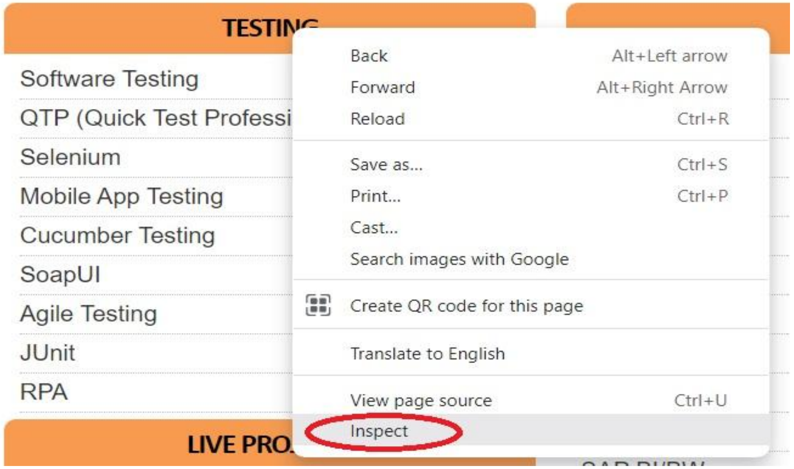
9.2 Absolute XPath

- It is the direct way to find the element
- **Key Characteristic of Absolute XPath:**
  - It begins with the single forward slash (/), which means element can be selected from root node.
- **Disadvantage of the Absolute XPath:**
  - If there are many changes made in the path of the element then that XPath gets failed.

9.2 Absolute XPath

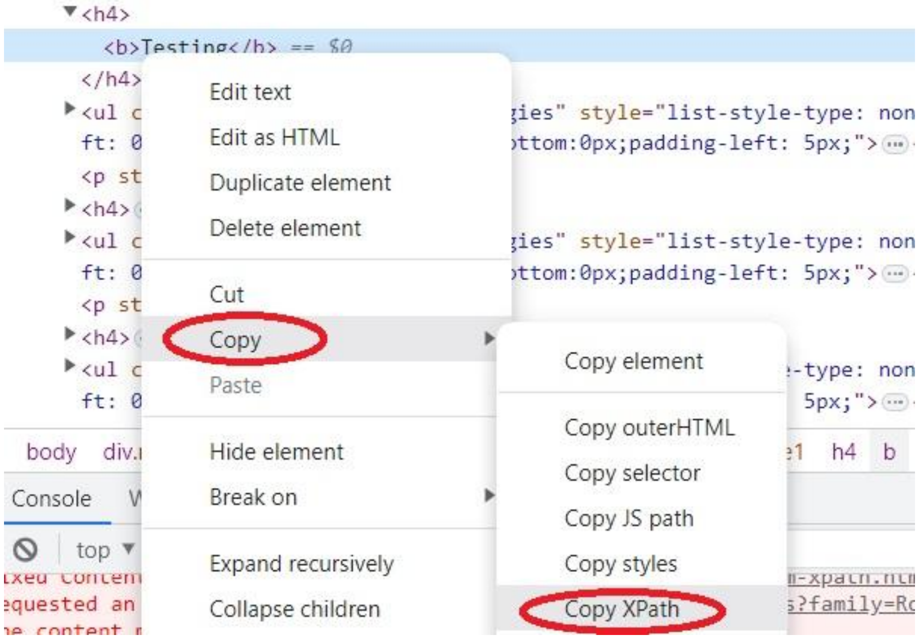
How to Identify Absolute XPath in Browser (Chrome)

- Step 1: “Right click” on the element and click inspect



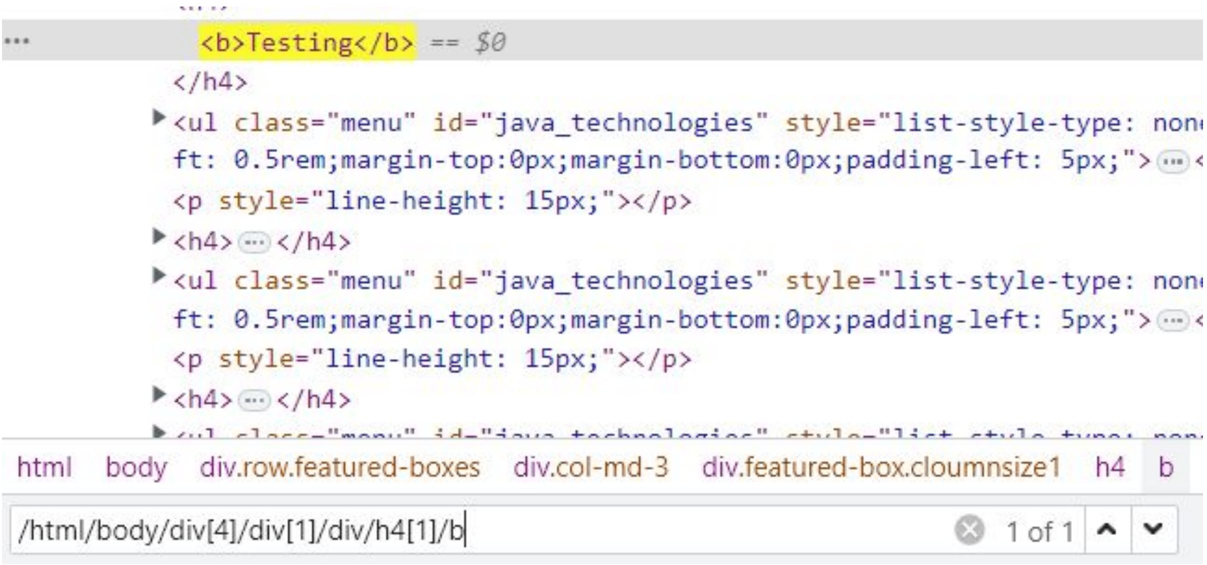
9.2 Absolute XPath

- Step 2: “Right click” on highlighted HTML element and copy XPath



9.2 Absolute XPath

Step 3: Enter the copied XPath into search and press enter. Relevant HTML element will be highlighted.



```
      <b>Testing</b> == $0
    </h4>
  ▸ <ul class="menu" id="java_technologies" style="list-style-type: non
    ft: 0.5rem;margin-top:0px;margin-bottom:0px;padding-left: 5px;">…<
    <p style="line-height: 15px;"></p>
  ▸ <h4>…</h4>
  ▸ <ul class="menu" id="java_technologies" style="list-style-type: non
    ft: 0.5rem;margin-top:0px;margin-bottom:0px;padding-left: 5px;">…<
    <p style="line-height: 15px;"></p>
  ▸ <h4>…</h4>
```

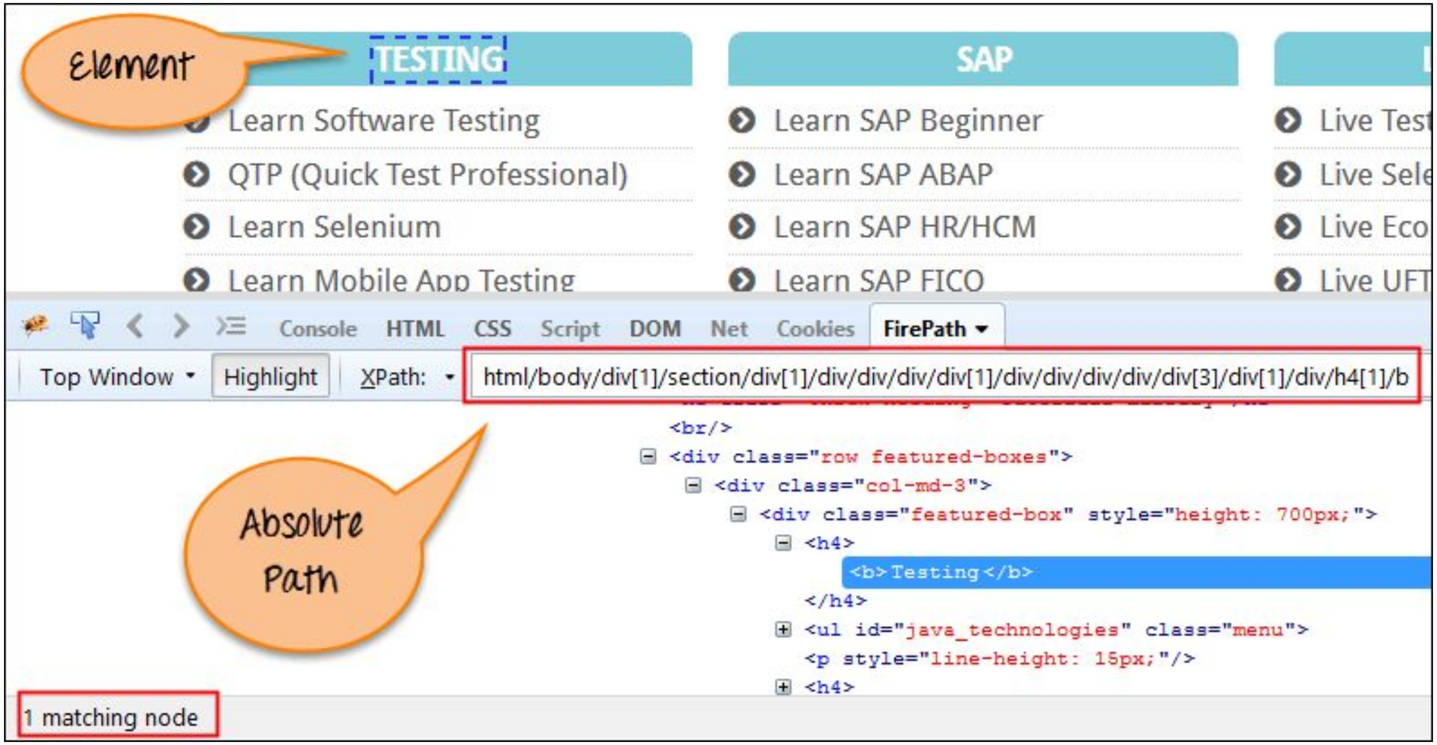
html body div.row.featured-boxes div.col-md-3 div.featured-box.cloumnsize1 h4 b

/html/body/div[4]/div[1]/div/h4[1]/b

9.2 Absolute XPath

Example:

```
/html/body/div[1]/section/div[1]/div/div/div/div[1]/div/div/div/div/div[3]/div[1]/div/h4[1]/b
```



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Console HTML CSS Script DOM Net Cookies FirePath
Top Window Highlight XPath:

XPath: html/body/div[1]/section/div[1]/div/div/div/div[1]/div/div/div/div/div[3]/div[1]/div/h4[1]/b

```
<br/>
⊟ <div class="row featured-boxes">
    ⊟ <div class="col-md-3">
        ⊟ <div class="featured-box" style="height: 700px;">
            ⊟ <h4>
                <b>Testing</b>
              </h4>
            ⊞ <ul id="java_technologies" class="menu">
              <p style="line-height: 15px;"/>
            ⊞ <h4>
```

1 matching node

Source: https://www.guru99.com/images/3-2016/032816_0758_XPathinSele2.png

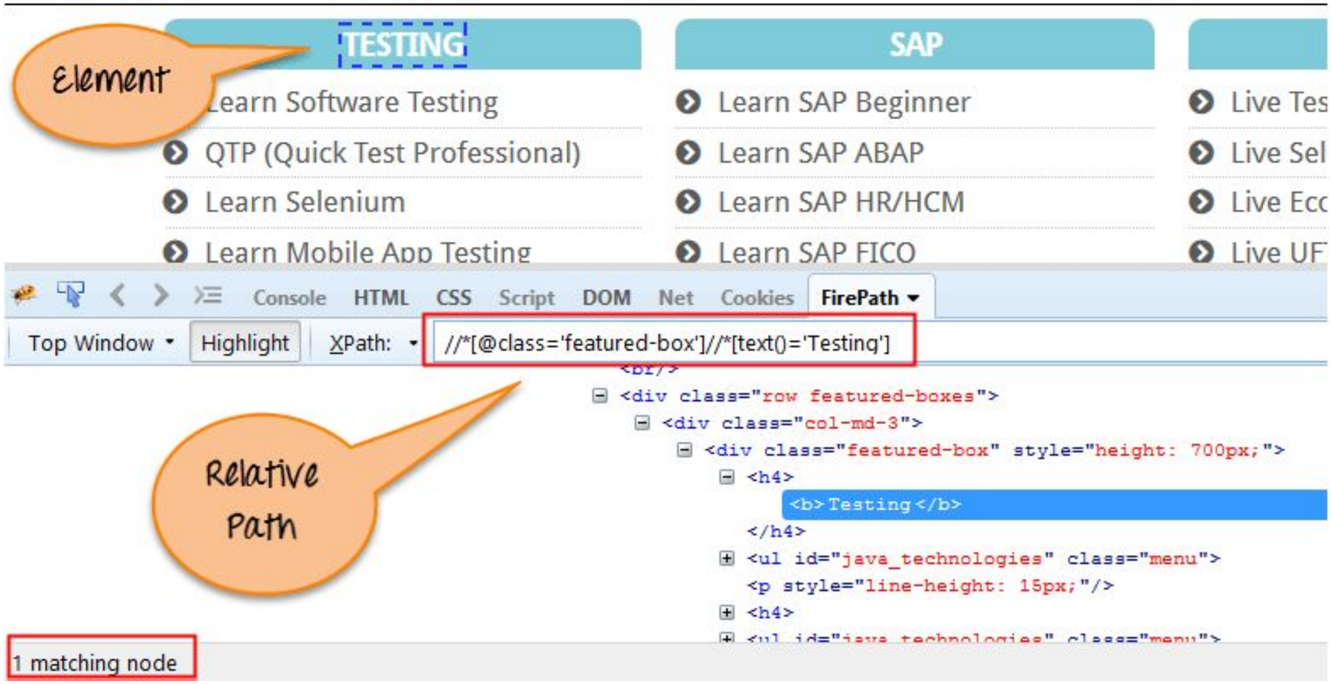
9.3 Relative XPath

- **Relative XPath** starts from the middle of HTML DOM structure
- Starts with doble forward slash(//).
- There is no need to write lengthy XPath, can start from middle of the HTML DOM structure.
- HTML element could be found by searching the relative XPath in the inspect tool of the browser.

9.3 Relative XPath

Example

//*[@class=‘featured-box’]//*[text()=‘Testing’]



XPath: //*[@class='featured-box']//*[text()='Testing']

```
<br/>
⊟ <div class="row featured-boxes">
  ⊟ <div class="col-md-3">
    ⊟ <div class="featured-box" style="height: 700px;">
      ⊟ <h4>
          <b>Testing</b>
        </h4>
      ⊞ <ul id="java_technologies" class="menu">
        <p style="line-height: 15px;"/>
      ⊞ <h4>
      ⊞ <ul id="java_technologies" class="menu">
```

1 matching node

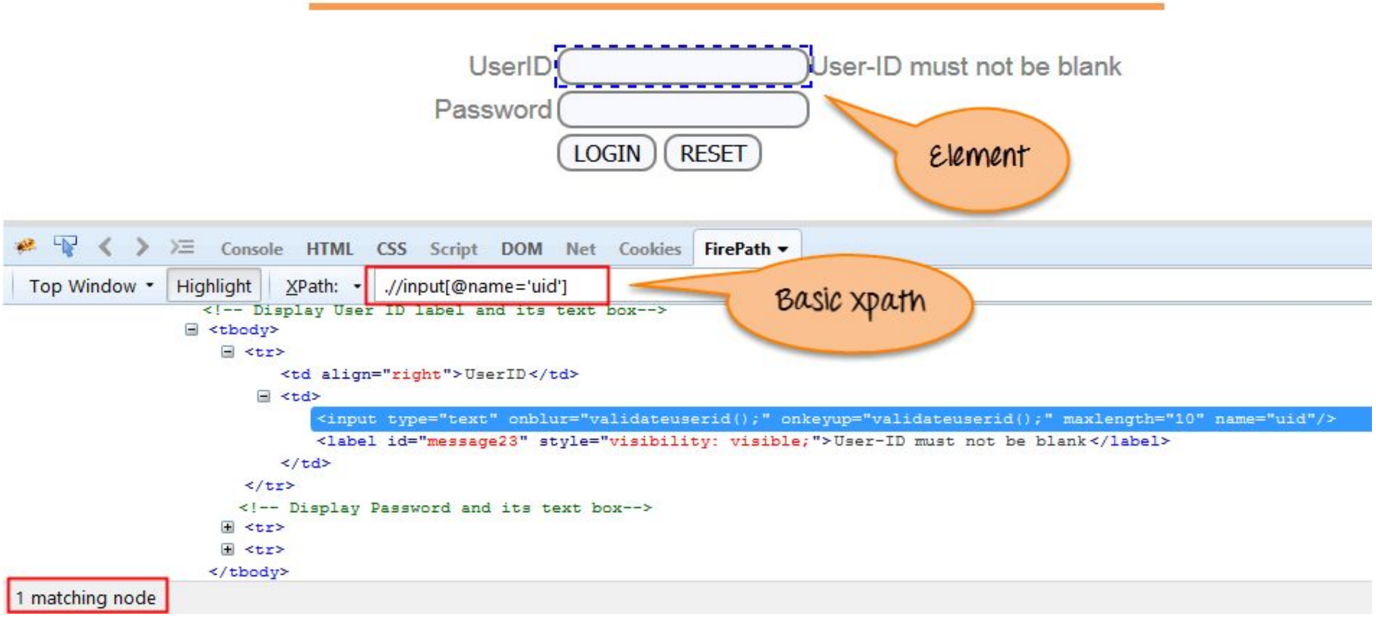
Source: https://www.guru99.com/images/3-2016/032816_0758_XPathinSele3.png

9.4 Finding Elements using Attributes with XPath

How to write dynamic XPath in Selenium WebDriver

1. Basic XPath:

- XPath expression select nodes or list of nodes on the basis of attributes like **ID, Name, Classname,** etc.



XPath: .//input[@name='uid']

```
<!-- Display User ID label and its text box-->
⊟ <tbody>
  ⊟ <tr>
      <td align="right">UserID</td>
    ⊟ <td>
        <input type="text" onblur="validateuserid();" onkeyup="validateuserid();" maxlength="10" name="uid"/>
        <label id="message23" style="visibility: visible;">User-ID must not be blank</label>
      </td>
    </tr>
    <!-- Display Password and its text box-->
  ⊞ <tr>
  ⊞ <tr>
  </tbody>
```

1 matching node

Source: https://www.guru99.com/images/3-2016/032816_0758_XPathinSele4.png

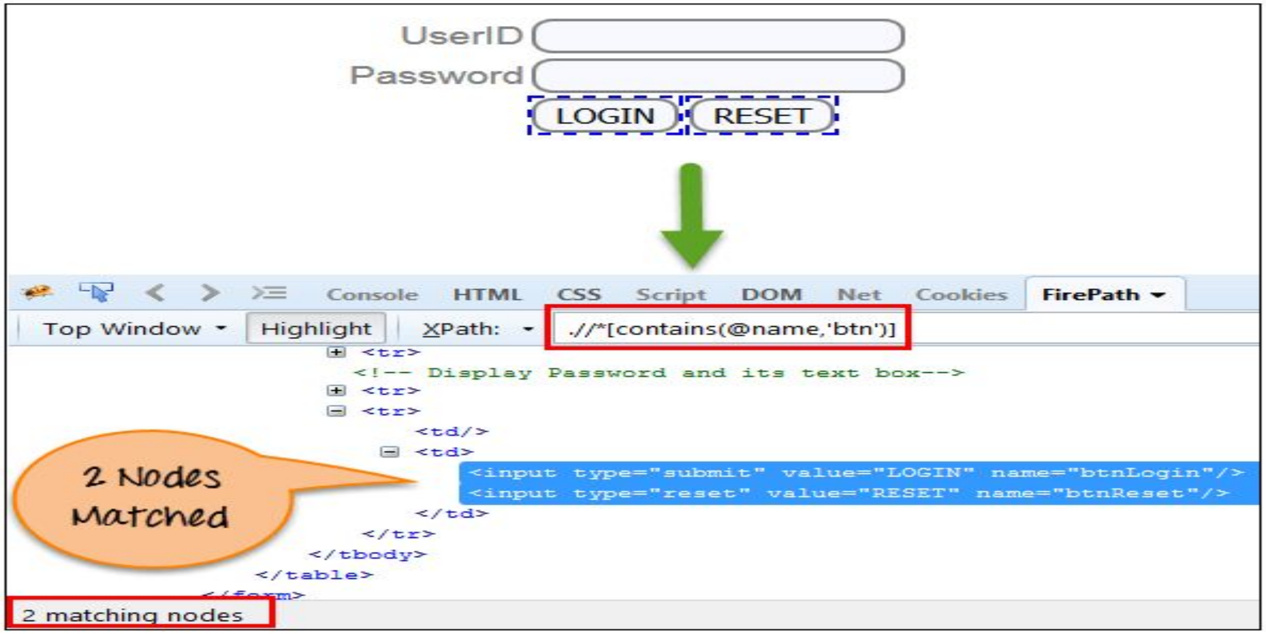
9.4 Finding Elements using Attributes with XPath

- Some more basic XPath expressions
  - //input[@type=‘text’]
  - //label[@id=‘message23’]
  - //input[@value=‘RESET’]
  - //a[@href=‘http://demo.guru99.com/’]

9.4 Finding Elements using Attributes with XPath

2. Contains()

- Contains() is a method used in XPath expression.
- Used when the value of any attribute changes dynamically
    - Ex – Login information
- Has an ability to find the element with partial text
    - Ex – Complete value of ‘name’ is ‘btnLogin’ but only using partial value ‘btn’



XPath: .//*[contains(@name,'btn')]

```
<tr>
  <!-- Display Password and its text box-->
<tr>
<tr>
    <td/>
  <td>
      <input type="submit" value="LOGIN" name="btnLogin"/>
      <input type="reset" value="RESET" name="btnReset"/>
    </td>
  </tr>
</tbody>
</table>
</form>
```

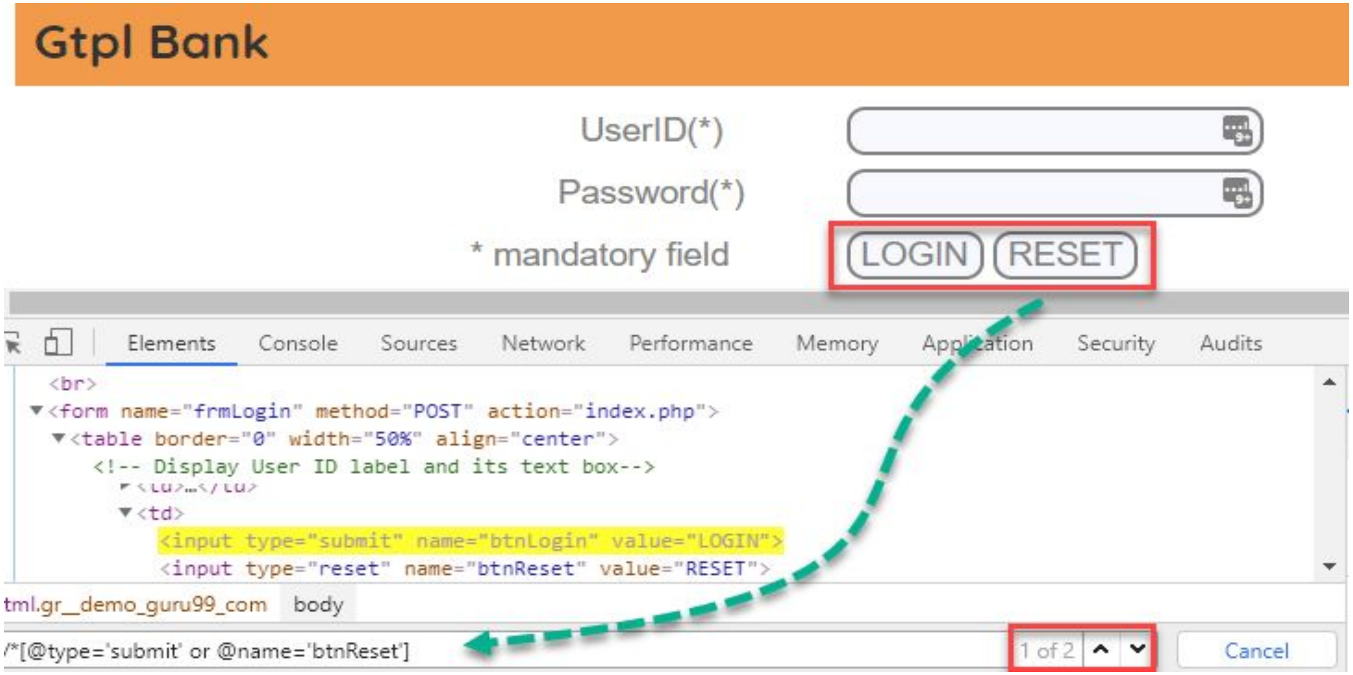
2 matching nodes

Source: https://www.guru99.com/images/3-2016/032816_0758_XPathinSele5.png

9.4 Finding Elements using Attributes with XPath

3. Using OR & AND

- OR expression: for the element to be found, any one condition or both must be true.
  - Ex – LOGIN element -> attribute ‘type’
    RESET element -> attribute ‘name’



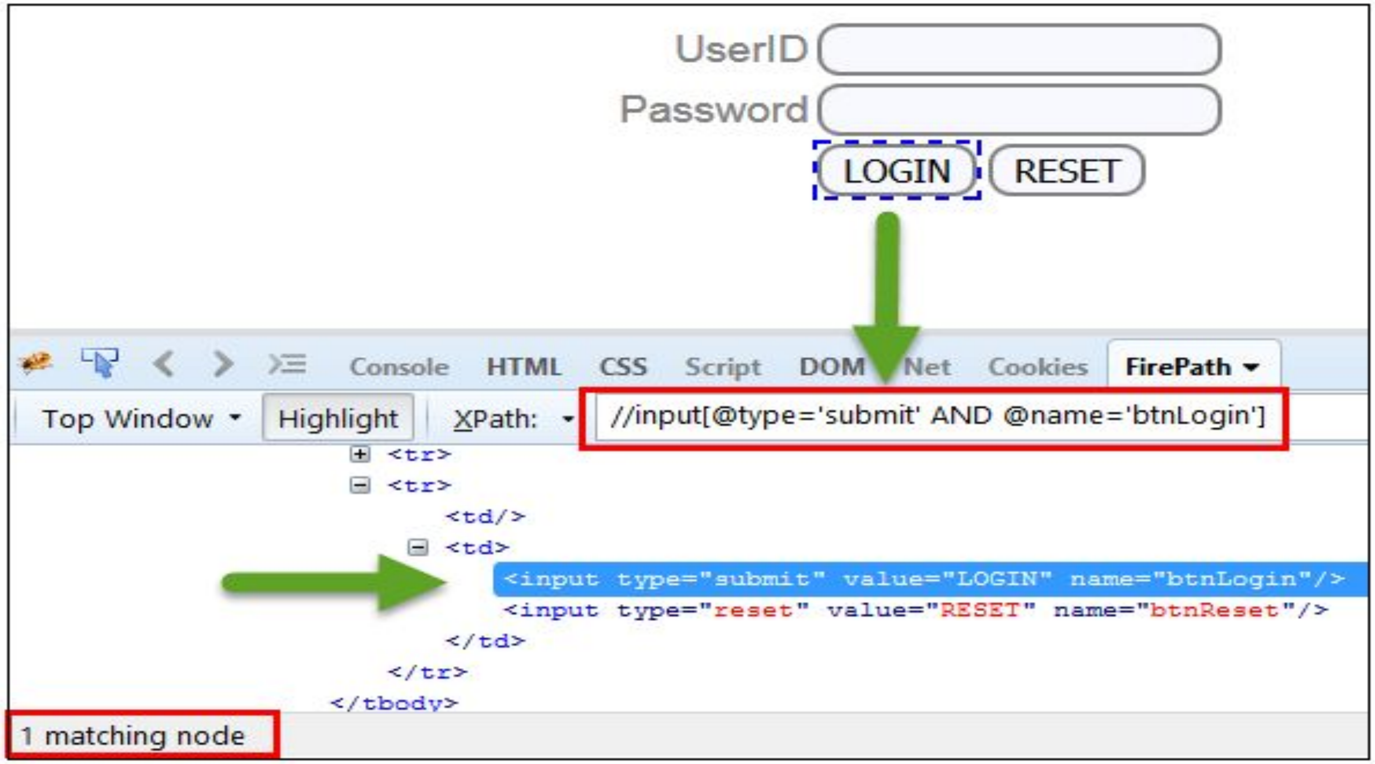
```
<br>
▼<form name="frmLogin" method="POST" action="index.php">
  ▼<table border="0" width="50%" align="center">
     <!-- Display User ID label and its text box-->
     ▶<td>…</td>
     ▼<td>
        <input type="submit" name="btnLogin" value="LOGIN">
        <input type="reset" name="btnReset" value="RESET">
```

```
/*[@type='submit' or @name='btnReset']
```

Source: https://www.guru99.com/images/3-2016/032816_0758_XPathinSele8.png

9.4 Finding Elements using Attributes with XPath c

- AND expression: both conditions used should be true to find element.
    - Ex – LOGIN element having both attribute ‘type’ and ‘name’



```
//input[@type='submit' AND @name='btnLogin']
```

```
<tr>
<tr>
    <td/>
    <td>
        <input type="submit" value="LOGIN" name="btnLogin"/>
        <input type="reset" value="RESET" name="btnReset"/>
    </td>
</tr>
</tbody>
```

1 matching node

Source: https://www.guru99.com/images/3-2016/032816_0758_XPathinSele9.png

9.4 Finding Elements using Attributes with XPath

4. Starts-with
   - Starts-with() is a function used for finding the web element whose attribute values gets changed on refresh or by other dynamic operations on the webpage.
   - In this method, the starting text of the attribute is matched to find the element whose attribute value changes dynamically.
   - Can also find elements whose attribute value is static.

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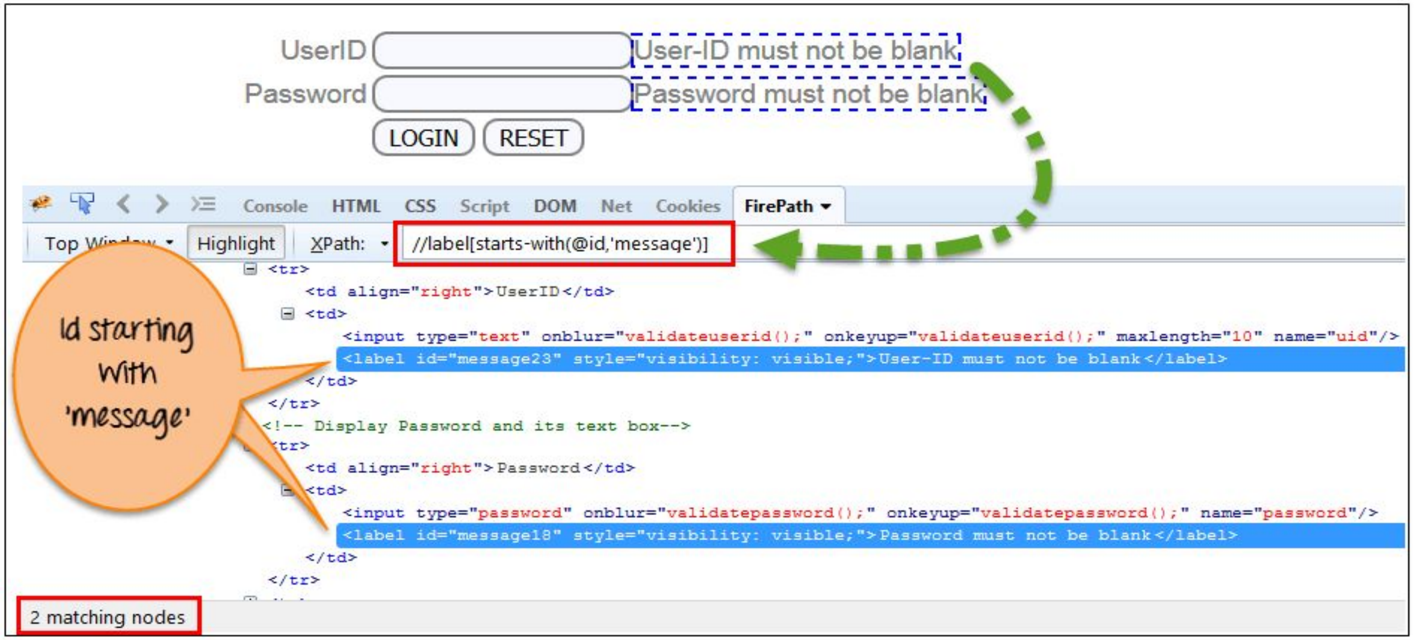
9.4 Finding Elements using Attributes with XPath

Example – Suppose the ID of particular element changes dynamically as follows

- Id = “message1”
- Id = “message10”
- Id = “message6345” and so on….



XPath: //label[starts-with(@id,'message')]

```
<tr>
    <td align="right">UserID</td>
  <td>
      <input type="text" onblur="validateuserid();" onkeyup="validateuserid();" maxlength="10" name="uid"/>
      <label id="message23" style="visibility: visible;">User-ID must not be blank</label>
    </td>
</tr>
<!-- Display Password and its text box-->
<tr>
    <td align="right">Password</td>
  <td>
      <input type="password" onblur="validatepassword();" onkeyup="validatepassword();" name="password"/>
      <label id="message18" style="visibility: visible;">Password must not be blank</label>
    </td>
</tr>
```

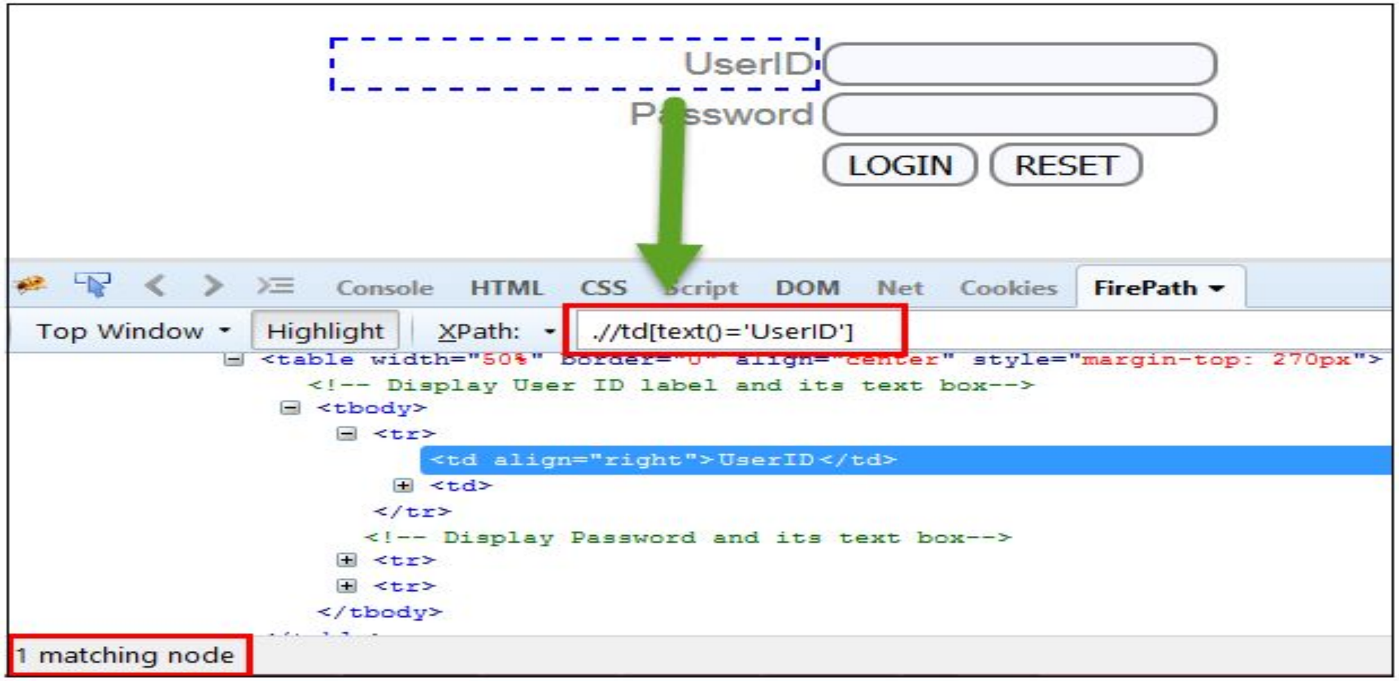
2 matching nodes

Source: https://www.guru99.com/images/3-2016/032816_0758_XPathinSele10.png

9.4 Finding Elements using Attributes with XPath

5. Text()

- a built-in function of selenium webdriver which is used to locate elements based on text of a web element.
- It helps to find the exact text elements.
- The elements to be located should be in string form.



XPath: .//td[text()='UserID']

```
<table width="50%" border="0" align="center" style="margin-top: 270px">
    <!-- Display User ID label and its text box-->
  <tbody>
    <tr>
      <td align="right">UserID</td>
      <td>
    </tr>
    <!-- Display Password and its text box-->
    <tr>
    <tr>
  </tbody>
```

1 matching node

Source: https://www.guru99.com/images/3-2016/032816_0758_XPathinSele11.png

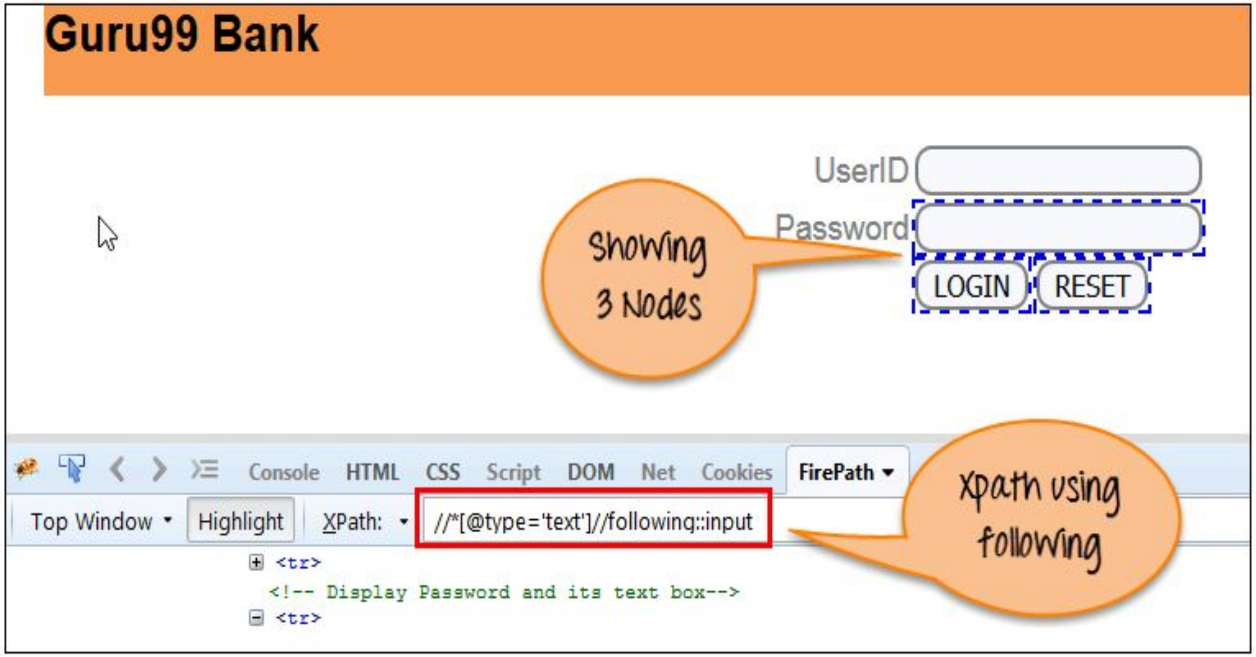
9.4 Finding Elements using Attributes with XPath

XPath axes

- XPath axes are the methods used to find elements, which dynamically change on refresh or any other operations.
- It search different nodes in XML document from current context node.
- Few commonly used axes methods in Selenium Webdriver are:
  - Child
  - Parent
  - Ancestor
  - Sibling
  - Preceding
  - Self and etc.

9.4 Finding Elements using Attributes with XPath

1. Following
   - Select all elements in the document of the current node()



```
//*[@type='text']//following::input
```

```
<tr>
  <!-- Display Password and its text box-->
<tr>
```

Source: https://www.guru99.com/images/3-2016/032816_0758_XPathinSele12.png

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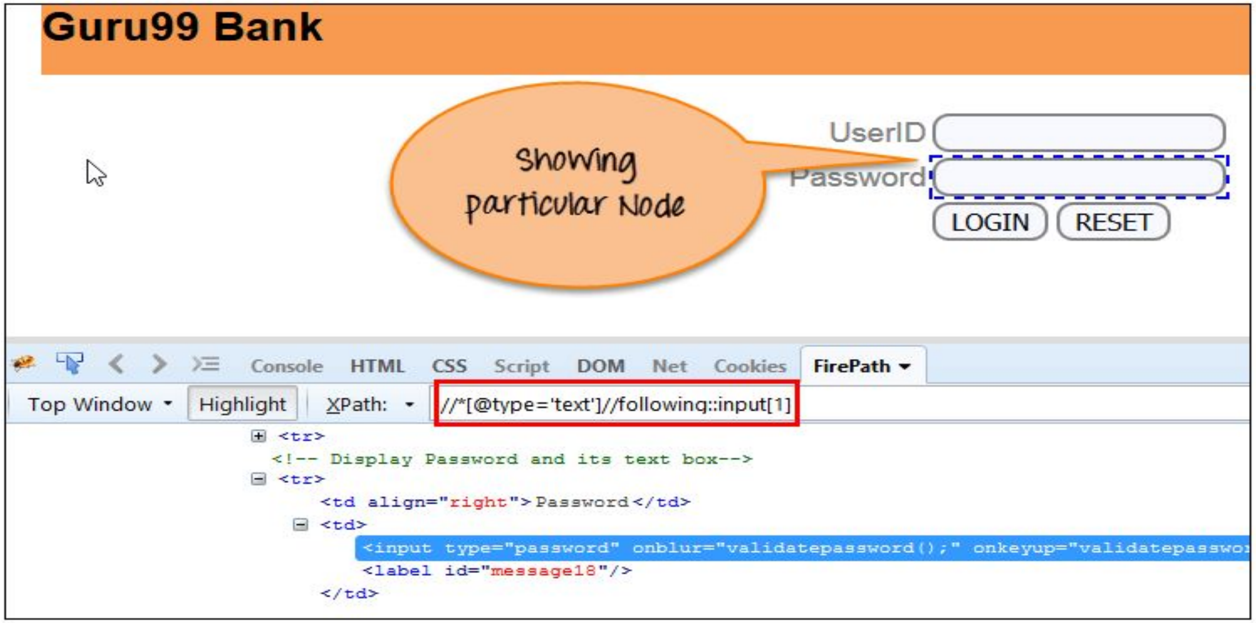
9.4 Finding Elements using Attributes with XPath

- *XPath = //*[@type='text']//following::input*
- There are 3 “input” nodes matching by using “following” axis-password, login and reset button.
- Following XPath method can be used to focus on any particular element.
    - *XPath=//*[@type='text']//following::input[1]*



XPath: //*[@type='text']//following::input[1]

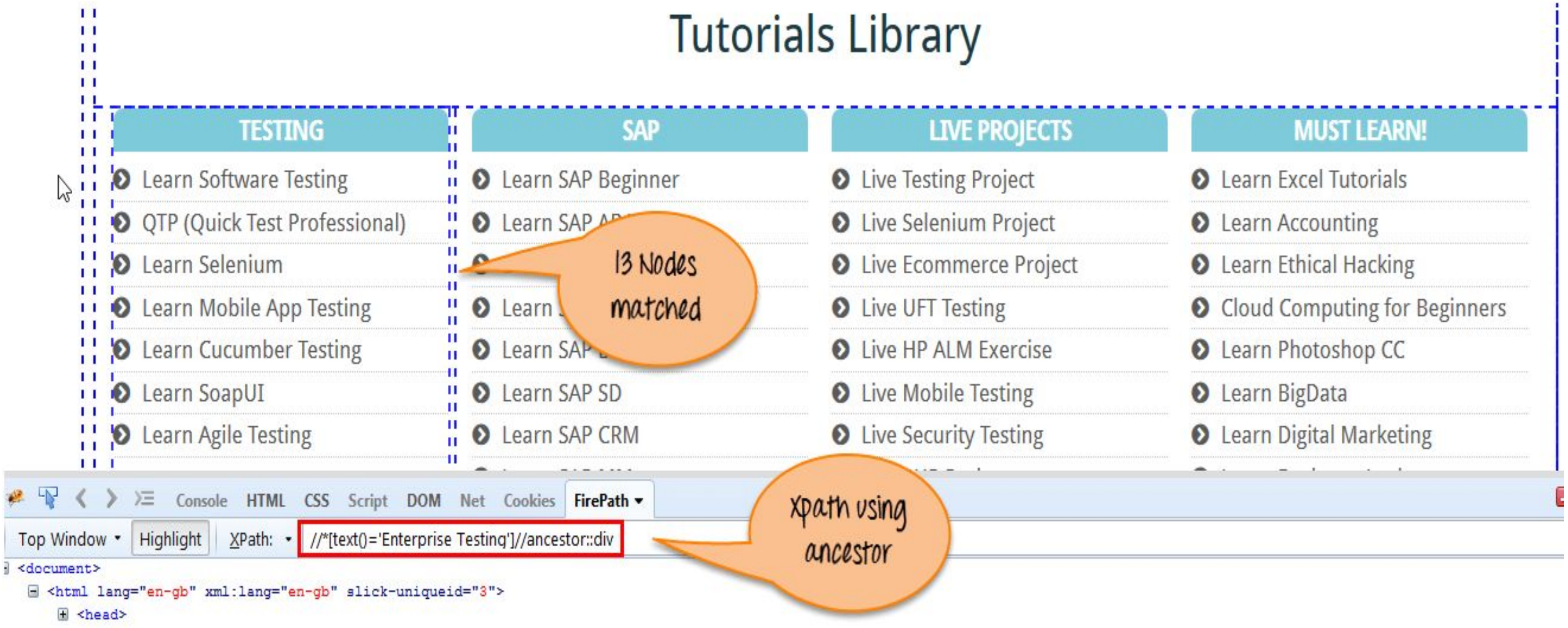
```
⊞ <tr>
  <!-- Display Password and its text box-->
⊟ <tr>
      <td align="right">Password</td>
    ⊟ <td>
        <input type="password" onblur="validatepassword();" onkeyup="validatepasswo
        <label id="message18"/>
      </td>
```

Source: https://www.guru99.com/images/3-2016/032816_0758_XPathinSele13.png

9.4 Finding Elements using Attributes with XPath

2. Ancestor:

- The ancestor axis selects all ancestor element (grandparent, parent, etc.) of the current node.



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XPath: //*[text()='Enterprise Testing']//ancestor::div

```
<document>
  <html lang="en-gb" xml:lang="en-gb" slick-uniqueid="3">
    <head>
```

Source: https://www.guru99.com/images/3-2016/032816_0758_XPathinSele14.png

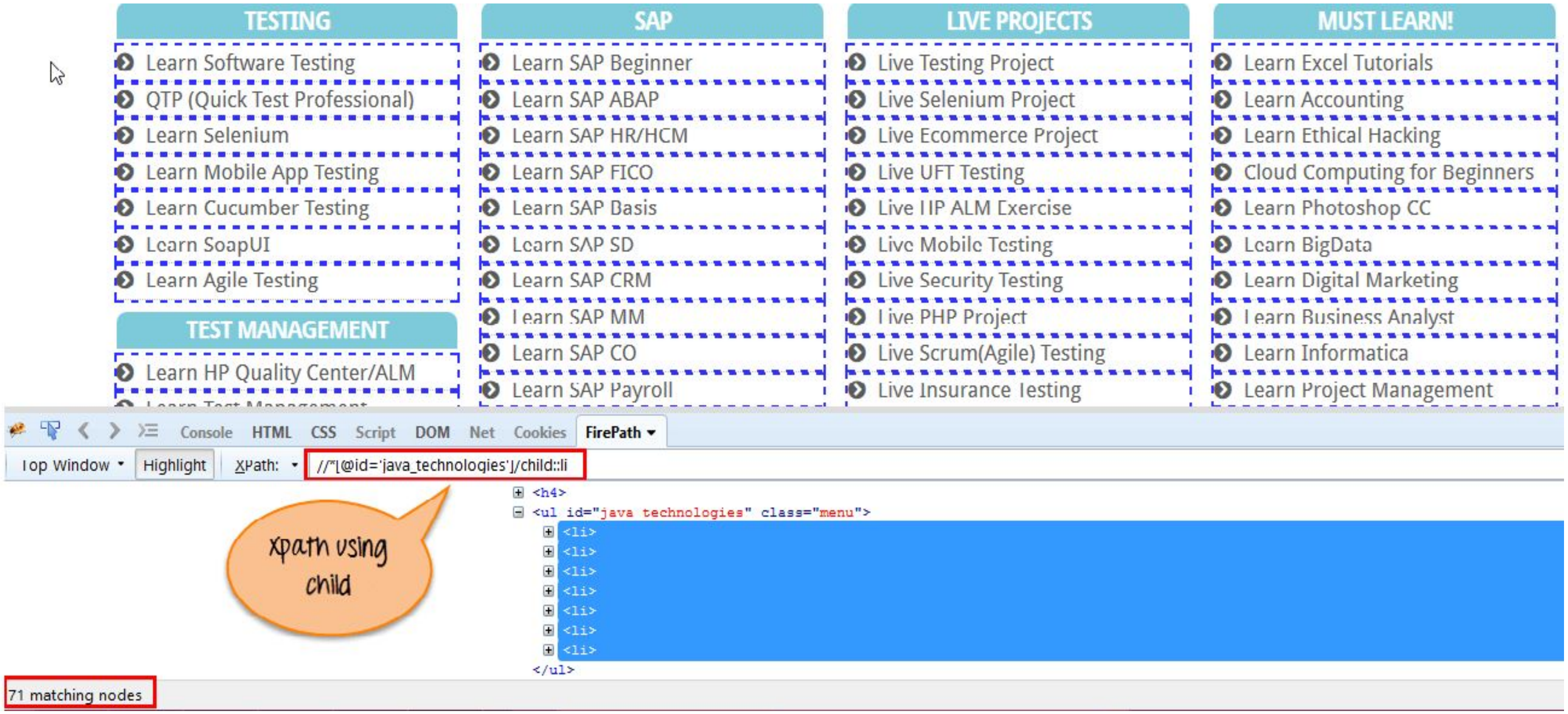
9.4 Finding Elements using Attributes with XPath

- In above example, there are 13 “div” nodes matching.
- Following XPath can be used to focus on any particular element.
  - *//*[text()='Enterprise Testing']//ancestor::div[1]*
- Can change the XPath according to the requirement by changing the number in div[].

9.4 Finding Elements using Attributes with XPath

3. Child

- Selects all children elements of the current node.



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XPath: `//*[@id='java_technologies']/child::li`

```
⊞ <h4>
⊟ <ul id="java technologies" class="menu">
    ⊞ <li>
    ⊞ <li>
    ⊞ <li>
    ⊞ <li>
    ⊞ <li>
    ⊞ <li>
    ⊞ <li>
  </ul>
```

71 matching nodes

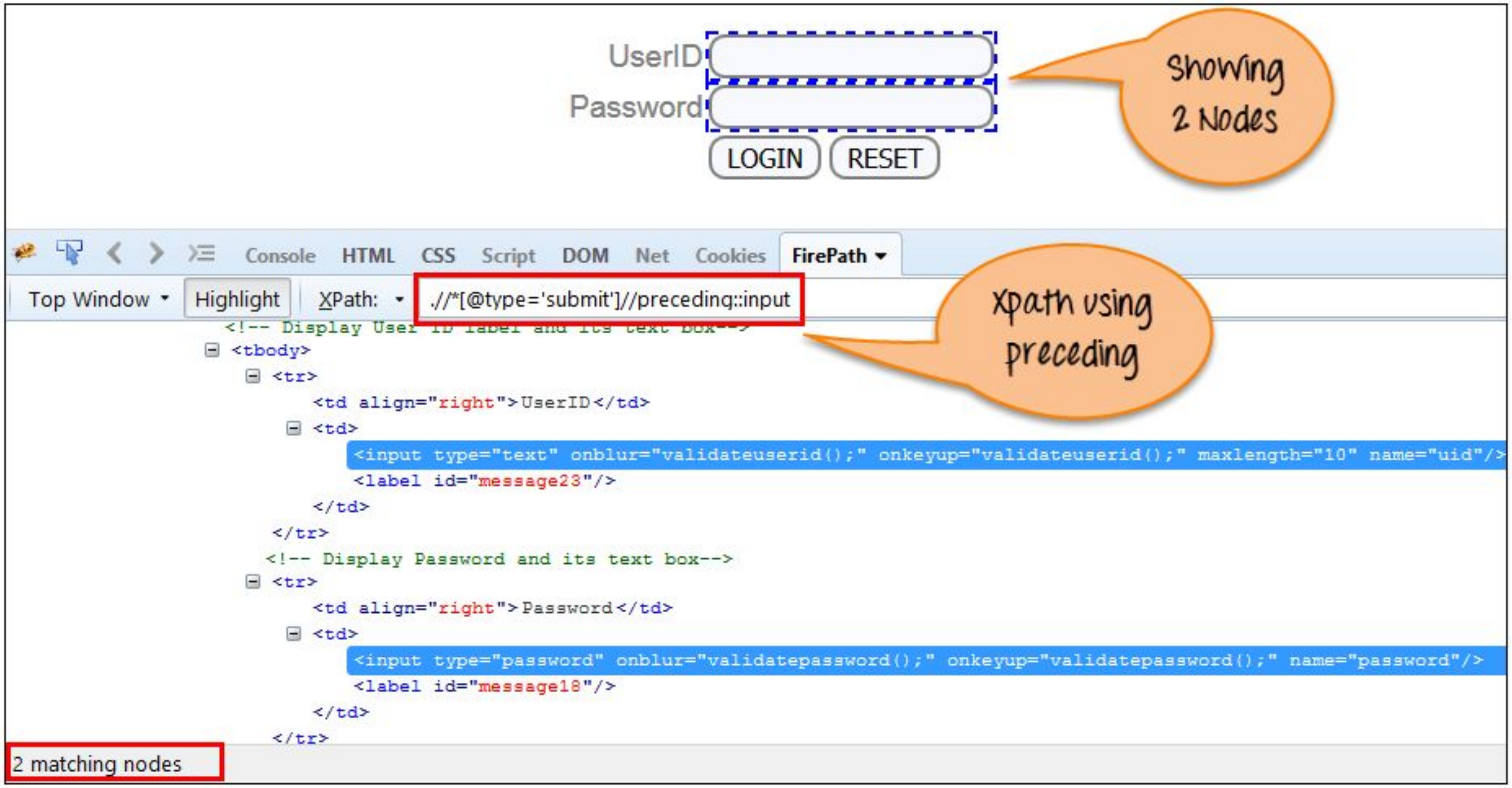
Source: https://www.guru99.com/images/3-2016/032816_0758_XPathinSele14.png

9.4 Finding Elements using Attributes with XPath

- In the above example, there are 71 “li” nodes matching by using “child ” axis.
- Following XPath can be used to focus on any particular element.
    - *//*[@id='java_technologies']//child::li[1]*
- Can change the XPath according to the requirement by changing the number in li[].

9.4 Finding Elements using Attributes with XPath

4. Preceding
   - Select all nodes that come before the current node.



Showing 2 Nodes

Xpath using preceding

```
.//*[@type='submit']//preceding::input
```

```
<!-- Display User ID label and its text box-->
⊟ <tbody>
  ⊟ <tr>
      <td align="right">UserID</td>
    ⊟ <td>
        <input type="text" onblur="validateuserid();" onkeyup="validateuserid();" maxlength="10" name="uid"/>
        <label id="message23"/>
      </td>
    </tr>
    <!-- Display Password and its text box-->
  ⊟ <tr>
      <td align="right">Password</td>
    ⊟ <td>
        <input type="password" onblur="validatepassword();" onkeyup="validatepassword();" name="password"/>
        <label id="message18"/>
      </td>
    </tr>
```

2 matching nodes

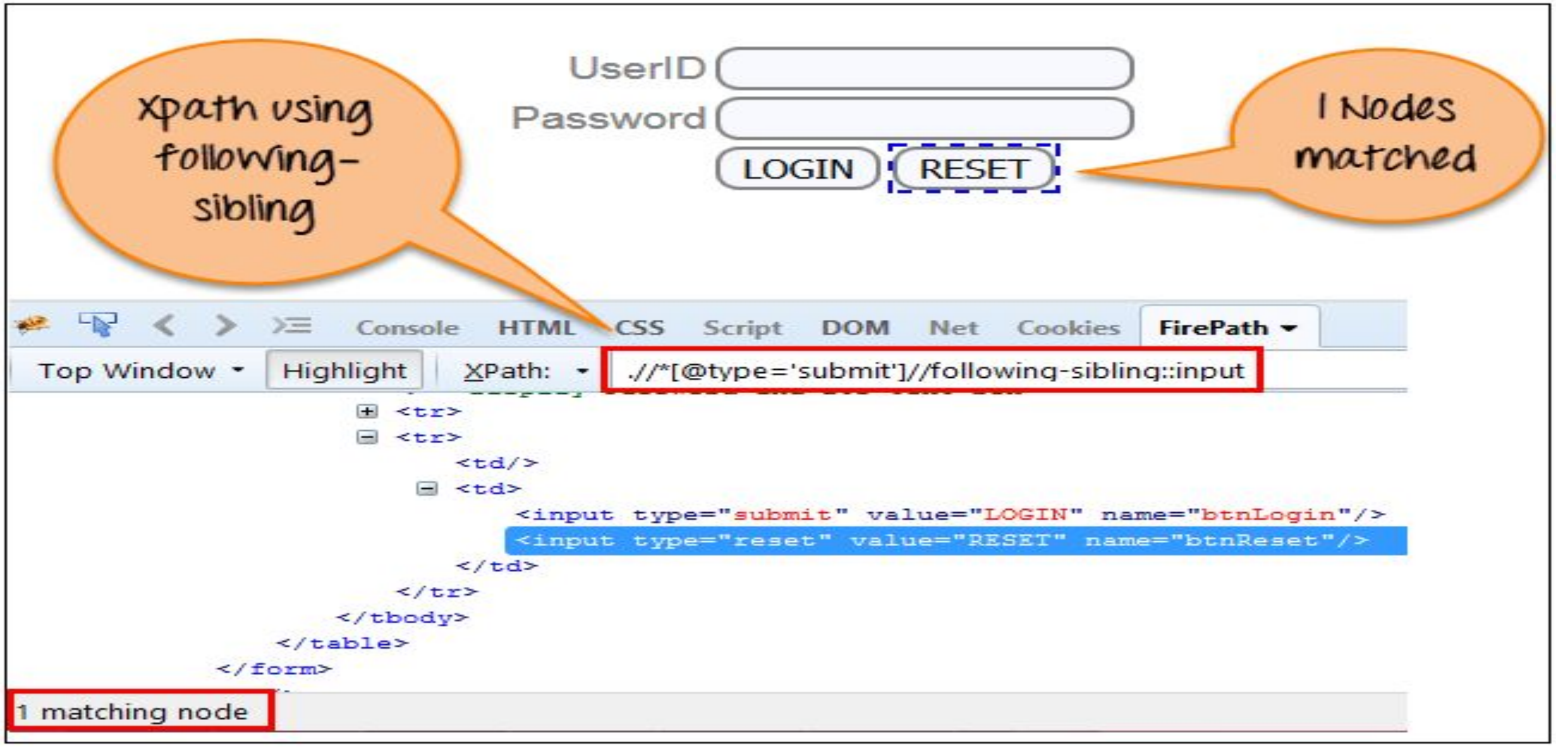
Source: https://www.guru99.com/images/3-2016/032816_0758_XPathinSele16.png

9.4 Finding Elements using Attributes with XPath

- In the above example, there are 2 “input” nodes matching by using “preceding” axis.
- Following XPath can be used to focus on any particular element.
  - *//*[@type='submit']//preceding::input[1]*

9.4 Finding Elements using Attributes with XPath

5. Following-sibling
    - Select the following siblings of the context node.
    - Siblings are at the same level of the current node.
    - It will find the element after current node.



XPath: .//*[@type='submit']//following-sibling::input

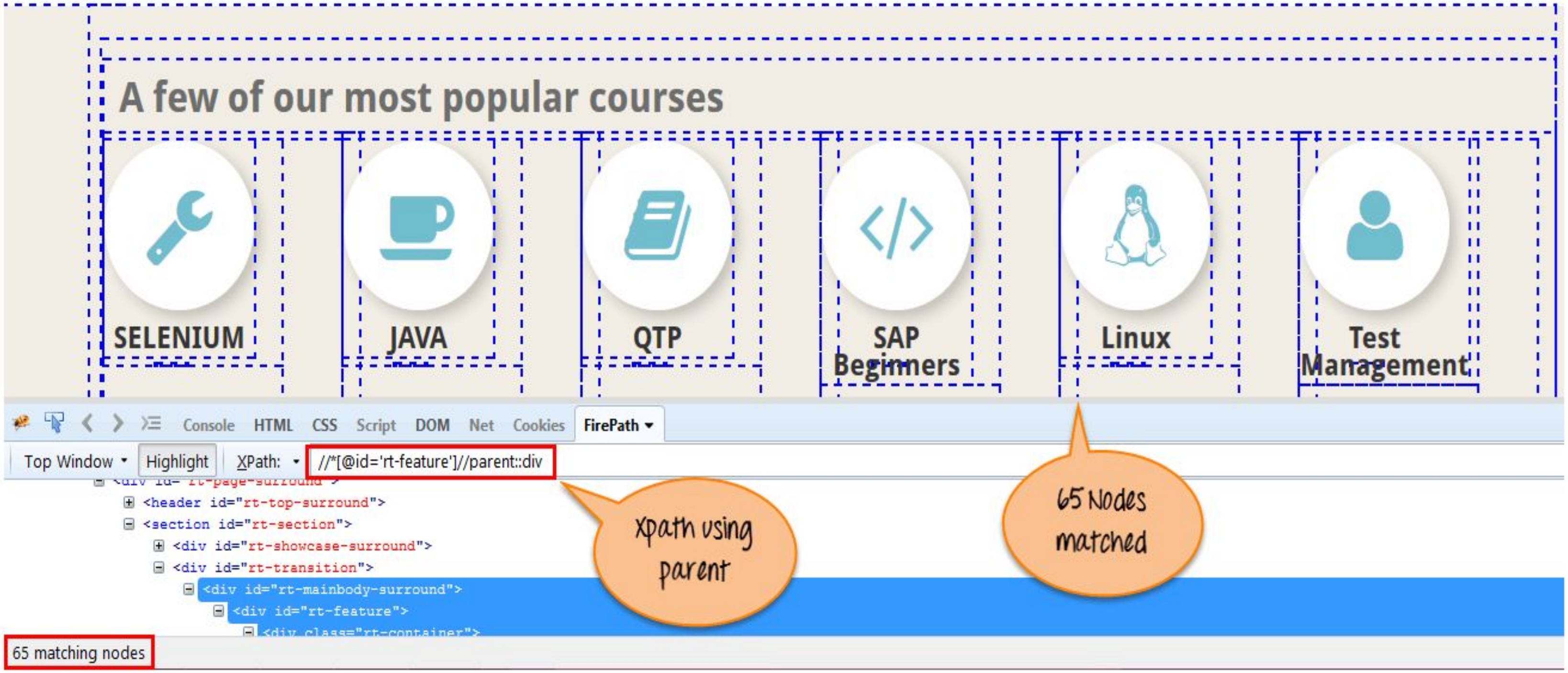
```
        <tr>
        <tr>
            <td/>
            <td>
                <input type="submit" value="LOGIN" name="btnLogin"/>
                <input type="reset" value="RESET" name="btnReset"/>
            </td>
        </tr>
      </tbody>
    </table>
  </form>
```

1 matching node

Source: https://www.guru99.com/images/3-2016/032816_0758_XPathinSele17.png

9.4 Finding Elements using Attributes with XPath

6. Parent
   - Selects the parent of the current node.



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XPath: //*[@id='rt-feature']//parent::div

```
<div id="rt-page-surround">
  <header id="rt-top-surround">
  <section id="rt-section">
    <div id="rt-showcase-surround">
    <div id="rt-transition">
      <div id="rt-mainbody-surround">
        <div id="rt-feature">
          <div class="rt-container">
```

65 matching nodes

Xpath using parent

65 Nodes matched

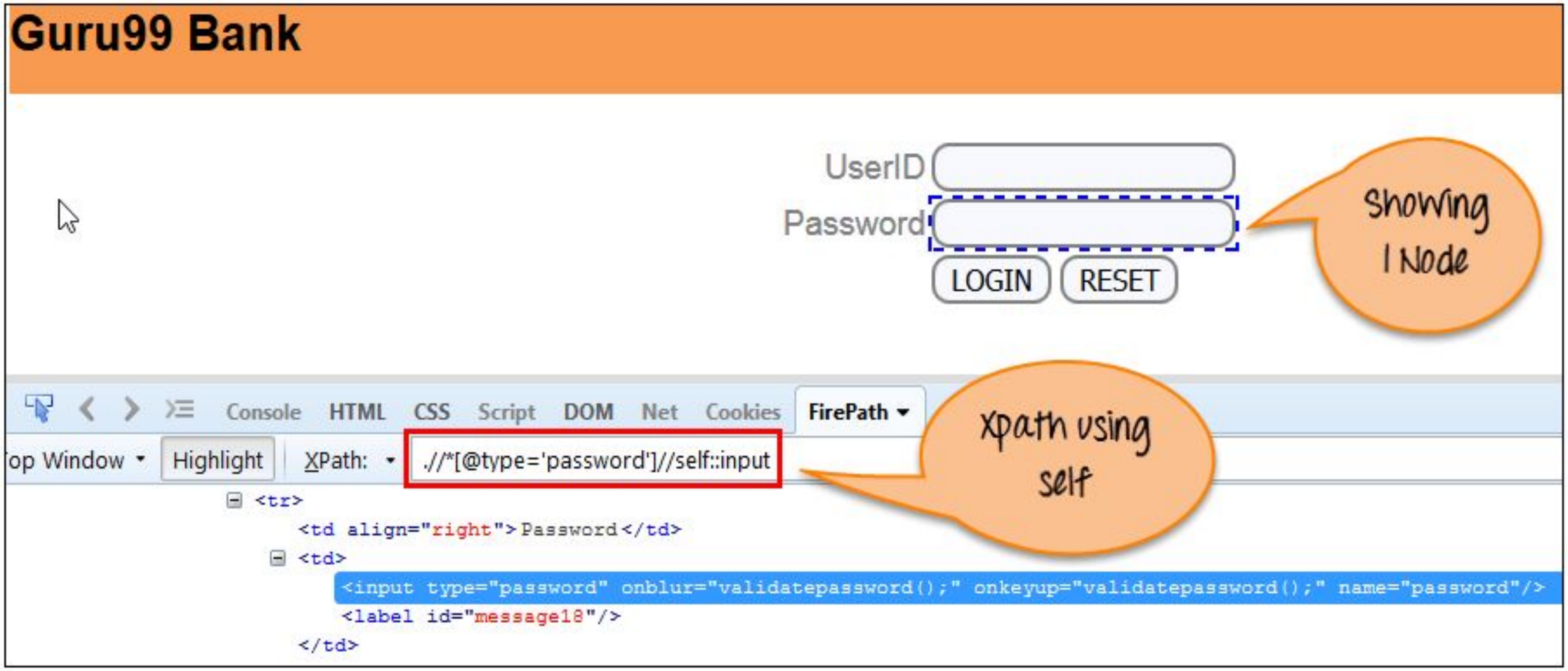
Source: https://www.guru99.com/images/3-2016/032816_0758_XPathinSele18.png

9.4 Finding Elements using Attributes with XPath

- In the above example, there are 65 “div” nodes matching by using “parent” axis.
- Following XPath can be used to focus on any particular element.
    - */*[@id='rt-feature']//parent::div[1]*

9.4 Finding Elements using Attributes with XPath

7. Self
    - Select the current node – indicates the node itself as mean by ‘self’.
    - It always find **only** one node as it represents self-element.



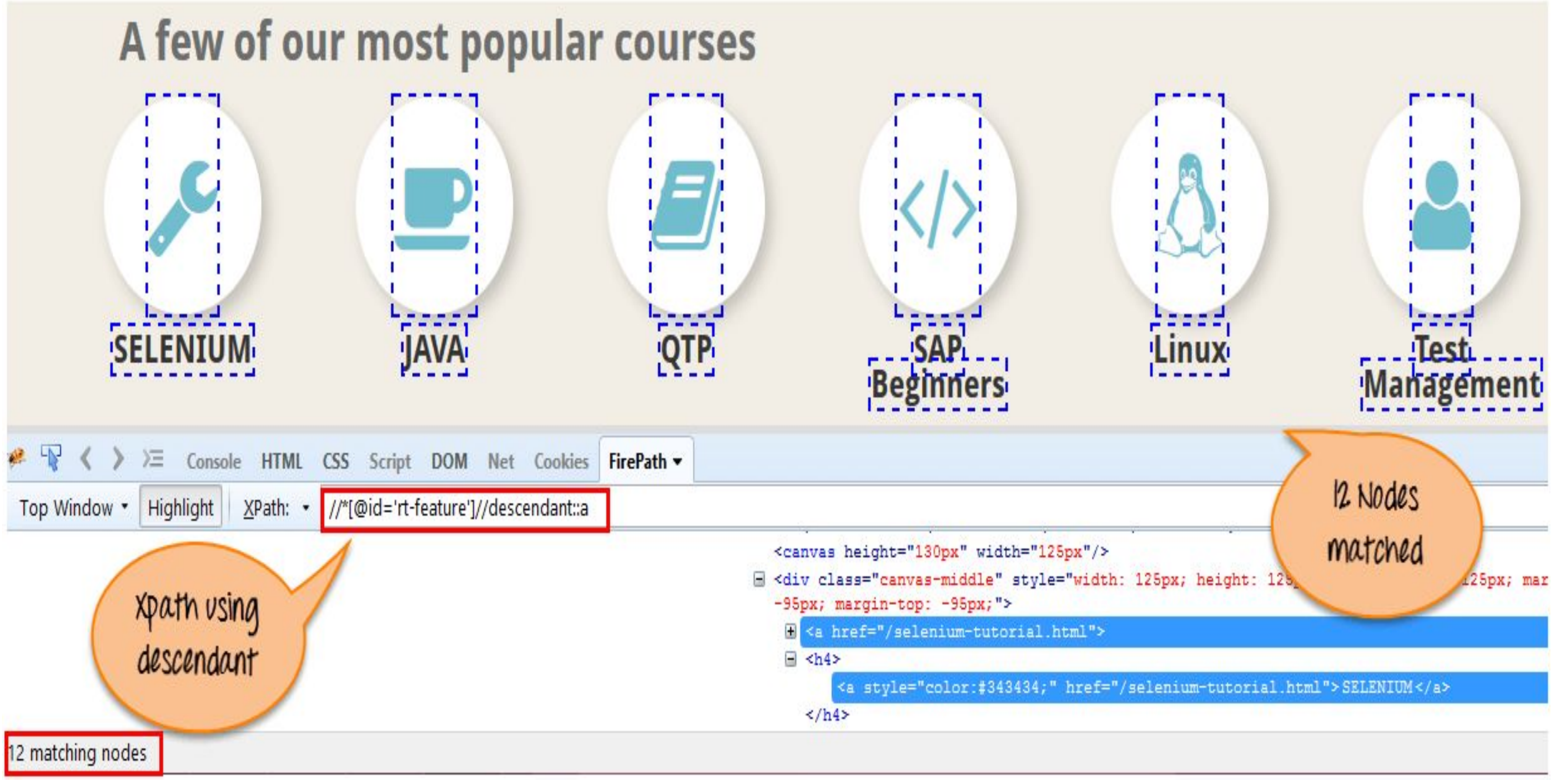
.//*[@type='password']//self::input

```
<tr>
    <td align="right">Password</td>
  <td>
      <input type="password" onblur="validatepassword();" onkeyup="validatepassword();" name="password"/>
      <label id="message18"/>
    </td>
```

Source: https://www.guru99.com/images/3-2016/032816_0758_XPathinSele19.png

9.4 Finding Elements using Attributes with XPath

8. Descendant
   - Selects the descendants of the current node.



XPath: //*[@id='rt-feature']//descendant::a

```
<canvas height="130px" width="125px"/>
<div class="canvas-middle" style="width: 125px; height: 125          125px; mar
-95px; margin-top: -95px;">
  <a href="/selenium-tutorial.html">
  <h4>
    <a style="color:#343434;" href="/selenium-tutorial.html">SELENIUM</a>
  </h4>
```

12 matching nodes

Xpath using descendant

12 Nodes matched

Source: https://www.guru99.com/images/3-2016/032816_0758_XPathinSele20.png

Summary

XML Path	• Used to find an element on web page as to do an operation on that element.
Types of XPath	• Absolute XPath • Relative XPath
Finding elements	• XPath axes methods used to find dynamic elements • XPath expression select nodes or list of nodes on the basis of attributes