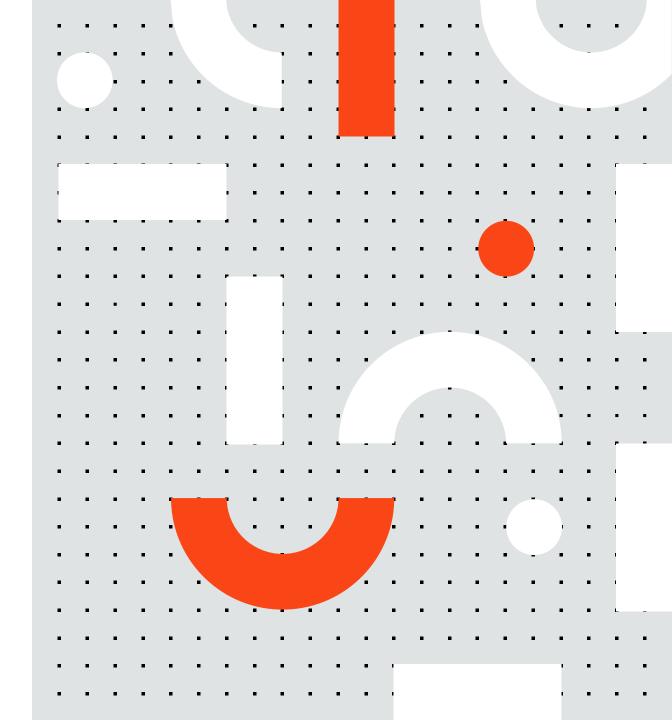# RPA Design & Development
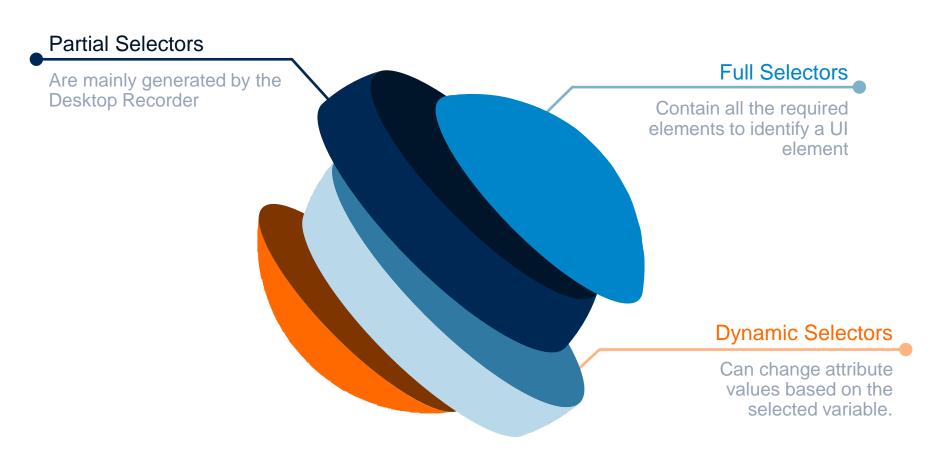
Recording and Advanced UI Interaction

Types Of Selectors

The Selectors are defined by looking at the element they target to perform their specific activity.

Partial Selectors

Are mainly generated by the Desktop Recorder

Full Selectors

Contain all the required elements to identify a UI element

Dynamic Selectors

Can change attribute values based on the selected variable.
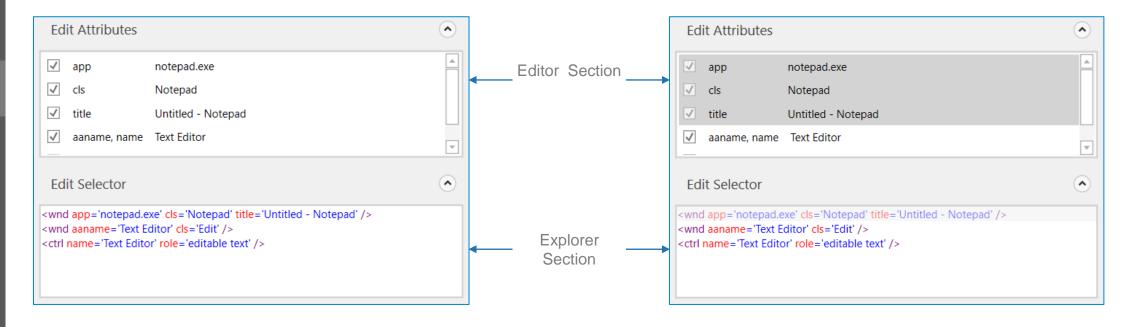
Ui Path™

Types Of Selectors (Contd.)

Full selectors

Best suited for situations in which the action performed requires switching between multiple windows.

Partial selectors

Best suited for performing multiple actions in the same window.

Edit Attributes

☑	app	notepad.exe
☑	cls	Notepad
☑	title	Untitled - Notepad
☑	aaname, name	Text Editor

← Editor Section →

Edit Selector

```
<wnd app='notepad.exe' cls='Notepad' title='Untitled - Notepad' />
<wnd aaname='Text Editor' cls='Edit' />
<ctrl name='Text Editor' role='editable text' />
```

← Explorer Section →

Edit Attributes

☑	app	notepad.exe
☑	cls	Notepad
☑	title	Untitled - Notepad
☑	aaname, name	Text Editor

Edit Selector

```
<wnd app='notepad.exe' cls='Notepad' title='Untitled - Notepad' />
<wnd aaname='Text Editor' cls='Edit' />
<ctrl name='Text Editor' role='editable text' />
```

Dynamic selectors

Best suited for situations in which the targeted element can constantly change **its** value.

Types and attributes of selectors

Selectors are made of nodes. And each node is made of tags and attributes.

<webctrl parentid='slide-list-container' tag='A' aaname='Details' class='btn-dwnl' />

Tags

- Nodes in the selector XML fragment
- Correspond to a visual element on the screen
- First node is the app window
- Last node is the element itself

For example:

- wnd (window)
- html (web page)
- ctrl (control)
- webctrl (web page control)
- Java (Java application control)

Attributes

Every attribute has a name and a value. You should use only attributes with constant or known values.

For example:

- parentid='slide-list-container'
- tag='A'
- aaname='Details'
- class='btn-dwnl'

Dynamic selectors

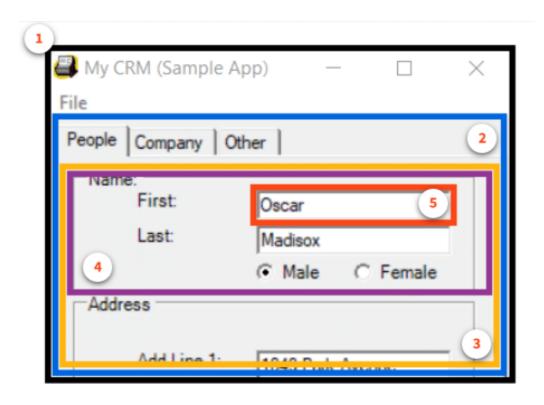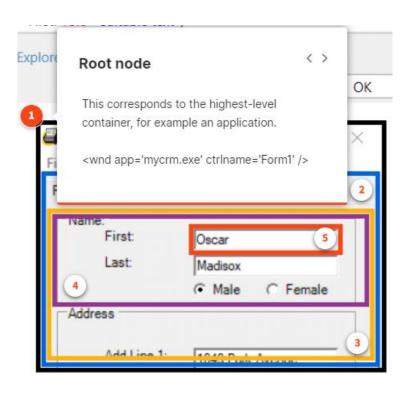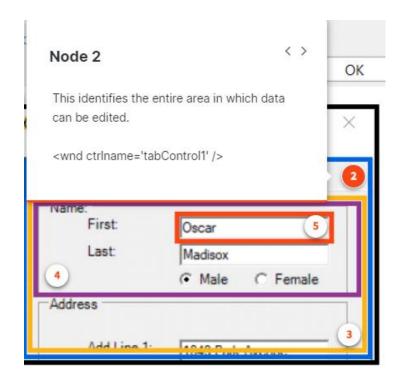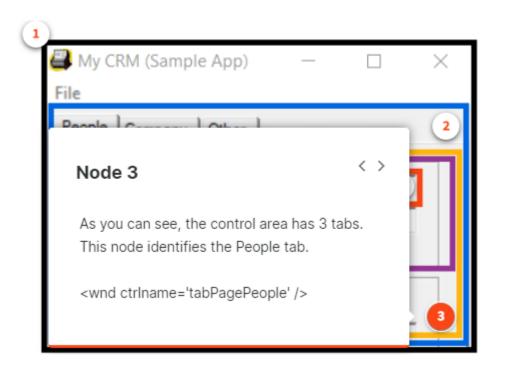Best suited for situations in which the targeted element can constantly change **its** value.

Structure of a selector

User Interfaces (UIs) are built using a series of containers nested one inside the other.

Structure of a selector

User Interfaces (UIs) are built using a series of containers nested one inside the other.

Structure of a selector

User Interfaces (UIs) are built using a series of containers nested one inside the other.

My CRM (Sample App)

File

People | ~~Company~~ | ~~Other~~

Node 3 ‹ ›

As you can see, the control area has 3 tabs. This node identifies the People tab.

`<wnd ctrlname='tabPagePeople' />`

My CR

File

People

Node 4 ‹ ›

This identifies the Name category of the People tab. As you can see, there are other categories as well, and Address is visible.

`<wnd ctrlname='groupBox5' />`

Name

Address

Add Line 1:

Structure of a selector

User Interfaces (UIs) are built using a series of containers nested one inside the other.
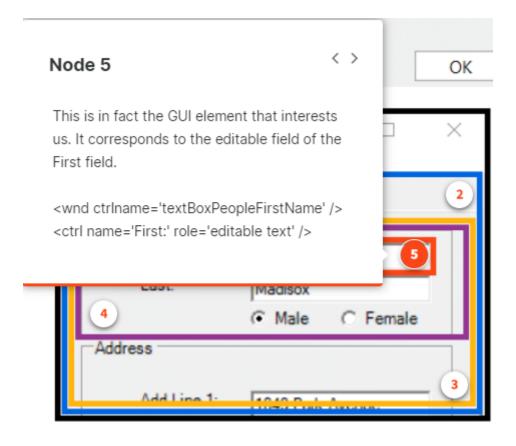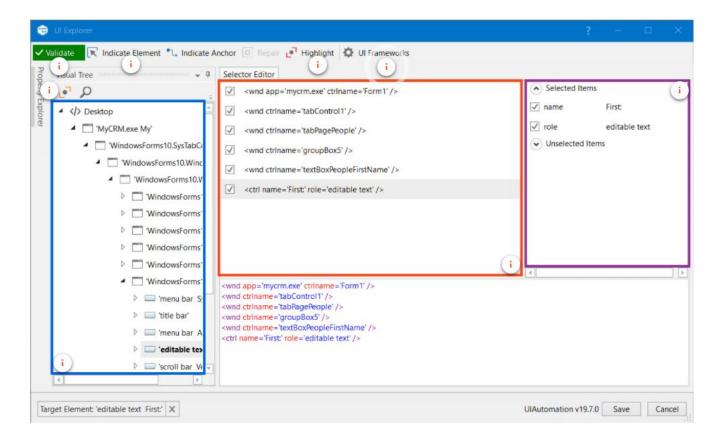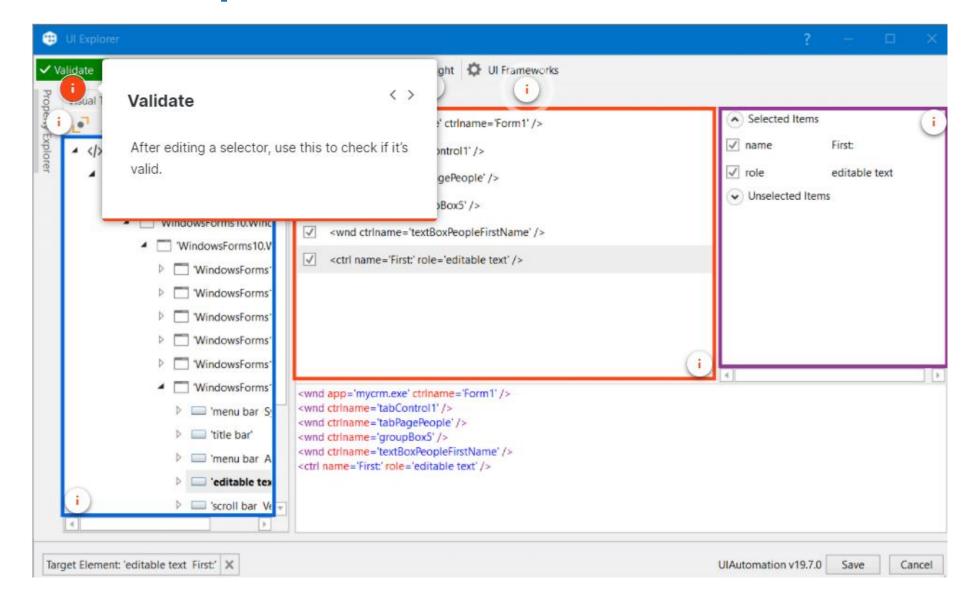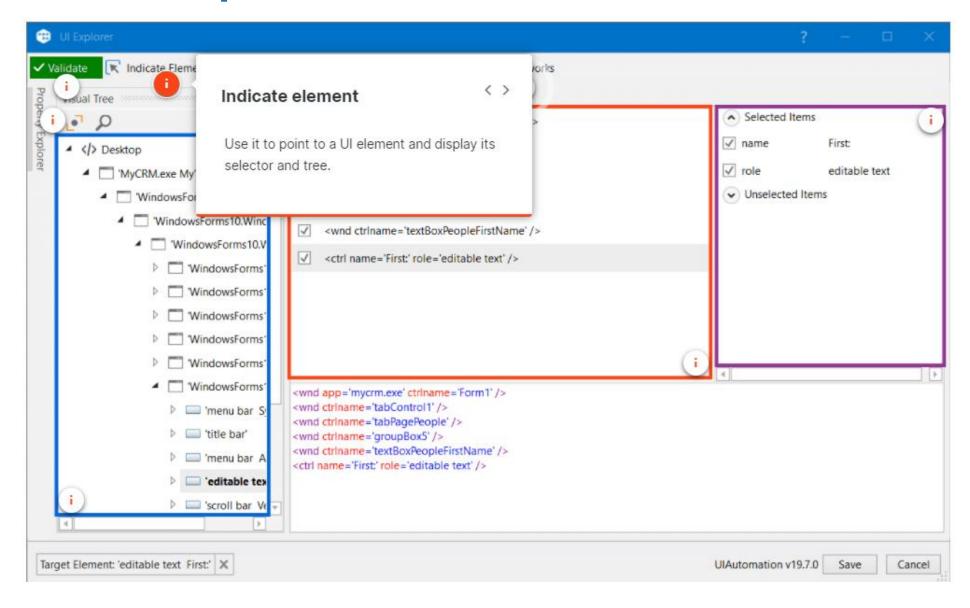
The UI Explorer

The UI Explorer can be used whenever the selectors that were automatically generated are not stable or reliable enough. For example, when:
- The selectors change from one execution to another.
- The selectors might change following product updates.
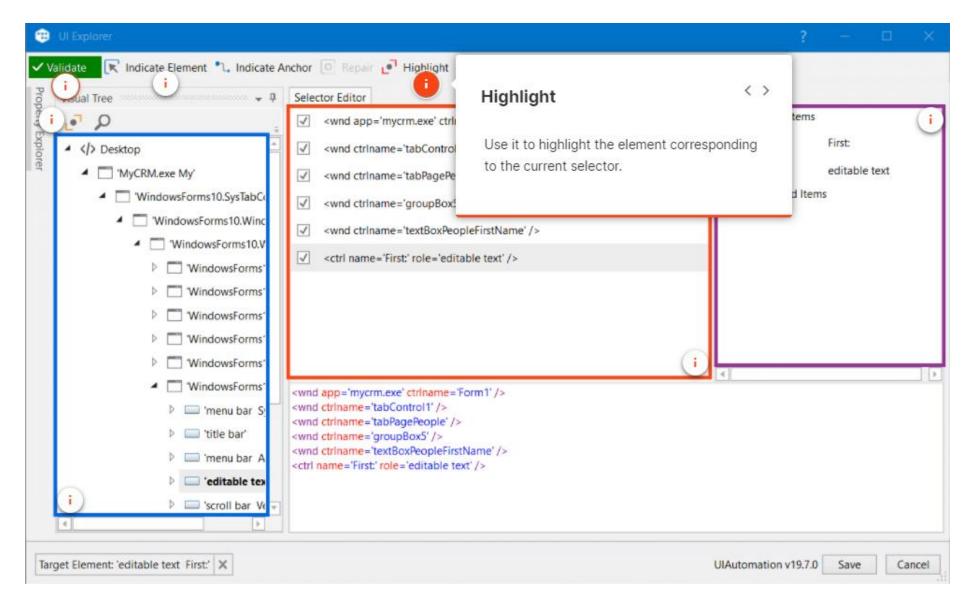- The selectors use unreliable info, such as index.

The UI Explorer

The UI Explorer

The UI Explorer

The UI Explorer

In order to return the best selector for the element of interest, we can switch between the different UI frameworks available in UiExplorer.

Default

—

This is the proprietary method which usually works correctly with all types of user interfaces.
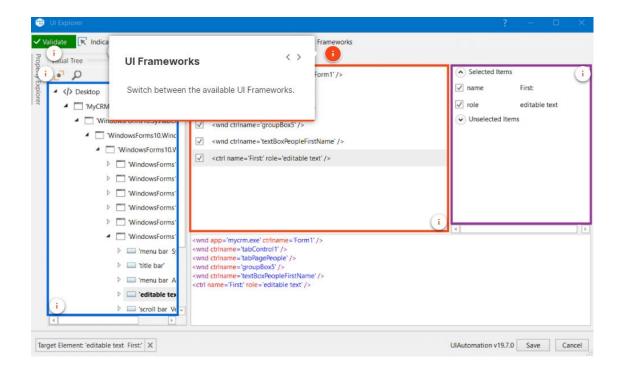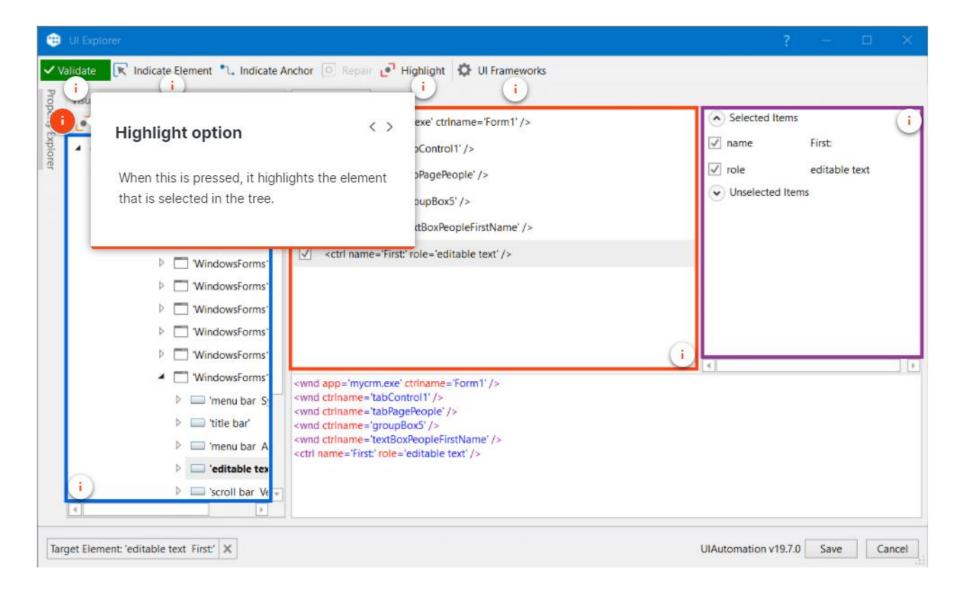
Active Accessibility

—

This represents an earlier solution from Microsoft that makes apps accessible. It is recommended when using legacy software, if the default framework does not work as expected.
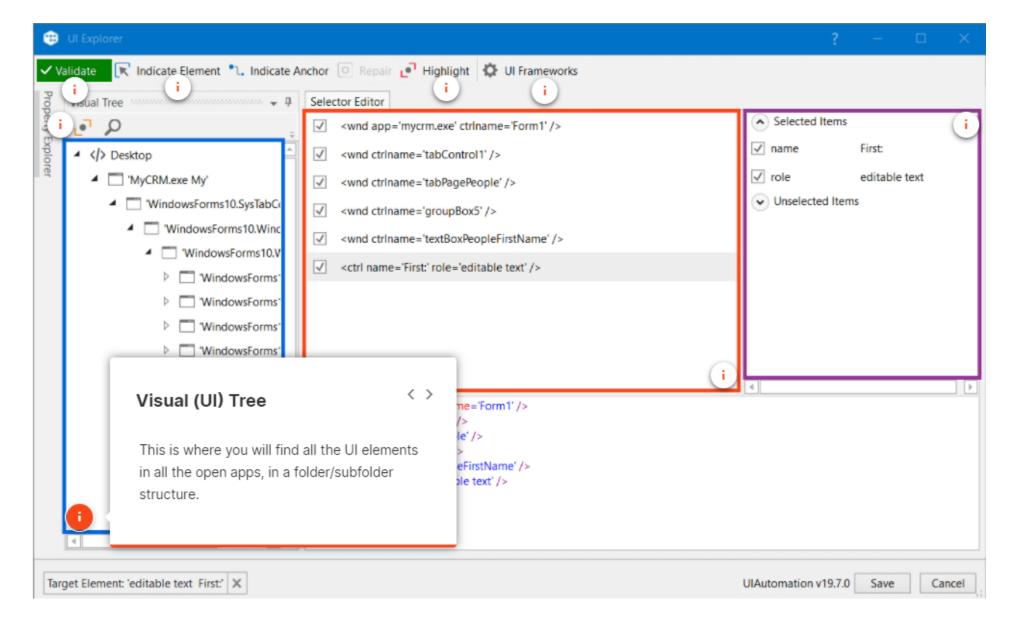
UI Automation

—

This is the improved accessibility model from Microsoft, which is recommended when using newer applications in case the default framework does not work as expected.

The UI Explorer

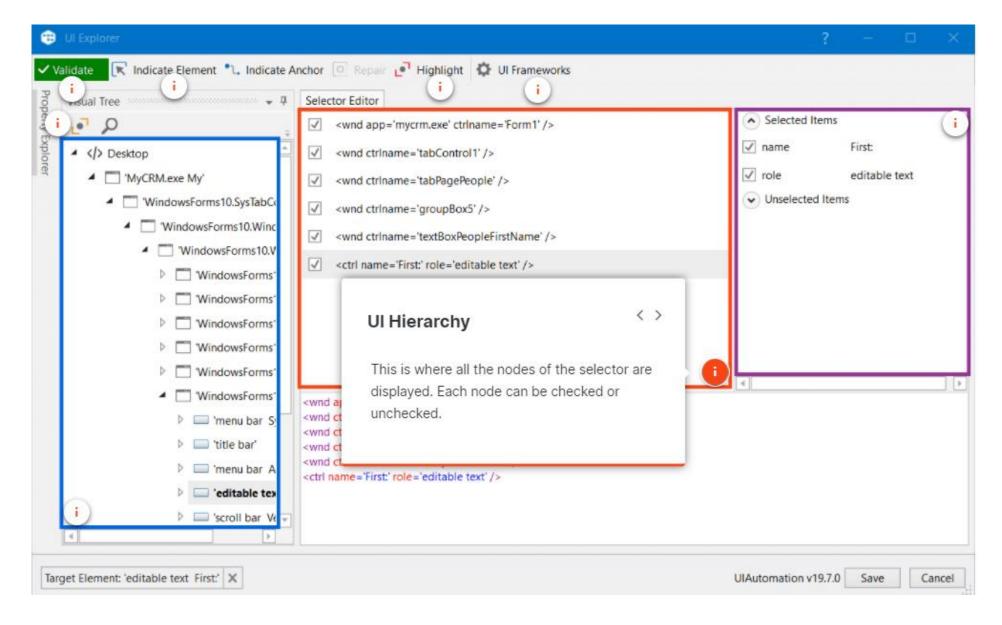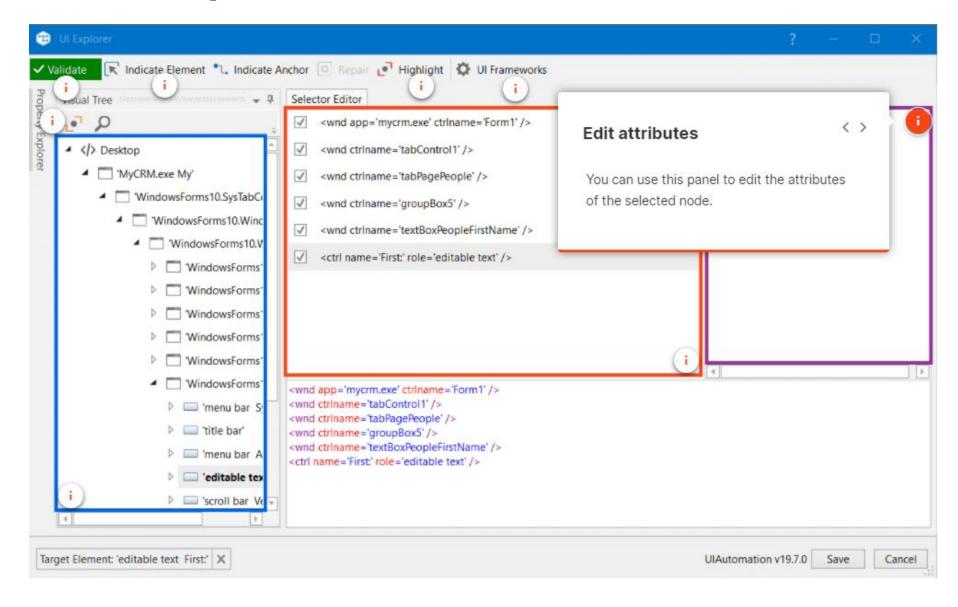# The UI Explorer

The UI Explorer

The UI Explorer

Practical Challenge

How would you program a robot to do some **simple operations** using the **Notepad** app?

Outline a method to do the following:
- Open the Notepad Application.
- Type "Let's have some fun!".
- Change the Font to 'Cambria'.
- Change the Font Style to 'Italic'.
- Set the Font Size to 16.
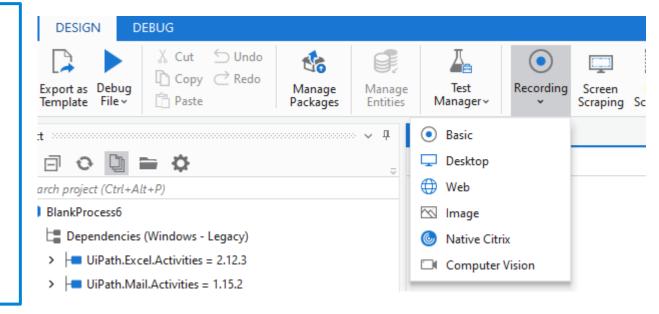
UiPath Studio Recording

The Recording functionality of UiPath Studio helps in capturing user's actions on the screen and translating them into sequences.
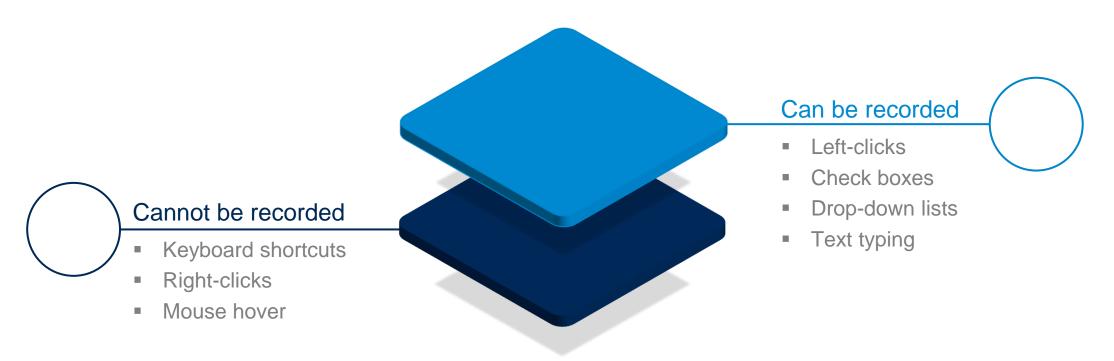
How does recording work?

- The recording tool can be accessed from the 'Design' tab in UiPath Studio.
- While recording, all user interface elements are highlighted, allowing easy identification of buttons, fields, menus, or elements the user interacts with.
- Once the recording ends, a sequence will be created, containing the activities performed by the user.

Actions that can be Recorded

The UiPath recorder can automate some actions but, not others.

Can be recorded
- Left-clicks
- Check boxes
- Drop-down lists
- Text typing

Cannot be recorded
- Keyboard shortcuts
- Right-clicks
- Mouse hover
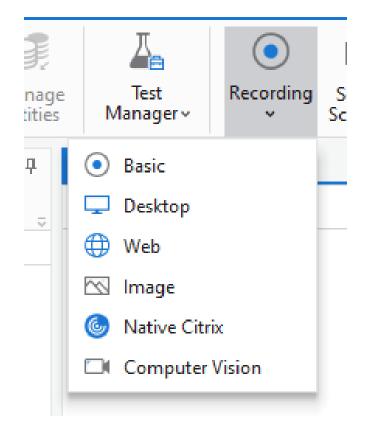
Recorder Overview

There are five recorders, in the UiPath. All of them come with their own controllers to perform common actions as well as actions particular to each environment.

- Basic Recorder
- Desktop Recorder
- Web Recorder
- Image Recorder
- Native Citrix Recorder
- Computer Vision
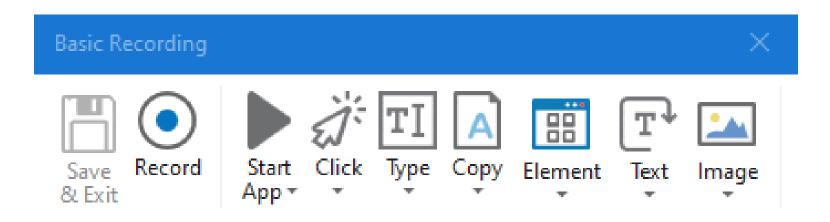
Components of Recording Wizard

The Recording Wizard consists of 3 types of components:

- **Save & Exit:** Closes the recorder and displays the activities in Designer.
- **Record:** Switches to automatic recording mode, in which multiple input activities are generated.
- **Manual Recording Actions:** Actions that users can select to generate single activities during their recording process.

Basic Recorder Vs. Desktop Recorder

Basic Recorder
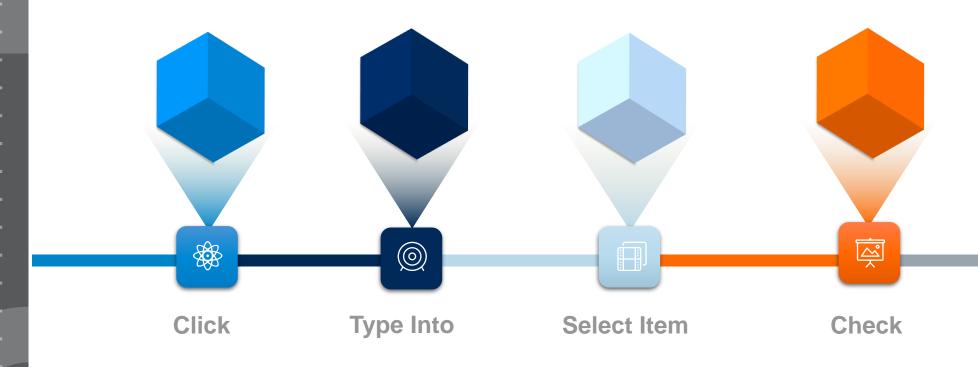
- It is used when multiple actions are performed in single window.

- Generates full selectors.

- Does not use Containers.

Desktop Recorder

- It is used when multiple actions are performed in many windows.

- Generates partial selectors.

- Uses containers.

Ui Path™

Automatic Recording Activities

Automatic Recording is used for recording multiple actions in one time. There are four activities that are automatically generated using Automatic Recording:

Click

Type Into

Select Item

Check

Start App and Start Browser
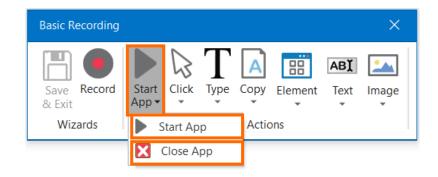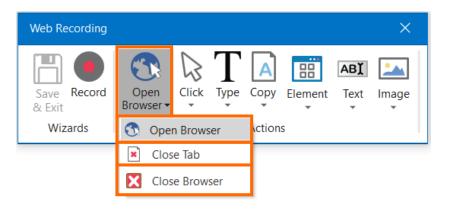
Start App (Basic & Desktop Recording)
- **Start App:** generates the 'Open Application' activity to launch a desktop application (.exe) to perform actions within it.
- **Close App:** generates the 'Close Application' activity to terminate a desktop application (.exe).
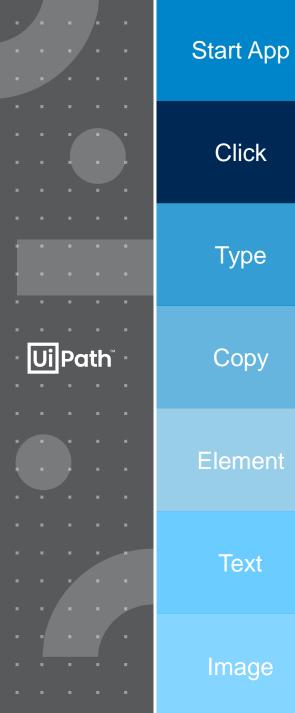
Open Browser (Web Recording)
- **Open Browser:** generates the 'Open Browser' activity to launch a web page and perform actions within it.
- **Close Tab:** generates the 'Close Tab' activity within an 'Attach Browser' to close a single tab.
- **Close Browser:** generates the 'Close Application' activity to terminate a browser application (.exe).

Click

| Start App |
| Click |
| Type |
| Copy |
| Element |
| Text |
| Image |
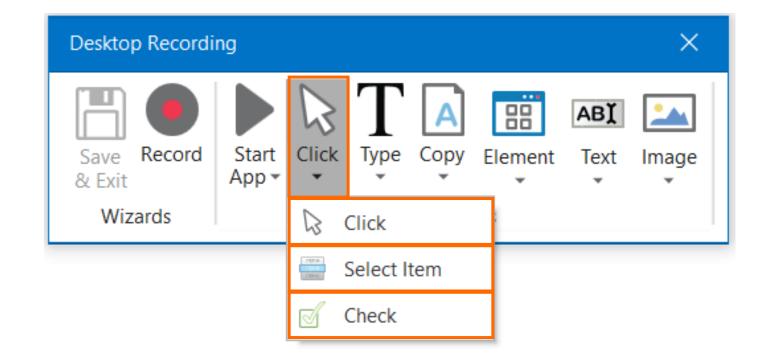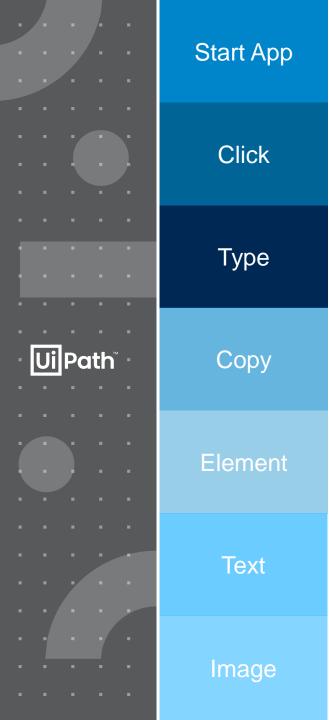
- **Click:** generates the 'Click' activity, prompting the user to indicate the UI element to click.
- **Select Item:** generates the 'Select Item' activity to select an option from a dropdown list or combo box.
- **Check:** generates the 'Check' to select a checkbox or radio button.
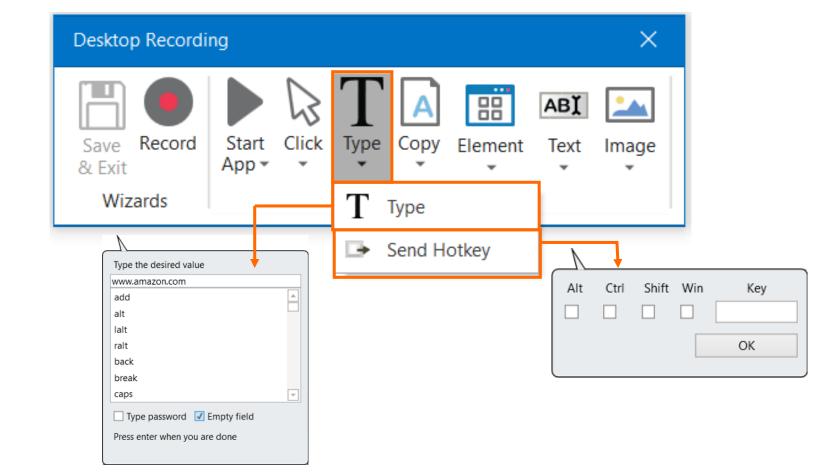
Type

- **Type:** generates the 'Type Into' activity prompting the user for their desired value.
- **Send Hotkey:** generates the 'Send Hotkey' activity prompting to define a Alt-, Ctrl-, Shift-, or Win + Key to send it to an application.

Start App

Click

Type

Copy

Element

Text

Image

Copy

Copy Text: generates the 'Get Text' activity prompting the user to indicate the UI element to copy text from.
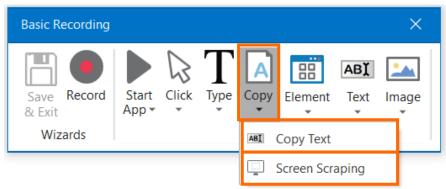
Screen Scraping: uses the 'Screen Scraping' tool to generate the 'Get Full Text' activity, using different image recognition technologies.
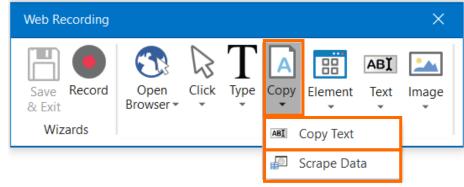
Scrape Data: uses the 'Data Scraping' tool to generate the 'Extract Structured Data' activity, that captures data from a web page in a structured table.
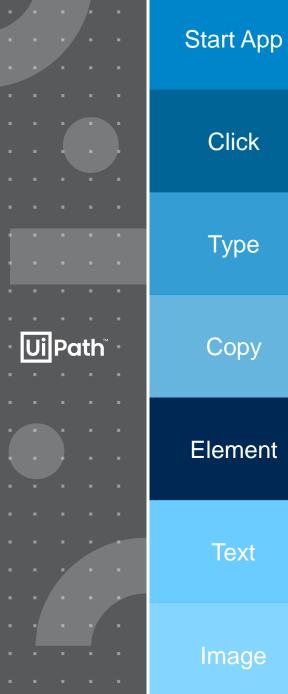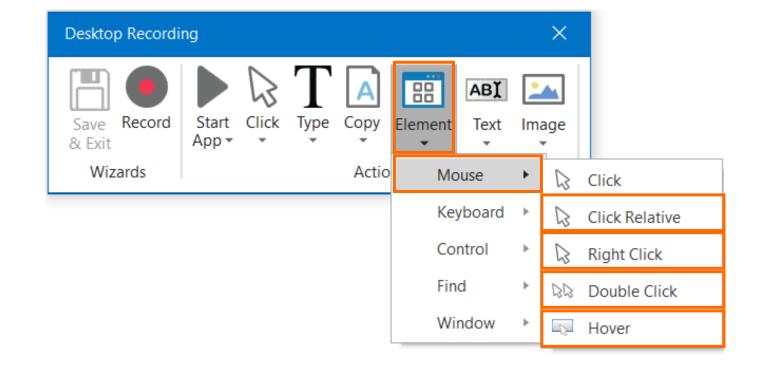
Mouse Element

- **Click Relative:** the user indicates a relative position to a certain identified UI element.
- **Right Click:** MouseButton Input is set to BTN_RIGHT.
- **Double Click:** ClickType Input is set to CLICK_DOUBLE.
- **Hover:** generates the 'Hover' activity prompting the user to indicate the UI element that they want the mouse to hover over for a couple of seconds.

Find Element

Start App
Click
Type
Copy
Element
Text
Image
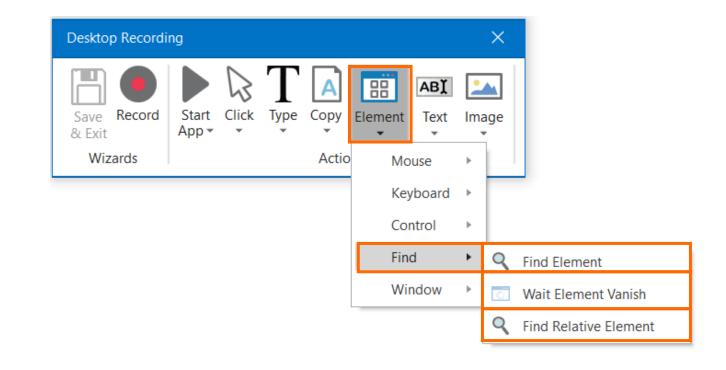
- **Find Element:** generates a 'Find Element' activity prompting the user to identify the UI element to wait for before proceeding with a certain activity.
- **Wait Element Vanish:** generates a 'Wait Element Vanish' activity prompting the user to identify the UI element that has to disappear before proceeding with a certain activity.
- **Find Relative Element:** generates a 'Find Relative Element' activity prompting the user to identify the relative position versus a fixed UI element before proceeding with a certain activity.

Text

Start App

Click

Type

Copy

Element

Text

Image

- **Mouse:** generates 'Click Text' activities prompting the user for the UI element to click.
- **Scrape:** generates 'Get Text' or 'Extract Structured Data' activities using Screen Scraping and Data Scraping.
- **Copy Text:** generates a 'Get Text' activity to copy the value of a UI element and store it in a new variable.
- **Set Text:** generates a 'Set Text' activity to input in a UI element.
- **Select & Copy:** generates a 'Type Into' and 'Copy Selected Text' activity prompting the user for the UI element to copy.
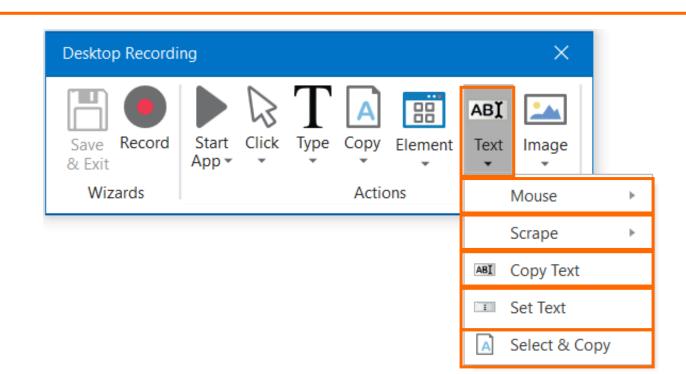
Image

- **Mouse:** generates 'Click Image' or 'Hover Image' activities prompting the user for the image to click.
- **Find Image:** generates a 'Find Image' activity prompting the user for the image to find on the screen before proceeding with the activity.
- **Wait Image Vanish:** generates a 'Wait Image Vanish' activity allowing the user to define the image that needs to disappear before proceeding with the activity.
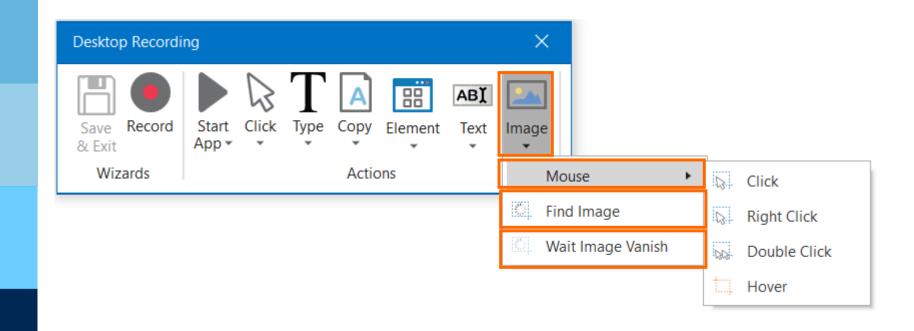
Start App

Click

Type

Copy

Element

Text

Image

Back to the Practical Challenge

For the simple process presented:

- **Open the Notepad Application**
- **Type "Let's have some fun!"**
- **Change the Font to 'Cambria'**
- **Change the Font Style to 'Italic'**
- **Set the Font Size to 16**

Use the **Basic and Desktop Recorders** to solve the challenges and notice the differences.

Notepad **Automation** Exercise
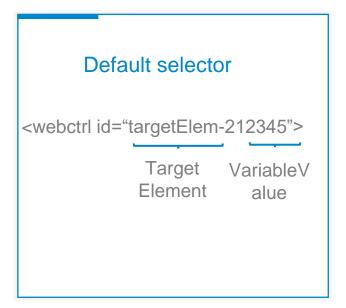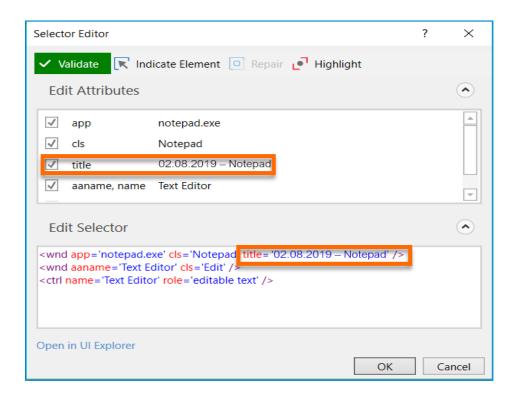
Activities (recorded both in Basic and Desktop):

1. Type into Editable Field "Good morning sunshine"

2. Click 'Format'

3. Click 'Font'

4. Type 'Cambria'

5. Click 'Italic'

6. Type '16' / Click '16'

7. Click 'OK'

UiPath™

Customizing Selectors

When a wildcard is used or a variable is added in between selectors, it is called customizing selectors. The default selector contains preset attributes.

Default selector

<webctrl id="targetElem-212345">

Target Element   VariableV alue

Selector Editor   ?   ✕

✓ Validate   ⬚ Indicate Element   ▢ Repair   ⬚ Highlight

Edit Attributes   ⌃

☑ app   notepad.exe
☑ cls   Notepad
☑ title   02.08.2019 – Notepad
☑ aaname, name Text Editor

Edit Selector   ⌃

<wnd app='notepad.exe' cls='Notepad title='02.08.2019 – Notepad' />
<wnd aaname='Text Editor' cls='Edit' />
<ctrl name='Text Editor' role='editable text' />

Open in UI Explorer

                                          OK   Cancel
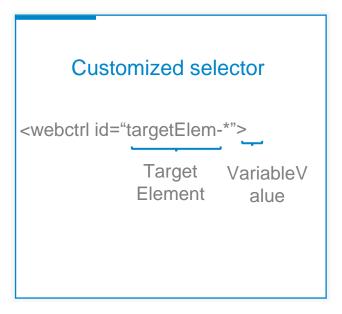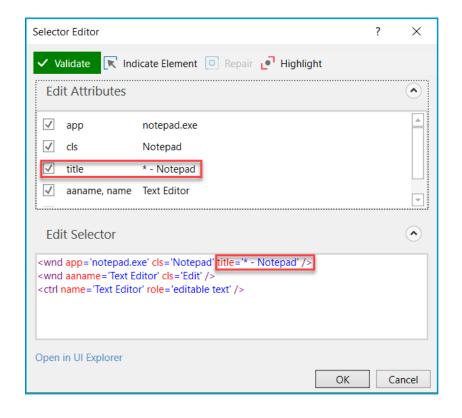
Customizing Selectors (Contd.)

The customized selector contains the "*" wildcard that replaces certain characters.

Customized selector

<webctrl id="targetElem-*">

Target Element   VariableValue

Selector Editor

✓ Validate   Indicate Element   Repair   Highlight

Edit Attributes

☑	app	notepad.exe
☑	cls	Notepad
☑	title	* - Notepad
☑	aaname, name	Text Editor

Edit Selector

```
<wnd app='notepad.exe' cls='Notepad' title='* - Notepad' />
<wnd aaname='Text Editor' cls='Edit' />
<ctrl name='Text Editor' role='editable text' />
```

Open in UI Explorer

OK   Cancel

Wildcard types

Asterisk (*) – replaces zero or more characters

Question mark (**?**) – replaces a single character
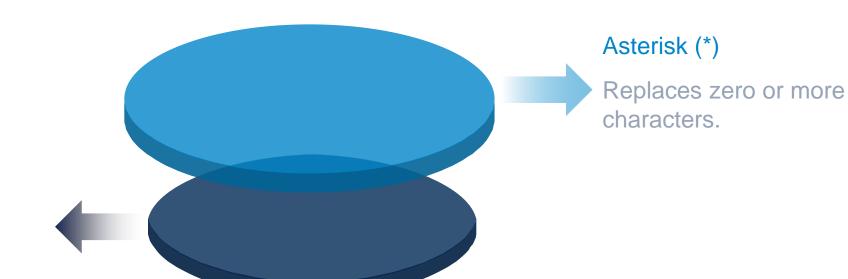
Customizing Selectors (Contd.)

A wildcard is a special character that can replace the dynamic part of a selector. There are two types of wildcard:

Asterisk (*)

Replaces zero or more characters.

Question mark (?)

Replaces a single character.
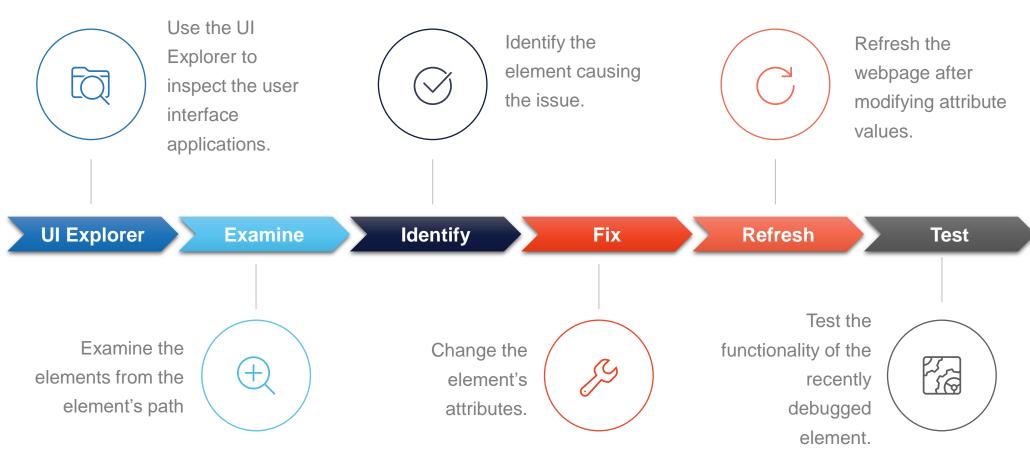
Debugging

Debugging is the process of identifying and removing errors from a given project.

Use the UI Explorer to inspect the user interface applications.

Identify the element causing the issue.

Refresh the webpage after modifying attribute values.

UI Explorer → **Examine** → **Identify** → **Fix** → **Refresh** → **Test**

Examine the elements from the element's path

Change the element's attributes.

Test the functionality of the recently debugged element.

Practice makes Perfect… Web Recording

Use the **Web Recording** functionality to build a workflow for finding the IMDb rating of a movie chosen by a user.

Web Recording: IMDb Rating
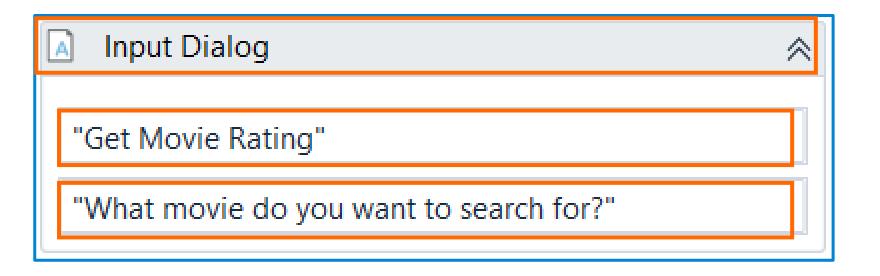
1. **Input Dialog**: user provides a movie title
2. **Open browser**: www.imdb.com
3. **Type into** the navigation bar the movie title
4. **Click** search button
5. **Click** on the first title from the results page
6. **Get value**: movie rating
7. **Message box**: display movie rating to user

UiPath™

Web Recording: IMDb Rating

1. Input Dialog: user provides a movie title.

Purpose: Get the movie name from the user and store it as an argument.

Variables: Movie (type: string, stores the user input)

A Input Dialog

"Get Movie Rating"

"What movie do you want to search for?"

Web Recording: IMDb Rating

2. Open browser: www.imdb.com

- Choose the web recorder from the Recorders.
- Click on Open Browser from the dropdown list.
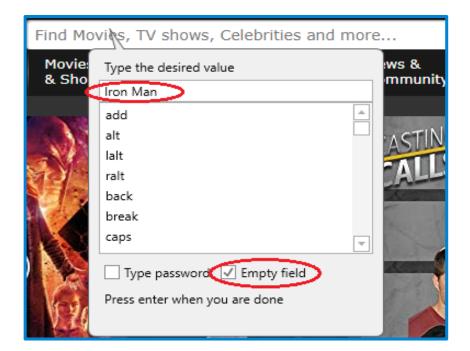
Web Recording: IMDb Rating

3. **Indicate** the URL and Click OK.

Web Recording: IMDb Rating

4. Click on the record option.

- Type the movie name "Iron Man".

- Click on the empty field box.

- Press the enter button.
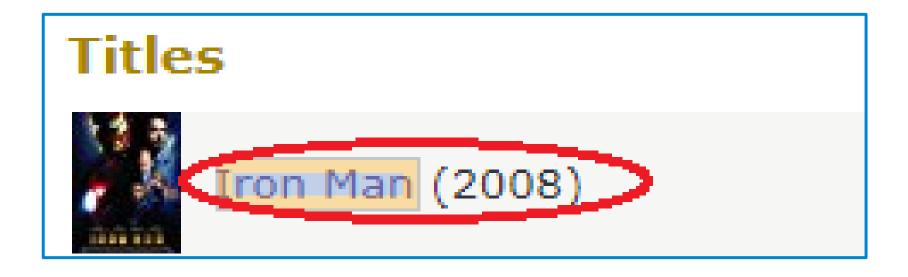
Web Recording: IMDb Rating

5. **Click** on the search bar option.

Web Recording: IMDb Rating

6. **Click** on the Iron Man movie that is displayed in the result.

Titles

Iron Man (2008)

Web Recording: IMDb Rating
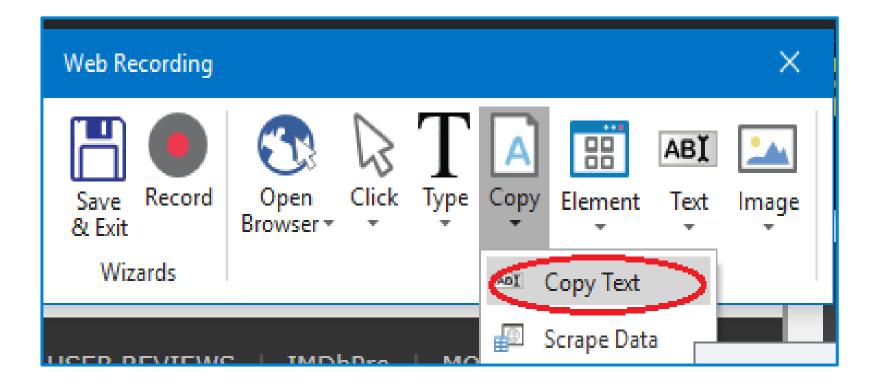
7. **Click** on Copy.

Select "Copy Text" from Dropdown list.

Web Recording: IMDb Rating

8. **Indicate** the rating of the movie.

Web Recording: IMDb Rating
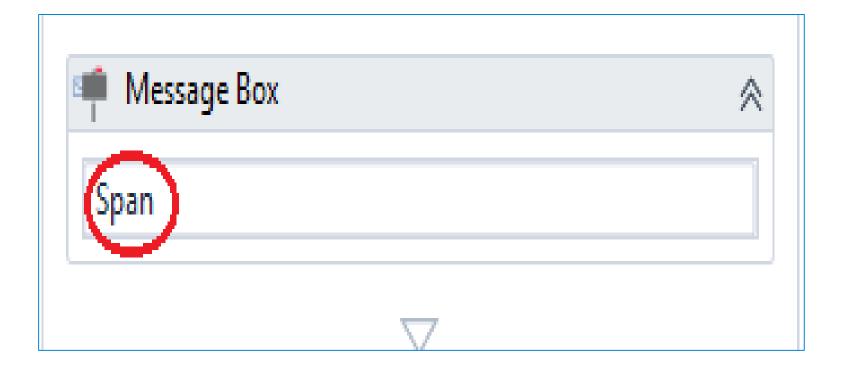
9. Go Back to UiPath Studio.

- Click on the copy text activity.
- Open the Properties of the copy text.
- The output variable is Span.

Common		
ContinueOnError	*Specifies to*	...
Display Name	Get Text 'SPAN'	
Input		
⊞ Target	Target	
Misc		
Private	☐	
Output		
Value	Span	...

Web Recording: IMDb Rating

10. Drag the message box from the activity panel.
- Pass the variable span inside it.
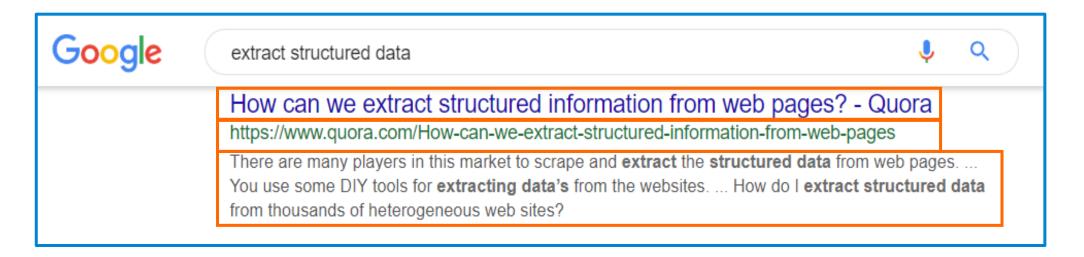
Data Scraping

Data Scraping is the process of extracting structured data from a browser, application, or document to a database, .csv file, or Excel spreadsheet.
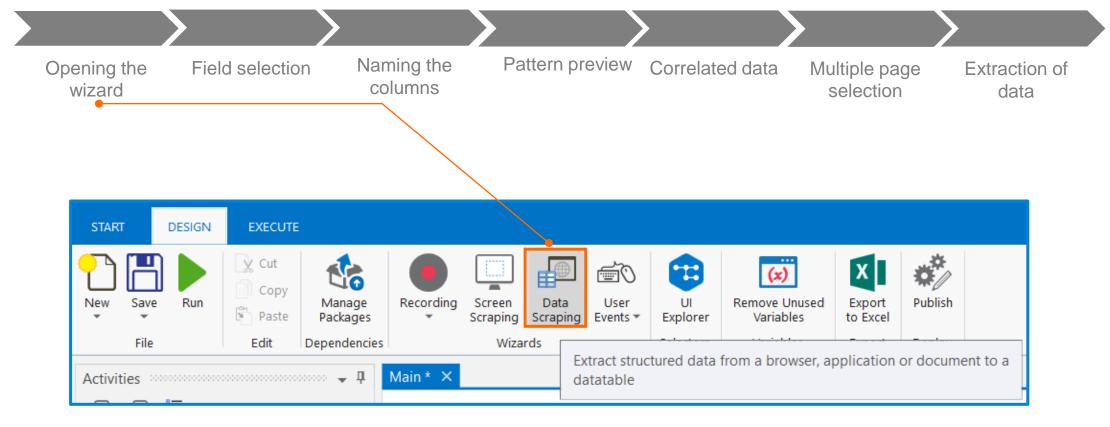
Structured data is a specific kind of information that is highly organized and is presented in a predictable pattern.

For example, Google search results are presented in the same structure:
- a link at the top
- a string of the URL
- a description of the web page

Data Scraping Walkthrough

Opening the wizard — Field selection — Naming the columns — Pattern preview — Correlated data — Multiple page selection — Extraction of data

Data Scraping Walkthrough (Contd.)

Opening the wizard | Field selection | Naming the columns | Pattern preview | Correlated data | Multiple page selection | Extraction of data

The user selects the first and last fields in the web page, document, or application that they want to extract data from.

Google | data table variables

Data Table Variables - UiPath Studio Guide
https://studio.uipath.com/docs/data-table-variables ▼
DataTable variables represent a type of variable that can store big pieces of ... Data.DataTable). For more information, see Browsing for .Net Variable Types.

Data Tables in Excel - Easy Excel Tutorial
https://www.excel-easy.com/examples/data-tables.html ▼ Traducerea acestei pagini
Instead of creating different scenarios, you can create a **data table** to quickly try out different values for formulas. You can create a one **variable data table** or a ...

UiPath™

Data Scraping Walkthrough (Contd.)

Opening the wizard → Field selection → Naming the columns → Pattern preview → Correlated data → Multiple page selection → Extraction of data

User can customize column header names and choose whether or not to extract URLs.

Ui Extract Wizard   ✕

Configure Columns

The identified fields are highlighted.

☑ Extract Text

Text Column Name   Column1

☐ Extract URL

URL Column Name   Column2

Help   Cancel   < Back   Next

Data Scraping Walkthrough (Contd.)

Opening the wizard → Field selection → Naming the columns → Pattern preview → Correlated data → Multiple page selection → Extraction of data

Ui Extract Wizard ✕

Preview Data

Name	URL
Data Tables in Excel - Easy Excel Tutorial	https://www.excel-easy.com/examples/data-tables.html
Graphing primer - MathBench - University of Maryland	https://mathbench.umd.edu/modules/visualization_gra
How to Create a One-Variable Data Table in Excel 2010	https://www.dummies.com/software/microsoft-office/e
Data-table dictionary definition	data-table defined - Y	https://www.yourdictionary.com/data-table
Create an Excel data table to compare multiple results -	https://www.techrepublic.com/blog/windows-and-offic
Data Table Variables - UiPath Studio Guide	https://studio.uipath.com/docs/data-table-variables
Data Tables in Excel - Easy Excel Tutorial	https://www.excel-easy.com/examples/data-tables.html
Introduction to data.table - R Project	https://cran.r-project.org/web/packages/data.table/vigr
Calculate multiple results by using a data table - Excel -	https://support.office.com/en-us/article/calculate-multi
Guidelines for Making a Data Table	http://www.sedl.org/afterschool/toolkits/science/pdf/as
DataTable Class (System.Data)	Microsoft Docs	https://docs.microsoft.com/en-us/dotnet/api/system.da
How to Create a Two-Variable Data Table in Excel 2010	https://www.dummies.com/software/microsoft-office/e
Access Data in a Table - MATLAB & Simulink - MathWor	https://www.mathworks.com/help/matlab/matlab_prog
DataTables example - Custom HTTP variables	https://datatables.net/examples/server_side/custom_va

Edit Data Definition   Maximum number of results (0 for all)   100

Help   Cancel   < Back   Extract Correlated Data   Finish

Once the 'Next' button is clicked, a preview of the data is shown.

Data Scraping Walkthrough (Contd.)

Opening the wizard → Field selection → Naming the columns → Pattern preview → Correlated data → Multiple page selection → Extraction of data

Ui Extract Wizard ✕

Configure Columns

The identified fields are highlighted.

☑ Extract Text

Text Column Name   Preview

☐ Extract URL

URL Column Name   Column4

Help   Cancel   < Back   Next

The correlated data can be extracted multiple times by adding the names of the column.

Data Scraping Walkthrough (Contd.)

Opening the wizard → Field selection → Naming the columns → Pattern preview → Correlated data → Multiple page selection → Extraction of data

Indicates the Next button in the web page, application, or document.

Ui Indicate Next Link   ✕

Is data spanning multiple pages?

Identify the element that navigates to the next pages. It could be a 'Next' button or an arrow (not a page number).

Press Yes to indicate it.

[Yes]   [No]

Goooooooooogle ›

1 2 3 4 5 6 7 8 9 10   Next

Data Scraping Walkthrough (Contd.)

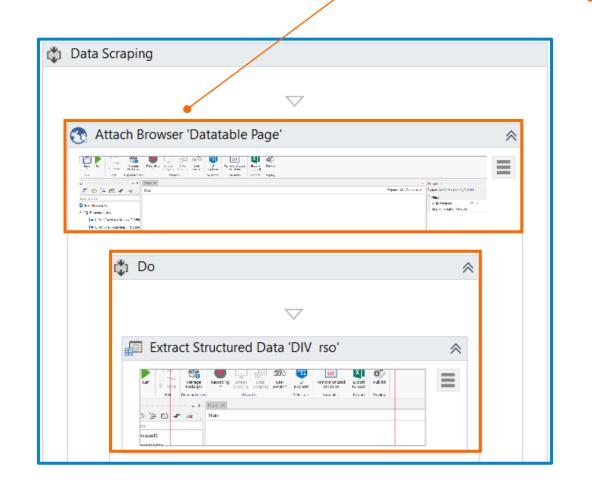Opening the wizard → Field selection → Naming the columns → Pattern preview → Correlated data → Multiple page selection → Extraction of data

The Designer is populated with a sequence of all the activities.

Questions & Answers

What is the format in which the selectors store GUI attributes and characteristics?

a) XML.

b) JavaScript.

c) CommaSeparatedValues.

Ui Path™

Which of the following best defines a partial selector?

a) Contains all the required elements to identify an UI element, including the top-level window.

b) It's generated by the Desktop Recorder and does not contain information about the top-level window.

c) Can change certain attribute values based on the selected variable.

Which types of selector are best suited for wildcard

a) Partial selectors.

b) Full selectors.

c) Dynamic selectors.

Which of the following actions cannot be recorded under Automatic Recording?

a) Draw-down lists

b) Right-clicks

c) Checkboxes

![UiPath logo]

Which of the following Recording modes does not support selectors?

a) Native Citrix

b) Web

c) Image

Which of the following actions is an action under both automatic and manual recording?
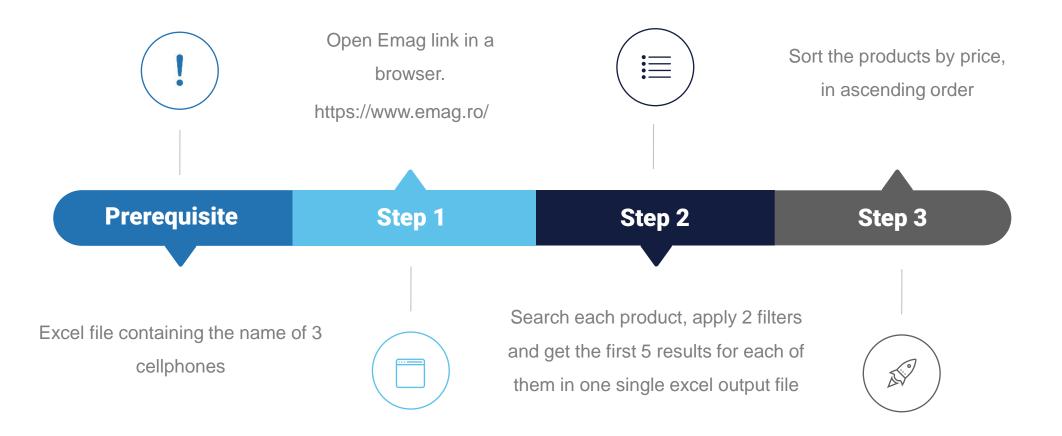
a) Type

b) Right click

c) Get text

Data scraping extracts structured data from…
[multiple answer]

a) Documents

b) Browsers

c) Apps

UiPath™

RPA Challenge

Open Emag link in a
browser.

https://www.emag.ro/

Sort the products by price,
in ascending order

| Prerequisite | Step 1 | Step 2 | Step 3 |

Excel file containing the name of 3
cellphones

Search each product, apply 2 filters
and get the first 5 results for each of
them in one single excel output file

Ui Path™

Next Steps

PDF Automation