Module-4

Taking Control of the Controls- Finding and attaching windows- Finding the control- Techniques for waiting for a control- Act on controls - mouse and keyboard activities- Working with UiExplorer- Handling events- Revisit recorder- Screen Scraping- When to use OCR- Types of OCR available- How to use OCR- Avoiding typical failure points.

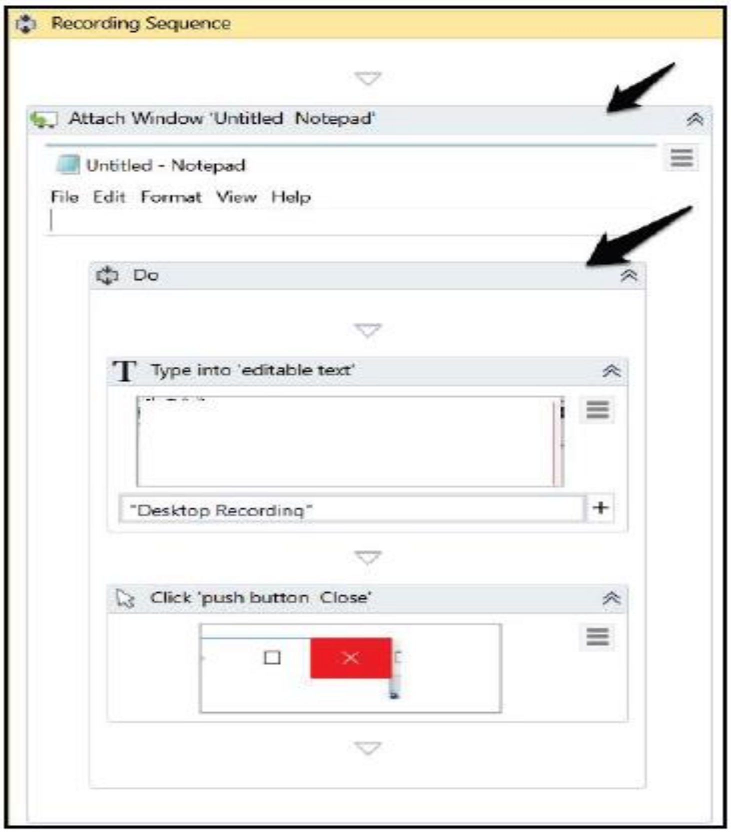
TAKING CONTROL OF THE CONTROLS

1. Finding and Attaching Windows

The **Attach Window** activity can be found in the **Activities** panel. This activity is generally used to attach an already opened window. It is also auto-generated when we record actions using the Basic or Desktop recorder.

2.Implementing the Attach Window Activity

In this example, we are going to attach a Notepad window and then write some text into it:


Recording Sequence
Attach Window 'Untitled Notepad'
Untitled - Notepad
File Edit Format View Help
Do
Type into 'editable text'
"Desktop Recording"
Click 'push button Close'

1. Create a blank project and give it a meaningful name.
2. Drag and drop the **Attach Window** activity on the main Designer panel. Connect the **Attach Window** activity to the **Click** activity.
3. Double-click on the **Attach Window** activity. Click on **Click Window on Screen** and indicate the Notepad window. The Notepad window is now attached to the previous activity:
4. For the sake of completeness, we are going to add a **Type into** activity. Just drag and drop the **Type into** activity, inside the **Attach Window** activity. Click on the **Indicate element inside window** and locate the Notepad window where you want to write the text. Write the text in the Text property of the **Type into** the activity.
5. Hit the **Run** button.

3. Finding the Control

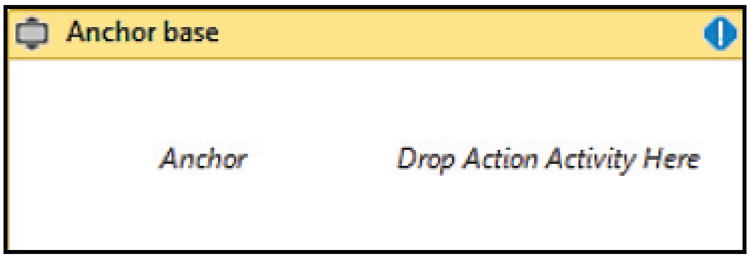
Following are the activities that help in finding the controls. These activities are used to find or wait for an UI element.

1. Anchor base
2. Element Exists
3. Element scope
4. Find children
5. Find element
6. Find relative element
7. Get ancestor
8. Indicate on screen

1. Anchor base

This control is used for locating the UI element by looking at the UI element next to it. This activity is used when we do not have a reliable selector.

1. Drag and drop a **Flowchart** activity on the Designer panel of a blank project. Also, drag and drop an **Anchor base** control from the **Activities** panel. Connect the **Anchor base** control with **Start**.
2. Double-click on the **Anchor base** control:



3. There are two activities that we have to supply to the **Anchor base** control: **Anchor** and action activities.
4. Drag and drop the **Anchor base** activity (for example; **Find Element** activity) in the **Anchor** field and **Action** activity (for example; **Type into**) in the **Drop Action Activity Here** field of the **Anchor base** control.

The **Anchor base** activity will find the relative element nearby the element on which you want to perform the Action, and the Action activity will perform the appropriate action that you have specified.

2. Element Exists

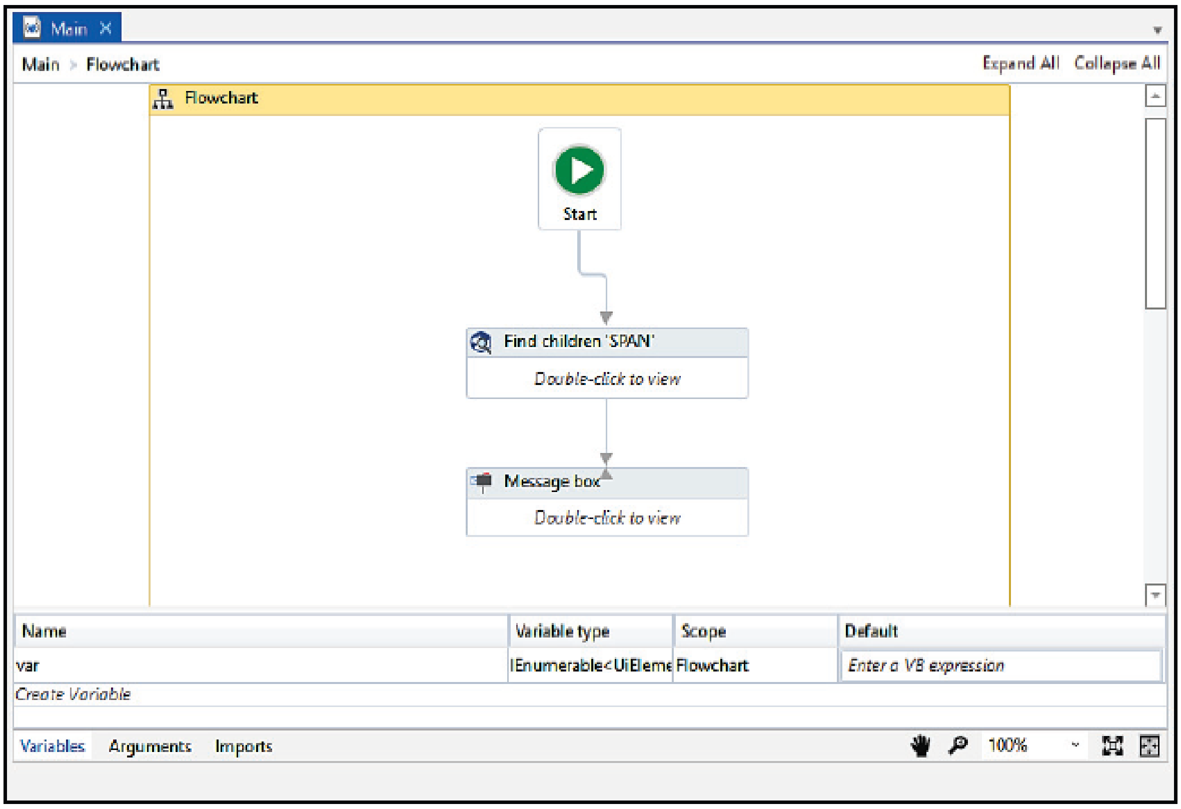
This control is used to check the availability of the UI element. It checks if the UI element Exists or not. It also returns a Boolean result if the UI Element Exists, then it returns true: otherwise, it returns false.

3. Element scope

This control is used to attach a UI element and perform multiple actions on it. You can use abunch of actions within a single UI element.Drag and drop the **Element scope** control and double-click on this control:

4. Find children

This control is used to find all the children UI elements of a specified UI element. It also retrieves a collection of children UI elements. Drag and drop the **Find children** control from the **Activities** panel. Double-click on it to indicate the UI element that you want to specify. You can indicate it by clicking on **Indicate on screen**:



Name	Variable type	Scope	Default
var	IEnumerable<UiEleme	Flowchart	Enter a VB expression
Create Variable			

5. Find element

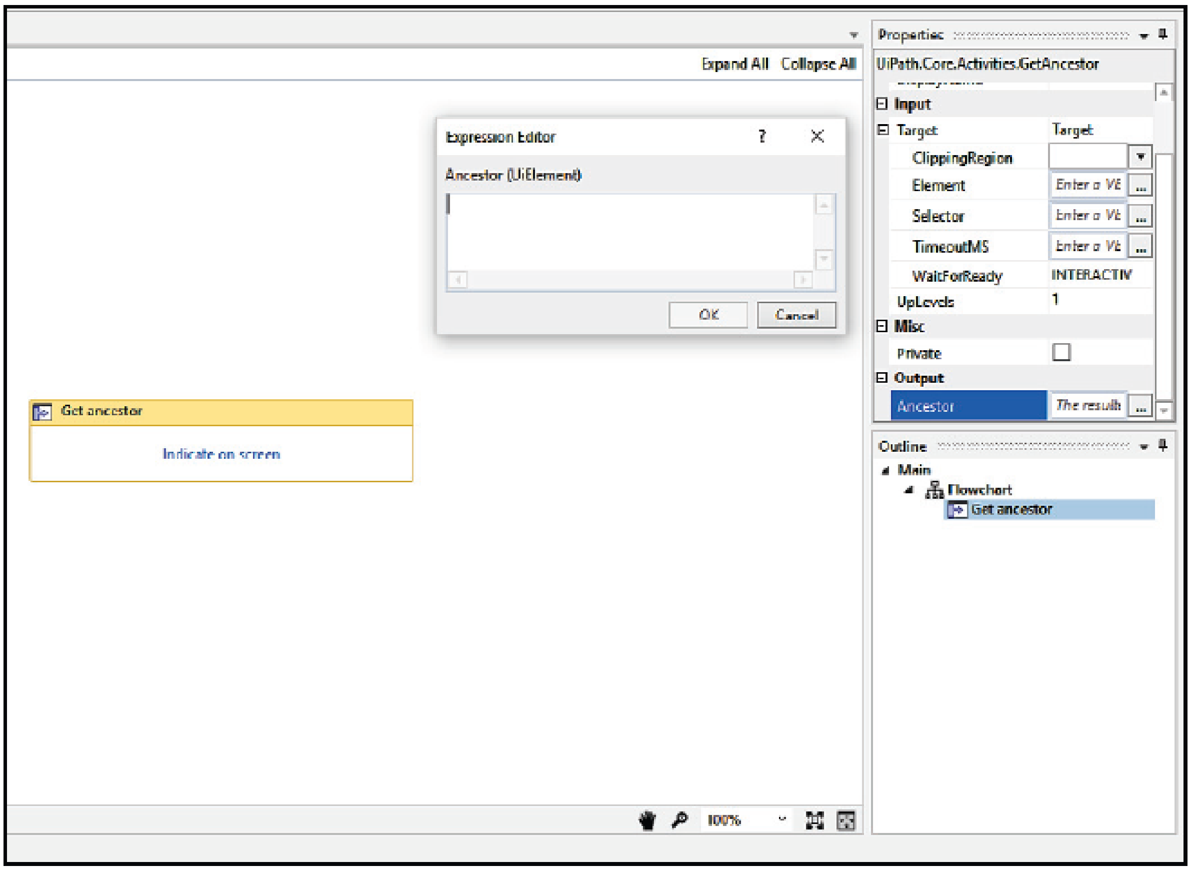
This control is used to find a particular UI element. It waits for that UI element to appear on the screen and returns it back.

6. Find relative element

This control is similar to the Find element control. The only difference is that it uses the relative fixed UI element to recognize the UI element properly. This control can be used in scenarios where a reliable selector is not present. Just drag and drop this control, and indicate the UI element by clicking on **Indicate on screen**.

7. Get ancestor

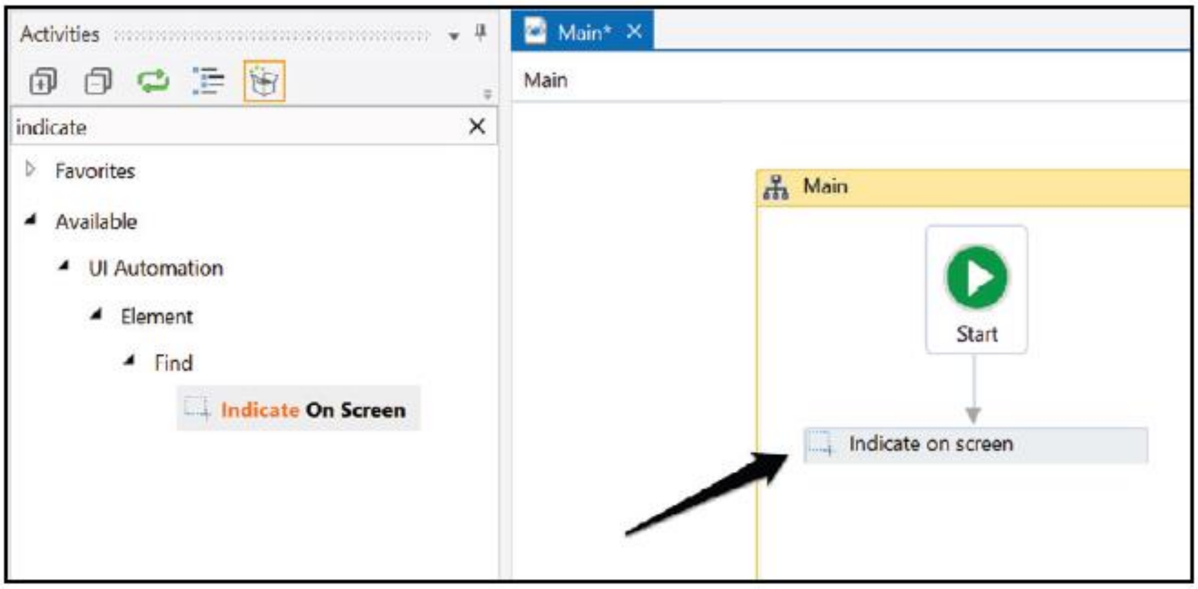
This control is used to retrieve the ancestor of the specified UI element. You have to supply a variable to receive the ancestor element as output. You can specify the variable name in the **Ancestor** property of the **Get ancestor** control.



Just drag and drop this control and indicate the UI element by clicking on **Indicate on screen**.

8. Indicate on screen

This control is used to indicate and select the UI element or region at runtime. It gives flexibility to indicate and select the UI element or region while running the workflow. You just have to drag and drop this control in your project:



4. Techniques for Waiting for a Control

There are three techniques through which we can wait for a control. They are:

1. Wait Element Vanish
2. Wait Image Vanish
3. Wait attribute

1. Wait Element Vanish

This activity is used to wait for a certain element to disappear from the screen. Let us see an example where the **Wait Element Vanish** activity is in use:

1. Create a **Blank** project and give it a meaningful name.
2. Drag and drop a **Flowchart** activity on the Designer panel. Also, drag and drop the **Wait Element Vanish** activity on the Designer panel. Set this activity as the **Start** node.
3. Double-click on the **Wait Element Vanish** activity, then indicate on the screen which element needs to vanish.

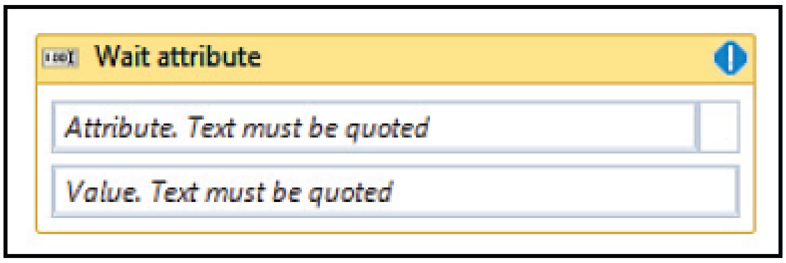
2. Wait Image Vanish

The **Wait Image Vanish** activity is similar to the **Wait Element Vanish** activity. This activity is used to wait for an image to disappear from the UI element. The only difference between the **Wait Element Vanish** and the **Wait Image Vanish** activities is that the former is used to wait for an element to disappear, while the latter is used to wait for an image to disappear.

3. Wait attribute

This activity is used to wait for the value of the specified element attribute to be equal to a string. We have to specify the string explicitly:

1. Drag and drop a **Flowchart** activity on the Designer panel. Next, drag and drop the **Wait attribute** on the Designer panel. Now, right-click on the **Wait attribute** activity and set it as the **Start** node.
2. Double-click on the **Wait attribute** activity. We have to specify three values: attribute, element, and text property. We also have to specify the element on which we have to supply the value:


Wait attribute

Attribute. Text must be quoted

Value. Text must be quoted

5. Act on Controls - Mouse And Keyboard Activities.

While working in UiPath Studio, we have to work with various types of controls, such as Find control, mouse control, keyboard control, and so on, to automate tasks.

Mouse activities

Those activities that involve interaction with the mouse fall under the category of mouse activities.

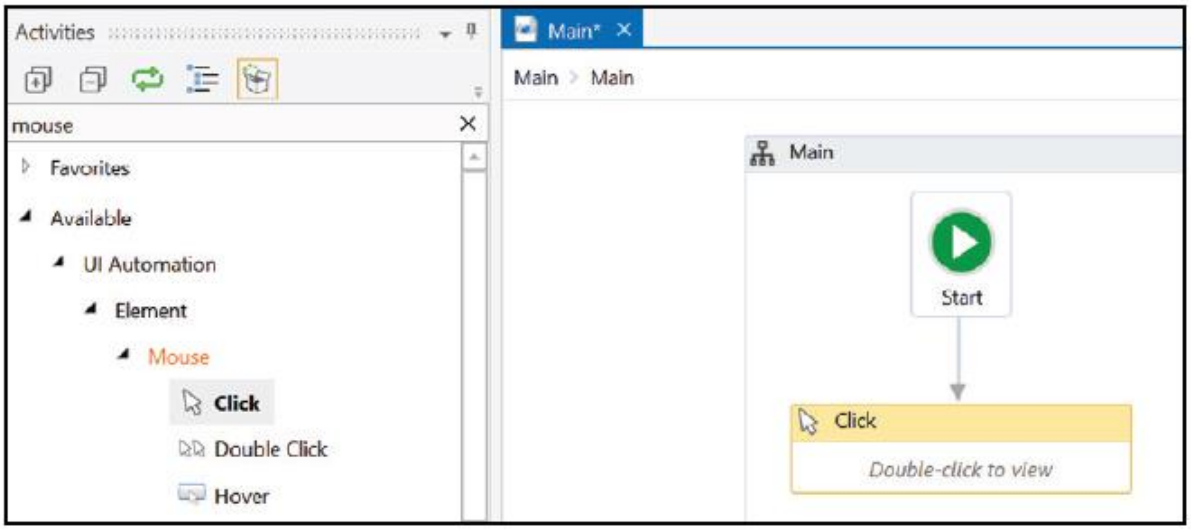
There are three mouse activities in UiPath Studio:

1. Click activity
2. Double-click activity
3. Hover activity

1. The Click activity

When we have to click on a UI element on the screen, we generally use the Click activity. It is very easy to use the **Click** activity.

1. Drag and drop a **Flowchart** on the Designer panel. Search for mouse in the search bar of the **Activities** panel. Drag and drop the **Click** activity. Right-click on the **Click** activity and select **Set as Start Node**.
2. Double-click on the **Click** activity. Click on **Indicate on screen** and indicate the UI element you want to click on:



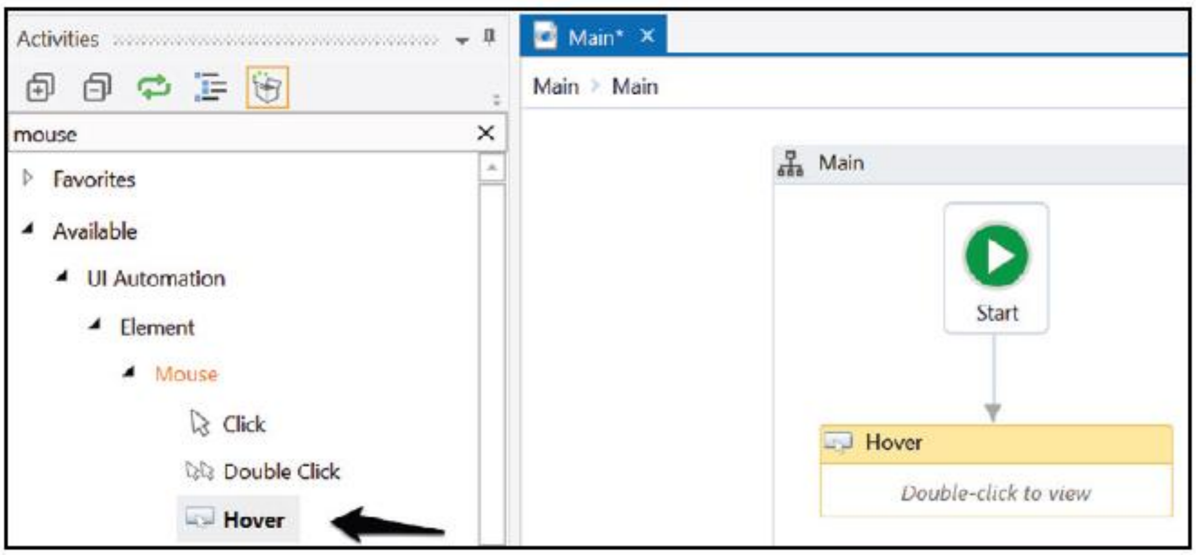
2. The Double-click activity

The Double Click activity is similar to the Click activity. It just performs the double-click action. Using the Double click activity in your project is almost the same as click. You have to use the Double click activity instead of the Click activity and indicate the UI element.

3. The Hover activity

The **Hover** activity is used to hover over a UI element. Sometimes, we have to hover over a UI to perform an action. The Hover activity can be used in this case:

1. Drag and drop a **Flowchart** on the Designer panel. Search for mouse in the search bar of the **Activities** panel. Drag and drop the **Hover** activity. Right-click on the **Hover** activity and select **Set as Start Node.**
2. Double-click on the **Hover** activity. Click on **Indicate on screen** to indicate the UI element you want to hover on. That's it. We are done. Hit the **Run** Button to see the result.



Keyboard activities

While automating tasks, we have to deal with keyboard activities a lot of a time. Keyboard activities generally involve an interaction with a keyboard. In UiPath Studio, the following are keyboard activities:

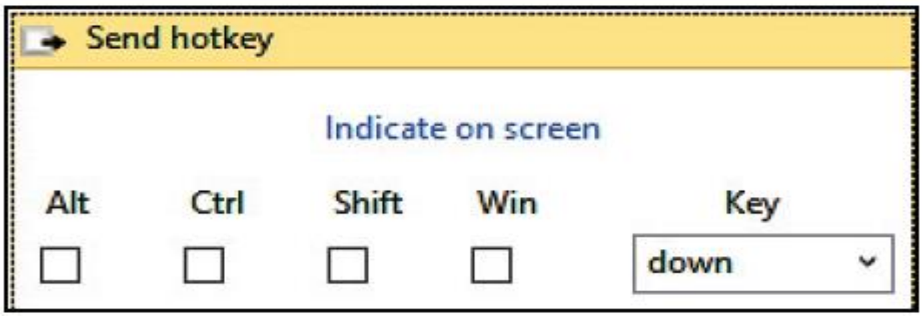
a. Send hotkey
b. Type into
c. Type secure text

a. Send Hotkey

This activity is used to send keystrokes from the keyboard as an input to the screen.

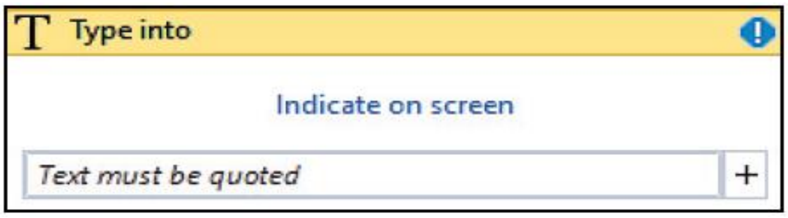
Example- Using **Send hotkey** activity to scroll the Flipkart main page:

1. Drag and drop a **Flowchart** on the Designer panel. Search for keyboard in the search bar of the **Activities** panel. Drag and drop a **Send hotkey** activity. Rightclick on the **Send hotkey** activity and select **Set as Start Node**.
2. Double-click on the **Send hotkey** activity. Click on the **Indicate on screen** and indicate the required page . You can assign any key by marking the checkboxes. You can also specify the key by selecting a key from the drop-down list. In our example, we have chosen the **down** key:



b.Type into activity

This activity is used to type the text into the UI element. It also supports special keys. The **Type into** activity is quite similar to the **Send hotkey** activity. We have to send the keystrokes along with the special keys. Special keys are optional:

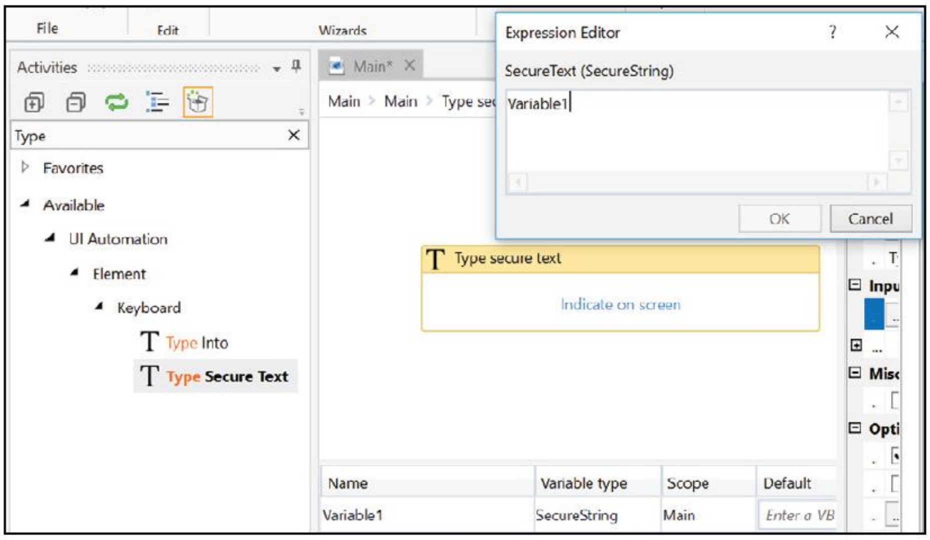


You can use this activity by simply dragging and dropping the **Type into** activity, and specifying the keystrokes and the special keys by clicking on the + icon and choosing the key from the drop-down list (if you wish to send special keys also). You also have to **Indicate on screen** the area where you want the text to be typed.

c.Type secure text

This activity is used to send secure text to the UI element. It sends the string in a secure way:

1. Drag and drop a **Flowchart** on the Designer panel. Search for keyboard in the search bar of the **Activities** panel. Drag and drop the **Type secure text** activity. Right-click on the **Type secure text** activity and select **Set as Start Node**.
2. Create a variable of type **SecureString**. Now, double-click on the **Type secure text** activity and specify the variable's name in the **SecureText** property of the **Type SecureText** activity. You also have to indicate on the screen by clicking on **Indicate on screen**.



Name	Variable type	Scope	Default
Variable1	SecureString	Main	Enter a VB

6. Working with UiExplorer

- UiExplorer is a more advanced version of the selector. It is a tool that gives us the flexibility to customize the selector.
- In this example, we are going to type some text into a Notepad window. You just have to use the **Type into** activity and **Indicate on screen** the area to be typed into and provide the text to be typed. Suppose you have opened a Notepad window, written some text into it, and then saved this file. If you want to write some text into it again, then UiPath Studio gives you an error. There is nothing wrong with the implementation. What actually happens is that when you write some text in Notepad, UiPath Studio recognizes the file, app, type, title, and class, and saves this information for future recognition. You have saved the file by providing a name. Hence, the title has been changed by the system (as the name of the Notepad window has changed). When you made the second attempt to write some text, UiPath Studio failed to recognize that instance of the Notepad window.
- The problem was when you opened the Notepad window, UiPath Studio saved the title attribute as **Untitled-Notepad**. You saved the file and its title changed to **test-Notepad**. When you tried to write some text next time, it did not recognize the title as it had been changed from **Untitled-Notepad** to **test-Notepad**.
- UiExplorer is used to customize the selector and to view attributes and their associated values. View it carefully and inspect the attribute that should be changed.

7. Handling Events

An event occurs when some action is performed. There are different types of events:

1. Element triggering event
2. Image triggering event
3. System triggering event

1. Element triggering events

This type of event deals with clicking and keypress events.

a. Click trigger

- This event occurs when a specified UI element is clicked. Before using the Click trigger, we have to use the **Monitor events** activity. Without **Monitor events**, the Click trigger cannot be used.
- Double-click on **Monitor events**. Drag and drop the Click trigger inside **Monitor events**.

b. Key Press Trigger

- This event is similar to the Click trigger. A Key press trigger event occurs when keystrokes have been performed on some particular UI element. It calls the **Event handler** when it is triggered.While using **Key press trigger** event you have to specify the key or combination of keys.

2. Image Triggering Events

The Click image trigger is an image tiriggering event.

Click image trigger, as the name suggests, is used for when we click an image. You just have to use the Click image trigger event inside the Monitor event and indicate the image. Upon clicking the indicted image in the Click image trigger event, the event handler will be called.

3. System Triggering Events

The following are System triggering events:

a. Hotkey trigger
b. Mouse trigger
c. System trigger

a. Hotkey trigger

This event is raised when special keys are pressed. You have to use this event inside the Monitor event.Specify the special key or combination of keys. Also, provide the event handler that will be called when the event occurs.

b. Mouse trigger

This event is fired when the mouse button is pressed. Use this event inside the Monitor event and specify the Mouse button: Either the left mouse button, middle mouse button, or the right mouse button.

c. System trigger

This event is used when you have to use all of the keyboard events, all of the mouse events,
or both.

8. Revisit Recorder

There are four types of recording in UiPath Studio:

a. Basic recording
b. Desktop recording
c. Web recording
d. Citrix recording

a. Basic recording

This is used to record the actions of applications that have a single window. Basic Recording uses a full Selector. It works better for applications performing a single action. It is not suitable for applications with multiple windows. There are two types of selectors, partial selectors and full selectors. A Full selector has all the attribute to recognize a control or application. The Basic recording uses full selectors.

b. Desktop recording

This is similar to Basic recording with the added advantage of working with multiple actions. It is most suitable for automating Desktop applications. Desktop recorder generates Partial selectors. The Partial selectors, have a hierarchical structure. They are split into parent child views for recognizing the UI element properly. Please note in the preceding image there is a **Attach Window** activities and other activities are nested under it. This flow is generated **Desktop** recorder:

c. Web recording

Web Recording can be done by using the Web recorder. For recording web actions, the UiPath extension for that browser should be installed. Otherwise, you will not able to automate tasks or actions using Web recording. You just have to click on the Setup icon and then click on Setup Extensions. Now, choose your browser and click on it. The UiPath extension will be added to your specified browser. Web Recording is similar to Desktop Recording. You just have to record the actions and save it.

Suppose we want to extract data from Amazon's website. Say we want to search for books on Amazon and extract the search results. Extracting data from websites becomes very easy with data scraping:

1. Create a blank project and give it a meaningful name. Click **Create**.
2. Log on to Amazon's website and search for books. A detailed list of books is listed on your screen:
3. Drag and drop a **Flowchart** activity on the Designer panel. Now, click on the **Data Scraping** icon. A window will pop up.
4. Click on the **Next** button.
5. You have to indicate the first book's entities. Entities can be name, price, author, and so on. It is your choice.
6. Lets's, indicate the book's name. After that, it will ask for the next book's entities. Indicate the second book entity as well. Click on **Next**.
8. Again, a window will pop up asking you to configure the columns. You can also extract the URL. If you want to do this, check the **Extract URL** checkbox.
9. You can specify the column name as well. Click on the **Next** button.
10. As you can see, all the book names are extracted to a window. If you want to extract more columns or more entities, then click on **Extract Correlated Data** and you have to again indicate another entity of the book to extract more columns, as we have done previously. After that, all the data will be extracted and will be added to this table. Here, we have one column but if you extract more entities, then more columns will be added to this table:
9. Click on the **Finish** button. If the results of your query span multiple pages, it will ask you to indicate the page navigation link on the website (Next button of the website that we used

to navigate to another/next page). If the results of your query span multiple pages, click on the **Yes** button and indicate the link, otherwise click on the **No** button.

10. We have clicked on the **No** button. A data scraping sequence is generated in our **Flowchart**.

9.Citrix

When dealing with the Remote Desktop connection, methods such as Basic Recording and Desktop Recording cannot be used. In an RDP environment, images will be sent from one desktop to another, and will be mapped by analyzing the position of the pointer of the mouse button. Hence, basic and desktop recording cannot be used, as these recording techniques fail to interact with the images. In a Citrix environment, we have the **Click Text** and **Click Image** activities, using which we can work with images with ease. You can clearly see the activities that are listed in a Citrix Recording:

1. Click Image
2. Click Text
3. Type
4. Select & Copy
5. Screen Scraping
6. Element
7. Text
8. Image

All these activities are used extensively in a Citrix environment.

10.Screen Scraping

Screen Scraping is a method of extracting data from documents, websites, and PDFs. It is a very powerful method for extracting text. We can extract text using the Screen Scraper wizard. The Screen Scraper wizard has three scraping methods:

a. Full Text
b. Native
c. OCR

a. Full text: The Full text activity is used to extract information from various types of documents and websites. It has a 100% accuracy rate. It is the fastest method among all three methods. It even works in the background. It is also capable of extracting hidden text. However, it is not suitable for Citrix environments.

b. **Native**: This is similar to the Full text method but has some differences. It has a slower speed than the Full text method. It has a 100% accuracy rate, like the Full text method. It does not work in the background. It has an advantage over the Full text method in that it is also capable of extracting the text's position. It cannot extract hidden text. It also does not work with a Citrix environment.

c. **OCR**: This method is used when the previous two methods fail to extract information. It uses the two OCR engines: Microsoft OCR and Google OCR. It has also a scale property: you can choose the scale level as per your need. Changing the scale property will give the best results:

Capability Method	Speed	Accuracy	Background Execution	Extract text position	Extract hidden text	Support for Citrix
Full Text	10/10	100%	Yes	No	Yes	No
Native	8/10	100%	No	Yes	No	No
OCR	3/10	98%	No	Yes	No	Yes

Let us consider an example of extracting text from the UiPath website's main page:

1. Create a **Blank** project and give it a meaningful name.
2. Log on to the UiPath website by logging in to www.uipath.com in your browser.
3. Drag and drop a **Flowchart** activity on the Designer panel. Click on the **Screen Scraping** icon and locate the area from which you want to extract the information. Just choose an area on the UiPath website. A window will pop up stating that the **AUTOMATIC method failed to scrape this UI Element**. By default, the **Screen Scraper Wizard** chooses the best scraping method to extract data, but it failed to do so in our case:
4. Try choosing another method. We shall choose the Full text method. This too will fail. Next, choose the Native method. This will also fail, as you can see in the following screenshot:
5. This time, choose the OCR Scraping method. You can clearly see the extracted text:

11.When to use OCR

There are some scenarios where normal activities such as **Get Text** and **Click Text** activities fail to extract the text or perform an action. This is when OCR comes in, giving us the flexibility to perform actions when existing activities fail to do their job. OCR stands for Optical Character

Recognition. It is a text recognition technique that transforms printed documents that are scanned into electronic formats. OCR is used mainly for images, scanned documents, PDFs, and so on, to extract information or perform actions. Extracting information or data from images, scanned documents, or PDFs is a very tedious job. Normal activities are not recommended for extracting these types of inputs. OCR uses a different method and approach to extract the information.

There are two OCRs available in UiPath Studio:

1. Microsoft OCR
2. Google OCR

Microsoft's OCR is known as MODI, and Google's OCR is called Tesseract. OCR is not limited to only these two types of OCR. You are free to use another type of OCR.

12.Types of OCR available

There are two OCRs available in our UiPath Studio:

1. Microsoft OCR
2. Google OCR

Both the Microsoft and Google OCR engines have their own advantages and disadvantages. The advantages of Google OCR include the following:

Multiple language support can be added in Google OCR Suitable for extracting the text from a small area It has full support for color inversion It can filter only allowed characters The advantages of Microsoft OCR include the following:

OCR is not 100% accurate. It is useful for extracting text that other methods cannot successfully do. It works with all applications, including Citrix. Microsoft and Google's OCRs are not the optimum for every situation. Sometimes, we have to look for more advanced OCRs to recognize more sophisticated text, such as handwritten documents and so on. There is another OCR available in UiPath Studio, known as the Abbyy OCR Engine. You can find this OCR engine in the **Activities** panel by searching for OCR.

How to use OCR

To extract text from the previous image, perform the following steps:

1. Open UiPath Studio and click on a **Blank** project. Give it a meaningful name. On the Designer panel, drag and drop a **Flowchart** activity.

2. Next, drag and drop a **Get OCR Text** activity from the **Activities** panel and set it as the start node. Double-click on it and click on the **Indicate on screen** option. Choose the specific area from which you want to extract the text from the image. In our case, we are using an image that we have searched for on Google.
3. Now, click on the **Text** property of the **Get OCR Text** activity. A window will pop up as shown in the following screenshot. Right-click inside the window and choose **Create Variable**. Give it a meaningful name, press *Enter*, and click on the **OK** button. A variable will be created with that name:
5. Drag and drop the **Message box** activity. Connect it to the Get OCR with text activity. Double-click on the **Message box** activity and specify the variable name that you have created earlier in the expression box.

13.Avoiding typical failure points

The following entities are used to tackle failure points:

- Selectors
- Scope of the variable
- Delay
- Element Exists
- Try/Catch
- ToString method

Selectors

Sometimes, it is tedious to deal with selectors while working with them. This is because a selector has attributes, title, and class properties. When we select a UI element using the selector, it stores all these properties. Different instances of an application may have different properties of a UI element. The problem with selectors is when you select a UI element, it captures its properties. These properties will differ when we select the UI element of a different instance of an application with the selector. Hence, the property will differ and the selector will fail to recognize the same UI element of another instance of the application. We can easily fix this problem by using wildcard characters or by attaching it to a live element. Two wildcard characters are available with UiPath:

1. The question mark symbol, ?, which replaces one character
2. The asterisk symbol, that is, *, which replaces a number of characters

Scope of the variable

Sometimes we create a variable inside a Sequence or Do activity. In doing so, the scope of the variable is limited to only that activity. When we try to access a variable from outside its scope, it cannot be accessed. We have to change the scope of the variable.

Delay activity

In some situations, we have to wait for a particular action. For example, when opening the Outlook application, it needs to connect to the server (for synchronization). When it is opened, it takes some time (the UI element is not stable at this stage). In the meantime, the robot's activity is waiting for the UI element to be stable so that it can perform the action. After waiting for some time, if the UI element is not stable, it results in an error because the activity cannot find the UI element. Thus, we have to add a Delay activity to ensure that the UI element is stable for action. Specify the time for the delay in the expression text box of the Delay activity. This activity will delay the process for the specified period of time.

Element Exists

This activity is used to ensure that the required Element Exists. It is used to ensure that the element we are looking for exists in this context. This is a good way of checking whether the activity exists or not.