Lab 6. Tame that Application with Plugins and Extensions

So far, you have learned how to record steps to automate and also learn about control flow, and the use of variables and data tables. The most important part was understanding and mastering controls. Unless you are able to identify controls of an application properly, it is not possible to successfully automate a process. Now, in this lab, we will step up to learn how to use external plugins and extensions. UiPath has many plugins and extensions to ease UI automation, apart from basic extraction and interaction with the desktop screen. These plugins allow us to directly interact with those applications or ease UI automation. Some of the important sections that are going to be covered in this lab are:

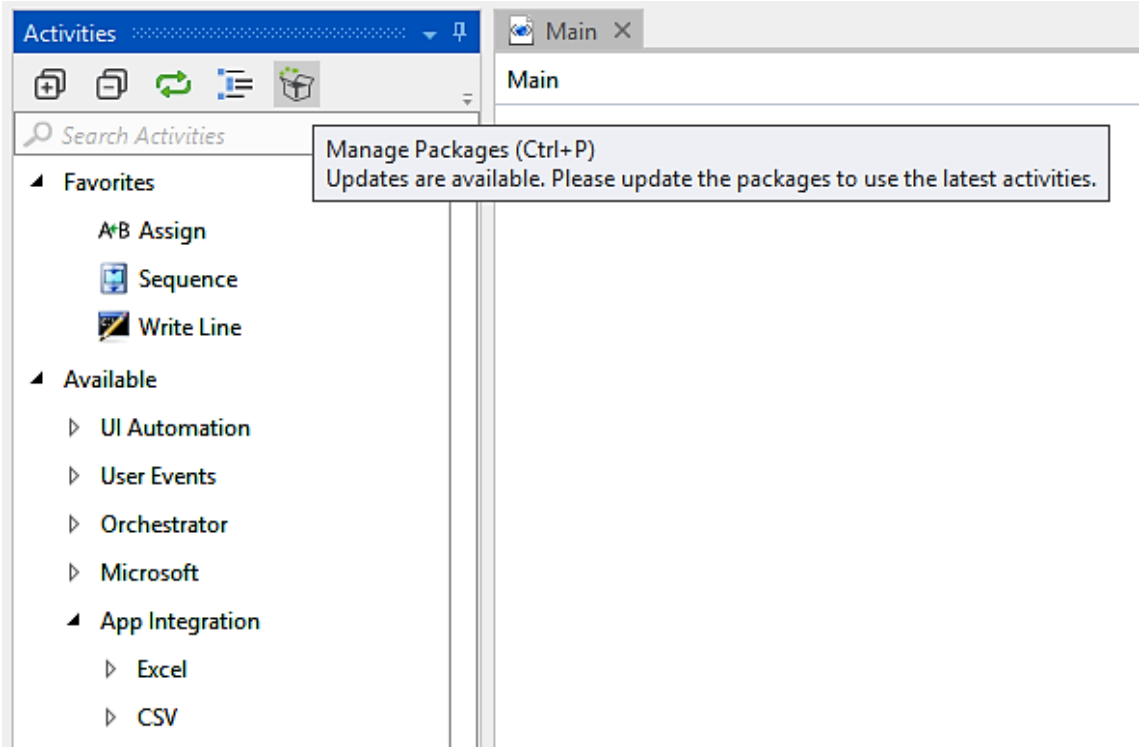
- Terminal plugin
- SAP Automation
- Java plugin
- Citrix Automation
- Mail plugin
- PDF plugin
- Web integration
- Excel and Word plugins
- Credentials management
- Extensions: Java, Chrome, Firefox, and Silverlight

Terminal plugin

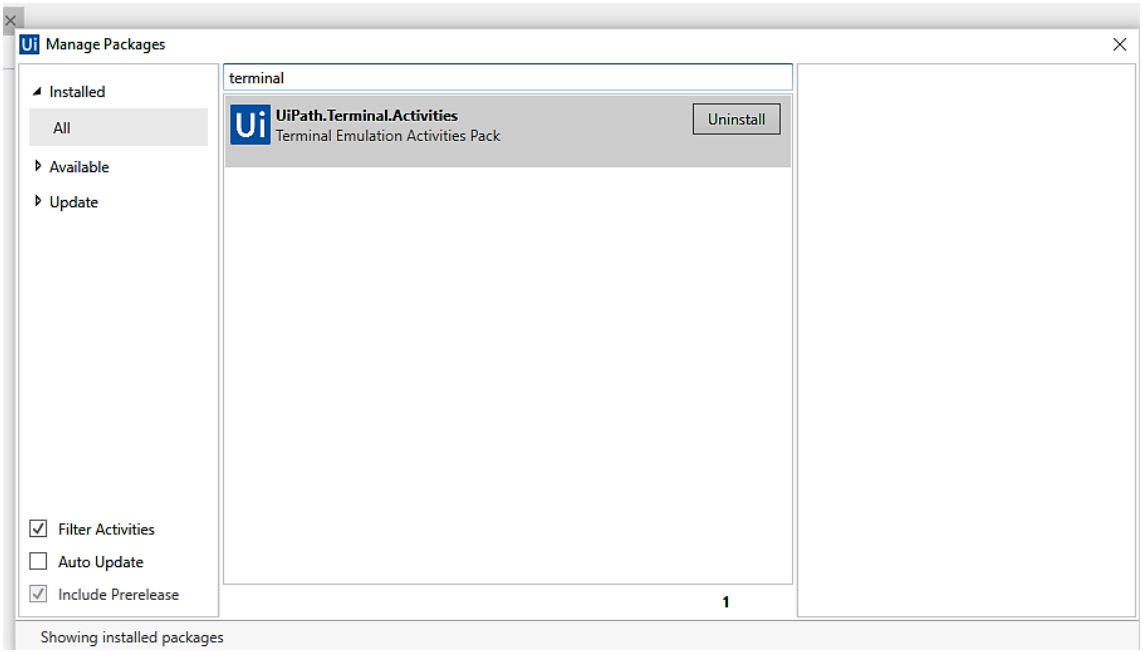
The Terminal plugin is used to execute commands in textual format (generally a black window). It works faster than the **Graphical User Interface** (**GUI**) methodology. It also has a broader scope in terms of authority and permissions.

In UiPath Studio, there is a NuGet Package called `UiPath.Terminal.Activities`. Terminal activity is pre-installed in UiPath Studio. In case it is not installed, we have to install it manually. To check whether the Terminal activity is installed or not, simply search for `Terminal` in the **`Activities`** panel. It will list all the terminal activities. If no activities are listed in the **`Activities`** panel, you have to install the `UiPath.Terminal.Activities` package.

To install Terminal activity NuGet Package, click on the **`Manage Package`** icon, as shown in the following screenshot:



The Manage Packages window will appear. Search for `terminal` in the search bar. As shown in the following screenshot, there is an **Uninstall** button next to **UiPath.Terminal.Activities**. This is because the **Terminal** activity is already installed in UiPath Studio. If it is not installed, an **Install** button will appear next to the **UiPath.Terminal.Activities**:



SAP automation

Whether in software or in the form of mechanical Robots, automation is everywhere. Businesses have not only the latest information but the most accurate too. In today's market, if businesses cannot be kept up to date then they will suffer.

SAP automation with UiPath is integrated with the latest techniques that are more suitable for organizations. Today, SAP automation is becoming the buzzword in the IT industry. These days, error-prone databases and unfilled/partially filled documents are mostly discarded.

With SAP automation from UiPath Studio, these can be easily avoided. It automates tasks easily and makes organizations more productive.

Some of the advantages of UiPath's SAP Automation are listed as follows:

1. It is compatible with all the SAP automation techniques that are best suited to the organization.
2. It is accurate (99.999 % of the time) and delivers the best results. It avoids typical errors that humans/employees would be likely to make.
3. Human employees demand higher salary and consideration has to be given to (**full-time employees**) FTE too. SAP automation has a modular approach to FTE.
4. It is scalable. Just set it up with hundreds of Robots and you do not have to monitor them. There is no need to constantly watch them. The Robots can work independently.

SAP Automation requires some steps with which you should be careful while automating. There are some situations when the Click activity fails to recognize the UI element. Click Text activity and Click Image activity are used when Click activity does not work in some situations while automating SAP.

There are some scenarios when we have to extract tabular data from SAP. Iterating through the table is not easy. In such case use selectors to recognize the table cell. You can implement a loop to iterate through each table cell. Now, how will you know when your loop should stop iterating the table cell? You can put your code inside a Try Catch activity and when an exception occurs (exception occurs when the loop encounters an empty table cell or when the end of the table has been reached), it is caught by the Catch block. In this way, you will be able to iterate through all the table cells.

While interacting with checkboxes and radio buttons, make use of Get attribute activity to check whether they are checked or not.

When dealing with elusive UI elements, for example, a small button to the right of some text, you have to think in terms of human actions. How would a human react to such steps?

How SAP Automation affects data entry jobs

Data entry is a complex task. Employees have to work in a smart manner during the entire process, constantly checking for errors. There are some tasks that employees/humans do well, such as scanning a form for some information and extracting it. They can categorize the documents properly. Tasks like these are considered to be difficult for a system/computer. Of course, employees/humans can make errors that no software ever would. UiPath takes the best of both worlds---the benefits of automation and the benefits of mimicking humans, making software Robots that can be trained to scan forms, copy data, or notice a key being pressed. This also significantly reduces errors in the programs (in comparison to human employees undertaking the same tasks).

In addition to these processes, UiPath uses a method to ignore unrelated information on a website, SAP software, or any other application, only giving priority to the important ones.

It means that no matter how much your SAP application is difficult to handle, UiPath handles every action with ease. It can scale with any application on any platform.

Examples where SAP automation is used commonly

Some examples in which SAP automation is used are:

1. Filling in a form from any application.
2. Copying and pasting data between SAP and other applications.
3. Comparing data fields on the screen.
4. Updating the status of an entity in a system.
5. Scraping data from any application/websites.

UiPath is simple to use. In fact, there is no need to know a programming language or any scripting language. UiPath's Robots can be trained by the visual programming interface. You can define a complex workflow for your existing application and train your Robot. Once trained, Robots can run independently at a lower cost. It is estimated that a software Robot's work efficiency is equal to three employees. It saves a lot of time and money.

UiPath Studio comes with built-in libraries and activities so that the Robot can be trained and processes can be automated. It means that it can copy and paste the entities from one application to the other so that employees have more time to do complex logical work. It increases productivity and efficiency.

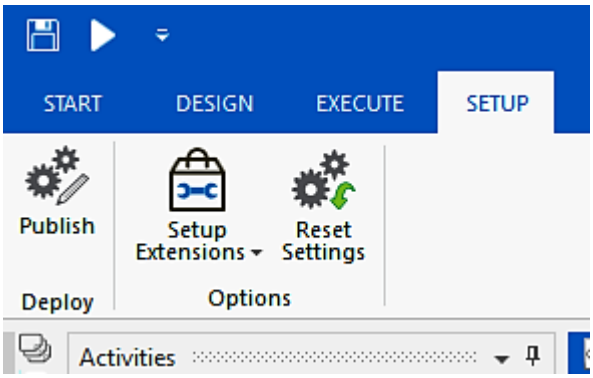
Java plugin

The Java plugin software is a component of the **Java Runtime Environment** (**JRE**). The JRE allows applets (software programs written in the Java programming language) to run in various browsers.

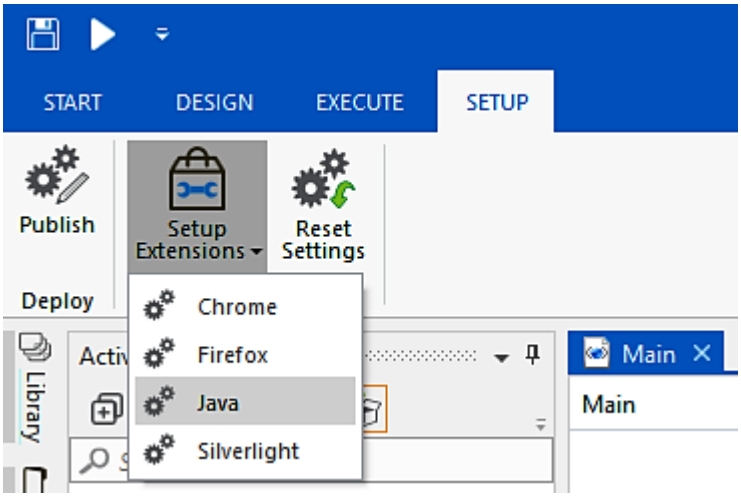
Why are we using the Java plugin with UiPath Studio?

Suppose we have to automate a Java application. We cannot use pre-installed activities with the Java application as it will not recognize them properly. Hence, in order to use activities with the Java application, we have to install the Java plugin.

Follow these steps to install the Java plugin inside UiPath Studio:1. Click on the `SETUP` wizard:



Next, click on Setup Extensions and choose Java:



A confirmation window will pop up stating that the Java plugin has been installed successfully.

To check whether the Java plugin is working properly, open UiExplorer, click on any Java application, and select an element. If the entire window is selected instead of that element, then your Java plugin has not been installed successfully. On the other hand, if the element is selected properly, then your Java plugin has been installed successfully.

Citrix automation

We have previously dealt with common automations---automating desktop applications or web applications. It is easy when we deal with these applications having graphical user interfaces. UiPath identifies the elements that we have clicked on and recognizes them. Thus, the next time the Robot executes a process, it successfully identifies the same element. We have already seen these types of action.

But what if we have a remote desktop connection and we need to automate an application using this remote desktop connection? It will be a tedious job.

Can we automate an application running on another machine while we are accessing it remotely with the activities that we have used with simple GUI? The answer is no.

Let's investigate why this is so. Suppose we have to automate a desktop application so that the Robot does all the necessary actions on that application. We can simply use the click, double-click, and other activities to automate it. We cannot, however, use these activities when establishing a connection with another system remotely. Why do normal activities such as click and double click not work with a remote desktop connection? The problem with a remote desktop connection is that it sends the images of a system to another system. Recording activities such as click or double click may not accurately capture the position of that control inside the remote system.

You will get a better understanding with this example. Consider that machine A has a screen whose resolution is 1366×768, while another machine B has a screen whose resolution is 1024×768 resolution. Suppose we are connecting machine A to machine B using a remote desktop connection.

Now machine B with a resolution of 1024×768 is being accessed by machine A. What actually happens is that the frontend image of the machine B window is being sent to machine A. Hence, we cannot click on an image.

Since both machines have different resolutions, sending the coordinates of an element to another machine is error-prone or difficult during the remote desktop connection.

We have pointed out two problems when automating through the remote desktop connection:

1. We cannot click on an image
2. Sending the coordinates of an element to another machine is error-prone

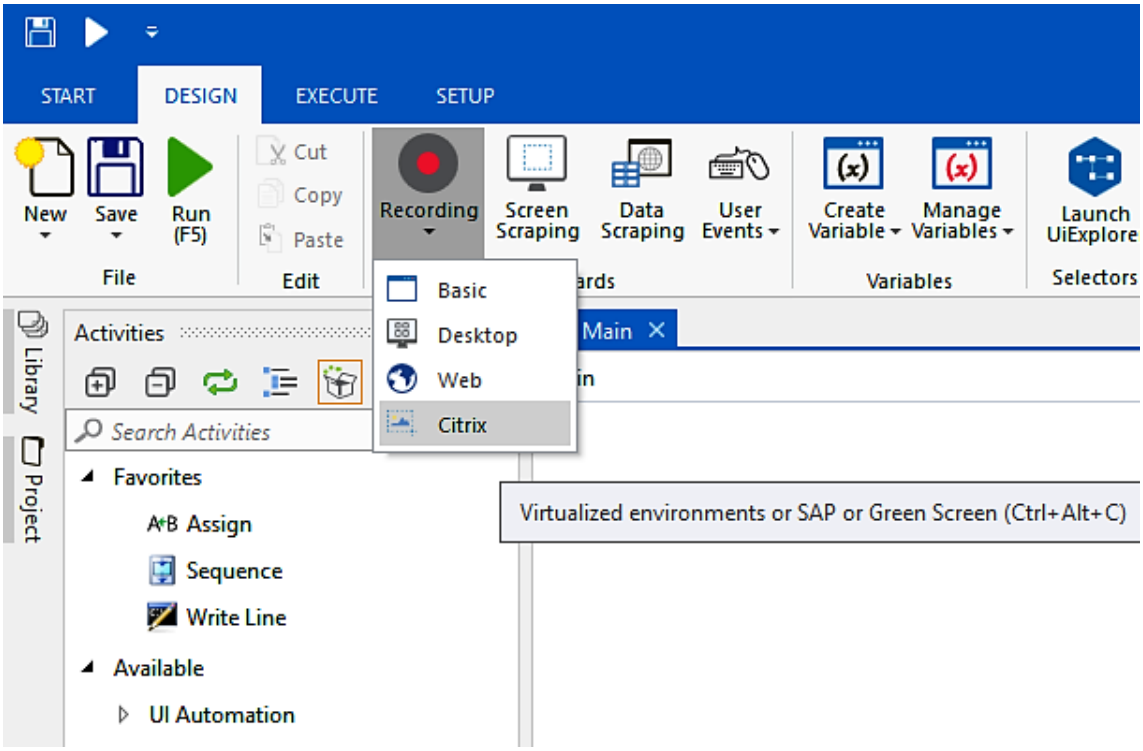
You will be wondering how we can overcome these two problems. Well, UiPath Studio comes with an environment called Citrix. Using the Citrix environment, it becomes very easy for us to automate an application when accessing it remotely.

It has a lot of options so that clicking on an image or sending the coordinates of an element become easy.

Some activities that Citrix supports are:

1. Click Image
2. Click text
3. Type
4. Send hotkey
5. Select and Copy
6. Screen Scraping and Scrape Data
7. Copy text

To automate using the Citrix environment, we have to select the Citrix Recording mode. In UiPath Studio, click on `Recording` and select `Citrix`:



Now, you can use a variety of controls and activities that help in automate applications remotely.

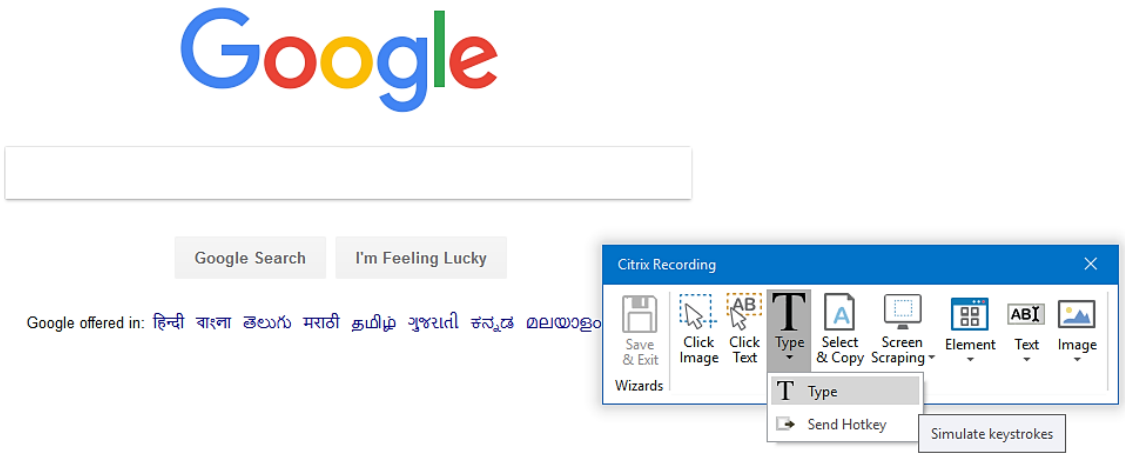
How does the Citrix environment work?

Citrix gives us the flexibility to work in **Remote Desktop Protocol** (**RDP**). It captures the image and its position along with its relative elements so that they can easily be identified on another machine. No matter what the resolution of the screen, it can recognize elements easily. Have a look:

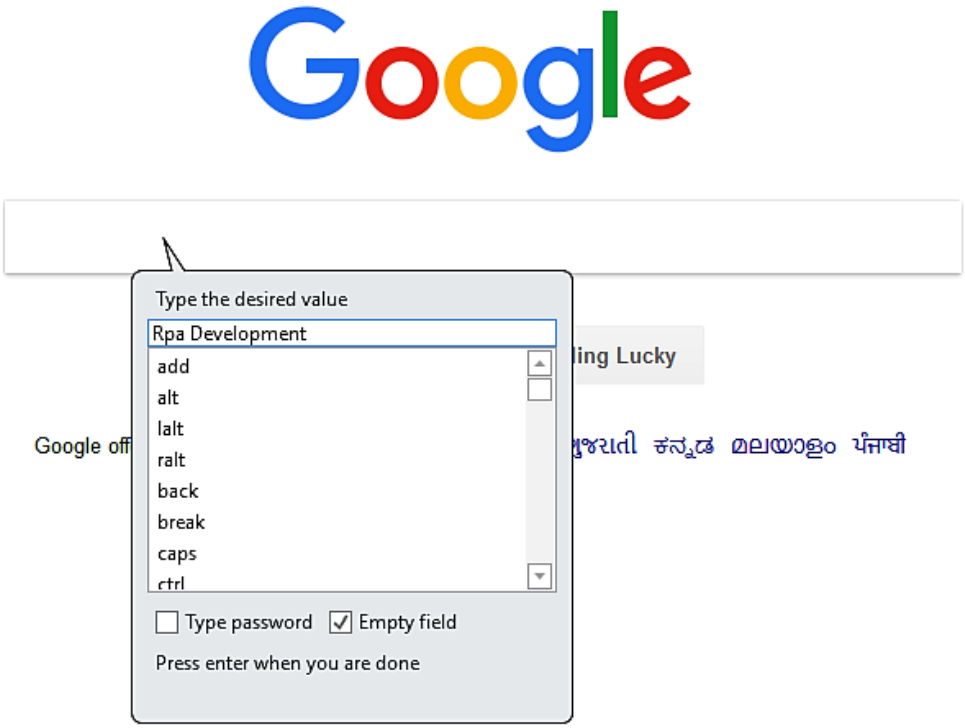
(We are not going to use RDP here. This is an example just to demonstrate the activity of Citrix).

Suppose we have to type into the Google search bar and click on the `Search` button.

Click on the `Recording` icon at the top of UiPath Studio. Select the `Citrix` option. A window will pop up. Now navigate to `Google` and click on the `Type` activity from the pop-up menu:

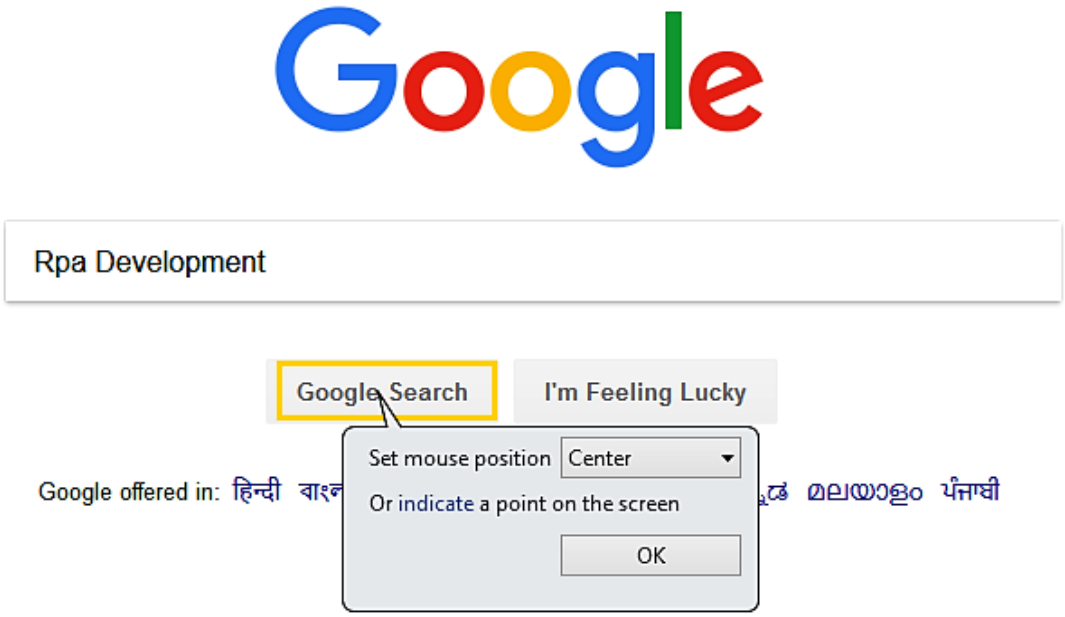


A pop-up window will be shown. Just type the text that you want to search for. Also, check the `Empty Field` option. Press `Enter`:

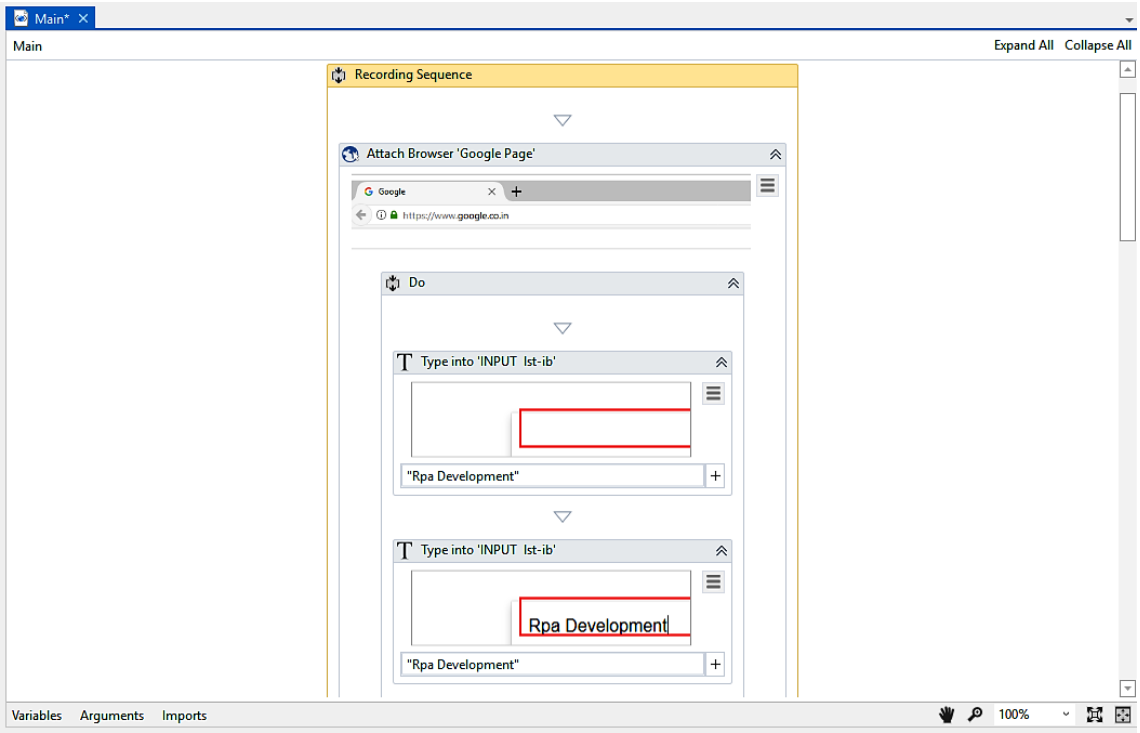


It will again show you a pop-up window. Now select `Click Image` from the Citrix Recording activity. You have to select the whole search area of the Google search bar. This time, it will ask you to indicate a point on the screen. Just

point to the element that you have previously selected (in our case, it was the search bar area):



Click `OK`. Press `Save & Exi``t` and we are done. You can clearly see that UiPath generated the sequence shown in the following screenshot:



Press [*F5*] to see the result.

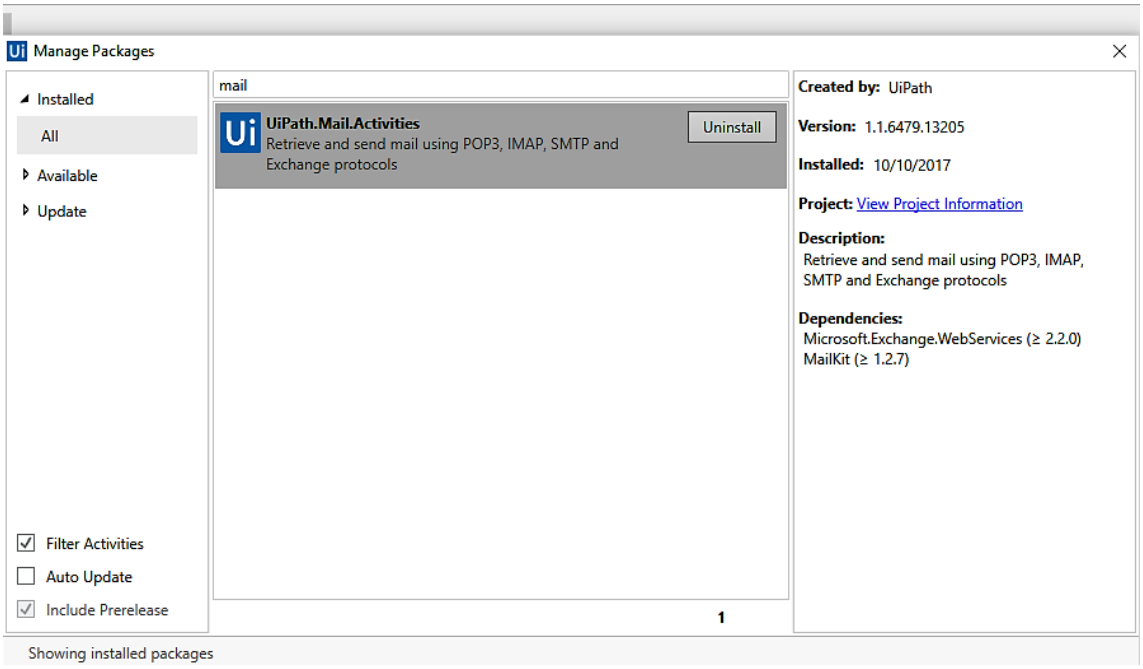
Note:

We have not used the **`Open browser`** activity. So, you have to log on to Google.com before executing this program. If you do not want this, then drag and drop the **`Open Browser`** activity before Recording Sequence.

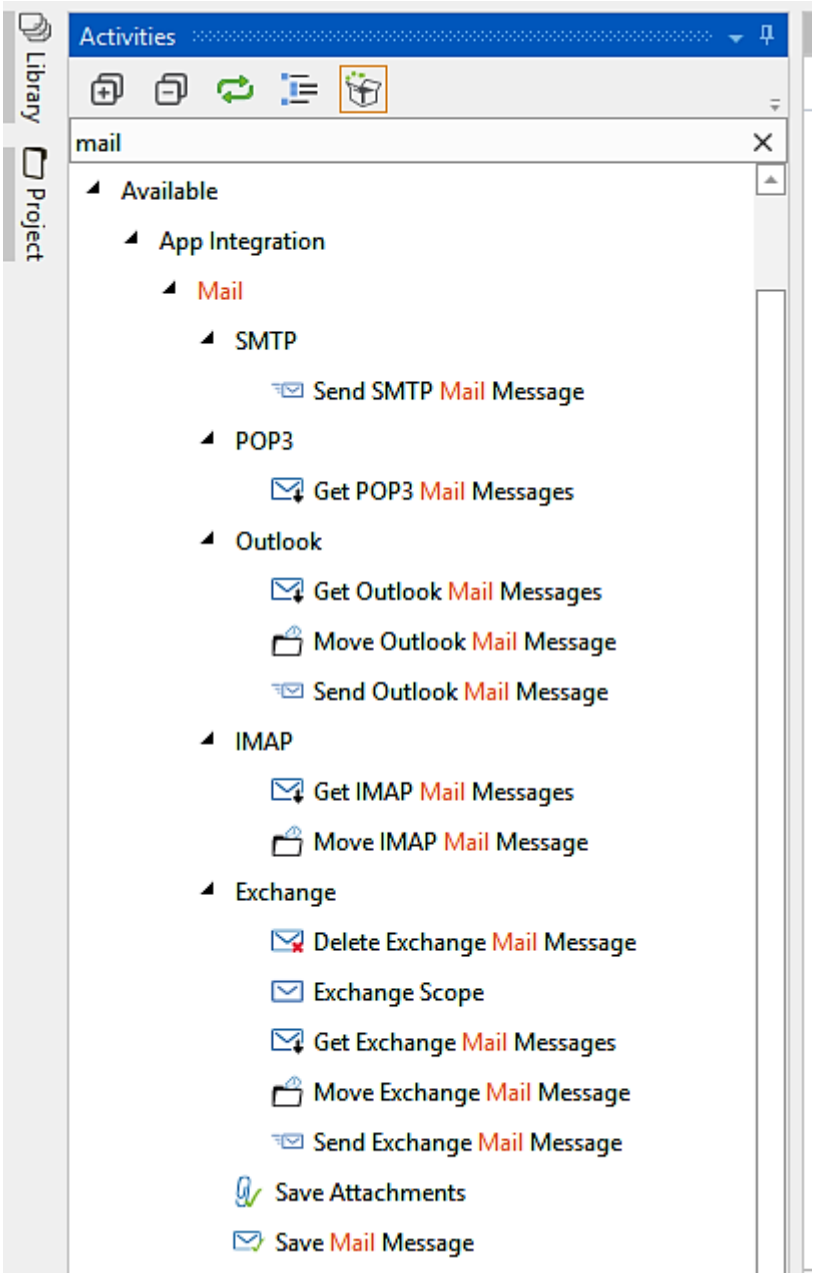
Mail plugin

To use any Mail activities, you have to install the Mail package. To check whether the Mail package is installed or not, simply search for `Mail` in the **`Activities`** panel. It will list all the mail activities. If the activities are not listed in the **`Activities`** panel then you have to install the `UiPath.Mail.Activities` package.

To install the Mail NuGet package, click on the **`Manage Package`** icon at the top of the **`Activity`** panel. The **`Manage``Packages`** window will appear. Search for `mail` in the search bar. As shown in the following screenshot, there is an **`Uninstall`** button next to **`UiPath.Mail.Activities`**. This is because the Mail activity is already installed in UiPath Studio. If it is not installed, an **`Install`** button will appear next to the **`UiPath.Mail.Activities`**:



There are various mail activities that are used when working with UiPath Studio:



Some frequently used Mail activities are:

1. **SMTP**: It is used to send mail messages:
    - **Send SMTP Mail messages** activity: This activity is used to send a mail to another mail.
2. **POP3**: Although this is not the preferred choice, it is still used to receive mail messages:
    - **Get POP3 Mail Messages** activity: This activity is used to receive mail messages.
3. **IMAP**: It is used to receive mail messages. It is a better option than POP3:
    - **Get IMAP Mail Messages** activity: This activity is also used to receive the mail messages. It gives us the flexibility to manipulate mail messages and can be accessed remotely.

Note:

Once you get familiar with these, you can easily try the rest of the activities.

PDF plugin

PDF stands for **Portable Document Format** and it is used to keep the document platform independent. Why do we use PDF?

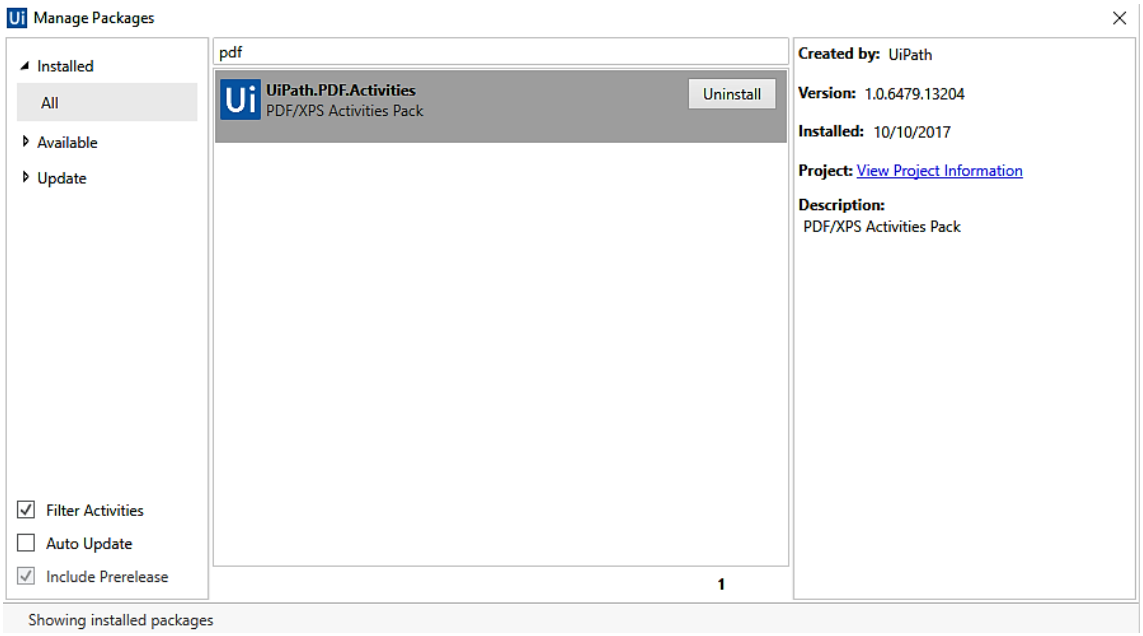
Suppose we have a Microsoft Word 2007 application installed in our system and we make a `.doc` file. This doc file can be opened on any system. Consider a system with Microsoft Word 2017 installed on it. If we view that doc file in this application, the format of the application is not going to be the same. This is because both Microsoft applications have different sets of architecture and specifications. Their format is not the same.

Here, PDF comes into action. It remains the same across all systems. That is why all confidential documents are sent or received using PDF. Also, if you do not want to change the behavior of the document across different platforms, you should convert the document into the PDF format.

To use any PDF activities, you have to install the PDF NuGet package. To check whether the PDF package is installed or not simply search for PDF activities in the **`Activity`** panel. It will list all PDF activities. If PDF activities are listed in the **`Activities`** panel, you have to install the `UiPath.PDF.Activities` package.

To install the PDF NuGet package, click on the **`Manage``Package`** icon at the top of the **`Activities`** panel.

The **`Manage Packages`** window will appear. Search for `PDF` in the search bar. As shown in the following screenshot, there is an **`Uninstall`** button next to **`UiPath.PDF.Activities`**. This is because PDF activity is already installed in UiPath Studio. If it is not installed, an **`Install`** button will appear next to **`UiPath.PDF.Activities`**:



In our case, the PDF activity is already installed. That is why there is an **`Uninstall`** button.

Some frequently used PDF activities are:

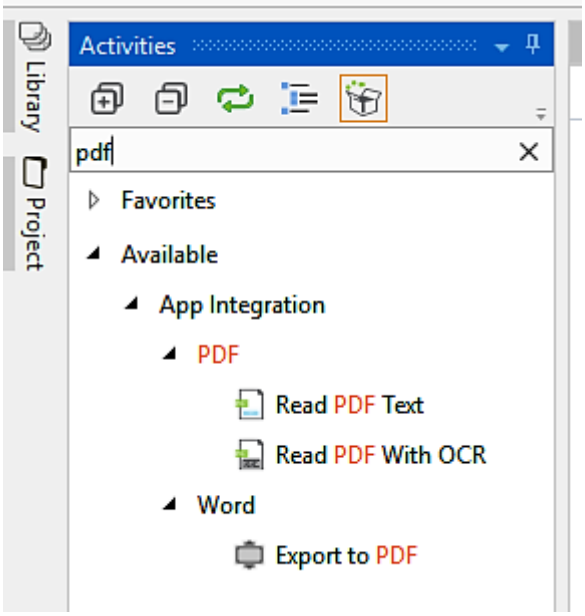
1. `Read PDF Text` : It is used to read the text written on any PDF document. However, the `Read PDF Text` activity cannot guarantee extraction of the entire text.

OR

We can extract all the fields from the PDF file by using the Screen Scraping activity. Start scraping the PDF file by clicking on the Screen Scraping icon in the menu and simply locating the area in which we have to extract the data. If the text extraction fails, then change the extraction type to OCR with a scale of 3 and above. Choose either Google or Microsoft OCR.

2. `Read PDF with OCR` : It is used to read the image part of the PDF file. Suppose there is an image in the PDF file and there is some text written on it. The Read PDF text activity will fail to read that text. This is where OCR is used. There might be scenarios in which some text is written on a colorful background. Such cases can easily be tackled by using the `Read Text With OCR` activity.

If both `Read PDF Text` and `Read PDF with OCR` methods fail to extract the text, we still have the Screen Scraping method to extract the data from PDF (sometimes, we have to indicate the related element in order to recognize the text):



Select the proper method according to your needs and whatever is best suited to your project.

Web integration

Creating a web project, such as a company's website, B2B portal, or e-commerce website, requires the involvement of a wide range of technologies such as database design, networking, design, UX, user accessibility, SEO, and project management. These technologies also require HTML, CSS, JavaScript, JQuery, AJAX, system analysis and design, testing, operation, and a number of other methodologies. All of these activities can be classified under web integration.

Web integration, therefore, involves a wide process of connecting all these technologies and components that are essential for completing the web project.

The following are the methodologies that are used extensively for integrating with the web:

- **Application Programming Interface** (**API**)

- **Extensible Markup Language** (**XML**)
- **Simple Object Access Protocol** (**SOAP**)
- **JavaScript Object Notation** (**JSON**)
- **Representational State Transfer** (**REST**)

1. **API**: API integration is used quite frequently. It is impossible to find a modern web application or website that is not exposed to an API. API integration allows a software or web application to interact with other software or web applications in real time.

UiPath Studio works both ways: It can automatically extract data from one application and pass it to a web service. Also, it can retrieve data from a web service and input it to another application.

You have already explored and implemented how UiPath automates user interfaces. API is the easiest way to connect two applications or systems over the internet.

2. **XML**: XML is a markup language like **Hyper Text Markup Language** (**HTML**). XML was designed to store and transport data and also to be self-descriptive. We can say that it extends the functionality of HTML. It is a software-independent and hardware-independent technique for storing and transporting data, for example:

```
<Message><To>John</To>
   <From>Ava</From>
   <Subject>Reminder</Subject>
   < Message Body>Do not forget to meet me this weekend!</Message body></Message>
```

You can make any Parent-Node structure in XML.

3. **SOAP**: SOAP is an XML-based messaging protocol for exchanging information between computers. You can say that SOAP is an application of XML.

The following are the advantages of SOAP:

-
    - SOAP is a communication protocol designed to communicate over the internet.
    - SOAP can extend HTTP requests.
    - SOAP can be used for broadcasting a message.
    - SOAP is platform-independent.
    - SOAP is language-independent.
    - SOAP is the XML way of defining what information is sent and how.
    - SOAP enables client applications to easily connect to remote services and invoke remote methods. SOAP can also be used in a variety of messaging systems.

4. **JSON**: JSON is a method of lightweight data-interchange. It is self-describing and easy to understand. The most important part of JSON is that it is language independent.

When exchanging data between a browser and a server, the data can only be text. JSON is text-based. We can convert any JavaScript object into JSON, and send JSON to the server. Not only that; most languages have their methods for converting their objects into JSON and vice-versa.

We can also convert any JSON received from the server into JavaScript objects. In this way, we can work with the data as JavaScript objects, without any parsing.

5. **REST**: REST relies on a stateless, client-server, cacheable communication protocol. It is [*an architectural style*] for designing networked applications. The idea is that, rather than using complex techniques such as SOAP to connect between computers, a simple HTTP is used to make calls between machines.

The World Wide Web itself is based on HTTP and can be viewed as a REST-based architecture. RESTful applications use HTTP requests to post, read, and delete data. REST is lightweight. It is simple and fully-featured. That said, there is basically nothing you can do in web services that cannot be done with a REST architecture.

Excel and Word plugins

The most important plugins are Microsoft office plugins. In this section, we will cover Excel and Word plugins.

In most projects, one of these two plugins is used.

Excel plugin

Excel is an application program developed by Microsoft. It is a part of the Microsoft Office suite. Excel is capable of creating and manipulating files that are saved with .xls or .xlsx extensions. General uses of Excel include (an individual cell) cell-based calculation. For example, with an Excel spreadsheet, you can create a table, use formulae to compute every row and column, make your own monthly expense list, and so on.

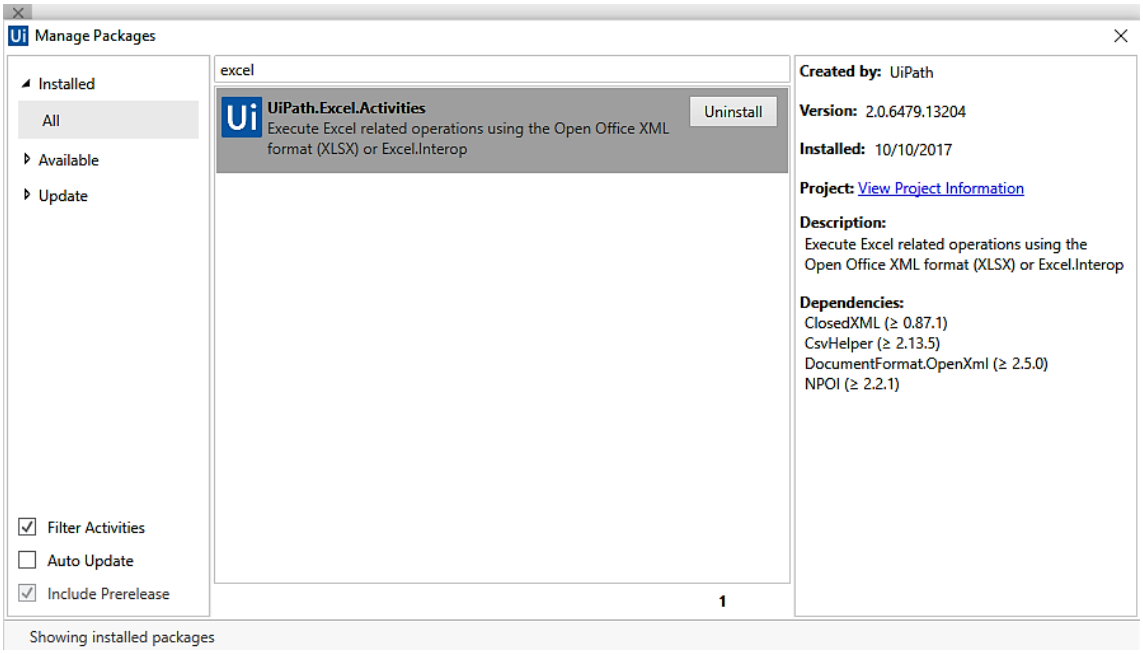
Unlike a word processor such as Microsoft Word, Excel documents consist of rows and columns. Each column consists of a cell in which we can store a value. The value can either be text, string, or number.

In UiPath Studio, there is a NuGet Package called `UiPath.Excel.Activities`. The Excel activity is pre-installed in UiPath Studio. In case it is not installed, it can be installed manually.

To check if the Excel activity is installed or not, simply search for `Excel` activities on the **`Activities`** panel. It will list all Excel activities. If Excel activities are not listed in the **`Activities`** panel, then you need to install the **`UiPath.Excel.Activities`** package.

To install the Excel NuGet package, click on the **`Manage Package`** icon located at the top of the **`Activities`** panel.

A **`Manage Packages`** window will appear. Search for `Excel` in the search bar. As shown in the following screenshot, there is an **`Uninstall`** button next to **`UiPath.Excel.Activities`**. This is because Excel activities are already installed in UiPath Studio. If it is not installed, an **`Install`** button will appear next to **`UiPath.Excel.Activities`**:



Word plugin

Microsoft Word is often called simply Word or MS Word. Microsoft Word is a widely used commercial word processor designed by Microsoft. Microsoft Word is a component of the Microsoft Office suite.

Microsoft Word is available for both Windows and Mac operating systems.

The following are the Microsoft Word features:

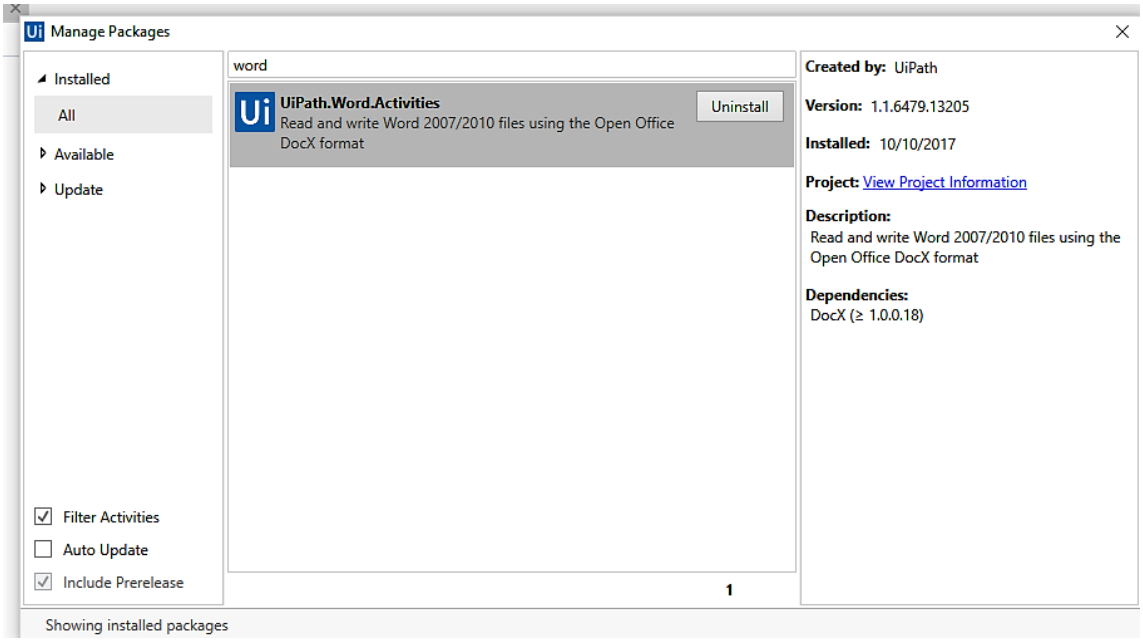
1. It makes it possible for everything displayed on the screen to appear in the same way when printed or moved to another program.
2. Microsoft Word has a built-in dictionary for spell checking.
3. Text-level features such as bold, underline, italic, and strike.

4. Page-level features such as paragraphing and justification.
5. Microsoft Word is compatible with many other programs, the most common being the other members of the Office suite.

In UiPath Studio, there is a NuGet package called **`UiPath.Word.Activities`**. Word activity is pre-installed in UiPath Studio. In case it is not installed, we have to install it manually.

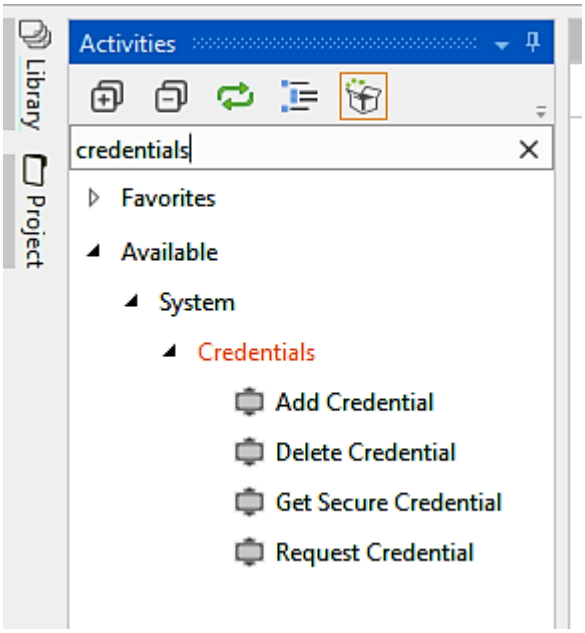
To check whether the Word activity is installed or not, simply search for `Word` in the **`Activities`** panel and press **`Enter`**. It will list all the Word activities. If Word activities are not listed in the **`Activities`** panel then you have to install the **`UiPath.Word.Activities`** package.

To install the Word NuGet package, click on the **`Manage``Package`** icon. The **`Manage Packages`** window will appear. Search for `Word` in the search bar. As shown in the following screenshot, there is an **`Uninstall`** button next to **`UiPath.Word.Activities`**. This is because Word activities are already installed in UiPath Studio. If it is not installed, there will be an **`Install`** button next to **`UiPath.Word.Activities`**:



Credential management

In the Windows operating system, you can view your network login credentials, that is, the username and password, by using Credential Manager. With the help of UiPath Studio, you can automate the process of creating, manipulating, and deleting credentials using some credential activities:



The following are credential activities:

1. **Add Credential activity**: You can add a credential activity for use in your project. You just simply have to specify the username and the password.
2. **Get Credential activity**: This activity is used to store the username and password for future use. It enables us to further check whether credentials are valid or not.

3. **Request Credential activity**: This activity is used to display a dialog box to a user asking them about their credentials. It then stores the username and password in string variables that can be further used to log in to the applications.
4. **Delete credential activity**: This activity is used to delete the credentials that we have stored.

Extensions -- Java, Chrome, Firefox, and Silverlight

Extensions are small software programs that can be used to modify and extend the functionality of any browser. You can build your own extension by using web technologies such as HTML, JavaScript, and CSS. Extensions have little or no user interface.

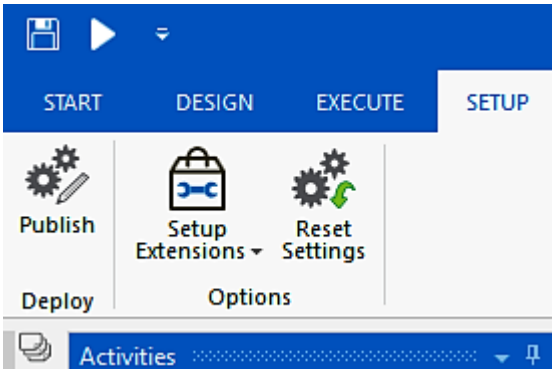
Java extensions are useful when you have to automate a Java application. Without this extension, UiPath Studio does not correctly identify the UI element of a Java application.

Chrome and Firefox extensions are used when you are working with the Chrome/Firefox browsers. By this, we mean that while automating with UiPath Studio, if you are interacting with a browser, you first have to install the extension for that browser.

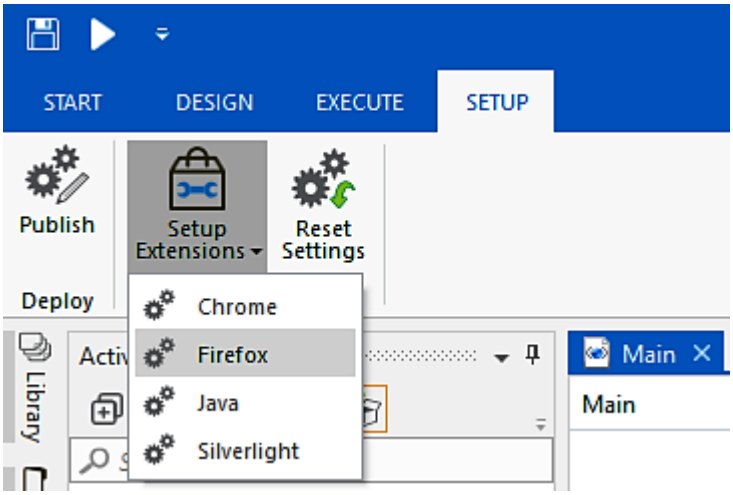
Similarly, the Silverlight extension has to be installed if you want to integrate your application using Microsoft's Silverlight.

Almost all extensions have a similar installation method. Once you get familiar with the method, you can install the remaining of the extensions on your own.

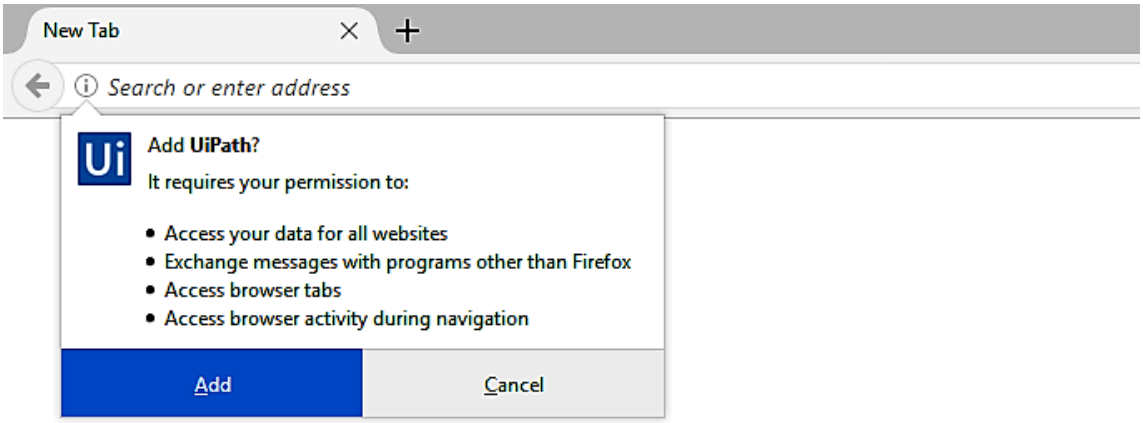
In UiPath Studio, you can find all the extensions in the `Setup Extensions` menu. Click on the `SETUP` tab at the top of the UiPath Studio window:



Now click on the `Set Up Extensions` icon and select the extension that you want to select:



In this session, we are going to select the Firefox extension from the drop-down list. Automatically, the Firefox browser is opened and asks you to add UiPath. Just click on the `Add` button:



Your extension has been successfully installed. A dialog box will pop up confirming this.

If you want to install other extensions, you just have to select the desired extension from the drop-down list.

Summary

In this lab, you have learned about the role of plugins and how they can increase the scope for automation. Over time, many new plugins will be introduced, the inclusion of those plugins and extensions will be on a similar line; however, the internal workings of those plugins may vary. You have also learned that the Terminal plugin is different

from the PDF plugin. In this lab, Java, Chrome, Firefox, and Silverlight extensions were also covered. You also learned about Mail, Web, and SAP integrations. Credential management was a nice addition to this lab.

In the next lab, we will focus on assistant bots and event triggers.