Dynamic Web Form Data Entry using UiPath

Abstract

This project report explores the automation of data entry tasks using UiPath, focusing on a dynamic web form scenario. The project addresses the challenges posed by dynamic web form fields that change positions after each submission. The objective is to achieve a 100% success rate in data entry from an Excel sheet into a web form while significantly reducing the time taken compared to manual entry. By leveraging UiPath's robust automation capabilities, the project demonstrates the efficiency and reliability of robotic process automation (RPA) in handling repetitive tasks.

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1. Introduction:

1.1 Background and Overview

Data entry is an essential but often monotonous task in many business processes. Traditionally, data entry tasks are performed manually, which can be time-consuming, prone to errors, and tedious. The advent of Robotic Process Automation (RPA) has revolutionized these tasks by enabling the automation of repetitive and structured activities. UiPath, a leading RPA tool, provides robust capabilities to automate data entry tasks, enhancing efficiency and accuracy.

You need to automate data entry from a spreadsheet into a web form using UiPath. The form fields' positions change after each submission.

1.2 Problem Statement

The RPA Challenge Level 1 involves entering data for 10 individuals into a web form with fields that change positions after each round of submission. Each individual has 7 attributes: First Name, Last Name, Company Name, Role in Company, Address, Email, and Phone Number. The challenge is to automate this process to achieve a 100% success rate in data entry while minimizing the time taken in milliseconds.

- Use UiPath to read data from the spreadsheet.
- Automate opening the web form in a browser.
- Write logic to input data from the spreadsheet into the web form fields.
- Automate the submission of the form.
- Implement logic to handle changes in field positions after each submission.

1.3 Objectives

The main objectives of this project are:

- To automate the data entry process for the RPA Challenge Level 1 using UiPath.
- To ensure a 100% success rate in data entry.
- To significantly reduce the time taken compared to manual entry.
- To handle dynamic web form fields effectively.

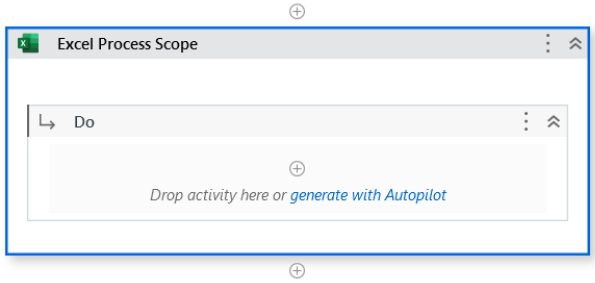
2. Methodology:

2.1 Tools and Technologies

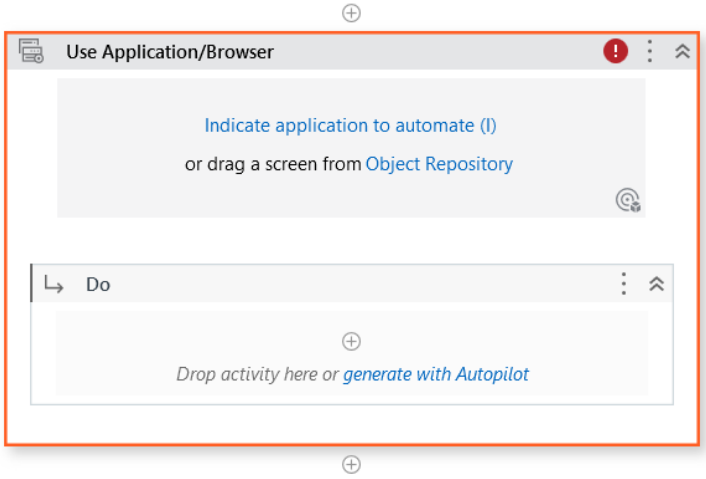
The project utilizes UiPath Studio, a leading RPA tool, for automation. Key activities used in UiPath include:

- **Excel Process Scope**: The **Excel Application Scope** activity in UiPath is a comprehensive tool designed to interact with Excel workbooks. It opens an Excel file and provides a container within which you can perform various operations such as

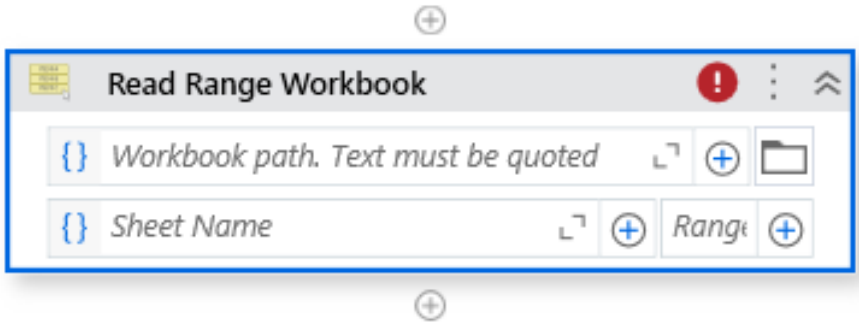
reading, writing, and manipulating data in Excel. This activity ensures that all actions performed on the Excel workbook are managed efficiently within a single scope.



- **Use Application/Browser**: The Use Application/Browser activity in UiPath is a versatile and essential component for automating tasks that involve interacting with desktop applications or web browsers. This activity is designed to open, use, and close applications or web pages, enabling robust automation solutions across different platforms.



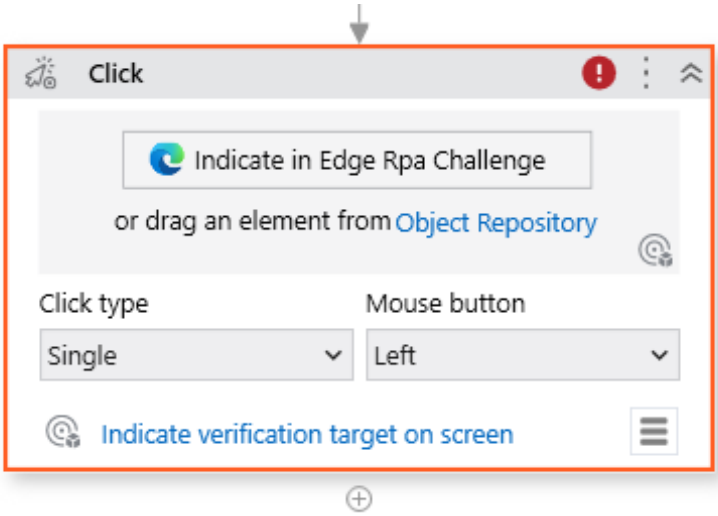
- **Read Range Workbook**: To read data from the Excel sheet into a data table. Choose the Excel workbook path that needs to be used for automated data entry on the RPA Challenge Level 1.



- **Click**: To simulate a mouse click on a specific UI element (like Start or Submit), such as a button, link, or field, within an application or web page. Click activity relies on

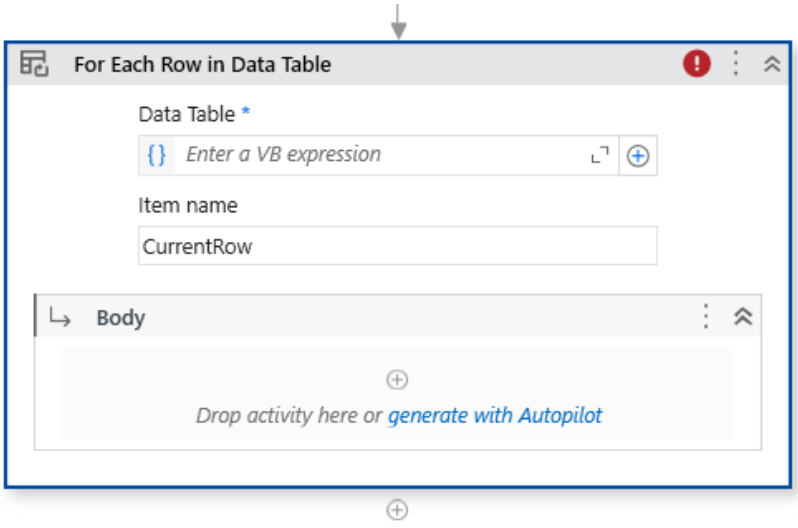
selectors to identify the UI elements. A selector is an XML fragment that includes attributes of the UI element, like id, name, class, etc. UiPath uses these selectors to precisely locate the element to be clicked.

- **Robust Selectors**: Use attributes that are less likely to change to create reliable selectors.
- **Anchor Elements**: Use anchors for better accuracy when elements have dynamic positions.

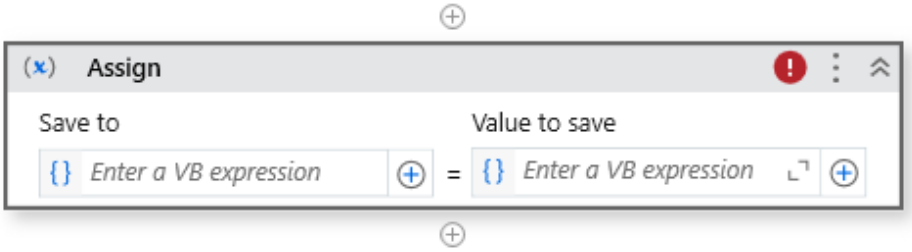



```
<Selector>
  <WebCtrl idx='1' name='{dynamicFieldName}' />
</Selector>
```

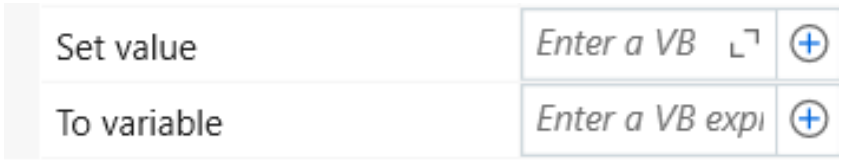
- **For Each Row in Data Table**: The **For Each Row in Data Table** activity in UiPath is used to iterate through each row of a DataTable, allowing you to perform a series of actions on each row. This activity is crucial for processing data in bulk, enabling automation workflows to handle large datasets efficiently.



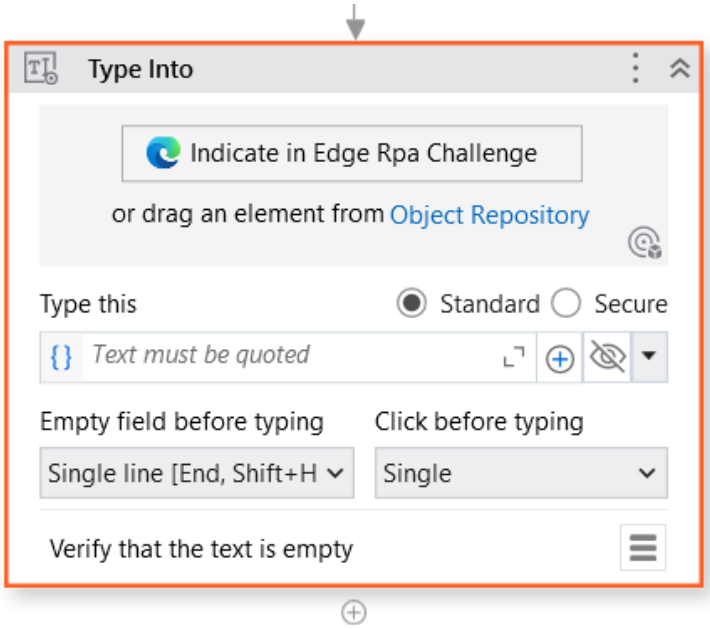
- **Assign**: The **Assign** activity in UiPath is a fundamental and versatile tool used to assign values to variables within your automation workflow. This activity is essential for storing, modifying, and managing data throughout the execution of a process. Use descriptive names for variables to make the workflow more understandable and maintainable.



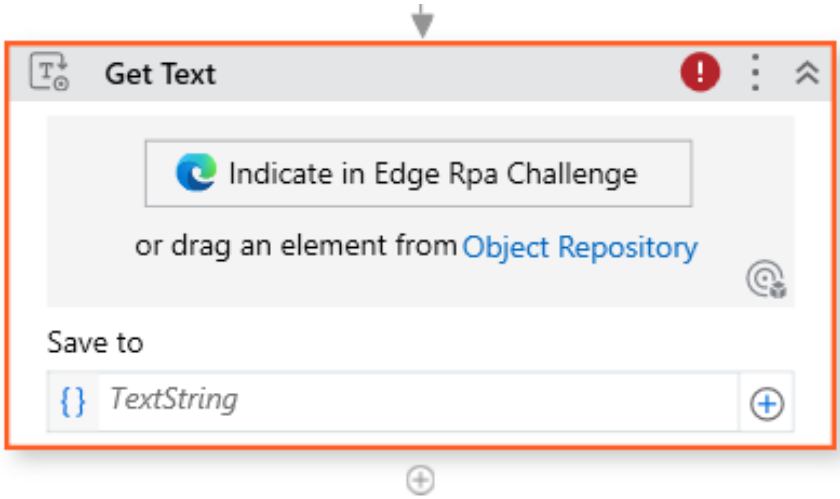
- **Set Variable:** To: Enter the name of the variable you want to set. If the variable doesn't exist, you can create it by pressing Ctrl + K while the cursor is in the "To" field, then typing the variable name and pressing Enter.Value: Enter the value you want to assign to the variable.



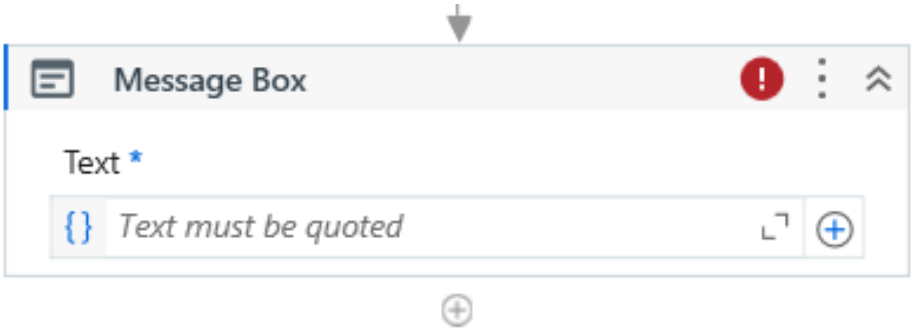
- **Type Into**: To input data into the web form fields. The Type Into activity in UiPath is a fundamental tool used to automate the process of entering text into input fields on various user interfaces, such as web forms, desktop applications, or virtual environments. This activity simulates keyboard typing to insert the specified text into the target element. The Type Into activity relies on selectors to identify the UI element where the text will be entered. Selectors are XML fragments that include attributes like id, name, class, etc., which uniquely identify the target element.



- **Get Text:** To extract text from a user interface element on a screen, such as a web page, desktop application, or even a virtual environment. This activity is particularly useful when you need to capture specific information displayed on the screen and use it within your automation workflows.



- **Message Box**: To display the message extracted from the user interface element on a screen. The **Message Box** activity in UiPath is a simple yet powerful tool used to display a dialog box with a specified message to the user. This activity is primarily utilized for debugging purposes, user notifications, and interaction within an automation workflow.



2.2 Data Collection

Data collection is a fundamental step in any research, analysis, or automation project. It involves gathering information from various sources to be used for making decisions, generating insights, or performing specific tasks.

In the context of UiPath automation, data collection typically refers to the process of retrieving data from different sources such as files, databases, or web services to be processed and used within the automation workflows.

2.3 Key Aspects of Data Collection

1. **Sources of Data**:

- **Files**: Includes data from Excel spreadsheets, CSV files, text files, and other document formats.
- **Databases**: Data from SQL databases, NoSQL databases, and other data storage systems.
- **Web Services**: Data retrieved through APIs, web scraping, or other online sources.
- **User Input**: Data collected directly from users through forms, surveys, or other interactive methods.

2. **Methods of Data Collection**:
   - **Automated Collection**: Using tools and technologies like UiPath to automatically gather data from specified sources. This method is efficient and reduces the risk of human error.
   - **Manual Collection**: Gathering data manually by users or researchers. This method can be time-consuming and is prone to errors but might be necessary for highly specialized or non-standard data.
3. **Tools and Technologies**:
   - **UiPath Activities**: UiPath provides various activities to facilitate data collection, such as:
     - **Read Range**: For reading data from Excel sheets into DataTables.
     - **Read CSV**: For reading data from CSV files.
     - **HTTP Request**: For making API calls to retrieve data from web services.
     - **Data Scraping**: For extracting data from websites.
   - **Database Integration**: Using database activities to connect to and retrieve data from SQL and NoSQL databases.

Data for the project is collected from an Excel sheet provided by the RPA Challenge website. The sheet contains details of 10 individuals, each with 7 attributes. The data is structured as follows:

- First Name
- Last Name
- Company Name
- Role in Company
- Address
- Email
- Phone Number

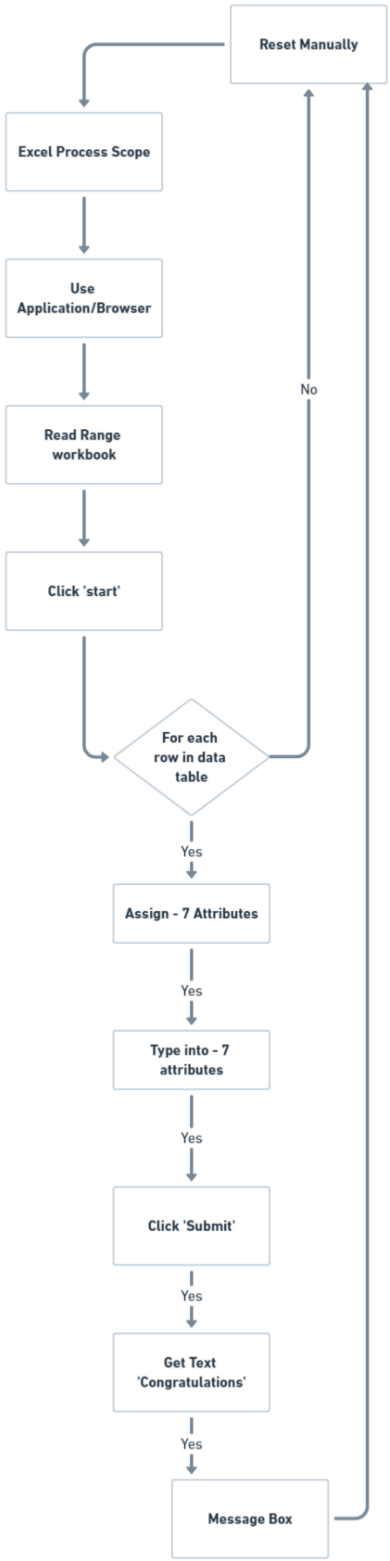
2.4 Sample Input:

	First Name	Last Name	Company Name	Role in Company	Address	Email	Phone Number
2	John	Smith	IT Solutions	Analyst	98 North Road	jsmith@itsolutions.co.uk	40716543298
3	Jane	Dorsey	MediCare	Medical Engineer	11 Crown Street	jdorsey@mc.com	40791345621
4	Albert	Kipling	Waterfront	Accountant	22 Guild Street	kipling@waterfront.com	40735416854
5	Michael	Robertson	MediCare	IT Specialist	17 Farburn Terrace	mrobertson@mc.com	40733652145
6	Doug	Derrick	Timepath Inc.	Analyst	99 Shire Oak Road	dderrick@timepath.co.uk	40799885412
7	Jessie	Marlowe	Aperture Inc.	Scientist	27 Cheshire Street	jmarlowe@aperture.us	40733154268
8	Stan	Hamm	Sugarwell	Advisor	10 Dam Road	shamm@sugarwell.org	40712462257
9	Michelle	Norton	Aperture Inc.	Scientist	13 White Rabbit Street	mnorton@aperture.us	40731254562
10	Stacy	Shelby	TechDev	HR Manager	19 Pineapple Boulevard	sshelby@techdev.com	40741785214
11	Lara	Palmer	Timepath Inc.	Programmer	87 Orange Street	lpalmer@timepath.co.uk	40731653845

3. Proposed System:

3.1 Flowchart

The flowchart below outlines the proposed system for automating the data entry process:

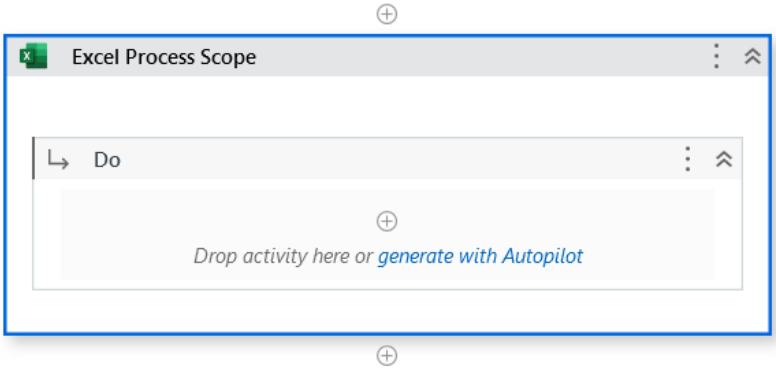


3.2 Architecture Explanation

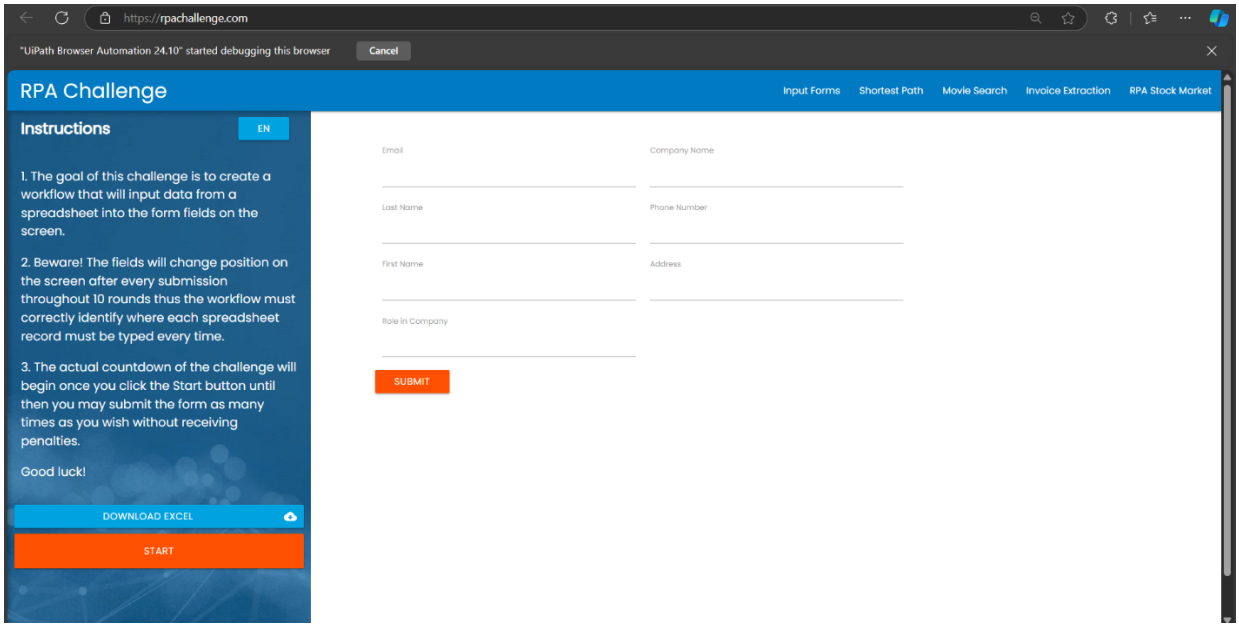
The architecture of the proposed system involves several key components and activities in UiPath:

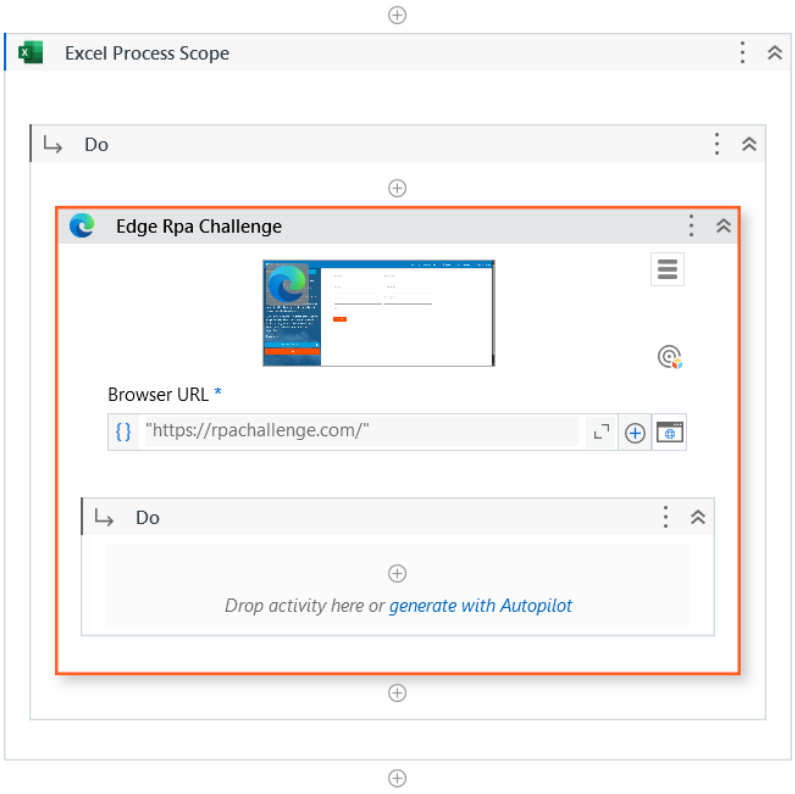
1. **Excel Process Scope**: This activity initiates an instance of Excel and opens the specified workbook containing the data. It ensures that the automation can interact with the Excel file to read and process the data.

    - Initiates an instance of Excel.
    - Opens the specified workbook containing the data.
    - Ensures interaction with the Excel file for data reading and processing.

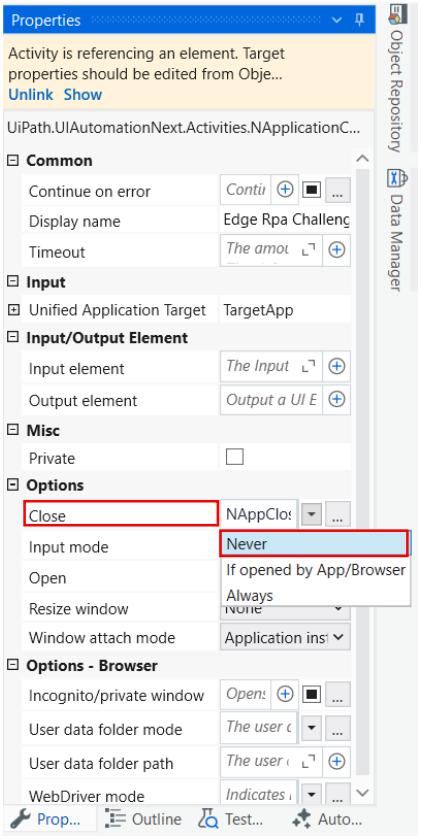


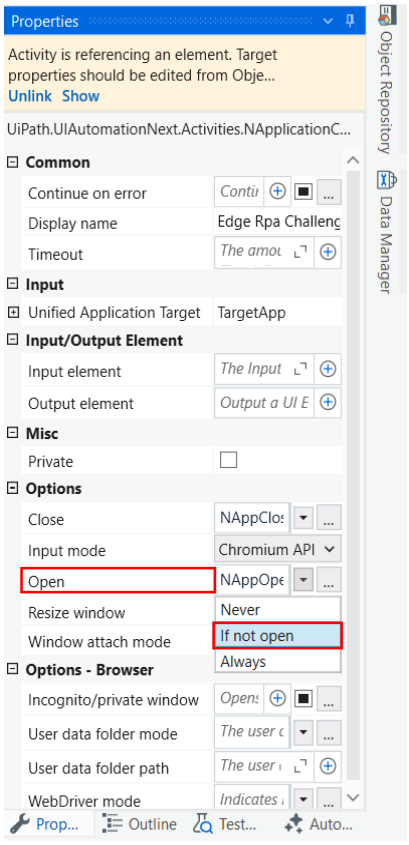
2. **Use Application/Browser**: This activity opens the web form in a browser where the data will be entered. It is configured to work with the specific URL of the RPA Challenge website. https://rpachallenge.com/



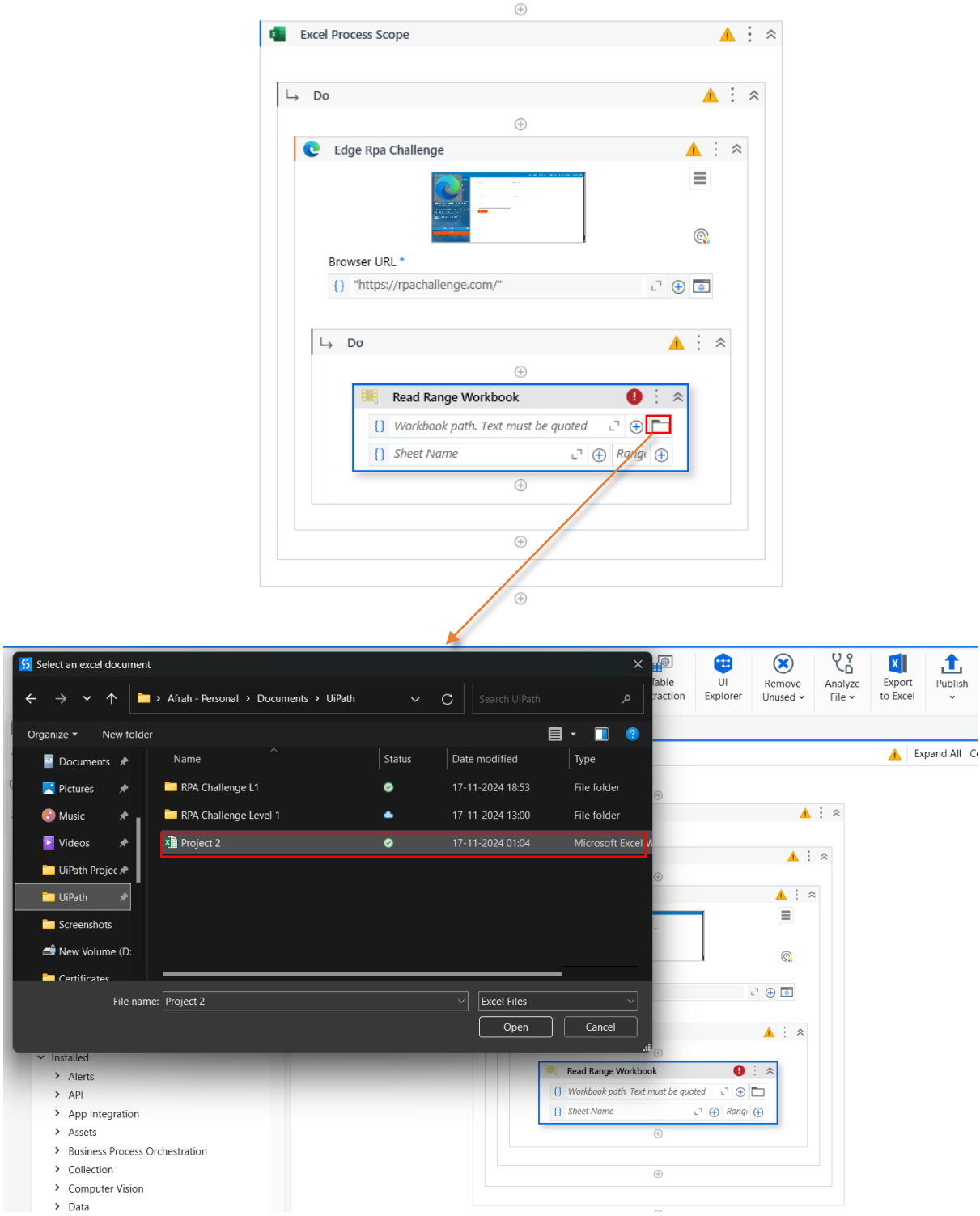


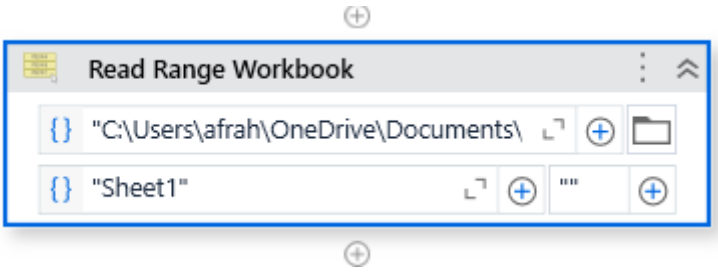
- After getting the URL, go to **Properties** to set the options of **Close** as never and **Open** as If not open, so that the automated entry starts by opening the website itself when we start debugging.



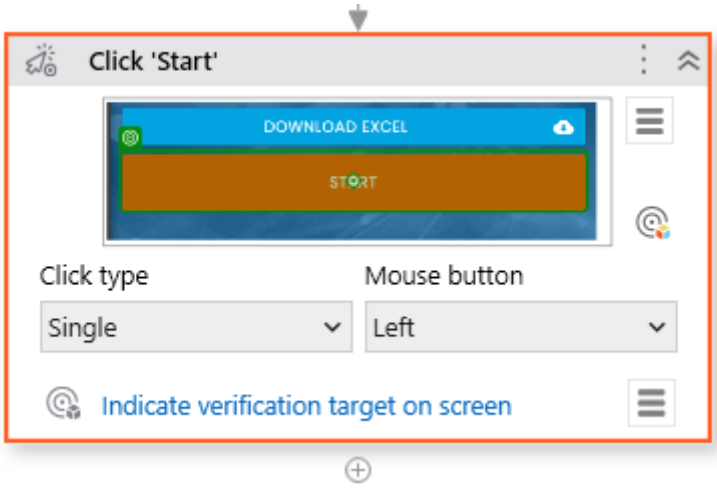


3. **Read Range Workbook**: This activity reads the entire range of data from the Excel sheet and stores it in a data table. This data table will be used to iterate through each row of data during the automation process. Choose the Excel workbook path that needs to be used for automated data entry on the RPA Challenge Level 1.

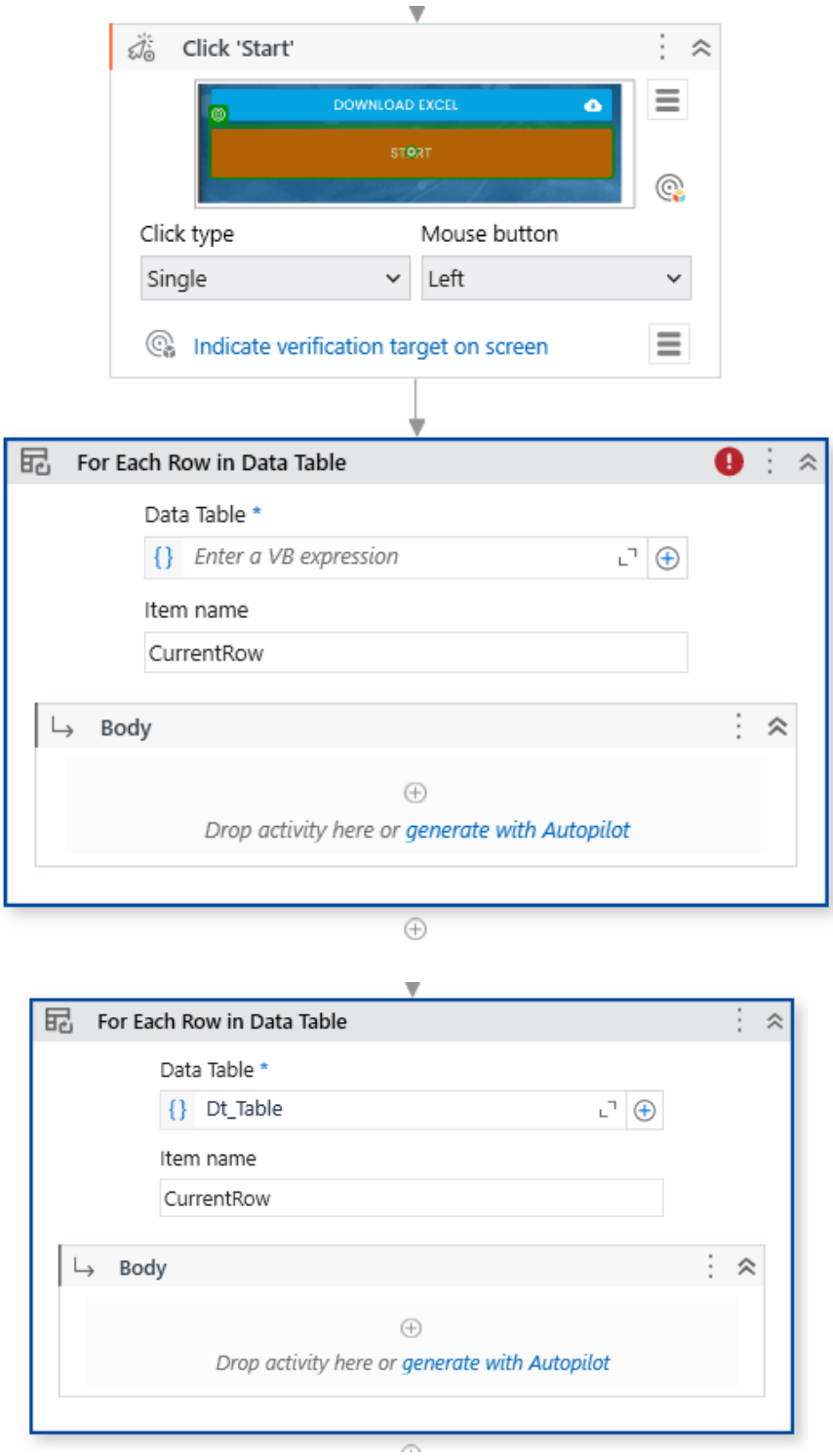




4. **Click 'Start'**: This activity clicks the 'Start' button on the web form to begin the data entry process. It is the first step in interacting with the web form after it has been opened.



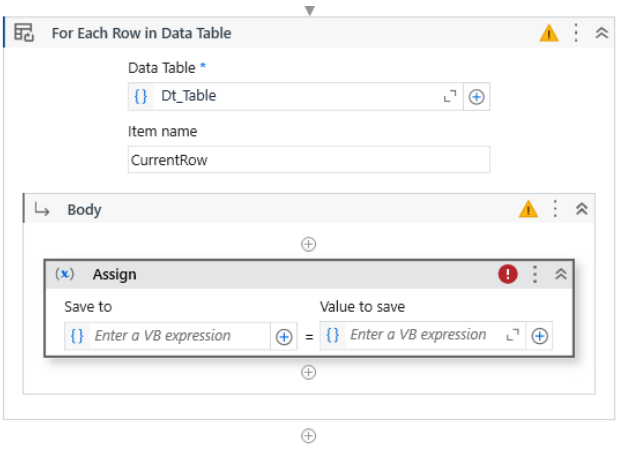
5. **For Each Row in Data Table**: This activity iterates through each row in the data table, processing one row at a time. Within this loop, several sub-activities are performed to assign values, enter data into the form, and submit the form.

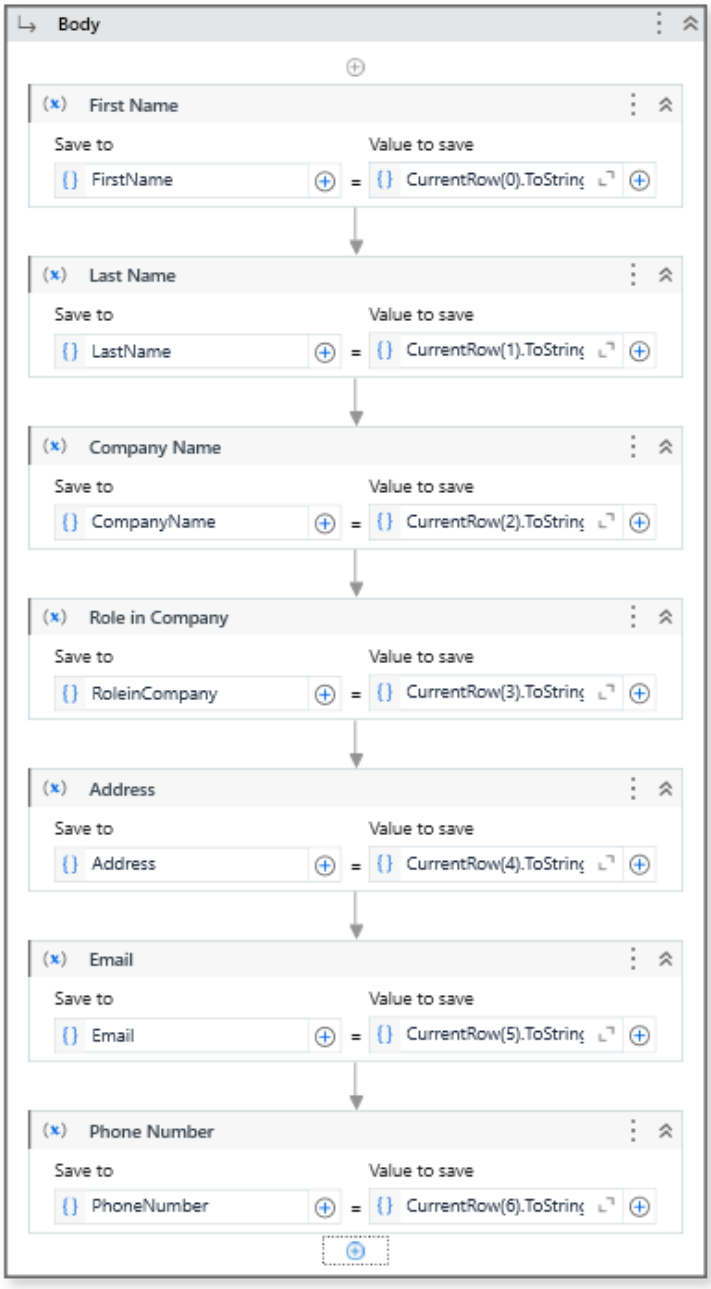


6. **Assign**: This sub-activity assigns values from each column in the data table to corresponding variables. It ensures that each attribute (First Name, Last Name, etc.) is correctly mapped to the appropriate variable. Use the Column Number of each attributes in the excel sheet in the order from 0 to 6 (7 columns), so the details of each person is entered correctly in the desired fields.

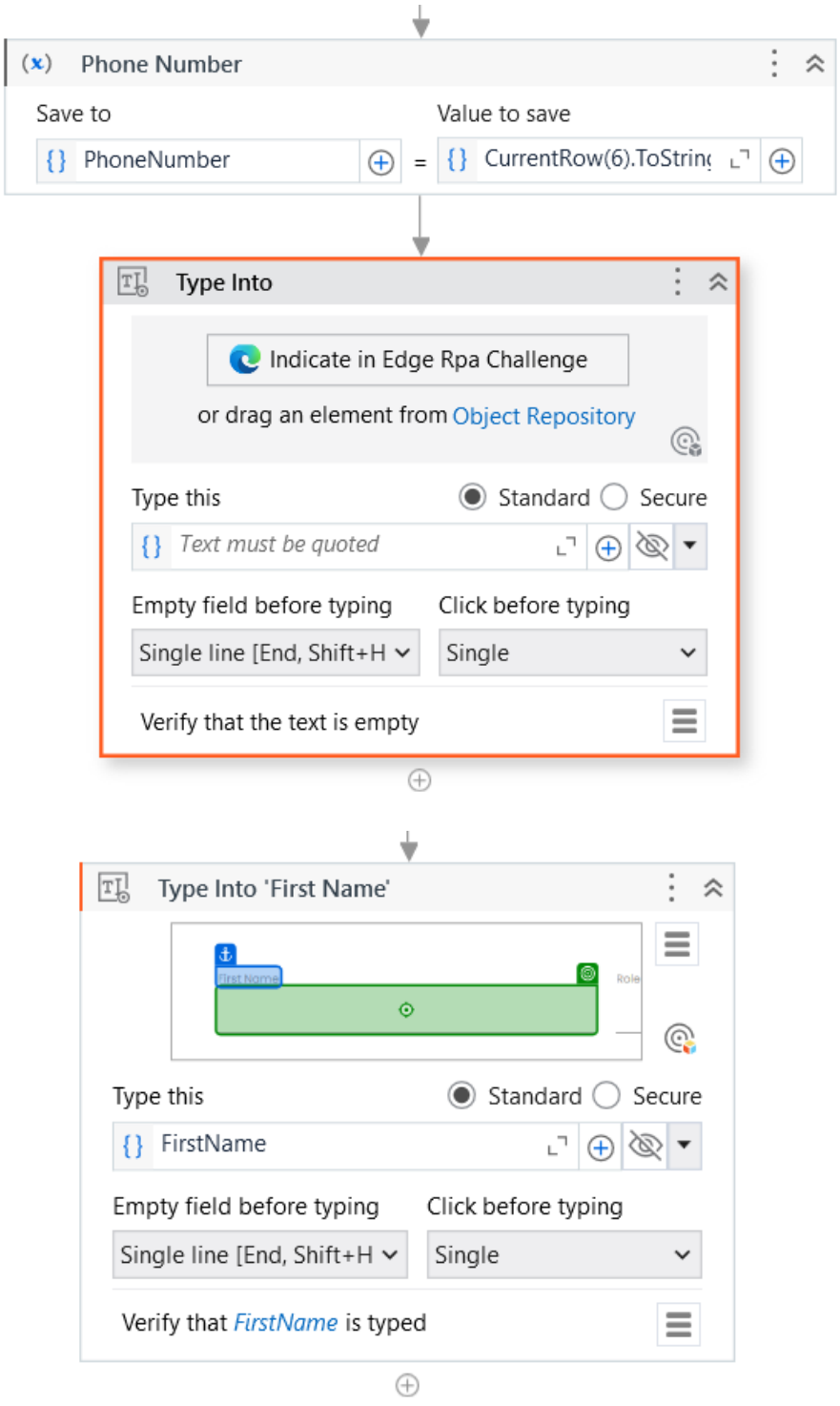
varFirstName = CurrentRow(0).ToString

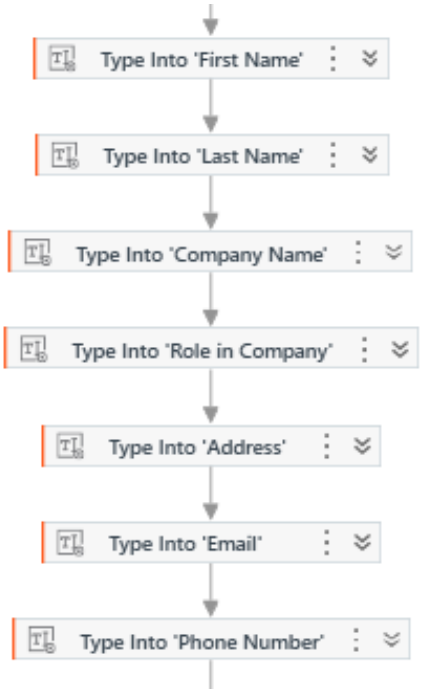
varLastName = CurrentRow(1).ToString


For Each Row in Data Table
Data Table *
Dt_Table
Item name
CurrentRow
Body
Assign
Save to
Value to save
Enter a VB expression
Enter a VB expression

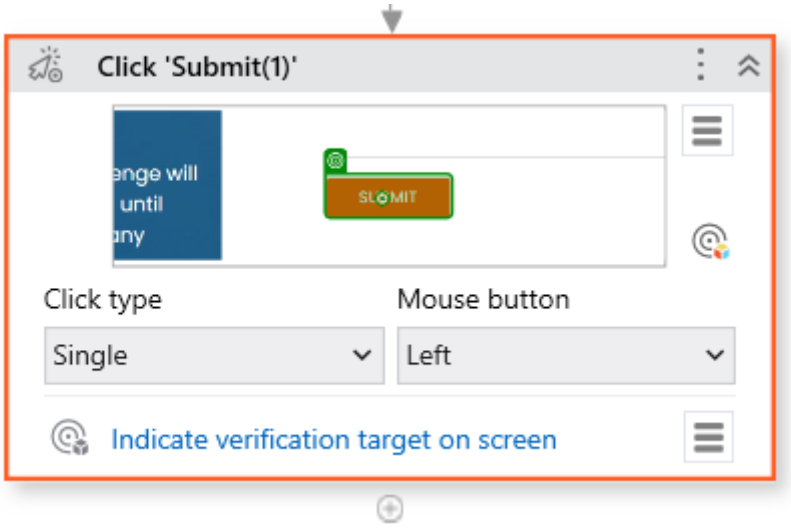

Body
First Name
Save to
Value to save
FirstName
CurrentRow(0).ToString
Last Name
Save to
Value to save
LastName
CurrentRow(1).ToString
Company Name
Save to
Value to save
CompanyName
CurrentRow(2).ToString
Role in Company
Save to
Value to save
RoleinCompany
CurrentRow(3).ToString
Address
Save to
Value to save
Address
CurrentRow(4).ToString
Email
Save to
Value to save
Email
CurrentRow(5).ToString
Phone Number
Save to
Value to save
PhoneNumber
CurrentRow(6).ToString

7. **Type Into**: This sub-activity inputs the data from the variables into the respective fields on the web form. It uses dynamic selectors to handle the changing positions of the form fields.

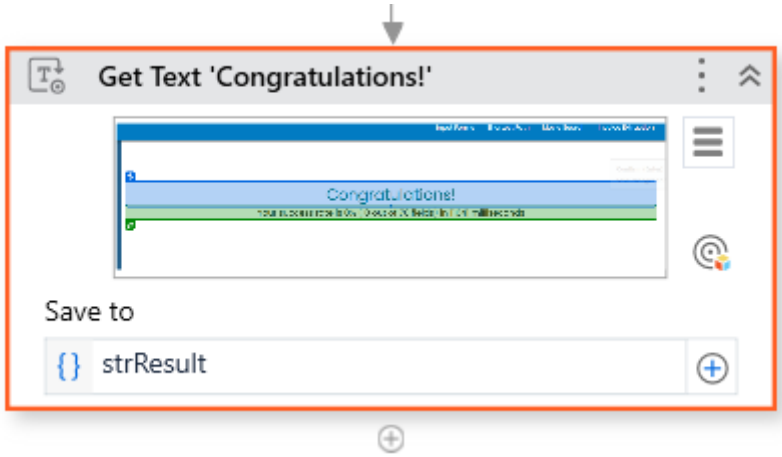




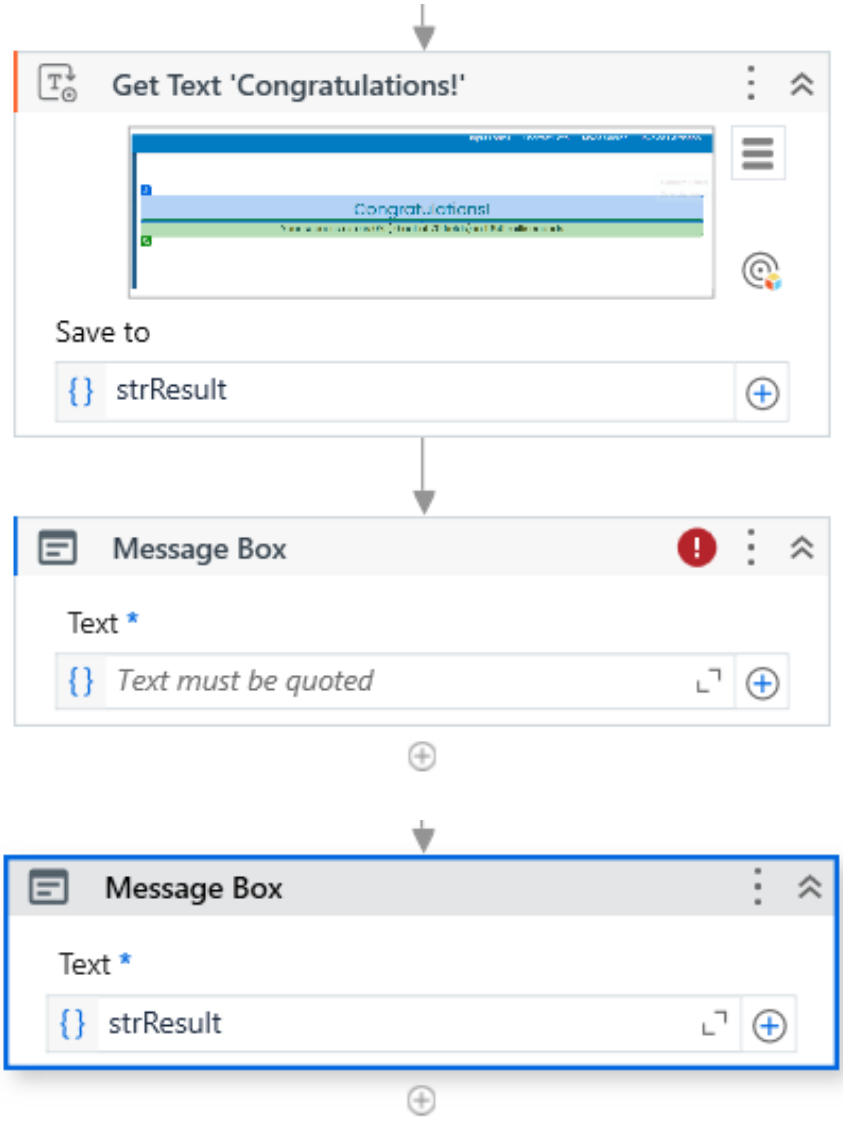
8. **Click 'Submit'**: This sub-activity submits the filled form. After submission, the form fields are expected to change positions, and the automation needs to handle this dynamically.



9. **Get Text 'Congratulations'**: This sub-activity verifies the successful submission of the form by checking for a 'Congratulations' message. This serves as a confirmation that the data was entered correctly.



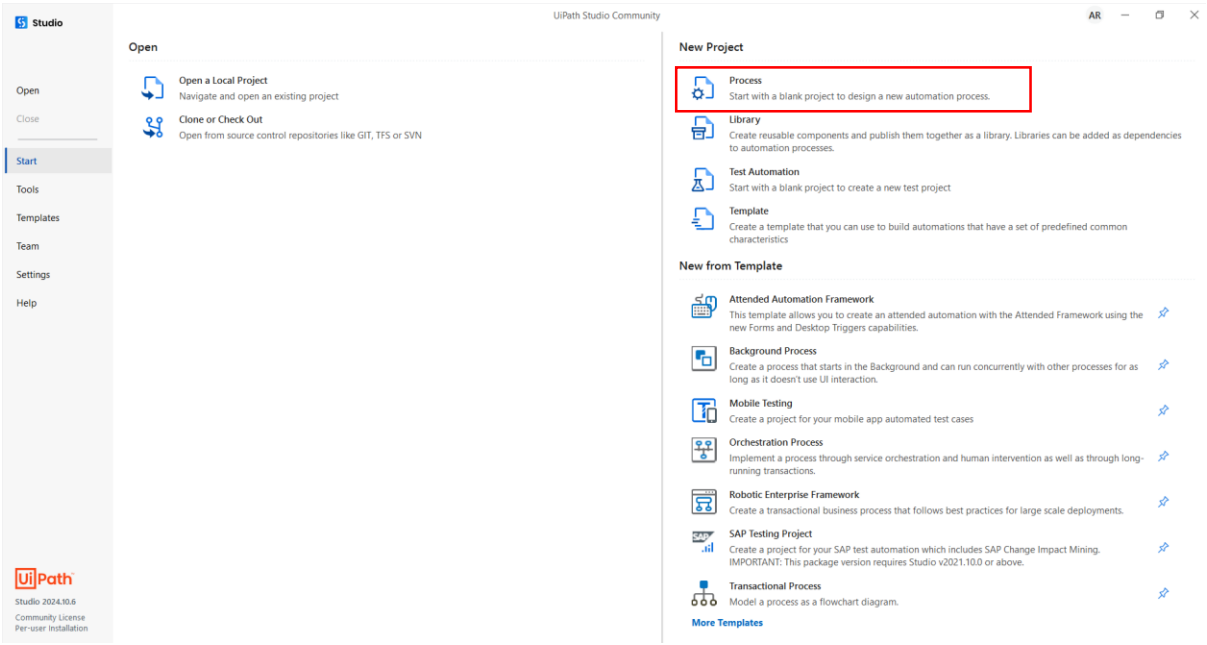
10. **Message Box**: This activity displays a message box with the success rate and the time taken for the entire process. It provides a summary of the automation performance.

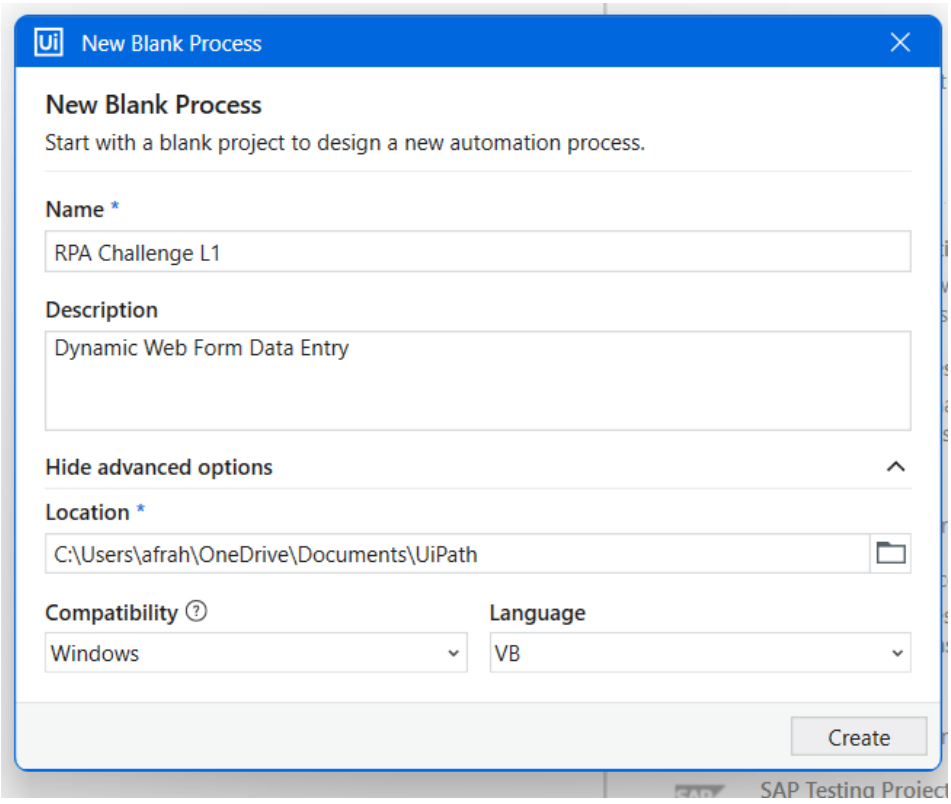


4. Implementation:

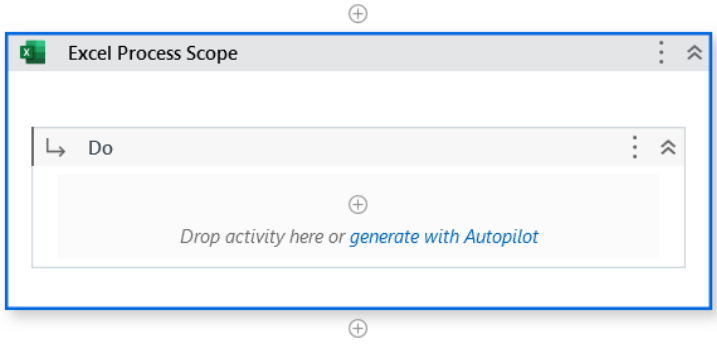
4.1 Setup and Configuration

1. **Install UiPath Studio**: Download and install UiPath Studio from the official website. Ensure you have the necessary licenses and permissions to use the software.
2. **Create a New Project**: Start a new project in UiPath Studio and name it appropriately (e.g., "Dynamic Web Form Data Entry" or “RPA Challenge L1”).

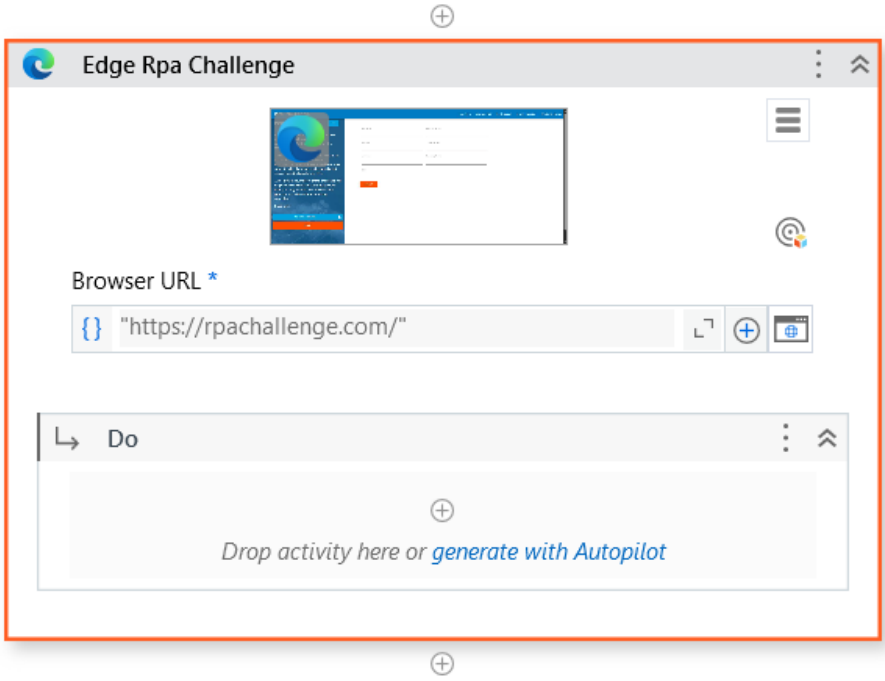




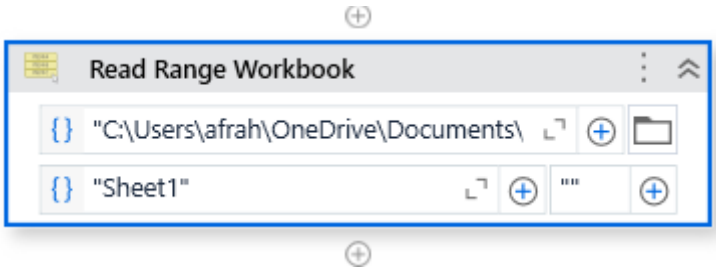
3. **Configure Excel Process Scope**: Add an Excel Process Scope activity and configure it to open the Excel file containing the data. Ensure the file path is correct and the necessary permissions are granted.



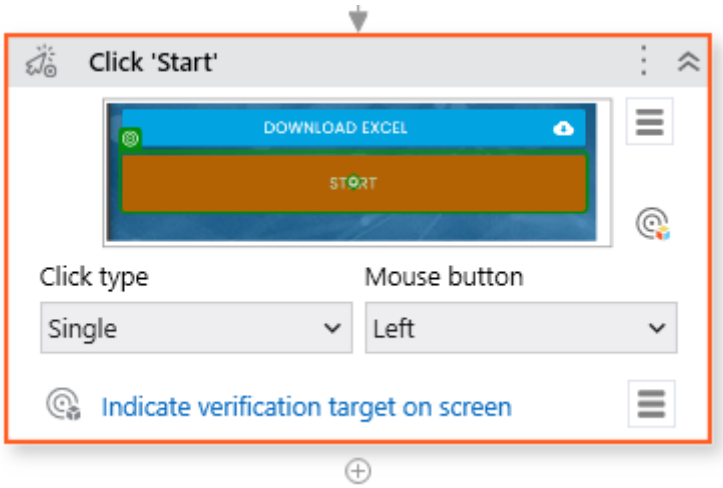
4. **Open Web Form**: Add a Use Application/Browser activity and configure it to open the web form in a browser. Set the URL to the RPA Challenge website or drag a screen from Object repositry.



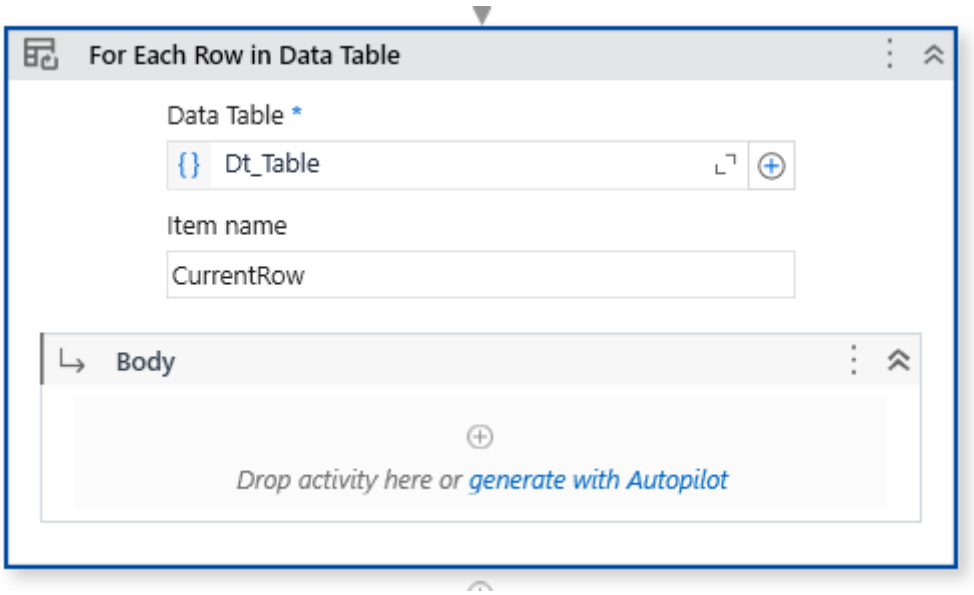
5. **Read Data from Excel**: Add a Read Range Workbook activity within the Excel Process Scope to read the data from the Excel sheet into a data table.



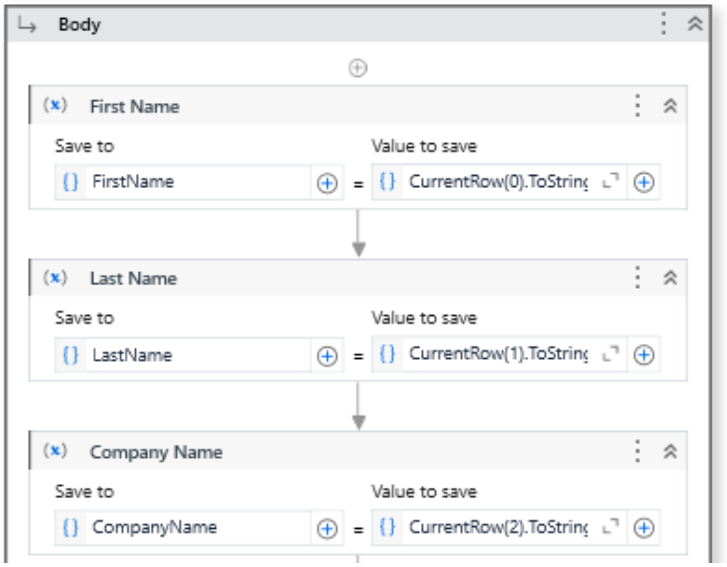
6. **Configure Click 'Start'**: Add a Click activity to click the 'Start' button on the web form. Use fuzzy selectors to identify the button accurately.



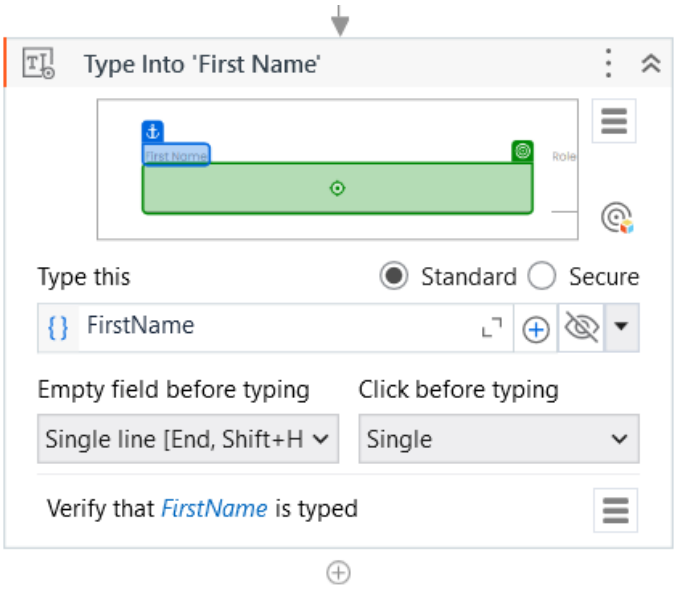
7. **Iterate Through Data Table**: Add a For Each Row in Data Table activity to iterate through each row of data. Within this loop, add activities to assign values, type data into the form, and submit the form.



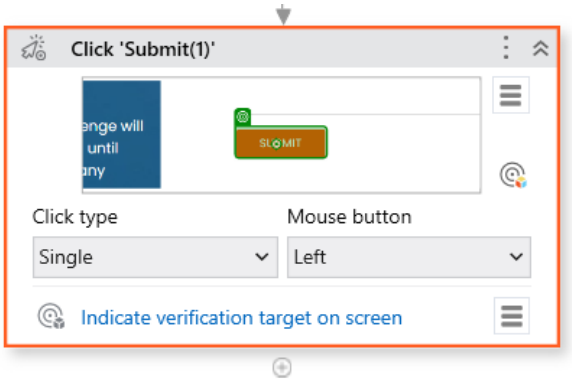
8. **Assign Variables**: Add Assign activities to map data from the Excel sheet to variables for each attribute (First Name, Last Name, etc.).



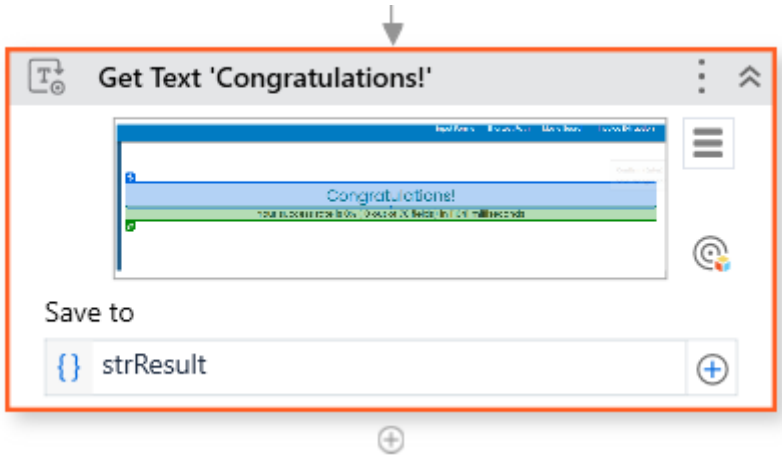
9. **Type Data into Form**: Add Type Into activities to input data into the web form fields. Use dynamic selectors to handle changing field positions.



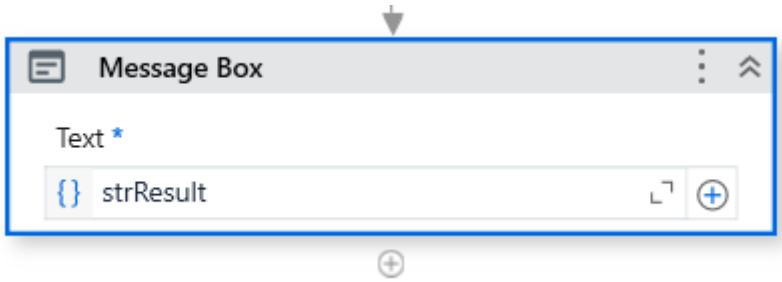
10. **Click 'Submit'**: Add a Click activity to submit the form. Ensure the selectors are configured to identify the submit button.

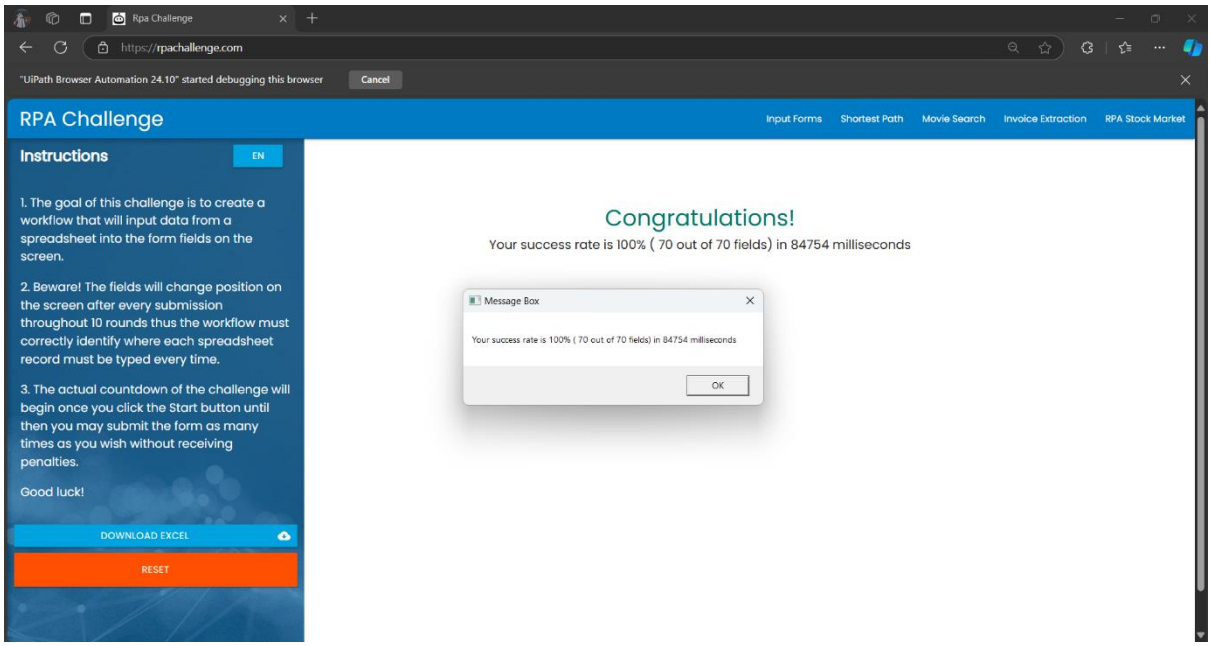


11. **Verify Submission**: Add a Get Text activity to check for the 'Congratulations' message, indicating a successful submission.



12. **Display Success Message**: Add a Message Box activity to display the success rate and time taken for the entire process.





4.2 Activity Sequence in UiPath

The sequence of activities in UiPath follows the logical flow of the process:

1. Start Process (Start Debug)
2. Open Excel File
3. Read Data from Excel
4. Open Web Form
5. For Each Row in Data Table
    - Assign Variables
    - Type Data into Web Form
    - Click Submit
    - Get Text 'Congratulations'
6. Display Success Message
7. End Process (End Debug)

5. Results:

5.1 Performance Metrics

The performance of the automated process is measured based on the following metrics:

- **Success Rate**: The percentage of form submissions that were successfully completed.
- **Time Taken**: The total time taken to complete the entire process, measured in milliseconds.

5.2 Success Rate

In the context of the RPA Challenge Level 1, the **success rate** refers to the percentage of data entries that are accurately and completely submitted into the web form. This metric evaluates the effectiveness of both manual and automated data entry methods in ensuring that all specified fields in the form are filled correctly without errors.

- **Manual Data Entry**: The success rate is typically around 95-100%, depending on the accuracy and attention of the person performing the task. Human errors, such as typos, incorrect field entries, or missed entries, can slightly reduce the success rate.
- **Automated Data Entry using UiPath**: The success rate is consistently 100%. Automation eliminates human errors by precisely following predefined instructions and using robust selectors to ensure that each field is accurately filled. This consistency leads to a higher overall success rate compared to manual entry.

5.3 Time Taken

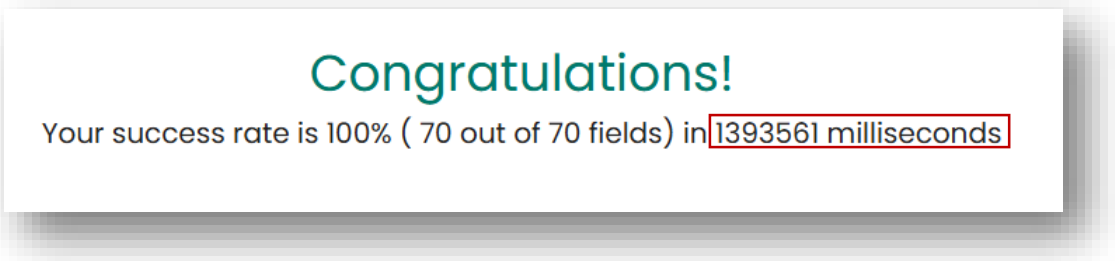
The time taken for the automation process was significantly less than the time taken for manual data entry. This reduction in time can be attributed to UiPath's ability to quickly and accurately input data into the web form, minimizing delays and errors.

- **Manual Entry Time**: Typically, manual entry for each individual, considering the dynamic nature of the web form fields, would take approximately 1-2 minutes per person, leading to a total time of around 15-20 minutes for all 10 individuals.
- **Automated Entry Time**: Using UiPath, the total time taken to complete the data entry for all 10 individuals was reduced to a matter of seconds, demonstrating the efficiency of automation.

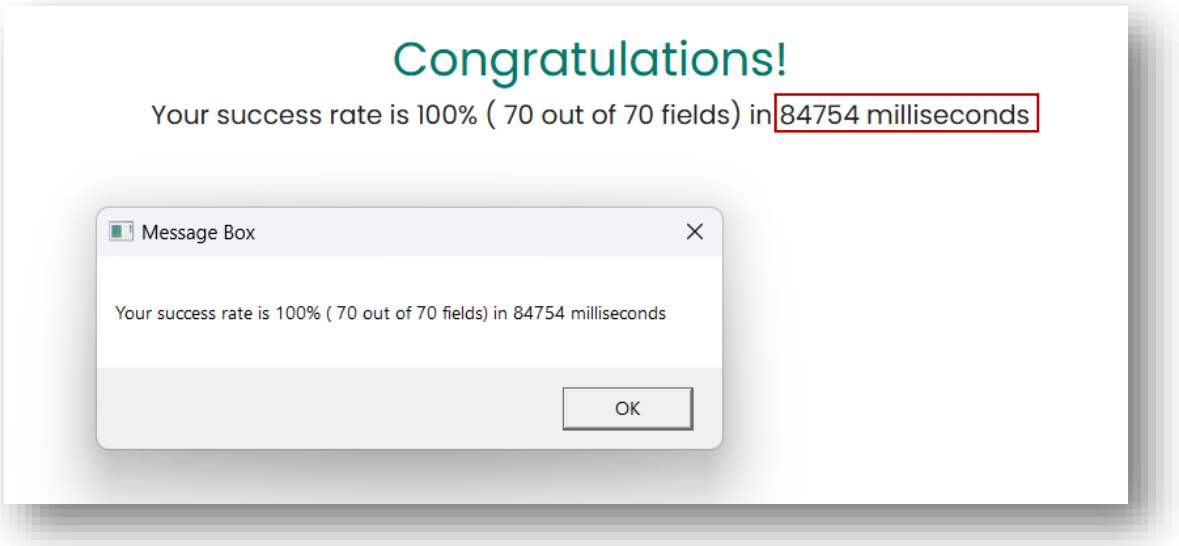
METRIC	MANUAL ENTRY	AUTOMATED ENTRY
SUCCESS RATE	100%	100%
AVERAGE TIME	1393.561 Seconds = 23 Minutes	84.754 Seconds = 1.4125667 Minutes

Output:

- For Manual Entry:



- For Automated Entry:



6. Discussion:

6.1 Challenges Faced

During the implementation of the automation solution, several challenges were encountered, including:

1. **Dynamic Web Form Fields**: The primary challenge was handling the web form fields that change positions after each submission. This required the use of dynamic or fuzzy selectors in UiPath to accurately identify and interact with the form fields.
2. **Selector Stability**: Ensuring the stability and accuracy of selectors was crucial to avoid errors during the data entry process. This involved extensive testing and refinement of selectors.
3. **Data Validation**: Ensuring the accuracy of data entry required rigorous validation checks. This included verifying that the correct data was being entered into the appropriate fields and that the data format was consistent.
4. **Error Handling**: Implementing robust error handling mechanisms to manage unexpected scenarios, such as network issues or changes in the web form structure.

6.2 Solutions Implemented

To address these challenges, the following solutions were implemented:

1. **Dynamic Selectors**: Utilized UiPath's capabilities to create dynamic selectors that adapt to changes in the web form fields. This involved using attributes like `aaname`, `id`, and `class` to dynamically identify the fields.
2. **Extensive Testing**: Conducted extensive testing to ensure the stability and accuracy of selectors. This included testing the automation with different datasets and web form configurations.
3. **Validation Checks**: Implemented validation checks at various stages of the automation process to ensure data accuracy. This included checking the format and consistency of data before inputting it into the web form.
4. **Error Handling Mechanisms**: Developed error handling mechanisms to manage unexpected scenarios. This included retry mechanisms, logging errors, and providing informative error messages.

7. Conclusion:

The "Dynamic Web Form Data Entry" project successfully demonstrated the efficiency and reliability of UiPath in automating repetitive data entry tasks. By automating the process, the project achieved a 100% success rate in data entry while significantly reducing the time taken compared to manual entry.The use of dynamic selectors and robust error handling mechanisms ensured the accuracy and stability of the automation. Overall, the project highlights the potential of RPA in enhancing productivity and accuracy in business processes.

8. Future Work:

While the project achieved its primary objectives, there are several areas for future improvement and expansion:

1. **Scalability**: Enhancing the scalability of the automation to handle larger datasets and more complex web forms.
2. **Advanced Error Handling**: Implementing more advanced error handling mechanisms to manage a wider range of unexpected scenarios.
3. **Integration with Other Systems**: Exploring the integration of the automation with other systems and applications to create a more comprehensive automation solution.
4. **Continuous Improvement**: Continuously refining the automation process based on user feedback and performance metrics to ensure ongoing efficiency and accuracy.

9. References:

1. **UiPath Documentation:**

   https://docs.uipath.com/

2. **RPA Challenge Website:**

   https://www.rpachallenge.com/

3. **UiPath RPA Challenge Solution - Enter Data into a Dynamic Web page:**

   https://youtu.be/-2dK0B2nD3A?si=LXyqO6e_f9r0IJIP

4. **UiPath RPA Challenge Solution | Data Entry dynamic pages:**

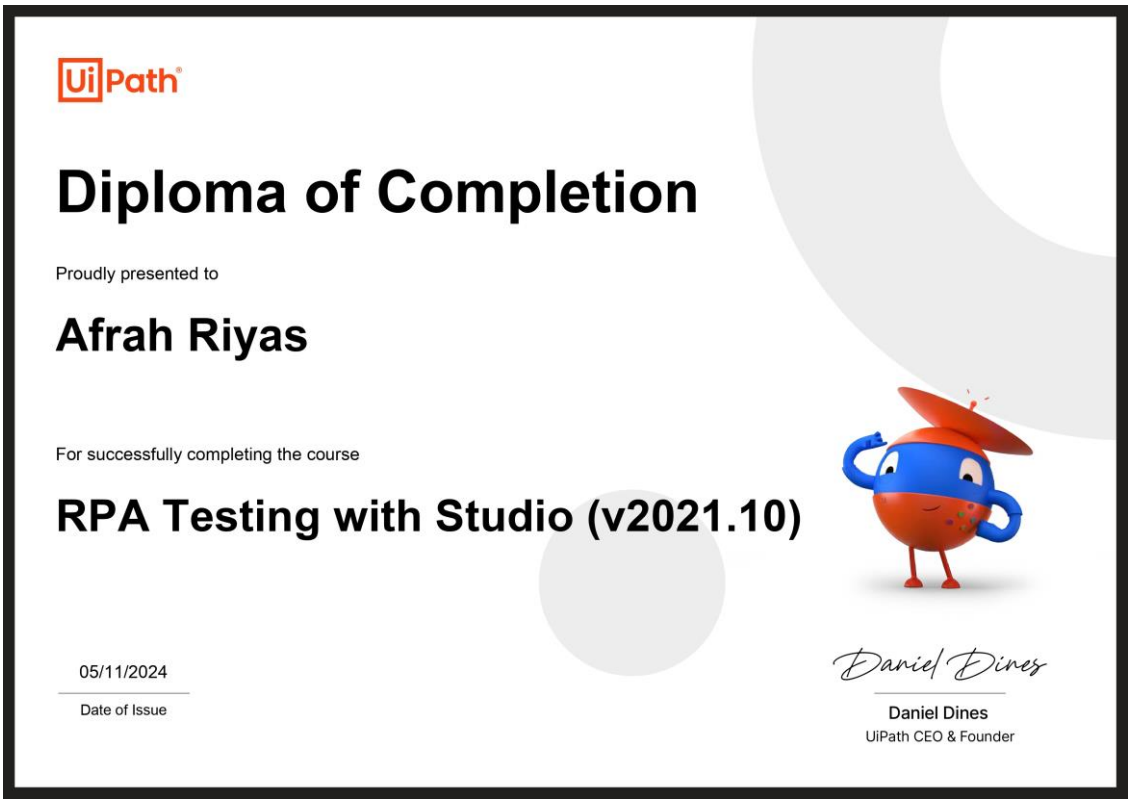
   https://youtu.be/bJlHsWzfwHY?si=1yfzfx9eQQp1NMSC

5. **UiPath | RPA Challenge | Classic Activity | Input Forms - Dynamic Selectors and Anchor:**

   https://youtu.be/Wi24E02w4TU?si=nWZRGKKA6FqWidmG

10. Naan Mudhalvan Robotic Process Automation Foundation Course For Engineering Students:

10.1 Course Completion Certificates



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