Graduate Diploma in Systems Analysis
SA48

Industrial Attachment Report

Project Title:	Card Ops - Robotic Process Automation of Banking Operations
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1. Introduction

1.1 Objective of the Industrial Attachment

The Industrial Attachment is designed in a way as to provide the intern with a comprehensive understanding of the real-life working experiences in the banking industry. It will give them an opportunity to discover, learn and familiarise with the operative mechanisms that are in place at the OCBC bank. The intern will acquire new skills and learn new technologies while implementing the various processes associated with their field of study.

Oversea-Chinese Banking Corporation (OCBC) is a well-known bank in Asia and the second largest bank in Singapore. The bank was recently named World's Best Consumer Bank by Global Finance. As a leading bank in Asia, OCBC has made multiple innovations to digitise their financial services. One of their measures was to introduce Robot Process Automation software to automate daily staff tasks. The career pathways for a computer science graduate in OCBC, or rather, in the Banking industry is limited to Technology Department and IT Security Department. The skills required are mostly related to Visual Basic, Object Oriented Programming Language (Python, C++ and Java), Robot Process Automation and Cyber Security.

OCBC, as a company has an expanded business structure. The nature of the business performed relies on several facets of this structure. These include Card Operations, Consumer Financial Services, Investment Operations and Human Resource to name a few. The organisation recognises people as an important factor in the attainment of its goals. The Industrial Attachment program emphasis mainly on this aspect of the business at large. The intern is required to work closely with the staff within his department and come up with a workable solution to their day-to-day activities.

The current project is a growing experience that the student will go through during the period of his internship. Its main emphasis is on the everyday business activities which are performed at the Card Operations department. The intern will be required to undergo a training process to understand the basic organisation structure of the OCBC bank. He will later move on to learning and implementing new technologies (UiPath) to automate the daily activities of the employees at the Card Ops and Investment Ops departments.

1.2 Project Background

The main challenge that the banking industry is currently facing is the optimisation of its costs. The scarcity of skilled resources and a need to increase efficiency in processes, along with a sharp increase in personnel costs, has given way to the adoption of Robotic Process Automation (RPA).

Most of the processes performed within the Card Operations department are currently manual tasks. There has been a pressing demand for a more efficient way of performing these tasks by reducing costs with the services of a software model.

Robotics in banking is primarily a tool to automate the manual processes with the use of a powerful robotic automation software (like UiPath). This software is used to install desktop and other end-user device level software robots to build an artificial intelligence workforce or virtual assistants. In its simplest form, it is the application of software-coded scripts governed parametrically by a business logic and structured inputs which are used to mimic routine user tasks.

RPA is an extensive process. It requires a structured training program and governance to yield full benefits. The intern will be initially tasked to take the UiPath RPA Advanced Developer Certification exam before working on the project. He must also undertake a series of video training and tutorial sessions from UiPath Online library to familiarise himself with the software tool. Once equipped with the right skills, the student can embark upon his journey of automation using this new technology.

The intern will be working with a team of ten people which includes both UiPath Developers and Business Analysts. The nature of the project is predefined with set rules and time constraints. The team will follow an agile scrum methodology to deliver periodic outputs based on the user requirements. The project will progress via a series of sprints each with a four-week timeline. The deliverables are assessed at the end of each sprint and the team will demonstrate the new functionality of the processes which are automated.

2. Overview of Activities

2.1 Project Plan and Schedules

2.1.1 Project Description

The project involves digital automation of everyday banking operations at the Card Ops department for Consumer Financial Services of the OCBC Bank. The intern will contribute to the design, implementation and testing of services for business automation using UI Path Process Automation (RPA) Studio.

The current manual system at Card Ops is time consuming and much effort is spent in processing the records and updating of the systems. This project aims to provide efficiency and save time for the OCBC Card Ops and Investment Ops departments through front line automation.

The following are some problems faced by the current manual system in the Card Ops department:

- Manual tasks are error prone and require constant employee support to check for any discrepancies.
- Delays in performing the tasks because of manual entries.
- Macros VBA support is not fulfilling as new system updates require debugging of many lines of code which is time consuming.

- The current database repository system maintained at the bank is a virtual environment that can only be updated using manual keystrokes which is tedious and error prone.

2.1.2 Project Vision

The project envisions to offer a new and faster solution to the performance of business activities with the help of robots that interpret applications, manipulate data, execute transactions, trigger responses and handle exceptions using the UiPath Studio for automation.

2.1.3 Project Methodology SCRUM

The project will follow Agile Scrum Methodology in its working during the development of the software. Both development and testing will be done concurrently. This scrum approach includes assembling of the user requirements, identifying which requirements can be developed, and building robots accordingly in a series of iterations called sprints that break down the use cases into smaller chunks of functioning bots.

Each sprint is a short time-boxed period of four weeks when the scrum team works to complete set number of use cases. The scrum team will consist of developers and business analysts along with the employees who will act as the product owner for each process. The intern will work as the main project lead and developer for set number of use cases, and is required to design, develop and deploy bots within the given time period.

During the Sprint a short 15 minute daily Stand-up Meeting (Daily Scrum Meeting) is held to update the status of the development and user testing. At the end of the Sprint, a Sprint Review Meeting is conducted to allow the employee to check if all their requirements are complete and implemented correctly. Additionally, a Sprint Retrospective is held to check and improve the project execution processes.

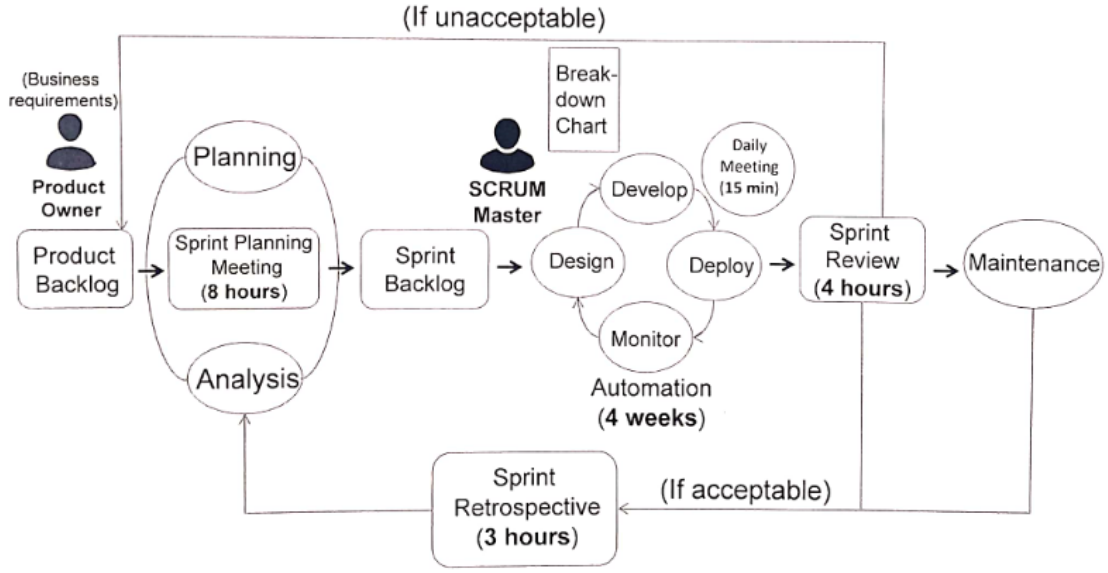


Figure 1: An overview of the Scrum Framework

The Sprint Planning Meeting will allow the team to see the dependencies and the correct order of work to deliver the use cases. Initially, a total of 39 use cases have been identified based on each employee requirements within the Card Ops and Investment Ops departments. The supervisor, who will perform the role of the scrum master, will overlook the whole process of developing the bots. He will make sure that the output translated is in accordance with the requirements of the user.

2.1.4 Implementation Methodology

Prior to the beginning of the development process, the primary task is to come up with an implementation methodology that allows to prioritize the tasks at hand and assess their feasibility in relation to automation. The technology qualification requirements for a practicable automation of a process is based on the complexity of the following components:

1. Activities to be automated
2. Data
3. Transaction Volume
4. Technology Compatibility
5. Scalability

The feasibility of automation of a business process using RPA is illustrated in the flow chart below.

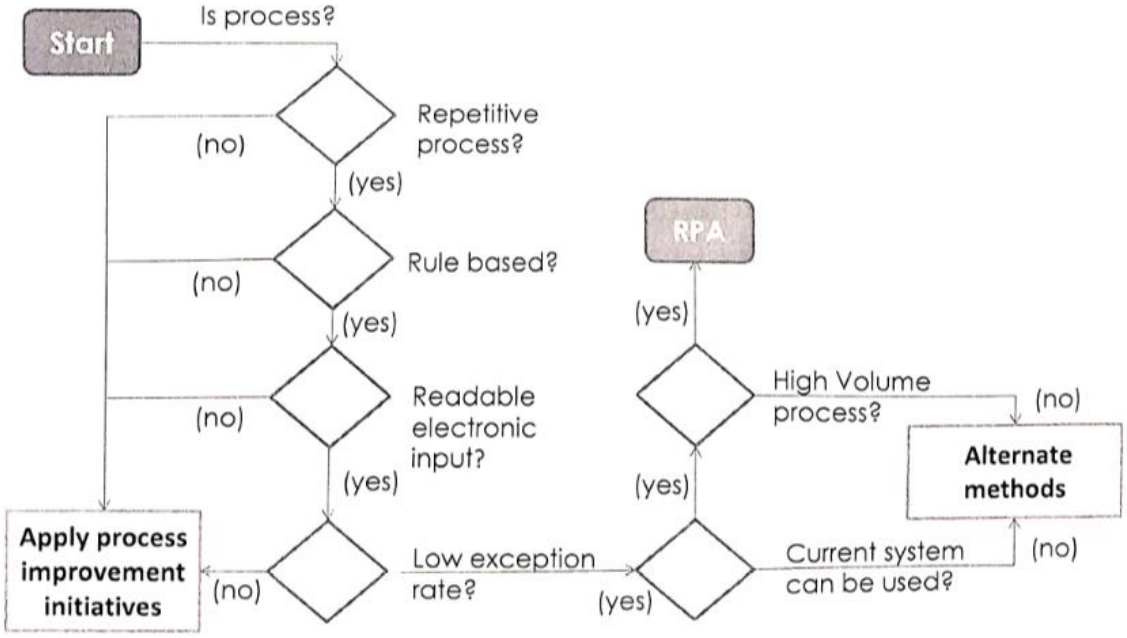


Figure 2: Flow Chart illustrating the quintessential of identifying a process for automation

As illustrated in the above diagram, the processes which are repetitive in nature and which require manual electronic input can be automated to perform more efficiently in a faster manner.

Technology Compatibility is key to automating a process. Setting realistic expectations based on operational hurdles that can occur during implementation will allow for a more desirable project output deliverable.

Robots are highly scalable. This allows for the management of high volumes of data during the bank's peak hours of transaction. More and more robots can be scheduled using the UiPath Orchestrator to deal with peak traffic in decisively shorter time than through manual operation.

2.1.5 What are the steps involved in RPA?

Once a process has been prioritized for automation, we move on to look at the low-level design of how robots are deployed to replicate normal human functions. In the example below, the robot is trained to perform a series of iterative actions like reading data from an excel file and updating the core banking system with the data that has been read. Additionally, a new bot can be trained to validate the results of another bot. This can be a helpful tool to cross check the accuracy of the output delivered. This mechanism can be termed as a prelude to Artificial Intelligence.

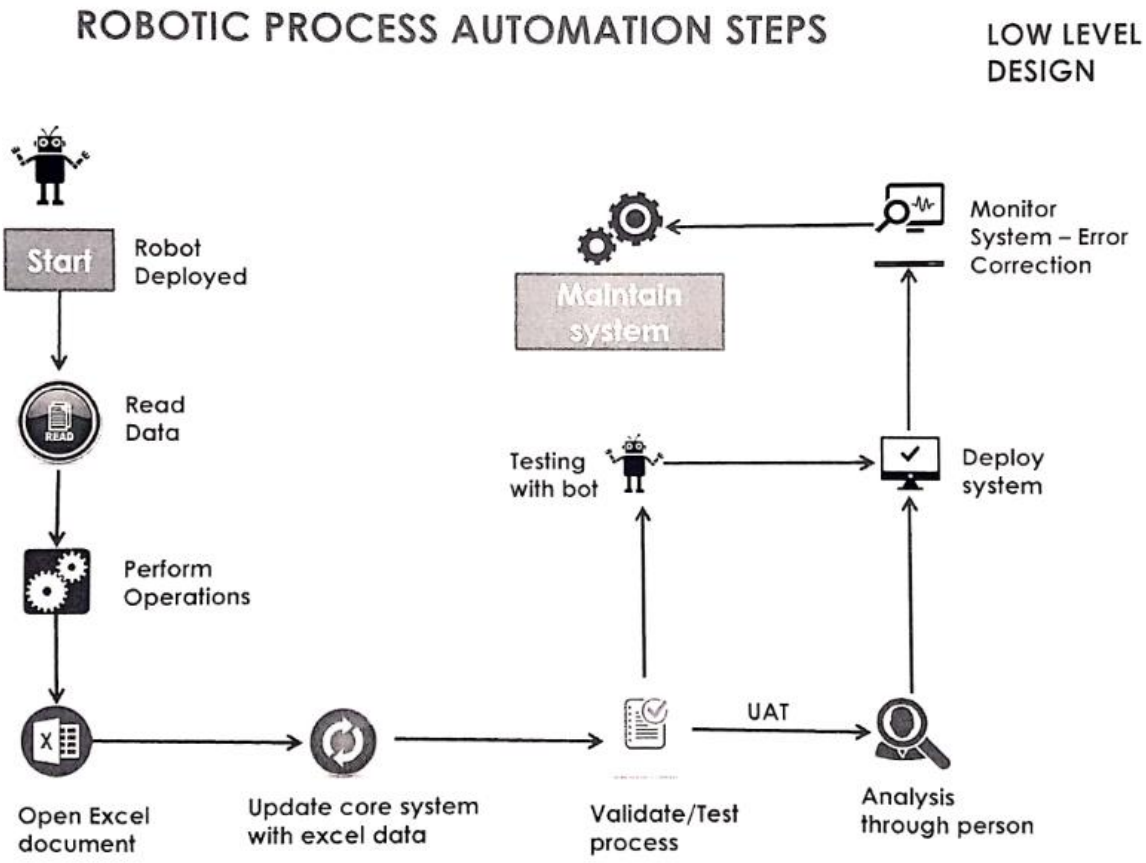


Figure 3: Low-Level Design of Robot Activity

2.1.6 High Level Design

We now look at the high-level overview of how the RPA solution is implemented within an existing business process. After identifying the activity and setting up the project team, we analyse the various design patterns and agree on an adapted design for the desired output. Once the design is finalised, we create an automated workflow and build the robot. The robot is then deployed on the testing environment and run for various testing scenarios. These test runs can yield multiple benefits to check how fast a process is running and for error checking any discrepancies.

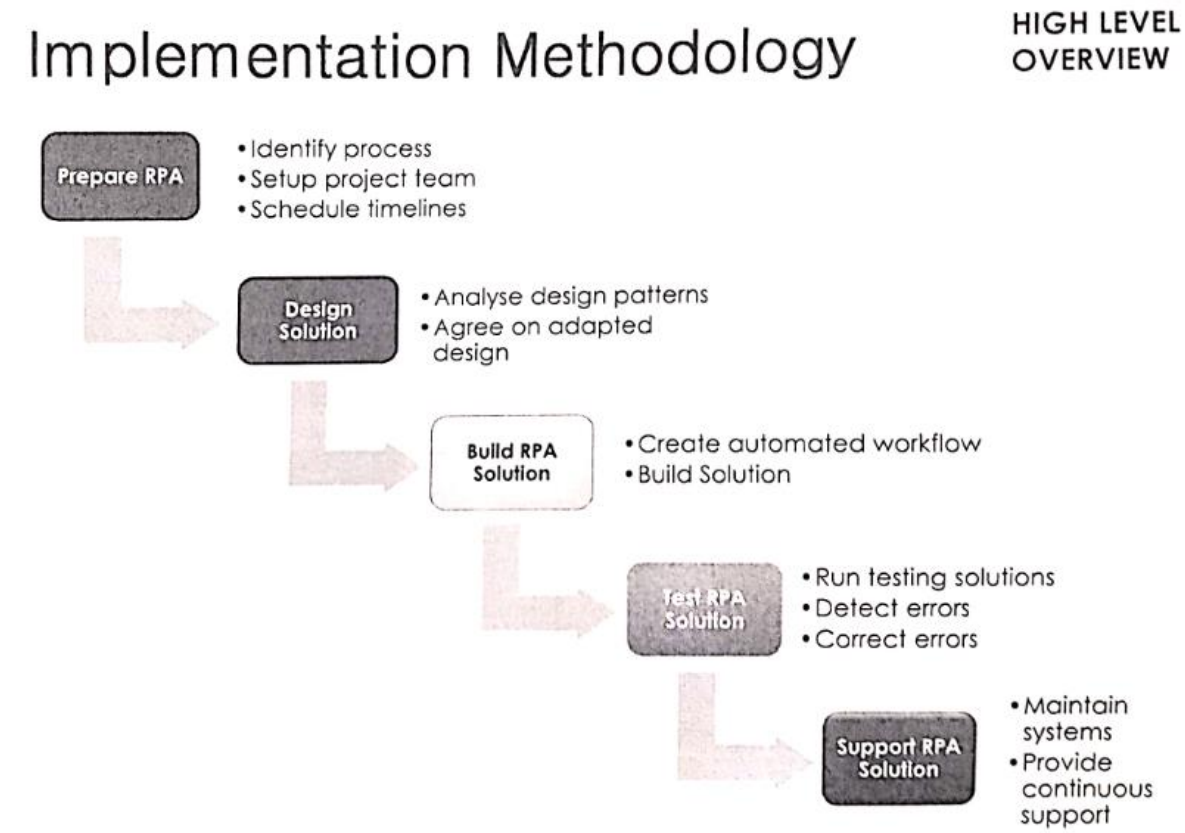


Figure 4: High Level Overview of the RPA Solution

2.2 Business Use Case Model

The primary purpose of the model of business use cases is to describe how the business is used by its employees and customers. Activities which are directly performed by the employees at the bank are represented using different use cases.

When looking at the activities in the bank, we will able to identify at least two categories of work corresponding to two categories of business use cases.

1. Firstly, there are commercially important activities that directly deal with customer and merchant data.
2. Second, there are lot of activities which are dependent on the inbuilt database repository system operated within the banks framework.

We will be covering the project SDLC, from user requirement gathering to UAT and deployment. Stages include:

1. **User Requirement Gathering:** The Business Analysts are tasked with the job of coming up with a comprehensive user guide for each process. The user guide will detail the current flow of actions performed by the user manually. Each use case is further sub divided into two sections.
    a. RPA As-Is: The manual user actions performed to complete a process
    b. RPA To-Be: The actions that will be performed by the robot after development.

The developer will be involved in this initial phase of the project to assess the feasibility of automating the given process.

2. **UiPath Robot Prototype Presentation:** This includes the first draft of output files generated by the robot to present to the user to get a feel of the user sentiment. After each sprint a build is delivered to the employee for their feedback. A demonstration of the functionality is provided at the end of each sprint. Any product backlogs will be sorted in the next sprint.

3. **User acceptance:** The robot will be deployed on the testing environment and is tested for multiple scenarios to validate the desired output. The output is focussed more on providing maximum business value. As we are following a scrum methodology of incremental builds, a working robot in its present error-free condition can be used directly on the production environment after the testing phase is completed. Additional user requirements will be assessed and developed in the next sprint.

3. Requirement Capture Workflow

3.1 Requirement Specification (Non-Functional)

3.1.1 System Architecture

The OCBC bank's core banking system is an integrated environment called the Silverlake Axis Integrated Banking Solution (SIBS) built on an IBM AS400 (Power Systems) Platform. This platform provides a scalable and a secure solution to the bank's businesses in a robust and compliant manner. Most of the processes the intern is required to automate currently run on this SIBS system.

Each employee is provided with a PC for accessing email and other work-related purposes. A printer will be shared by the staff for generating the output files. The company uses local intranet to communicate and collaborate between employees within the bank's framework.

For the current project, 4 PCs are installed with UiPath Studio software for developmental purposes. In addition, 2 PCs installed with UiRobot will function as the Testing Environment for deployment.

3.1.2 System Performance Requirements

Once the robots are developed, they are deployed directly on either on the testing machines. UAT is performed daily to check for any further discrepancies and errors. After performing UAT for multiple testing scenarios and upon multiple successful runs, the robot will be moved to the user's local machine and scheduled to perform its operation daily. The robot will be available 24 hours a day, 7 days a week.

3.1.3 Understanding UiPath Studio Software (System Requirements)

UiPath Studio is a Robotic Process Automation tool that helps in building up workflows by dragging and dropping activities within the development environment. It is a flowchart based modelling tool with a visual interface that is built on .NET and supports .NET functionality. It uses VB.Net and C# as scripting languages. It encapsulates both simple and complex solutions for automating administrative and business IT processes.

UiPath Robot runs the processes that are designed in the UiPath Studio. It is a Windows service that can open interactive/non-interactive windows sessions to execute processes developed using the Studio. The robots can work both attended and unattended without any human intervention to trigger these processes.

UiPath Orchestrator is a web-based platform which runs and manages the Robots. It can be used to deploy multiple Robots, and scheduling and monitoring their activities.

The main types of project supported by UiPath includes the following:

- Sequence
- Flowchart
- Assistant
- State machine

Considering the scope of the project for the internship, we only use Sequence and Flowcharts for automation.

The following is an illustration of the usage of flowcharts and sequences to create a seamless account transaction processing workflow:

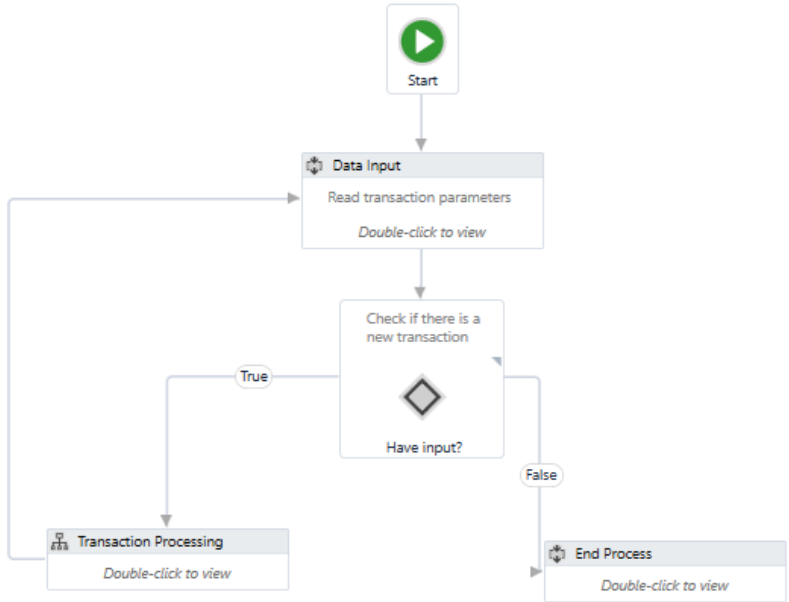


Figure 5: An example of the usage of flowchart and sequence in a project

3.1.4 Task Recorder

The automation of the process is carried out by the recording of the activities performed by the user. With the task recorder, we can create a basic framework for automation. The user's actions are recorded by the recorder and turned into a recording sequence in the current project. This is how the Robots are trained to mimic human actions.

There are four types of recording in UiPath Studio:

1. Basic
2. Desktop
3. Web
4. Citrix

Depending on their usability, any of the above methods can be used recording purposes.

3.1.5 Coding the Workflow - Sequence, Flowchart and Control Flow

Coding the workflow is done sequentially. Robots are trained to process a type of transaction by giving instructions in a methodical flow. These instructions are executed in a Sequence. A Sequence here is a group of logical steps. The workflow is programmatically arranged for the Robot to execute a sequence of activities in a predefined manner.

An Activity is the building block of process automation. They are used to make up the actions performed within the workflow. Code snippets are inserted into these activities to replicate user actions. All the necessary coding procedures are done with the use of these activities.

Declaration of variables, arguments, arrays, conditionals is all done using the activity panels. These activities are interconnected to create a complex workflow for process automation. An example of simple if/else conditional activity is illustrated:

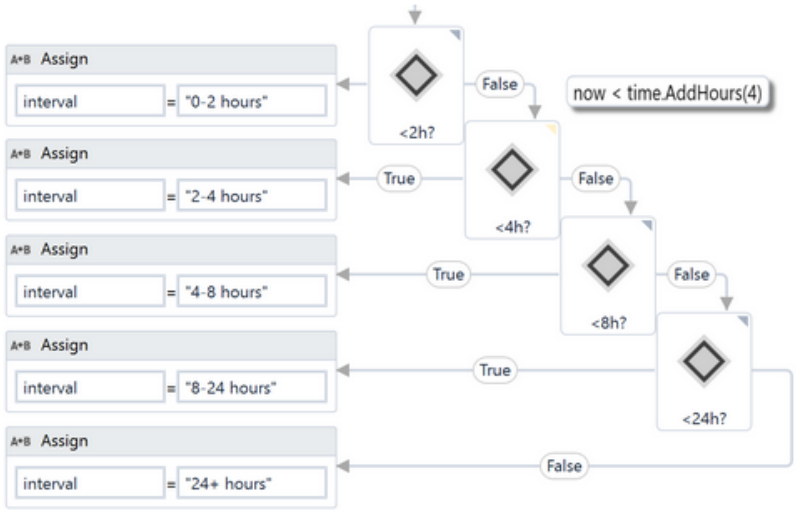


Figure 6: A simple example of a conditional workflow

In the above illustration, the Assign activity is used to declare the variable 'interval' and a series of if/else conditions is used to check for the correct time of the day.

The Expression Editor allows us to insert code snippets into the workflow. Here, in the above example, the VB If operator is used to define a series of If conditions for the program to process.

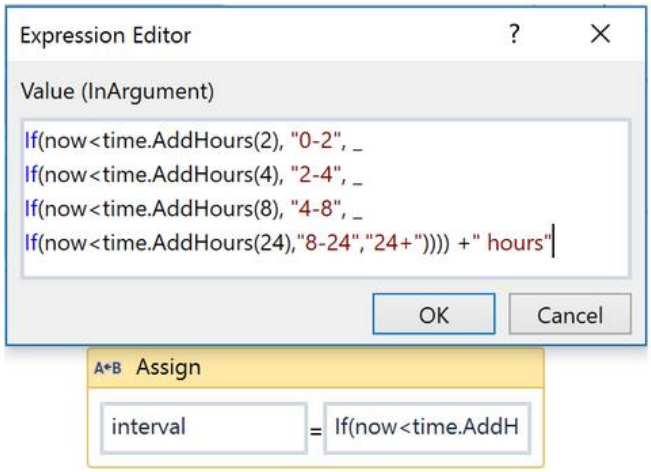


Figure 7: Expression Editor to insert code snippets

3.1.6 Activity Packages

UiPath Studio incorporates the use of several packages to create a clear and smooth automation process. These project dependencies are installed based on their usage and in consideration of each project definition, which includes the activities it uses, variables and input/output arguments.

The following packages are primarily used to automate the business processes under the internship project:

- **UiPath.Excel.Activities**: Aids to automate all aspects of Microsoft Excel. Read information from a cell, columns, rows or ranges, write to other spreadsheets or workbooks, execute macros, and extract formulas. We can also sort data, colour code it or append additional information.
- **UiPath.Mail.Activities**: Facilitate the automation of any mail-related tasks, covering various protocols, such as IMAP, POP3 or SMTP.
- **UiPath.System.Activities**: Contains all the basic activities used for creating automation projects. These activities enable the robots to manipulate data tables by adding or extracting information.
- **UiPath.UiAutomation.Activities**: Enable the robots to simulate human interaction, such as performing mouse and keyboard commands or typing and extracting text, for basic UI automation.
- **UiPath.Terminal.Activities**: Contains activities designed to connect to a terminal and efficiently work within it. We can retrieve text, fields or screen positions, send keys, text, or wait for certain text or fields to appear as triggers.

- **UiPath.Word.Activities**: Contains multiple activities that enable to manipulate .docx files. It is possible to use them to add images to your documents, read, append or replace text within them, add bookmarks, as well as export them to PDF.

The project dependencies and their corresponding activities are illustrated in the figure below:

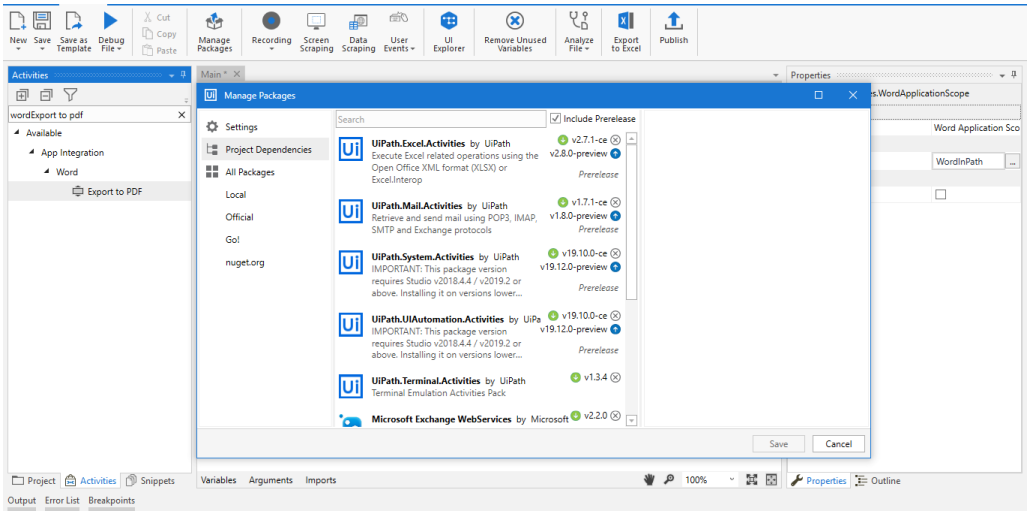


Figure 8: An overview of the project dependencies and the installed packages

3.2 Requirement Specification (Function)

3.2.1 Use Cases:

The intern has been tasked to develop bots for 9 use cases. For the sake of maintaining banking secrecy, the names of the use cases have been altered in conformity with the banking rules and guidelines.

1. Provident Fund Price Update Process
2. Retirement Fund Price Update Process
3. Bulk File Upload Parameters - Tax Adding Process
4. Bulk File Upload Parameters – Tax Editing Process
5. Bulk File Upload Parameters – Account Conversion Process
6. Bulk File Upload Parameters - Ledger Adding Process
7. Bulk File Upload Parameters - Ledger Editing Process
8. Bulk File Upload Parameters – Account Transaction Adding Process
9. Bulk File Upload Parameters – Account Transaction Editing Process

USE CASE MODEL REALIZATION

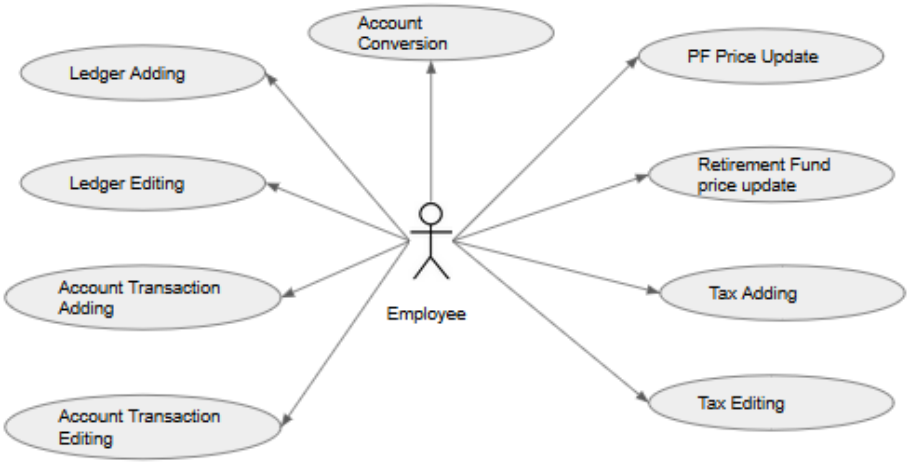


Figure 9: Use Case Model Realization for the 9 business processes

3.2.2 Use Case 1: Provident Fund Price Update

The Provident Fund price update processing time can be reduced from 25 minutes to just under 4 minutes by eliminating the copying and pasting of customer information from one banking system to the next. The foreign exchange rates and the corresponding merchant codes are extracted and moved to the output excel file.

The robot will scan through the foreign exchange conversion rate website and retrieve the current rate as per today's date. Excel is formatted as per the required output and fund prices are retrieved from the local intranet. The robot is trained to capture the fund prices even though they are dynamically updated on the website everyday using keywords to match the current price point.

Excel automation is one of the key features of UiPath. The advantage of Excel over other MS platform applications is data readability in an excel file. Each cell can be read independently as a string or a generic variable type and the data can be transferred to other applications. Excel is also one of the prime applications used to maintain banking information. Furthermore, by setting the Excel activity parameter to invisible enables the whole functionality to be performed in the back end.

Excel Application Scope activity reads the excel in the form of a data table. The data from this table can now to be transferred to the bulk upload output file.

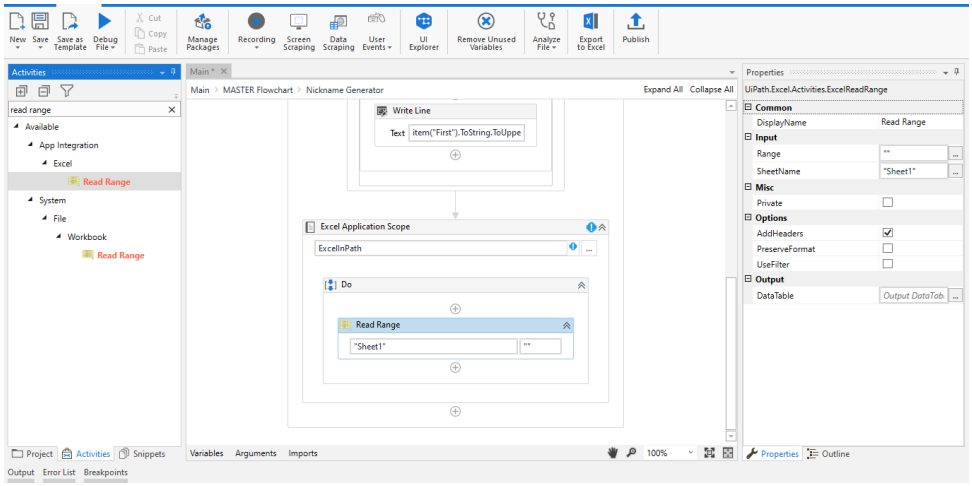


Figure 10: An overview of the Excel Application Scope activity in UiPath Studio

RPA To-Be for the process

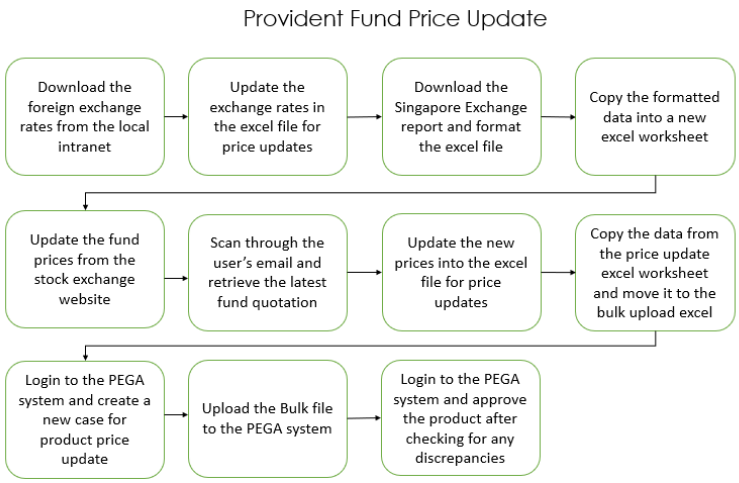


Figure 11: Process flow for PF price update

3.2.3 Use Case 2: Retirement Price Update

The Retirement Price Update process requires OCR technology to replicate the user actions. The processing time is reduced from 15 minutes to less than two minutes for retrieving the customer data and generating the bulk upload output file.

In the given situation, the usage of normal scraping of data is not applicable as the required data cannot be captured directly from the screen. The user has to extract the data from an excel file which the normal scraping method cannot read fully. To resolve this issue, Google OCR from the Get OCR Text activity in UiPath is used to scan the entire screen finding all the characters that are displayed. Get OCR extracts a string and its information from the indicated UI Element using the OCR screen scraping method. Other engines like Abby, Microsoft, Tesseract can be used to extract data. Find OCR Text activity is also used in conjunction with the Get Text to retrieve the exact information from the Excel file.

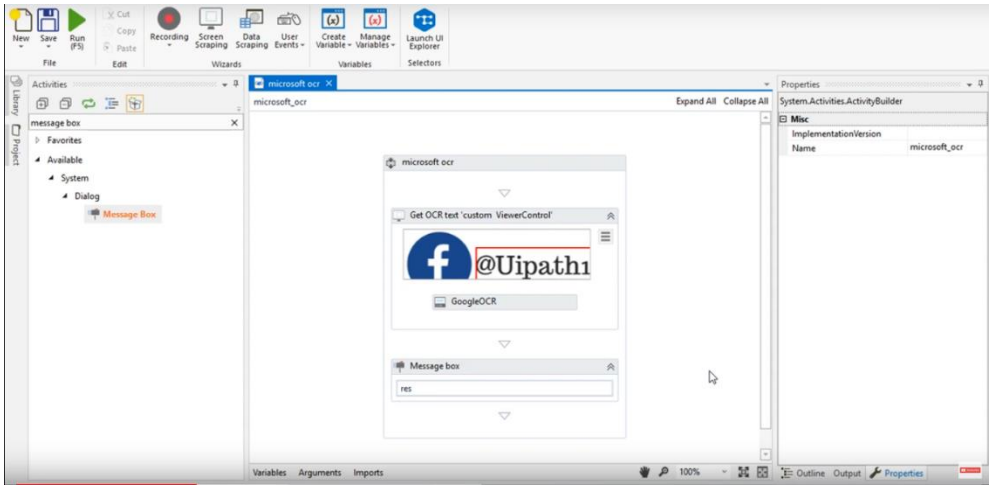


Figure: An example of the Google OCR from the Get OCR Text activity

RPA To-be flow for the Retirement Fund price update

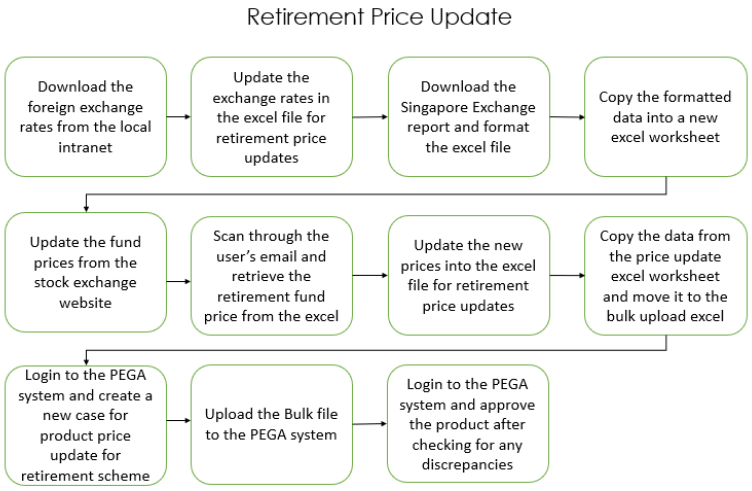


Figure 12: Process flow for retirement fund price update

3.2.4 Use Case 3: Tax Adding

The Tax Adding use case requires the automation of the Repository Database Mainframe built within the bank's network. This process is redundant as number of transaction code additions that can be made during this process is undefined.

The robot is trained to extract the codes from a customised excel and update the existing Database system in a recurring loop. The process of updating the mainframe is made easier by use of terminal activities in UiPath. A terminal connection is established with the mainframe repository by inserting the IBM Personal Communications terminal activity into the workflow.

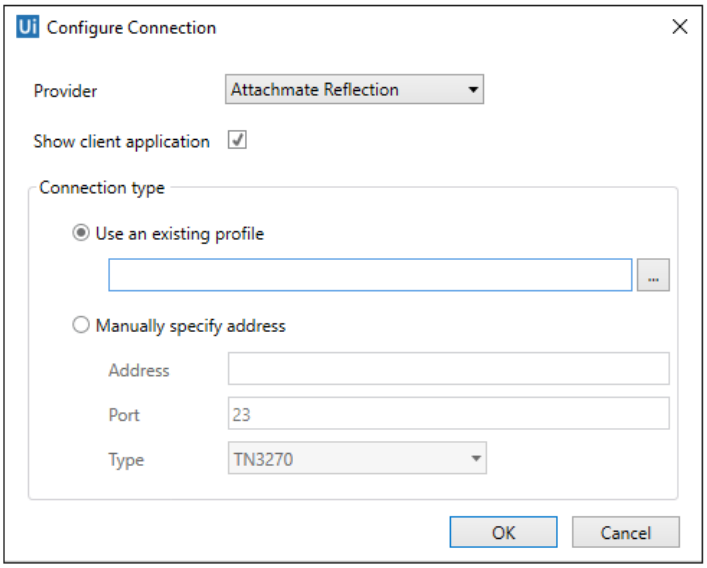


Figure 13: Displaying the Configure connection dialog box

There are several ways to automate the terminals:

- Using the existing/installed terminal application
- Using the IBM EHLL standard
- Using the UiPath implementation of these protocols

One may choose between those three based on the accuracy and the level of the provided details (like colour, field information, etc)

After specifying the connection parameters, the UiPath Terminal Wizard is automatically started.

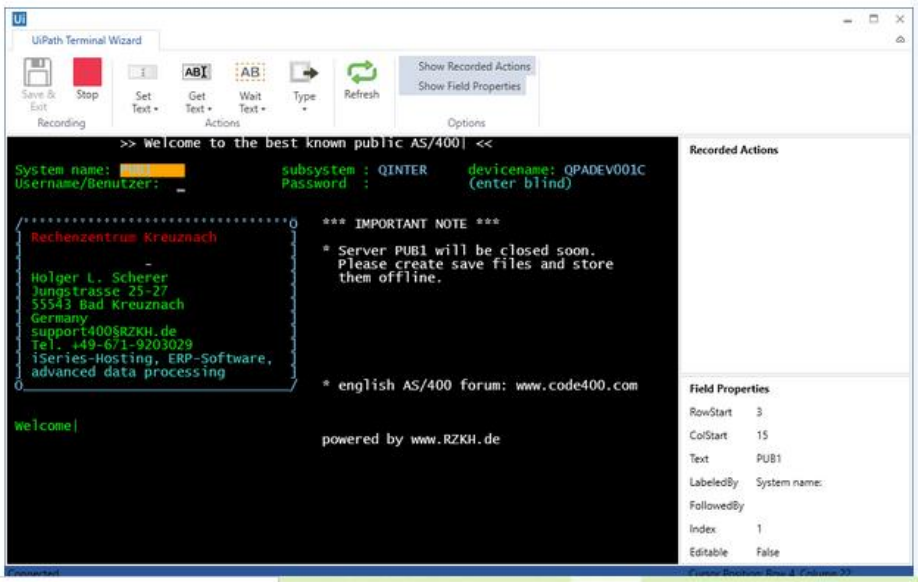


Figure 14: UiPath Terminal Wizard

The terminal screen is organised in fields with the properties displayed in the adjacent pane. The row/column coordinates are used to locate the field. The

workflow is designed in such a way to capture the subsequent row/column coordinates and perform the user actions on screen based on the given coordinates. The Move Cursor activity is used to move the cursor to the specific location.

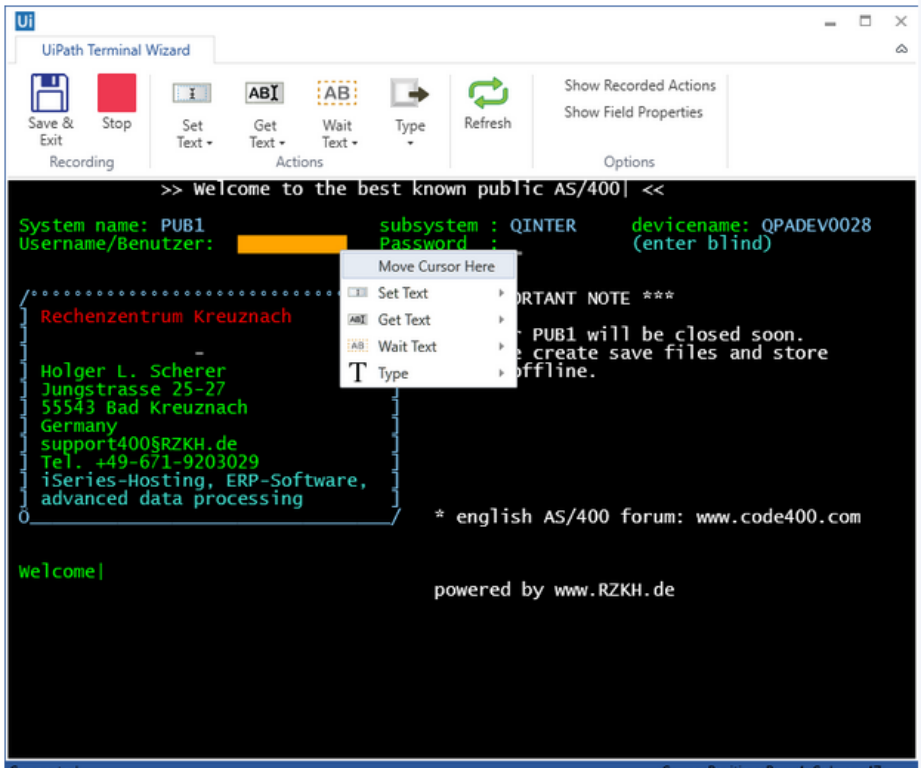


Figure 15: Move Cursor Activity to set field position

The robot is trained to capture separate fields by moving the cursor to different set field positions and the tax codes are added into the Repository Database. The processing time for this use case is effectively made shorter with the use of this terminal activity.

RPA To-be for the Tax Adding

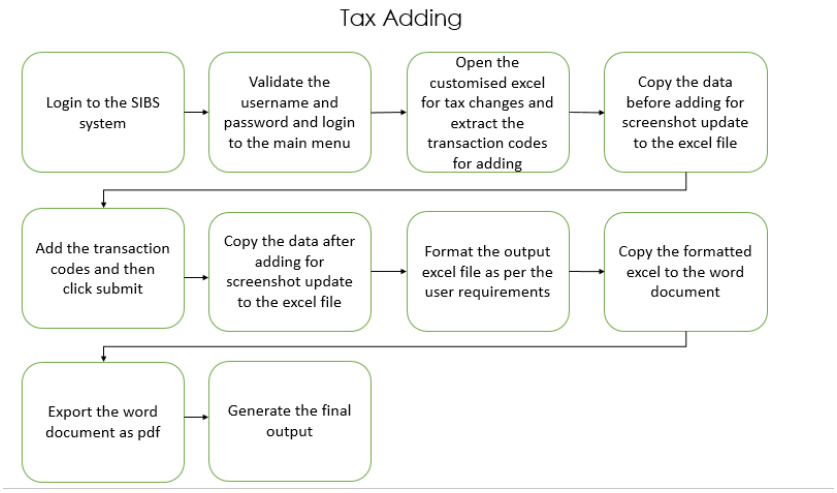


Figure 16: Process flow for Tax Adding

3.2.5 Use Case 4: Tax Editing

The Tax Editing use case is akin to the Tax Adding process in that the robot navigates through the same set of screens for data entry. The terminal session is maintained while the robot performs user actions. Advanced terminal activities are used to capture screens before and after the editing process.

The Get Text terminal activity is used to extract the text from the Repository system. It is not limited to a single field and captures the whole text on screen. The captured text is transported to a new excel file for formatting of the final output. The output is formatted on a new word document with the use of the UiPath Word Activities in a tabular manner.

RPA To-be for Tax Editing

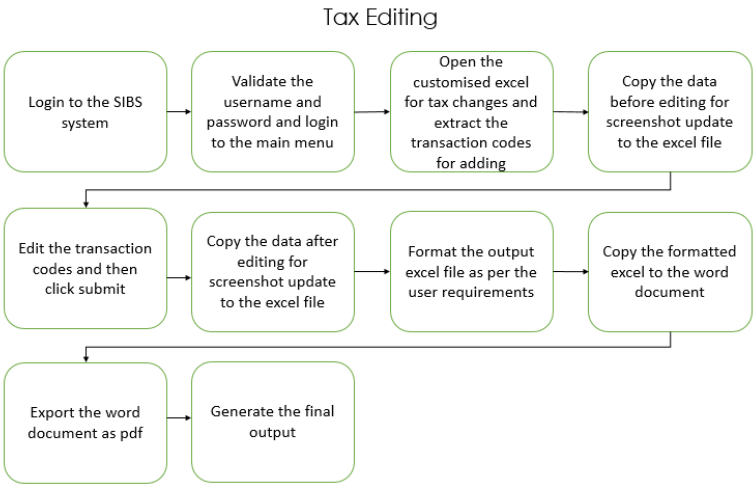


Figure 17: Process flow for Tax Editing

3.2.6 Use Case 5: Account Conversion

The Account Conversion process has multi layered requirements. Firstly, the robot is trained to extract the conversion ids from a customised excel file and remove any duplicates found. The IDs are then sorted and added in the Repository system.

The challenge in dealing with this process is that thousands of records must be checked for any existing record update. If the current ID is not found, then the corresponding data entry must be made. Another challenge is to enter the IDs in a sequence so that only one log file is created for the whole set of IDs instead of one for each.

The robot is trained to scroll down hundreds of pages within the Repository Database Mainframe system. The terminal connection is established using the UiPath terminal activity. The following key properties are adjusted within the terminal activities inside the UiPath studio so that the pages are read by the robot at a faster pace.

- DelayMS: represents the time to wait after the activity is executed; value is in milliseconds

- TimeoutMS: specifies the time to wait for the activity to execute; value is in milliseconds

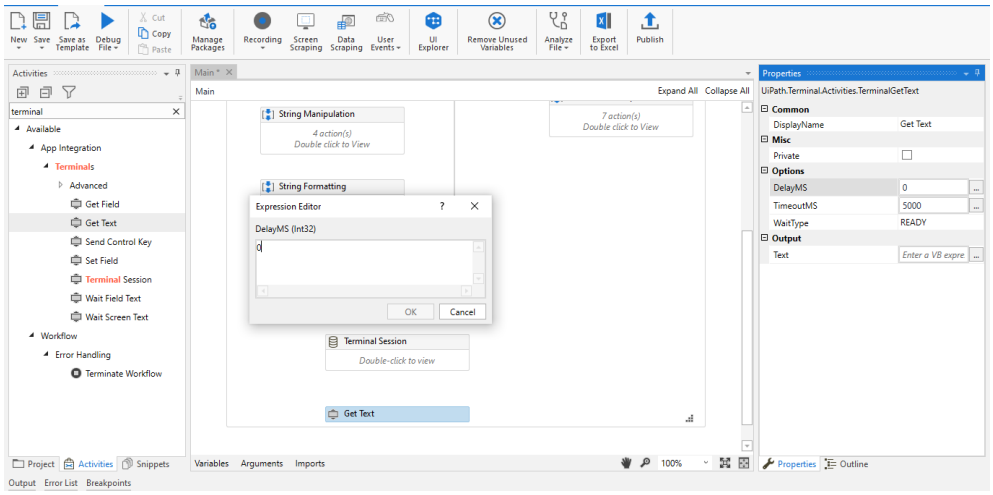


Figure 18: Displaying the DelayMS property within the Get Text activity

Setting the DelayMS to 0 is critical to making this process run without which the robot performance is greatly slowed down.

Another challenge with automating this process is the dynamically changing field input. To set a field using the terminal activity, the primary two components are the adjacent two fields as shown in the example below.

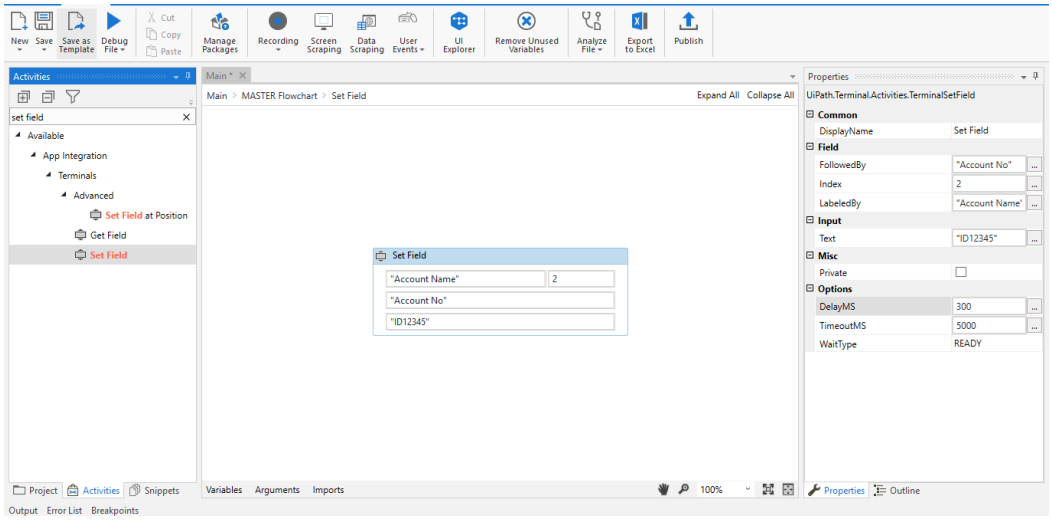


Figure 19: Displaying the Set Field property within the terminal activity

The FollowedBy field, which displays the "Account No", is dynamically altered in case of a missing account number. In such a case, the subsequent field will move to the FollowedBy field and the robot fails to catch the correct input field. This problem is addressed by use of Get Text property where we extract the whole data string and parse it for the right field input.

Training the robot within such a restricted environment is a case of trial and error and consumes a lot of developer time. But once the challenges are overcome, the performance of the bot exceeds the manual process by manifold times.

3.2.7 Use Case 6: Ledger Adding

The Ledger Adding process involves the same mechanism of training the robot as the above Tax Adding and Account Conversion processes. The only challenge here is the extended horizontal page structure within the Repository Database.

The Repository Database screen size is of fixed length. It can only contain a fixed number of characters on the screen at a given moment. If the customer data requires more fields, the data must be entered either by vertically scrolling down the page to the next page or horizontally incorporating new fields in the new screen. The Ledger Adding process uses the latter for data entry and update.

This poses a challenge as the robot must memorise the data entered on the first screen before moving to the next screen for additional inputs. A complex array data structure is used to resolve this issue. A variable array of fixed size is used to catch all the data entry points and then later updated based on indexing and field location.

RPA To-be for Ledger Adding

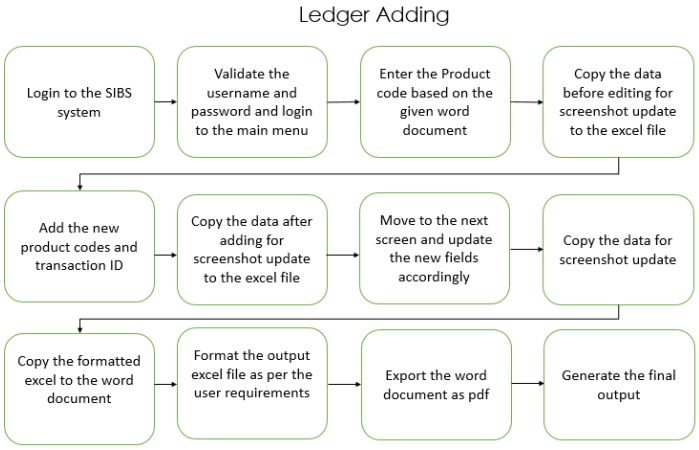


Figure 20: Process flow for Ledger Adding

3.2.8 Use Case 7: Ledger Editing

The Ledger Editing process is akin to Ledger Adding except that there are two entry points to login to the account. One is via the Account Transaction Code and the other using the Product ID itself. The robot is trained to read the excel cells and capture the keywords to check if the entry point is a Transaction Code or the Product ID.

The varying field structure via the two entry points is resolved by use of if else conditions in the program workflow. The use of functional program allows for a more structured workflow. The invoke workflow activity is used to invoke standalone code

to avoid redundancy in code. Arguments can be passed in/out of the workflow. This allows for a seamless integration of the whole code.

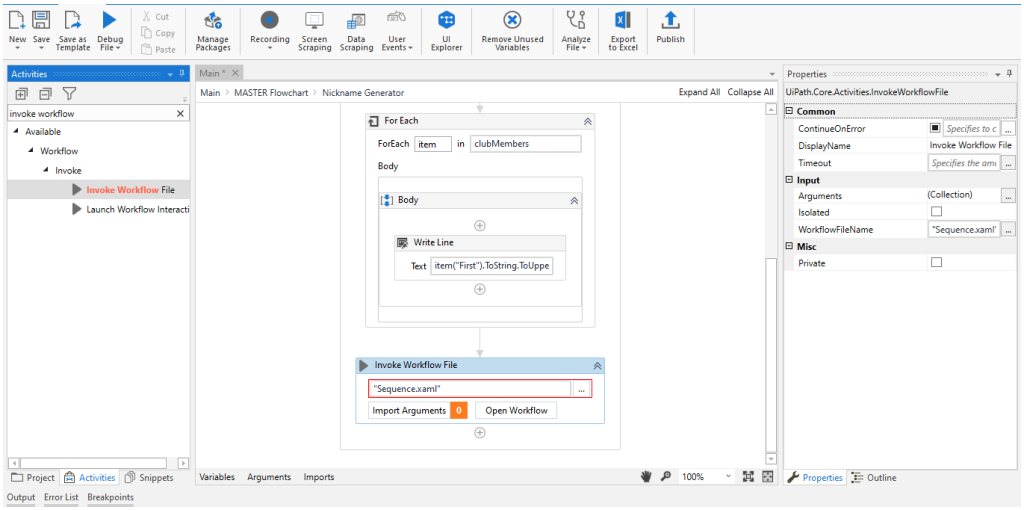


Figure 21: Example of Invoke Workflow activity

RPA To-be for Ledger Editing

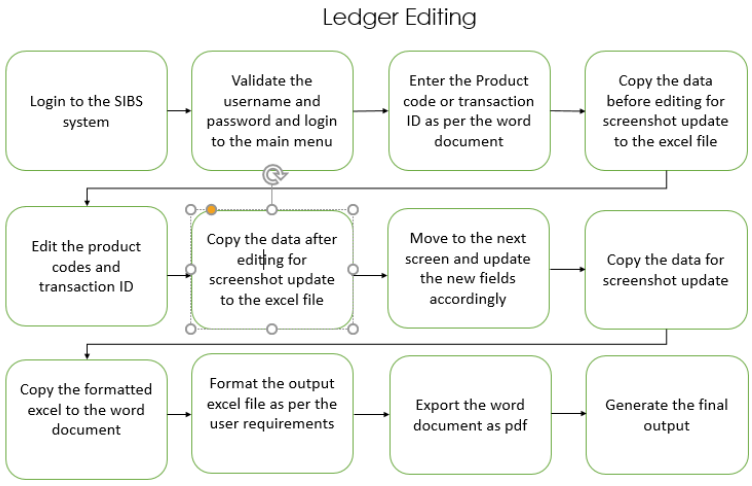


Figure 22: Process flow for Ledger Editing

3.2.9 Use Case 8: Account Transaction Adding

The Account Transaction Adding use case also works the same as the other Repository Update use cases. However, a few parameters must be met within the workflow to maintain an error free output. The card termination parameters must be checked for any inconsistencies. The starting and ending dates are altered based on the Card category type.

The screen capture required for the output is in the form of a pdf. A simple Export to PDF activity within UiPath Studio can be used to convert the Word to PDF file without any noticeable delays.

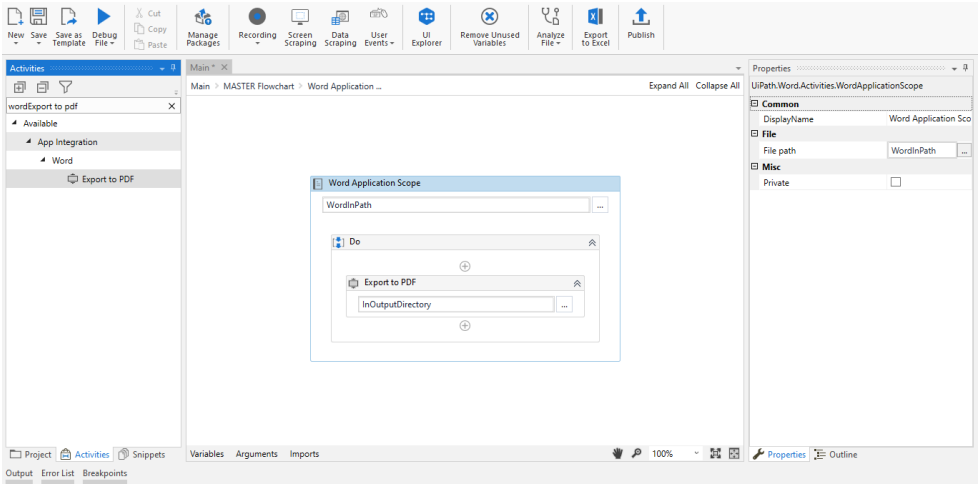


Figure 23: Export to PDF activity within the Word Application Scope

The account transaction information is made available to the user as a pdf using the Export Word to pdf activity. The processing time for the output delivered is henceforth considerably reduced.

RPA To-be for Account Transaction Adding

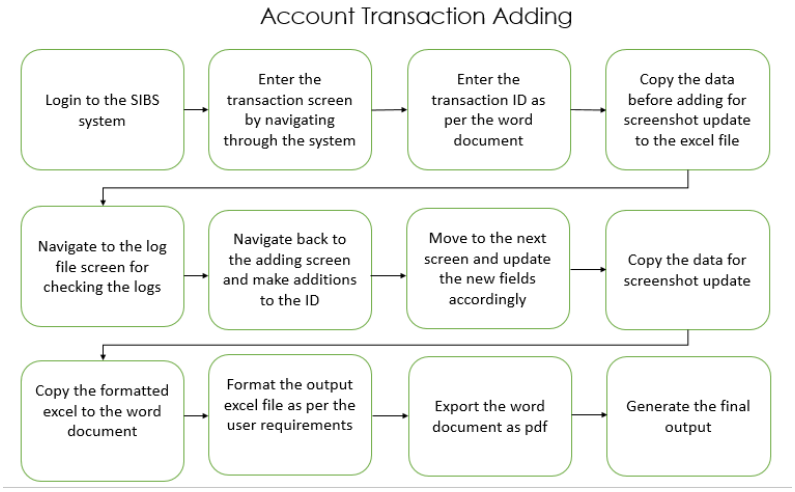


Figure 24: Process flow for transaction adding

3.2.10 Use Case 9: Account Transaction Editing

The Account Transaction Editing use case is the same as the Adding process. Once the terminal session has been established, the robot clears each field using the clear EraseOf property within the terminal activity.

The Invoke Code activity is used to generate the output as per the user requirements. This activity synchronously invokes the VB.NET or C# code while passing in a list of arguments. In the previous process, the bots were trained to extract data from the SIBS system and populate the cells in the excel file. The excel is

later formatted and moved to the word document in a form of a table for the final screenshot output.

Bu using the Invoke Code activity, the data is directly copied and formatted in the Word document. The time taken for this process is much lesser than the previous task. As the output file format is same for most of the processes, this code has been readjusted to be used as a standalone xaml file within each use case. An illustration of how Invoke Code activity is used is given below. The VB.NET script is invoked within the Word Application Scope activity to deliver the desired final output formatting.

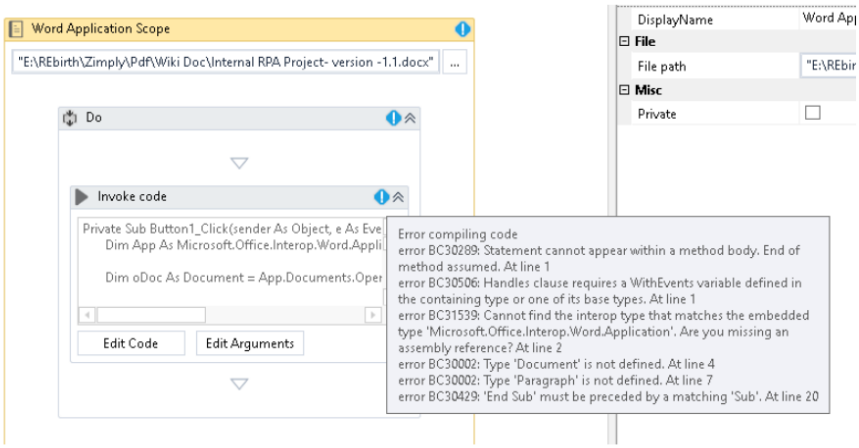


Figure 25: Illustrating the Invoke Code methodology within the UiPath Studio

RPA To-be for Account Transaction editing

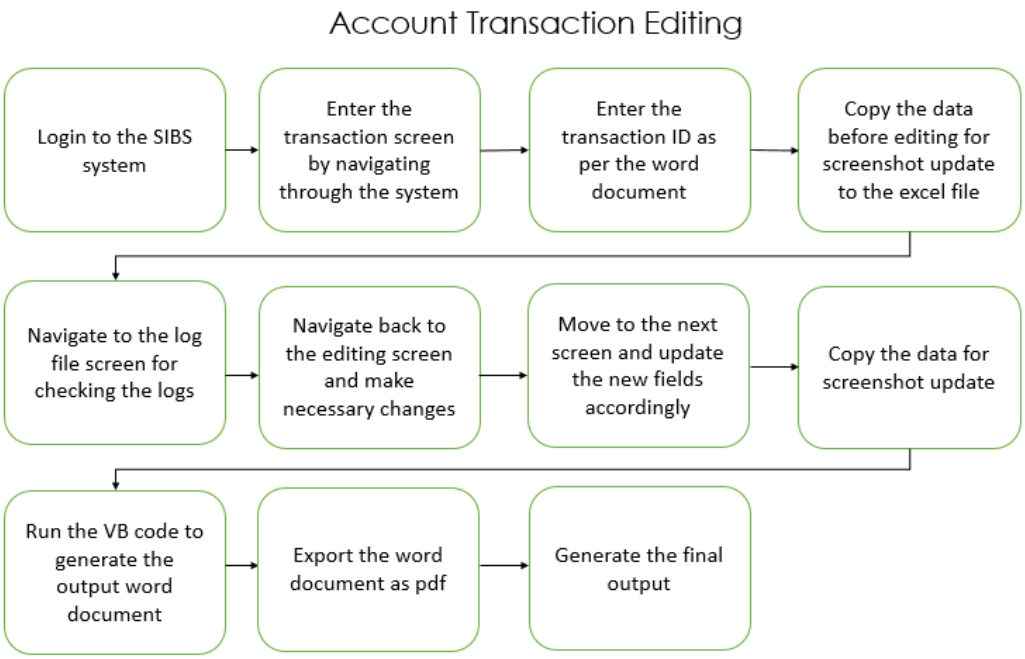


Figure 26: Process flow for transaction editing

4. Problems and Solutions

We now look at a few issues that were evident during the developmental stage of the internship project. Some of them were general in nature and required the assistance of the vendor and business. Some were process related which required a collaborative effort from the developers for their resolution.

4.1 System Related Issues

Issue	Description	Solution
Compatibility Issues	Compatibility issues when trying to run the robot on a Win 10 machine when using the UiPath Studio on a Win 7 to generate the package module.	Develop and deploy the robots on machines with similar configuration
Connection Issues	Unable to connect to the IBM Personal Communications Terminal using UiPath.	Upgrade UiPath to the latest version
Documentation	Lack of proper documentation hampering the progress while using the IBM Personal Communications to record the SIBS system.	Provide with proper document and methodology for each process
Installation	Installing the UiRobot on a Win7 machine using UiPlatform.exe was based on trial and error. Require assistance in overcoming a similar situation in future installations.	System hardware requirements must be checked before installation

Table 1: System related issues and solutions

4.2 Process Related Issues

Issue	Description	Solution
SIBS system	Cannot long press buttons and scroll down through thousands of records using the IBM Personal Communications Terminal. Keyboard shortcuts not available for scrolling down or reaching the end of the list of records.	Setting DelayMS property to 0 will resolve this issue
Internet Connectivity	Internet speed adversely affecting the automation process. Using alternate means as setting higher delays and	Enabling cache and allowing uninterrupted access to the process

	interactive page loads to bypass the delays.	websites can help mitigate this issue
Word Compatibility	Results coming fine on one machine but Word formatting 100% not reliable on a different system when not using macros for formatting.	Installing Word Activities package can help resolve this issue
Internet browser	Internet browser connection problems completely halting the automation.	Updating the browser to accommodate the new scripts can improve page readability
Memory leaks	Memory Error halting the automation suddenly forcing to rerun the process.	Adding more RAM and processing power to a machine can help avoid memory leaks
System crash	SIBS system crashing and becoming unusable while connected to the IBM Personal Communications terminal forcing to restart of the system.	Using IBM EHLLAPI as alternate means to rectify this problem
Excel Compatibility	Excel compatibility on different windows versions requires constant changes in selectors used.	Workaround for excel applications using Excel activities package
Text Capture	Cannot use direct screen and text capture in IBM Personal Communications. The field values are limited and force to use indirect methods for screen capturing.	Using of click activity outside the terminal activity within the program workflow is a possible solution.

Table 2: Process related issues and solutions

5. Recommendations

RPA is not a one stop magic solution to the problems plaguing the industry. It is unlikely to solve every unautomated activity in the organisation. However, its advantages cannot be overlooked as we understand the brighter side of how skilled professionals in RPA use this technology to help organisations achieve better operational efficiency within a short span of time. But that does not mean that RPA projects are perfect and offer no challenges.

Several key points can be highlighted while looking at the challenges of dealing with automation in a restricted business environment like a bank. Some of them include:

- Shortage of skilled resources
- Lack of required support from the business side

- Not so effective team structure
- Vaguely defined user guide requirements
- Unrealistic user expectations
- Incorrectly identified use cases for automation
- Lack of support from the Vendor
- Post implementation and maintenance

1. Shortage of skilled resources: Although RPA is a booming market, there is a visible shortage of skilled resources that adversely affects the manifold uses of the software used. The team had one experienced developer in UiPath along with three other developers who are relatively new to the technology. Owing to this, there was a mismatch in the quality of the output delivered at various stages of development. Owing to this discrepancy, some of the processes had to be redone from scratch for lack of consistency in the final output.

Recommendation: This can be resolved to an extent by having a backup plan for back filling a skilled resource in case of attrition or starting of a new project.

2. Lack of support from the business side: In order for the project to be a success, it is extremely important that the key business use cases are provided with the necessary workflows and possible workarounds for any potential failure scenarios. Lack of a comprehensive Process Design Document was a hindrance in setting up a realistic expectation for the output delivered.

Recommendation: The key to resolving this issue is to open a channel of communication between the developmental team and the business so that their thoughts and ideas are aligned in the achievement of their set goals.

3. Ineffective team structure: Clearly defining the roles within a team is the key to the success of any project. Lack of adequate knowledge about the processes was noticeable among the business analysts which in turn affects the overall quality of the output delivered. Inability to share resources poses a risk in achieving the set milestones for the project.

Recommendation: A well-defined team structure with set roles and functions can provide a well-oiled machine collaborative work.

4. Vaguely defined user guide requirements: Properly defined user guide is key to ensuring a successful project output. Without which the developmental team will be in a constant state of flux in understanding the user requirements. This will result in a loss of time and will further delay the project proceedings.

Recommendation: A clearly defined and formatted user guide should be put in place before starting any developmental work. The developer must be notified if any changes to the user guide are mandated so that they can make the necessary adjustments to the code.

5. Unrealistic user expectations: Not all processes can be automated fully. Users are naturally enticed by the idea of sophisticated robots taking over their processes and accomplishing these tasks in a lightning fast manner. But setting these expectations high can lead to further disappointment.

Recommendation: Understanding the limitations of automation is key to ensuring a compromising RPA solution that is effective, stable and yield the best results within the given scope.

6. Incorrectly identified use cases for automation: A good Return of Investment is critical to get the business buy-in as it will ensure the budget allocation parameters for the subsequent projects are sufficiently met. Wrongly identified use cases for automation can become a detriment to this fact as the ROI will be greatly reduced and the business will need to relook at its automation strategy.

Recommendation: Identifying the exact use cases for automation depending on the complexity of the processes is important in producing the expected ROI.

7. Lack of support from the vendor: In the current RPA project, there were times when the developmental work was halted because of lack of proper understanding on the usage of the software. There were situations when no straightforward solution was existing to create a workaround for automation. Lack of proper documentation from the vendor's side was a hindrance in using the tool features and their implementation.

Recommendation: Proper documentation and reliable vendor support is critical to ensuring the project is completed in a timely manner.

8. Post implementation and maintenance: This is one of the key areas of automation that the business overlooks. Once a robot is deployed, failure to take care of the push backs can sabotage the whole working process. Without proper measures to counter such an occurrence leads to unwanted time delays and resources.

Recommendation: A pool of possible resolutions must be made before the deployment of the robot. Counter measures must be put in place to overcome any challenges that arise during the implementation and maintenance phases.

6. Conclusion

My time spent at the OCBC bank has imbibed in me a spirit of discipline and self-motivation that came through continuous hours of work and practice. The nature of work at the organisation involved me to contribute within set time constraints. It also gave me a chance to work with people from multiple ethnicities. The expanded work culture at the bank has greatly helped in gaining deeper insights into the essence of how technology is used to supplement the banking operations. The overall stream of work is seamlessly aligned with the constant changes based on the ever changing business requirements. This created a scope for more creative endeavours whilst performing my daily activities. I have implemented innovative solutions to several business processes earning appreciation from my colleagues at work. Overall, the contributions I have made trivial as they might be, gave me an accomplished sense of fulfilment and achievement. The work culture at the organisation and the context of the business has allowed me the opportunity to think out of box and provide a long lasting maintainable solution to their business activities.

Appendix A (Weekly reports and Project Plan)

Week 1 Report (02 Sep 19 - 06 Sep 19)

SNO	Milestones	Start Date	End Date	Status
1. Reporting to the company	Finishing the formalities and signing the onboard documentation at SimTech	02 Sep 19	02 Sep 19	Completed
2. Familiarising with the work culture	Acquainting myself with the systems at my workplace.	03 Sept 19	03 Sep 19	Completed
3. Exploring internal software developing tools	Familiarised myself to use the tools at the workplace	04 Sep 19	04 Sep 19	Completed
4. Briefing on project work	Discussed project outline with the supervisor	05 Sep 19	05 Sep 19	Completed
5. Implementing project work using Angular.js and other workplace tools	Tried different variations on project work	06 Sep 19	06 Sep 19	Completed

Planned Tasks for Next Week (09 Sep 19 - 13 Sep 19)

SNO	Tasks	Start Date	End Date	Status
1.	Produce project Plan	09 Sep 19	12 Sep 19	
2	User requirement Specification Document	09 Sep 19	10 Sep 19	
3	UI Prototype	11 Sep 19	13 Sep 19	

Week 2 Report (09 Sep 19 - 13 Sep 19)

SNO	Milestones	Start Date	End Date	Status
1. Define Project scope	Defined the project scope for the implementation of robotic automation in the existing banking system	09 Sep 19	13 Sep 19	Completed
2. Train as a UI Path RPA Developer	Completed 3 levels of online tutorials that are required to take the RPA Developer certification exam for UI Path	09 Sept 19	11 Sep 19	Completed
3. Take Certification Exam	Completed the certification exam for RPA Advanced Developer	11 Sep 19	11 Sep 19	Completed
4. Workshop on understanding the existing core systems in place at the bank	Attended a workshop conducted by my supervisor and manager to understand the existing core systems in place at the OCBC bank	12 Sep 19	12 Sep 19	Completed
5. Prepare business requirements for Robotic Automation Methodology life cycle	Prepared the ppt for Robotic Automation life cycle to be implemented in the banking system based on business requirements	12 Sep 19	12 Sep 19	Completed
6. Extract data from the banking core system into an excel spreadsheet	Use of VBA coding to extract data from the existing SIBS system at the bank to an excel spreadsheet	13 Sep 19	13 Sep 19	In progress

Planned Tasks for Next Week (16 Sep 19 - 20 Sep 19)

SNO	Tasks	Start Date	End Date	Status
1. Data extraction using VBA	Understanding the macros in place and extract data using VBA	16 Sep 19	18 Sep 19	
2. Start project work on digitalisation of banking operations using UI Path	Use of UI Path to automate tasks at the bank	19 Sep 19	20 Sep 19	

Week 3 Report (16 Sep 19 - 20 Sep 19)

SNO	Milestones	Start Date	End Date	Status
7. Data extraction using VBA	Understanding the macros in place and extract data using VBA	16 Sep 19	17 Sep 19	Completed
8. SCRUM Diagram	Come up with a comprehensive SCRUM diagram for the automation processes detailing each Sprint.	17 Sept 19	17 Sep 19	Completed
9. Project Work – Requirement Analysis	Understand the business requirements for automation by going through the existing user guide	18 Sep 19	19 Sep 19	Completed
10. Analysis and Design	Come up with an updated user guide with an high level design document for automation.	19 Sep 19	23 Sep 19	In progress

11. Use Case and Activity diagrams	Prepare use case and activity diagrams for the workflow	20 Sep 19	25 Sep 19	In progress
12. Resolve coding issues	Use of VBA coding to resolve issues in relation to merchant data – wrong entries and inconsistent output	16 Sep 19	20 Sep 19	Completed

Planned Tasks for Next Week (16 Sep 19 - 20 Sep 19)

SNO	Tasks	Start Date	End Date	Status
3. Design	Design Document for the automation processes in the Car Operations Department at OCBC	19 Sep 19	23 Sep 19	
4. Power point presentation to the supervisor	Submit a power point presentation to the supervisor of the Design document	24 Sep 19	24 Sep 19	

Week 4 Report (23 Sep 19 - 27 Sep 19)

SNO	Milestones	Start Date	End Date	Status
13. Design	Design Document for the automation processes in the Card Operations Department at OCBC	19 Sep 19	23 Sep 19	Completed
14. Power point presentation to the Supervisor	Presentation to the supervisor on the whole project plan and design	24 Sept 19	24 Sep 19	Completed

15. Training on the UI Path Studio Software	Training with UI Path studio software for robotic automation	25 Sep 19	26 Sep 19	Completed
16. Prioritise User Guide requirements	Prioritise the user guide activities and identify the most important tasks for automation	27 Sep 19	27 Sep 19	In progress
17. Use Case and Activity diagrams	Prepare use case and activity diagrams for the workflow	20 Sep 19	25 Sep 19	Completed
18. Resolve coding issues	Use of VBA coding to resolve issues in relation to SIBS system	23 Sep 19	27 Sep 19	Completed

Planned Tasks for Next Week (16 Sep 19 - 20 Sep 19)

SNO	Tasks	Start Date	End Date	Status
5. Develop automation workflow	Develop automation workflow for the processes	30 Sep 19	4 Oct 19	
6. Process Design Document	Submit process design document to the supervisor	30 Sep 19	4 Oct 19	

Week 5 Report (30 Sep 19 - 04 Oct 19)

SNO	Milestones	Start Date	End Date	Status
19. Develop automation workflow	Develop workflow for the 45 processes that are to be automated	30 Sep 19	04 Oct 19	In progress
20. Process Design Document	Design of PDD for the first use case	03 Oct 19	08 Oct 19	In progress
21. Develop the robots for the CPF fund retrieval in	Use of UiPath software to develop the robots for automation	03 Oct 19	15 Oct 19	In progress

Investment Ops department				
22. Implement daily sprint meetings	Conduct daily sprint meetings for the management of the project schedule and timeline	02 Oct 19	04 Oct 19	In progress
23. Resolve coding issues	Use of VBA coding to resolve issues in relation to SIBS system	30 Sep 19	04 Oct 19	Completed

Planned Tasks for Next Week (07 Oct 19 - 11 Oct 19)

SNO	Tasks	Start Date	End Date	Status
7. Develop automation workflow	Develop automation workflow for the processes	07 Oct 19	11 Oct 19	
8. Automate CPF fund retrieval for the Investment Operations department	Use of UiPath to automate the tasks	07 Oct 19	11 Oct 19	

Week 6 Report (07 Oct 19 - 11 Oct 19)

SNO	Milestones	Start Date	End Date	Status
24. Develop automation workflow for CPF fund retrieval	Develop workflow for the CPF Fund retrieval using Ui Path Studio	07 Oct 19	11 Oct 19	Completed
25. Process Design Document	Design of PDD and SDD for the CPF Fund retrieval	10 Oct 19	15 Oct 19	In progress

26. Deploy the robot on the user machine	Use of UiPath software to deploy the robots on the user machine	10 Oct 19	11 Oct 19	In progress
27. Implement daily sprint meetings	Conduct daily sprint meetings for the management of the project schedule and timeline	07 Oct 19	10 Oct 19	In progress
28. Resolve coding issues	Use of VBA coding to resolve issues in relation to SIBS system	07 Oct 19	10 Oct 19	Completed

Planned Tasks for Next Week (14 Oct 19 - 18 Oct 19)

SNO	Tasks	Start Date	End Date	Status
9. Develop automation workflow	Develop automation workflow for SRS fund retrieval	14 Oct 19	18 Oct 19	
10. Deploy the bots for SRS fund retrieval	Use of Ui Path to deploy the bots on the user machine	17 Oct 19	18 Oct 19	

Week 7 Report (14 Oct 19 - 18 Oct 19)

SNO	Milestones	Start Date	End Date	Status
29. Develop automation workflow for SRS fund retrieval	Develop workflow for the SRS Fund retrieval using Ui Path Studio. Implement using C#.	14 Oct 19	17 Oct 19	Completed
30. Process Design Document	Design of PDD and SDD for the CPF Fund retrieval	14 Oct 19	15 Oct 19	Completed
31. Process Design Document	Design of PDD and SDD for the SRS Fund retrieval	16 Oct 19	21 Oct 19	In progress

32. Implement daily sprint meetings	Conduct daily sprint meetings for the management of the project schedule and timeline	14 Oct 19	18 Oct 19	Completed
33. Debug the CPF and SRS processes	Use of C#, VB for debugging purposes	17 Oct 19	18 Oct 19	Completed
34. Automate the SIBS system process	UIPath automation of the SIBS system at the OCBC bank	18 Oct 19	22 Oct 19	In Progress

Planned Tasks for Next Week (21 Oct 19 - 25 Oct 19)

SNO	Tasks	Start Date	End Date	Status
11. SIBS system automation	Develop automation workflow for the SIBS system	18 Oct 19	22 Oct 19	
12. Deploy the bots for SRS fund retrieval	Use of Ui Path to deploy the bots on the user machine	24 Oct 19	24 Oct 19	

Week 8 Report (21 Oct 19 - 25 Oct 19)

SNO	Milestones	Start Date	End Date	Status
35. SIBS System Automation	Develop automation workflow for the SIBS system. Use of UiPath Studio and C# coding	21 Oct 19	25 Oct 19	Completed
36. Process Design Document	Design of PDD and SDD for the GST Adding and GST Editing	22 Oct 19	25 Oct 19	Completed
37. GST Adding and Editing	Develop automation workflow for GST Adding and Editing in the SIBS system	24 Oct 19	25 Oct 19	In progress

38. Implement daily sprint meetings	Conduct daily sprint meetings for the management of the project schedule and timeline	21 Oct 19	25 Oct 19	Completed
39. Debug the GST Adding and GST Editing activities	Use of C#, VB for debugging purposes	24 Oct 19	25 Oct 19	In Progress
40. Deploy the bots on the testing environment	Deploy the robots on the testing environment for the CPF and SRS use cases. Created bat files for user interactions.	21 Oct 19	23 Oct 19	Completed

Planned Tasks for Next Week (28 Oct 19 - 01 Nov 19)

SNO	Tasks	Start Date	End Date	Status
13. Develop workflow for VA interaction in the SIBS system	Develop automation workflow for the SIBS system	28 Oct 19	1 Nov 19	
14. Test the Robots on the user machines	One week testing of the CPF and SRS use cases on the testing environment	28 Oct 19	01 Nov 19	

Week 9 Report (28 Oct 19 - 01 Nov 19)

SNO	Milestones	Start Date	End Date	Status
41. Develop workflow for VA interaction in the SIBS system	Develop automation workflow for the SIBS system. Use of UiPath Studio and .NET coding	29 Oct 19	01 Nov 19	In Progress

42. Process Design Document	Design of PDD and SDD for VA Workflow	31 Oct 19	01 Nov 19	In Progress
43. GST Adding and Editing	User Testing for GST Adding and Editing	01 Nov 19	01 Nov 19	Completed
44. Implement daily sprint meetings	Conduct daily sprint meetings for the management of the project schedule and timeline	29 Oct 19	01 Nov 19	Completed
45. Debug the GST Adding and GST Editing activities	Use of C#, VB for debugging purposes	29 Oct 19	01 Nov 19	In Progress
46. Daily UAT for CPF and SRS processes	Submit the results to the user on daily basis	29 Oct 19	01 Nov 19	Completed

Planned Tasks for Next Week (04 Nov 19 - 08 Nov 19)

SNO	Tasks	Start Date	End Date	Status
15. Develop workflow for GST Deleting Use Case	Develop automation workflow for GST Deleting	04 Nov 19	08 Nov 19	
16. Test the Robots on the user machines	GST Adding and Editing	04 Nov 19	08 Nov 19	

Week 10 Report (04 Nov 19 - 08 Nov 19)

SNO	Milestones	Start Date	End Date	Status
47. Develop workflow for	Develop automation workflow for the VA process and deploy the	04 Nov 19	08 Nov 19	In Progress

VA interaction.	bot on the user machine for daily usage.			
48. Process Design Document	Design of PDD and SDD for VA Workflow	05 Nov 19	06 Nov 19	Completed
49. GST Adding and Editing- Additional User Requirements	Develop automation for GST Adding and Editing based on new user requirements	04 Nov 19	08 Nov 19	Completed
50. Implement daily sprint meetings	Conduct daily sprint meetings for the management of the project schedule and timeline	04 Nov 19	08 Nov 19	Completed
51. Debug the GST Adding and GST Editing activities	Debug and deploy the bot on the testing environment	04 Nov 19	08 Nov 19	Completed
52. Daily UAT for CPF and SRS processes	Submit the results to the user on daily basis	04 Nov 19	08 Nov 19	Completed

Planned Tasks for Next Week (11 Nov 19 - 15 Nov 19)

SNO	Tasks	Start Date	End Date	Status
17. Complete the automation for VA use case	Complete the bot automation and deploy in the testing environment for user interaction	11 Nov 19	15 Nov 19	
18. Test the Robots for the completed use cases on the user machines	Run daily tests for the completed robots in the testing environment and check the results	11 Nov 19	15 Nov 19	

Week 11 Report (11 Nov 19 - 15 Nov 19)

SNO	Milestones	Start Date	End Date	Status
53. Coding for the VA use case	Develop automation workflow for the VA process and deploy the bot on the user machine for daily usage.	11 Nov 19	15 Nov 19	In Progress
54. Daily testing and excel updates to the supervisor	Prepare daily spreadsheet updates and submit to the supervisor	14 Nov 19	15 Nov 19	Completed
55. CPF and SRS additional user requirements	Coding for additional requirements as per the user suggestions and improvements	11 Nov 19	14 Nov 19	Completed
56. Implement daily sprint meetings	Conduct daily sprint meetings for the management of the project schedule and timeline	11 Nov 19	15 Nov 19	Completed
57. Test run the completed use cases in presence of the users	UAT testing and requirement freezing	13 Nov 19	15 Nov 19	Completed
58. Daily UAT for CPF and SRS processes	Submit the results to the user on daily basis	11 Nov 19	15 Nov 19	Completed

Planned Tasks for Next Week (18 Nov 19 - 22 Nov 19)

SNO	Tasks	Start Date	End Date	Status
19. Complete the automation for VA use case	Complete the bot automation and deploy in the testing	18 Nov 19	19 Nov 19	

	environment for user interaction			
20. Test run the VA use case with the user	Deploy the bots on the testing environment and test run in presence of the user.	21 Nov 19	21 Nov 19	

Week 12 Report (18 Nov 19 - 22 Nov 19)

SNO	Milestones	Start ate	End Date	Status
59. Coding for the VA use case	Complete the automation workflow and coding for VA use case.	18 Nov 19	22 Nov 19	Completed
60. Daily testing and excel updates to the supervisor	Prepare daily spreadsheet updates and submit to the supervisor	18 Nov 19	22 Nov 19	Completed
61. CPF user requirement changes	Coding for additional requirements as per the user suggestions and improvements	19 Nov 19	22 Nov 19	In Progress
62. Implement daily sprint meetings	Conduct daily sprint meetings for the management of the project schedule and timeline	18 Nov 19	22 Nov 19	Completed
63. Test run the completed use cases in presence of the users	UAT testing and requirement freezing	18 Nov 19	22 Nov 19	Completed
64. GST Adding new user requirements and upgrades	Upgrade the bot for the GST Adding with new user requirements	18 Nov 19	22 Nov 19	Completed

Planned Tasks for Next Week (25 Nov 19 - 29 Nov 19)

SNO	Tasks	Start Date	End Date	Status
21. Test run the GST Adding and Editing in presence of the user	UAT testing for GST Adding and Editing use cases	25 Nov 19	27 Nov 19	
22. Test run the VA use case with the user	Deploy the bots on the testing environment and test run in presence of the user.	28 Nov 19	29 Nov 19	

Week 13 Report (25 Nov 19 - 29 Nov 19)

SNO	Milestones	Start ate	End Date	Status
65. Updated user requirements VA use case	Complete the automation workflow and coding for VA use case based on updated user requirements	25 Nov 19	29 Nov 19	Completed
66. Daily testing and excel updates to the supervisor	Prepare daily spreadsheet updates and submit to the supervisor	25 Nov 19	29 Nov 19	Completed
67. UAT testing for GST adding and Editing	UAT testing for different scenarios for GST Adding and Editing	28 Nov 19	28 Nov 19	Completed
68. Implement daily sprint meetings	Conduct daily sprint meetings for the management of the project schedule and timeline	25 Nov 19	29 Nov 19	Completed
69. User guide finalization	Finalize the user guide for the VS use case	29 Nov 19	03 Dec 19	In progress

for VS use case				

Planned Tasks for Next Week (02 Dec 19 - 06 Dec 19)

SNO	Tasks	Start Date	End Date	Status
23. Test run for VA use case	UAT testing for VA use case	02 Dec 19	03 Dec 19	
24. Test run for GST Adding and Editing	UAT testing for VA use case	02 Dec 19	03 Dec 19	

Week 14 Report (02 Dec 19 - 06 Dec 19)

SNO	Milestones	Start ate	End Date	Status
70. Resolve the VA process on the testing environment	Resolve issues relating to the VA use case on the testing PC	02 Dec 19	02 Dec 19	Completed
71. Daily testing and excel updates to the supervisor	Prepare daily spreadsheet updates and submit to the supervisor	02 Dec 19	06 Dec 19	Completed
72. Automation for TC Update use case	Develop automation for TC Update use case. Freeze the user requirements for the initial work flow.	03 Dec 19	06 Dec 19	In Progress
73. Implement daily sprint meetings	Conduct daily sprint meetings for the management of the project schedule and timeline	02 Dec 19	06 Dec 19	Completed

74. User guide finalization for GL Update use case	Finalize the user guide for the GL Update. Meeting with BA and the user	06 Dec 19	06 Dec 19	In progress

Planned Tasks for Next Week (09 Dec 19 - 13 Dec 19)

SNO	Tasks	Start Date	End Date	Status
25. Test run for GST Adding and Editing and finalize the output document	UAT testing for GST Adding and Editing	09 Dec 19	09 Dec 19	
26. Complete the automation work flow for TC Update use case.	Develop and complete the automation work flow for TC Update use case	09 Dec 19	13 Dec 19	

Week 15 Report (09 Dec 19 - 13 Dec 19)

SNO	Milestones	Start ate	End Date	Status
75. Deploy the TC Update bot on the Testing Environment	Successfully deployed the TC Update Adding process on the Testing Environment. UAT completed	09 Dec 19	13 Dec 19	Completed
76. Daily testing and excel updates to the supervisor	Prepare daily spreadsheet updates and submit to the supervisor	09 Dec 19	13 Dec 19	Completed
77. Deploy the GST Adding on the Testing nvironment.	Successfully deployed the GST Adding process on the Testing Environment. UAT completed	09 Dec 19	13 Dec 19	Completed

Generate output as per User requirements				
78. Deploy the GST Editing bot on the testing environment	Successfully deployed the GST Editing process on the Testing Environment. UAT completed	09 Dec 19	13 Dec 19	Completed
79. Debug the VA Update process based on different testing scenarios	Implementing codes to debug the VA Update process and test it for different scenarios.	09 Dec 19	13 Dec 19	In progress

Planned Tasks for Next Week (16 Dec 19 - 20 Dec 19)

SNO	Tasks	Start Date	End Date	Status
27. Deploy the VA Update process on the Testing Environment	Deploy the bot and generate output. UAT pending	16 Dec 19	20 Dec 19	
28. Complete the automation work flow for TC Update Editing use case.	Develop and complete the automation work flow for TC Update Editing use case	16 Dec 19	20 Dec 19	

Week 16 Report (16 Dec 19 - 20 Dec 19)

SNO	Milestones	Start ate	End Date	Status
80. Deploy the VC Update bot on the	Successfully deployed the VA Update Adding process on the Testing	16 Dec 19	16 Dec 19	Completed

Testing Environment	Environment. UAT completed			
81. Daily testing and excel updates to the supervisor	Prepare daily spreadsheet updates and submit to the supervisor	16 Dec 19	20 Dec 19	Completed
82. Complete the automation work flow for GL Update Adding use case.	Coding for the GL Update use case. Partially done	17 Dec 19	20 Dec 19	In Progress
83. Deploy the TC Update Editing bot on the testing environment	Successfully deployed the TC Update Editing bot on the Testing Environment. UAT completed	18 Dec 19	18 Dec 19	Completed
84. Coding for the GL Update Editing process	Develop automation work flow for the GL Update Editing process	20 Dec 19	20 Dec 19	In progress

Planned Tasks for Next Week (23 Dec 19 - 27 Dec 19)

SNO	Tasks	Start Date	End Date	Status
29. Deploy the GL Update Adding process on the Testing Environment	Deploy the bot and generate output. UAT pending	23 Dec 19	27 Dec 19	
30. Deploy the GL Update Editing process on the Testing Environment	Deploy the bot and generate output. UAT pending	23 Dec 19	27 Dec 19	

Week 17 Report (23 Dec 19 - 27 Dec 19)

SNO	Milestones	Start ate	End Date	Status
85. Deploy the GL Update Addingbot on the Testing Environment	Successfully deployed the GL Update Adding process on the Testing Environment. UAT completed	23 Dec 19	23 Dec 19	Completed
86. Daily testing and excel updates to the supervisor	Prepare daily spreadsheet updates and submit to the supervisor	23 Dec 19	27 Dec 19	Completed
87. Complete the automation work flow for GL Update Editing use case.	Coding for the GL Update Editing use case. Partially done	24 Dec 19	27 Dec 19	In Progress
88. Test run the TC Update Editing bot on the testing environment	Successfully deployed and test run the TC Update Editing bot on the Testing Environment.	25 Dec 19	25 Dec 19	Completed
89. Test run the VA use case for multiple user scenarios	Test run the VA use case on the testing environment with the user. Clean the code and debug for future implementations	27 Dec 19	27 Dec 19	Completed

Planned Tasks for Next Week (30 Dec 19 - 03 Jan 20)

SNO	Tasks	Start Date	End Date	Status
31. Deploy the GL Update Editing process on	Deploy the bot and generate	30 Dec 19	03 Dec 19	

the Testing Environment	output. UAT pending			
32. Test run all the completed 9 nine processes on the testing environment	UAT testing for the nine processes	30 Dec 19	03 Jan 20	

Week 18 Report (30 Dec 19 - 03 Jan 20)

SNO	Milestones	Start ate	End Date	Status
90. Create automation workflow for GL Update Editing use case	Collect updated user requirements and complete the automation work flow accordingly	30 Dec 19	03 Jan 20	In progress
91. Daily testing and excel updates to the supervisor	Prepare daily spreadsheet updates and submit to the supervisor	30 Dec 19	03 Jan 20	Completed
92. Complete the automation work flow for GL Update Adding use case.	Coding for the GL Update Editing use case. Updated user requirements. Output pending.	30 Dec 19	03 Jan 20	In Progress
93. Test run the GL Update Adding bot on the testing environment	Successfully deployed and test run the GL Update Adding bot on the Testing Environment. Output format pending.	02 Jan 20	02 Jan 20	Completed
94. Test run the VA use case for multiple	Test run the VA use case on the testing environment with the user. Clean the code and	30 Dec 19	30 Dec 19	Completed

user scenarios	debug for future implementations			

Planned Tasks for Next Week (06 Jan 20 - 10 Jan 20)

SNO	Tasks	Start Date	End Date	Status
33. Deploy the GL Update Editing process on the Testing Environment	Deploy the bot and generate output. UAT pending	06 Jan 20	10 Jan 20	
34. Test run all the completed 9 nine processes on the testing environment	UAT testing for the nine processes	06 Jan 20	10 Jan 20	

Week 19 Report (06 Jan 20 - 10 Jan 20)

SNO	Milestones	Start Date	End Date	Status
95. Complete automation workflow for GL Update Editing use case	Collect updated user requirements and complete the automation work flow accordingly	06 Jan 20	10 Jan 20	In progress
96. Daily testing and excel updates to the supervisor	Prepare daily spreadsheet updates and submit to the supervisor	06 Jan 20	10 Jan 20	Completed
97. Complete the automation work flow for GL Update	Coding for the GL Update Editing use case. Updated user requirements. Output pending.	06 Jan 20	10 Jan 20	In Progress

Adding use case.				
98. Test run all the bots	Test run all the bots on the testing environment	06 Jan 20	10 Jan 20	In Progress
99. Prepare the final report	Document the final report	06 Jan 20	10 Jan 20	In Progress

Planned Tasks for Next Week (13 Jan 20 - 17 Jan 20)

SNO	Tasks	Start Date	End Date	Status
35. Test run all the bots	Perform the final test run on all the bots on the testing environment	13 Jan 20	17 Jan 20	
36. Document the final project report	Prepare and document the final report	13 Jan 20	17 Jan 20	

Week 20 Report (13 Jan 20 - 17 Jan 20)

SNO	Milestones	Start Date	End Date	Status
1. Test run all the bots	Perform the final test run on all the bots on the testing environment	13 Jan 20	17 Jan 20	Completed
2. Daily testing and excel updates to the supervisor	Prepare daily spreadsheet updates and submit to the supervisor	13 Jan 20	17 Jan 20	Completed
3. Document the final project report	Prepare and document the final project report	13 Jan 20	17 Jan 20	In Progress

Project Plan

1.0 Project Overview

This project plan provides a definition of the project, including the project's goals and objectives.

The project involves developing a digital operation application for Consumer Financial Services in the Banking Industry. The intern will contribute to the design, implementation and testing of services for Business automation using UI Path Process Automation (RPA) studio and VBA Macros.

The current manual system at the OCBC bank is time consuming and much effort is spent in processing records and updating the systems. This project aims to provide efficiency and save time for the OCBC Card Operations and Investment Operations departments by automating these processes.

2.0 Project Vision / Mission

The project aims to optimize business operational activities by developing Microsoft Excel Macros using VBA Programming Language and Robotic Automation using UI Path Studio.

3.0 Project Description

The following are some problems faced by the current manual system in the Card Operations department at OCBC bank:

- Manual tasks are error prone and require constant employee support to check for any discrepancies.
- Delays in performing the tasks because of manual entries.
- Macros VBA support is not fulfilling as new system updates require debugging of many lines of code which is time consuming.
- The current SIBS system maintained at the bank is a virtual environment that can only be updated using manual keystrokes which is tedious and error prone.

The project is targeted to end on 20 January 2020.

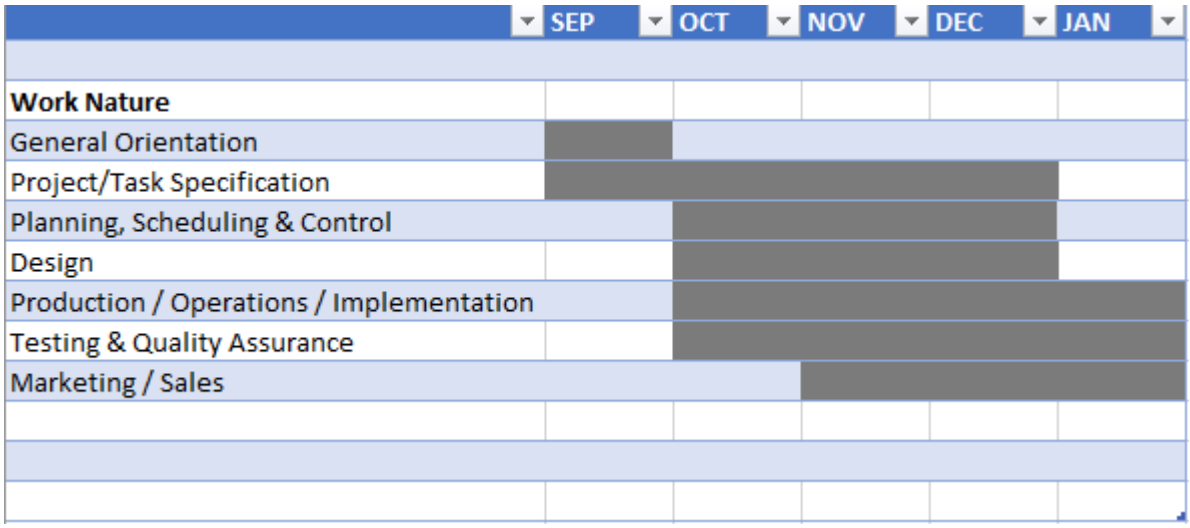
4.0 Project Objectives

This project aims to automate the banking operations to:

- Improve productivity by overcoming difficulties caused by the existing manual system.
- Provide better control over the system processes.
- Facilitate faster and reliable operational activities.

- Provide a flexible and reliable technology base for the future.

5.0 Work Nature



6.0 Roles and Responsibilities

- Develop project plan and schedule
- Manage deliverables according to the plan
- Lead and assign tasks for the project team
- Provide regular updates to Supervisor
- Work with users to establish and meet business needs
- Complete user requirements specifications
- Complete design and development deliverables
- Conduct performance testing
- Document the process

7.0 Project Status Reporting

A weekly progress report will be provided throughout the duration of the project.

8.0 Project Issue Management

Issues will be recorded in an issue log on a weekly basis and tracked to resolution.

S/No	Issues / Risks	Impact	Owner	Target Date
1				

• **Risk Items**	• **Likelihood**	• **Impact**	• **Priority**	• **Mitigation/** • **Contingency Actions**
• Project scope creep	• 6: Scope is generally defined, subject to revision	• 8	• 48	Scope is initially defined in project plan, reviewed weekly by project team to prevent undetected scope creep
• Attitude/Absence of Users	• 7: No immediate access to users	• 7	• 49	Seek feedback from project supervisor to ensure continued support
• Additional workload or time requirements	• 9: Unforeseen system bugs may cause delays	• 10	• 90	Timeline to be reviewed by project leader on weekly basis to prevent timeline departures

9.0 Learning Objectives

During my internship, I expect to gain some hands-on experience on business/software application development process. I wish to strengthen my software design and development skills by running business projects. I hope to develop high quality maintainable software by applying Software Project Management concepts, such as Agile Scrum Software Development methodologies.

Moreover, I want to experience the workplace culture in a Singapore local bank. I hope to get insights on how Operations Department uses technology to support daily business transactions.

10.0 Project Deliverables / Milestones

Project Plan	29 Sep 19
System User Guide	07 Oct 19
Process Design Document	10 Oct 19
Solution Design Document	10 Oct 19
Development	15 Oct 19
UAT Performance Test Plans	20 Oct 19
Conduct UAT	22 Oct 19

UAT Signoff Weekly Project Status Reports	23 Oct 19 Every Friday