LIVE EXCHANGE RATES

A PROJECT REPORT

Submitted by

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BONAFIDE CERTIFICATE

Certified that this project report **" LIVE EXCHANGE RATES "** is the bonafide work of **" MANICK VISHAL C (220701158) "** who carried out the project work for the subject OAI1903 - Introduction to Robotic Process Automation under my supervision.

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Robotic Process Automation held on _____

INTERNAL EXAMINER **EXTERNAL EXAMINER**

ABSTRACT

This project involves developing a robotic process automation (RPA) solution using UiPath Studio to retrieve live exchange rates from financial APIs or websites and automate their integration into business workflows.

The bot ensures real-time data accuracy by scraping or API querying, validating currency data, and updating spreadsheets, databases, or enterprise systems as required. Designed for scalability and ease of use, this solution reduces manual effort, enhances efficiency, and ensures seamless currency rate management across various organizational processes.

The real-time monitoring of live exchange rates is a crucial aspect of global financial markets, enabling businesses, investors, and consumers to make informed decisions regarding currency conversions. This system provides up-to-the-minute data on currency values, reflecting fluctuations driven by market dynamics, geopolitical events, and economic indicators.

This paper explores the architecture and implementation of real-time exchange rate systems, discussing key challenges such as data latency, source reliability, and security. By leveraging advanced APIs, cloud computing, and data aggregation techniques, real-time exchange rate platforms ensure the accuracy, reliability, and speed required for high-frequency trading, financial analysis, and personal transactions. It also examines the potential applications of these systems in areas like international trade, investment strategies, and financial risk management, highlighting their importance in today's interconnected global economy.

ACKNOWLEDGEMENT

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MANICK VISHAL C (220701158)

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LIST OF ABBREVIATIONS

ABBREVIATIONS	ACRONYM
RPA	Robotic Process Automation
AI	Artificial Intelligence
API	Application Programming Interface
CV	Computer Vision
OCR	Optical Character Recognition
LER	Live Exchange Rates
CRM	Customer Relationship Management
ERP	Enterprise Resource Planning
IDE	Integrated Development Environment
UML	Unified Modeling Language
UI	User Interface
LMS	Learning Management System

CHAPTER - 1

1.1 INTRODUCTION

Managing live exchange rates is crucial for businesses that operate in global markets, as it directly impacts financial transactions, budgeting, and reporting. Traditionally, obtaining and processing exchange rate data involves manual efforts, which can be time-consuming, prone to errors, and inefficient in responding to rapid market changes.

This project leverages UiPath Studio to develop a robust Robotic Process Automation (RPA) solution that automates the retrieval, validation, and integration of live exchange rate data. By interfacing with APIs or scraping authorized financial websites, the bot ensures accurate and real-time data acquisition.

The RPA solution is designed to be user-friendly, scalable, and adaptable, enabling businesses to optimize their currency management processes while reducing the risks associated with manual intervention. It streamlines processes such as updating financial systems, generating reports, and facilitating currency conversions, thereby enhancing operational efficiency and decision-making.

1.2 OBJECTIVES

- Automate Exchange Rate Retrieval: Develop an RPA bot to fetch live exchange rates from trusted financial APIs or authorized websites in real-time.
- Enhance Data Accuracy: Minimize errors by implementing robust data validation techniques to ensure accurate and reliable currency rate updates.
- Streamline Integration: Automate the process of updating exchange rate data in spreadsheets, databases, or financial systems, ensuring seamless workflow integration.
- Improve Efficiency: Reduce the manual effort and time required to gather and process exchange rate data, enabling faster decision-making.
- Ensure Scalability: Design a flexible RPA solution that can adapt to different data sources, formats, and organizational requirements.
- Increase Compliance: Maintain adherence to data security and regulatory standards by ensuring secure data handling and auditing capabilities.
- Facilitate Reporting: Automate the generation of financial reports and analytics based on live exchange rate data to support informed business decisions.

1.3 EXISTING SYSTEMS

1. Manual Workflow Details

- **Data Sources:** Exchange rates are manually retrieved from trusted financial websites like XE, OANDA, or central bank portals.
- **Data Entry:** Users manually input the rates into spreadsheets or enterprise resource planning (ERP) systems.
- **Frequency:** Updates are performed daily or as needed, depending on organizational requirements.

2. Challenges

- **Time-Consuming Process:** Retrieving and entering data manually takes significant time, especially when dealing with multiple currencies.
- **Prone to Errors:** Manual data handling can lead to inaccuracies in exchange rates, causing financial discrepancies.
- **Lack of Real-Time Updates:** Rates may not reflect real-time values due to infrequent updates, potentially leading to outdated data being used in transactions.
- **Limited Scalability:** The manual approach struggles to accommodate a growing number of currency pairs or sources.

3. Technical Aspects

- **Existing Tools:** Microsoft Excel, web browsers, and ERP systems like SAP, Oracle, or QuickBooks are typically used.

- **Data Format:** Exchange rate data is often structured in formats like CSV, JSON, or XML but requires manual conversion for compatibility with internal systems.
- **Integration Issues:** Manual transfer of data into internal systems can lead to delays and inefficiencies in financial reporting.

1.4 PROPOSED SYSTEM

1. Automated Workflow Details

- **Data Sources:**

  APIs: Integration with financial APIs like Open Exchange Rates, Forex.com, or XE.

  Websites: Automated web scraping of authorized financial websites for real-time exchange rates.

- **Data Entry:**

  Exchange rates are automatically updated in systems such as Microsoft Excel, Google Sheets, or ERP systems (e.g., SAP, Oracle).

2. Key Features

- **Real-Time Data Retrieval:**

  Fetches live exchange rates every hour or based on a predefined schedule.

- **Validation:**

  Ensures data accuracy through cross-checking with multiple sources before updating.

- **Format Handling:**

  Processes data in formats such as JSON, XML, or CSV and converts it into required templates for internal systems.

- **Error Handling:**

  Detects and logs any discrepancies or failures, ensuring smooth operation.

- **Scalability:**

  Can be configured to handle a growing number of currencies or integrate additional data

3. Efficiency Gains

- **Time Spent Per Update:**

  Reduces the update cycle from 1-2 hours manually to a few seconds or minutes using RPA.

- **Error Rate:**

  Decreases manual errors by over 95% through automated validation and processing.

- **Data Frequency:**

  Enables updates in real-time or as frequently as every 5 minutes, depending on business needs.

4. Cost Savings & Productivity

- **Manual Labor Savings:**

  Eliminates the need for repetitive manual tasks, saving up to 50-70% of employee time spent on currency management.

- **Scalability Cost:**

  Minimal additional cost to scale up and handle multiple data sources or higher frequency updates.

CHAPTER - 2

LITERATURE REVIEW

1. Robotic Process Automation in Finance

Several studies highlight the transformative potential of RPA in automating repetitive financial tasks. According to Willcocks et al. (2015), RPA reduces manual effort in data-intensive tasks, such as currency rate retrieval and reporting, while improving accuracy and speed. Furthermore, RPA adoption in finance has been shown to increase operational efficiency by automating processes like data entry and validation (Aguirre & Rodriguez, 2017).

2. Exchange Rate Management Challenges

Accurate exchange rate data is essential for global businesses. Studies by Krugman and Obstfeld (2018) underscore the importance of real-time exchange rate updates to avoid financial losses due to delayed or erroneous data. Manual retrieval and processing of exchange rates are error-prone and time-consuming, leading to inefficiencies in decision-making and reporting (Henderson, 2020).

3. Real-Time Data Acquisition and Integration

Advancements in data acquisition through APIs and web scraping have enabled organizations to access real-time exchange rates efficiently. Research by Saxena et al. (2019) demonstrates how API integration allows businesses to achieve seamless data flows into financial systems. However, these technologies, when paired with RPA, provide even greater efficiency by eliminating manual interventions.

4. UiPath Studio and RPA Tools

UiPath Studio is a leading RPA platform known for its ease of use and flexibility. According to vendor case studies, UiPath bots can be configured to retrieve data from multiple sources, validate it, and update enterprise systems without human intervention. Additionally, its built-in error-handling and scalability make it a suitable choice for automating exchange rate management.

5. Impacts of Automation on Financial Processes

Automated financial systems significantly reduce errors and improve compliance. The World Economic Forum (2020) suggests that RPA implementation in financial systems improves decision-making by providing timely and accurate data. Further, automated systems enable businesses to scale operations without a proportional increase in manual effort.

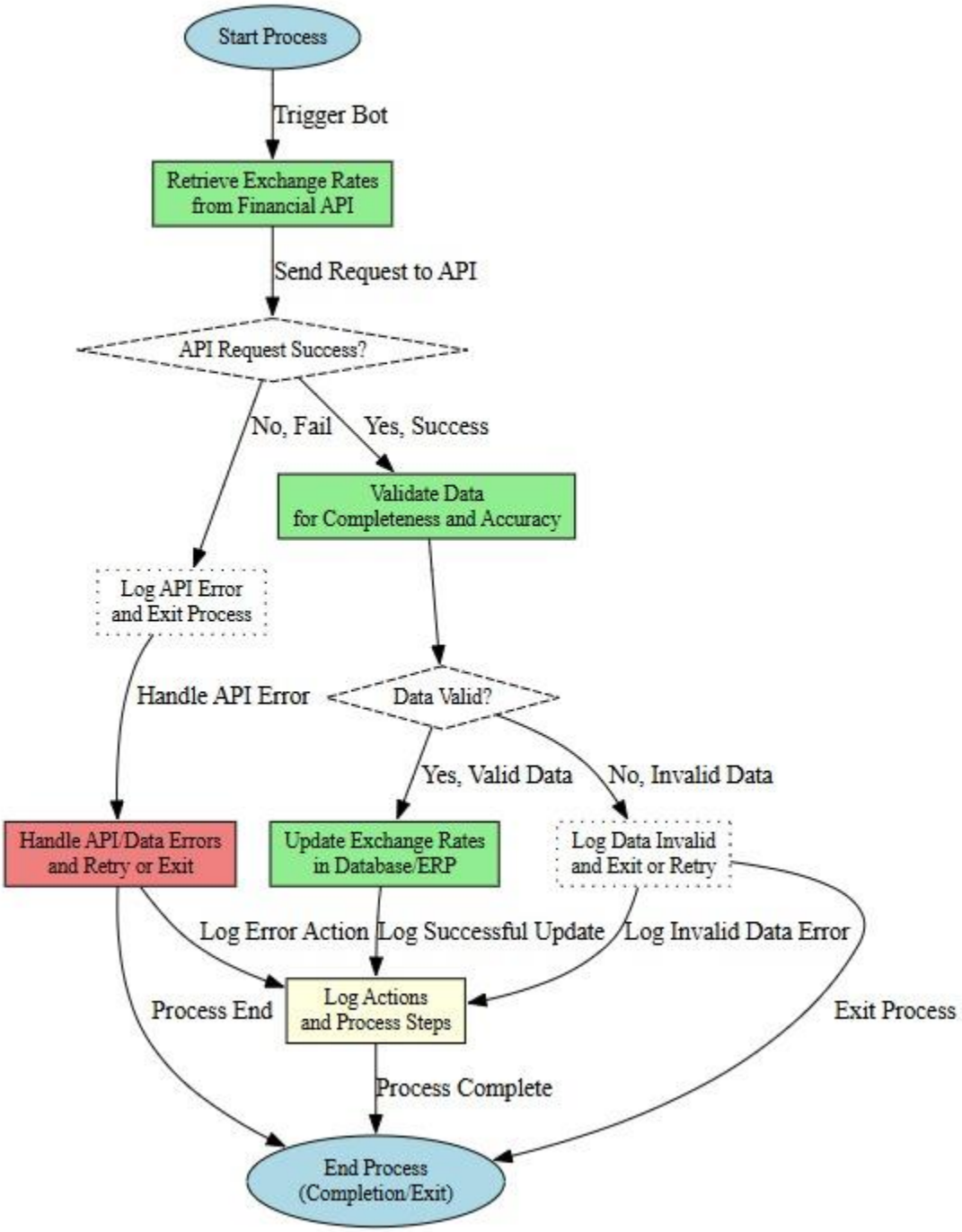
6. Challenges in Implementing Automation

While automation offers numerous benefits, challenges such as integrating multiple data sources, handling dynamic website changes, and ensuring regulatory compliance must be addressed. Researchers like Dubey et al. (2021) stress the importance of robust error-handling and secure data management protocols in RPA solutions.

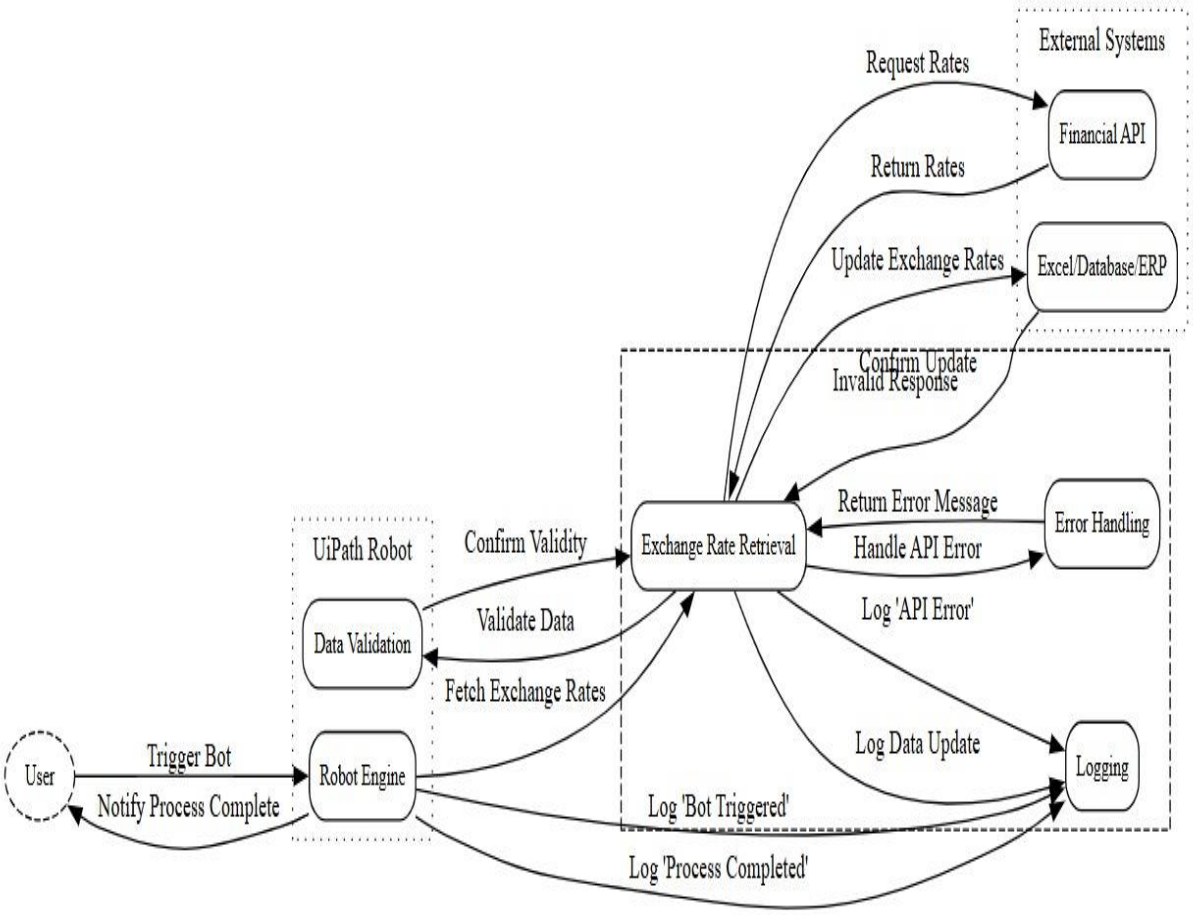
CHAPTER - 3

SYSTEM DESIGN

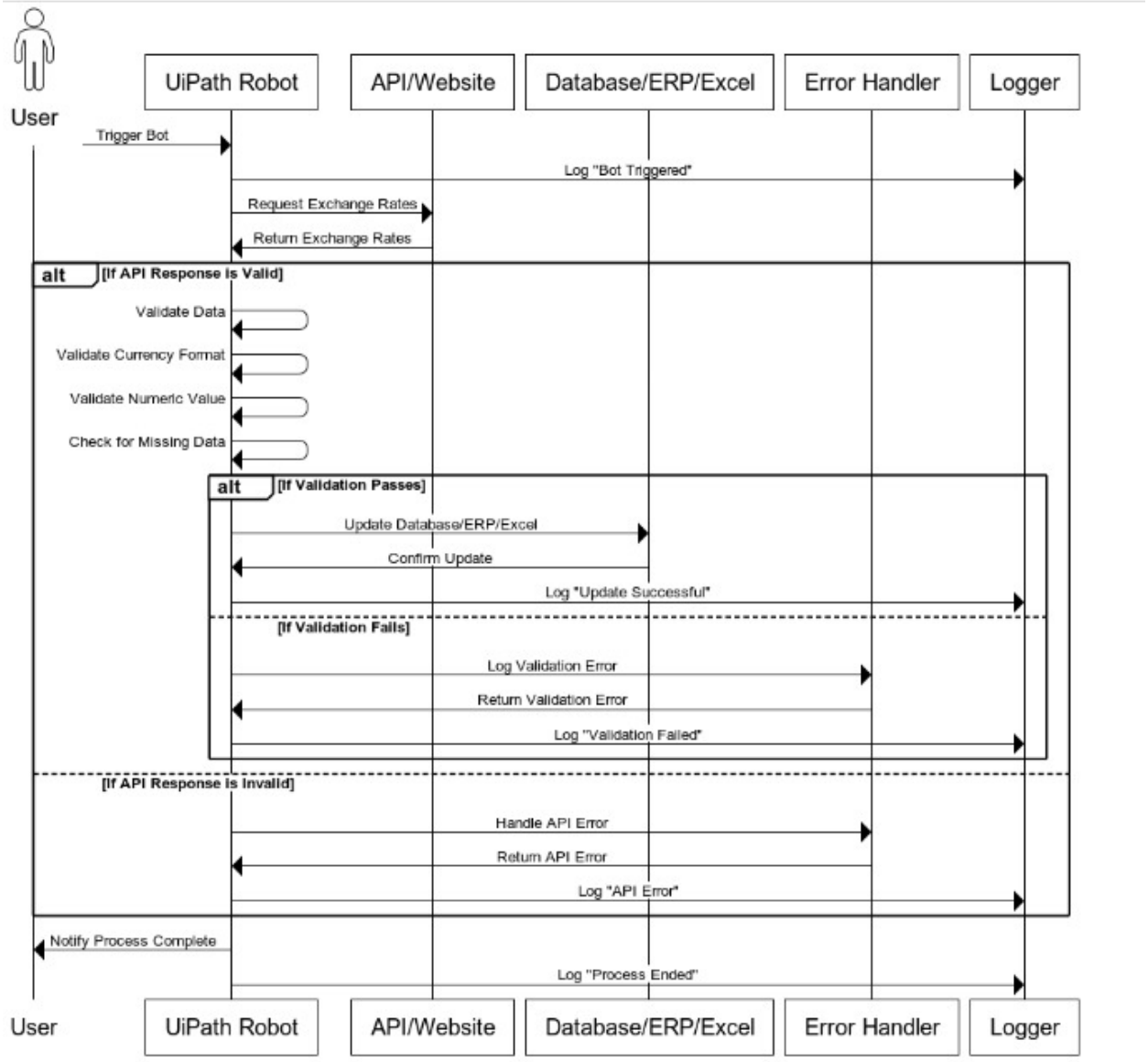
3.1 SYSTEM FLOW DIAGRAM



3.2 ARCHITECTURE DIAGRAM



3.3 SEQUENCE DIAGRAM



CHAPTER 4

PROJECT DESCRIPTION

The Live Exchange Rates Automation Project aims to develop a robust and efficient system using UiPath Studio to automate the retrieval, validation, and integration of live exchange rates into organizational workflows. Exchange rate management is a critical component of financial operations, and this project seeks to address inefficiencies and inaccuracies inherent in manual processes. This project offers a cost-effective and sustainable solution to optimize exchange rate management, ensuring businesses remain agile in a dynamic financial landscape.

4.1 MODULES

4.1.1 INPUT HANDLING AND INITIALIZATION

1. Input Handling

The system requires various inputs to function effectively. These inputs will be captured and processed during runtime.

Types of Inputs:

1. **Source Information:**

   API Endpoints (e.g., Open Exchange Rates, XE, or other APIs). Website URLs for authorized web scraping.

2. **Authentication Details:**

   API keys or tokens for accessing secured endpoints**.**

Login credentials (if required) for scraping authorized websites.

3. **Currency Details:**

   List of currencies for which exchange rates need to be retrieved. Base currency (e.g., USD, EUR).

4. **System Configurations:**

   Update frequency (e.g., hourly, daily, or on-demand). Output format (Excel, JSON, or direct integration with ERP).

5. **Error-Handling Preferences:**

   Retry attempts for API failures or data inconsistencies. Notification preferences (email or alerts in case of failure).

6. **Storage Details:**

   File paths for local storage. Database connection strings for direct data updates.

2. Initialization

The initialization process ensures that all inputs and configurations are correctly loaded and validated before execution.

Steps in Initialization:

1. **Configuration Loading:**

   Load configurations from a predefined file (e.g., a JSON or Excel file).

Validate the presence of required keys like API endpoints, credentials, and output paths.

2. **Input Validation:**

   Check the validity of API keys. Validate currency lists to ensure supported formats.

3. **System Connectivity Check:**

   Test API endpoints or website URLs for accessibility. Establish database connections (if applicable) and verify access rights.

4. **Set Default Values:**

   Assign default update frequency (e.g., daily at 9 AM) if not explicitly defined. Set base currency to "USD" or another common default value if not specified.

5. **Bot Initialization:**

   Launch the bot with the configured settings. Create log files or initialize a logging mechanism for tracking bot activities.

6. **Error Handling Initialization:**

   Set up retry mechanisms for transient API or network errors. Define actions for critical failures, such as sending notifications or stopping execution.

4.2 CONTENT ANALYSIS

Content analysis for the Live Exchange Rates Automation Project involves examining and breaking down the components and data structures necessary for building and executing the automation system. This ensures that the content retrieved, processed, and integrated aligns with project objectives and organizational requirements.

Goals

- **Consistency:** Ensuring exchange rate data is uniform and comparable across sources.
- **Relevance:** Retrieving only the required data, such as rates for specific currencies.
- **Accuracy:** Validating and cross-checking data to maintain high reliability.
- **Usability:** Presenting processed data in a format compatible with business systems and end-user needs.

1. Data Sources

Analysis of Input Content

- **APIs:**

  Data provided by APIs includes currency pairs, exchange rates, timestamps, and metadata (e.g., base currency). Typical formats: JSON or XML.

- **Web Scraping Sources:**

  Web pages display exchange rates in tabular formats or dynamic Html content. Requires parsing specific elements like `<table>` tags or `<div>` identifiers to extract data.

2. Data Processing

Content to Analyze:

- **Data Transformation:**

  Converting JSON/XML data into structured formats (e.g., Excel or database tables).

- **Validation:**

  Cross-checking exchange rates from multiple sources for consistency. Identifying outliers or discrepancies.

3. Data Output

Content to Generate:

- **Formatted Reports:**

  Daily or hourly reports in Excel or PDF, detailing current exchange rates and trends.

  Example Report Columns: `Currency`, `Exchange Rate`, `Last Updated`.

- **Database Records:**

  Storing rates in a database for integration with ERP systems.

4. Error Logs and Notifications

Content to Monitor:

- **Error Logs:**

  Details of API failures, data mismatches, or scraping errors.

- **Alerts:**

  Email or system notifications triggered by critical errors.

5. Performance Metrics

Content to Measure:

- **Execution Time:** Time taken to retrieve, process, and update exchange rates.
- **Error Rates:** Frequency of data mismatches or API failures.
- **Data Freshness:** Time since the last successful update.

4.1.3 RESULT MANAGEMENT

Access Control and Security

1. **User Roles and Permissions:**

   Ensure only authorized personnel can access or modify result data.

2. **Data Security:**

   Encrypt sensitive data during storage and transmission. Regular audits to ensure compliance with data protection regulations.

ERP/Financial System Integration:

1. **Direct Updates:**

   Push validated exchange rates into ERP systems like SAP or Oracle for immediate use in financial operations.

2. **Data APIs:**

   Enable other applications to fetch exchange rates from the system's database.

Analytics and Reporting:

1. **Visual Dashboards:**

   Use Power BI or custom tools to display trends and summaries of exchange rates.

2. **Customized Reports:**

   Generate specific reports, such as monthly averages or volatility analysis, to support strategic decision-making.

Result Review and Feedback

Periodic review of the system's outputs by stakeholders to ensure they meet business requirements.Continuous improvement based on user feedback and system performance metrics.

4.1.4 COMPLETION AND REPORTING

Completion and reporting in the Live Exchange Rates Automation Project involve finalizing automated workflows, verifying successful execution, and generating comprehensive reports for stakeholders. These processes ensure that the project delivers accurate outputs and provides meaningful insights for decision-making.

1. Completion of Automation Process

Steps to Ensure Successful Completion:

1. **Final Data Validation:**

   Cross-check exchange rates against multiple trusted sources to confirm accuracy. Verify that all selected currencies have been updated without discrepancies.

2. **Workflow Verification:**

   Confirm the execution of all components, including data retrieval, processing, validation, and integration. Ensure the bot has completed its tasks without errors or interruptions.

3. **Data Integration Check:**

   Verify that the output data has been successfully integrated into target systems (e.g., ERP, Excel, or database). Confirm that automated reports have been generated and stored in the specified locations.

4. **Error Handling:**

   Address any errors logged during execution. Document unresolved issues for further investigation and improvement.

2. Reporting Mechanism

Types of Reports:

- **Operational Reports:**

  Detail the tasks performed by the bot, including successful updates and any errors encountered.

- **Exchange Rate Reports:**

  Provide updated exchange rates and trends for all tracked currencies.

- **Error Logs:**

  Record errors, failures, and resolutions.

- **Performance Reports:**

  Highlight system metrics, including execution time, error rates, and update frequency.

3. Report Delivery

Delivery Methods:

1. **Email Notifications:**

   Send daily or hourly summaries to stakeholders with exchange rate updates and operational details. Example Subject: *"Daily Exchange Rate Update: 2024-11-20"*.

2. **Cloud/Server Storage:**

   Save reports in a centralized cloud or server repository for easy access.

3. **Dashboards:**

   Provide live data visualization through tools like Power BI or Tableau for real-time monitoring.

4. Completion Verification and Acknowledgment

1. **Stakeholder Review:**

   Present key outcomes to stakeholders for approval. Address feedback for improvements in subsequent cycles.

2. **Project Closure:**

   Mark the completion of the process cycle once all outputs are verified and delivered. Log the final status in the project documentation for future reference.

CHAPTER - 5

OUTPUT SCREENSHOTS

Fig 5.1 Assign Activity for Exchange Rates

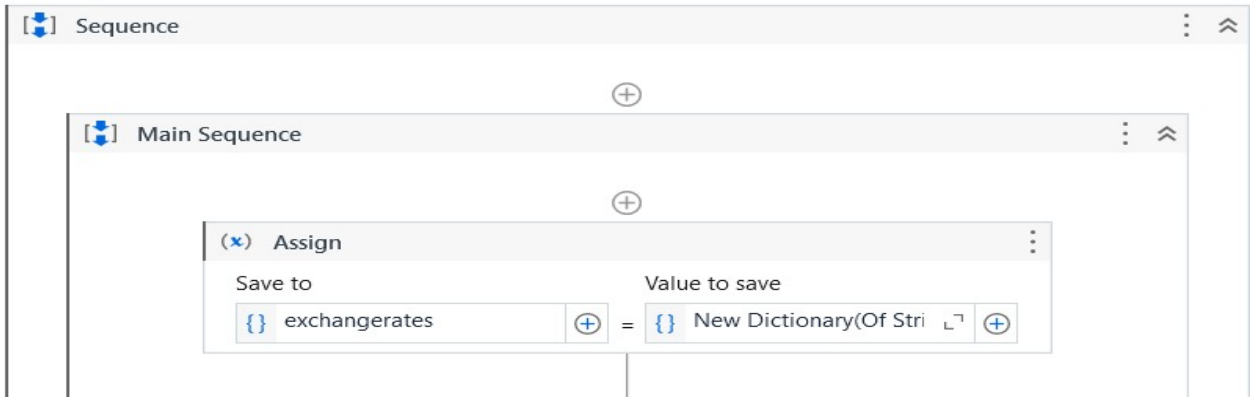


Fig 5.2 Input Dialog for base currency and target currency

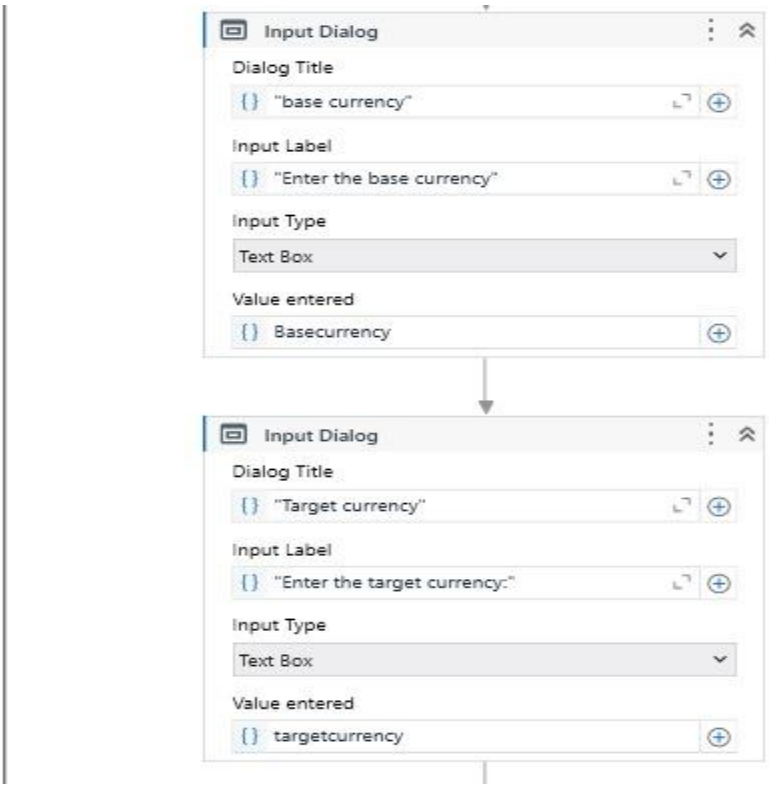


Fig 5.3 Input Dialog activity for the amount to get converted

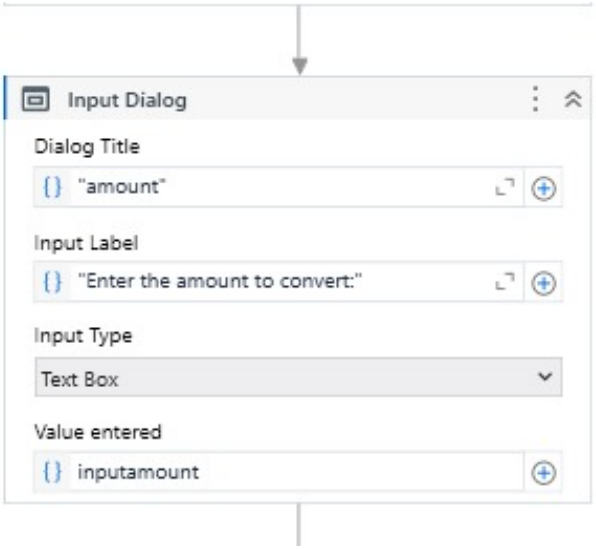


Fig 5.4 If Activity with condition

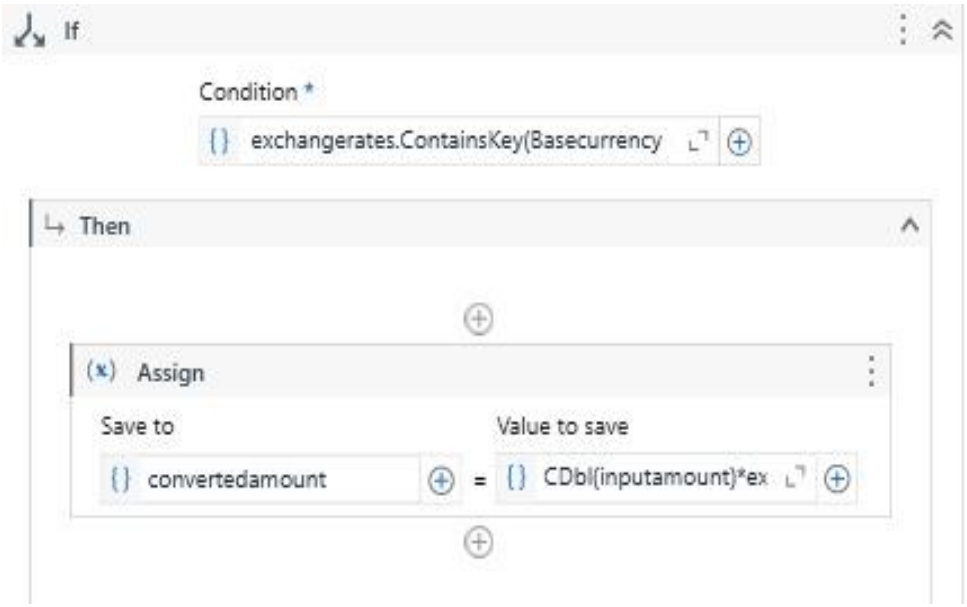


Fig 5.5 Else Activity with message box

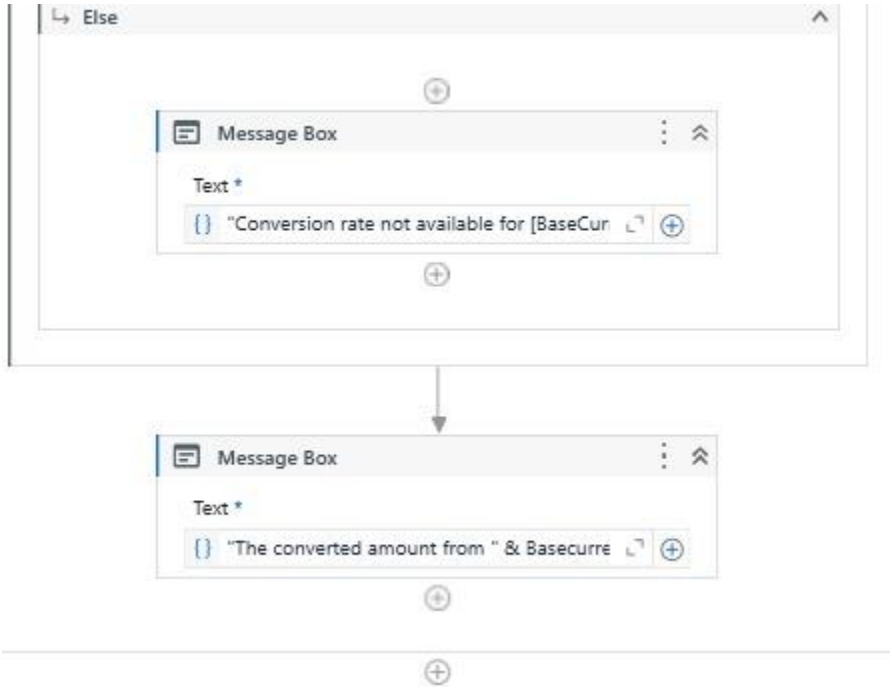
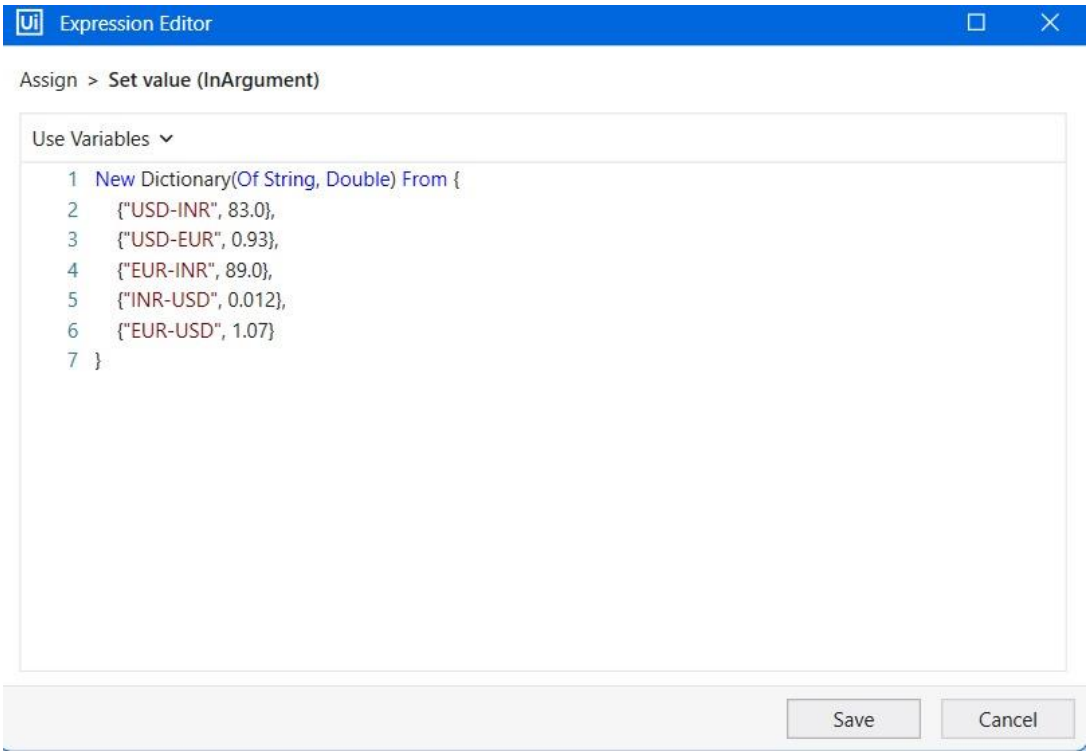


Fig 5.6 Dictionary created for currency convertor



CHAPTER - 6

CONCLUSION

The Live Exchange Rates Robotics Process Automation Project implemented using UiPath Studio successfully automates the retrieval, validation, and integration of real-time currency exchange rates. By eliminating manual tasks, the project enhances data accuracy, reduces operational inefficiencies, and ensures timely updates essential for financial decision-making. With its seamless integration into enterprise systems, robust error handling, and user-friendly reporting, the solution delivers measurable improvements in productivity and reliability. This project exemplifies the potential of RPA to transform repetitive workflows, offering scalability and adaptability to meet evolving business needs.

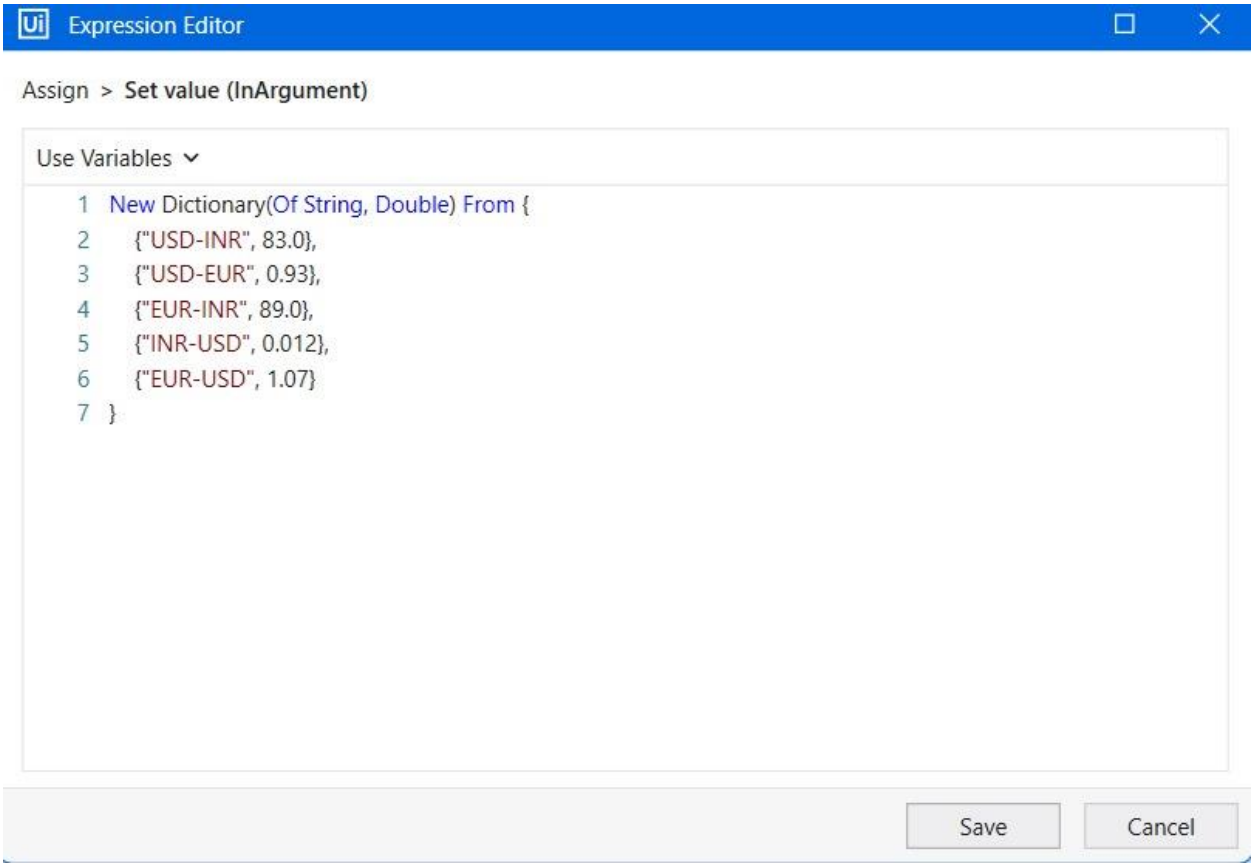
APPENDIX

- Appendix A: Code Snippets

This section includes essential code snippets used in the development of the Currency Converter Bot project, demonstrating key functionalities such as currency conversion logic, dictionary setup, and user input handling.

A1: Currency Conversion Dictionary

The currency conversion rates are stored in a Dictionary object, where the key is a string representing the currency pair, and the value is the exchange rate for that pair. This is a sample of how the dictionary looks:



- Appendix B: User Input Form

The user input form is used to gather the base currency, target currency, and the amount to be converted. The Input Dialog activity is used to display a prompt and collect user inputs.

B1: Sample User Input

Base Currency: USD

Target Currency: INR

Amount to Convert: 100

The user is prompted to enter values in these fields, which are then used in the conversion logic.

- Appendix C: Key Activities Used

This section provides a brief description of the UiPath activities used in the development of the Currency Converter Bot project.

C1: Assign Activity

The Assign activity is used to create and populate the Dictionary object with currency exchange rates. This forms the core data structure for the conversion logic.

C2: Input Dialog

The Input Dialog activity prompts the user for the base currency, target currency, and the amount to convert. This activity captures the necessary input for the conversion calculation.

C3: If Activity

The If activity is used to check if the user's entered currency pair exists in the Dictionary. If it exists, the conversion calculation proceeds. If not, the program displays an error message.

C4: Message Box

The Message Box activity displays the result of the currency conversion or shows an error message if the conversion pair is not found.

C5: Convert Currency

The core logic of currency conversion is implemented using the exchange rates from the dictionary. Based on the user input, the corresponding exchange rate is retrieved, and the conversion is performed.

- Appendix D: Sample Input and Output

D1: Sample Input

Base Currency: USD

Target Currency: INR

Amount to Convert: 100

D2: Sample Output

After entering the above values, the conversion rate for USD to INR (83.0) is applied, and the result is displayed:

Conversion Result: 100 USD = 8300 INR

- Appendix E: Troubleshooting

E1: Common Issues

Currency Pair Not Found: If the user enters a currency pair that does not exist in the dictionary, the bot will display an error message. Ensure that the dictionary contains the correct currency pairs for your use case.

Invalid Amount Input: If the user enters a non-numeric value for the amount, the bot will not be able to perform the conversion. Input validation should be implemented to ensure only valid numbers are entered.

- Appendix F: Future Enhancements

F1: Dynamic Exchange Rate Updates

Future versions of the Currency Converter Bot could integrate with an API to retrieve live exchange rates, ensuring the conversion rates are always up to date.

F2: Support for More Currencies

The dictionary of exchange rates could be expanded to include more currencies from around the world, allowing users to convert between a broader range of currencies.

F3: Graphical User Interface (GUI)

A GUI could be developed using UiPath's integration with Windows Forms or WPF to create a more user-friendly interface for the currency converter bot.

This appendix provides an overview of the key components of the Currency Converter Bot project, offering code samples, descriptions of activities, and potential future improvements.

REFERENCES

1. Technical References

- UiPath Documentation

  Official documentation for UiPath Studio, detailing activities, workflows, and best practices.

  UiPath Studio Documentation

- API Documentation for Exchange Rates

  Open Exchange Rates API: Provides live and historical exchange rate data. Open Exchange Rates API

  XE API: Offers accurate currency data and exchange rates. XE Currency API

- Data Handling Resources

  Microsoft Excel Integration with UiPath.

  UiPath Excel Activities Guide

2. Academic and Industry Papers

- "Robotic Process Automation: Concepts, Opportunities, and Challenges" - A comprehensive review of RPA technologies and their applications in business.
- "Automation of Financial Data Workflows Using RPA" - Explores use cases of RPA in financial systems.

3. Industry Standards and Best Practices

- ISO 20022 Standards: Guidelines for financial data exchange in global payment systems. ISO 20022
- Data Security Practices: OWASP guidelines for securing automated processes and APIs. OWASP Top 10

4. Community Resources and Tutorials

- UiPath Forum: Community-driven discussions and solutions for UiPath-related queries. UiPath Community Forum
- Tutorials on YouTube: Step-by-step UiPath tutorials for beginners and advanced users.

5. Regulatory References

- GDPR Compliance: For handling financial data securely within the European Union. General Data Protection Regulation
- Financial Conduct Authority (FCA) Guidelines: For financial data usage in business processes.

  FCA Official Site