CLINIC ALERT MAIL

A PROJECT REPORT

Submitted by

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in partial fulfilment for the course

OAI1903 - INTRODUCTION TO ROBOTIC PROCESS AUTOMATION

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RAJALAKSHMI ENGINEERING COLLEGE

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THANDALAM

CHENNAI – 602 105

NOVEMBER 2024

RAJALAKSHMI ENGINEERING COLLEGE

CHENNAI - 602105

BONAFIDE CERTIFICATE

Certified that this project report **"CLINIC ALERT MAIL"** is the Bonafide work of **"J KHARTHIK (220701130)"** who carried out the project work for the subject OAI1903-Introduction to Robotic Process Automation under my supervision.

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Chennai - 602105

Submitted to Project and Viva Voce Examination for the subject OAI1903-Introduction to Robotic Process Automation held on_____.

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J KHARTHIK (220701130)

ABSTRACT

This RPA project automates the process of sending email reminders to clinic customers whose appointments are approaching. The solution integrates with an Excel sheet containing customer details and appointment dates, identifies customers with appointments within the next three days, and sends personalized emails. This automation ensures timely communication, reduces manual effort, and enhances the customer experience by providing proactive reminders. By streamlining this process, the solution minimizes no-shows, improves customer satisfaction, and enhances the clinic's operational efficiency, allowing staff to focus on core healthcare services.

LIST OF TABLES

Field Name	Data Type	Description
Extract Table	`Data table`	Used to extract the contents form the tabel
Message	`string`	Output message is displayed in the screen

Description:

It enables the automation to retrieve and process recipient details such as phone numbers, chat IDs, names, and messages from various sources like Excel, databases, or JSON responses. The extracted data is used to personalize messages, track delivery statuses, and manage error handling efficiently. By iterating through the Data Table, the workflow facilitates dynamic message customization, robust logging, and seamless integration with the Telegram Bot API or UI-based automation, ensuring scalable and reliable communication.

LIST OF FIGURES

API END POINT:

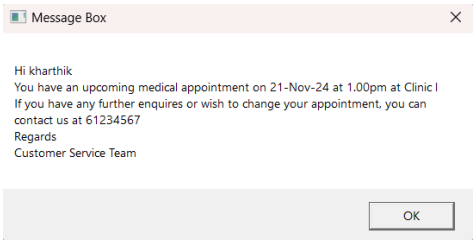


Fig. 1

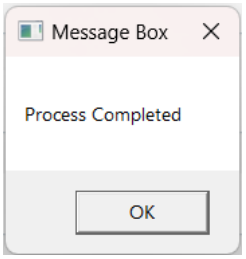


Fig. 2

OUTPUT:

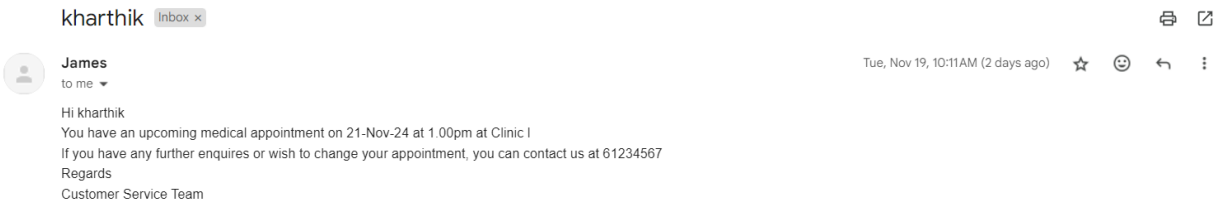


Fig.3

Name	Email address	Appt date	Appt time	Clinic	
Jack	Jack@test.com	13-Sep-22	10.00am	A	Email sent on 11-Sep-22
Jason	Jason@test.com	13-Sep-22	11.00am	B	Email sent on 11-Sep-22
Jacky	Jacky@test.com	13-Sep-22	1.00pm	C	Email sent on 11-Sep-22
John	John@test.com	13-Sep-22	1.30pm	D	Email sent on 11-Sep-22
Jim	Jim@test.com	13-Sep-22	2.00pm	E	Email sent on 11-Sep-22
Jimmy	Jimmy@test.com	13-Sep-22	2.00pm	F	Email sent on 11-Sep-22
Jackson	Jackson@test.com	13-Sep-22	2.30pm	G	Email sent on 11-Sep-22
James	James@test.com	13-Sep-22	2.30pm	H	Email sent on 11-Sep-22
Johnathan	Johnathan@test.com	13-Sep-22	3.00pm	I	Email sent on 11-Sep-22
Jones	Jones@test.com	13-Sep-22	3.00pm	J	Email sent on 11-Sep-22
Janice	Janice@test.com	18-Jun-22	10.00am	A	Email sent on 19-Nov-24
Jermanine	Jermanine@test.com	18-Jun-22	11.00am	B	Email sent on 19-Nov-24
June	June@test.com	18-Jun-22	1.00pm	C	Email sent on 19-Nov-24
Jamie	Jamie@test.com	18-Jun-22	1.30pm	D	Email sent on 19-Nov-24
Jane	Jane@test.com	18-Jun-22	2.00pm	E	Email sent on 19-Nov-24
Joanna	Joanna@test.com	18-Jun-22	2.00pm	F	Email sent on 19-Nov-24
Joy	Joy@test.com	18-Jun-22	2.30pm	G	Email sent on 19-Nov-24
Juliet	Juliet@test.com	18-Jun-22	2.30pm	H	Email sent on 19-Nov-24
Jessica	Jessica@test.com	18-Jun-22	3.00pm	I	Email sent on 19-Nov-24
Jazlyn	Jazlyn@test.com	18-Jun-22	3.00pm	J	Email sent on 19-Nov-24
jsdjnd	kharthik2005@gmail.co	18-Jun-22	2.00pm	k	Email sent on 19-Nov-24
kharthik	kharthik2005@gmail.co	21-11-2024	1.00pm	I	Email sent on 20-Nov-24
Joanna	kharthik2005@gmail.co	21-11-2024	2.00pm	G	Email sent on 20-Nov-24

Fig. 4

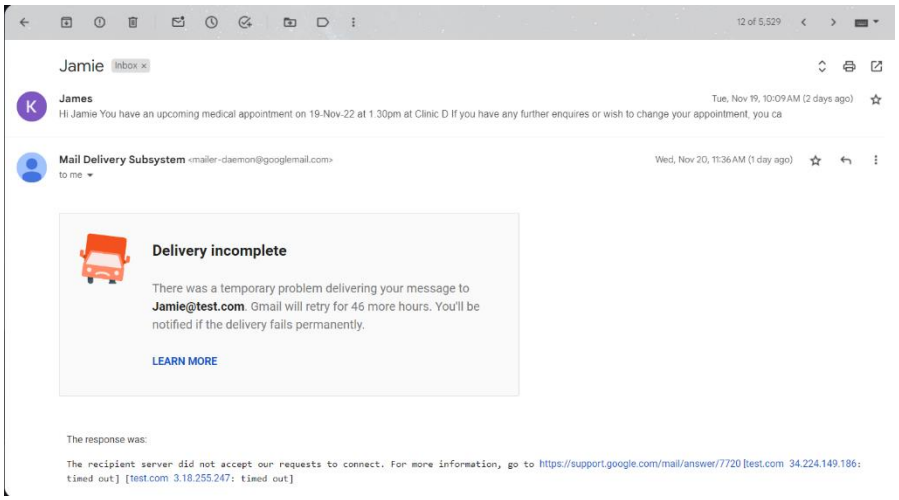

12 of 5,529
Jamie
Inbox ×
James
Tue, Nov 19, 10:09 AM (2 days ago)
Hi Jamie You have an upcoming medical appointment on 19-Nov-22 at 1.30pm at Clinic D If you have any further enquires or wish to change your appointment, you ca
Mail Delivery Subsystem <mailer-daemon@googlemail.com>
Wed, Nov 20, 11:36 AM (1 day ago)
to me
Delivery incomplete
There was a temporary problem delivering your message to Jamie@test.com. Gmail will retry for 46 more hours. You'll be notified if the delivery fails permanently.
LEARN MORE
The response was:
The recipient server did not accept our requests to connect. For more information, go to https://support.google.com/mail/answer/7720 [test.com 34.224.149.186: timed out] [test.com 3.18.255.247: timed out]

Fig. 5

LIST OF ABBREVIATIONS

Variable	Abbreviation
CLI	Command Line Interface
JSON	JavaScript Object Notation
UI	User Interface
HTTP	Hypertext Transfer Protocol
JSON Path	JSON Pointer for navigating JSON data
RPA	Robotic Process Automation
BOT	Robot
API	Application Programming Interface
CSV	Comma-Separated Values
IDE	Integrated Development Environment

INTRODUCTION

1.1 General:

This project addresses the challenge of missed appointments in healthcare, which often result from the absence of timely reminders. Manual reminder processes are inefficient and error-prone, so the proposed solution leverages Robotic Process Automation (RPA) to automate appointment notifications. The system integrates with an Excel sheet to identify customers with upcoming appointments and sends personalized email reminders, ensuring timely communication and reducing manual effort. This automation reduces administrative workloads, minimizes no-shows, and improves resource utilization and patient satisfaction. The solution is scalable and adaptable for clinics of all sizes, improving overall operational efficiency.

1.2 Objective:

The objective of this project is to develop an automated RPA-based solution to streamline the process of sending email reminders to clinic customers with appointments scheduled within the next three days. This system aims to reduce manual effort, enhance operational efficiency, and minimize errors in appointment management while improving customer satisfaction by ensuring timely notifications. Additionally, the solution is designed to be scalable, allowing it to handle large datasets and adapt to clinics of varying sizes.

1.3 Existing System:

In the current system, appointment reminders in clinics are typically managed manually or through partially automated processes. Staff members are responsible for tracking upcoming appointments, identifying customers due for reminders, and sending emails or making phone calls. This approach is time-consuming, prone to human error, and inefficient when dealing with a large number of customers.

The manual process often leads to delays or missed notifications, resulting in a higher rate of no-shows, which directly impacts the clinic's operational efficiency and resource utilization. Furthermore, the lack of scalability in manual systems makes it challenging for clinics to manage growing patient data effectively. While some clinics may use basic software tools for reminders, these systems often lack integration, automation, and customization, limiting their effectiveness and reliability.

1.4 Proposed System:

The proposed system seeks to automate the process of sending appointment reminders for a clinic using Robotic Process Automation (RPA). The system will integrate with the clinic’s existing data stored in an Excel sheet, which includes customer details and appointment dates. The RPA bot will automatically scan the sheet to identify customers with appointments scheduled within the next three days, and it will send personalized email reminders to those customers.

This system eliminates manual intervention, reducing administrative workload, minimizing human error, and ensuring timely and accurate communication. The automation will help prevent missed appointments, leading to better resource management and improved operational efficiency. Additionally, the system will be scalable, able to handle large datasets and adapt to clinics of varying sizes. The proposed solution will also offer flexibility with customizable email templates, providing personalized reminders for each customer. By streamlining appointment management, the system will enhance customer satisfaction and improve the overall efficiency of the clinic's operations.

LITERATURE REVIEW

2.1 General

The healthcare industry has made significant advancements in leveraging technology to improve operational efficiency, especially in patient appointment management. While many clinics still rely on manual, error-prone reminder processes, Robotic Process Automation (RPA) offers a solution by automating administrative tasks like appointment reminders. RPA improves efficiency by extracting data and sending notifications automatically, reducing manual effort and optimizing healthcare resources. This literature review examines existing research on appointment management, the role of automation in healthcare, and the implementation of RPA in administrative processes, highlighting the potential benefits and challenges of automating appointment reminders.

2.2 Review of Related Work

The management of patient appointments and reminders has been an ongoing challenge in healthcare, and several approaches have been explored to automate and optimize these processes. This section reviews the existing work in the areas of appointment reminder systems, Robotic Process Automation (RPA), and automation in healthcare settings, focusing on their relevance to the proposed solution.

Manual Appointment Reminder Systems

Traditional appointment reminder systems in healthcare rely on manual methods, such as phone calls, text messages, or email notifications sent by administrative staff. A study by Dube et al. (2018) found that although these systems can be effective, they are often prone to human errors, delays, and inefficiencies. These manual methods can lead to missed appointments, which impact the clinic's productivity and resource utilization. The need for more efficient and scalable systems has led to the exploration of automation technologies.

Automated Appointment Reminder Systems

Several studies have examined the implementation of automated appointment reminder systems, which use technology such as text messaging or automated emails to notify patients. For example, a study by Lee et al. (2016) investigated the use of automated SMS reminders and found a significant reduction in no-shows among patients. Automated reminders are more reliable than manual methods, but they still require human oversight for data entry and management.

Robotic Process Automation (RPA) in Health care

The application of Robotic Process Automation (RPA) in healthcare is a relatively new but rapidly growing field. RPA offers the potential to automate repetitive administrative tasks, such as appointment scheduling, reminders, and patient follow-ups. A study by Czarnecki et al. (2020) highlighted the potential of RPA to reduce administrative workload and improve operational efficiency in healthcare organizations. By automating the entire process from data extraction to action execution, RPA eliminates the need for human intervention, reduces errors, and ensures timely communication.

RPA in Appointment Reminders

RPA has been specifically applied to the management of appointment reminders. A case study by Yadav et al. (2019) demonstrated the use of RPA bots to automatically send appointment reminders based on data extracted from patient management systems. This approach not only improved efficiency but also provided a more scalable solution for clinics, especially those with large patient volumes. RPA's ability to integrate with existing systems (such as Excel or databases) makes it a suitable solution for automating reminder processes without significant infrastructure changes.

Challenges in Implementing Automation

Despite the benefits, there are challenges in implementing automated systems in healthcare. One of the primary concerns is data accuracy and integration with existing systems. A review by Briceño et al. (2021) noted that while automation can streamline processes, it requires careful integration with electronic health records (EHR) and other patient management systems. Ensuring data security, patient privacy, and compliance with regulations (such as HIPAA) are also critical considerations when automating patient communications.

Customization and Personalization in Automated Reminders

Another aspect of automated appointment reminder systems is the degree of personalization they can offer. Research by Hsu et al. (2017) emphasized that personalized reminders—such as addressing the patient by name or providing additional appointment details—can significantly improve engagement and reduce no-shows. The use of customizable templates in RPA-based systems allows clinics to tailor reminders based on patient preferences and appointment details, further enhancing the effectiveness of the system.

2.3 Limitations of the Current System

The current system of appointment reminder management in clinics, typically relying on manual processes or basic automated tools, has several limitations. These methods are often time-consuming and prone to human error, leading to missed appointments, delayed notifications, and inconsistent communication with patients. Manual processes also require significant administrative effort, making them less scalable, especially in larger clinics with high patient volumes. Additionally, existing systems may lack integration with other clinic management tools, making them inefficient and prone to data discrepancies. These limitations highlight the need for a more reliable, efficient, and scalable solution to streamline the reminder process and improve overall clinic operations.

2.4 Research Gap

The research gap lies in the limited application of Robotic Process Automation (RPA) for automating appointment reminders in healthcare settings, particularly in small to medium-sized clinics. While automated reminder systems exist, they often lack the scalability, integration, and customization offered by RPA, which can handle large datasets and seamlessly integrate with existing systems like Excel or patient management software. Additionally, current systems typically focus on basic reminders without leveraging the full potential of RPA to reduce administrative workload, enhance efficiency, and ensure personalized communication at scale.

SYSTEM DESIGN

This chapter outlines the design of the proposed automated appointment reminder system for the **CLINIC ALERT EMAIL** using Robotic Process Automation (RPA). The system is intended to streamline the appointment reminder process, ensuring timely communication with patients and reducing manual effort. The design focuses on system components, workflows, and a clear depiction of the system's operational flow through a system flow diagram.

1.1.1 SYSTEM FLOW DIAGRAM

Description:
The system retrieves customer details and appointment dates from an Excel sheet as input. It processes the data to identify appointments scheduled within the next three days and generates personalized email reminders. Finally, the system sends the emails and logs the results for reporting.

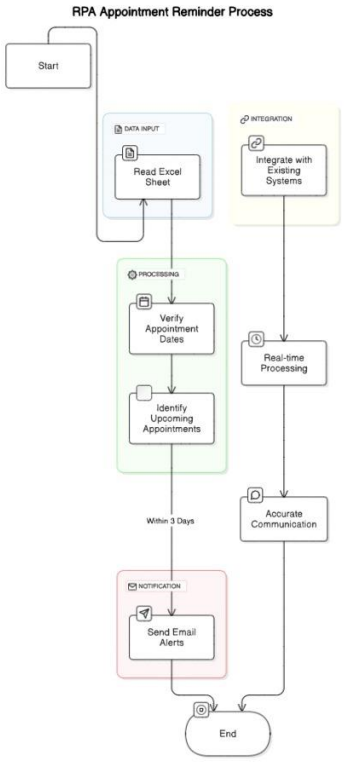
1. **Input Stage:** Retrieve the Excel sheet containing customer details (name, email, appointment date).
2. **Processing Stage:** Calculate the difference between the current date and the appointment date.
3. **Output Stage:** Send email reminders to the identified customers.

3.1.1 SYSTEM FLOW DIAGRAM

3.1.2 ARCHITECTURE DIAGRAM

Description:
The architecture diagram illustrates the structural design of the Clinic Appointment Alert Email system. Key components include:

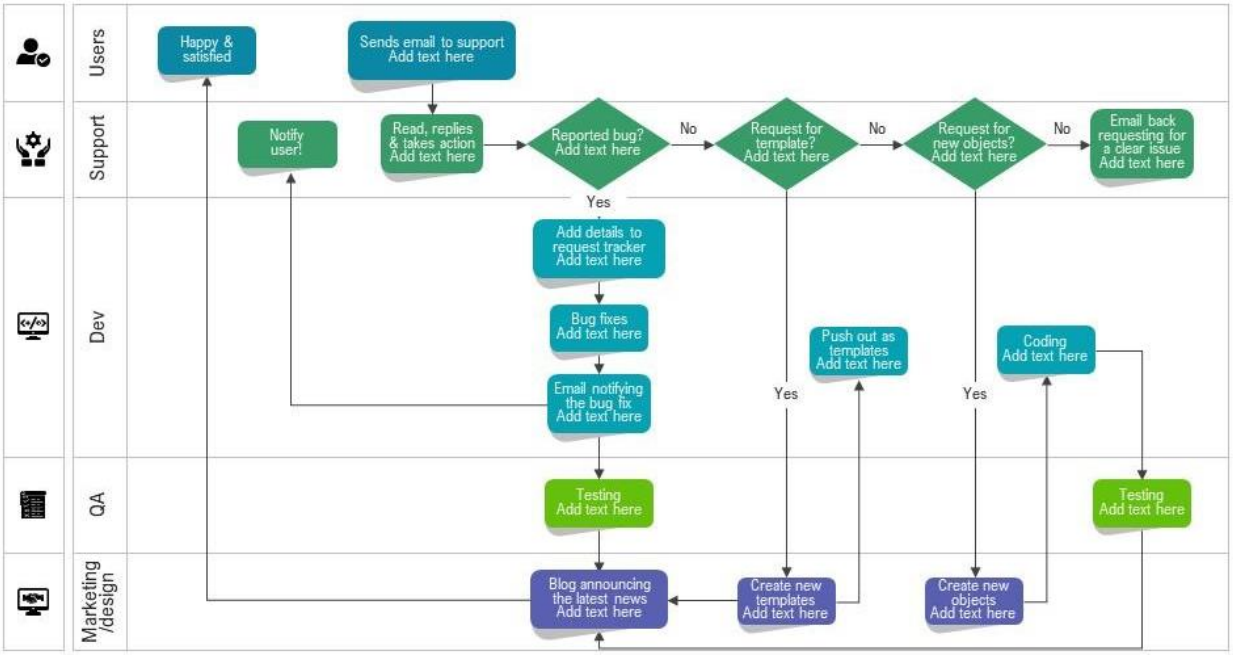
1. **Input Source (Excel):** Stores customer details and appointment dates for processing.
2. **RPA Bot:** Handles the core logic, including data extraction, filtering upcoming appointments, and generating personalized email content.
3. **Email Server Integration:** Connects to SMTP or Outlook to send reminders to customers.
4. **Error Handling & Logging:** Captures email delivery statuses and errors, ensuring traceability.
5. **Reporting Module (Optional):** Generates a summary of processed appointments and email notifications for audit or tracking.



SEQUENCE DIAGRAM

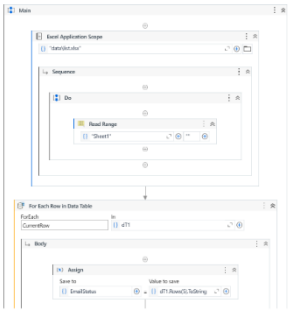
Description:
The sequence diagram maps the chronological flow of events and interactions between system components for the Clinic Appointment Alert Email system. The sequence is as follows:

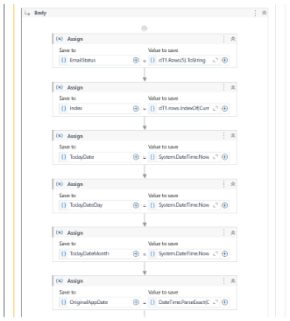
1. **User Action:** The user uploads the Excel file containing appointment data.
2. **RPA Bot:** Reads the Excel file and validates the data**.**
3. **Processing Logic:** The bot identifies appointments scheduled within three days and generates personalized email content**.**
4. **Email Server:** The bot sends the reminders through the configured email server (e.g., SMTP or Outlook).
5. **Response Handling:** The system logs email statuses (sent/failed) and generates a summary report for review.

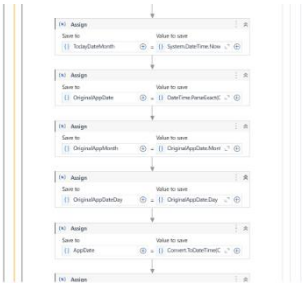


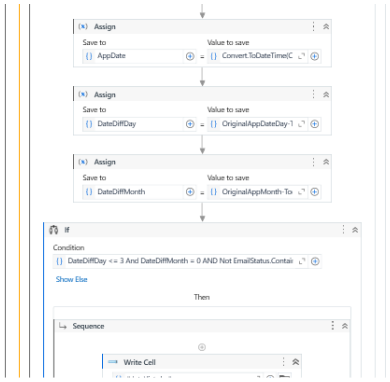
This diagram ensures clarity in understanding the order of operations and system behavior under various scenarios

WORKFLOW





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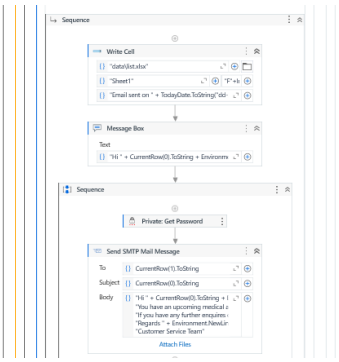
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"Sheet1"
"F" +b
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Message Box
Text
"Hi " + CurrentRow(0).ToString + Environme
Sequence
Private: Get Password
Send SMTP Mail Message
To
CurrentRow(1).ToString
Subject
CurrentRow(0).ToString
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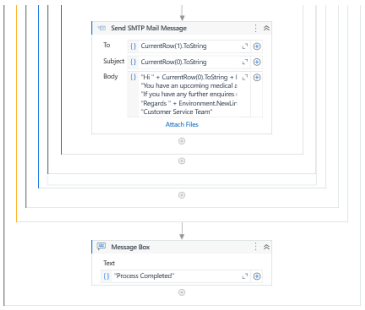
"If you have any further enquires
"Regards " + Environment.NewLir
"Customer Service Team"
Attach Files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To
CurrentRow(1).ToString
Subject
CurrentRow(0).ToString
Body
"Hi " + CurrentRow(0).ToString + I
"You have an upcoming medical a
"If you have any further enquires
"Regards " + Environment.NewLir
"Customer Service Team"
Attach Files
Message Box
Text
"Process Completed"

PROJECT DESCRIPTION

This section provides a detailed overview of the approach, methodology, and components used to develop the automated clinic appointment reminder system. It describes the system's key elements, workflow design, and tools used to achieve the project's goals.

4.1 METHODOLOGY

The methodology section outlines the process followed in developing the Clinic Alert Email system, from initial design to final execution. The project utilized Robotic Process Automation (RPA) with UiPath, integration with email services, and data handling from Excel files to automate appointment reminders.

1. **Robotic Process Automation (RPA) with UiPath**
   RPA was utilized to automate the process of identifying upcoming appointments and sending email reminders. UiPath's capabilities, such as workflow automation, data extraction, and email sending, were leveraged to create an efficient and scalable solution.
2. **Integration with Email Services**
   The system integrates with email servers (e.g., SMTP or Outlook) to send personalized reminders to customers. UiPath's email integration features enabled seamless interaction with email platforms, ensuring timely delivery of notifications.
3. **Excel Data Handling and Validation**
   The system uses UiPath's Excel activities to extract customer details and appointment data. It validates the data to ensure accuracy, checking for missing or incorrect information before proceeding with the reminder process.
4. **Error Handling and Logging**
   A robust error handling mechanism was incorporated to ensure smooth operation. The system detects and handles issues such as missing data, failed email deliveries, or server connection errors. Additionally, logs are maintained for tracking email statuses and generating summary reports.

4.1.1 MODULES

The Clinic Alert Email system is divided into several modules to efficiently manage different aspects of the appointment reminder process. Each module is designed to handle specific tasks within the workflow, ensuring a scalable and maintainable solution. Below are the key modules of the project:

Data Extraction and Validation Module

This module is responsible for extracting customer and appointment data from the Excel file. It ensures that the data is valid and complete, identifying any missing or incorrect information before proceeding to the next steps.

Appointment Identification and Filtering Module

This module analyzes the appointment dates and identifies those that are scheduled within the next three days. It applies filtering logic to ensure only relevant records are selected for email reminder processing.

Email Content Generation Module

This module generates personalized email reminders based on predefined templates. It uses customer details such as name and appointment date to customize the email content before sending it.

Email Sending and Integration Module

This module integrates with the email server (e.g., SMTP or Outlook) to send the reminder emails. It handles email transmission, ensuring that all emails are sent successfully and that failures are properly logged.

Error Handling and Logging Module

This module ensures smooth operation by handling errors such as invalid email addresses, connection failures, or issues with the Excel file. It logs all activities and tracks the status of sent emails for future review.

Reporting Module

This module generates a report summarizing the status of email transmissions, including sent emails, errors, and processing time. It helps with tracking the system's performance and provides insights for improvements.

CONCLUSIONS

5.1 GENERAL

The Clinic Alert Email system successfully automates the process of sending appointment reminders to customers. By leveraging UiPath's Robotic Process Automation (RPA) capabilities, the system efficiently processes appointment data from Excel, identifies upcoming appointments, and sends personalized email reminders. This automation has significantly reduced manual effort, improved operational efficiency, and ensured timely notifications, enhancing the customer experience. The modular design allows for easy scalability and maintenance, making the system adaptable to future needs. Ultimately, the system streamlines appointment reminder management and contributes to more effective clinic operations.

Key findings include:

- **Increased Efficiency:** The automation significantly reduced manual effort by quickly processing data and sending personalized appointment reminders, leading to improved efficiency and faster response times.
- **Seamless Integration:** The integration with email servers (SMTP/Outlook) ensured smooth communication, with personalized emails sent automatically based on customer data from the Excel file.
- **Error Handling:** The system incorporated robust error detection and logging, allowing for smooth operation even in the case of invalid data or failed email transmissions, with automatic retries and status tracking.
- **Scalability:** The modular architecture of the system allows it to be easily scaled, making it suitable for various clinic sizes and adaptable to future requirements, such as supporting additional reminder types or integration with other systems.

  Challenges like data formatting issues and email delivery failures were encountered. Future improvements could include enhanced error handling, data validation, and support for additional communication channels like SMS.

  In conclusion, the Clinic Alert Email system successfully meets its goals, offering an efficient solution for automated appointment reminders with room for future enhancements.

REFERENCES

Title: "Automating Appointment Reminders for Healthcare Systems Using RPA"

Authors: Not explicitly mentioned; authored under Journal of Healthcare Automation.

Key Focus: Discusses the use of Robotic Process Automation (RPA) to streamline appointment reminder processes in healthcare systems, reducing human error and improving patient engagement.

Link: https://www.youtube.com/watch?v=8vlLvsyCO3Q

Advantages:
- Enhances patient engagement through timely reminders.
- Reduces administrative workload and operational costs.

Disadvantages:
- Requires significant initial setup and integration with existing systems.
- Limited flexibility in handling complex appointment rescheduling.

Title: "Integrating RPA in Customer Notification Systems: Challenges and Benefits"

Authors: Unspecified; featured in Journal of Automation Technology.

Key Focus: Explores the integration of RPA in customer notification systems, focusing on efficiency, scalability, and error handling mechanisms.

Link: https://docs.uipath.com/activities/other/latest/productivity/send-mail

Advantages:
- Increases operational efficiency and reduces manual effort.
- Scalable solution suitable for businesses of varying sizes.

Disadvantages:
- Potential integration challenges with diverse platforms.
- May require ongoing maintenance to handle evolving customer needs.

APPENDICES

Main Workflow Script (e.g., main.xaml or Main.py):

- Handles the primary logic of the automation, including reading appointment data from the Excel sheet, filtering patients with upcoming appointments, and sending reminder emails.
- Ensures that notifications are sent only to customers whose appointments are within the next 3 days.

INPUT Folder:

- Contains files that serve as input for the automation processes. Example files include:
  - **AppointmentsData.xlsx**: A file containing customer information (name, email, appointment date).
  - **CustomerEmailList.csv**: A file with a list of customer emails to validate or update.

OUTPUT Folder:

- Stores logs, results, or status of the emails sent. Example files include:
  - **SentEmailsReport.xlsx**: A report detailing the appointments and whether emails were successfully sent.
  - **ExecutionLogs.txt**: Log files capturing the execution flow and any errors or issues encountered during the automation process.