CS595 (**Thursday, 15:15 – 18:05**)

COMPUTER SCIENCE CAPSTONE COURSE

San Francisco Bay University, Fremont, CA

MIDTERM REPORT

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Prof. Ahmed Banafa

Payroll Tax Updates Tracking

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Abstract

This report presents the development of the Payroll Tax Update Tracking System by a dedicated team at San Francisco Bay University. The project studied the inefficiencies in current payroll management practices, focusing on tax update tracking across the Federal and State (California) systems. Utilizing Python, Flask, MongoDB, and the OpenAI API, the team followed an Agile methodology to create an automated system that streamlines the monitoring and reporting process. The outcomes include a functional system capable of real-time updates, comparative analysis of tax forms, tax calculations by toggling parameters, and AI-enhanced user support, poised to transform payroll management through increased accuracy and efficiency

Introduction

In an era where financial regulations are increasingly complex and dynamic, the task of tracking and implementing payroll tax updates is more critical than ever. Payroll managers often grapple with a labyrinth of federal, state, and local tax regulations that are subject to frequent revisions. The existing manual methods of monitoring and updating payroll systems are not only labor-intensive but also prone to human error, leading to potential legal and financial repercussions for businesses. The project, thus, arises from an acute need for an automated solution that streamlines the update process, ensuring accuracy and compliance while freeing up valuable resources. The expected outcomes include a reduction in the time and effort required to track tax updates, minimization of compliance risks, and the facilitation of more strategic use of payroll professionals' expertise.

Project Overview

Problem Statement

The intricacies of payroll tax legislation across jurisdictions pose a formidable challenge. Each state in the U.S. may have its own set of rules and rates, which can differ vastly and change without substantial notice. This fragmentation makes the task of keeping up-to-date not just burdensome but also fraught with risk. Discrepancies in tax filings due to outdated information can result in hefty penalties, making reliable tax update tracking indispensable.

Proposed Solution

The proposed Payroll Tax Update Tracking System is a multifaceted platform designed to automate and simplify the process of tax update tracking. The system's update tracking feature is designed to monitor changes in real time, employing web scraping techniques to ensure that any alterations in tax legislation are promptly reflected. The PDF comparison tool uses advanced algorithms to analyze and highlight differences between tax document versions, making it easy to pinpoint modifications. Email notifications serve as a proactive measure to inform users of critical updates as they happen. The AI chatbot, powered by OpenAI's GPT-3.5, stands ready to assist users with tax-related inquiries, providing a conversational interface that can interpret and respond to a wide array of questions with accuracy and speed.

Objective

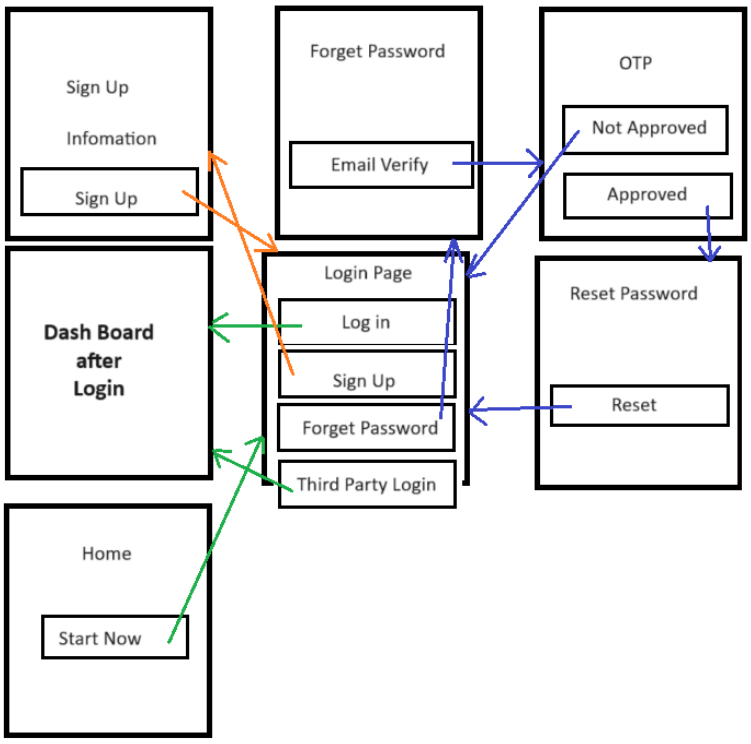
The objectives of the project are threefold:

- Significantly reduce the workload associated with tax update tracking, aiming for a 50% reduction in the manual effort required by payroll professionals.
- Attain a high level of precision in the tracking and reporting of tax updates, with a goal of 95% accuracy in reflecting the most current tax information.
- Enhance the user experience by delivering real-time notifications of tax form changes, ensuring that users are never behind on crucial tax information.

System Design

Architecture

The technical architecture of the system is a modern web application stack. The backend is built on the Python Flask framework, providing a lightweight yet powerful foundation for web services and API integration. The front end, crafted with HTML, CSS, and JavaScript, offers a user-centric design that is both responsive and intuitive. MongoDB serves as the backend database, chosen for its agility in handling unstructured data and its ability to scale with the system's growth.

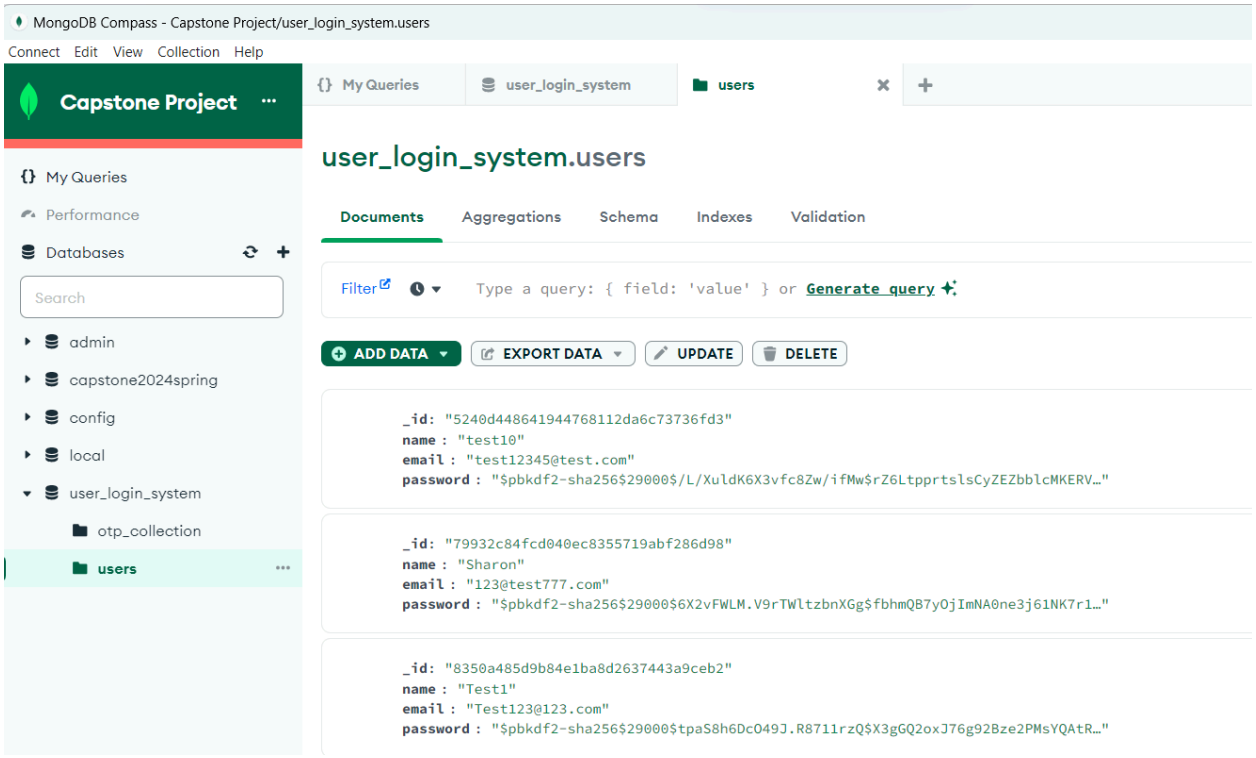


The program will have a login page in the beginning with the options of third-party login, sign up, and forget password sections. The forget password option will implement the OTP technology. After login successfully, the user will have the dashboard with different functions (tax calculator, update tracking, PDF comparisons, etc.)

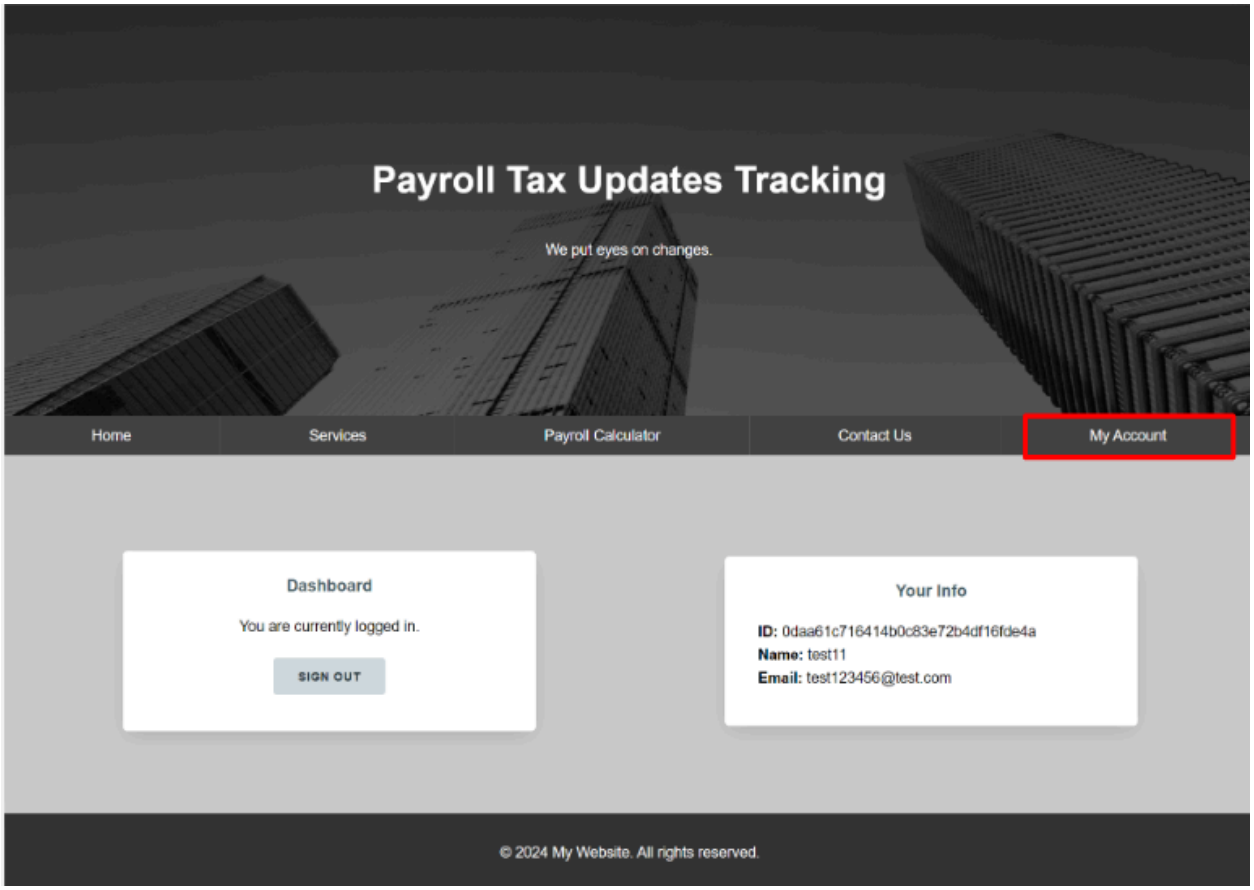
Technology Stack

Each element of the technology stack was chosen for its proven reliability and compatibility with the project goals:

- **Python Flask Framework**: Offers simplicity and flexibility for rapid development and deployment of web applications.
- **HTML, CSS, JavaScript**: These foundational web technologies enable the creation of a polished and interactive user interface.
- **MongoDB**: Its non-relational nature makes it ideal for managing diverse and complex tax data.
- **OpenAI GPT-3.5**: Provides an AI-driven interface that can handle user inquiries with a nuanced understanding of natural language.



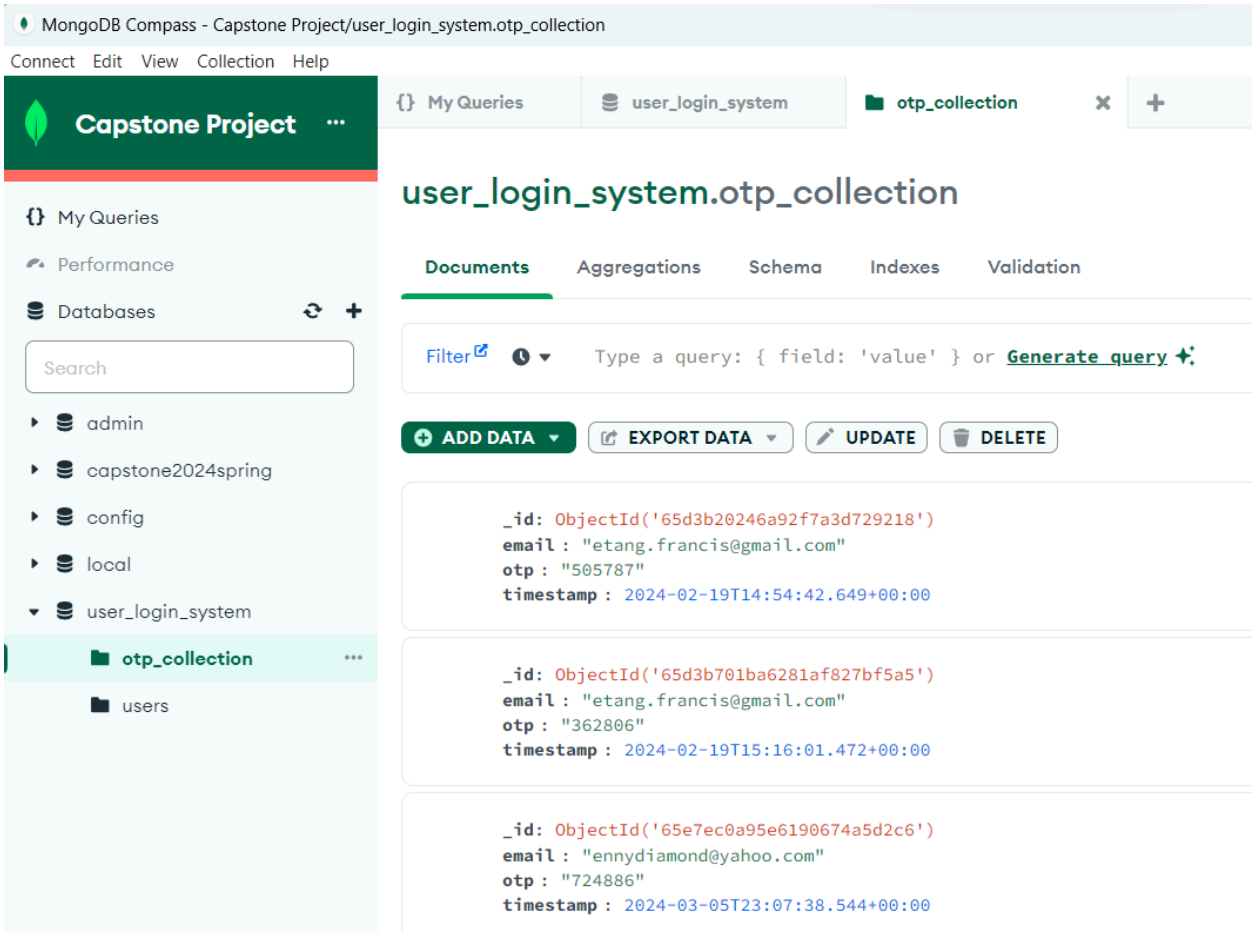
We use MongoDB to store users' database, which contains ID, username, email, and password hashed with SHA256. We also have the “otp_collection” section for collecting OTP generations.



The dashboard of the program with different service tabs using HTML, CSS, and JavaScript alongside with Flask framework for directing between pages.

Security and Compliance

The system incorporates state-of-the-art security protocols to safeguard sensitive data. Compliance with tax regulations is ensured through continuous monitoring and adaptation to legal changes, reflecting a commitment to data integrity and regulatory adherence.



OTPs will be saved in the MongoDB database alongside the users' database.

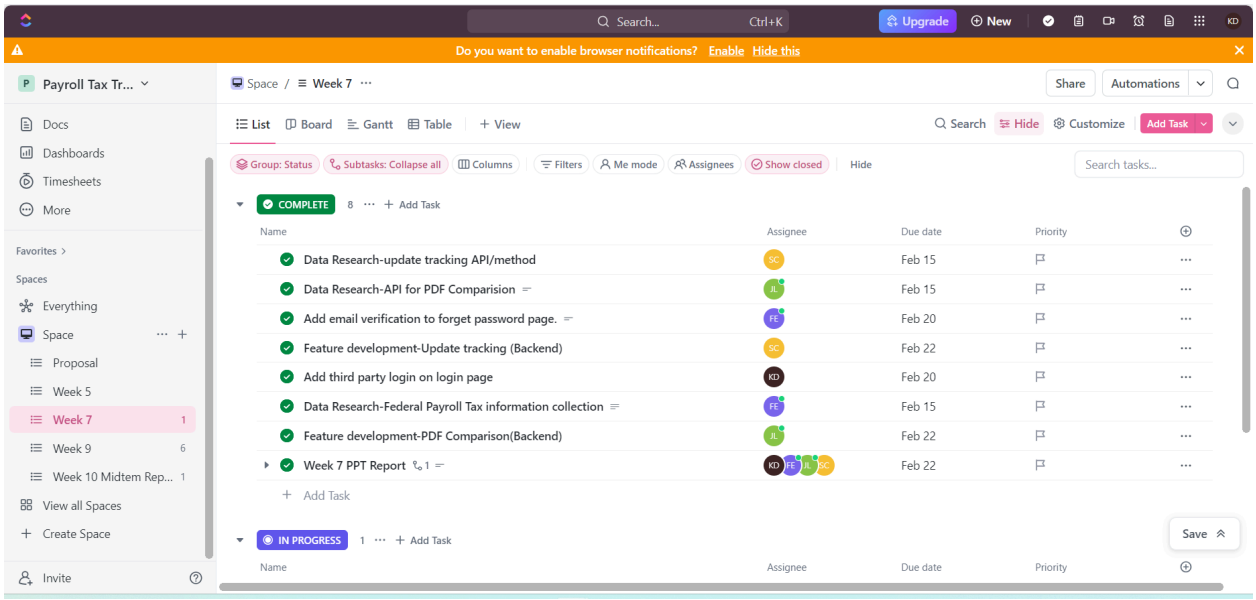
Development Process

Methodology

The Agile Scrum framework guides the development process, fostering a collaborative and adaptable approach. Sprints are managed via ClickUp for task tracking and GitHub for version control, ensuring that the team can respond quickly to change and maintain high standards of code quality.

Progress Updates

The project's progress is meticulously documented, showcasing milestones like the completion of the development environment setup, successful database integrations, feature implementation phases, and the initial rollout of the AI chatbot functionality. For our team, we use ClickUp to track the progress of the team members.

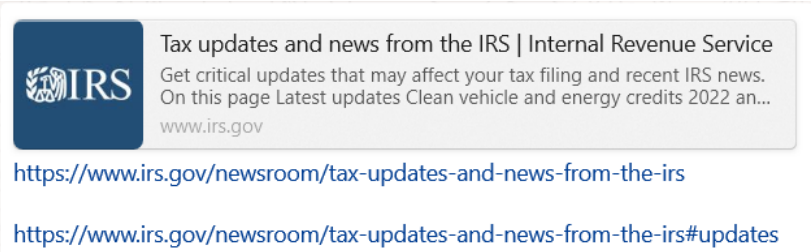


An example of using ClickUp to track the progress in Week 7.

Challenges and Solutions

Throughout the development journey, the team encountered several challenges, including diverse data source management and real-time update synchronization. Innovative solutions, such as the deployment of bespoke web scraping tools and the creation of a dynamic data pipeline, were crafted to address these issues.

Tax	Rates	Forms
State Income Tax	1 - 12.3%	W-4 or DE44
State Disability Insurance (SDI)	1.10%	DE2501
State Unemployment Insurance (UI)	3.4% (2-3 years), then varies	DE1101
Employment Training Tax (ETT)	0.1% of the first $7,000	DE-88 and DE-9/DE-9C
State Income Tax Withholding		DE4
Quarterly Tax Reporting		DE9
Corporate Income Tax Rate	8.84%	



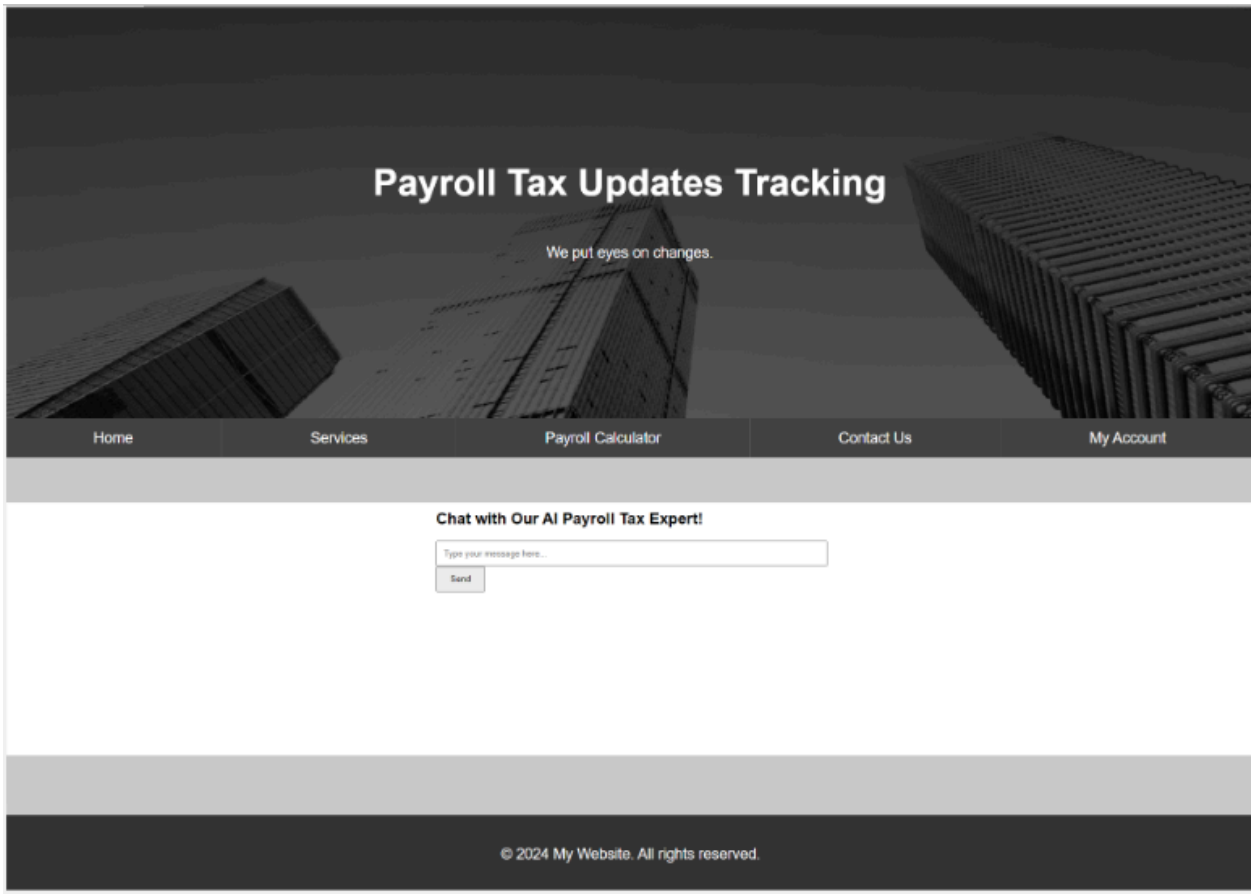
The difficulties lie in updating and crawling news about Payroll Tax in order to implement on our Chatbot system.

Testing and Validation

The system undergoes rigorous testing to ensure reliability and accuracy. A combination of automated testing frameworks and manual user testing rounds provide a thorough validation of system functions.

Future Directions

Looking ahead, the project team is committed to refining the AI chatbot's capabilities and exploring new integrations to further streamline payroll processes. The feedback loop with users is critical, guiding the continuous improvement and evolution of the system.



We are trying to implement the Chatbot using AI technology and API from OpenAI ChatGPT 3.5.

Conclusion

In summary, the Payroll Tax Update Tracking System represents a significant leap forward in tackling the complexities of payroll tax management. Through the use of cutting-edge technologies and an innovative approach to system design, the project delivers a solution that not only meets the current needs of payroll professionals but also paves the way for future advancements in the field.

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