AI enabled business cards organizers.

(A full stack serverless intelligent enabled application)

Project Report

(COMP 264 – Sec003)

Professor – Mayy Habayeb

Group 1

Team Members

1. Chukkapalli, Uma Pavan Kumar 301211308
2. Mannem, Vinay Kumar 301211306
3. Patel, Poojaben GhanshyamBhai 301224016
4. Kasu, Karuna Sindhu 301213148
5. Vishalkumar, Parekh 301221947

Contents

RESEARCH

Research Requirements:

A. Provide a summary of options in the market for AI enabled business cards organizers.

Options for AI Enabled Business Cards:

Covve:

- scanning accuracy that leads the market in more than 30 languages. Scan business cards and add location, tags, and notes.
- Sort and go over our business cards.
- Save to the contacts on your phone. Export to Google Contacts, Outlook, or Spreadsheet
- Scan cards and send them to your team or helper.
- Directly send cards to Salesforce and Use Zapier to send to any other platform.
- Your data is secure because of our terms and technology.

ABBYY:

Functionalities:

- Put business cards in 25 different languages into our smartphone. Quick, simple, and precise. Scan business cards with our smartphone to add all the information to our contact list. Able to read bilingual cards; BCR allows up to three languages on a single card.
- With only one tap, network and share our contact information. It now simply takes a few seconds to send an email with our digital business card attached.

- Export information from scanned business cards in.CSV format to Salesforce Leads, Microsoft Outlook, Google Contacts, and Microsoft Excel.
- Secure and problem-free. Ignore the card holders! All our contacts are synchronised across our devices and stored in the cloud, making it possible to access them from a computer, tablet, or smartphone.

snapADDY CardScanner: It works for Microsoft Dynamics CRM System.

Functionalities:

- In seconds, a snapshot may entirely digitise the contact information on gathered business cards without the need for typing.
- Support for 23 distinct languages and thousands of international address formats
- Export to a phonebook or the Microsoft Dynamics CRM system
- Around 800 companies already utilise the snapADDY products to collect additional information via notes, attachments, or the back of business cards.

CamCard:

Functionalities:

- Read Business Cards accurately in 16 languages.
- To reduce card clutter, batch scan every paper card you have.
- Get notifications when your connections start new businesses, obtain jobs, or do other things.
- At conferences, trade shows, or seminars, interchange e-cards with others in the area.
- Fill out our own profile to give our contacts a better first impression. Sync cards between cell phones, tablets, and the web application.

- Get their corporate news immediately to get to know our contacts better.
- Set reminders and include text or image meeting notes.

B. Provide a summary of the ML/DL algorithms used to understand the information in the business card.

Convolutional Neural Networks:

- It is also known as ConvNets, ConvNets are multi-layer networks that are mostly utilised for image processing and object detection. Yann LeCun created the first CNN, known as LeNet, in 1988. It recognised characters such as ZIP codes and numbers.

Long Short-Term Memory Networks:

- LSTMs are Recurrent Neural Network (RNN) types that can learn and remember long-term dependencies. The default behaviour is to recall past information for extended periods of time.
- Throughout time, LSTMs retain information. Because they remember prior inputs, they are valuable in time-series prediction. LSTMs have a chain-like structure with four interacting layers that communicate in a distinct manner. LSTMs are commonly employed for speech recognition, music creation, and pharmaceutical research, in addition to time-series predictions.

Recurrent Neural Networks:

- It has connections that form directed cycles, allowing the LSTM outputs to be fed as inputs to the current phase.

- The LSTM output becomes an input to the current phase, and its internal memory allows it to remember prior inputs. RNNs are frequently employed in image captioning, time series analysis, natural language processing, handwriting recognition, and machine translation.

Linear Regression:

A relationship between independent and dependent variables is established in this procedure by fitting them to a line. This is the regression line, and it is represented by the linear equation Y= a *X + b.

Support Vector Machine Algorithm (SVM):

It is a classification algorithm method that involves plotting raw data as points in an n-dimensional space (where n is the number of features you have). The value of each feature is then assigned to a specific point, making it simple to categorise the data. Classifier lines can be used to separate data and plot it on a graph.

Apart from the above there are various ML/DL Algorithms that are used to extract data from the business cards.

ML, DL ALGORITHMS:

Image identification and natural language processing (NLP) tasks have been performed using Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs).

To identify and extract specific data elements from unstructured text, named entity recognition (NER) and information extraction (IE) techniques are used. White papers on these topics include "Reading Text in the Wild with Convolutional Neural Networks" by Max Jaderberg et al. and "End-to-End Neural Entity Recognition" by Guillaume Genthial.

c. Provide a summary of each element of the technology stack used for the project and how it will contribute to the project.

The following elements may be present in the technological stack for business card organisers with AI support:

Amazon Rekognition: This is a service that provides image and video analysis capabilities, including object and face detection, recognition, and analysis. It is used for extracting information from business card images, such as contact information and other relevant data.

NLP algorithms: These algorithms aid in understanding the context and meaning of the text that was extracted.

Amazon DynamoDB: This is a fully managed NoSQL database service that provides low-latency access to data. It is used to store and retrieve data for the application, such as user data and business card data.

User Interface: Users can communicate with the system, see, and change their contacts, and carry out other tasks thanks to the user interface.

Machine learning models: These models are employed to progressively raise the system's accuracy over time.

Each element of the technology stack adds to the system's overall functionality, allowing users to manage and organise their business card contacts with the use of tools powered by AI.

Design Document

FUNCTIONAL REQUIREMENTS

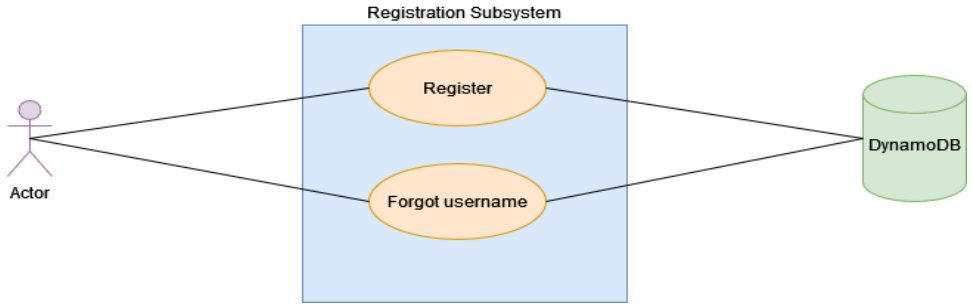
- Image recognition: The system should be able to recognize and extract text from the images of business cards using Amazon Rekognition.
- Natural Language Processing: The system should be able to use Amazon Comprehend to extract key information such as name, company, phone number, and email address from the extracted text.
- Data storage: The system should use Amazon DynamoDB to store the extracted contact information in a fast and flexible NoSQL database.
- User Interface: The system should provide a user-friendly interface for users to view and manage their contacts. Users should be able to search, filter, and sort contacts
- Performance: The system should be able to perform efficiently and provide quick responses to user requests.
- Accuracy: The system should be able to accurately recognize and extract text from the images of business cards and extract key information with a high degree of accuracy.

DESIGN GRAPHS ILLUSTRATING

REGISTRATION SUBSYSTEM

FR#	Name (Goal Use case)	Role Player	Description
FR01	Register organization	All users	Allow users to register their organization.
FR02	Retrieve organization username	All users	Allow a registered user to retrieve the org username.

Use Case Diagram



User Story

1. As a user, I want to register my organization, so I store and access leads.

   Acceptance Criteria:

   - Should be able to register with the organization.

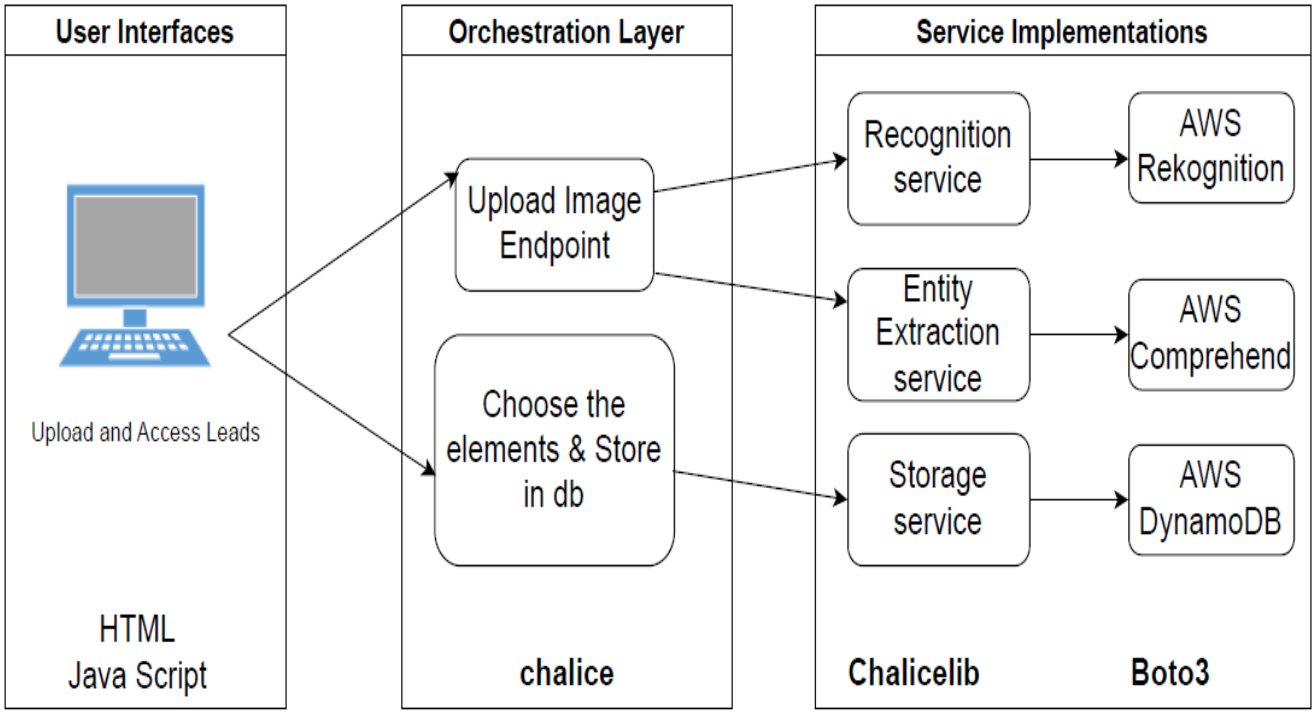
2. As a user, I want to retrieve my username, so I could see my leads if I forgot the username.

Acceptance Criteria: Should users have registered their organization and provided with security answers be able to fetch the username.

LEAD MANAGEMENT SUBSYSTEM

FR#	Name (Goal Use case)	Role Player	Description
FR01	Add leads	All users	Allow users to add leads to their organization.
FR02	Update leads	All users	Allow a registered user to update the leads of their org.
FR03	Delete leads	All users	Allow the user to delete the leads only under their org.
FR04	Retrieve leads	All users	Allow the user to view all the leads

i. ARCHITECTURE DIAGRAM



ii. COMMUNICATION DIAGRAMS

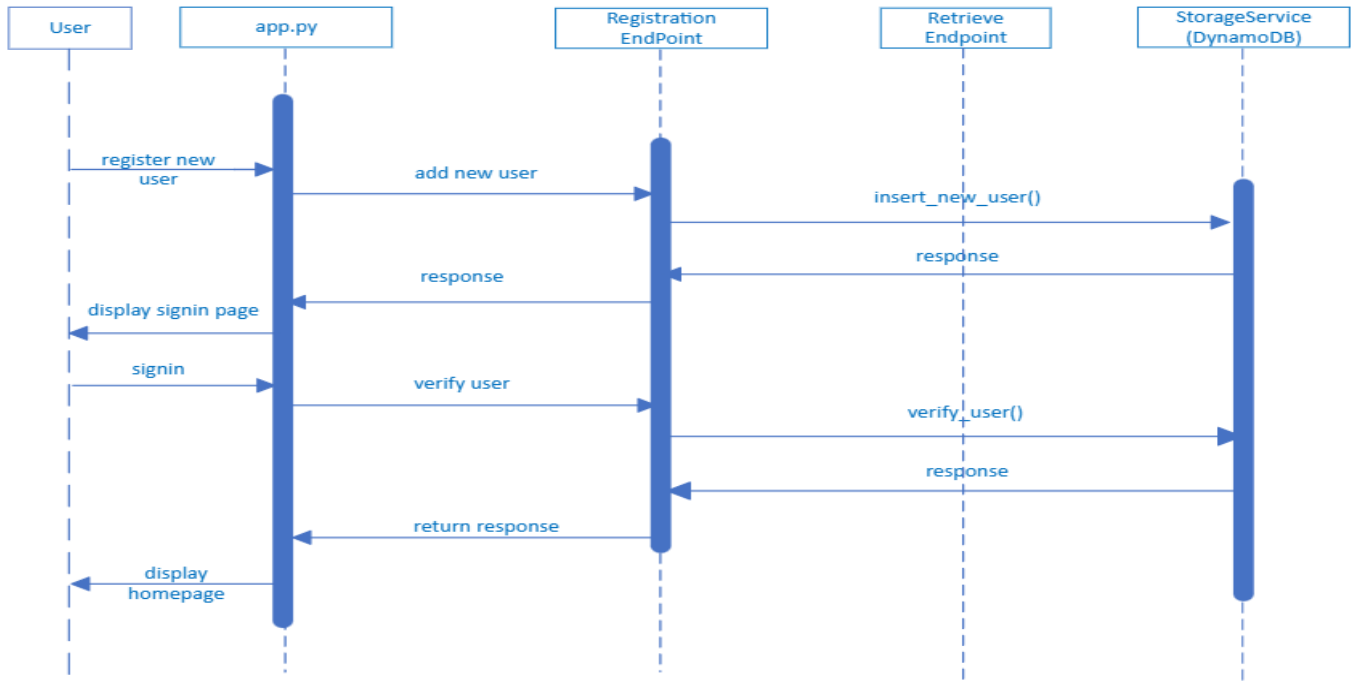


Fig: Registration and login service

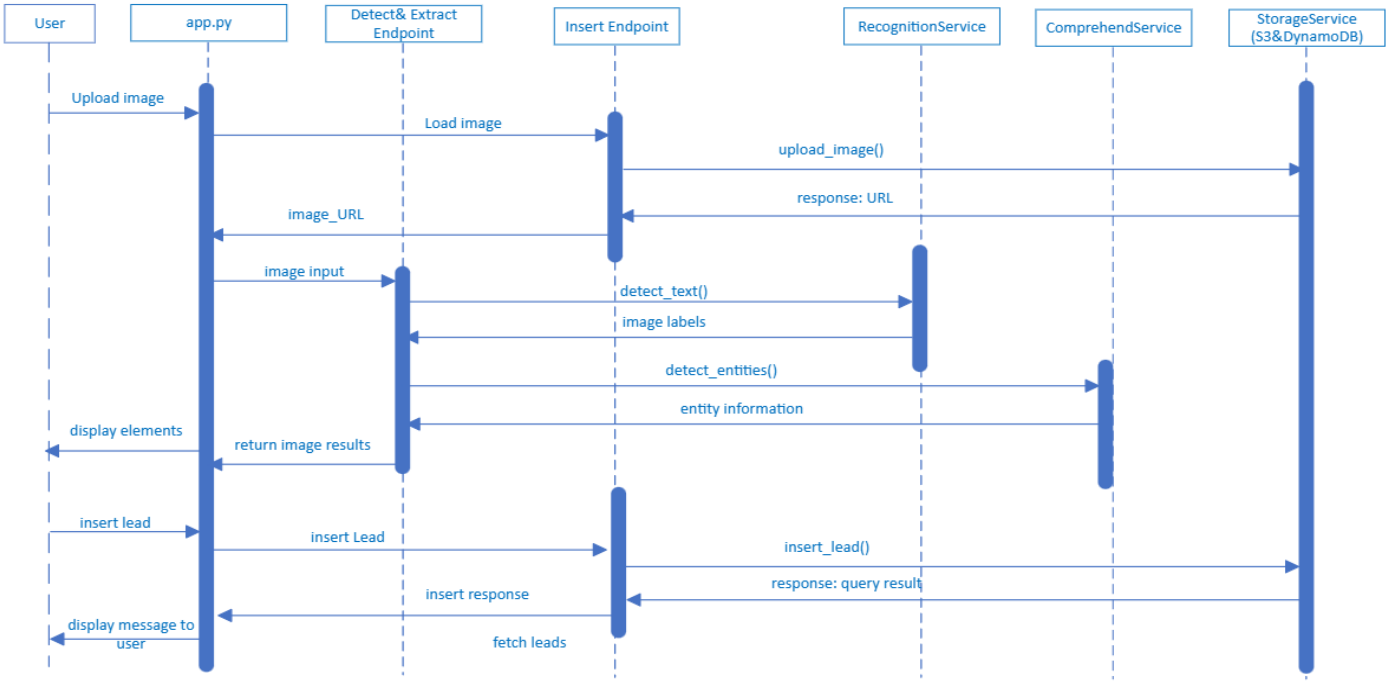


Fig: Add lead service

iii. private and public endpoints

Private endpoints:

1. Recognition service
2. Comprehend service
3. Storage service

Public endpoints:

1. Upload image
2. Insert/Update/Delete

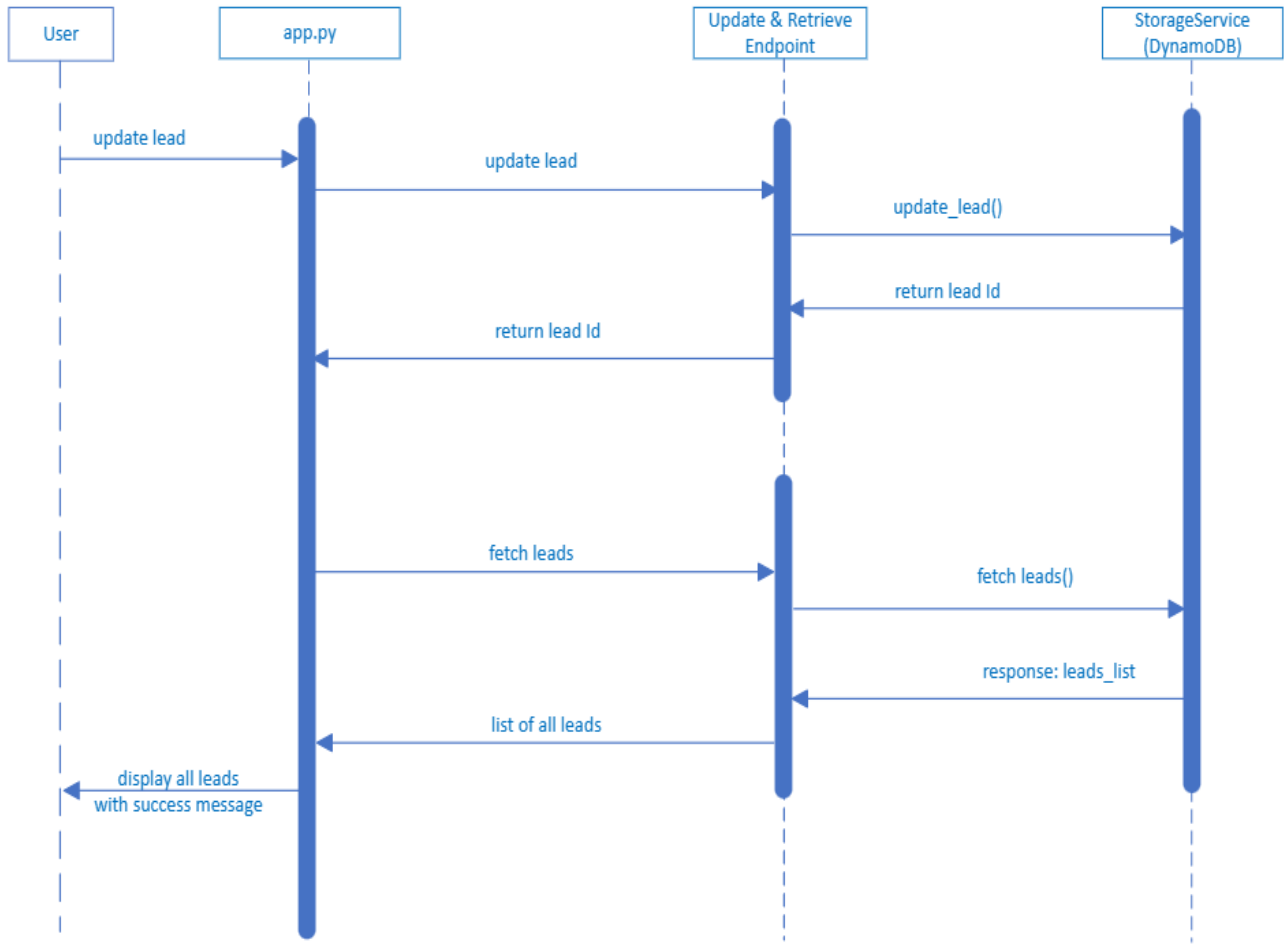


Fig: Edit lead service

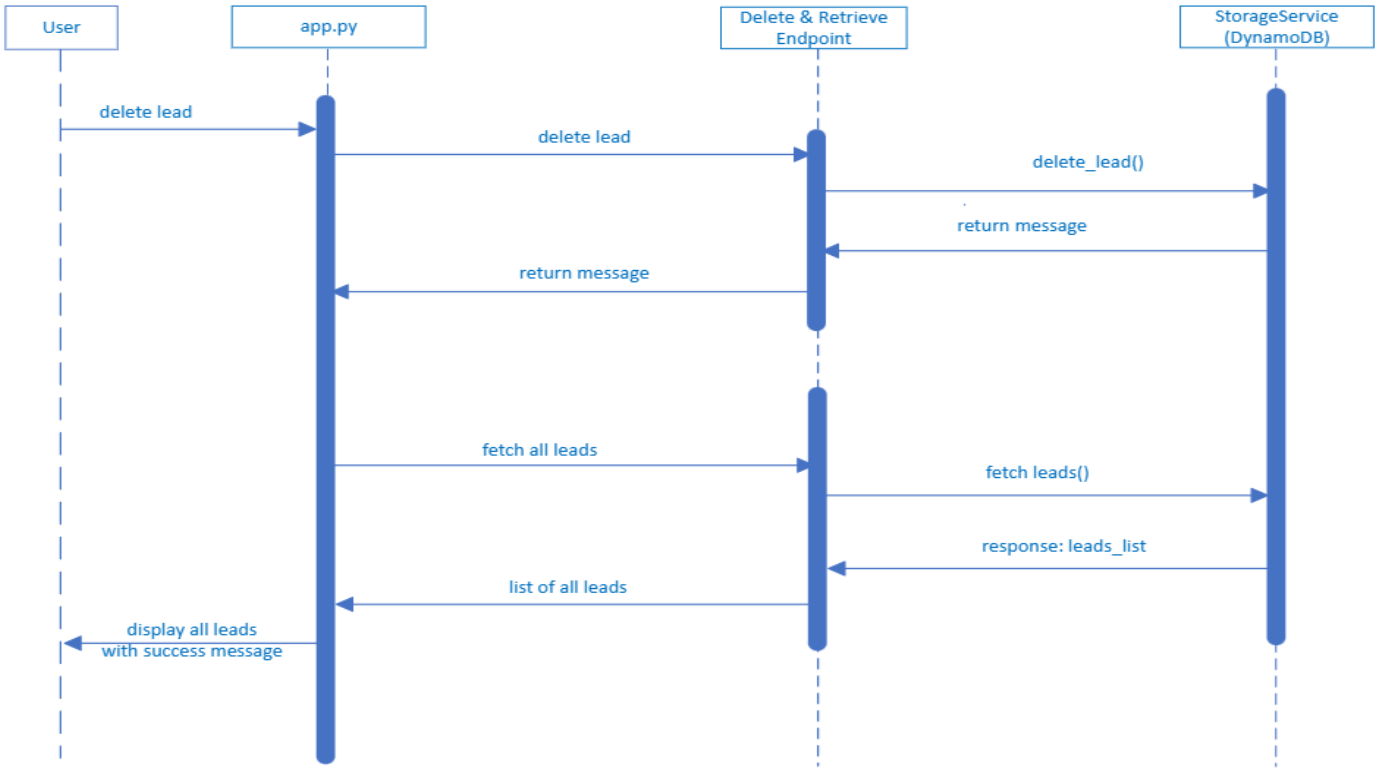
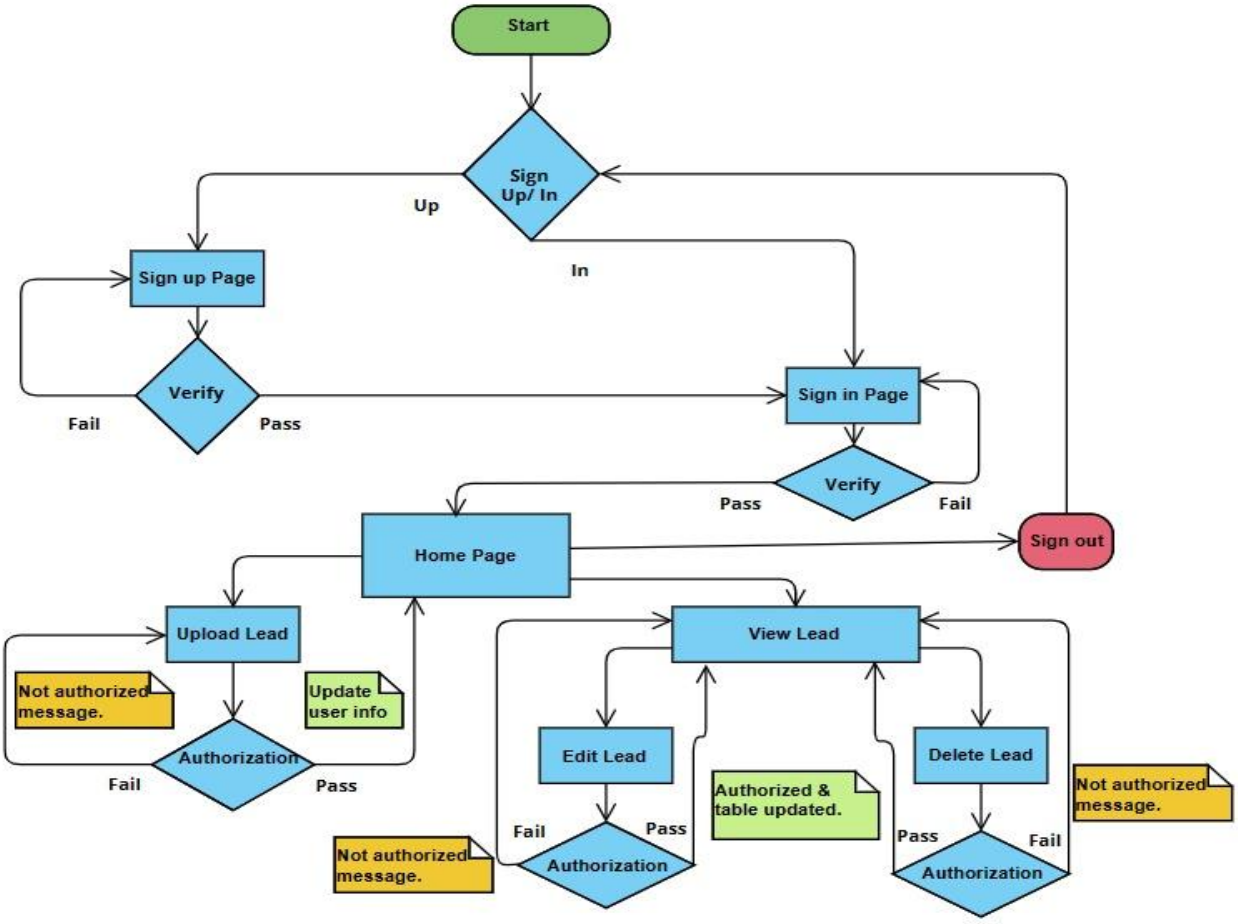


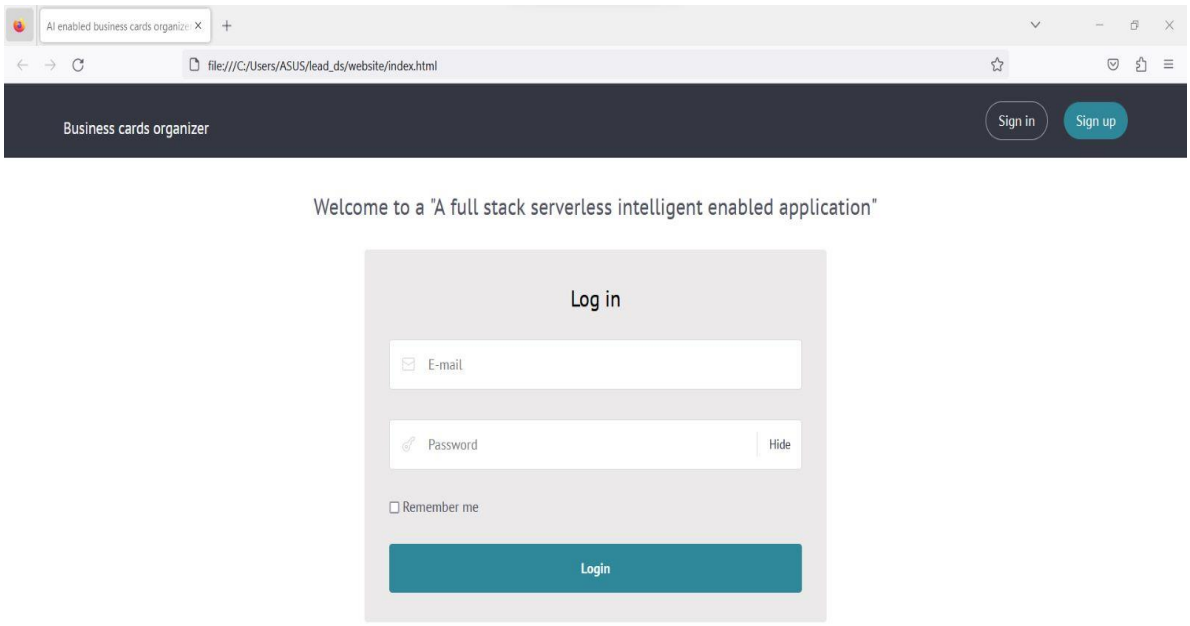
Fig: Delete lead service

Flow diagram:

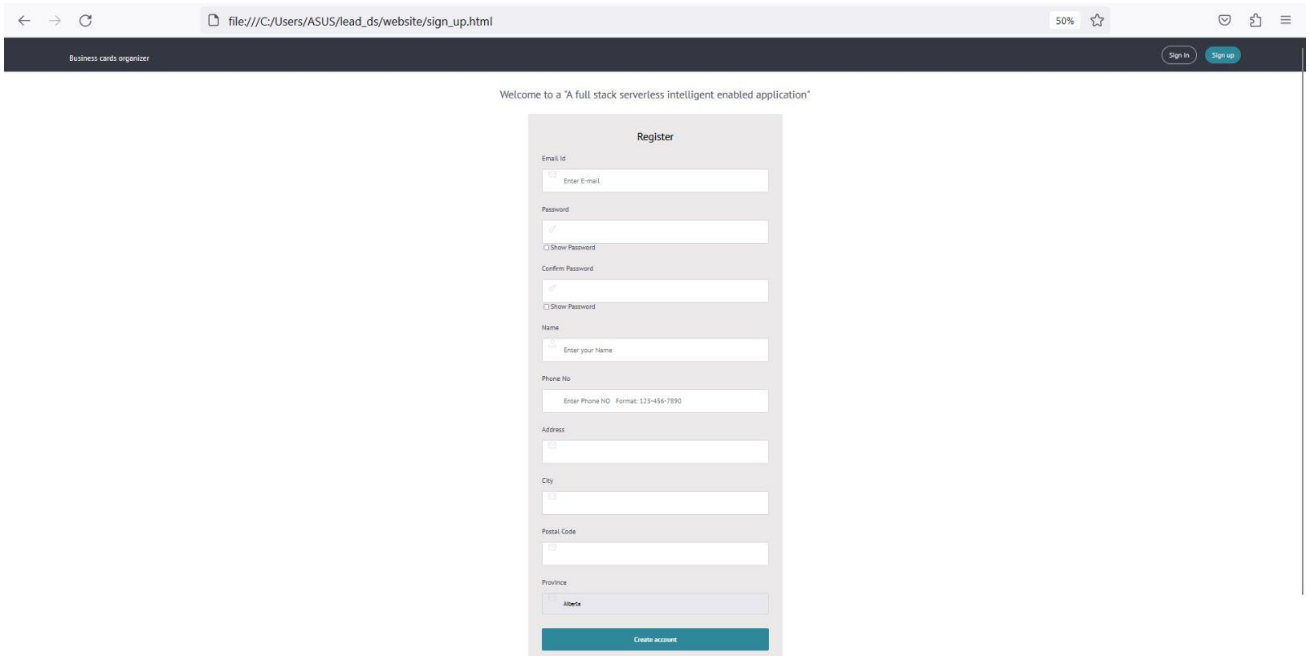


iv. USER INTERFACE MOCKUP

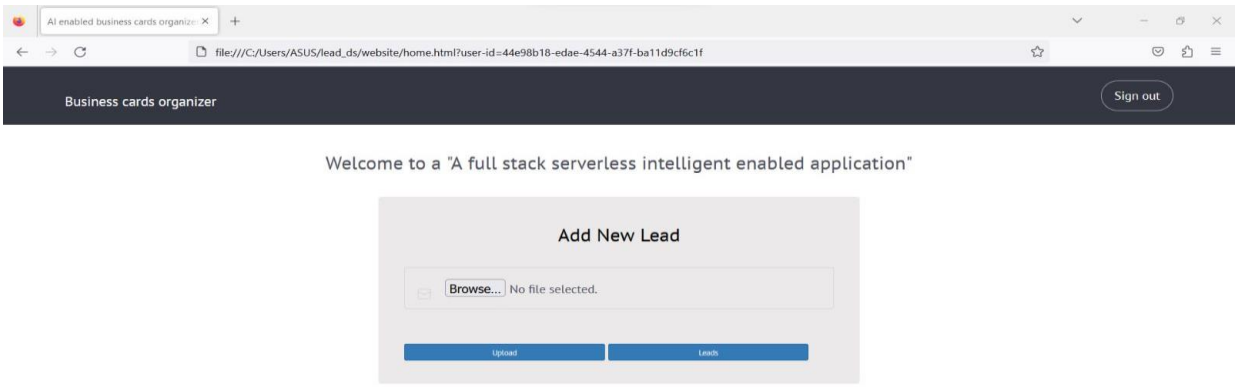
1. Log in Screen



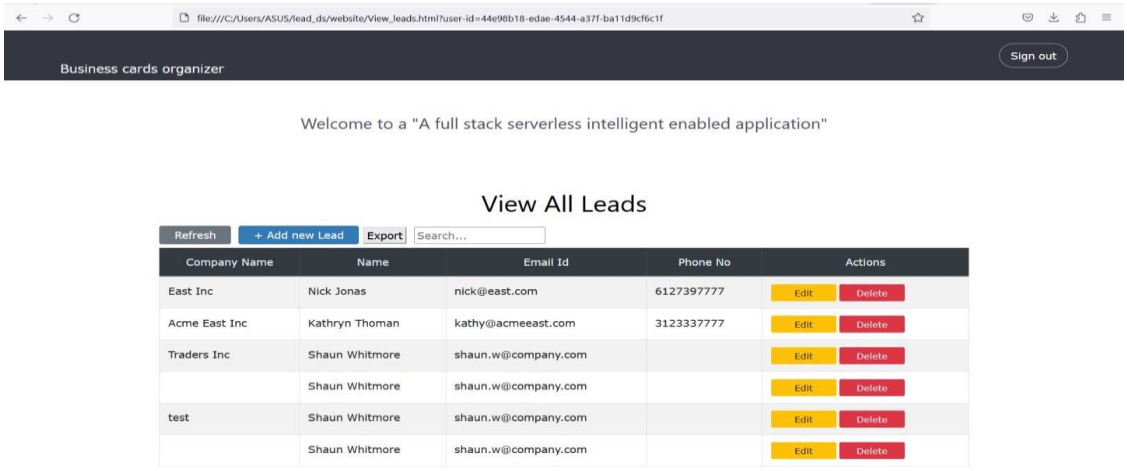
2. Register account screen



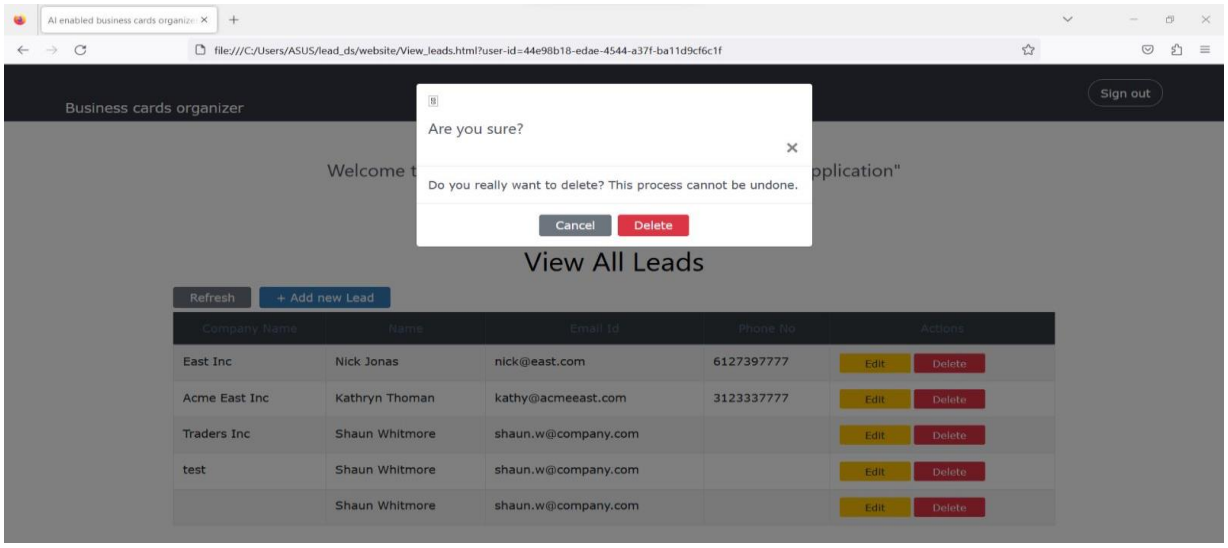
3. Add Lead

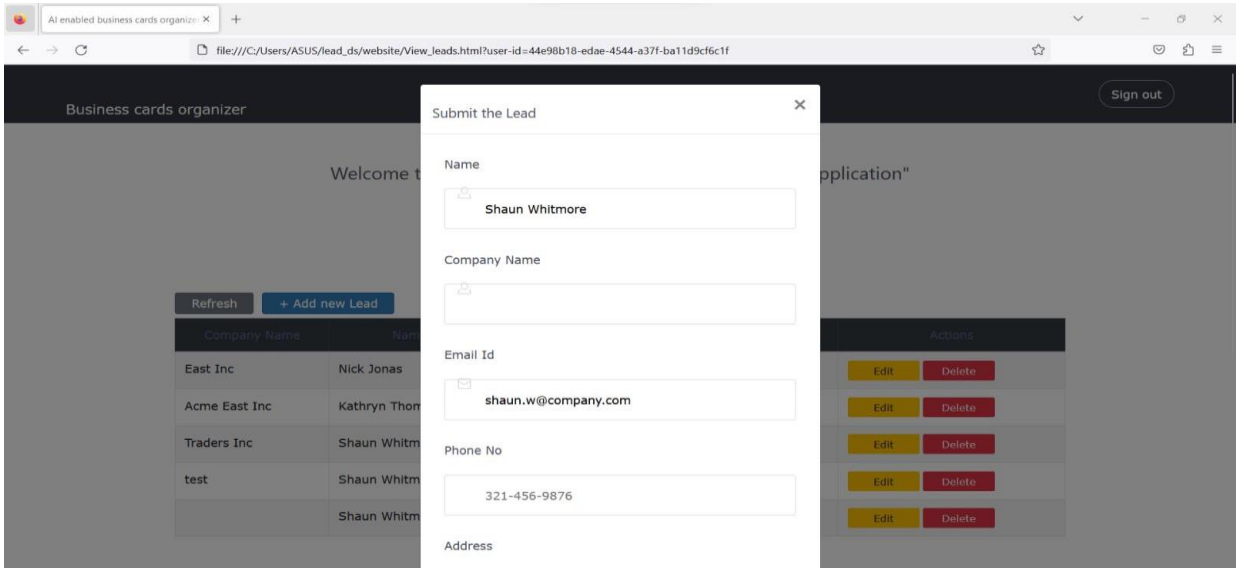


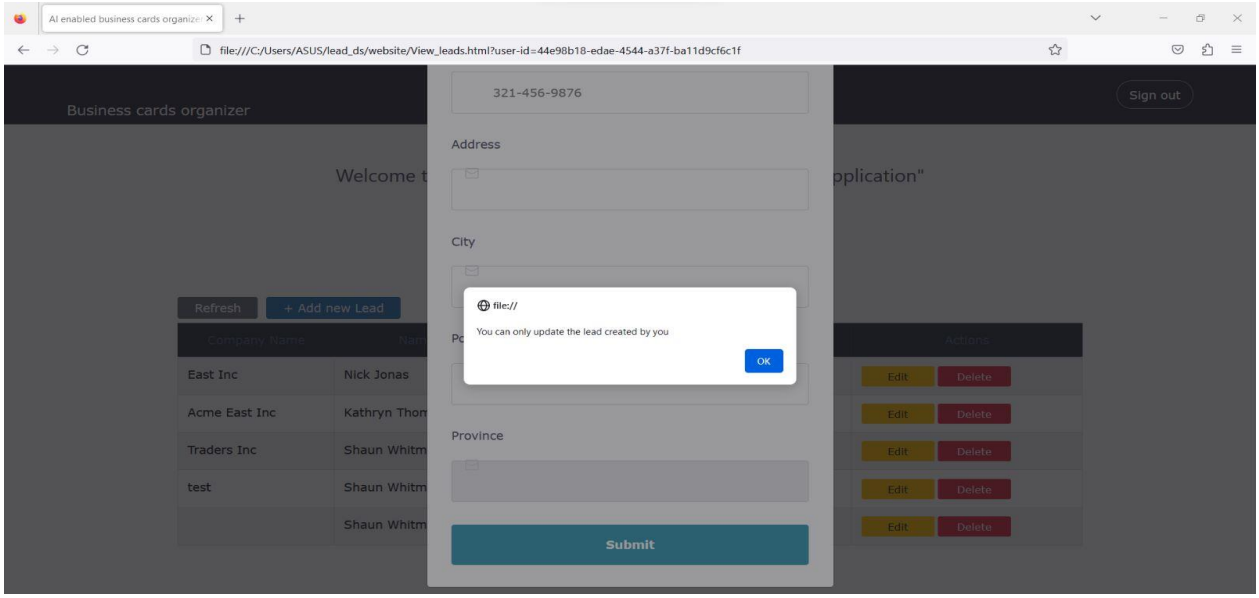
4. View All Leads

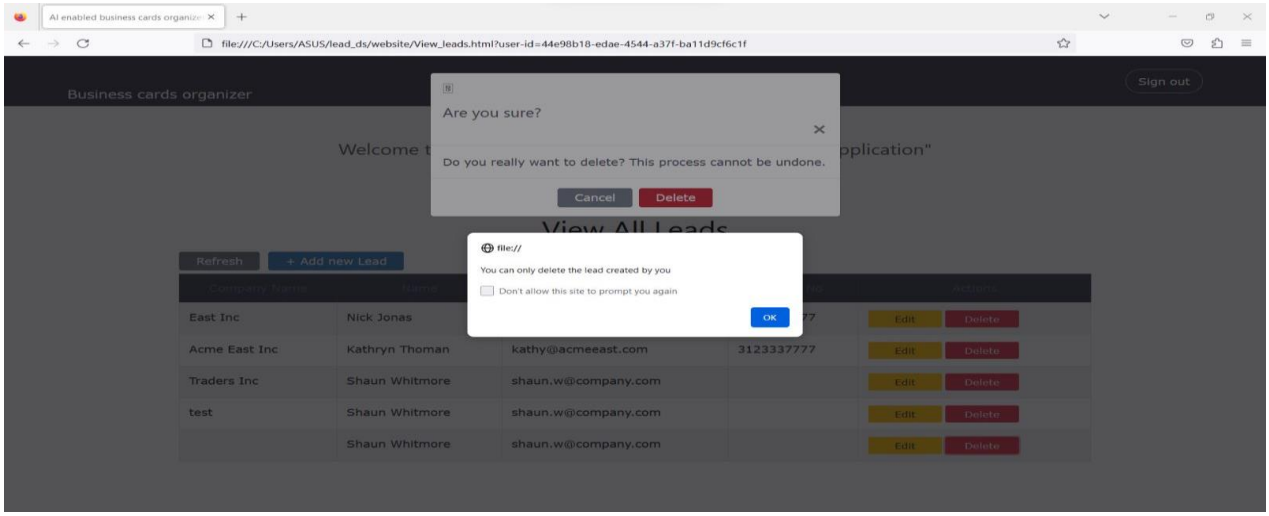


5. Edit the Lead


AI enabled business cards organize
file:///C:/Users/ASUS/lead_ds/website/View_leads.html?user-id=44e98b18-edae-4544-a37f-ba11d9cf6c1f
Business cards organizer
Sign out
Are you sure?
Do you really want to delete? This process cannot be undone.
Cancel
Delete
View All Leads
Refresh
+ Add new Lead
Company Name
Name
Email Id
Phone No
Actions
East Inc
Nick Jonas
nick@east.com
6127397777
Edit
Delete
Acme East Inc
Kathryn Thoman
kathy@acmeeast.com
3123337777
Traders Inc
Shaun Whitmore
shaun.w@company.com
test
Shaun Whitmore
shaun.w@company.com


AI enabled business cards organize
file:///C:/Users/ASUS/lead_ds/website/View_leads.html?user-id=44e98b18-edae-4544-a37f-ba11d9cf6c1f
Business cards organizer
Sign out
Submit the Lead
Name
Shaun Whitmore
Company Name
Email Id
shaun.w@company.com
Phone No
321-456-9876
Address
Refresh
+ Add new Lead
East Inc
Nick Jonas
Acme East Inc
Traders Inc
test
Edit
Delete


AI enabled business cards organizer
file:///C:/Users/ASUS/lead_ds/website/View_leads.html?user-id=44e98b18-edae-4544-a37f-ba11d9cf6c1f
Business cards organizer
Sign out
321-456-9876
Address
City
Province
Submit
file://
You can only update the lead created by you
OK
Refresh
+ Add new Lead
Company Name
Name
Actions
East Inc
Nick Jonas
Acme East Inc
Traders Inc
Shaun Whitm
test
Edit
Delete


AI enabled business cards organizer
file:///C:/Users/ASUS/lead_ds/website/View_leads.html?user-id=44e98b18-edae-4544-a37f-ba11d9cf6c1f
Business cards organizer
Sign out
Are you sure?
Do you really want to delete? This process cannot be undone.
Cancel
Delete
file://
You can only delete the lead created by you
Don't allow this site to prompt you again
OK
Refresh
+ Add new Lead
East Inc
Nick Jonas
Acme East Inc
Kathryn Thoman
kathy@acmeeast.com
3123337777
Traders Inc
Shaun Whitmore
shaun.w@company.com
test
Edit
Delete

FUTURE WORK

- **Integration with voice assistants:** Alexa and Google Assistant are two increasingly popular voice assistants that might be integrated into AI-enabled business cards to increase their effectiveness. Users might simply ask Alexa to send John their business card by saying, "Hey Alexa, give my business card to John."
- **Augmented reality features:** Consider scanning an AI-enabled business card and seeing a 3D model of the person's product or service appear in front of you. Augmented reality elements could assist consumers in displaying their products or services in a more engaging and interactive manner.
- **Integration with CRM software:** Business cards could be linked to customer relationship management (CRM) software to immediately add new leads to a user's CRM system, allowing for quick follow-up and contact management.
- **Predictive analytics:** Predictive analytics could be used by AI-enabled business cards to anticipate the requirements and preferences of the user's contacts, allowing users to adjust their communications and interactions to maximize their efficacy.

- **Gamification:** Gamification techniques could be used on business cards to encourage users to interact with their contacts and expand their network. Rewards or badges for successful networking engagements or referrals could be included.
- **Automatic lead scoring:** Automatic lead scoring capabilities in business cards could use machine learning algorithms to determine the most potential leads and prioritize follow-up.
- **Data analytics:** Data analytics capabilities on business cards could provide users with insights into how their cards are being used and how they can optimize their networking efforts.
- **Integration with business card scanning hardware:** While OCR technology can help automate the text extraction procedure, the user must still physically photograph the business card with their mobile phone. By integrating with specialized business card scanning devices, the program can allow users to scan business cards fast and effortlessly, increasing the speed and efficiency of the lead management process.
- **Dynamic QR codes:** Business cards could include dynamic QR codes that can be updated with fresh information or connections to resources, allowing users to remain in touch with their contacts more easily.
- **Mobile application:** A mobile application can give users with a more convenient and portable alternative for handling their leads. Users can scan business cards on the move by creating a mobile application, eliminating the requirement for a desktop computer or scanner. This can help to increase the lead management process's efficiency and flexibility by allowing users to handle their leads from anywhere.
- **Data visualization:** Data visualization can give users a more natural and simple method to view their prospects and contacts. The program, by including data visualization tools such as charts,

graphs, and heat maps, may assist users quickly and easily spot trends and patterns in their lead data, allowing them to make better informed business decisions.

- **Multi-language support:** Businesses in a globalized world must be able to interact and conduct business with people from other countries and cultures. By adding multilingual capability, users will be able to scan business cards in numerous languages, making it easier to handle foreign contacts and leads.

Conclusion

The application that we have suggested provides a practical and efficient solution for lead management, offering users a full set of capabilities to properly manage their leads and contacts.

Furthermore, the application allows users to change and update the data extracted before it is placed in a DynamoDB table. This "Human in the Loop" strategy guarantees that the data is correct and up to date, boosting the quality of the leads and making them more useful for sales and marketing.

The program contains tools for finding and obtaining leads by name, updating and removing leads, and providing an extra layer of control and security, in addition to the basic functionality.

Looking ahead, there are a number of potential additions that might be explored in order to increase the application's usefulness and value. Integrating email marketing with appointment booking software, for example, or adding data visualization and social media integration.

The proposed lead management application offers customers with a powerful and effective solution to handle their leads and contacts by combining these recommended changes. It has the potential to become an even more effective tool for companies of all sizes, assisting them in growing and thriving in today's extremely competitive market.

Assumptions

As a result, for our project, we created an app that extracts information from business card photos. We arrived at several assumptions that must be considered while determining the effectiveness of the application.

To begin, the program assumes that the data collected from the business card image is correct and trustworthy.

Second, while changing and updating leads, the program anticipates that users will supply correct and comprehensive information. However, if the user commits errors or omits key information, the quality of the leads may suffer.

Third, in order to access and utilize the program, users must have a reliable internet connection. Users may suffer disruptions or delays in obtaining and employing the program if their internet connection is unreliable.

Fourth, the program presumes that users are familiar with technology and possess the requisite abilities to efficiently utilize the software.

Finally, the program presumes that user data is safe and secure, free of illegal access or hacking efforts. However, there is always the possibility of security breaches and data leaks, which might expose user data and result in legal and financial ramifications.

To address these possible difficulties, suitable measures should be implemented, such as security standards and user training.

Reference

1. Tavasoli, S. (2023). Top 10 Machine Learning Algorithms For Beginners: Supervised, and More. *Simplilearn.com*. https://www.simplilearn.com/10-algorithms-machine-learning-engineers-need-to-know-article
2. Biswal, A. (2023). Top 10 Deep Learning Algorithms You Should Know in 2023. *Simplilearn.com*. https://www.simplilearn.com/tutorials/deep-learning-tutorial/deep-learning-algorithm
3. Amazon Web Services. (n.d.). Amazon DynamoDB. Retrieved from https://aws.amazon.com/dynamodb/.
4. Amazon Web Services. (n.d.). Amazon S3. Retrieved from
    a. https://aws.amazon.com/s3/
5. Tesseract OCR. (n.d.). Tesseract Wiki. Retrieved from
    a. https://github.com/tesseract-ocr/tesseract/wiki
6. Jaderberg, M. (2014, December 4). *Reading Text in the Wild with Convolutional Neural Networks*. arXiv.org. https://arxiv.org/abs/1412.1842
7. *Salesforce User Tour*. (n.d.). https://trailhead.salesforce.com/content/learn/modules/lex_salesforce_tour/lex_salesforce_tour_sales

APPENDIX 1: PROJECT PLAN

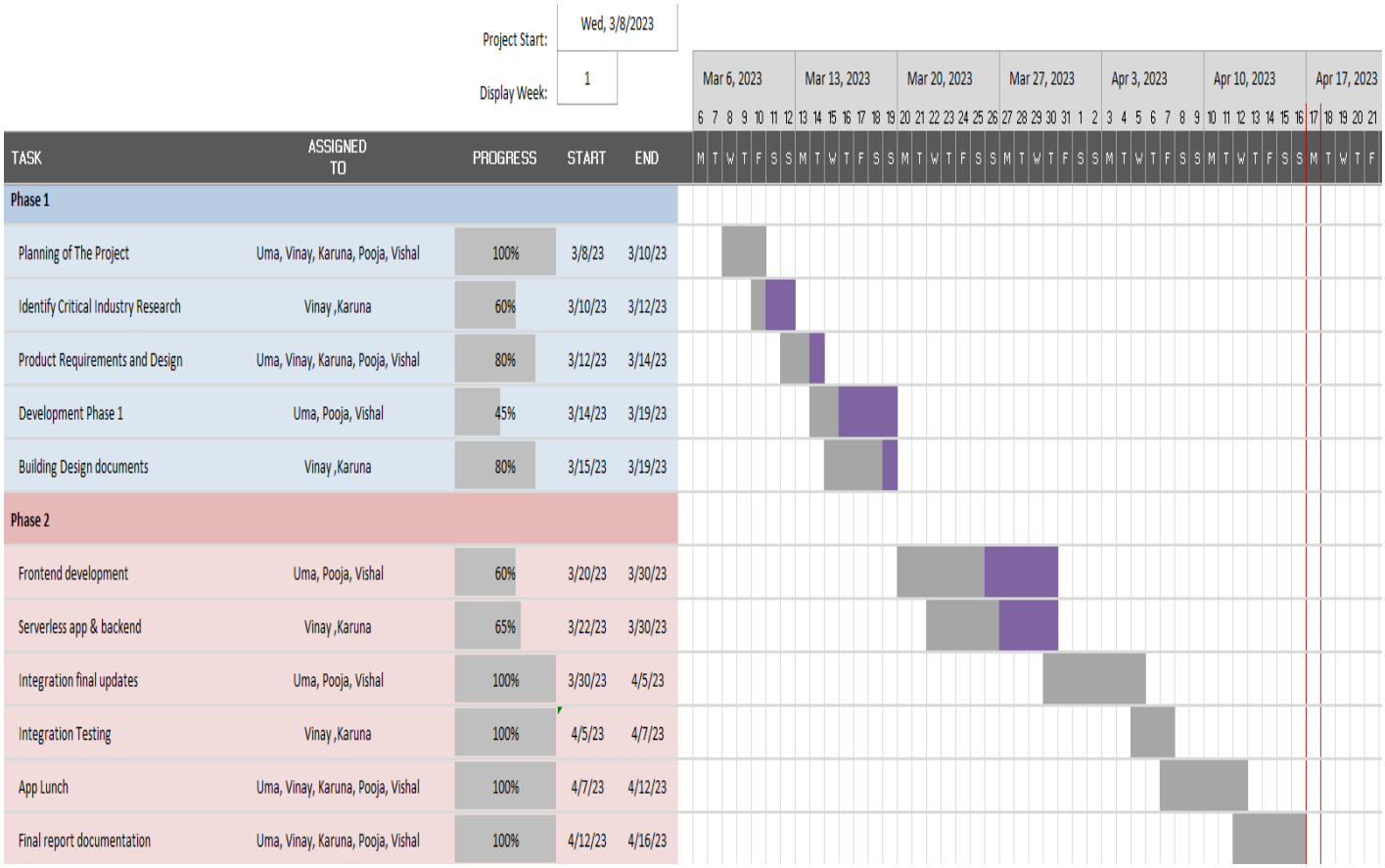
Project Goals and Objectives

Create a lead management app that takes data from business cards and allows users to save, update, and retrieve leads in a DynamoDB table.

Scope and Deliverables

From uploaded business card photos, the application will detect and extract the name, phone number, email address, company website, and address. Before the extracted data is put in a DynamoDB table, users will be able to update and change it. The application will also have search features and allow users to only update or delete their own information.

Timeline and Milestones:



Project Start: Wed, 3/8/2023
Display Week: 1

TASK	ASSIGNED TO	PROGRESS	START	END
Phase 1				
Planning of The Project	Uma, Vinay, Karuna, Pooja, Vishal	100%	3/8/23	3/10/23
Identify Critical Industry Research	Vinay ,Karuna	60%	3/10/23	3/12/23
Product Requirements and Design	Uma, Vinay, Karuna, Pooja, Vishal	80%	3/12/23	3/14/23
Development Phase 1	Uma, Pooja, Vishal	45%	3/14/23	3/19/23
Building Design documents	Vinay ,Karuna	80%	3/15/23	3/19/23
Phase 2				
Frontend development	Uma, Pooja, Vishal	60%	3/20/23	3/30/23
Serverless app & backend	Vinay ,Karuna	65%	3/22/23	3/30/23
Integration final updates	Uma, Pooja, Vishal	100%	3/30/23	4/5/23
Integration Testing	Vinay ,Karuna	100%	4/5/23	4/7/23
App Lunch	Uma, Vinay, Karuna, Pooja, Vishal	100%	4/7/23	4/12/23
Final report documentation	Uma, Vinay, Karuna, Pooja, Vishal	100%	4/12/23	4/16/23

Risk Management

Data extraction failures, security breaches, and user adoption challenges are all potential concerns. Regular testing and quality assurance, data encryption, and user training and support are all examples of mitigation techniques.

Quality Assurance and Testing

To ensure correct data extraction and database functionality, the application will be subjected to frequent testing and quality assurance. By following below steps:

1. Define your testing requirements.

2. Identify the testing types.
3. Create test cases.
4. Monitor performance.

By following these steps, we can ensure that our full stack serverless intelligent enabled application using cloud Artificial Intelligence (AI) services is thoroughly tested and meets the desired quality and functional requirements.

Deployment and Implementation

The application will be developed and deployed on a cloud-based platform, with user training and support resources made available.

APPENDIX 2: RECORD OF MEETINGS

DATE	TIME	ATTENDEES	SUBJECT DISCUSSED	ASSIGNMENTS
March 08,2023	6:30 -7:30pm	Everyone	Planning of The Project	Identify Critical Industry Research, Design documentation
March 15,2023	6:30 -7:30pm	Everyone	Product Requirements and Design	Front End login page and functionality implementation, GitHub repository creation.
March 19,2023	8:00-9am	Everyone	Development	Create wireframes and prototype
March 26,2023	8:00-9am	Everyone	Database functionality	Test and debug integration
April 2,2023	8:00-9am	Everyone	Check point 1	Review the tasks that we completed for phase 1
April 9,2023	8:00-9am	Everyone	Backend Development	Test and debug
April 16,2023	8:00-9am	Everyone	Testing	Identify and resolve bugs
April 17,2023	8:00-9pm	Everyone	Final documentation check	Project file submission