Walter White: Generative AI Powered Dashboard for enhanced operations and loan approvals

TEAM CYBER WARDENS

College: Vishwakarma Institute of Technology

- Chinmayee Prabhu ~ (AI/ML , Frontend)
- Pratham Gadkari ~ (UI/UX, Cloud, Full Stack)
- Suraj Chavan ~ (AI/ML , Cloud , Full Stack)
- Anuj Tadkase ~ (AI/ML , Cloud, Banking)

Track chosen: Operational Efficiency

It's a request , to go through git-hub readme first as its more detailed

Link: https://github.com/ANUJT65/bob_hackathon/blob/main/README.md

Problem Statement?

The **banking industry** faces challenges in operational efficiency, especially with **repetitive tasks** and **lengthy loan approvals** .
Our project, Walter White , tries to address these issues using **Generative AI** and **Machine Learning** through a **centralized dashboard**.

The main goals are to:

- **Streamline Loan Approvals:** Automate loan approval processes, cutting approval times by **85 percent**.
- **Retrieve and Analyze Customer Data:** Automate data fetching, storage, and processing for better decision-making.
- **Perform Repetitive Calculations:** Automate **financial calculations** to reduce manual effort and errors.
- **Categorize and Respond to Emails:** Use AI to classify **emails** and **generate responses**, enhancing customer service as well as operational efficiency.
- **Streamline inputs:** Making it easier for customers to **input data**, using **azure** form recognizer and lower burden on bankers for **data handling** and **cleaning** thereby **enhancing efficiency**

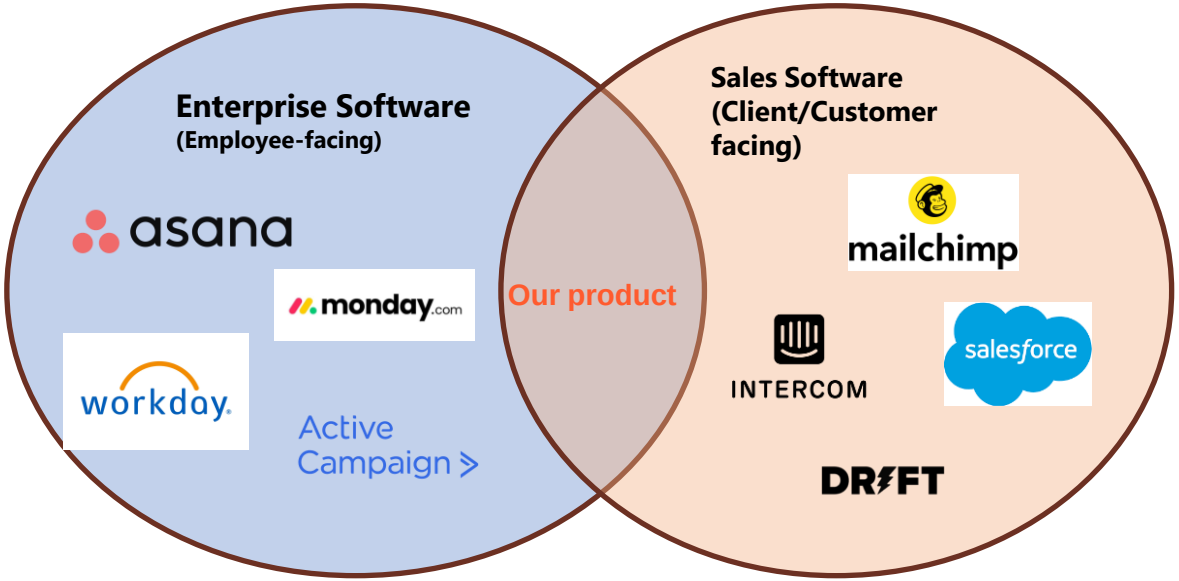
It’s a request , to go through git-hub readme first as its more detailed

Links: https://github.com/ANUJT65/bob_hackathon/blob/main/README.md

Pre-Requisite

What are the **alternatives/competitive products** for the problem you are solving?

In streamlining **workflow** and **automating tasks** there are multiple software present in the market like following:



1)Sales Software(Customer Facing):
Platforms that allow a company to communicate well with its **customers**
Eg. **Email automation** for **marketing**, salesforce that keeps track of clients etc

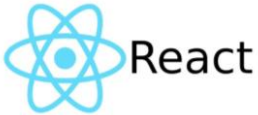
2)Enterprise Software:
Platforms that are used internally in banks to **assign tasks, track work done**, and **streamline workflows.**

So we don't have to compete in this pre-existing space.

3)Our product (Walter White) :
Will **combine** the functionality of these two**,** by including services for the **customer and communication**, as well as streamlining **workflows internally.**

Tools or resources

Web Dev Stack



React JS

Flask

Node JS

Python

Tailwind CSS

Azure Gen Ai and Machine Learning

Azure Generative AI

Azure ML

Azure Command Line interface

Azure Function Apps

Azure Cognitive Services

Azure Data Factory

PANDAS

Hosting , Deployment and Database services

Blob Storage

Azure SQL

Azure SQL database

Docker

Any Supporting Functional Documents

Link to architecture: https://github.com/ANUJT65/bob_hackathon/assets/123918593/1fbaae4d-004a-4190-bc64-5a3606f7c41b

1)Data Collection and Preprocessing

Input: **Balance sheet (audited),input pdfs/csv/forms** data from businesses will be stored in **Excel format**.
User will be guided through this process for inputs

- **Azure Blob Storage:** Store the uploaded Excel files.
- **Azure Function:** Triggered when a new file is uploaded to Blob Storage.

1.2)Conversion: Convert Excel data to SQL database tables.

- **Azure Function:**
- **Trigger: Blob Storage** trigger.
- **Action:** Read the **Excel file** and convert it to **SQL database** tables.
- **Link**: **https://medium.com/@ynskrn54/building-an-azure-function-to-process-excel-files-from-blob-storage-and-store-data-in-azure-sql-312947e21674**

2)Business loan thresholds:

For approval of business loans we are checking 3 thresholds as follows:

2.1) Financial Ratio Calculation

- **Azure SQL Database:** Calculate key **financial ratios** (e.g., **current ratio, debt-to-equity ratio**) using SQL queries and store in SQL itself **(Ai is not reliable to do calculations).**

Link of type of ratios being calculated: https://corporatefinanceinstitute.com/resources/commercial-lending/credit-analysis-ratio

2.2) External Data Integration(For checking business reputation)

- **Azure Logic Apps:** Automate the process of **fetching news** articles using a **News API.**
- **News API: Fetch news** articles related to the business to identify **potential risks** or **legal issues**.
- **Azure Gen AI and Cognitive Search:** Use **Azure AI** to search for pending cases about the business from the web**.**

Link:https://medium.com/@ramitsharma1994.rs/sentiment-analysis-of-news-headlines-with-microsoft-azure-cognitive-services-be3dedf3ccec

Any Supporting Functional Documents

2.3)Auditing Agency verification: Verify that the audited sheet and organization is reliable

- **Verification Process**: Ensure all **financial** and **external data** meet the **required standards.**
- **Why??: https://www.5paisa.com/blog/satyam-scam**

3)Loan Approval Process (1-step loan approval):

Verify that all thresholds **(financial ratios, external data, audit verification**) are met.

- **Azure Functions**: Implement the logic for **threshold checks** and validation.
- **Final approval** will be done after all the **income tax** returns/ **balance sheet pdfs** are compared and validated
- Time for approval is **reduced** by **almost 85 percent**(from 1 week to at-least 1 day for businesses and from days to couple of hours for customers).

4)Customer Personal Loan approvals (Non businesses):

- **Credit score** will be calculated for **non associated customers** using **improved ML model** and loan will be approved on basis of their **Cibil scores inputs and forms.**
- **Reference: https://github.com/ANUJT65/bob_hackathon/blob/main/backend/credit_score_calculations.py**

5). Email Classification of customer queries and Response from banking side

- With help of **azure cognitive services** and **azure ml ,**emails and applications are classified and responses are generated through **azure gen ai** .
- **Reference: https://github.com/ANUJT65/bob_hackathon/tree/main/backend**

6)Lang-Chain for Database Retrieval and analysis:

- **Azure Functions:** Use **Lang-Chain** and **Azure AI** for **efficient database** retrieval and **analytics** and query generation based on predefined prompts.
- **Reference: https://alejandro-ao.com/chat-with-mysql-using-python-and-langchain/**

FOR MUCH DETAILED INFORMATION DO CHECKOUT https://github.com/ANUJT65/bob_hackathon/blob/main/README.md

Key Differentiators

How is your solution better than alternatives

Software	Customer Connect	Software Based Automation	Generative AI for textual queries	Data Classification, Analytics.	Awesome
ERP/RPA Tools (Enterprise resource management) (Robotic process automation)	✗	✓	✗	✓	✗
CRM Automation Tools Customer Resource management	✓	✓	✗	✗	✗
Walter White (Our Product)	✓	✓	✓	✓	✓

Walter White is **superior** by integrating customer connection, automation, generative AI for queries, data analytics, and overall excellence, unlike **ERP/RPA** and **CRM** tools.

Business Potential and Relevance

What are the business applications of the problem you are solving?

1)Platform as a Service Application (PaaS):

- This **software** can be used to implement a common application system across banks.
- Furthermore, **similar to UPI,** it can be used by all **banks** for **streamlining** internal operations as well as customer resource management**.**

2)Reduces overhead of employee training to work with new software:

- With the vast **range of services** that a bank uses, **constant employee training** has become the norm.
- However, our product **reduces** the need as well as **frequency of training** by introducing a more easy **centralized dashboard system** and **humane Generative AI experience**.

3)Micro-automation at work:

- Automating the **small tasks** in a software suite is in itself a huge problem that needs to be solved. At the same time, we ensure that none of the banks **existing infrastructure** is affected.

4)Corporate Banking Advantages:

Corporates and **small businesses** can easily integrate this system in their own Enterprise Platforms to facilitate an easier banking experience.

- The major work of **balance sheet summarization** and **calculations , loan approvals**, overall company **sentiment analysis(from news), email classification, customer analytics** and responses can be done easily.
- The **time given** by dedicated **Customer Relationship Managers/Employees** can be greatly **reduced**, especially in the case of big companies.

Adoption Plan

how do you plan to build adoption?

External Platform named **"Walter White"** which customers and employees can use to improve their **productivity**.

- **Customers** need not sign up- Login is done using A/C No and OTP.
- Similarly, **Employees** can login using internal email-id and OTP.

This website will lie on top of existing features and will be used for multiple small repetitive tasks as follows.

- **Loan Approvals:** Pre-built **credit score**, financial history summarizer using **Azure Gen AI**
- **Data entry and retrieval and analytics :** Done through **Chatbot and dashboard interaction**
- **Mails/Queries/Custom advertisements: E-mail classification**(complaints , bank downtimes, enquiry mails) are sent to respective departments, **responses** and even **future advertisements** will be sent through **centralised dashboard**.

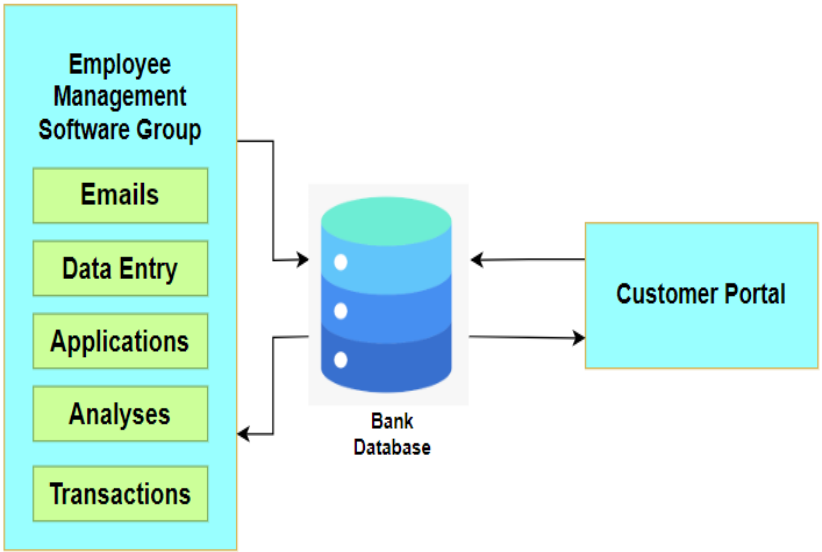
  Link: https://medium.com/@mehmetcan.oralalp/python-gmail-auto-responder-using-chatgpt-7f3a0fe4651c

Hence this would be very easily adoptable because of user friendly interface and ease of use and also as website will lie on top of existing infrastructure causing less disruptions.

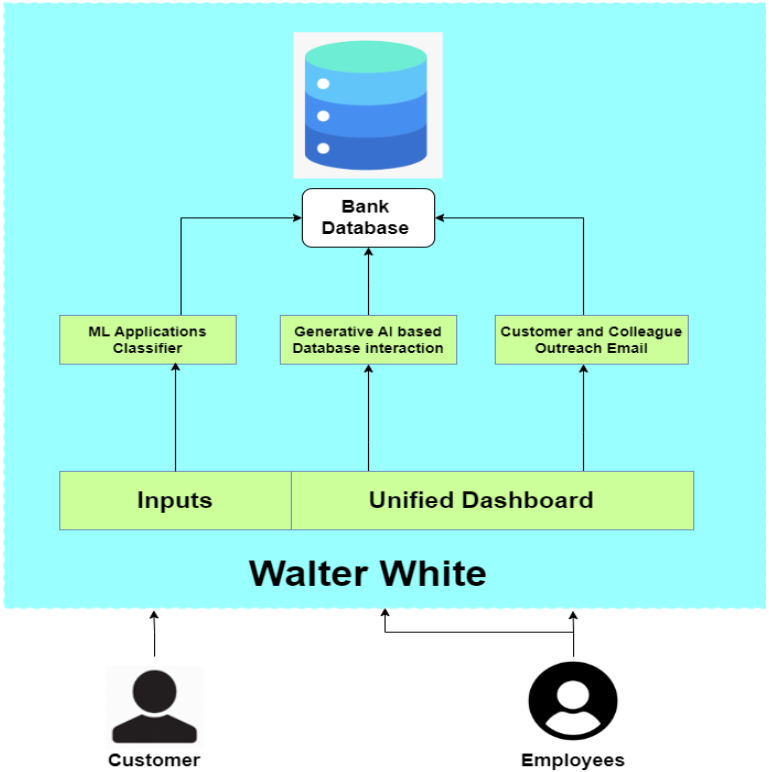
Adoption Plan

how do you plan to build adoption?

Before



After



GitHub Repository Link & supporting diagrams, screenshots, if any

For detailed explanation of methodology please checkout readme from github:

Link for readme: https://github.com/ANUJT65/bob_hackathon/blob/main/README.md

1)Architecture for methodology:

Link to architecture: https://github.com/ANUJT65/bob_hackathon/assets/123918593/1fbaae4d-004a-4190-bc64-5a3606f7c41b

2)Implementation Frontend:

Instructions: Please be free to scroll through readme or access it from table of content to see implementation with description of frontend :

Proper images of implementation have been provided.

Links: https://github.com/ANUJT65/bob_hackathon/blob/main/README.md

3)Implementation Backend/ML models:

Some Considerations:

- We have used documentations for showing azure backend implementation in readme

- We have also shown some documentation for showing poc of machine learning models and also implemented some of them in git-hub.

Links for models: https://github.com/ANUJT65/bob_hackathon/tree/main/backend

Links for Bankend: https://github.com/Suraj-Chavan1/Bob_final

Uniqueness of Approach and Solution

1)Increased engagement of customers and employees too:

- **Customers** will be guided by our **software** to submit their **financial statements/balance sheet** as **excel sheets** which the **ML algorithm will analyze** and **share the analysis** with the designated employee.
- **Wait time** for **applying for loan** is reduced and the **repetitive task** for employees to do the **analytics and calculations** is also reduced**.**

2)Azure Generative AI based data base retrieval:

- **Repetitive data** entry and **retrieval tasks** need not be done by employees.
- **Walter White** can generate insights, run **Azure SQL database** scripts and do the **boring work** for you!

3)Unified Dashboard System:

- Rather than using **multiple software** and losing productivity, all the tools you need are on a **single dashboard**, powered by **Azure Gen AI and analytics**!

4)Easy calculation of the business credit metrics, credit score with azure machine learning:

- No requirement of **financial calculators** and **meticulous use of excel** on **balance sheets.**
- Our **ML based algorithms would** do the **boring work** for you.

5)Automated email classification and responses and even ai generated advertisements:

- **Emails/queries/complaints** from customers are **categorized** and sent to respected **departments** so that proper action is taken,
- **Responses** to **emails** can be generated using **Azure generative AI** for responding to **customer queries**.
- **Emails** can be sent through **dashboard/personal email** and responses will be received on dashboard to the bankers.
- **Custom advertisements** could be made for customers using **generative ai**

6)One click loan approval by banks(after proper validation of documents):

- Having all the **information** in the database, the Bank can approve **loans quicker** because it does not have to deal with **messy paperwork.**

User Experience

How will your idea enhance the user experience?

Task/User	Employee	Customer
Applications (for loans, accounts ...)	• Spreadsheet summarization and automation	• No need to fill long forms, just attach **form** in csv/pdf format .
Approvals	• **ML** based predictions for easy categorization and approval/rejection	• **Quicker reply** with approval or rejection through mail and dashboard.
Communication	• **Azure Generative AI** based **email responses** make it easy and quick to respond. • On-platform **ML model** categorizes **email(from customers)** based on keywords for faster responses from **respective departments.**	• **Communicating** with the bank on the platform through **dashboard ,**allows for queries to be effectively **categorized** and dealt with faster. • Hence this boosts the trust between banks and customers
Generative AI Advantage	• **Repetitive tasks** like **metric calculation** are automated • **Database summarization** and decision making is easier. • Workflow wrt customers are managed efficiently.	• **Effort** to fill forms is drastically reduced • **Miscalculation** chances are diminished

Scalability

How effectively can your solution be scaled to accommodate growth without compromising performance?

Infrastructure Readiness:

Azure's **cloud services** enables both **horizontal and vertical scaling**, ensuring **Walter White** can handle **increased user** numbers and **application volumes** without compromising performance, specifically for features like **loan approval processing, financial data analysis,** and **customer communication**.

- **Horizontal Scaling**: Add more **resource instances** using **Azure Virtual Machine Scale Sets based on demand.**
- **Vertical Scaling**: Upgrade existing resources with **flexible VM sizes** and **Azure SQL Database** scaling.

Key Azure Services which will be used for ensured Scalability

1) **Azure Virtual Machine Scale Sets**: Automatically scale **VM instances** based on demand for **financial data analysis and loan processing**.
2) **Azure SQL Database**: Automatically scale performance for **storing** and **processing customer** and **financial data**.
3) **Azure Blob Storage**: Handle massive **data volumes** for handling **financial documents** and **large data csv/pdf files**.

[For more detailed information do checkout github readme]

Ease of Deployment and Maintenance with Docker and Azure functions

How simple is your solution to implement and maintain on an ongoing basis?

How Docker Helps Our Project Run Smoothly??
Isolation and Integration Benefits:

1. Containerization and Isolation:
•**Encapsulation:** Docker packages our project with all its dependencies, ensuring it runs consistently everywhere.
•**Isolation:** Each **container** operates **independently**, preventing conflicts with the **bank's existing systems**.
2. No Interference with Existing Systems:
•**Independent Execution:** Containers are lightweight and **don't interfere** with other applications on the s**ame system**.
3. Easy Integration:
•**API and Microservices:** Our project can interact with the bank's systems through **APIs**, making integration smooth and secure and also integrates with **azure functions** seamlessly.
•**Networking:** Docker also allows containers to communicate **securely** with each other and with **external systems**.
4. Easy Maintenance:
•**Consistent Environments:** Docker ensures our project runs the same way in **development**, **testing,** and **production,** reducing environment-specific issues.
•**Simplified Updates:** We can **update** or **roll back** our project without affecting the bank's critical systems.
•**Isolated Troubleshooting:** Problems can be fixed within a container without impacting others, making maintenance simpler and faster.
•**Link: https://medium.com/@lucascuello/azure-functions-with-docker-82d3c4a2d831**

Security Considerations

Data Security:

Advanced Encryption:
•All **sensitive data** is **encrypted both** in transit and at rest using **industry-standard encryption** protocols.
•This ensures that data remains **secure** from **unauthorized** access at all times.

Access Control:
•Implementing **access control mechanisms**, including **Azure multi-factor authentication (MFA) for users** and **role-based access control (RBAC)**, to **restrict data write** access to **authorized personnel** only.

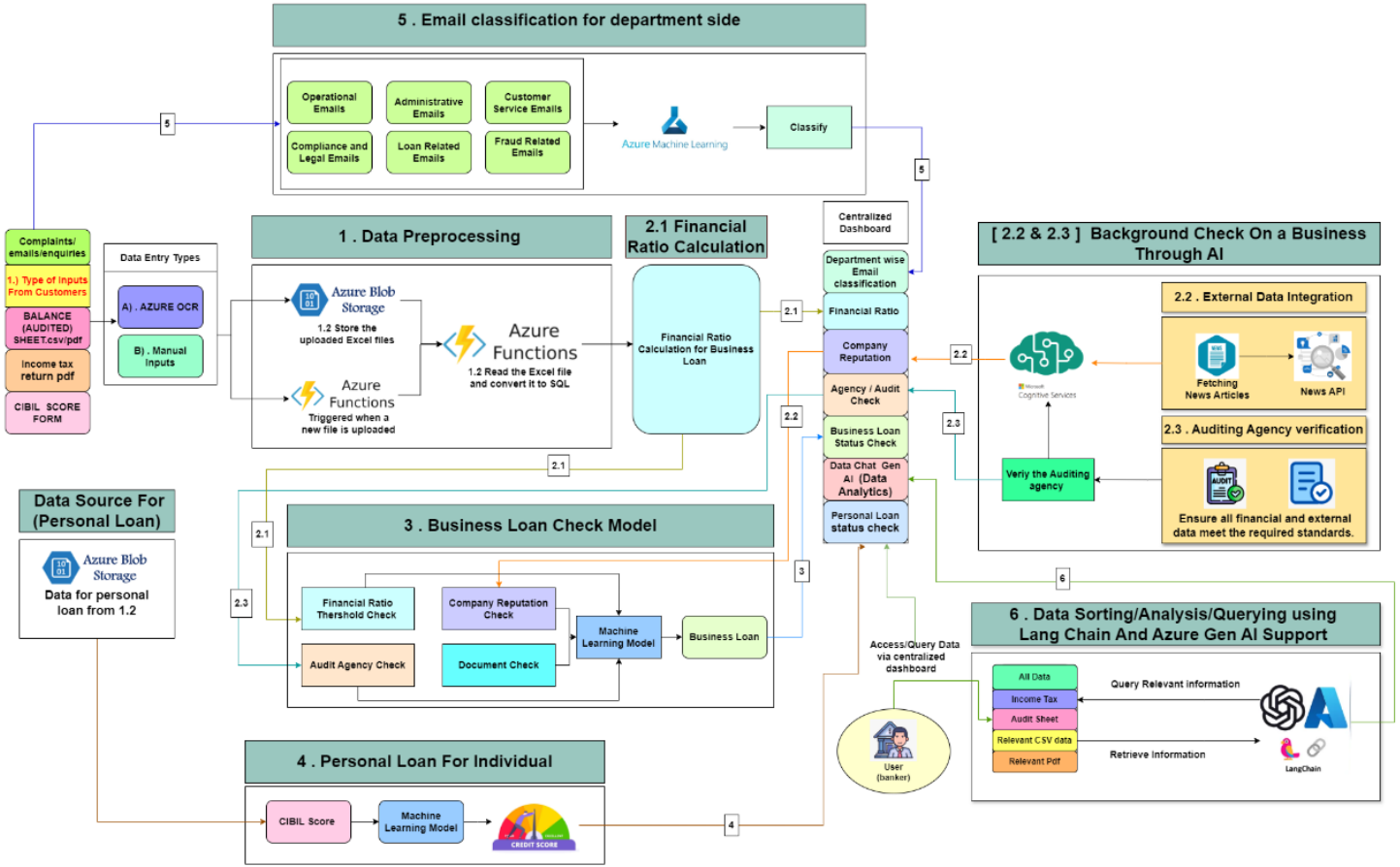
•**Link**: https://medium.com/@kenny_Cloud_Architect/lets-talk-about-azure-ad-rbac-2070182e3424
•**Link:** https://learn.microsoft.com/en-us/entra/identity/authentication/concept-mfa-howitworks

[For more details check github on how access would be controlled in 3 way basis]
[We have covered in more detail about security aspects in github readme, please do check it out]
(https://github.com/ANUJT65/bob_hackathon/blob/main/README.md)

Regular Security Updates:
•**Utilize automated systems** for **timely software updates** and **security patches**.
•This helps in keeping the platform secure against emerging threats without **manual intervention**.

Architecture diagram & Images

Link: https://github.com/ANUJT65/bob_hackathon/assets/123918593/1fbaae4d-004a-4190-bc64-5a3606f7c41b



Solution Screenshots & video & Github Link

Points to be considered:

- **Back end** has been successfully been **deployed** on **azure app services** and all calls are made from **frontend**
- **Front end** has been deployed on vercel(temporarily), which will be switched to **azure app services** web app in **next 2 days.**
- Present focus was on **Azure Gen AI implementation**, Azure **AI/ML** based loan approvals and email classification , beautiful and **user-friendly UI/UX** and **frontend**, and **easy adoptability** and **deployment.**
- Our next focus would be on **security aspects** and **ease of deployment and also optimization of the gen ai models.**

Solution :

Video Link:

Form link for doing OCR:

BusinessLoan Form:
https://github.com/ANUJT65/bob_hackathon/blob/main/backend/business%20form%20(1).jpg

Customer Loan Form :
https://raw.githubusercontent.com/ANUJT65/bob_hackathon/main/backend/Image_Example/personalloan_orc.jpg

Frontend Images pdf+github (ALL images are in readme):
https://github.com/ANUJT65/bob_hackathon/blob/main/README.md

Frontend Link Deployed link: **https://bob-hackathon-sigma.vercel.app/**

Backend Link(FLASK): **https://bobcyberwardenfinal.azurewebsites.net/**

GitHub Backend link : **https://github.com/Suraj-Chavan1/Bob_final**

Thank You!

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Thank you very much for giving us an **opportunity** to show our idea.
We have tried to show as much **implementation** and **documentation** as we can, really hope you like our idea.
We would really like to work with **Bank Of Baroda** and **Microsoft** on this idea and really appreciate any feedback we could get from the judges!

Feedback form:
https://docs.google.com/forms/d/e/1FAIpQLSeEYeO0i4gwhKAgsvP2TqNMkgJf6N86oUwLe16KCgaWIU-PBg/viewform

From ~~ Team Cyber Wardens