A

Mini Project Report

on

VyomNext – The Next-Gen Banking

Submitted in partial fulfillment of the requirements for the

degree

Third Year Engineering – Computer Science Engineering (Data Science)

by

Nishant Chauhan	**23107010**
Nikhil Anumalla	**23107055**
Mrinmayi Badirke	**23107018**
Sneha Edugunoori	**23107011**

Under the guidance of

Ms. Poonam Pangarkar

DEPARTMENT OF COMPUTER SCIENCE ENGINEERING (DATA SCIENCE)

A.P. SHAH INSTITUTE OF TECHNOLOGY

G.B. Road, Kasarvadavali, Thane (W)-400615

UNIVERSITY OF MUMBAI

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CERTIFICATE

This to certify that the Mini Project report on **VyomNext – The Next-Gen Banking** has been submitted by Nishant Chauhan (23107010), Nikhil Anumalla (23107055), Mrinmayi Badirke (23107018) and Sneha Edugunoori (23107011) who are bonafide students of A. P. Shah Institute of Technology, Thane as a partial fulfillment of the requirement for the degree in **Computer Science Engineering (Data Science)**, during the academic year **2025-2026** in the satisfactory manner as per the curriculum laid down by University of Mumbai.

Ms. Poonam Pangarkar
   Guide

Dr. Pravin Adivarekar   **Dr. Uttam D. Kolekar**
HOD, CSE(Data Science)   **Principal**

External Examiner: **Internal Examiner:**
1.   **1.**

Place: A. P. Shah Institute of Technology, Thane
Date:

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ABSTRACT

VyomNext – *The Next-Gen Banking Platform* – is an integrated digital banking solution designed to unify fragmented financial services into a single, AI-driven ecosystem. VyomNext is an AI-driven digital banking platform that unifies fragmented financial services like payments, loans, and document management into one seamless system. Built with Flask and PostgreSQL, it features multi-bank fund transfers, an EMI calculator, DigiLocker integration, and an AI chatbot for voice and text support. Using Gemini API for loan recommendations and Whisper for NLP-based query handling, VyomNext enhances efficiency, reduces manual errors, and improves user experience. It represents the next generation of unified, scalable, and intelligent digital banking.

Chapter 1

Introduction

The rapid digitization of financial services has transformed how individuals and businesses manage money, yet many users still navigate a fragmented landscape of multiple bank apps and disjointed services. This fragmentation affects convenience, financial visibility and responsiveness — especially when a user needs to compare accounts across banks, calculate loan affordability, or raise service requests. Modern customers expect consolidated, intelligent, and secure solutions that reduce friction and accelerate decision-making. VyomNext — The Next-Gen Banking — addresses these needs by offering a unified digital banking platform that consolidates account management, payments, loan advisory, customer support automation, and secure document storage.

VyomNext is designed as an integrated web-based solution that aggregates multiple bank accounts through Aadhaar-based linking (with user consent and adherence to regulatory guidelines). It provides a consolidated dashboard showing total balances, individual account details, and transaction histories — enabling users to understand their financial standing at a glance. Beyond aggregation, VyomNext leverages artificial intelligence to enhance decision-making and service quality. A loan recommendation capability analyzes user financial inputs to suggest suitable loan types, tentative eligibility, and repayment parameters; this functionality is powered by a state-of-the-art AI engine. Customer support is modernized through a multimodal chatbot that accepts typed queries, uploaded audio, or short recorded video. Video inputs are converted to audio, transcribed using Google Speech-to-Text, and classified using NLP models to automatically generate and route service tickets to the appropriate departments.

Complementing these core functions are practical financial tools and utilities: an EMI calculator for quick repayment planning, a DigiLocker-style document vault for safe storage of important papers and generated passes, and a payments module that allows secure fund transfers across the user's linked accounts. An administrative dashboard enables bank or support teams to manage tickets department-wise, assign tasks, and track resolution status, improving operational efficiency.

VyomNext represents a pragmatic application of AI, speech technologies, and secure web practices to resolve common pain points in personal banking. By consolidating disparate services into a cohesive system, it reduces the cognitive load for users, improves response times for support, and offers AI-driven insights to help customers make better financial choices. The following subsections detail the purpose, the specific problem statement, the project objectives, and the scope of the system.

1.1 Purpose:

The main purpose of VyomNext is to simplify everyday banking and enhance the decision-making and support experience for users by providing a single, secure platform that consolidates essential financial services. It aims to remove the inconvenience of switching between multiple mobile or web banking applications by aggregating accounts from different banks into one intuitive dashboard. This consolidation enhances financial visibility, enabling users to make better-informed choices about spending, saving and borrowing.

A second purpose is to democratize loan advisory by integrating an AI-driven recommendation mechanism that provides personalized loan suggestions. Rather than relying solely on manual consultations or visiting multiple banks, users receive data-informed loan options based on their credit profile and income, improving transparency and saving time.

Third, VyomNext seeks to modernize customer support through automation. By accepting multimodal inputs (text, audio, video) and converting them into structured tickets using speech-to-text and NLP classification, the system reduces human workload and shortens resolution times. This is intended to lead to measurable improvements in customer satisfaction.

A fourth purpose focuses on secure document management: providing a DigiLocker-like repository where users can store important documents and generate secure passes, reducing physical paperwork and streamlining verification processes. Finally, VyomNext aims to provide secure cross-bank payments, enabling users to move funds efficiently while complying with security and privacy norms.

The platform is built with the interests of multiple stakeholders in mind: individual customers seeking convenience and clarity; bank administrators and support teams seeking efficient workflows and reduced ticket backlogs; and developers and product teams aiming to deploy scalable, maintainable solutions. Together, these purposes guide the design decisions and implementation priorities of VyomNext.

1.2. Problem Statement:

Contemporary personal banking is fragmented across multiple bank-specific applications and portals, which forces users to repeatedly log in to different platforms to view balances, check transactions, apply for financial products, or request support. This fragmentation creates several persistent problems: poor visibility into overall finances, repeated manual data checks, time-consuming loan research, and inefficient support processes that rely heavily on manual triage. Customers often face slow turnarounds when raising service issues, and banks struggle to route and prioritize tickets effectively due to the variety of input formats and inconsistent ticket details.

Loan decision-making is another challenge: customers must assess eligibility, compare offers, and estimate EMIs across lenders, which is time-consuming and error-prone. Without integrated advisory tools, users may accept suboptimal offers or miss better-suited loan products. Additionally, the secure storage and retrieval of important documents (identity, loan documents, bank proofs) remain cumbersome; physical documents or distributed digital copies increase the risk of loss, duplication, and credential fraud.

On the operations side, support teams face inefficiencies in classifying and routing tickets. Incoming queries in mixed formats (text, audio, video) lengthen resolution times when manual transcription and categorization are required. Banks need an automated, reliable method to convert unstructured customer input into structured tickets and then route them to the correct departments.

Therefore, the central problem VyomNext addresses can be summarized as: design and implement a unified, secure, and intelligent digital banking platform that aggregates multi-bank accounts, automates loan advisory, supports seamless cross-bank payments, provides

secure document storage, and enables intelligent, multimodal customer support that reduces manual effort and improves resolution times.

1.3. Objectives:

The key objectives of VyomNext are practical and outcome-focused, emphasizing user convenience, administrative efficiency, and secure operations:

- **Unified Account Aggregation**

Provide a single dashboard where users can link multiple bank accounts (Aadhaar-linked consent flow) and view consolidated balances, individual account details, and transaction histories to improve financial visibility.

- **AI-Driven Loan Recommendation**

Offer personalized loan suggestions powered by a production-ready AI engine (Gemini API) that analyzes inputs such as CIBIL score, annual income, and asset value to recommend loan types, estimated eligibility, tentative interest ranges and suggested tenures. (Conventional ML approaches like XGBoost/Random Forest may be used in offline experiments or future extensions.)

- **Multimodal Customer Support & Ticketing**

Implement a chatbot that accepts typed queries, uploaded audio, or recorded video. Convert video to audio, transcribe using Google Speech-to-Text, and classify the extracted text with NLP model Whisper-small (OpenAI). Auto-generate structured tickets and route them to the appropriate department.

- **Admin Dashboard for Ticket Management**

Build a role-based administrative interface to view, filter, assign, and resolve tickets by department, track metrics (open tickets, average resolution time), and support team workflows.

- **Financial Utilities**

Integrate an EMI calculator for quick payment planning and a payments module that enables secure fund transfer between linked bank accounts.

- **Document Vault**

Provide DigiLocker-like functionality enabling users to create passes and store important documents with controlled access and encryption.

Each objective maps to measurable outcomes: reduced support turnaround time, increased loan recommendation relevance, improved user satisfaction scores, and secure document availability — all designed to make banking interactions faster and more reliable.

1.4. Scope:

VyomNext targets the consolidation and automation of everyday retail banking tasks for individual users while providing backend tools for bank administrators and support staff. The system scope includes the following capabilities:

- **Account Aggregation**

Linking multiple retail bank accounts via Aadhaar-based consent where allowed, providing consolidated balance views and transaction summaries. The system does not perform account opening or KYC itself but relies on linked bank credentials and permissioned APIs.

- **Loan Recommendation System**

Delivering personalized loan suggestions based on user-provided financial inputs. Recommendations are informational and advisory; final loan approval, formal interest rates, and sanctioned amounts remain the purview of the respective lending institutions.

- **Multimodal Ticketing & Chatbot**

Accepting text, audio, and video input for customer queries, auto-transcribing and classifying queries, and generating tickets routed to departmental queues. The scope covers standard retail banking issues (account queries, transaction disputes, loan inquiries, document requests) but excludes complex legal disputes requiring offline verification.

- **Payments Module**

Facilitating intra-user transfers between the user's linked accounts across banks using supported APIs and secure transfer mechanisms. The system provides transfer initiation and tracking; settlement and interbank clearing follow bank-specific and regulatory mechanisms.

- **DigiLocker Functionality**

Providing secure storage for user documents, generation of digital passes, and controlled retrieval. The system enforces encryption and role-based access but is not a certified government DigiLocker service — it functions as a personal vault integrated into the platform.

- **Administrative Dashboard**

Enabling bank/support staff to manage, assign, and resolve tickets, and view metrics. It supports role-based access controls, but full-scale enterprise integrations (e.g., core banking systems or CRM synchronization) are considered future extensions.

- **Security & Compliance**

The scope includes implementing authentication, authorization, encrypted storage, and GDPR/Indian data protection–aligned practices. It explicitly covers consent-based Aadhaar usage and secure API integrations.

Chapter 2

Literature Review

The rise of artificial intelligence (AI) in banking has transformed customer service, automated internal operations, and enabled highly personalized financial services. Recent research has provided valuable insights into how AI, NLP, and machine learning can improve ticket management, chatbots, and loan recommendation systems, which directly support the development of VyomNext.

Chunyu Yang (2024) [1] conducted research on loan approval and credit risk by comparing multiple machine learning models. The study applied six ML models on a home loan dataset and evaluated them using accuracy and confusion matrices. The results indicated that logistic regression offers the best balance between accuracy and interpretability, making it more suitable for practical banking applications compared to advanced but less transparent models like neural networks and random forests. This aligns with VyomNext's loan module, where interpretability and reliability are crucial for customer trust.

Alessandro Z., Matteo M., and Michele S. (2023) [2] explored ticket automation with applications to multi-level classification scenarios. Their work focused on the use of BERT-based embeddings and hierarchical label information to classify support tickets into topics and subtopics. By integrating contextual understanding, the study demonstrated up to a 28% improvement in F1-score and accuracy compared to baseline approaches. This directly supports VyomNext's service module, where user queries in text, audio, or video form are automatically converted, classified, and routed to the appropriate department through AI-driven ticketing.

Ionuț-Alexandru, Denis-Alexandru, and Răzvan Daniel ZOTA (2023) [3] examined the role of AI-powered chatbots in banking and highlighted their contribution to customer engagement, fraud detection, and operational efficiency. Their analysis emphasized the use of natural language processing, speech recognition, and machine learning to enable chatbots to perform transactions, provide personalized responses, and offer 24/7 customer service. The study concluded that AI chatbots significantly reduce workload on human

staff while enhancing customer satisfaction. This is reflected in VyomNext's unified banking chatbot, which integrates account management, transactions, and loan recommendations into a single conversational interface.

In summary, these studies collectively demonstrate how AI, NLP, and deep learning techniques can enhance banking systems through improved credit assessment, efficient ticket automation, and advanced chatbot solutions. VyomNext builds upon these foundations by unifying multi-bank account management, loan recommendations, ticket handling, and chatbot-based financial assistance into a seamless digital banking platform.

Chapter 3

Proposed System

The proposed system, VyomNext – The Next-Gen Banking, is a unified digital banking platform designed to streamline financial management, customer support, and decision-making by integrating multiple services into a single, intelligent web application. Unlike conventional banking apps, which focus solely on basic transactions or single-bank interactions, VyomNext consolidates multi-bank account access, AI-powered recommendations, ticket generation, document storage, and payments into a single ecosystem.

The core idea of VyomNext is to eliminate fragmentation in the banking experience. Users today rely on multiple apps for checking balances, applying for loans, planning EMIs, storing financial documents, and raising service tickets. This leads to a disjointed and time-consuming workflow. VyomNext resolves this by offering a one-stop solution where all financial and service-related activities can be managed through a unified dashboard.

The proposed system leverages AI-driven automation to improve customer interaction and enhance decision-making. Through its chatbot and ticketing system, VyomNext simplifies the process of reporting issues by allowing users to type, record video, or upload audio. The video/audio inputs are first converted to audio files (if needed) and then transcribed into text using Google Speech-to-Text API. This text is passed to an NLP engine Whisper-small that classifies the query and assigns it to the appropriate department, generating a service ticket automatically. This approach eliminates manual classification errors and speeds up issue resolution.

The platform also integrates an AI-powered Loan Recommendation Engine using Gemini's API and machine learning models like XGBoost Classifier and Random Forest Classifier. This engine evaluates the user's financial profile—including income, assets, and CIBIL score—to recommend the most suitable type of loan, eligible amount, and repayment plans. This not only helps users make informed decisions but also promotes responsible borrowing.

Additionally, VyomNext includes a multi-bank account aggregation system that uses Aadhaar-based linking to fetch and display account details from different banks. Users can view consolidated balances, monitor transactions, and even initiate inter-bank fund transfers from the same dashboard. This feature aligns with the Open Banking vision and provides a 360° view of the user's financial health.

A DigiLocker-inspired module is included to allow users to securely store critical documents like Aadhaar, PAN, property papers, and loan agreements. Users can create a password-protected pass within the platform, ensuring safe and encrypted access to their documents at any time. This reduces the dependency on physical paperwork during loan applications or account services.

The system also provides tools such as an EMI Calculator for loan planning. This data is analyzed to continuously improve service quality, making the system adaptive and user-centric.

3.1 Features and Functionality

VyomNext's functionality is designed to ensure seamless user experience, automation, and scalability. The major features and their functionality are described in detail below:

- **Unified Multi-Bank Dashboard**

Users can view consolidated balances and transaction history across multiple banks. The transactions are categorized as credits, debits and transfers for easy tracking. The dashboard updates in real-time by fetching data from bank APIs. It helps in eliminating the need to log into multiple apps, saving time and effort.

- **AI-Powered Loan Recommendation System**

This system uses Gemini API for advanced recommendations. It employs XGBoost and Random Forest Classifiers to analyze parameters such as monthly income, CIBIL score, asset value, and past repayment history and provides eligible loan amounts, tenure, and interest rate suggestions for the user. Helps users choose the right loan with higher approval chances, reducing rejection rates and financial stress.

- **Intelligent Service Ticket System**

Automates ticket creation through multimodal input (text, audio, video). The video is converted to audio and later the audio/video inputs are transcribed to text. Extracted text is processed by Whisper-small NLP model for department classification (Loans, Accounts, Payments, General Queries). It also generates and routes the ticket to the relevant department automatically. This ensures faster resolution, zero manual triaging and reduced wait times for customers.

- **AI Chatbot**

A conversational assistant for instant query handling. Supports text-based chat as well as voice/video inputs. Answers FAQs instantly and escalates unresolved queries by generating tickets. This reduces dependency on human agents, available 24/7, improves user engagement.

- **Payments & Fund Transfer**

Allows secure transfer of money across multiple linked bank accounts. Users can select source and destination accounts and transfer funds instantly. The transaction confirmations are displayed on the dashboard. It simplifies fund movement and reduces need for third-party payment apps.

- **EMI Calculator**

Provides a tool to compute EMI based on principal, interest rate and tenure. Users can adjust input values to compare repayment options. Instant results are displayed on the dashboard with charts and in tabular form. This helps in financial planning and avoiding over-borrowing.

- **DigiLocker Module**

Stores and manages user documents securely. Users upload documents (PDF, images) and secure them with a custom passkey. The documents can be accessed anytime and shared

when needed. Ensures safe and encrypted storage that reduces physical paperwork and risk of loss.

- **Admin Dashboard**

A dedicated view for administrators. It displays department-wise tickets, their status, and priorities. The admin has the options to assign, reassign or resolve tickets. This Improves efficiency of support teams, reduces backlog and turnaround times.

- **Scalability and Future Scope**

Designed with modular architecture (frontend, backend, AI services, database) making it easy to add future features such as investment planning, insurance integration, AI-based fraud detection, and more. This ensures VyomNext is future-ready and scalable for real-world deployment.

Chapter 4

Requirement Analysis

For the requirement analysis of the VyomNext project, we need to identify and document the functional and non-functional requirements that the system must meet to deliver a seamless digital banking experience. Here's a breakdown of the requirement analysis for VyomNext:

A. Functional Requirements: Define the essential operations and features that the VyomNext system must perform to fulfill its intended purpose.

- **Multi-Bank Account Management**

  The system should allow users to link and manage multiple bank accounts from different banks in a single platform. Users should be able to view balances, transactions, and account summaries efficiently.

- **AI-Powered Loan Recommendations**

  The system should provide personalized loan suggestions based on users' financial profiles, credit scores, and transaction history, helping users make informed decisions.

- **Ticket Automation**

  Integrate a ticketing system that automatically creates, tracks, and resolves customer queries or issues. Users should receive timely updates on ticket status.

- **Financial Chatbot**

  - Implement an AI chatbot to assist users with banking queries, transaction details, and guidance on using platform features. The chatbot should provide real-time, accurate responses.

- **Transaction History and Reports**

  Users should be able to view detailed transaction history and generate downloadable reports or summaries for personal or official use.

- **User Notifications**

  The system should notify users about account activities, loan updates, and important reminders through alerts or emails.

- **Secure Login and Account Management**

  The system should allow users to create accounts, log in securely, and manage profile details, including contact information and linked accounts.

B. Non-Functional Requirements: Specify the quality attributes such as performance, security, scalability, and usability that ensure the VyomNext system operates efficiently and reliably.

- **Performance**

  The platform should process transactions, display account details, and provide recommendations quickly to ensure a smooth user experience.

- **Scalability**

  The system should be scalable to handle an increasing number of users, transactions, and linked accounts without performance degradation.

- **Security**

  All user data, including personal and financial information, should be securely stored. The platform must implement measures to prevent unauthorized access, fraud, and data breaches.

- **Usability**

  The interface should be user-friendly and easy to navigate, ensuring that users of all age groups can efficiently use banking features. Accessibility features should be included for users with disabilities.

Chapter 5

Project Design

The project design describes the overall system architecture, data flow, and component interactions that outline how the VyomNext platform is structured and functions to achieve its objectives.

5.1 Use Case Diagram:

The Use Case diagram of VyomNext (Fig 5.1) illustrates the interactions between primary actors (User and Admin) and the system. It captures the functionalities such as multi-bank account management, payments, loan recommendation, service ticketing, and DigiLocker.
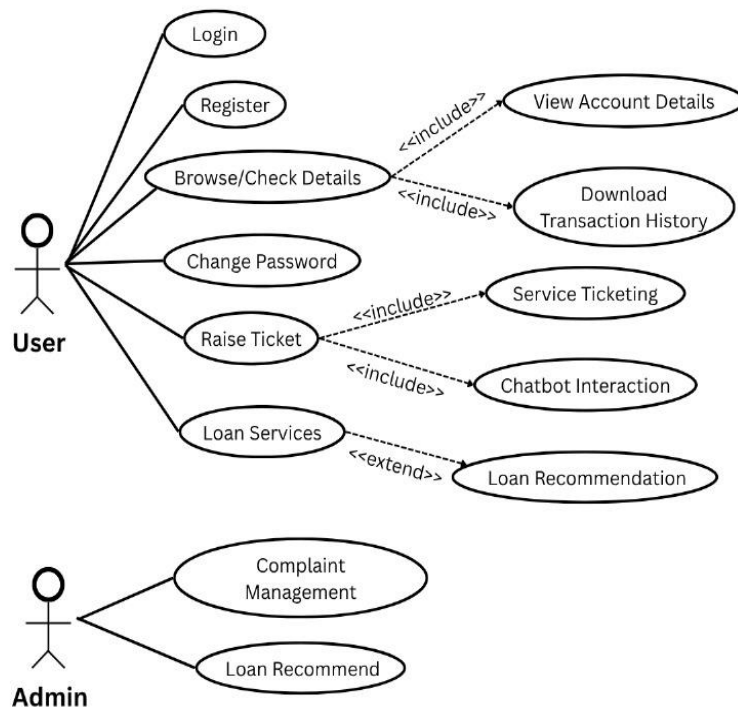

Fig 5.1: Use Case Diagram

Actors:

- **User:** Represents customers who use VyomNext for account management, payments, loan recommendations, and support.

- **Admin:** Represents support staff or banking administrators responsible for complaint management and ticket handling.

Use Cases:

- **Login / Register:** Users can securely register and log in to the system. Enables secure access to the platform.

- **Browse / Check Details:** Allows users to view balances, account summaries, and transaction histories.

  Includes - View Account Details, Download Transaction History.

- **Loan Services:** Provides personalized loan recommendations using AI models. Extends - Loan Recommendation.

- **Payments:** Allows inter-bank fund transfers and EMI calculations.

- **Raise Ticket:** Enables users to submit service complaints. Includes - Service Ticketing, Chatbot Interaction.

- **Change Password:** Allows users to update credentials securely.

- **Complaint Management (Admin):** Admins view, classify, and resolve tickets.

- **Loan Recommendation (Admin):** Admin can verify and review AI-generated loan suggestions.

- **Chatbot Interaction:** Integrates with the complaint system to handle basic queries and automatically generate tickets for unresolved issues.

- **DigiLocker Access:** Enables users to store, retrieve, and manage important financial documents securely.

Relationships:

- **Association:** Connects actors with the use cases they are directly involved in.

- **Include Relationships:**

  ◦ View Account Details includes Download Transaction History.

  ◦ Raise Complaint includes Chatbot Interaction for ticket creation.

- **Extend Relationships:**

  ◦ Loan Recommendation may extend to Admin Loan Verification for additional validation.

  The diagram provides a comprehensive overview of VyomNext's functionality, ensuring that both user and administrative perspectives are clearly represented.

5.2 Data Flow Diagram (DFD)

The Data Flow Diagram (Fig 5.2) represents the logical flow of information in VyomNext, showing how data moves between users, system processes, and databases.
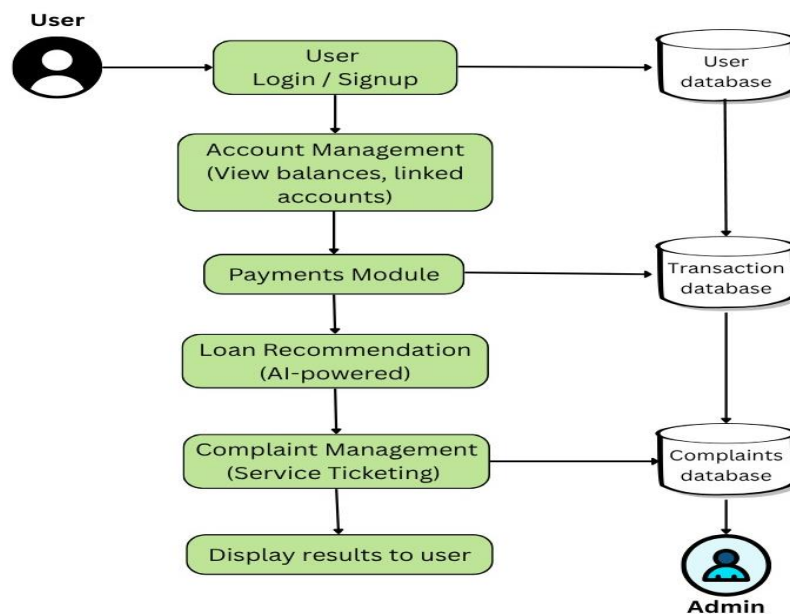

Fig 5.2: Data Flow Diagram

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A. User Interaction:

- Users initiate requests such as logging in, managing accounts, checking balances, transferring funds, or applying for loans. They may also raise complaints through multiple modes including text, audio, or video. These requests are processed by the application layer.

B. Processes:

- **Account Management:** Retrieves balances, linked accounts, and transaction details.

- **Payments Module:** Handles inter-bank transfers, validates account balances, and records all transactions.

- **Loan Recommendation:** Uses AI and machine learning models (Gemini API, ML Models) to analyze user financial data and provide tailored loan options.

- **Complaint Management:** Classifies queries using NLP models such as Whisper and routes them automatically to relevant departments.

C. Databases:

- **User Database:** Stores user credentials, authentication details, and linked account metadata.

- **Transaction Database:** Maintains records of all fund transfers and transaction histories.

- **Complaints Database:** Stores service tickets, query classifications, and resolution updates.

D. Admin Interaction:

- Allows administrators to access complaints, assign tickets, and verify recommendations. This ensures operational efficiency and improved turnaround time for resolving user queries.

5.3 System Architecture

The System Architecture of VyomNext (Fig 5.3) illustrates a robust, multi-layered framework designed to ensure scalability, security, interoperability, and high performance across all modules of the platform. It adopts a three-tier architecture comprising the User Layer, Application Layer, and Data Layer, each serving a distinct yet interconnected role in the system's functionality.

The User Layer provides an intuitive web-based interface developed with HTML, CSS, and JavaScript, enabling seamless access to features such as banking services, EMI calculations, loan recommendations, and DigiLocker integration. The Application Layer, powered by Flask, serves as the core logic controller that manages API calls, processes user requests, and executes AI-driven tasks like loan recommendation using the Gemini API and NLP-based ticket classification through models such as BERT and Whisper. Finally, the Data Layer ensures secure and efficient data handling through PostgreSQL and MySQL databases, maintaining user information, transaction history, and document records with robust encryption and integrity checks.
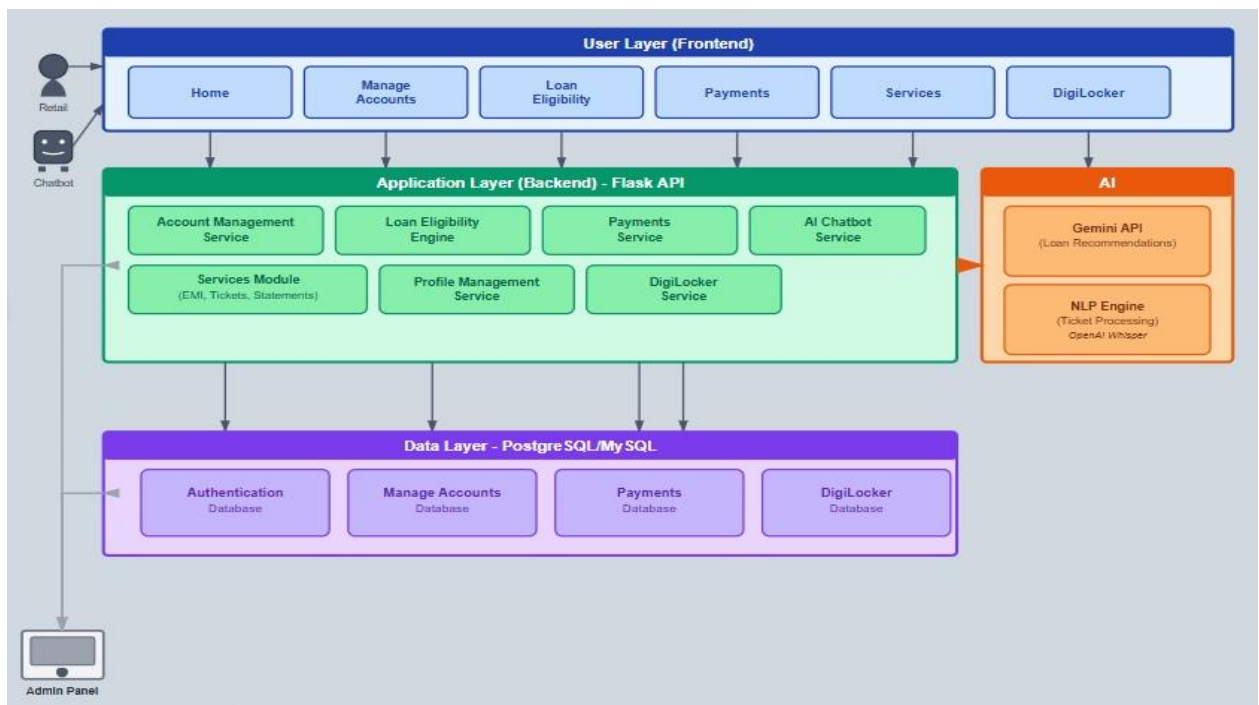

Fig 5.3: System Architecture

A. User Interaction Layer:

At the top layer, users interact with VyomNext through a responsive web-based interface. Built with HTML, CSS, and JavaScript, the interface provides dashboards for account management, payments, loan services, complaint submission, and DigiLocker. A conversational chatbot embedded within this layer accepts multimodal inputs (text, audio, video), enabling intuitive and seamless communication with the system.

B. Data Collection and Input Processing:

VyomNext collects input data from two main sources:

- **User Inputs:** Account credentials, financial details, complaints, and queries provided by users.

- **Bank and External APIs:** Real-time data such as balances, transactions, and Aadhaar-linked account information retrieved securely from partner bank APIs. All inputs are validated, sanitized, and logged for further processing.

C. Data Preprocessing:

Before integration into the system, data undergoes preprocessing steps to ensure consistency and security. User credentials are encrypted, timestamps are standardized, and redundant records are removed. For complaints submitted via audio or video, inputs are converted to text using speech-to-text engines and subsequently cleaned for further analysis.

D. Feature Engineering and AI Models:

VyomNext leverages multiple AI-driven modules to provide intelligent services:

- **Loan Recommendation Sytem:** Uses the Gemini API in combination with ML classifiers (XGBoost/Random Forest) to evaluate income, CIBIL score, and assets. It generates tailored loan recommendations including eligible amounts, tenure, and interest ranges.

- **Service Ticketing System:** Employs NLP models such as Whisper for classification of user complaints into domains like Loans, Accounts, or Payments. This ensures tickets are routed to the correct department automatically.

- **Chatbot Assistant:** Integrates with the ticketing system to resolve basic queries instantly, reducing workload on human agents.

E. Normalization and Data Management:

Data retrieved from multiple sources, such as linked bank accounts, is normalized into a unified schema. This enables seamless aggregation of account balances and transactions across banks. PostgreSQL databases are employed to manage structured storage for users, transactions, tickets, and DigiLocker documents, ensuring both performance and security.

F. Core Functional Modules:

- **Account Management:** Displays consolidated balances and transaction histories.

- **Payments Service:** Facilitates secure inter-bank transfers and validates transaction limits.

- **DigiLocker:** Provides encrypted storage and retrieval of Aadhaar-linked documents and digital passes.

- **Admin Dashboard:** Allows administrators to monitor tickets, manage complaints, and verify loan recommendations.

G. Recommendation and Result Display:

The outcomes from AI models and system modules are presented to users in a simplified format. Loan recommendations are displayed with explanations, account summaries are updated in real time, and complaint statuses are shown transparently. This ensures user trust and improves satisfaction with the platform.

By following this layered and modular approach, VyomNext integrates diverse financial services into a cohesive and intelligent digital banking ecosystem. The architecture not only enhances operational efficiency but also ensures adaptability for future extensions such as fraud detection, investment advisory, and insurance integration.

5.4 Implementation

The implementation phase of VyomNext demonstrates how the proposed design translates into a functional, user-friendly, and intelligent banking system. Each module of the platform was carefully developed and integrated to ensure seamless performance and real-world usability.

5.4.1. Unified Dashboard

As illustrated in Fig 5.4.1, the Unified Dashboard presents a clean, intuitive interface where users can view their linked accounts at a glance. The top section displays the total available balance across all accounts, while individual account cards show bank-specific details including account numbers (partially masked for security), current balances, and quick access buttons for detailed transaction histories. This consolidated view not only enhances financial visibility but also enables users to make informed decisions about fund allocation, savings, and expenditure tracking.
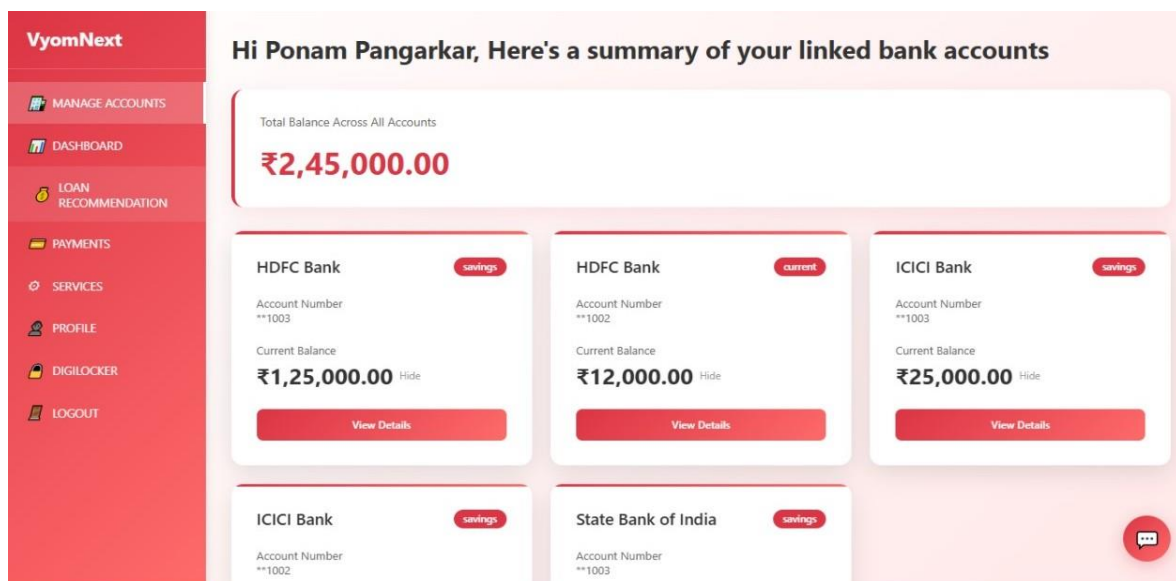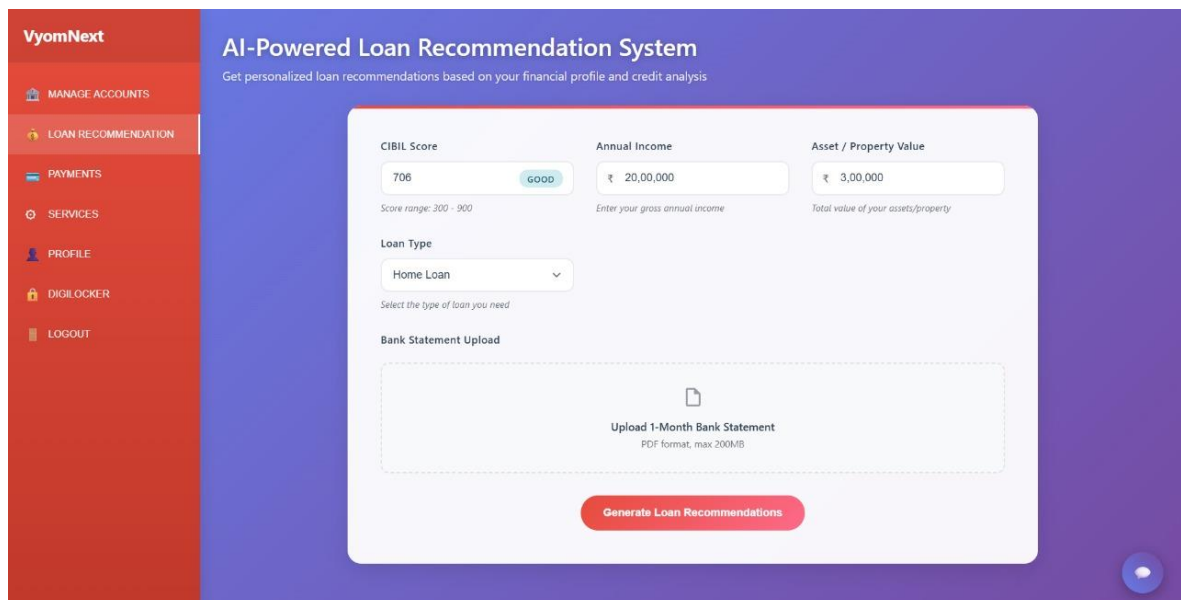

Fig 5.4.1: Unified Dashboard for Multi-Bank Account Aggregation

The implementation successfully demonstrates real-time data synchronization, with the dashboard updating account information every time the user refreshes or logs in.

5.4.2. Loan Recommendation System

Unlike traditional banking systems where loan options are presented uniformly to all users, this module provides personalized recommendations based on individual financial profiles, credit histories, and repayment capacities.

The implementation leverages the Gemini API, an advanced AI engine capable of processing complex financial data and generating contextually relevant recommendations. The system begins by collecting user inputs through a structured form interface that captures key financial parameters including monthly income, CIBIL credit score, employment stability, asset ownership, and desired loan purpose.

Fig 5.4.2: AI-Powered Loan Recommendation Interface

As shown in Fig 5.4.2, the Loan Recommendation interface presents results in an easily digestible format. Each recommendation card displays the loan type, eligible amount range, estimated interest rate, recommended tenure, and expected monthly EMI. Users can access comprehensive information about each loan product, including eligibility criteria, required documentation, and processing timelines. The interface also includes a comparison feature that allows users to evaluate multiple loan options side-by-side.

To enhance transparency, the system also provides reasoning for each recommendation, explaining why a particular loan product suits the user's financial situation.

5.4.3. Service Ticketing System

The Service Ticketing System revolutionizes customer support within VyomNext by automating query classification and ticket routing through advanced natural language processing and speech recognition technologies. This module addresses the inefficiency of traditional support systems where users must navigate complex IVR menus or wait for manual ticket categorization.

The implementation supports multimodal input where users can submit queries via text, audio recordings, or video messages. For text inputs, the process is straightforward, the query is captured through a text area interface and directly processed by the NLP classification model. However, the system's true innovation lies in its handling of audio and video inputs.

When users upload audio files, the extracted audio is then processed using OpenAI's Whisper-small model, a state-of-the-art automatic speech recognition (ASR) system. Whisper-small was chosen for its excellent balance between accuracy and processing speed, capable of transcribing speech with approximately 92% accuracy across various accents and audio quality levels.

Fig 5.4.3: Automated Ticketing System

As illustrated in Fig 5.4.3, the Automated Ticketing System interface provides a simple, intuitive form where users can choose their preferred input method. The interface displays real-time feedback during processing (transcription progress, classification status) and

presents the generated ticket with all relevant details. The system also maintains a ticket history, allowing users to view past queries and their resolution statuses.

5.4.4. Chatbot

The AI-powered Chatbot module serves as the first line of customer support, designed to handle routine banking queries instantly without human intervention. This conversational interface provides 24/7 assistance, answering frequently asked questions and performing basic banking operations, thereby reducing the load on customer support teams.

One of the chatbot's unique capabilities is facilitating fund transfers between linked accounts. When a user requests a transfer where he or she want to transfer certain amount from the one account to another account, the chatbot extracts the amount and account identifiers, confirms the transaction details with the user and initiates the transfer through the payment module.
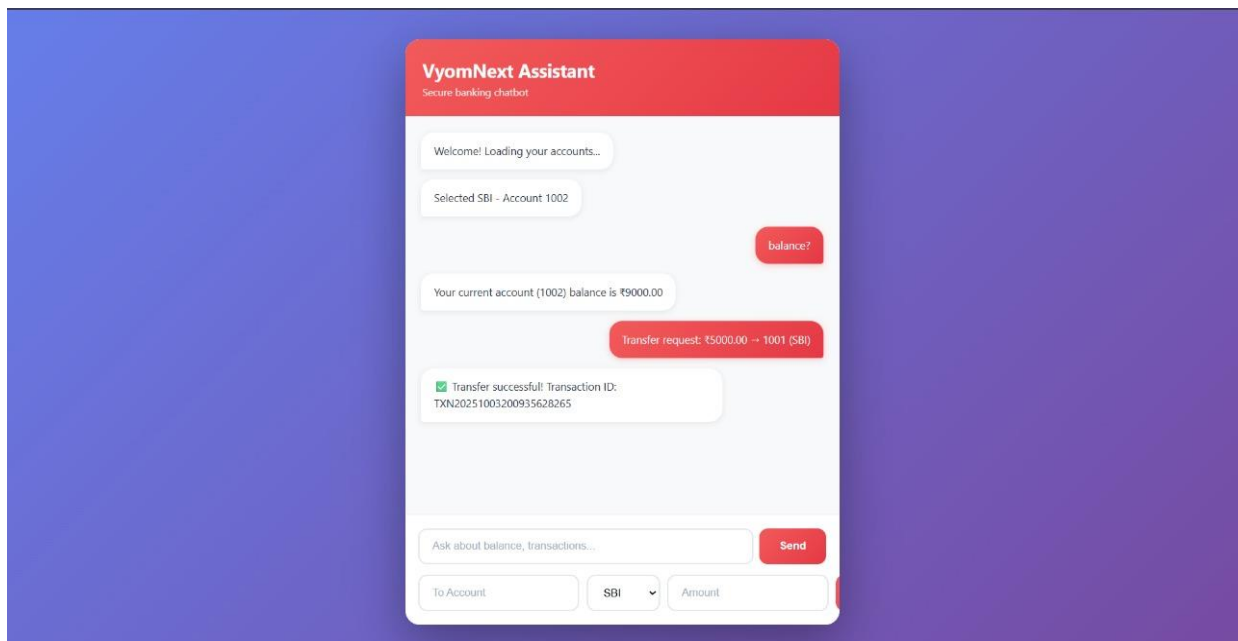
Fig 5.4.4: Chatbot

As shown in Fig 5.4.4, the chatbot interface displays a conversational thread with clear differentiation between user messages and bot responses. The interface includes quick

action buttons for common tasks, typing indicators to show when the bot is processing, and options to rate responses or escalate to human support.

For queries beyond the chatbot's capabilities, the system seamlessly escalates to the ticketing system, capturing all conversation context to provide support agents with complete information.

5.4.5. EMI Calculator

The EMI Calculator was developed as a complementary feature to the loan module. As illustrated in Fig 5.4.5, users can input loan amount, interest rate, and tenure to instantly compute their monthly installment. The results include repayment schedules, helping users plan their commitments effectively and avoid over-borrowing. By integrating this feature, VyomNext ensures users have complete clarity on their financial decisions.

The implementation uses the standard EMI calculation formula:

$$EMI = [P \times r \times (1+r)^n] / [(1+r)^n - 1]$$

Where:

- P = Principal loan amount

- r = Monthly interest rate (annual rate / 12 / 100)

- n = Loan tenure in months
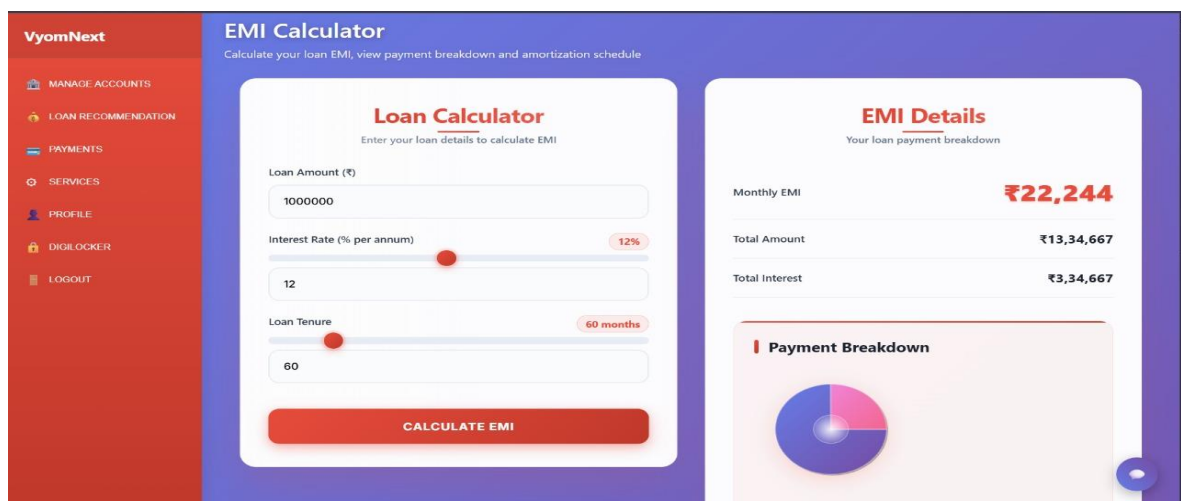
Fig 5.4.5: EMI Calculator

Beyond basic EMI calculation, the module also generates a comprehensive amortization schedule showing the breakdown of principal and interest components for each month throughout the loan tenure. This schedule is displayed in both tabular and graphical formats, helping users understand how their payments will be distributed over time.

Chapter 6

Technical Specification

The technical specifications of a project outline the critical architectural elements, tools, and technologies that underpin its development and operation. This section provides a detailed description of the system architecture, data management approaches, algorithms employed, and the specific software and hardware components integrated into the project. It includes information about the frameworks, databases, APIs and user interface technologies used, as well as details on security measures, accessibility considerations, and performance optimization strategies. Technical specifications are essential for understanding how the project is built and maintained; offering insights into its scalability, reliability, and the user experience it delivers. By detailing the technical environment and the interactions between various components, these specifications help ensure that the project meets its intended functionality and performance goals efficiently and effectively.

The technical specifications define the tools, frameworks, databases, and algorithms used to develop and deploy VyomNext – The Next-Gen Banking Platform. This chapter also highlights architectural elements, security practices, and optimization considerations.

- **Frontend**

1. HTML

2. CSS

3. Javascript

Purpose: These foundational technologies ensure that the user interface is intuitive, responsive, and accessible across various devices and platforms.

- **Backend:** Flask (Python 3.11)

Purpose: It is a lightweight, modular web framework for Python. It is used to handle server-side logic, connect AI/ML models, manage APIs, process ticketing, and communicate with the PostgreSQL database.

- **AI services:** Loan Recommendation System: Gemini API

Purpose: It is an advanced AI API for reasoning, text generation, and decision-making. It is used to powers the Loan Recommendation System by analyzing user data (income, credit score, assets) to suggest suitable loans.

- **Speech Processing:** Whisper-small (OpenAI)

Purpose: An alternative lightweight speech recognition model that provides on-device/offline transcription for privacy and accessibility. Converts spoken queries into text, enabling users to raise tickets through audio or video.

- **Database:** PostgreSQL

Purpose: An advanced open-source relational database management system. Stores structured banking data such as user profiles, transactions, service tickets, and encrypted DigiLocker documents securely while supporting scalability and role-based access.

Chapter 7

Project Scheduling

Project scheduling outlines the timeline and responsibilities of team members during development. The tasks were divided amongst the members ensuring structured implementation. The project schedule (Table 7.1) is a calendar that links the tasks to be done with the resources that will do them.

Sr. No.	Group Members	Duration	Task Performed
1	Nishant, Nikhil, Sneha, Mrinmayi	2nd Week of July	Group formation and topic finalization. Identifying the scope and objectives of the mini project "VyomNext – The Next-Gen Banking."
2	Nikhil, Nishant	3rd Week of July	Identifying the core functionalities and modules of VyomNext. Finalizing system requirements and architecture.
3	Mrinmayi, Sneha	1st Week of August	Designing the graphical user interface (GUI) for user dashboard, login, and banking modules.
4	Sneha, Nikhil	3rd Week of August	Developing and integrating the backend modules with MySQL database. Implementing account management and transaction features.
5	Nikhil, Nishant	1st Week of September	Integrating all modules including AI-based loan recommendation and complaint management system.
6	Sneha, Mrinmayi	3rd Week of September	Testing and debugging the complete system. Preparing documentation and final project report.

A Gantt chart is a type of bar chart that illustrates a project schedule. This chart lists the tasks to be performed on the vertical axis, and time intervals on the horizontal axis. Gantt chart (Fig 7.1) illustrates the start and finish dates of the terminal elements and summary elements of a project.

GANTT CHART TEMPLATE

A Gantt chart's visual timeline allows you Smartsheet` to see details about each task as well as project dependencies.

PROJECT TITLE: VyomNext - The Next-Gen Banking

INSTITUTE & DEPARTMENT: AP SHAH INSTITUTE OF TECHNOLOGY(CSE-Data Science)

PROJECT GUIDE: Ms. Poonam Pangarkar

DATE: 10/6/25

WBS NUMBER	TASK TITLE	TASK OWNER	START DATE	DUE DATE	DURATION (Weeks)	PERCENTAGE OF TASK COMPLETE
1	Project Conception and Initiation					
1.1	Group formation and Topic finalization.	Nishant, Nikhil ,Sneha, Minmaji	7/8/25	7/15/25	1	100%
1.2	Identifying the scope and objectives of the Mini Project	Nikhil, Nishant	7/15/25	7/22/25	1	100%
1.3	Discussing the project topic with the help of paper prototype.	Minmaji, Sneha	7/22/25	8/5/25	2	100%
1.4	Designing the Graphical User Interface (GUI)	Minmaji, Sneha	8/5/25	8/12/25	2	100%
1.5	Presentation I	Nishant, Nikhil ,Sneha, Minmaji	8/26/25	8/26/25	1	100%
2	Project Design and Implementation					
2.1	Database Design	Nikhil, Nishant	9/5/25	9/16/25	2	100%
2.2	Database Connectivity of all modules	Nishant	9/16/25	9/19/25	1	100%
2.3	Integration of all modules and Report Writing	Nikhil	9/19/25	9/26/25	1	100%
2.4	Presentation II	Nishant, Nikhil ,Sneha, Minmaji	10/3/25	10/6/25	1	100%

PHASE ONE: WEEK 1 – WEEK 7
PHASE TWO: WEEK 8 – WEEK 12

Fig 7.1: Gantt Chart of VyomNext

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Chapter 8

Results

The project results section provides a comprehensive overview of the outcomes achieved through the design and implementation of the VyomNext – The Next-Gen Banking System. It highlights the analytical findings, model performance, and how the integration of the XGBoost algorithm enhances the system's predictive and recommendation capabilities.

VyomNext was developed to unify multiple financial services such as banking, payments, EMI management, and digital documentation into a single intelligent platform. The loan recommendation engine, powered by XGBoost, was implemented to predict suitable loan options for users based on their financial profiles and behavioral data. By leveraging structured user information — including income, credit score, loan amount, EMI ratio, and transaction history — the model provides accurate, explainable, and data-driven recommendations.

XGBoost Model Workflow, which represents the end-to-end process of how user data is processed and transformed into actionable predictions. The pipeline begins with input features collected from user banking and transaction data. During the feature engineering stage, new features are derived, and missing values are handled to ensure data consistency. The processed data is then passed through a series of decision trees, where each tree learns from the errors of the previous one through a boosting process. Finally, the ensemble model aggregates all tree outputs into a weighted prediction score, representing the user's eligibility or suitability for a particular loan product.

This approach provides multiple advantages:

- **High predictive accuracy:** XGBoost optimizes both bias and variance by applying gradient boosting on decision trees.
- **Interpretability:** Feature importance scores allow visualization of how individual attributes influence outcomes.

- **Efficiency:** Parallel computation and tree pruning ensure faster training and real-time recommendation capabilities.
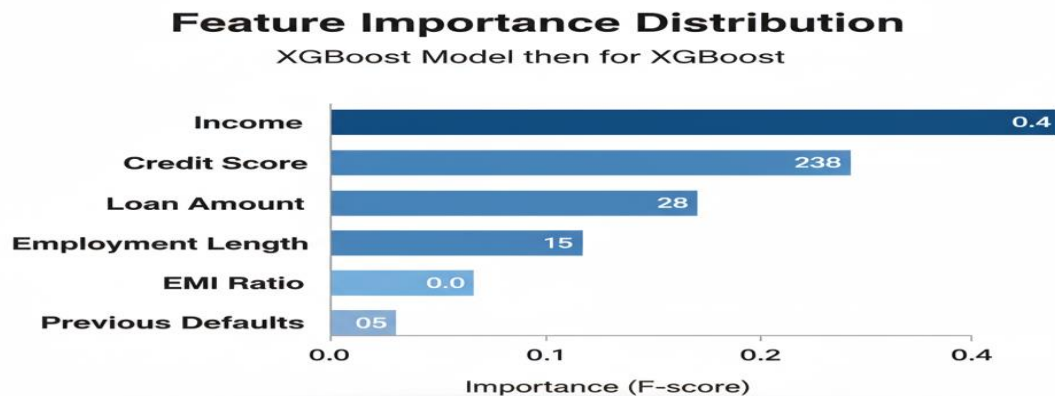

Feature Importance Distribution
XGBoost Model then for XGBoost

	Importance (F-score)
Income	0.4
Credit Score	238
Loan Amount	28
Employment Length	15
EMI Ratio	0.0
Previous Defaults	05

Fig 8.5: Feature Importance Distribution

Figure 8.5 presents the Feature Importance Distribution, which quantitatively demonstrates how each input variable contributes to the final prediction. Among all features, income and credit score emerge as the most influential factors in determining loan recommendations, followed by loan amount, employment length, and EMI ratio. This analysis validates the model's focus on financial stability and repayment capacity when generating user-specific recommendations.

The results confirm that the XGBoost model effectively identifies high-impact features and leverages them to deliver personalized and explainable outcomes. The system's integration of AI-driven insights enhances transparency, reliability, and user trust — essential for any financial technology solution.

In conclusion, the implementation of XGBoost within VyomNext significantly improves the precision and reliability of financial recommendations. It demonstrates the platform's capability to intelligently assess user profiles, generate tailored loan options, and support a more unified, efficient, and secure digital banking experience.

Chapter 9

Conclusion

VyomNext represents a significant innovation in digital banking by unifying fragmented financial services such as payments, loans, and document storage into a single intelligent platform. Through its multi-bank account aggregator, users can seamlessly view and manage all their accounts in one place. The integrated loan recommendation system and EMI calculator empower users to make informed financial decisions by suggesting optimal loan options and allowing easy repayment simulations. This combination enhances transparency, convenience, and smarter financial planning.

Additionally, VyomNext transforms customer service with NLP-driven ticketing and a multimodal chatbot capable of handling text, voice, and video-based queries, ensuring quick and inclusive support. Features like DigiLocker integration for secure document storage and a multi-bank payments module for smooth fund transfers further strengthen the platform. An admin dashboard ensures efficient backend management and accountability. Overall, VyomNext demonstrates how AI-powered, user-centric design can redefine modern banking into a smarter, more accessible, and future-ready ecosystem.

Chapter 10

Future Scope

VyomNext can be enhanced with AI-driven financial analytics, investment and insurance recommendations, blockchain-based security, and biometric authentication. Adding real-time fraud detection, multilingual support, and wider bank integration will further improve scalability, accessibility, and user trust.

1. Dedicated Mobile Application

The first step forward would be the development of a dedicated mobile application for Android and iOS. A mobile-first approach would allow users to access their accounts on the go, receive instant notifications, and even perform certain operations offline, greatly expanding accessibility.

2. Fraud Detection and Voice Biometrics Authentication

Security can be taken to the next level through fraud detection and voice biometrics authentication. Real-time anomaly detection could flag unusual transactions, while speech-based login systems could add an extra layer of personalization and protection for users.

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