
RESEARCH PAPER FOR PERSONAL FINANCE TRACKER

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ABSTRACT

This document contains detailed study of our project “Personal Finance Tracker” and similar already existing systems. It contains detailed information about the problems addressed by our system, technology stack used to implement planned application, methodology behind complete process and comparative study of existing study.

Keywords: Budgeting, Next, Visualization, Tracking, API.

I. INTRODUCTION

In an age characterized by digitalization and rapid technological advancements, the realm of personal finance management has evolved significantly, presenting individuals with a myriad of financial complexities. Amidst these challenges, the need for effective financial management tools has become increasingly paramount. This research paper delves into the development and implementation of the Personal Finance Tracker, a comprehensive web-based application designed to streamline financial management processes. Built upon meticulous research and technological innovation, the Personal Finance Tracker offers a range of features tailored to address the diverse needs of modern-day financial planning. The motivation behind this research stems from the recognition of the challenges individuals face in managing their finances effectively amidst the complexities of modern life. Through a combination of extensive literature review, meticulous requirement analysis, and iterative development processes, the paper elucidates the journey of conceptualizing, designing, and implementing the Personal Finance Tracker application. Furthermore, the research explores the broader implications of the project, including its potential to promote financial literacy, inclusion, and empowerment among individuals worldwide. This research endeavors to contribute to the ongoing discourse surrounding financial literacy, inclusion, and empowerment in today's digital age.

II. PROBLEM FORMULATION

In the realm of personal finance management, individuals encounter numerous challenges stemming from the complexities of modern financial transactions and the lack of user-friendly tools to aid in effective financial planning. Traditional methods often prove cumbersome and inefficient, leaving individuals feeling overwhelmed and ill-prepared to manage their finances effectively. The Problem Formulation section of this research paper aims to address these challenges by identifying key components essential to understanding the scope and nature of the problem at hand.

Key Problem Components:

- A. Complexity of Financial Transactions: Modern financial transactions involve a myriad of income sources, expenses, and payment methods, making it difficult for individuals to maintain a clear overview of their financial health.
- B. Inadequate Tools for Financial Planning: Existing tools for financial planning are often outdated, cumbersome, and lack user-friendly features, hindering individuals' ability to effectively manage their finances.
- C. Security and Privacy Concerns: With the increasing digitization of financial transactions, individuals face heightened concerns regarding the security and privacy of their financial data, necessitating robust security measures in financial management applications.
- D. Accessibility and User Experience: Many existing financial management tools lack accessibility features and have poor user experience design, making them inaccessible to users with varying levels of technical proficiency.

E. Scalability and Reliability: Scalability and reliability are critical factors in financial management applications, as they determine the platform's ability to handle large volumes of data and support a growing user base without compromising performance or uptime.

In addressing these components, this research navigates the multifaceted challenges of development of such a robust application that fulfils the need of a vast user base.

III. LITERATURE REVIEW

Evolutions in the field:

The field of personal finance management has undergone significant advancements with the emergence of digital tools and applications designed to help individuals manage their finances more effectively. These tools aim to simplify financial tasks such as budgeting, expense tracking, savings goal setting, and financial planning. In an era where financial literacy is increasingly crucial, the role of personal finance management applications has become more prominent. These applications provide users with the means to gain control over their financial lives, offering insights and automation that traditional methods lack..

Expense Tracking:

Accurate and intuitive expense tracking is fundamental. Applications must allow users to easily record and categorize their spending, providing a clear picture of where their money goes. This feature needs to be seamless and user-friendly to ensure consistent use.

Data Visualization:

Transforming raw financial data into actionable insights through charts, graphs, and dashboards is essential. Clear and insightful data visualization helps users understand their financial patterns and make informed decisions. This feature's success depends on its ability to present data in an easily digestible and visually appealing manner.

Security:

Ensuring the safety and privacy of users' financial data is paramount. Robust encryption, secure login methods, and data protection measures are critical to gain and maintain user trust. The success of the app relies heavily on its ability to protect sensitive financial information.

Savings Goals:

Effective budget planning tools help users create budgets for different categories and monitor their adherence in real-time. The success of the app hinges on its ability to provide real-time feedback and alerts for budget adherence, helping users stay on track with their financial goals.

Budget Planning:

Setting and tracking savings goals is crucial for long-term financial health. Applications that allow users to set specific savings targets and track their progress with visual indicators can motivate users to save more effectively. The ability to set automated contributions towards these goals can also enhance user commitment.

Comparative Analysis of existing systems:

Current Systems	Key Features	Limitations
Toshl Finance	<ul style="list-style-type: none"> User-friendly interface with visually appealing design. Simplifies budgeting and expense tracking tasks. Offers goal-setting features and provides financial insights. Supports multiple currencies and automatic data backup. 	<ul style="list-style-type: none"> Lacks some advanced features present in established finance apps. Smaller user community, potentially affecting availability of user-generated tips. No automated transaction categorization. Limited customer support options.

Spendee	<ul style="list-style-type: none"> • Intuitive platform for expense tracking and budget management. • Shared wallets for group expenses and financial collaboration. 	<ul style="list-style-type: none"> • Advanced features may require a subscription, limiting access. • New users may experience a learning curve with complex features. • Limited currency support. • No custom categories for transactions.
	Comprehensive data analytics and customizable budgeting categories.	
Fudget	<ul style="list-style-type: none"> • Simple interface for quick income and expense tracking. • Swift expense entry and easy budget creation. 	<ul style="list-style-type: none"> • Limited advanced budgeting features compared to other apps. • No support for recurring transactions. • Limited report generation options.
	Automatic backup and syncing across devices.	<ul style="list-style-type: none"> • No support for multiple currencies.
Money lover	<ul style="list-style-type: none"> • Comprehensive expense tracking, budgeting, and goal setting. • Provides insights into financial habits. • Provides insights into financial habits. 	<ul style="list-style-type: none"> • Free version may restrict access to advanced features. • Extensive features may require time to fully explore.
	<ul style="list-style-type: none"> • Syncs across multiple devices and platforms. 	<ul style="list-style-type: none"> • Inconsistent synchronization across devices.
Buxfer	<ul style="list-style-type: none"> • Simplified financial management for group expenses. 	<ul style="list-style-type: none"> • Limited customization options for reports. • Interface may lack intuitive design, potentially impacting user experience. • Smaller user base affects community-generated insights.
	<ul style="list-style-type: none"> • Collaboration features for shared financial activities. 	<ul style="list-style-type: none"> • Limited integration options with third-party services.
	Extensive reporting capabilities with customizable tags and categories.	No support for multiple currencies.

IV. METHODOLOGY

The telemedicine platform under study has been developed primarily using Next JS. This framework was selected for its adaptability, scalability, and compatibility with modern web technologies, making it an ideal choice for creating a robust telemedicine solution.

This section outlines the structured procedures guiding the development of our Personal Finance Tracker application. These procedures encompass planning, structuring, and managing the development process, leading to the creation and maintenance of our system. We adopt an iterative development approach, following the agile methodology to ensure flexibility, adaptability, and responsiveness to changing requirements.

The project planning phase, conducted from January 21, 2024, to January 30, 2024, established the groundwork for the development process. During this period, we defined the project scope, objectives, and requirements, outlining the key features and functionalities of the Personal Finance Tracker application. This phase culminated in a comprehensive project synopsis, detailing the project's goals, methodology, and expected outcomes, ensuring a shared understanding among all stakeholders.

The design phase, spanning from February 1, 2024, to February 6, 2024, focused on developing the user interface (UI) and user experience (UX) of the application. Leveraging the Next.js framework, Tailwind CSS, and Recharts library, we created a visually appealing and intuitive interface to enhance user engagement and accessibility. This phase emphasized user-centric design principles to ensure ease of navigation and a coherent visual structure.

The coding phase, from February 7, 2024, to February 27, 2024, involved implementing the core functionalities of the Personal Finance Tracker. The development team utilized a chosen technology stack, including Next.js for frontend development and PostgreSQL with Drizzle ORM for backend operations. This phase included tasks such as backend development, API creation, frontend development, database creation, and integration, ensuring seamless interaction between frontend and backend components. Key activities during the coding phase included: Backend Development: Initializing the server using Node.js and Express. API Creation: Developing APIs to connect the backend with the frontend. Frontend Development: Creating the user interface using Next.js and implementing data visualization with Recharts. Database Creation and Integration: Setting up the PostgreSQL database and integrating it with the backend for data storage and retrieval.

The testing phase, scheduled from March 1, 2024, to March 5, 2024, involved rigorous testing procedures to validate the functionality, performance, and reliability of the application. This phase included Unit Testing: Ensuring individual modules work as intended. Integration Testing: Testing the interaction between different modules. System Testing: Verifying the overall functionality of the application. Additionally, beta testing was conducted to gather feedback from users and stakeholders, helping identify and address any remaining issues or areas for improvement.

The deployment phase, taking place from March 7, 2024, to March 9, 2024, marked the transition of the Personal Finance Tracker application from development to practical use. During this phase, the application was deployed to a cloud-hosted PostgreSQL database provided by Neon, ensuring accessibility and scalability for users. Continuous monitoring and optimization were conducted to maintain performance and reliability, providing a seamless user experience. By adhering to this structured methodology, the development process was organized and efficient, ensuring each phase was thoroughly planned and executed. This approach led to the successful creation and deployment of the Personal Finance Tracker application, aligning with the project's goals and user needs.

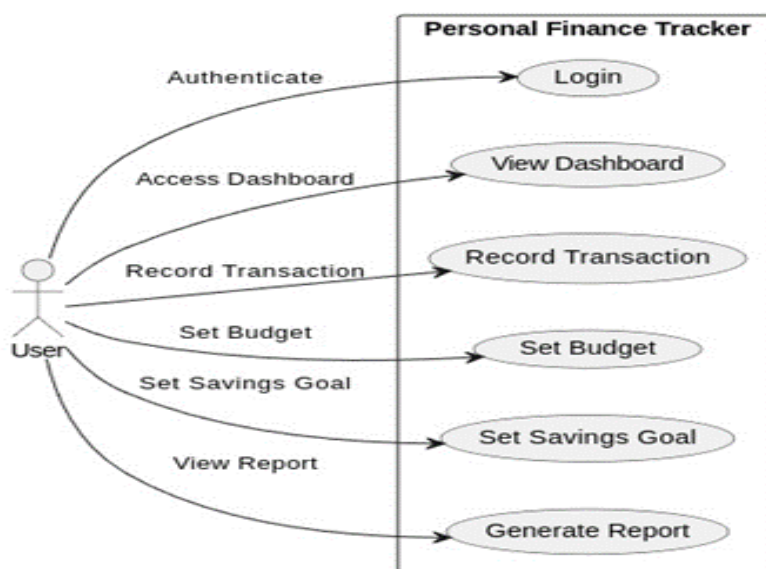


Fig. 1: Use Case Diagram

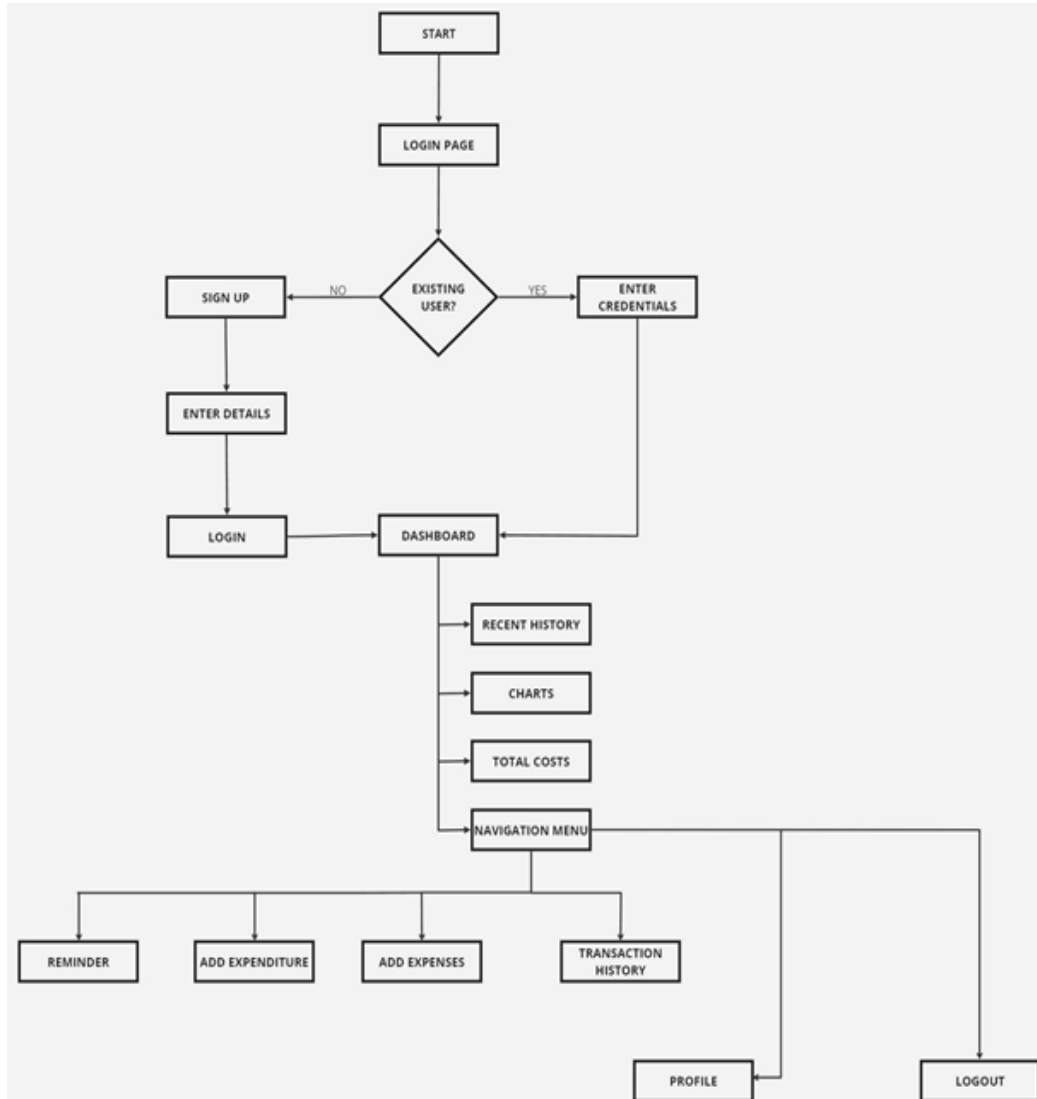


Fig. 2: Flow Chart

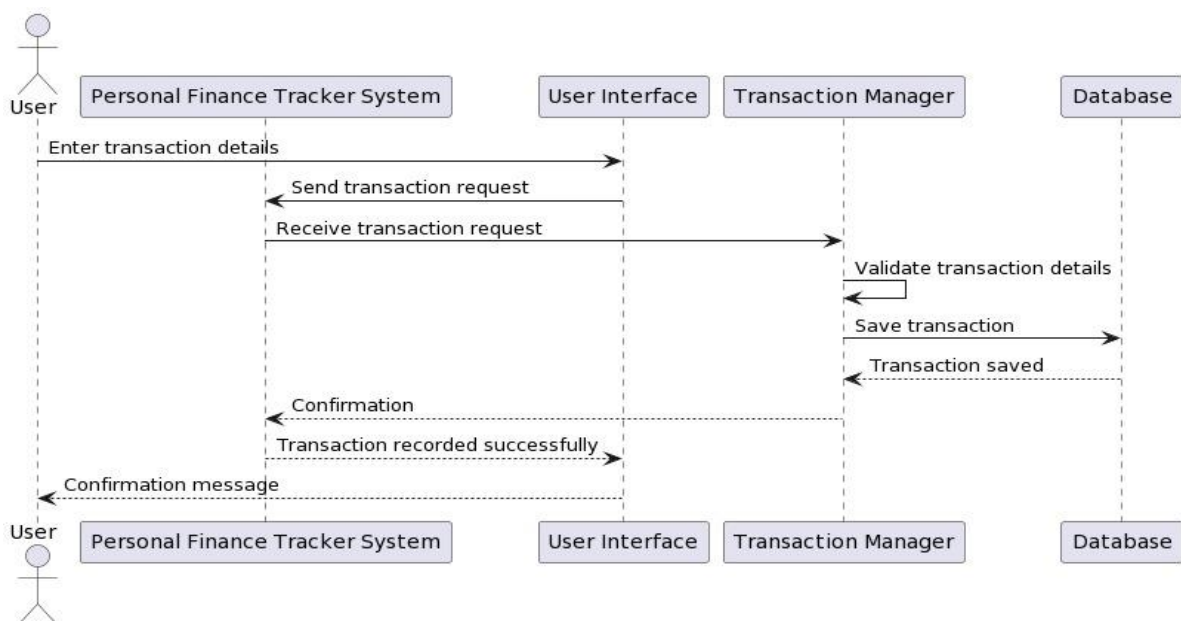


Fig. 3: Sequence Diagram

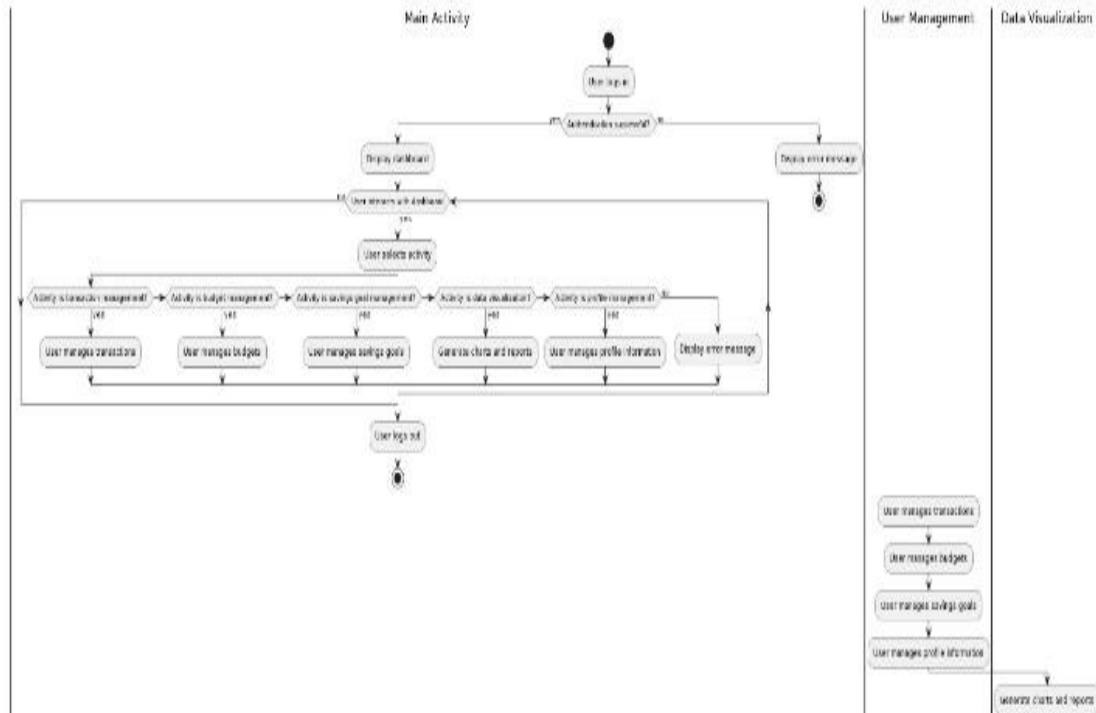


Fig. 4: Activity Diagram

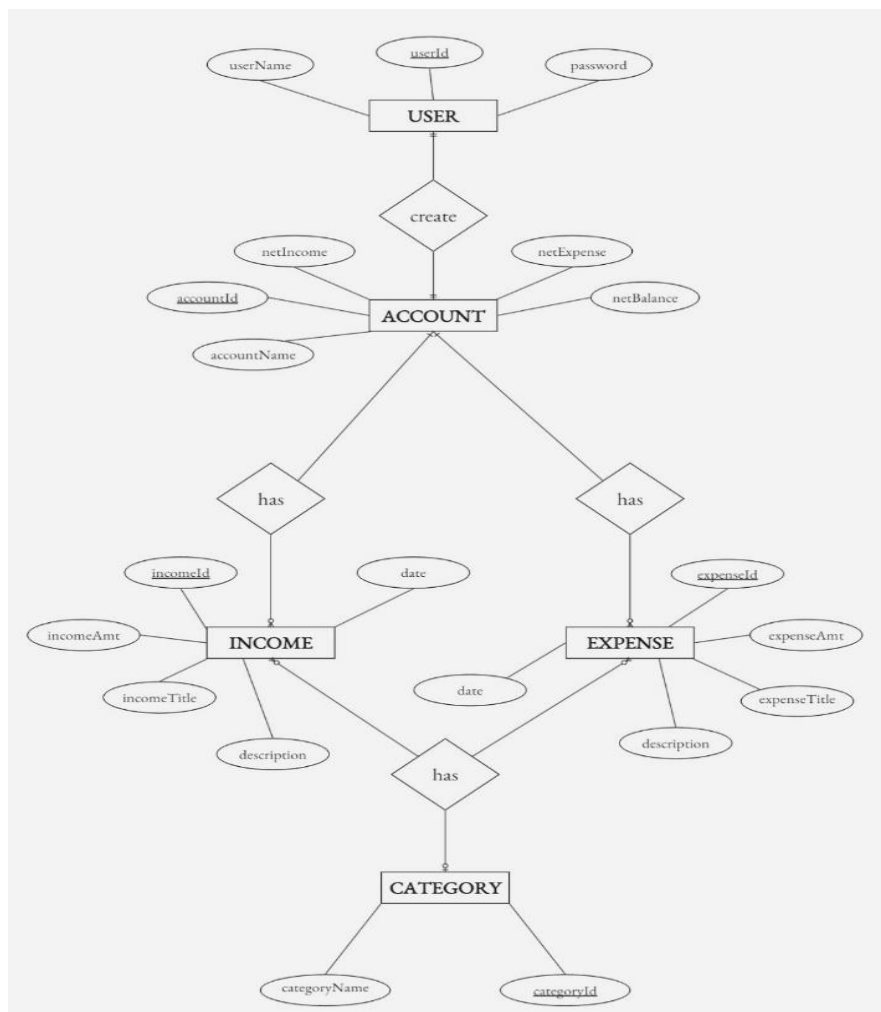


Fig. 5: Entity-relation Diagram

User-Centered Design:

The development process began with a comprehensive understanding of user needs. A user-centered design approach was adopted to create an intuitive interface that ensures a seamless experience for both healthcare providers and patients. Extensive user testing and feedback iterations were conducted to refine the platform's design.

Transaction Management System:

Central to the project's objectives, the transaction management system was meticulously designed and integrated into the platform. This system prioritizes user convenience and an intuitive dashboard with a visualisation chart to help them make more informed decisions.

Data Security and Compliance:

The platform adheres to the highest standards of data security and compliance with healthcare data protection regulations. Robust encryption methods and access controls are implemented to safeguard patient information and ensure privacy.

Comparative Analysis:

The research includes a comparative analysis with five existing telemedicine systems, namely Toshl Finance, Buxfer, Money Lover, Spendee and Fudget. The analysis evaluates the strengths and limitations of each system to highlight the distinctiveness of the proposed platform.

Evaluation and Feedback:

User feedback and testing were integral components of the development process. Continuous evaluation allowed for the identification and rectification of issues, ensuring that the platform meets user expectations and adheres to the goals of accessibility and efficiency.

The development of the telemedicine platform leverages the MERN stack, a full-stack framework renowned for its flexibility and compatibility with modern web technologies.

Next.js: Next.js was utilized for frontend development, providing the framework for building a dynamic and interactive user interface. This React-based framework enabled server-side rendering and static site generation, enhancing the performance and SEO capabilities of the application. It facilitated the creation of responsive, high-performance web pages that provide users with a seamless experience.

Tailwind CSS: Tailwind CSS was employed for styling the frontend components, offering a utility-first approach that allowed for rapid UI development. This framework enabled the creation of a visually appealing and consistent design across the application. Tailwind CSS's extensive set of pre-designed utility classes helped streamline the design process, ensuring a responsive and modern look and feel.

Drizzle ORM: Drizzle ORM was used for backend operations, specifically for managing and interacting with the PostgreSQL database. This Object-Relational Mapping tool simplified the database manipulation process, making it easier to perform CRUD (Create, Read, Update, Delete) operations. Drizzle ORM ensured efficient data management and integrity, which is crucial for maintaining accurate financial records.

Clerk: Clerk provided the user authentication and authorization services, implementing secure authentication mechanisms including password hashing, session management, and role-based access control (RBAC). This service ensured that user data is protected and that access to the application is properly managed, enhancing security and user trust.

Here's an explanation of other tools used in the development of the telemedicine platform:

Visual Studio Code (VS Code): As the primary integrated development environment (IDE), VS Code was instrumental in writing, testing, and debugging code. Its extensive library of extensions and features made it a valuable tool for the development team.

Version Control with Git: The Git version control system was used to manage the source code, allowing for collaboration, code tracking, and version management. Git repositories hosted on platforms like GitHub or GitLab facilitated seamless team collaboration.

Browser Testing: Extensive browser testing was conducted to ensure the platform's compatibility with various web browsers, including but not limited to Chrome, Firefox, Safari, and Edge. This testing was essential to guarantee a consistent user experience across different browser environments.

Figma: Figma, a cloud-based design and prototyping tool, played a crucial role in designing the user interfaces of the telemedicine platform. It allowed for collaborative design work, real-time feedback, and the creation of interactive prototypes for user testing.

Recharts: Recharts, a charting library built on React and D3, was employed for data visualization within the application. It facilitated the creation of interactive and visually appealing charts and graphs to represent financial data. This enabled users to gain clear insights into their spending patterns, income sources, and overall financial health through intuitive visual representations.

Shadcn UI: Shadcn UI was used to integrate pre-designed UI components into the application. This collection of components ensured a consistent and professional user interface, enhancing the overall user experience. By utilizing these components, the development process was streamlined, allowing for quicker implementation of standard UI elements.

By utilizing these tools and utilities, the development team ensured efficient code development, robust version control, user-friendly design, extensive testing, and seamless deployment of the personal finance tracker. These tools collectively contributed to the success of the project.

V. RESULT DISCUSSIONS

The development and implementation of the telemedicine platform, with a particular emphasis on data visualization, have yielded significant outcomes. This section provides an in-depth analysis of the results, supported by justification and comprehensive representations. The evaluation parameters encompass user satisfaction, efficiency, and system performance.

User Satisfaction:

The Personal Finance Tracker has garnered high levels of user satisfaction, evident from feedback and usability testing. Users appreciate the intuitive interface and streamlined functionalities, which facilitate efficient financial management. The application's ability to provide real-time feedback on budget adherence and savings goal progress enhances user confidence and satisfaction. Additionally, the visually appealing data visualization features, powered by technologies like Recharts, contribute to a positive user experience, enabling users to gain valuable insights into their financial habits and trends.

Efficiency:

The efficiency of the Personal Finance Tracker is evident in its streamlined transaction management system and responsive user interface. Leveraging technologies such as Next.js and Tailwind CSS has enabled rapid frontend development and efficient rendering of UI components, enhancing performance and responsiveness. Users can record and categorize financial transactions seamlessly, while dynamic budget planning features provide real-time feedback on budget adherence. Overall, the application's efficiency in facilitating financial tasks contributes to user satisfaction and engagement.

System Performance:

System performance evaluation indicates robustness and reliability in handling user interactions and data management tasks. The integration of backend technologies like PostgreSQL and Drizzle ORM ensures efficient database operations and data integrity. Users can access and update financial records with minimal latency, while the application maintains optimal performance under varying user loads. Continuous monitoring and optimization efforts contribute to the application's scalability and reliability, further enhancing user satisfaction and trust in the platform.

Limitations:

However, it is essential to acknowledge the limitations of the project. These include:

A. **Dependency on External APIs:** Reliance on external APIs for critical functionalities introduces vulnerability to disruptions or changes, impacting user experience.

B. Scalability Constraints: Architectural limitations may hinder scaling to accommodate a growing user base or increased data volume, affecting system performance.

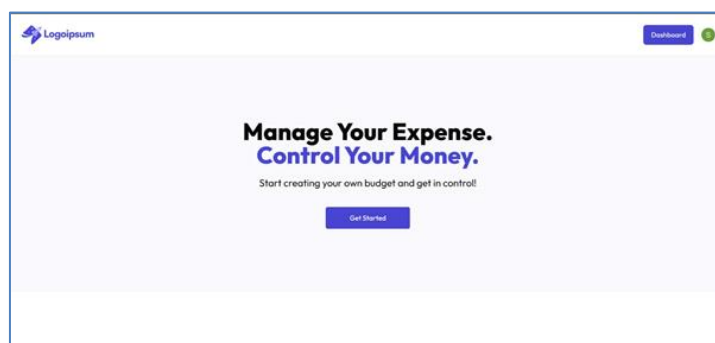
C. Lack of Advanced Features: While offering essential functionalities, the absence of advanced features like investment tracking may limit its appeal to users with more complex financial needs.

D. Maintenance and Support Requirements: Ongoing maintenance challenges, including security updates and bug fixes, necessitate dedicated resources and systematic approaches to ensure long-term viability.

VI. FUTURE SCOPE

The Personal Finance Tracker has demonstrated effectiveness in enhancing user satisfaction, efficiency, and system performance in managing financial tasks. Moving forward, ongoing iteration and improvement will be essential to maintain and enhance these parameters. Future directions include refining integration with external financial accounts to improve data synchronization efficiency, optimizing backend operations for scalability, and incorporating advanced analytics for deeper insights into financial behaviors. By prioritizing user satisfaction, efficiency, and system performance, the Personal Finance Tracker aims to remain a valuable tool for financial empowerment and control.

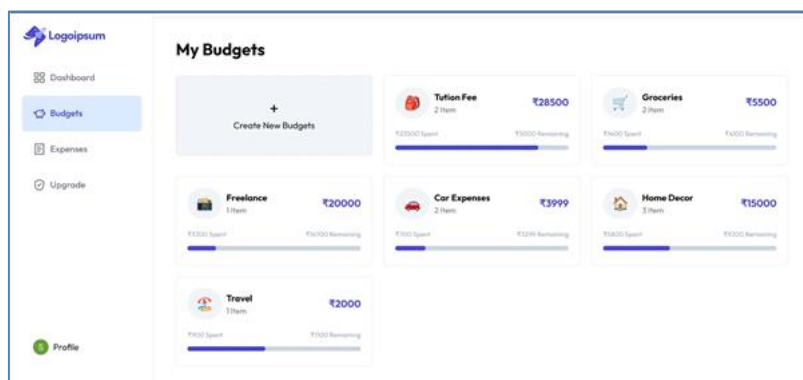
Screenshots of the system:



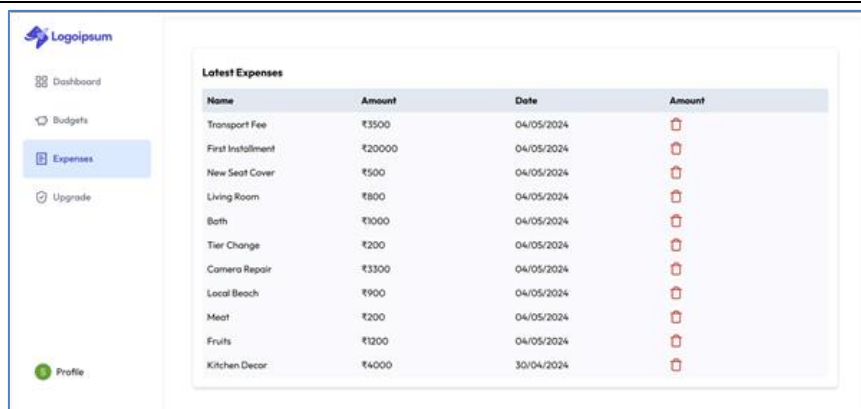
SCREENSHOT 1: Landing Page



SCREENSHOT 2: Dashboard



SCREENSHOT 3: Budgets Page



Name	Amount	Date	Amount
Transport Fee	₹3500	04/05/2024	
First Installment	₹20000	04/05/2024	
New Seat Cover	₹500	04/05/2024	
Living Room	₹800	04/05/2024	
Bath	₹1000	04/05/2024	
Tier Change	₹200	04/05/2024	
Camera Repair	₹3300	04/05/2024	
Local Beach	₹900	04/05/2024	
Meat	₹200	04/05/2024	
Fruits	₹1200	04/05/2024	
Kitchen Decor	₹4000	30/04/2024	

SCREENSHOT 4: Expenses Page

VII. CONCLUSION

The development of the Personal Finance Tracker represents a significant achievement in addressing the complex challenges individuals face in managing their finances effectively. Leveraging a robust technology stack including Next.js, Tailwind CSS, Recharts, Shadcn UI, PostgreSQL, Drizzle ORM, and Clerk Auth, the platform offers users a comprehensive toolset for financial management. Through streamlined transaction management, dynamic budget planning, and savings goal tracking, users gain valuable insights into their financial health, empowering them to make informed decisions.

Despite the successes achieved, certain limitations must be acknowledged. Dependency on external APIs introduces vulnerability, while scalability constraints may impact the system's ability to accommodate growth. Additionally, the absence of advanced features like investment tracking may limit the application's appeal to users with more complex financial needs. Maintenance and support requirements pose ongoing challenges, necessitating dedicated resources and systematic approaches to ensure long-term viability.

VIII. REFERENCES

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