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Digitalizing Residential Society Management System

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Abstract: The mobile application is designed to enhance residential building management by streamlining communication between residents and Treasurer/Committee members. It allows users to submit and track maintenance requests, view payment statuses in real-time, and securely upload payment proofs. The application supports cloud-based data storage and synchronization, providing a platform for detailed maintenance analysis, expense tracking, and asset management. The system is designed to be user-friendly, secure, reliable, and maintainable, addressing common challenges in residential building management such as inefficient communication and manual data handling. In addition to the core features, the mobile application offers robust role-based access control, ensuring that sensitive actions, such as verifying payment proofs or adding new members, are restricted to authorized personnel like committee members. This enhances security by preventing unauthorized changes. The application also incorporates a notification system that sends real-time alerts to residents about important updates, such as payment requests or community notices, fostering better engagement.

Index Terms **- Society Management, Two factor authentication, Cloud Storage.**

I. INTRODUCTION

The management of residential societies plays a crucial role in fostering community well- being and ensuring effective communication among residents. Historically, reliance on manual processes and fragmented communication methods has hindered operational efficiency and transparency, leading to numerous challenges in day-to-day management. As residential communities grow in size and complexity, the need for streamlined solutions becomes increasingly vital. This paper addresses these challenges by exploring innovative digital solutions that utilize advanced technologies such as artificial intelligence (AI), mobile applications, and secure data management systems. By reviewing four key digital solutions, the research highlights how these technologies can automate routine tasks, enhance security, and improve overall resident engagement. Furthermore, it emphasizes the necessity of transitioning from traditional management practices to a more integrated digital approach, ultimately aiming to elevate the quality of life within residential societies through enhanced functionality, transparency, and community cohesion

II. LITERATURE REVIEW

Numerous technological solutions have been proposed and implemented to enhance the management of residential societies, focusing on streamlining operations, improving resident satisfaction, and enhancing security. Recent studies have shown the evolution of housing society management systems from simple billing tools to comprehensive digital platforms that integrate artificial intelligence, real-time databases, and mobile accessibility. In a 2024 study, Diksha M. Jadhav et al. proposed a Society Management System that focuses on streamlining rent payments, complaint reporting, and document uploads. With integrated CCTV surveillance and centralized administrative features, the system aims to enhance both efficiency and safety. However, it lacks detailed evaluation regarding long-term community engagement and may struggle with scalability due to its limited customization for diverse residential settings.[1]

Similarly, Society Sync, developed by Mayank Thacker and colleagues in 2022, introduced a modular design with OCR-based vehicle tracking, administrative management, and resident interaction capabilities. While the system stands out for its integration of AI, it may face issues with facial recognition accuracy, miscommunication between residents and the secretary, and maintaining consistent data quality. The 2021 survey paper by Adukathil Arjun et al. expanded upon this by introducing emergency health alerts and chatbot-assisted navigation in a Housing Society Management System. This approach encourages social interaction and facilitates real-time communication, though it notably lacks integration with digital payment platforms and raises concerns about user data security. [2]

Focusing on secure access, Saniya A. Karigar et al. (2020) designed an Android-based maintenance and billing system with two-factor authentication. The system emphasizes security and user-friendliness through real-time databases and cloud storage. However, its scope is confined to online payments and lacks support for managing assets or integrating external legal or contractor services. Divyansh Goel and team (2020) introduced a more service-centric system that includes a ParkAlert module, visitor registration, and maintenance service access. It encourages digital transformation within societies by reducing paperwork.[3]

In the domain of mobile communication, Mohamed Abdalla Mokar et al. (2019) highlighted the use of Firebase Cloud Messaging (FCM) to manage mobile applications by sending data messages in JSON format. Though effective for controlled messaging, its limitation lies in being a desktop-based system and requiring manual message configurations, thus limiting automation and web accessibility. Rahul Bhagwat et al. (2018) presented an Android Society Management Application with comprehensive features such as billing, maintenance, visitor tracking, and CCTV viewing. It also supports staff attendance and SMS-based maintenance reminders. However, its reliance on uninterrupted internet connectivity and smooth integration of hardware components presents potential implementation challenges.[4]

III. Overview And Features

BuildingSync is a transformative mobile application designed to address the inefficiencies in managing residential societies. Traditional methods often involve manual processes that are prone to errors and time-consuming, leading to communication breakdowns, delays in handling maintenance requests, and difficulties in tracking payments. BuildingSync aims to streamline these processes, enhancing the overall management experience for both residents and committee members.

Enhanced Communication is a cornerstone of BuildingSync. The app provides a centralized platform where residents and management can communicate effectively. Push notifications ensure that important updates and notices are delivered promptly, reducing the chances of missed information. The user-friendly interface makes it easy for users of all technical levels to interact with the app, fostering a more connected and informed community.

Automated Maintenance Management is another key feature. Residents can submit and monitor maintenance requests through the app, while management can efficiently manage and update these requests. This automation reduces delays and errors associated with manual handling, ensuring that maintenance issues are addressed promptly and accurately. By streamlining maintenance management, BuildingSync enhances transparency and accountability within the society.

Real-Time Payment Tracking is crucial for maintaining financial transparency. The app allows residents to track their payments in real-time, while management can oversee and verify these payments securely. Secure data handling ensures that all sensitive information, including payment records and maintenance requests, is stored and transmitted in compliance with modern privacy and security standards. This feature helps prevent misunderstandings and missed payments, contributing to a smoother financial management process.

Cloud-Based Synchronization ensures that all data is updated across devices in real-time. This means that residents and management can access the latest information from any device, at any time. The cloud-based storage also provides a reliable backup, ensuring that data is not lost and can be easily retrieved when needed. This feature enhances the overall user experience by providing seamless access to information.

Expense and Asset Management tools equip the management committee with the ability to track expenses and manage building assets effectively. This feature helps in maintaining accurate records and provides insights into the financial health of the society. By addressing the key challenges faced in traditional society management, BuildingSync offers a more efficient, transparent, and user-friendly solution that improves the overall management experience for both residents and committee members.

IV. PROPOSED SYSTEM

The proposed system, **BuildingSync**, is a comprehensive mobile application designed to enhance the management of residential societies by addressing common inefficiencies and improving overall communication and operations. The system aims to streamline interactions between residents and management committees, automate maintenance requests, and provide real-time payment tracking, thereby reducing administrative burdens and improving the quality of life within the community.

4.1 System Architecture:

4.1.1 User Interface (UI):

A user-friendly interface that accommodates users with varying levels of technical expertise. Intuitive navigation and design to facilitate easy interaction and access to features.

4.1.2 Communication Module:

Centralized platform for effective communication between residents and management. Push notification technology for timely updates and notices. Meeting notifications and complaint management to ensure all issues are addressed promptly.

4.1.3 Maintenance Management Module:

Automated system for residents to submit and monitor maintenance requests. Management interface to efficiently handle and update maintenance requests. Real-time tracking of request status to reduce delays and errors.

4.1.4 Payment Tracking Module:

Real-time updates on payment statuses for residents. Secure verification and tracking of payments by management. Integration with secure payment gateways to ensure data privacy and security.

4.1.5 Data Security and Privacy:

Secure storage and transmission of sensitive data, including payment records and maintenance requests. Adherence to modern privacy and security standards to protect user information.

4.1.6 Cloud-Based Synchronization:

Utilization of cloud storage to ensure real-time data synchronization across devices. Reliable data backup to prevent data loss and ensure easy retrieval.

4.1.7 Expense and Asset Management:

Tools for the management committee to track expenses and manage building assets effectively. Accurate record-keeping and financial insights to maintain the society's financial health.

4.2 Key Features:

Enhanced Communication: Centralized platform with push notifications for efficient communication.

Automated Maintenance Management: Streamlined process for submitting and tracking maintenance requests.

Real-Time Payment Tracking: Secure and real-time monitoring of payments.

User-Friendly Interface: Intuitive design for easy interaction.

Secure Data Handling: Compliance with privacy and security standards.

Cloud-Based Synchronization: Real-time data updates and reliable backup.

Expense and Asset Management: Effective tracking of expenses and assets.

By integrating these features, BuildingSync provides a robust solution to the operational challenges faced by residential societies, promoting efficient governance and community satisfaction. The proposed system aims to enhance transparency, reduce manual efforts, and improve the overall management experience for both residents and committee members.

V. SYSTEM ARCHITECTURE

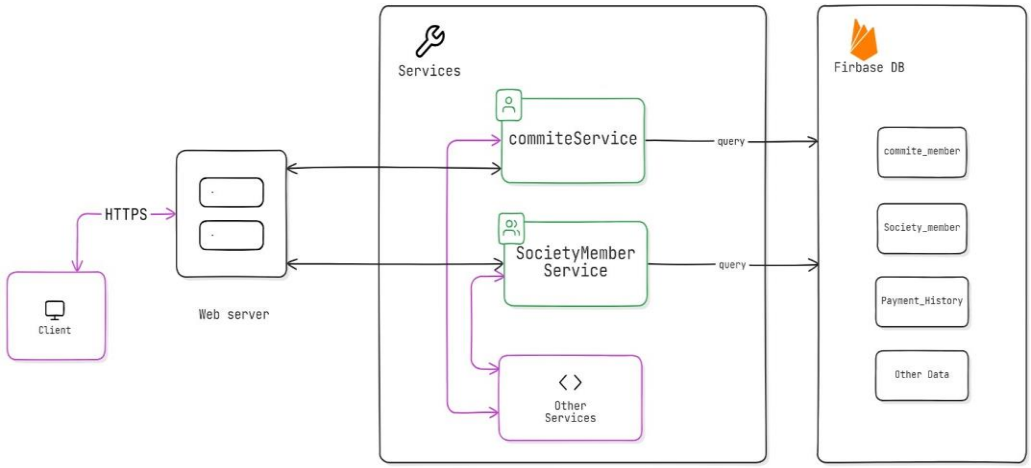

Fig 1 Architecture

The architecture of **Building Sync** is designed to ensure efficient communication, seamless data management, and secure operations. The system comprises several key components, each playing a crucial role in the overall functionality of the application.

Client:

The client represents the end-users, including residents and management committee members, who interact with the application through a user-friendly interface. Communication between the client and the web server is secured using HTTPS, ensuring data privacy and security.

Web Server:

The web server acts as an intermediary between the client and the backend services. It handles incoming requests from the client, processes them, and communicates with various services to fetch or update data. The web server ensures that requests are efficiently managed, and responses are promptly delivered to the client.

Services:

The services component includes multiple service modules that handle specific functionalities within the application.

- Committee Service: Manages queries related to committee members, such as their roles, responsibilities, and communications.
- SocietyMemberService: Handles society member-related queries, including maintenance requests, payment tracking, and general interactions.
- Other Services: Interacts with SocietyMemberService to provide additional functionalities, ensuring comprehensive management of society operations.

These services work together to process requests, manage data, and ensure smooth operations within the application.

Firebase DB:

Firebase DB is the database component that stores all relevant data for the application. It includes collections such as committee member, society member, payment history, and other essential data. The database ensures that data is securely stored and easily accessible for both the client and services. Queries

from Committee Service and SocietyMemberService are directed to Firebase DB to fetch or update data as needed.

VI. DESIGNS

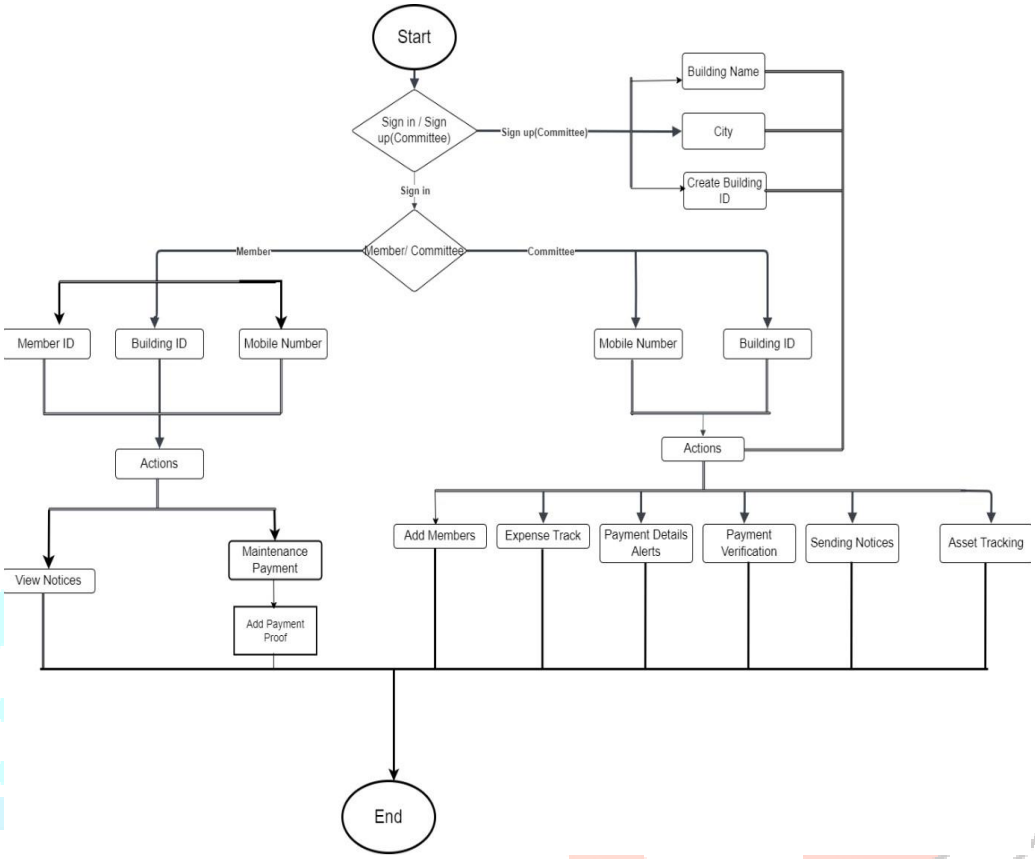

Fig. 2 Flow Chart

This flowchart outlines the management process for members and buildings in a residential society. It starts with sign-in or sign-up, followed by member management tasks like viewing notices and handling maintenance payments. Building management includes adding members, tracking expenses, sending alerts, verifying payments, and asset tracking, concluding at the end node.

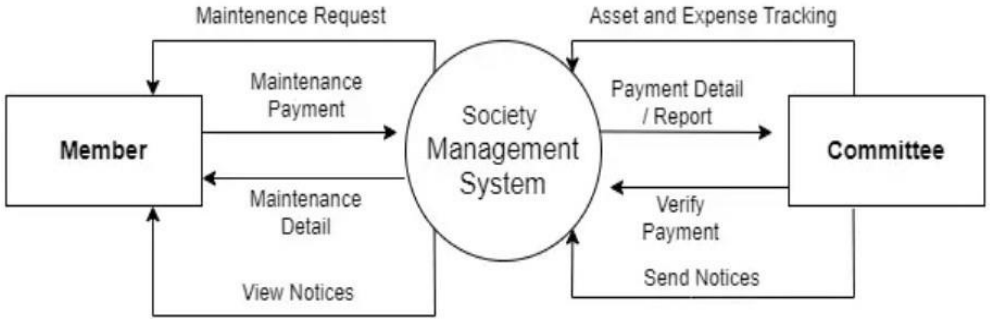

Fig.3 DFD Level 0

Level 0 Data Flow Diagram (DFD) illustrates the basic flow of information in a society management system. Members submit maintenance payments and view notices, while the committee verifies payments and sends notices to members. The system tracks assets and expenses, generating payment details and reports for the committee. The flow between members and the committee is mediated through the system, ensuring efficient management of society operations

VII. RESULT AND DISCUSSION

The implementation of the BuildingSync mobile application has significantly improved residential society management by addressing key challenges such as inefficient communication, manual maintenance tracking, and payment verification. The app facilitated real-time communication through push notifications, enabled residents to submit and monitor maintenance requests, and allowed committee members to verify payment proofs securely. Role-based access control ensured secure operations, while features like expense comparison, balance sheets, and asset tracking provided comprehensive financial oversight. The cloud-based infrastructure enabled real-time data synchronization and scalability, enhancing overall efficiency and transparency. These results demonstrate that BuildingSync not only streamlines operational workflows but also fosters better community engagement and accountability within residential societies.

VIII. FUTURE SCOPE

The scope of this project involves developing a cross-platform mobile application aimed at streamlining residential building and society management by enabling seamless communication between residents and the management committee. The application is designed to serve both residents and committee members by offering a centralized platform for various maintenance and administrative tasks.

For residents, the app facilitates the submission and real-time tracking of maintenance requests, provides access to personal payment history, enables secure uploading of payment proofs, and allows users to receive timely community notices and alerts. Additionally, residents can stay updated on society activities and receive important announcements directly through the app.

For committee members and administrators, the app offers robust tools to manage incoming maintenance tickets, verify payments, generate balance sheets, compare yearly expenses, and oversee assets like fixed deposits or investments. Advanced features like expense analytics, monthly financial summaries, and category-wise expense comparisons help in transparent financial governance.

The app is built using Flutter for cross-platform capability and Firebase for secure cloud storage, real-time data synchronization, and authentication. Emphasis is placed on scalability, user-friendliness, data privacy, and Android compatibility, with potential for future expansion to iOS platforms and web dashboards.

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