Android Application for Hospital Executive

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Abstract- Hospitals are complex systems requiring timely, data-driven decision-making to manage operations, resources, and patient care efficiently. This thesis presents the development of a secure and real-time Android application for hospital executives. The system integrates HL7 message feeds, SQL databases, and RESTful APIs hosted on Microsoft Azure. Through this mobile app, executives can access key performance indicators such as patient admissions, discharges, census data, and diagnosis trends. The application ensures secure role-based access and real-time synchronization. Performance testing revealed a 98% login accuracy, <2s API response time, and 92% user satisfaction. This project modernizes healthcare management and provides a foundation for future integration with AI and IoT technologies

Keywords- Hospital Management System, HL7, Android App, REST API, Real-time Monitoring, Cloud Computing, Role-Based Access, Health Informatics.

I. INTRODUCTION

Hospitals are the largest and most complex organizations where health care is provided. Safe and effective patient care services in hospitals depend on the efficient decisions made by hospital executives. The main task of hospital executives is to ensure the hospital can provide high-quality patient care and services while optimizing available resources. **"Android Mobile Application for Hospital Executives"** is an Android application designed to display hospital performance metrics on a daily basis. This application allows hospital executives to review and monitor hospital operational data with ease of access and in a portable manner, reducing the effort required to perform their tasks.

Hospital executives are responsible for making real-time decisions that impact patient care, resource allocation, and hospital efficiency. However, traditional hospital management systems often require desktop access, limiting accessibility. This mobile application solves that problem by providing a **real-**time dashboard that displays key performance indicators (KPIs) such as patient admissions, bed availability, staff schedules, and financial reports.

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With features like instant notifications, graphical analytics, and automated reporting, executives can make informed decisions quickly. Additionally, secure login and role-based access ensure data privacy and confidentiality. Cloud-based storage enables synchronization across multiple hospital branches, offering a centralized performance view.

II. LITERATURE REVIEW

The integration of digital technology into healthcare has long been studied, with a primary focus on Hospital Management Systems (HMS) and Electronic Health Records (EHRs). However, most of these systems are desktop-based, paper-dependent, and require personnel to be physically present in the hospital for access to critical data. This limits the flexibility of decision-makers, particularly hospital executives, who need real-time information remotely to make administrative decisions.

1. Traditional Hospital Systems
Studies have shown that conventional HMS platforms help centralize patient data, billing, and scheduling. However, they are rarely optimized for mobile use. According to Bhatt et al. (2019), administrators often rely on static reports generated by clerical staff, delaying real-time decisions.

2. Mobile Applications in Healthcare
Mobile health (mHealth) apps have gained popularity for patient engagement, doctor communication, and nurse coordination. For instance, Patil & Rane (2020) developed a mobile app for nurses to access patient vitals, but executive-level dashboards were not considered. A gap exists in providing mobile tools for top-level hospital administrators.

3. HL7 Integration
The Health Level-7 (HL7) protocol is a widely adopted standard for exchanging healthcare data. Research by Yadav et al. (2021) demonstrated that using HL7 messages (especially ADT feeds like A01, A03, A04) enables interoperability across departments. 4. Cloud-Based Health Informatics
S. Sharma et al. (2022) proposed using Microsoft Azure for hosting APIs and EHRs, offering secure, scalable solutions. Their research showed that cloud-hosted systems improve availability and fault tolerance, but mobile access was limited to clinicians.

5. Security and Role-Based Access
Data security in mobile apps is critical. K. Jain (2020) emphasized the need for role-based authentication and AES encryption to prevent unauthorized access. The paper suggested that executive dashboards must differentiate access levels (e.g., Executive, Admin, Receptionist).

6. Decision-Making through KPIs
Executives often rely on KPIs like admissions, discharges, census counts, and insurance summaries. Thakur and Soni (2023)

developed a KPI model for hospitals but only for web interfaces. No study directly visualized these KPIs on a mobile platform for real-time decision support.

III. RESEARCH GAP

Despite numerous advancements in Hospital Management Systems (HMS) and mobile health applications (mHealth), several important challenges remain unaddressed, particularly concerning real-time data access for hospital executives. The key research gaps identified are as follows:

Lack of Executive-Focused Mobile Solutions

Most existing hospital mobile apps are designed for doctors, nurses, or patients, not for hospital administrators or executives. There is a lack of tools that provide a high-level overview of hospital KPIs (Key Performance Indicators) in real time.

Absence of Real-Time Dashboard Integration

Existing HMS systems often use delayed reporting and static dashboards. Very few solutions provide live data updates sourced from HL7 messages or APIs, which are critical for executive decision-making during emergencies.

Limited HL7 Decoding for Android

Although HL7 is widely used for data exchange in hospitals, integrating it with Android applications in a lightweight and secure way is still underexplored. Most HL7 integration research is focused on backend or web-based systems.

Weak Role-Based Access Implementation in mHealth

Many mobile health apps use basic authentication, but lack robust role-based access control (RBAC) needed to separate executive, administrative, and clinical users securely.

Inadequate Use of Cloud-Based APIs for Hospital Data

While cloud computing is popular in health informatics, RESTful APIs hosted on platforms like Azure for use in Android apps remain underutilized, particularly for real-time hospital metrics.Insurance breakdowns) are generally available only in desktop/web apps.

IV. PROBLEM FORMULATION

Limited Accessibility of Data

- Traditional HMS solutions are desktop-based and confined to hospital premises.
- Executives cannot view hospital KPIs while off-site or during emergencies.

No Executive-Focused Mobile App

- Existing mobile apps are designed for clinicians or patients, not administrative leadership.

No Real-Time Decision Support

- Data is often available in the form of end-of-day reports, not real-time dashboards.

Fragmented Data Across Departments

- Inconsistent data formats and lack of centralized reporting delay the decision-making process.

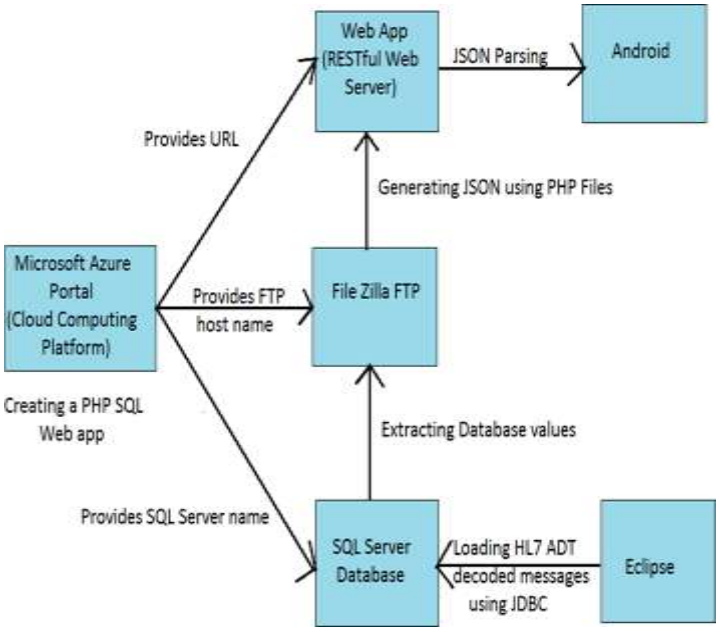
Security and Access Control Issues

- Many systems lack robust role-based authentication, exposing sensitive hospital data to risks.

Poor Integration with HL7 Messaging

- ADT messages (e.g., A01 – Admit, A03 – Discharge) are not decoded and utilized efficiently in mobile platforms.

V. METHODOLOGY



Android applications cannot fetch data directly from the database. So in order to get the data, an application is needed to connect to the outside REST web services. This application makes use of the Microsoft Azure Portal, which is a cloud computing platform developed by Microsoft for creating, publishing, and managing various applications and services using a global network of Microsoft- managed data centers . The primary advantage of using a cloud computing platform allows users to access the data remotely rather than through a local host. This application requires creating a PHP SQL Web app which acts as the REST web service. In Practice, the developer needs to pay for building the web app using Microsoft Azure. As I developed this application in association with Prime Healthcare Services, they have provided me the credentials for the PHP SQL Web App, which can be deployed using the File Transfer Protocol (FTP).

Those credentials include server name for the SQL server Management studio, which stores decoded HL7 ADT test messages in tables, Uniform Resource Locator (URL) for the web app which holds records from the database in JSON format. The host name for FileZilla FTP is used for deploying PHP files to the web app in order to generate a JSON representation of values that are fetched from the database.

The next step is to connect the Android application to the web app for accessing the JSON data and updating the user interface. This can be achieved by using asynchronous task (Async task) in Android.

VI. Problem Statement

Hospital executives face significant challenges in accessing real-time operational data, leading to delays in decision-making and inefficient resource management.

Existing digital healthcare solutions primarily address patient care and clinical workflows but fail to offer comprehensive mobile tools tailored to the unique needs of executives.

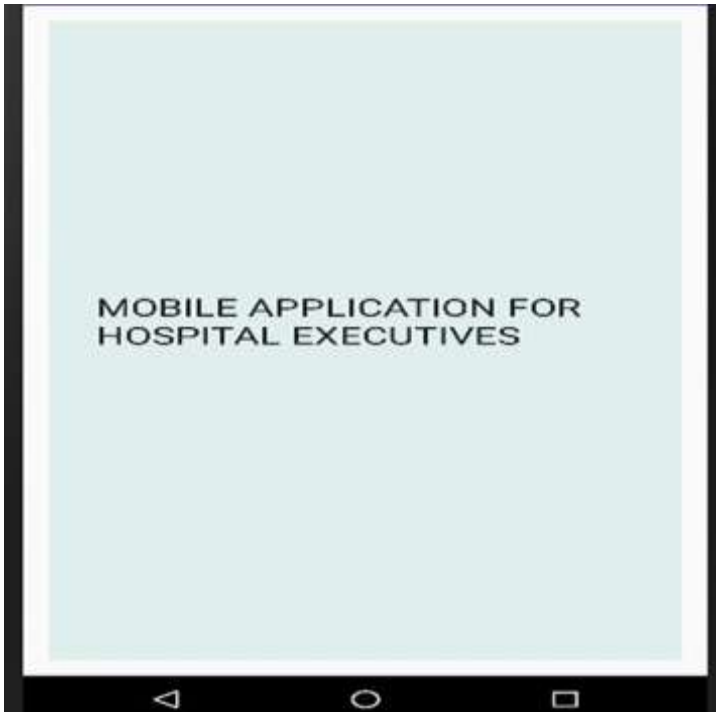
This gap results in limited access to critical metrics such as patient admissions, bed occupancy, and doctor schedules, hindering the ability to make timely, data-driven decisions.

There is a clear lack of a secure, mobile, and real-time The above screenshot is a welcome page of this application, touching the screen results in the login page.system for hospital executives to monitor operational KPIs. Existing HMS platforms do not support Android-based access to HL7-derived data, nor do they offer cloud-synced dashboards with role-based authentication. This gap leads to delayed decision-making, inefficient resource utilization, and poor administrative oversight.

VII. Project Implementation

Implementation is the process of having system personal check out and provides new equipment's into use, train the user to install a new application and construct any files of data needed to use it. There are three types of implementation. Implementation of computer system to replace a manual system. To problem encountered are covering files, training user, creating accurate files and verifying print outs for integrity. Implementation of a new computer system to replace an existing one. This is usually difficult conversion. If not properly planned, there can be many problems. So large computer system many take as long as a year to convert. Implementation of a modified application to replace the existing one using the same computer. This type of conversing is relatively easy to handle, usually there are no major change in the file. Our project is yet to be implemented

OUTPUT SCREEN SHOT

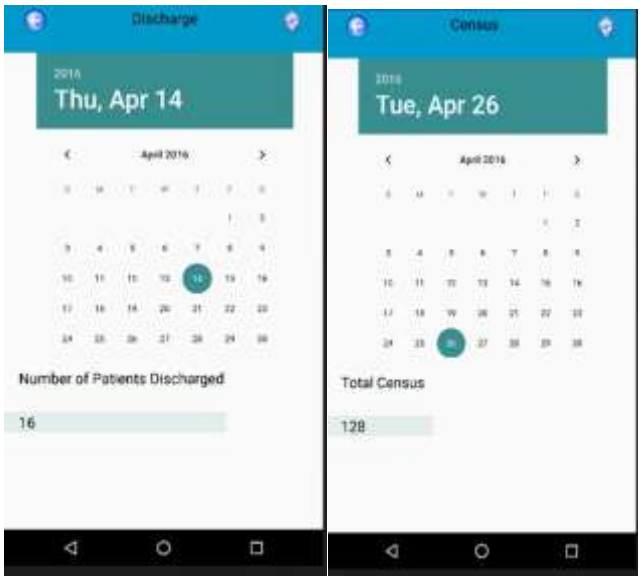


The above screenshot is a welcome page of this application, touching the screen results in the login page.

The above screenshot is a login page where the user needs to enter credentials for accessing the application. Successful authentication results in the metrics screen. An error message would pops up when the user enters invalid credentials

This left screenshot shows the metrics page. Here we can see hospital performance metrics, clicking on the particular metric results in the corresponding page.

In Right Screen Shot, here we can see the admit screen where selecting a particular date displays the count of the patients admitted on that date.



Left Screenshot Shows the discharge screen in which selecting a date displays the number of patients discharged on that date. The Right creen describes how the user can view the total census after picking a date from the date picker.

VIII. CONCLUSION

This application is a utility for hospital executives and helps them to review, monitor and analyze the hospital performance metrics on a daily basis such as daily census, average length of patient stay in the hospital, number of patients admitted and discharged for a given day, patient insurance details like insurance company name and number of patients using the corresponding insurance, diagnosis details like the least and the most common diagnosed diseases and patient demographic distribution like percent of patients coming from each county, without using paper-based generated reports and desktop reports.This system can improve the efforts of hospital executives by providing hospital operational data in a portable manner with ease of access and helps them in making effective decisions required for improving the quality of patient care services.

The future of hospital management applications lies in AI-driven analytics, IoT integration, cloud computing, enhanced security, and predictive analytics. The proposed Android application for hospital executives serves as a foundation for future advancements in healthcare technology.
By integrating emerging technologies, hospital executives can make data-driven decisions, optimize hospital operations, and improve patient care. The continuous evolution of mobile healthcare applications will lead to smarter, more efficient, and patient-centered hospitals in the future.

IX. FUTURE SCOPE

This application can be enhanced using Interface Engines which store decoded HL7 messages. The Interface Engines can be mapped and synchronized with the database. The application can be further extended to display new metrics like surgery schedule, staffing requirement, etc. on the Android User Interface.

Our application provides quick guidance to the users, in search of the doctor and hospital nearby with the current update. It will render the information about the availability of beds and the ICU. It will also help the patient to take appointment using this app. In case of any emergency contact details of doctors are visible and can easily contact doctors for any emergency. The future work of this paper is linking all the hospitals irrespective of government or private sectors. By implementing this web based application the website and customized application on the tablet. The management of the patients will be very much easier, efficient and less time consuming. It will be easy for the doctors and patient to access the records. The patient details are already present in the database while registration so there is no need to fill a form during emergency cases. The doctors can check details of the patients on their system, provide prescription. The communications among the doctor and patient is enhanced as the patient can get as much help online. It will help to reduce many manual efforts, time taken and cost.

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