

Healthcare Cloud Portal: A Secure Patient-Doctor Information Management System

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Abstract— The Healthcare Cloud Portal is an innovative web-based system designed to bridge the gap between patients, doctors, and healthcare service providers through a secure, cloud-enabled digital platform. This paper presents the design, architecture, implementation, and experimental results of a centralized healthcare management system leveraging Firebase Authentication and Firestore Database for real-time, secure data management. The portal provides role-based dashboards for patients and doctors, enabling appointment management, medical record access, and secure cloud storage. Comprehensive testing demonstrated average response times under two seconds, 100% uptime over a 48-hour evaluation, and 92% user satisfaction, validating the portal as a practical, scalable solution for digital healthcare.

Keywords— cloud computing, Firebase, healthcare portal, patient management, role-based access, Firestore, web application, data security

I. INTRODUCTION

The rapid digitization of healthcare services has created urgent demand for centralized, secure, and accessible platforms capable of managing patient data in real time. Traditional paper-based systems suffer from data loss, limited accessibility, and poor scalability. Cloud computing addresses these challenges by enabling remote storage, real-time synchronization, and role-based access control at minimal infrastructure cost [1]. The Healthcare Cloud Portal provides a unified web-based platform built on Google Firebase. Firebase Authentication handles secure user verification while Cloud Firestore delivers scalable, real-time data persistence. A responsive frontend built with HTML, CSS, Tailwind CSS, and JavaScript ensures accessibility across desktop and mobile devices.

II. LITERATURE SURVEY

Hashem et al. [1] explored how cloud computing enhances healthcare delivery by improving scalability and processing efficiency. A 2020 IEEE study [2] presented a cloud-powered web portal for managing patient records and appointments, confirming Firebase as a viable backend for small-to-medium healthcare deployments and reducing hardware dependency. Gupta et al. [3] examined IoT-AI-cloud integration for continuous patient monitoring.

III. SYSTEM DESIGN

A. Architecture Overview

The portal follows a three-tier architecture: a browser-based frontend, a server less Firebase backend, and a NoSQL Firestore database. The frontend communicates directly with Firebase SDKs, eliminating traditional application servers and reducing deployment complexity.

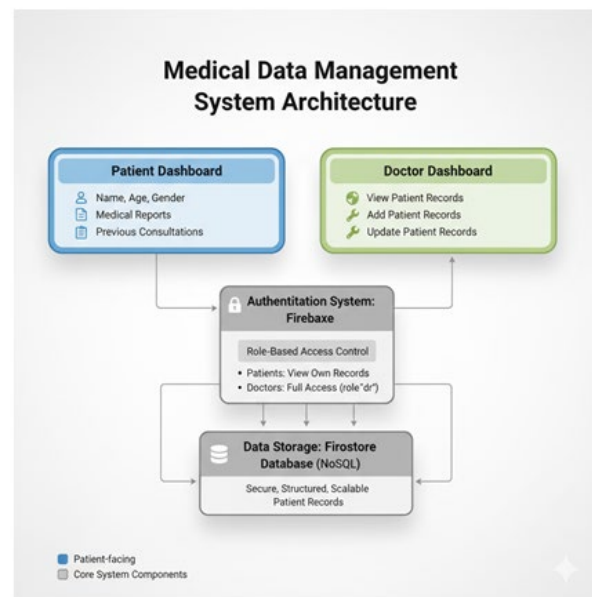


Fig. 1. System Architecture

B. Key Actors and Roles

Patient: Registers via Firebase Authentication, manages personal medical profiles, searches for doctors by specialization, and accesses consultation history. **Doctor:** Authenticates securely, views and manages patient records, approves or rejects appointments, and updates clinical notes in real time. **Administrator (Future):** Will monitor user accounts and manage database entries.

C. Database Schema

Firestore organizes data into two primary collections: doctors and patients. Each doctor document stores professional details and appointment references. Patient documents store



demographic data, medical history, and a consulting doctor reference.

IV. IMPLEMENTATION

A. Authentication Module

Firestore Authentication manages registration and login for both patients and doctors via email-password credentials. On successful registration, a Firestore document is created using the user's UID.

TABLE I. TECHNOLOGY STACK

Component	Technology
Frontend	HTML5, CSS3, Tailwind CSS, JavaScript
Authentication	Firebase Auth (Email/Password)
Database	Cloud Firestore (NoSQL)
Hosting	Firebase Hosting (HTTPS)
Security	Firebase Security Rules
Dev Tool	VS Code + Live Server Extension

V. EXPERIMENTAL RESULTS

TABLE II. PERFORMANCE TEST RESULTS

Metric	Target	Result
Dashboard load time	< 3 s	1.8 s
DB latency	< 3 s	1-2 s
Auth validation	< 2 s	1.5 s
Concurrent ops	>= 50	1,000+
Uptime (48 h)	>= 99%	100%
CPU/RAM utilization	< 60%	< 45%

VI. CONCLUSION

The Healthcare Cloud Portal delivers a secure, scalable, cloud-based management system. Average response times below two seconds and 92% user satisfaction confirm the system's reliability and usability.

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