VISVESVARAYA TECHNOLOGICAL UNIVERSITY

BELGAUM, KARNATAKA - 590 014

MINI-PROJECT SYNOPSIS

ON

"MedTrack: Unified Patient History Management System"

Submitted By

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Problem Statement:

In modern healthcare, patient records are often isolated in different hospital databases, making it difficult for healthcare providers to access comprehensive patient histories. This fragmentation results in inefficiencies such as delayed treatments, repetitive tests, and increased healthcare costs. Additionally, the lack of interoperability between different systems makes it challenging for doctors to gather complete information on a patient, especially during emergencies. Furthermore, securing sensitive medical data is a growing concern, with many existing systems failing to provide adequate privacy and security measures.

The problem, therefore, is to create a unified, secure platform where healthcare professionals can quickly and securely access patient records, even if the data comes from multiple hospitals or sources, while adhering to strict data protection regulations like HIPAA[3] and GDPR[4].

Objectives of the Project:

The project has following key objectives:

1. Provide a centralized platform for doctors and authorized medical personnel to access patient medical histories across various hospitals.
2. Ensure secure and privacy-compliant access to sensitive patient data.
3. Improve the efficiency of healthcare services by reducing the time spent accessing patient records from different systems.
4. Enable hospitals to integrate and share patient data while maintaining control over access and modification rights.
5. Ensure transparency with audit trails for every access or modification of patient records.

Methodology:

The project will involve the following steps:

1. **User Authentication and Access Control:**
   - A secure login system will be implemented using OAuth2 and NextAuth. Role-based access control will be applied to ensure that only authorized personnel (doctors, nurses, etc.) can access patient records.
2. **Data Integration:**
   - The platform will integrate patient data from multiple hospitals using APIs that support healthcare data exchange standards like HL7 or FHIR. This ensures that the platform can pull data from various sources seamlessly.
3. **Data Encryption and Security:**
   - All patient data will be encrypted both at rest and in transit to ensure compliance with privacy regulations such as HIPAA. Encryption techniques like AES for data at rest and TLS for data transmission will be used. An audit trail will track all access to patient data to provide transparency.

4. **User Interface:**
   - A responsive web interface built using Next.js will allow doctors to easily search and view patient records. The dashboard will display critical patient information, including medical history, test results, medications, and allergies.
5. **Audit Logs and Reporting:**
   - The system will generate audit logs for every interaction with the patient records, documenting who accessed or modified the data. This ensures transparency and accountability.

Hardware & Software to be Used:

1. **Hardware:**
   - Cloud servers for hosting the application (e.g., AWS, Azure)
   - Client devices such as laptops, desktops, and tablets for accessing the platform.
2. **Software:**
   - **Frontend**: Next.js for building the web application interface.
   - **Backend**: Node.js and Express.js for handling business logic and server-side operations.
   - **Database**: MongoDB for securely storing patient records.
   - **APIs**: Integration with hospital data systems using HL7 and FHIR protocols.
   - **Authentication**: NextAuth for OAuth2-based authentication.
   - **Encryption**: TLS/SSL for communication security and AES for data encryption.
   - **Cloud Platform**: AWS or Azure for hosting and scaling the application.

Expected Outcomes:

1. A fully functional, secure web application where authorized healthcare professionals can access patient histories from multiple hospitals.
2. Faster and more efficient healthcare delivery by providing doctors with comprehensive patient information.
3. Adherence to data protection laws (HIPAA, GDPR) with secure storage and transfer of patient records.
4. Transparency in the healthcare system through audit trails that log all data access and modifications.
5. A scalable and interoperable platform that can be adopted by various healthcare institutions.

Process Description:

The proposed system will follow this process:

1. **User Authentication**: Users (doctors, medical staff) will log in using a secure OAuth2 system.
2. **Search Patient Records**: The user will search for patient data using various filters (e.g., patient ID, hospital, name).

3.**Data Retrieval**: The platform retrieves patient data from multiple hospitals via integrated APIs.
4.**View and Analyze Data**: The data will be displayed in a well-organized format, showing medical history, test results, prescriptions, etc.
5.**Audit Logging**: Every access or modification to patient data will be logged for accountability.

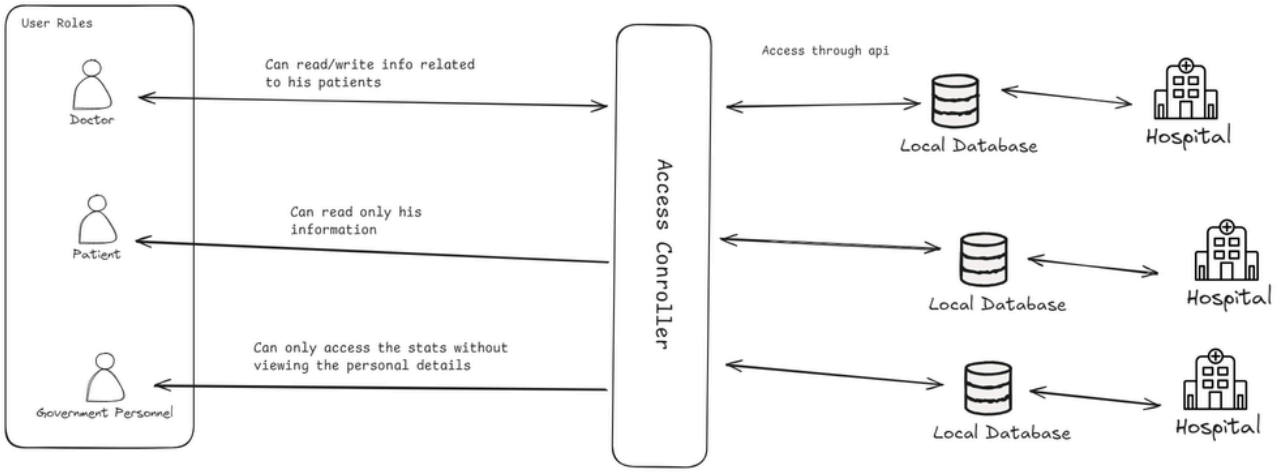

Figure: System chart

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