PROJECT WORK - MCA 2022-2024
ONLINE BLOOD BANK WEB APP USING MERN STACK

Abstract:

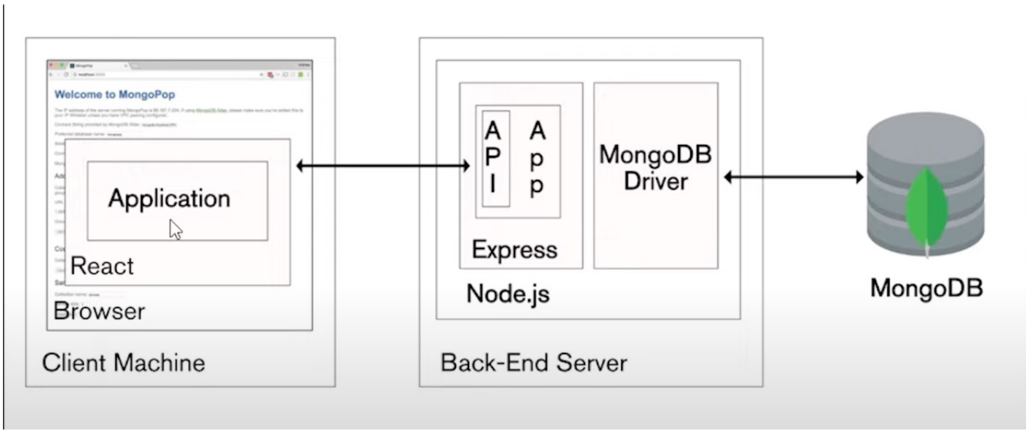
In modern healthcare systems, the efficient management of blood donation and distribution plays a crucial role in saving lives. The Blood Bank Web App, built using the MERN (MongoDB, Express.js , React.js , Node.js) stack, addresses the challenges associated with blood donation and management by providing a comprehensive platform for donors, recipients, and blood bank administrators.

This platform emerges as a beacon of hope, a digital ecosystem meticulously crafted to streamline the intricate blood donation process. With its profound mission to bridge the ever-persistent gap between blood supply and demand, At its core, this web application embodies the fusion of cutting-edge technologies with the humanitarian ethos of blood donation.

Through the harmonious integration of the MERN stack , donors and recipients alike are greeted with an user-friendly interface that simplifies every step of the donation journey. From the moment a potential donor registers on the platform to the instant a life-saving transfusion takes place, every interaction orchestrated to ensure efficiency, transparency, and convenience. it connect donors with recipients in need.

The Online Blood Bank Web App empowers decision-makers to optimise resource allocation, anticipate demand fluctuations, and streamline logistical operations. the Online Blood Bank Web App stands as a beacon of hope, a testament to the boundless potential of technology to foster positive change and create a brighter, healthier future for all.

Student Name:	Pulaparthi Kumara ss Kamal	**Project Work Supervisor**
Roll No	**:** 22021F0011	Dr. K Sahadevaiah
Mobile No	**:** 8500457260	Professor , CSE, UCEK(A)



Front-End Technologies: In the MERN (MongoDB, Express.js, React.js, Node.js) stack, the frontend technologies primarily consist of React.js, along with HTML, CSS, and JavaScript. Here's an explanation of these frontend technologies along with their functionalities:

React.js:

Language: JavaScript

Library: React.js

Functionality: React.js is a powerful JavaScript library for building user interfaces, developed by Facebook.It follows a component-based architecture, where UIs are composed of reusable components that manage their state and lifecycle.React allows developers to create interactive and dynamic UIs using a declarative syntax, making it easier to understand and maintain code.It employs a virtual DOM (Document Object Model), which efficiently updates and renders components based on changes in data or state.React.js facilitates the creation of single-page applications (SPAs), where UI updates occur without requiring full page reloads, resulting in a smoother user experience.With the help of React Router, developers can implement client-side routing to handle navigation within the application without server roundtrips.

HTML (Hypertext Markup Language):

Language: HTML

Functionality: HTML is the standard markup language used to create the structure of web pages.It provides a set of elements and tags to define the content and layout of a webpage, including headings, paragraphs, lists, links, and more.HTML elements are used to represent the structure and semantics of a document, making it accessible to users and search engines.In the context of the MERN stack, HTML is often used alongside React.js to define the structure of React components, incorporating dynamic data and rendering logic.

CSS (Cascading Style Sheets):

Language: CSS

Functionality: CSS is a style sheet language used for describing the presentation of a document written in HTML.It enables developers to control the visual appearance of elements on a webpage, including layout, colors, fonts, and animations.CSS can be applied internally within HTML documents, externally as separate style sheets, or inline directly within HTML elements. With the use of CSS preprocessors like Sass and Less, developers can write more maintainable and modular stylesheets, incorporating features like variables, mixins, and nesting.CSS frameworks such as Bootstrap and Material-UI provide pre-designed styles and components to expedite frontend development and ensure consistency across projects.

JavaScript:

Language: JavaScript

Functionality: JavaScript is a high-level, interpreted programming language that enables dynamic and interactive behavior on web pages.It is the primary scripting language for web development, allowing developers to manipulate DOM elements, handle events, and create interactive features.JavaScript is essential for adding interactivity and functionality to web applications, such as form validation, animations, and AJAX requests. JavaScript introduced modern features like arrow functions, classes, modules, and async/await syntax, enhancing developer productivity and code readability. JavaScript frameworks and libraries like React.js, Angular, and Vue.js provide abstractions and tools for building complex web applications, enabling developers to create rich, interactive user experiences.Together, these frontend technologies in the MERN stack empower developers to build modern, responsive, and interactive web applications with a focus on code reusability, maintainability, and performance.

Back-End Technologies:

In the MERN stack, the backend technologies consist primarily of Node.js and Express.js. Here's an explanation of these technologies along with their functionalities:

Node.js:

Language: JavaScript

Functionality: Node.js is a server-side JavaScript runtime environment built on Chrome's V8 JavaScript engine.It allows developers to run JavaScript code on the server, enabling full-stack JavaScript development.Node.js is event-driven and non-blocking, making it efficient for handling concurrent connections and I/O operations.It provides a vast ecosystem of packages and modules through npm (Node Package Manager), facilitating code reuse and dependency management.Node.js is well-suited for building scalable, real-time applications such as web servers, APIs, and microservices.

Express.js:

Language: JavaScript

Framework: Express.js

Functionality: Express.js is a minimalistic web application framework for Node.js.It provides a robust set of features for building web servers and APIs, including routing, middleware, and template engines.Express simplifies the process of handling HTTP requests and responses, allowing developers to define routes and execute corresponding logic.Middleware functions in Express can preprocess requests, perform authentication, logging, error handling, and more.Express.js is highly flexible and extensible, allowing developers to integrate additional libraries and customize the server's behavior as needed.It is widely used in the Node.js ecosystem for building RESTful APIs, single-page applications (SPAs), and server-side rendering (SSR) applications.Together, Node.js and Express.js form the backbone of the backend in the MERN stack, providing the server-side logic and infrastructure necessary to handle client requests, interact with databases (such as MongoDB), and serve data to frontend components built with React.js. They enable developers to create efficient, scalable, and maintainable web applications with a unified JavaScript stack**.**

DataBase: In the MERN (MongoDB, Express.js, React.js, Node.js) stack, the database technology primarily consists of MongoDB. Here's an explanation of MongoDB along with its functionalities

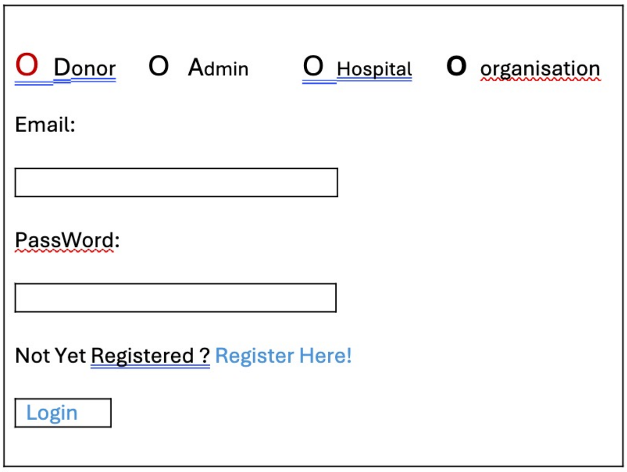
MongoDB:

Database Type: NoSQL Functionality:MongoDB is a cross-platform, document-oriented database program, classified as a NoSQL database.It stores data in flexible, JSON-like documents called BSON (Binary JSON), which allows for nested data structures and dynamic schemas.MongoDB is schema-less, meaning you can store heterogeneous data without a predefined schema, providing flexibility and scalability.The database supports ad-hoc queries, indexing, and manipulation.MongoDB is highly scalable, with built-in support for horizontal scaling through sharding, enabling distribution of data across multiple servers.It provides high availability and fault tolerance through replica sets, ensuring data redundancy and automatic failover in case of node failures.MongoDB's rich query language and powerful aggregation framework make it suitable for a wide range of applications, from small-scale projects to large-scale enterprise systems.With official drivers and libraries available for various programming languages, including Node.js, MongoDB integrates seamlessly with the backend in the MERN stack, allowing developers to interact with the database using familiar JavaScript syntax.In summary, MongoDB serves as the database technology in the MERN stack, offering flexibility, scalability, and performance for storing and managing data in modern web applications. Its document-oriented approach, coupled with features like horizontal scaling and high availability, makes it well-suited for a diverse range of use cases, from content management to real-time analytics. By leveraging MongoDB alongside other components of the MERN stack, developers can build robust, scalable, and feature-rich applications that meet the demands of today's dynamic web environments.

Expected Results:

1) Login and Registration pages:

Login page



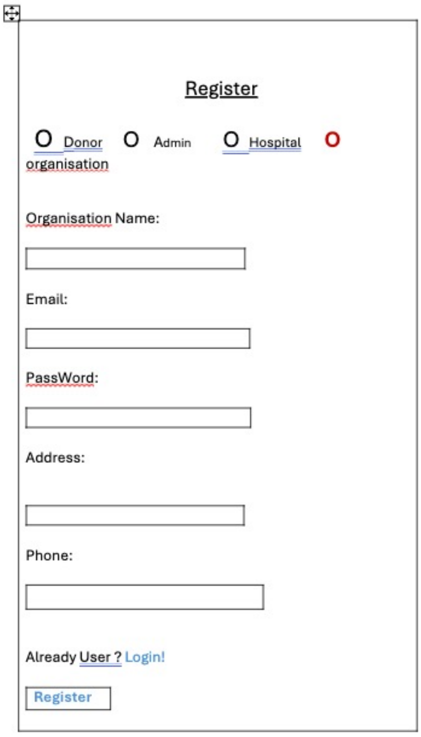
○ Donor ○ Admin ○ Hospital ○ organisation

Email:

PassWord:

Not Yet Registered ? Register Here!

Login



Register

○ Donor ○ Admin ○ Hospital ○ organisation

Organisation Name:

Email:

PassWord:

Address:

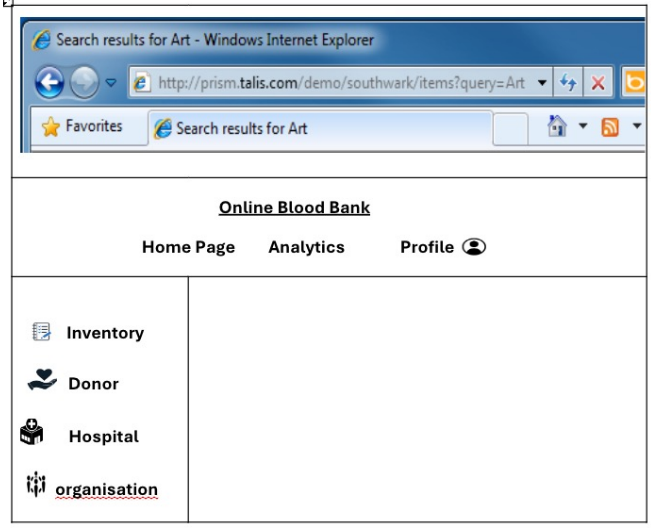
Phone:

Already User ? Login!

Register

2) Organisation Login and Components:

Organisation --> home page Details:


Search results for Art - Windows Internet Explorer
http://prism.talis.com/demo/southwark/items?query=Art
Favorites
Search results for Art

Online Blood Bank

Home Page Analytics Profile

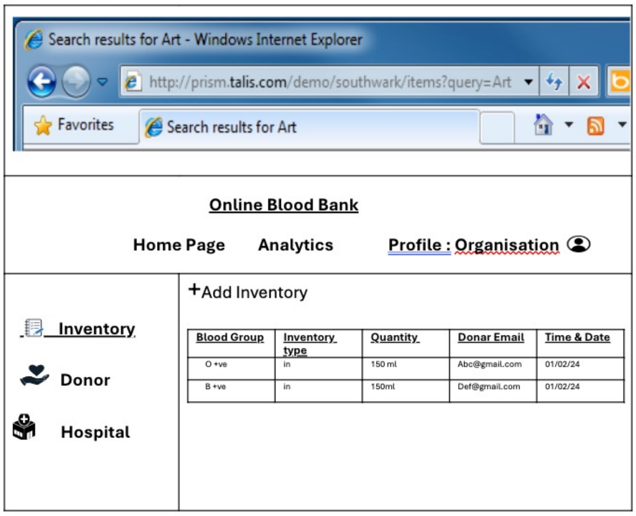
Inventory

Donor

Hospital

organisation

Organisation -->inventory Details:


Search results for Art - Windows Internet Explorer
http://prism.talis.com/demo/southwark/items?query=Art
Favorites
Search results for Art

Online Blood Bank

Home Page Analytics Profile : Organisation

Inventory

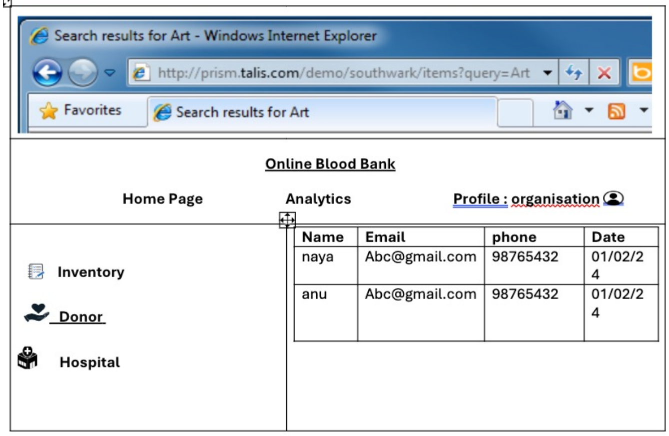
Donor

Hospital

+Add Inventory

Blood Group	Inventory type	Quantity	Donar Email	Time & Date
O +ve	in	150 ml	Abc@gmail.com	01/02/24
B +ve	in	150ml	Def@gmail.com	01/02/24

Organisation --> Donar details:


Search results for Art - Windows Internet Explorer
http://prism.talis.com/demo/southwark/items?query=Art
Favorites
Search results for Art

Online Blood Bank

Home Page Analytics Profile : organisation

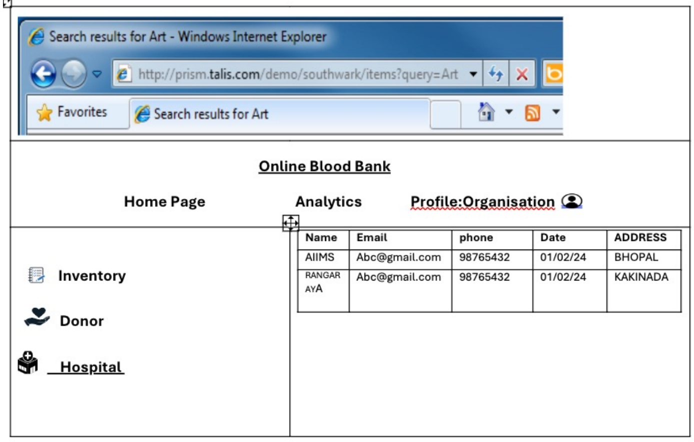
Inventory

Donor

Hospital

Name	Email	phone	Date
naya	Abc@gmail.com	98765432	01/02/24
anu	Abc@gmail.com	98765432	01/02/24

Organisation--> Hospital details:


Search results for Art - Windows Internet Explorer
http://prism.talis.com/demo/southwark/items?query=Art
Favorites
Search results for Art

Online Blood Bank

Home Page Analytics Profile:Organisation

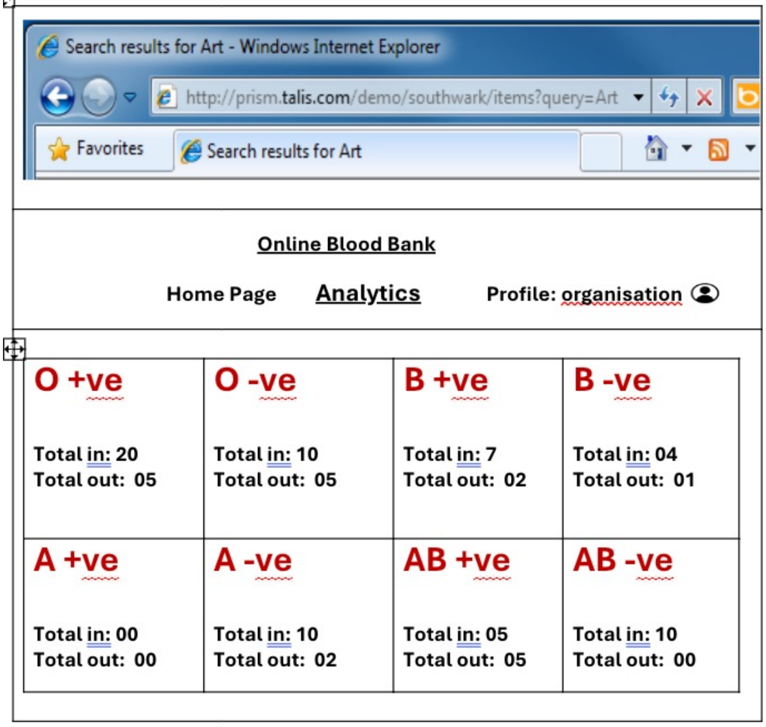
Inventory

Donor

Hospital

Name	Email	phone	Date	ADDRESS
AIIMS	Abc@gmail.com	98765432	01/02/24	BHOPAL
RANGARAYA	Abc@gmail.com	98765432	01/02/24	KAKINADA

Organisation -->Analytics Details:


Search results for Art - Windows Internet Explorer
http://prism.talis.com/demo/southwark/items?query=Art
Favorites
Search results for Art

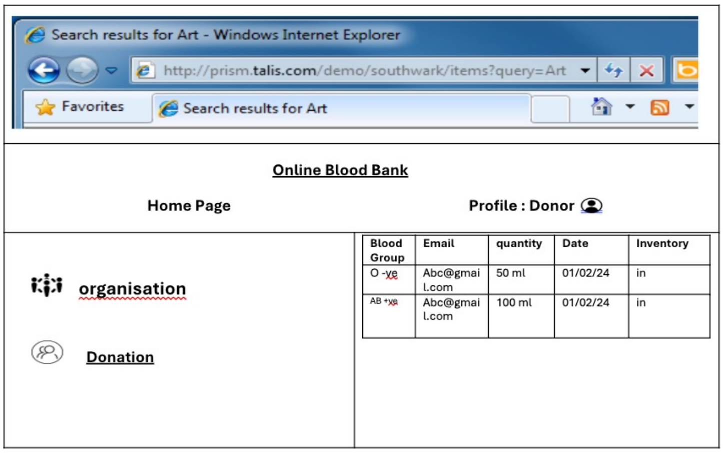
Online Blood Bank

Home Page Analytics Profile: organisation

O +ve Total in: 20 Total out: 05	O -ve Total in: 10 Total out: 05	B +ve Total in: 7 Total out: 02	B -ve Total in: 04 Total out: 01
A +ve Total in: 00 Total out: 00	A -ve Total in: 10 Total out: 02	AB +ve Total in: 05 Total out: 05	AB -ve Total in: 10 Total out: 00

(3) Donor login and components

Donor login details:


Search results for Art - Windows Internet Explorer
http://prism.talis.com/demo/southwark/items?query=Art
Favorites
Search results for Art

Online Blood Bank

Home Page Profile : Donor

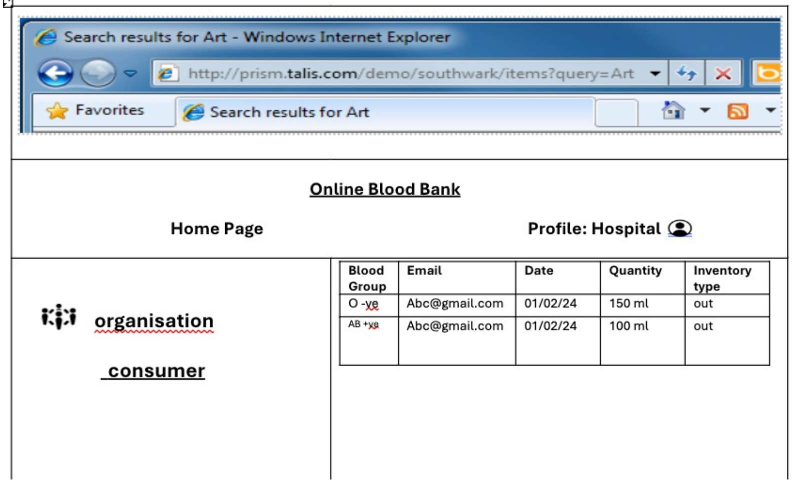
organisation

Donation

Blood Group	Email	quantity	Date	Inventory
O -ve	Abc@gmail.com	50 ml	01/02/24	in
AB +ve	Abc@gmail.com	100 ml	01/02/24	in

(4) Hospital login and components:

Hospital login details:


Search results for Art - Windows Internet Explorer
http://prism.talis.com/demo/southwark/items?query=Art
Favorites
Search results for Art

Online Blood Bank

Home Page Profile: Hospital

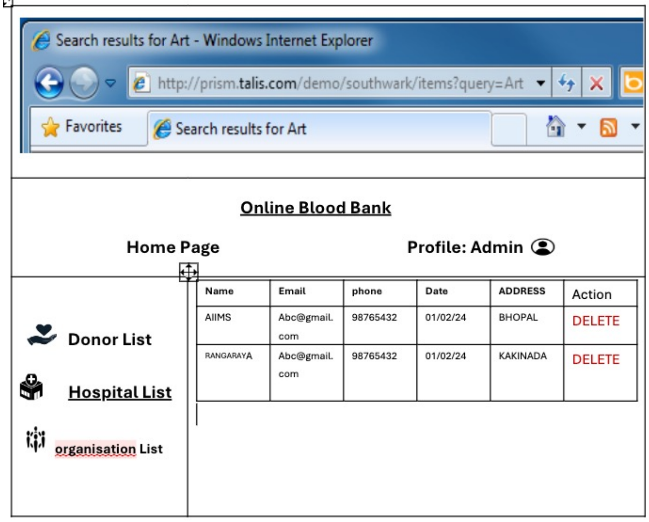
organisation

consumer

Blood Group	Email	Date	Quantity	Inventory type
O -ve	Abc@gmail.com	01/02/24	150 ml	out
AB +ve	Abc@gmail.com	01/02/24	100 ml	out

(5) Admin login and components:

Admin--> home page Hospital Actions Details:


Search results for Art - Windows Internet Explorer
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Favorites
Search results for Art

Online Blood Bank

Home Page **Profile: Admin**

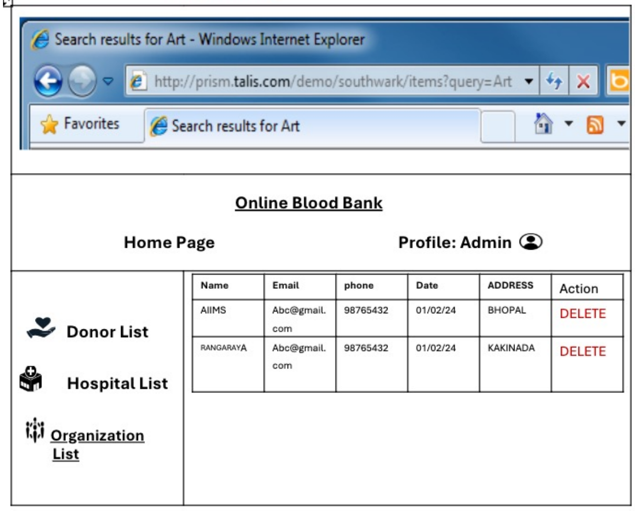
Donor List

Hospital List

organisation List

Name	Email	phone	Date	ADDRESS	Action
AIIMS	Abc@gmail.com	98765432	01/02/24	BHOPAL	DELETE
RANGARAYA	Abc@gmail.com	98765432	01/02/24	KAKINADA	DELETE

Admin--> home page Organisation Action Details: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Favorites
Search results for Art

Online Blood Bank

Home Page **Profile: Admin**

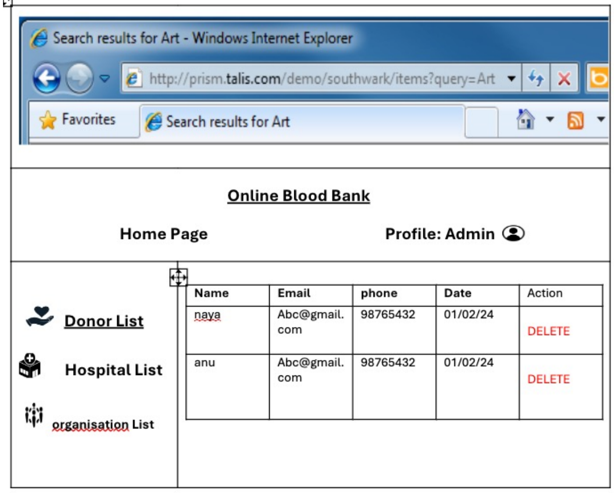
Donor List

Hospital List

Organization List

Name	Email	phone	Date	ADDRESS	Action
AIIMS	Abc@gmail.com	98765432	01/02/24	BHOPAL	DELETE
RANGARAYA	Abc@gmail.com	98765432	01/02/24	KAKINADA	DELETE

Admin--> home page Donor Actions Details: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Search results for Art

Online Blood Bank

Home Page **Profile: Admin**

Donor List

Hospital List

organisation List

Name	Email	phone	Date	Action
naya	Abc@gmail.com	98765432	01/02/24	DELETE
anu	Abc@gmail.com	98765432	01/02/24	DELETE

Key Features:

User Registration/ and Authentication: Users can register as donors, Hospital, blood bank administrators or Organisation ensuring secure access to the platform.Robust authentication mechanisms safeguard user data and privacy.

login: User may be a Donar/ Organisation / Hospital/ Admin Required information is gathered after logging in to the application home page

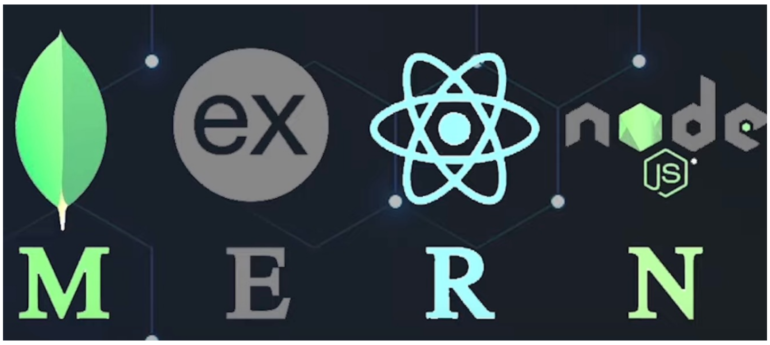
Donor Management: Donors can create and manage their profiles, including personal information, blood type, and donation history.Real-time updates allow donors to receive notifications about local blood drives and urgent donation requests.

Consumers Requests: Recipients, such as hospitals or individuals in need of blood, can submit requests for specific blood types.The app matches recipients with potential donors based on location and blood compatibility, streamlining the donation process.

Inventory Management: Blood bank administrators can monitor and manage the blood inventory in real-time.Features include tracking donations, expiration dates, and ensuring adequate supply levels to meet demand.

Analytics Management: Analytics will give pictorial view of Blood groups present in the bank Inventory gives the core information to Analytics.

Technologies Used for Development:



MERN Stack:

MongoDB:.MongoDB uses collections and documents to organize data, similar to tables and rows in relational databases.It supports rich queries, indexing, and aggregation pipelines for efficient data retrieval and manipulation

Express.js: Express.js is a minimalist web application framework for Node.js.It provides a robust set of features for building web servers and APIs. Express simplifies routing, middleware integration, and request handling.Middleware functions in Express can perform tasks like authentication, logging, and error handling.

React.js: React.js is a JavaScript library for building user interfaces, developed by Facebook.It allows developers to create reusable UI components using a declarative syntax.React efficiently updates and renders components based on changes in application state.It promotes a component-based architecture, making it easier to manage complex UIs.

Node.js: Node.js is a server-side JavaScript runtime built on Chrome's V8 engine.It allows JavaScript to be executed outside the browser, enabling server-side development.Node.js has a non-blocking, event-driven architecture, making it lightweight and scalable.It comes with a vast ecosystem of packages and modules available through npm (Node Package Manager).

How MERN Stack Works: Client-Side Interaction:The client interacts with the application's user interface, built using React.js.React components render the UI based on application state and user interactions.Components may make requests to the server-side API for data retrieval or manipulation.

Server-Side Logic: Express.js handles server-side logic and routing.Routes are defined to handle incoming HTTP requests and execute corresponding actions.Middleware functions can preprocess requests, authenticate users, and perform other tasks before passing control to route handlers.

Database Operations: MongoDB is used to store and retrieve data.Mongoose, an ODM (Object Data Modeling) library for MongoDB, can be used to define schemas and interact with the database from Node.js.

API Communication: Client-side components interact with the server-side API endpoints via HTTP requests.Express.js routes handle these requests, performing CRUD (Create, Read, Update, Delete) operations on the database.Responses from the server are typically in JSON format, which can be consumed by React components.

Real-Time Updates (Optional): Socket.io or other real-time communication libraries can be integrated to enable real-time updates between clients and the server.This allows for features like live chat, notifications, or collaborative editing in real-time.

Deployment: MERN applications can be deployed to various hosting platforms, such as Heroku, AWS, or DigitalOcean.Deployment involves configuring the server environment, setting up a database, and deploying the client-side code. By combining MongoDB, Express.js, React.js, and Node.js, developers can create full-stack web applications with a unified JavaScript stack, enabling efficient development and seamless communication between the client and server components.