Food Delivery App

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ABSTRACT

- This paper describes the design and development of a scalable and efficient "food delivery application" based on MERN stack i.e. combination of MongoDB, Express.js, React.js, and Node.js. The food delivery application aims at simplifying food ordering process, connecting user with restaurant, and tracking the order. The research work includes system architecture, UI/UX strategies, backend development, database modelling, and deployment practices. Performance evaluations indicate that MERN stack provides a good foundation for real-time web applications with dynamic user interface.
- The front-end development has been done with React.js. A responsive user interface which provides interactive experience to the user has been developed. Customers can see the menu and place an order.
- The technical analysis during the development of the food delivery application and the fixes that we have implemented will be discussed.
- To conclude, MERN stack developed Food Delivery Application shows how you can successfully build a feature-rich application that enables smooth food ordering and food delivery services. While satisfying the needs of the patrons and the restaurant owners, a great user experience is guaranteed by using the latest web technologies and efficient development practices.

I. INTRODUCTION

This is full stack web application for ordering food developed using MERN stack (MongoDB, Express, React, Node.js). In this project, there will be an admin app for managing orders, menu items, etc. and customer app for ordering food.

1.MongoDB: MongoDB is a NoSQL database that is flexible and ideal for managing semi-structured data because it stores data in documents that resemble JSON. It is built for high performance, high availability, and easy scalability.

2.Express.js: Express.js is a simple and unopinionated, yet feature-rich web application framework for Node.js that provides a robust set of features for developing web and mobile applications. Express.js makes middleware development easy, request and response object processing and route management simple. Its lightweight and modular architecture make it incredibly flexible and efficient for creating web applications.

3.React.js: React.js is a JavaScript user interface development library. It makes it possible to create reusable user interface components and to efficiently update and redraw them in response to changes in data. The component-based approach of React.js promotes modularity, maintainability, and reuse. It also has a virtual DOM as well. (Document Object Model) which improves rendering and performance.

4.Node.js: Node.js lets you run JavaScript code on a computer, not just in a web browser. It's mainly used to build the back-end parts of websites and applications. Programmers can run JavaScript code outside of a web browser. Because of its non-blocking, event-driven architecture, it is incredibly scalable and adept at handling many requests concurrently. Developing the backend of websites is a great fit for Node.js because it provides network connectivity, file system functions, and server-side scripting.

LITERATURE SURVEY

A number of works emphasize on the importance of real-time functionality, modular design, programming and responsiveness of user interface in food delivery application. Owing to its complete JavaScript foundation, MERN stack benefits from reducing the development times and enhancing the maintainability of the codebase by allowing the developers to write isomorphic code for both the front-end and back-end. Previous works have also shown the efficiency of NoSQL database such as MongoDB in handling complex and unstructured data which is typical of user-generated systems.

1. Food delivery application based on MERN stack used by R. Sharma et al. (2020). Their application focuses on real-time and module-based design of order. High responsiveness of user interface and smooth user experience achieved by the System.
2. Scalable meal ordering application developed by P. Verma et al. (2021). They used MongoDB database to store menu and user information. They also used Express.js and Node.js in their backend. High performance achieved by the system while processing large number of orders concurrently.

Web Development Using MERN Stack

Restaurant management system coded by S. Mehta et al. (2019) in Node.js (backend) and React.js (frontend).In their research work, they concluded that how MERN able to decrease the load on server and increase responsiveness of client.

SYSTEM DESIGN

3.1 Technologies

- **Frontend:** Handles Routing, React Context API, React Router , React.js
- **Backend:** Node.js, Express.js
- **Database:** MongoDB (stores user profiles, restaurant data, menu items, and orders).

3.2 Features

- User authentication and authorization
- Explore food items
- Add food items to the cart and place orders
- Secure and reliable payment processing and Order tracking
- Admin panel to manage menu items, orders

3.3 Design

We will be using MERN (MongoDB,Express.js,React,js,Node.js) stack to build an application. MERN has a good set of tools, libraries to build a scalable web application.

MongoDB will be used to store consumer and restaurant information.

Express will be used to build a backend of the application to handle requests and responses between the database and front end.React will be used to build an user interface to allow customer browse restaurant and place an order.Node.js will used to build the backend.

3.4 DEVELOPMENT

The application will have the following functions:

1. **User Authentication**: In order to use the application, users need to register and login first.
2. **Menu Management**: Patrons will have the ability to peruse the menu.
3. **basket and Checkout**: Customers can use a variety of payment options to add things to their basket and check out. 4. **Order Management**: Orders and their status can be viewed and managed by the restaurant.

3.5 MODEL DEVELOPMENT

3.5.1 MONGODB

Many Internet apps, including apps that eat, use the NoSQL database management system called MongoDB. One of the most appealing features of using MongoDB is the ability to store data in document formats. This makes it the best database management system to use in apps that have dynamic schema Structures. An application like meal delivery application can store different type of data using MongoDB such as user profiles, order, menu, and reviews. A document is a data structure, which is similar to a JSON and can hold numerous fields of different types and values. As a result, developers can store and retrieve complex data objects without having to worry about complex SQL queries and schema structures.

3.5.2 React.js

React.js is a library to create experiences for user interface in JavaScript. The frontend of the meal delivery application, which is the part that the user sees and interacts with, was built in using React. React provides some features and components that make it easy to quickly build complex user interfaces. Using a component-based design, it suggests that the user interface is composed of simple, interchangeable components that can be combined to create more complex interfaces.
React then uses a digital blueprint of your website's structure called the virtual DOM. When the website's data changes, React first updates this blueprint in its memory. Then, it efficiently figures out the exact changes needed on the actual website and updates only those parts on the screen. This makes updates fast. React can quickly update the user interface without having to reload the website.

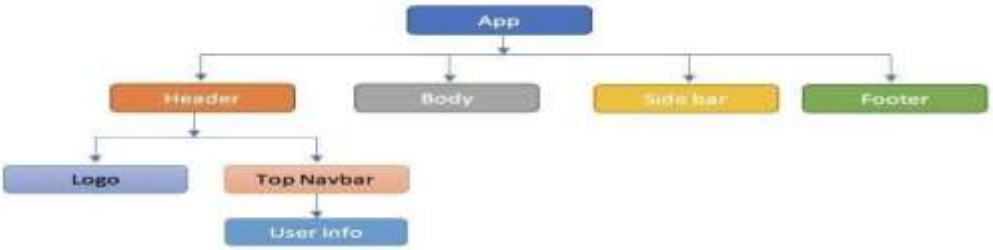

Figure 1: React Component-based Development

3.5.3 Express.js

A versatile Node.js web application framework called Express.js is used to create the backbone of online applications such as food delivery services. Its versatility and ease of use make it a popular option for API design. With the help of the straightforward Express.js API, developers can provide middleware, process HTTP requests and answers, and create routes.

Express.js is used in the food delivery industry to offer a RESTful API that connects to the front-end application developed with React.js. Client-side requests are handled by the API, which also interacts with the database, and sends data back to the user interface. It makes the software easy to maintain, scalable, and efficient.

Methodology

The agile methodology was used throughout the development lifecycle:

- Planning and Requirement Analysis: To determine key features, do competitor and interview analyses.
- Design: Figma is used for wireframing and UI prototyping.
- Code created in modular JS files with reusable components is used for implementation.

RESULTS AND EVALUATION

Performance (responsiveness, load time), user experience (design, navigation flow), and stability (API reliability) were the parameters on which the program was judged. Rapid development and smooth integration of components were made possible with MERN stack. High performance and accessibility ratings were reported by Lighthouse audits.

Figure 2: Home Page

Figure 3: Login **Page**

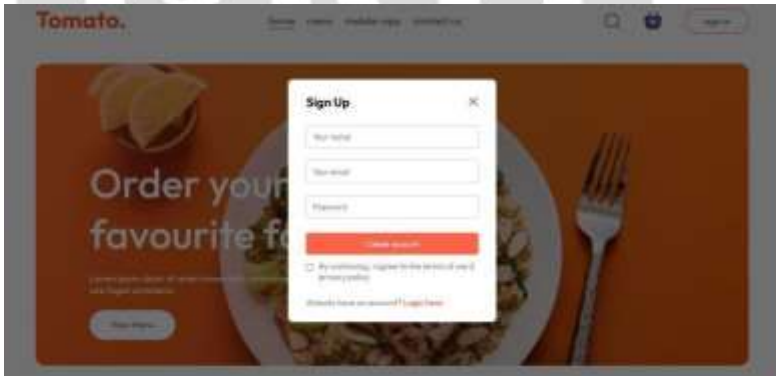

Figure 4: Signup **Page**

CONCLUSION AND FUTURE WORK

This research concludes that MERN is the right stack for building an interactive food delivery application which is scalable as well. In future, the application can be enhanced by integrating payment gateways, recommendation of food through AI and tracking of delivery partner through GPS.

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