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A MERN Stack and Next.js Based Freelancer Marketplace for Local Services with Secure Authentication, Profile Management, and Booking System

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***Abstract*: Freelancing has become a popular career choice for those individuals who are seeking flexibility, independence, and opportunities to work on projects which perfectly suit their interest and align very well with the skills they possess. Yet, local freelancers find it hard to attract clients locally because of a shortage of specialized platforms. This paper outlines the design and implementation of a localized freelancer marketplace built using the MERN stack and Next.js. The platform aims at bridging the gap between local freelancers and clients by offering secure authentication, customizable and personalized freelancer profiles, and a real-time booking system. It tries to address key limitations which are there in the existing global platforms by focusing on locality, security, and seamless user experience. The proposed system emphasizes secure transactions, smooth communication and helps people find nearby services, making it simple for clients and service providers to connect and work together.**

***Keywords*: Freelancer Marketplace, Online Freelancing, Real-Time Service Booking System, Location-Based Services.**

1. Introduction

Freelancing has performed miracles for individuals in recent years by giving them employment based on the skills they hold and an environment where they can work independently without being bound to one employer. It is preferred these days by many companies as well as individuals to hire freelancers for services such as photography, repair jobs at home, tutoring, or design jobs. But perhaps the greatest challenge in this arena is getting local freelancers together with local clients who require their services. While there are websites such as Fiverr or Upwork that offers a marketplace to clients to outsource freelancer and freelancers to reach such clients, but the issue with such websites is that they aim at worldwide connections, which might not be suitable for services required to be performed face-to-face.

Now to address this issue, we have created a localized freelancer platform which is made to assist the clients in identifying reliable freelancers in their respective location that can offer the clients the services that they need. The application is developed on MERN Stack (MongoDB, Express.js, React.js, Node.js) and Next.js which are some of the most trending web technologies because they provide a quick, responsive, and scalable web experience to users. Freelancers are able to create in-depth profiles, upload their portfolios (images, videos, reviews), and schedule their availability. Customers can simply search for freelancers by location, see their profiles, and book their services in real time through an integrated booking calendar [1], [3].

Security is possibly the most important feature of this website. Unlike the majority of the other systems, it employs JWT (JSON Web Token) in session management with an additional protection layer through Multi-Factor Authentication (MFA) through SMS or email. This protects against unauthorized access by only verified users, keeping the data and the transactions safe. Also, clients can securely pay freelancers using Stripe which is one of the most secure and trusted payment gateways, and clients and freelancers can review one another, assisting in building trust on the platform.

In short, this project will establish a safe, user-friendly, and efficient web-based system that brings local service providers and people who need them together and provides greater safety, flexibility, and ease of use than the majority of existing freelancing sites [2], [6].

2. Literature Review

The rise of freelancing platforms over the years has really transformed the way individuals offer and find services across the globe. Sites such as Fiverr, Upwork, and Freelancer have made large digital marketplaces in which customers are able to employ freelancers for an assortment of jobs. Though such platforms work fine to facilitate worldwide connections, they tend to be deficient in location-based services that need person-to-person delivery. There are a lot of researches and studies conducted which explores the currently available freelance platforms, their functionalities, and the challenges they offer especially with regards to local service discovery, user experience, and safe communication among parties [5].

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A. Design and Implementation of a Collaborative Freelancers' Sourcing Platform

The research proposes a platform that brings together independent contractors with jobs that match their skill sets. The objectives of the platform are to improve the efficiency of the sourcing process and facilitate freelancers to work together. The paper emphasizes labor force and how increased global job competition has led to the rise in self-employment and freelancing. The authors emphasize that there is a need for a platform that will bring together independent contractors with the right employment opportunities according to qualification. The server-side application of the envisaged platform makes use of PHP, MySQL, JavaScript, and Node.js. The authors describe in detail how Node.js, with event-driven architecture and asynchronous I/O support, is an ideal candidate to achieve high throughput and scalability for web applications with high input/output operations [4].

B. Online Freelancing Website

This paper gives a thorough rundown of websites that facilitate online freelancing, which are platforms that let employers advertise job openings and freelancers to submit bids for those positions. The history, development, advantages, disadvantages, and difficulties of online freelance websites are all covered in the paper. The article gives a thorough explanation of the various kinds of online freelance websites, such as general platforms that provide a large selection of jobs across multiple industries, specialized platforms that target particular industries or work types, and hybrid platforms that incorporate aspects of both general and specialized platforms. [5].

C. A Study on The Freelancing Remote Job Websites

The article discusses the demand for freelance work in view of the emerging, cheap, and new Internet broadband technologies as well as the business capabilities of very powerful yet inexpensive computers. It also gives the conditions under which businesses are required to employ freelancers. These freelancers do short-term projects for multiple companies. Depending on the requirements of the business and the customers, they are often engaged for specific knowledge-based activities and possess specific qualifications. [7].

D. Web App for Freelancing Developers and Designers

The essay discusses the requirement for freelance work against the backdrop of the new, low-cost, and high-speed Internet broadband technologies and the business value of extremely powerful but low-cost computers. The essay also discusses the circumstances under which the businesses must be run in order to utilize freelancers. The freelancers are engaged temporarily by different firms. Based on the requirements of the business and the clients, they are generally engaged on some knowledge-intensive work and possess some qualifications [8].

3. Purpose Idea

To cater to the local service-based freelancing, we recommend the creation of a location-based freelancer platform that provides simple-to-use, safe, and efficient client-service provider interaction. Unlike existing global platforms, this platform will especially aim at users looking for freelancers including them and therefore being highly suitable for services which require corporal presence. The site is built using the MERN Stack and Next.js for speed, scalability, and smooth performance. It will include editable freelancer profiles, real-time booking with calendar integration, and location-based matching algorithms to match most akin to service providers neighbouring. In an attempt to secure and win trust of the users, the system will employ JWT-based authentication along with Multi-Factor Authentication (MFA) through SMS or email. Security of payments integration with Stripe/PayPal and two-way review system will make platform even better reliability. [8], [10].

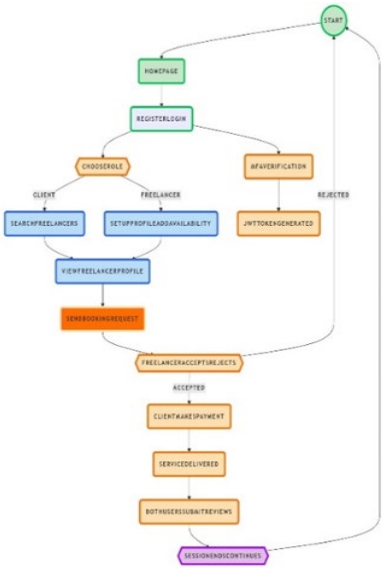

Fig. 1. Flowchart

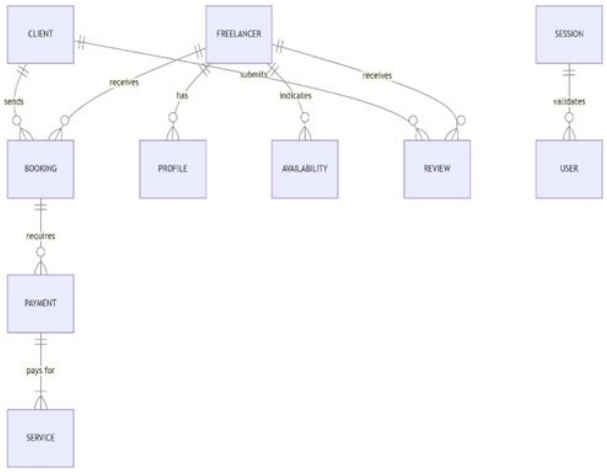

Fig. 2. ER-Diagram

4. Objective

The main objectives of this system are:

A. Enable Location-Based Freelancer Discovery

Because they are also geographically close, the service will help the clients find independent freelancers. This avoids delayed provision of the service and enables the clients to employ specialists in jobs with onsite requirements.

B. Implement Secure Authentication with MFA

The system will use JWT (JSON Web Token) for login sessions and Multi-Factor Authentication through email or SMS to add additional security to prevent unwanted access as well as to protect user data.

C. Provide Customizable Freelancer Profiles

The capacity to develop extensive profiles that feature their services, skills, images, videos, and customer reviews will be accessible to freelancers. Based on actual work samples and feedback, this helps the clients make informed decisions.

D. Provide Customizable Freelancer Profiles

The customers can book appointments and view a freelancer's availability through an in-built calendar and booking system. This is one more convenience to the user as it spares them back and forth.

5. System Architecture

1. *Frontend*: It is developed using ReactJS and NextJS. It handles user interface and client-side routing. It enables the users to register, log in, browse freelancers, book services, and make payments.
2. *Backend*: It is developed using NodeJS and ExpressJS. It processes requests from frontend and handles authentication, booking logic, payments, and user data management.
3. *Database*: The project uses MongoDB as database. It uses Mongoose for schema modelling and stores user profiles, bookings, reviews, and payment records.
4. *Authentication*: It secures user login using JWT tokens. It adds an extra layer in the authentications process with help of email/SMS-based Multi-Factor Authentication.

6. Methodologies

A. Local-First Approach with Geo-Based Matching

Unlike global freelance platforms, the focus of this system is finding local services around one's vicinity based on location search. On registration with his or her credentials, the user can enter their location, and the system will reasonably match the user with the local freelancers who offer comparable services. Such a local matching system not only helps in getting faster responses, but it also makes local services like photography, teaching, or any other service more reliable. The focus here is to give freelancing the feeling of belonging to a local community and network, which modern global platforms fail to provide.

B. Secure and Seamless Authentication with JWT + MFA

To ensure only verified and authenticated users enter the ecosystem, this platform integrates a JWT-based authentication system combined with Multi-Factor Authentication (MFA). First, users log in using email and password, then they must verify via a time-based OTP sent to email/SMS and if they unable to do so they will be stuck in the login page. Now once the user is verified, the system issues a JWT token, ensuring secure and persistent sessions. This extra layer of authentication mechanism adds a strong shield against impersonation and data breaches, making user trust a built-in feature [9], [11].

C. Component-Driven Frontend with Next.js

The frontend of this system is developed using Next.js, a web framework based on React supporting server-side rendering and auto-routing. This helped develop super-responsive pages like service listings, freelancer profiles, and booking dashboards. Each feature was developed as a reusable component to make it more maintainable and scalable. Dynamic routing is employed by the platform for smoother and easier navigation between various user roles like clients and freelancers which are present in this system. This means each user is shown pages and features based on their role and hence the experience is more personalized and organized. Since performance of the system is always a part of user experience, Next.js helped optimize page loads and SEO by server-side rendering of content as and when needed. This helped make it easier to handle layouts and inclusion of API data fetching within the pages [15].

D. Real-Time Calendar Booking and Schedule Syncing

Real-time booking helps clients easily see when a freelancer is free and choose a time that works. Freelancers have a simple dashboard to manage their time. The system updates everything to stop double bookings. When someone books, both the client and freelancer get a message. All details are saved safely, so there’s less need to send lots of messages. This makes the process easier and faster. Hence title or subject, which implies that clients are in full information always, and freelancers can be able to serve their work. The user interface is greatly enhanced by a calendar for booking services, which provides an easy source of reference of the proposed date and time for providing the services. It aids both users easily to book work with simplicity and clarity [13].

E. Role-Based System with Custom Dashboards

Role-Based Access Control is utilized by the platform to ensure organization and security. This implies that freelancers and clients both have a dashboard with features specific to their requirements. Freelancers can add their work, edit their profiles, and define their availability. On the other hand, clients can search for services and book independent contractors. The system provides that no individual has access to information that they should not have, like a freelancer seeing payment information or a client modifying another individual's profile. To make sure that only logged-in individuals with the correct role can access specific pages or do specific activities, there are special routes and checks. Due to this setup, the platform is

secure, dependable, and easy to use for everyone [12].

F. Integrated Payment and Review Loop

The site combines safe payment facilities with trusted gateways, including Stripe. A client is able to make secure payments online after they have reserved a service, and after confirmation, the freelancer is wired the money. This allows clients not to worry about making payments and ensures freelancers receive payments on time and appropriately. The site also has a review and rating system to improve the services of the freelancers and enable them to give me a feedback. Prospective customers can rate the freelancer and comment on their working experience with him/her after completion of the service. These reviews are publicly available and sit on freelancer profiles, making it possible for potential clients to choose the best candidate. It all from secure payments to publicly available reviews brings life to a system that makes clients and individual contractors feel valued, secure, and motivated to create their work best [12], [14].

7. Result and Discussion

A. Why is JWT the Best for Authentication

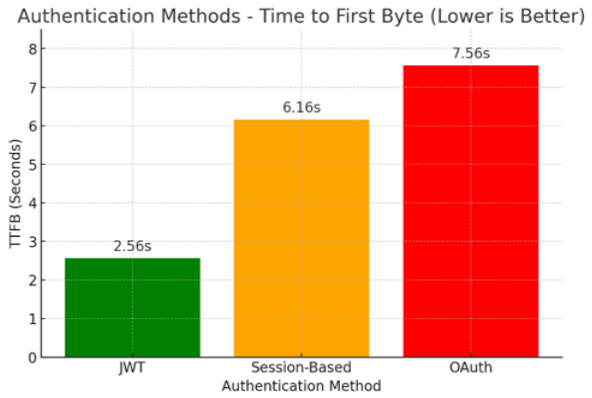

Fig. 3.

Based on our performance data, we compare three authentication methods and analyze their efficiency using *Time to First Byte (TTFB), TCP Handshake, DNS Lookup, Socket Initialization and Total Response Time*.

B. Why is JWT the Best Choice?

1) Stateless Authentication & Reduced Database Queries

Contrary to session-based authentication, JWT does not need a centralized session store like Redis or a relational database. Traditional session authentication has each request involving a database query to authenticate the session token, introducing latency. But JWT, being self-contained, removes this round-trip and eliminates response time.

2) Lower Server Load & Network Latency Reduction

Session-based authentication means session state to be kept on the server, which results in increased server memory usage. OAuth generally involves many network requests to external authentication servers, which creates tremendous request overhead. JWT, on the other hand, is locally signed and verified by cryptographical algorithms such as HMAC SHA512 or RSA, keeping unnecessary requests to a minimum and making it more efficient.

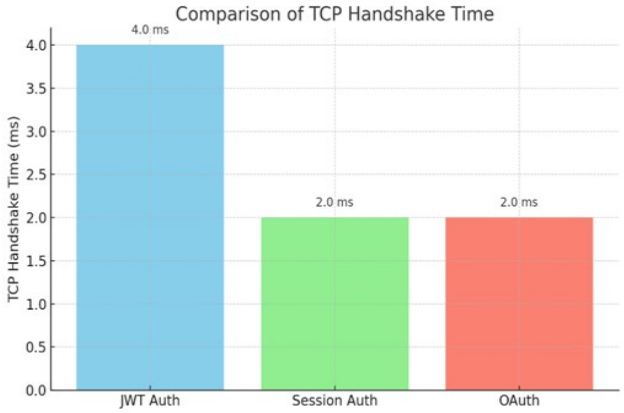

Fig. 4.

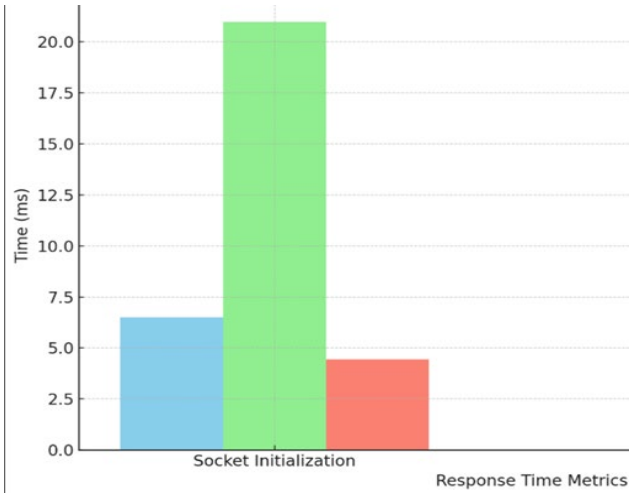

Fig. 5.

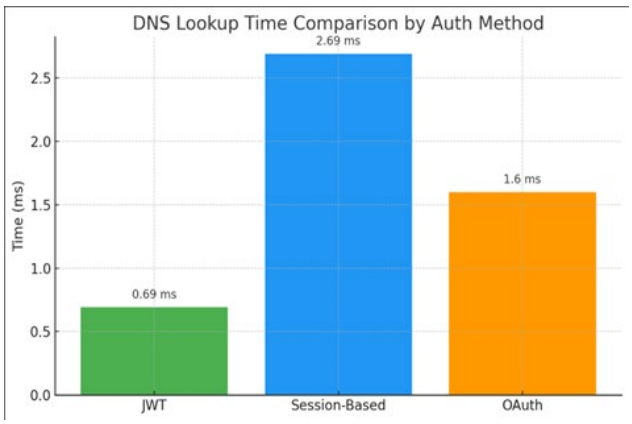

Fig. 6.

3) Asynchronous & Distributed System Support

JWT fits nicely in the context of microservices because it doesn't depend on shared session state. JWT accommodates horizontal scaling because the authentication is shared out, whereas session-based authentication requires sticky sessions or replicated sessions on several servers.

4) Efficient Token Verification & Processing

JWT tokens have a header, payload, and signature, enabling local verification without having to ask an authentication

server. The Time-to-First Byte (TTFB) for JWT is considerably less because of effective cryptographic verification, as opposed to session-based approaches that need state validation, resulting in further latency.

5) Better Security Features

Algorithms such as RS256 and ES256 enable the utilization of a public-private key pair for improved security. On the other hand, OAuth authentication involves token introspection through external identity providers, introducing network latency overhead and response time increases.

C. Final Verdict: Why is JWT the Best?

1) JWT is Ideal for

JWT is ideally used where low response time is required for high-performance applications. It can be used for microservices and distributed systems in which session replication is impossible. It can handle scalable authentication models with minimal database dependencies and can be used for decentralized, stateless environments to keep server overhead to a minimum and maximize efficiency.

8. Conclusion

This research aimed at providing a localized freelancer marketplace which assist in bridging the gap between service providers and clients within a specific geographical area. The system was designed with a strong emphasis on security, user personalization, and efficient service booking. This project offered a targeted solution that was adapted to local requirements by recognizing the shortcomings of the current international freelance platforms. An environment for freelancing that is more dependable and user-focused is created by implementing secure authentication, customizable profiles, real-time booking, and integrated payment and review systems. Overall, the project shows how focused technology solutions can fill particular market gaps no matter how big or small it is and improve user convenience, trust, and engagement in local service ecosystems.

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