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ClickSlot - ADVANCED SCHEDULING APP

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ABSTRACT: ClickSlot - Advanced Scheduling App, is a responsive, full-stack web application, scheduling and booking of virtual meetings, designed to alleviate scheduling, and booking problems a user might have. Users can create public or private events, determine their availability, and send a personalized booking link to their audience. ClickSlot's Tech Stack includes Next.js, Tailwind, ShadiCN UI, Clerk for authentication, and NeonDB for the database. ClickSlot will eliminate the risks associated with manual booking/scheduling with external integration with the Google Calendar API to auto-generate your meeting link and add the events to your calendar, syncing all events in real-time. ClickSlot is a scalable and user-friendly scheduling and booking software that can be easily adopted by anyone, from professionals to freelancers, educators, and service providers.

KEYWORDS: Scheduling App, Next.js, Clerk, NeonDB, Google Calendar API, Event Booking, Full Stack Web Development, Google Meet integration, Appointment Management, Tailwind CSS.

I. INTRODUCTION

As we persist in living within a digital environment and understanding how to exist and thrive in it, scheduling meetings quickly and efficiently in the 21st century is an important business process for professionals, educators, and teams who are working or collaborating remotely. Traditional ways of scheduling meetings using email, texting, or handwritten calendars can sometimes put users at risk of miscommunication, scheduling conflicts, or simply causing additional inefficiency when scheduling meetings spanning time zones. The increase in online meetings requires a greater demand for smarter, automated scheduling.

This paper will conduct an examination of ClickSlot - Advanced Scheduling App, an intelligent full-stack web application that automates meeting scheduling for users using user and experience-focused features. All built with Next.js, ShadCN UI, Tailwind CSS, Clerk, and NeonDB, ClickSlot has been created with modern design and responsive user interface design including secure authorization and a backend integration to support it.

What are the features that users will be able to interact with? Users will be able to create public or private events; define their availability and personal booking link.In the coming months, ClickSlot will integrate with the Google Calendar API, so you can create events in your personal calendar and also create a Google Meet link, among other features that would allow hosts and participants to have real-time synchronized calendars.

ClickSlot has been designed to allow complete custom configuration, and scalability and simple for developers to integrate, so professionals and organizations (including engaging consultants, freelancers but are not limited to) could make use of it as an enterprise-grade scheduling system. If ClickSlot can deliver an offline scheduling option, with a strong focus on productivity and efficiency (notable reduction in manual coordination efforts), it could potentially fill a huge hole in a new world of working conditions that are remote and time-challenged.

II. LITERATURE SURVEY

[1] R. Zohrevandi, A. Shahidinejad, "Development of an Appointment Scheduling System also using cloud based technologies", IEEE, 2022.
This paper detailed an appointment system which was cloud based, and had the aims of scalability and availability. This system had good functionality surrounding appointment scheduling with provisions for healthcare systems, however, it was lacking a polished and up to date front-end, lacks third-party login to ensure secure (i.e. external institutions) and website personalization (different booking pages for different users).https://ieeexplore.ieee.org/document/9753216

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[2] T. Aljohani, M. Alghamdi, "An Intelligent Online Appointment Scheduling System Using AI", IEEE, 2021
This paper proposed an AI based booking model that optimizes appointment scheduling in education institutions. The paper was about limiting and reducing appointment conflicts and missed appointments while improving efficiency. The paper did not interface with a Google Calendar, and has no option for real-time ability to create a link, these are key features of ClickSlot.https://ieeexplore.ieee.org/document/9447452

[3] S. Garg, A. Jain, "Secure Online booking system using Firebase and Flutter", IEEE, 2020.
This paper explained a mobile-first appointment app, with Firebase used for the real-time cloud database (also functioning in an offline mode). This system offered efficiencies for quick deployments, creativity was shown in design concepts however it lacks the ability to configure the flexibility of availability and it cannot be integrated.
https://ieeexplore.ieee.org/document/9301426

[4] M. Nayak et al., "Calendar Integration in Scheduling Platforms: A Comparative Study," IEEE, 2023.
This paper surveyed a number of scheduling systems and their ability to integrate with calendar applications, such as Google and Outlook. It was concluded that while most tools could add calendar integration, very few would ever have full automation of a Google Meet link, which is what ClickSlot aims to accomplish. https://ieeexplore.ieee.org/document/10298745

[5] A. Chatterjee et al., "Design and Implementation of a Personalized Meeting Scheduler," IEEE, 2021.
This project reported on a meeting app, allowing the users to select time slot's based on the availability of the admin. While this overlaps in conceptual space, it does not allow for user profile pages or event privacy, both of which ClickSlot has from the start. https://ieeexplore.ieee.org/document/9532142
[6] M. Bashir and K. Singh, "A Web-Based Smart Meeting Scheduler," IEEE, 2022.

The mentioned authors proposed a simple web app to facilitate team meeting organization. While it can allow for group coordination, it does not allow for third-party login systems (like Clerk), nor does it utilize the scalable database like ClickSlot (e.g. NeonDB). https://ieeexplore.ieee.org/document/9875430.

EXISTING SYSTEM
While current scheduling platforms like Calendly, Doodle, and Microsoft Bookings have basic functionality for selecting time slots, connecting to digital calendars and other calendar syncing options, many paywall the more advanced features and simply do not provide personalized booking pages or enhanced calendar availability notifications. Although, some of these tools are open-source based, they lack ease of setup, real-time integrations (e.g., Google Meet link generation), and require advanced notions to integrate other aspects such as workflows. Most systems also have minimal authentication functionality. Current functionality lacks flexibility and customization and does not have, or provide fully comprehensive integrations; therefore, we have moved ahead and focused on developing a dedicated scheduling tool like ClickSlot.

PROPOSED SYSTEM
ClickSlot – Advanced Scheduling App is a web app that lets users create events of various types, configure their available days or hours, and share links to personal booking pages. ClickSlot also uses the Google Calendar API to create Google Meet links for all events and to automatically sync events. The app is powered by Clerk for secure authentication and NeonDB for backend storage. ClickSlot is developed in Next.js as well as ShadCN UI / Tailwind CSS technology, allowing a responsive app that is easily modified and simple to navigate by users. ClickSlot successfully solves for current bottlenecks in existing tools with greater levels of control, automation, and scalability.

III. SYSTEM ARCHITECTURE

The ClickSlot - Advanced Scheduling App is built with a modular full-stack architecture that includes five distinct layers:

[1] Frontend Layer: The frontend uses Next.js, ShadCN UI and Tailwind CSS. The front end layer includes user interface, client-side routing; it provides a device agnostic, mobile-friendly experience which emphasizes performance and accessibility.

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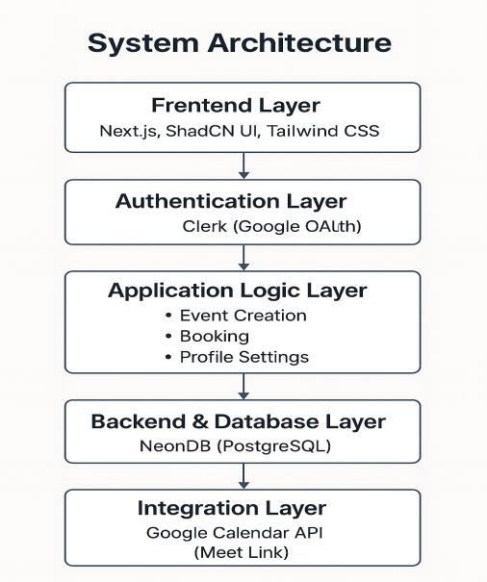

Fig 3.1 System Architecture

[2] Authentication Layer: The authentication layer uses Clerk, which uses GoogleOauth as authentication, which is responsible for session management and access to user profiles.

[3] Application Logic Layer: the application logic layer is responsible for many of the application features, such as event creation, availability configuration, booking workflows, as well as custom profile features. This is the business logic layer.

[4] Back-end and Database Layer: The back-end and database layer is using NeonDB (PostgreSQL) and Prisma ORM for the storage of data with permanent storage of users, events, time slots and bookings, as well as queries to manipulate data.

[5] Integration Layer: The integration layer is extensible, and uses third party services (Google Calendar API) to create calendar events, as well as manages auto generated Google Meet links in users calendar.

IV. METHODOLOGY

The ClickSlot - Scheduling App was built using an incremental process - based on Agile methodology - allowing the team to design, develop and test each module in sprint, enabling a process of continuous integration and ongoing improvement. Frontend was developed using Next.js and supplemented with ShadCN UI and Tailwind CSS to make sure the web app was responsive and accessible for a variety of devices.

User authentication was implemented using Clerk, which allowed for secure user authentication based on Google OAuth, session persisted and controlled. The user data (event content, availability slots, booked slots) were stored in a NeonDB (PostgreSQL) database using Prisma ORM as a partner - clean data management to build and execute all backing code.

Key functions (organize events, manage availability, book time slots) were built and executed as sequential, block reusable components and API route (React Hook Form & Zod) so data was accurate and possibility of errors from user eliminated.

To additional automate event creation and generate Google Meet-link, ClickSlot integrated Google Calendar API - added additional automation and convenience of scheduling events. Github and Postman were used throughout development history to enhance version control, service collaboration, and API testing.

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V. DESIGN AND IMPLEMENTATION

ClickSlot is a user-focused, modular web application that allows customized scheduling and automated integration with Google Calendar. Users can securely sign in with Google (through Clerk), set availability, create events, and share customizable booking pages. The front-end was built with Next.js, Tailwind CSS and ShadCN UI, and database logic and API logic was used to implement back-end business logic through Prisma ORM connected to a NeonDB database. Bookings trigger creation of events and Meet links in Google Calendar via API integration. The features of the system are responsive, secure, and optimized for performance and scalability

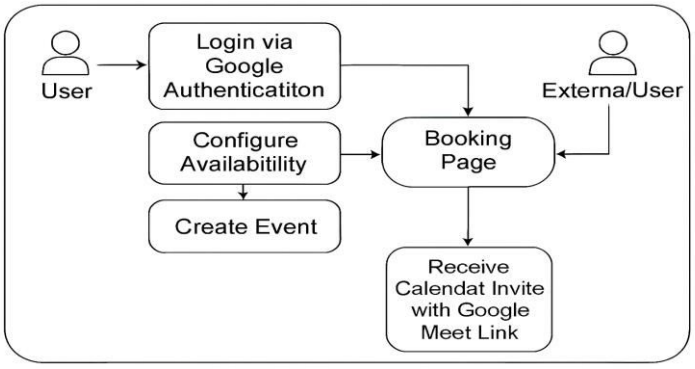

Fig. 5.1 Overview of User Flow and System Roles

The component-based design allows for room for future feature growth on the system, including features such as analytics, reminders, and supportive team collaboration.

In the image above (Fig. 5.1), a user logs in to the website through Google authentication, configured their availability, and created an event. Invited external users could now access the booking page through a shared link, select the available time slot, and then receive a calendar invite with an automatically generated Google Meet link to join the meeting.

VI. OUTCOME OF RESEARCH

The outcome of ClickSlot - Advanced Scheduling App was a fully functional, responsive and secure scheduling application. The development team successfully implemented the core features of the application: authentication, creating events, managing availability, and all separated by customizable booking pages. The robust platform allows seamless scheduling of meetings and is tied to automated event creation in Google Calendar which also allows automated Meeting link generation. In addition to the convenience it provided users and diminished the manual coordination of calendars, it is a complete case study on how easily third-party integrative solutions can save developers on time, etc.

Even with the modules in the application, I am pleased with the ease of usability across devices and the still clean UI/UX of the app. The technology stack of Next.js, Clerk, NeonDB and others demonstrate how full-stack development and modern technologies integrating real-time application can be accomplished. My research confirms that a customizable solution that is developer-friendly can use a range of technologies to produce solutions that can provide a similar or better user experience than any commercial alternatives. Furthermore, it provides more flexibility and control to the user.

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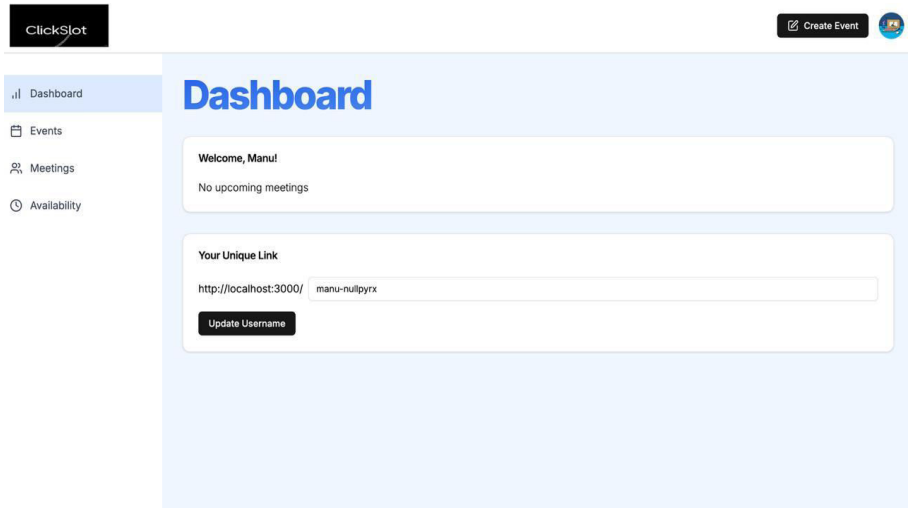
VII. RESULT AND DISCUSSION

After being developed and successfully tested ClickSlot, we ended up with a responsive scheduling experience that allowed users to quickly create and manage their schedules. Majority of the features worked as expected including Google login capabilities, event creation, capacity for setting availability, calendar integrations, etc. Each booking was also created with a Google Meet link as expected and would also update the availability on the calendar as well. I was able to utilize new technologies in terms of guaranteeing security, efficiency and scalability such as Clerk, Prisma, and NeonDB. Overall, ClickSlot achieved all of the ambitions we set out for it and presents a solid case for making better in the future.



VIII. CONCLUSION

ClickSlot – Advanced Scheduling App has addressed the problems of manual and clunky scheduling for meetings through a secure, customizable and fully automated experience. With features such as personal booking pages, integration with Google Calendar, and flexibility in setting time frames for meeting availability, ClickSlot provided a seamless integration for users and invitees. Use of modern technologies including Next.js, Clerk and NeonDB guarantee performance, scalability and development ease. The system accomplished its planned aims and serves as an effective replacement to existing tools. There is more potential to grow this product into team collaboration, analytics and cross-platform availability.

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