Web application to help people track and report climate change impacts, such as sea level rise, extreme weather events, and changes in plant and animal life.

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***Abstract*—Embark on a revolutionary journey to craft a dynamic web application, a digital catalyst empowering individual to become stewards of our planet. This visionary endeavor aims not only to track and report climate change but to spark a collective awakening. Our primary mission is to democratize access to the heartbeat of our planet—the real-time pulse of climate data, fostering a vibrant community of informed advocates committed to environmental stewardship and positive change. The current challenge lies in limited accessibility to up-to-date climate information and the absence of a user-friendly platform for reporting environmental shifts. This project aims to bridge these gaps, ensuring users easily access and contribute to crucial climate data. As we revolutionize climate solutions with our cutting-edge web app, meticulous attention is given to optimal performance. The strategy revolves around a user-centric interface, addressing accessibility challenges while providing an intuitive space for users to navigate complex climate data. Our commitment extends beyond temperature and rainfall data. We dedicate ourselves to broadening data coverage, managed by skilled professionals in each relevant workforce section. This evolution transforms our application into a holistic platform, encompassing a comprehensive array of climate impact data. The strategic integration of APIs empowers our app with the latest and most accurate climate insights, turning users into active participants in the ongoing climate dialogue. With these enhancements, we anticipate transformative results, fostering an informed and engaged community dedicated to tackling climate change. This holistic approach positions us to achieve significant milestones in our mission to empower individuals and contribute to positive environmental change.**

***Index Terms*—Climate Tracking, Environmental Reporting, climate impact, Web Application, Rain Data Analysis, Temperature Monitoring, Admin Interface, Data Management, User Engagement, Researcher Dashboard, Customer Care Integration**

Identify applicable funding agency here. If none, delete this.

I. Introduction

In a world confronted by the urgent challenges of climate change, our study undertakes a pioneering venture to develop a dynamic web application—a digital catalyst aimed at empowering individuals to become proactive stewards of our planet. The current problem at hand revolves around the limited accessibility to up-to-date climate information and the absence of a user-friendly platform for reporting environmental shifts. This critical gap serves as the impetus for our visionary endeavor.

Our primary mission is to democratize access to the heartbeat of our planet—the real-time pulse of climate data. The study is grounded in the recognition of the need for a collective awakening to the realities of climate change. We aspire to cultivate a vibrant community of informed advocates, united by a shared commitment to environmental stewardship and positive change. Against this backdrop, the research objective encompasses the development of a cutting-edge web application with meticulous attention to optimal performance. The strategy centers on a user-centric interface, addressing accessibility challenges and providing an intuitive space for users to navigate complex climate data. Beyond mere temperature and rainfall data, our commitment extends to broadening data coverage, transforming the application into a holistic platform encompassing a comprehensive array of climate impact data.

This study transcends conventional technological innovation; it adopts a holistic approach focused on yielding transformative outcomes. Through the strategic integration of APIs, we not only empower the application with the latest and most accurate climate insights but also establish a robust foundation. We meticulously save all climate data in our dedicated data server using myadminphp. This serves as the backbone for providing users with comprehensive information, ensuring

Fig. 1. climate Change Impact.

they stay informed about ongoing climate changes.

Beyond being passive recipients of data, users are actively engaged in climate dialogue. They gain access to a wealth of information stored on our data server, enabling a deeper understanding of complex climate patterns. Moreover, our proactive approach involves notifying users promptly about emergency climate change events and impactful news. This two-fold strategy not only enhances user engagement but also underscores our commitment to fostering a community that is not only informed but also prepared to respond effectively to the challenges of a rapidly changing climate. Through these enhancements, we anticipate fostering an informed and engaged community dedicated to tackling the pressing challenges of climate change. This introduction sets the stage for a research endeavor that aligns with the urgency of our environmental responsibilities, acknowledging the current problem while articulating a purposeful and impactful mission.

II. Literature Review

We have focused on a comprehensive platform dedicated to understanding and addressing climate change. Our focus is on exploring the causes and effects of climate change, and more importantly, finding effective remedies. With all this we just want to understand the importance of tracking climate changes. We believe in empowering our users with knowledge and tools to make a positive impact on our planet.

The articles discuss the impacts of climate change on various sectors, including the environmental hazards of e-waste[1], risks to Italy's electric infrastructures[2], and the link between climate change, population, urbanization, and human mortality[3]. They highlight the importance of managing water levels in peatlands[5], the increasing severity of droughts in Central India[6], and the disruption of marine species due to climate change[7]. The need for increased tree plantation and urban greening is emphasized[14], along with the public sentiment towards Terrace Greening Systems in China[15]. The threat of climate change on biodiversity, ecosystems, and human welfare is underscored[16][17], as well as the potential of digitalization in enhancing agricultural sustainability[24]. The challenges faced by Aboriginal communities due to climate change are highlighted[25]. The impact of climate change on Sarawak River flow[27], European coastal cities[28], and Portugal's energy sector[31] is discussed. The papers predict increased temperatures and reduced precipitation in the Eastern Mediterranean and Middle East[32], and review the impact of climate change on cultural heritage sites[35].

The research articles collectively delve into the multifaceted impacts of climate change on sectors such as agriculture, infrastructure, biodiversity, and cultural heritage. They underscore the potential of digitalization in enhancing agricultural sustainability, shed light on challenges faced by specific communities, and illuminate the broader effects of climate change on the environment. However, a critical gap emerges concerning the absence of robust web applications to effectively manage and disseminate the wealth of climate impact data presented in these studies. While the articles provide valuable insights, there is a notable lack of application-based support systems to maintain and organize this data for user accessibility. This deficiency hinders the development of user-friendly platforms that could notify and educate users about ongoing climate changes and their impacts. As we reflect on these findings, it becomes apparent that future research and policy interventions should not only explore the identified gaps but also emphasize the imperative of developing innovative web applications to bridge the divide between research outcomes and user engagement in the realm of climate change.

III. Problem Statement

In the face of the monumental challenge that is climate change, we passionately acknowledge it as one of the most urgent and complex global issues. The crux of the matter lies in the stark insufficiency of accessible real-time climate data and the alarming absence of a user-friendly platform for reporting environmental changes. This glaring inadequacy obstructs individuals, organizations, and policymakers from making informed decisions critical to both mitigating and adapting to the relentless impacts of climate change.

To confront these obstacles head-on, our unwavering commitment propels us toward the development of a comprehensive web application. This groundbreaking platform not only ensures seamless access to real-time rain and temperature data but also empowers users to actively contribute their firsthand observations. In our proactive approach, we have strategically designed roles, including admin, data manager, researcher, and user, envisioning a collaborative ecosystem that facilitates the dynamic collection and widespread dissemination of indispensable climate information.

In recognition of the widespread challenge of limited access to climate data, we have implemented innovative plans. Our platform aims to address the issue by ensuring that people not only have access to climate impacts data but also understand and utilize it effectively. We prioritize informing and guiding users on climate impacts, ensuring that the reports generated are not merely data points but actionable insights. Moreover, our commitment extends to the security and privacy of user-contributed data, employing avant-garde methodologies and technologies to guarantee the utmost protection.

Our endeavor goes beyond bridging the gap between climate data and public engagement; it is a proactive leap toward a future defined by sustainability and resilience. By harnessing cutting-edge technologies, we aspire to catalyze transformative shifts in how society perceives climate change, prompting decisive actions. The web application we envision is a testament to our commitment to empower individuals and communities, ensuring they play pivotal roles in the collective endeavor against the looming specter of climate change.

IV. Methodology

Our approach systematically addresses climate change challenges, beginning with a comprehensive problem analysis to identify data accessibility limitations. Employing a user-centric design, we defined functional requirements and shaped an architecture for various roles. Implementation featured robust API-driven data integration for real-time climate information, coupled with rigorous testing to ensure solution adherence to requirements and bolstered by security measures for data protection. Prioritizing scalability, we focused on detailed documentation. Continuous stakeholder feedback refines the solution to evolving needs. Subsequently, we proceeded with constructing an optimized database structure and crafting a software architecture that seamlessly integrates these components, ensuring a robust and efficient system aligned with our climate change solution.

A. Problem/Solution Designs

Embarking on the development of our web application, we employ a problem-solving design methodology that spans two key perspectives— the current state (”as-is”) and the envisioned future state (”to-be”). These perspectives are encapsulated in two rich pictures, each offering a unique insight into the challenges we aim to address and the transformative solutions we envision.

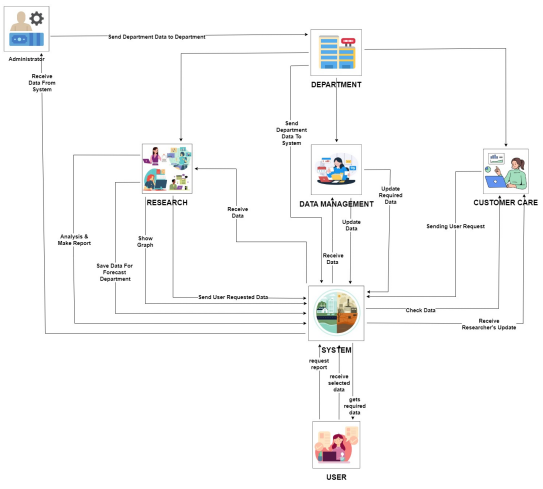

Fig. 2. As-Is Rich Picture.

Our As-If rich picture encapsulates a robust solution design where the admin oversees the seamless integration of real-time climate data into the system. The research department employs advanced analytic to derive meaningful insights, the data manager ensures the integrity and accessibility of the data pool, and customer care serves as a responsive support hub. This collective effort empowers general users to actively engage in climate tracking and reporting.

Our To-Be rich picture enhances the web app by introducing IT support for streamlined user experience and policymaker integration for informed decision-making. This fortifies our application, ensuring accessibility, control, and impactful environmental management, aligning with our vision for an enhanced and responsive climate tracking platform.

B. entity relationship diagram(ERD)

In crafting our ERD for the web application, we lay the foundation for a structured and efficient database model. The ERD visually represents the relationships between various entities, ensuring seamless data management and retrieval.

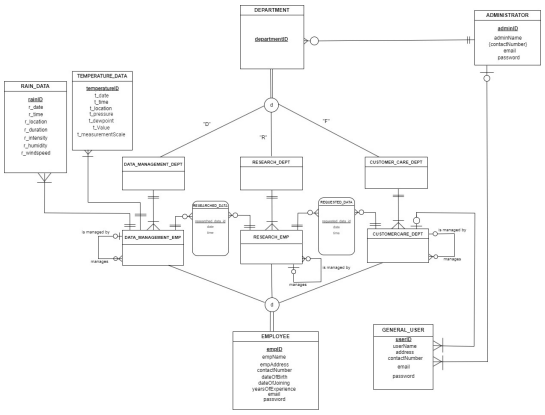

Fig. 3. entity relationship diagram(ERD).

The Entity-Relationship Diagram (ERD) for our climate management application encompasses diverse entities essential for seamless functionality. Users, including general users, researchers, data managers, customer care interact with the application. Admin oversees system administration, and the Research Department collaborates with the Data Manager to analyze climate data. Users contribute data, forming a relationship with the Data Manager entity. Customer Care provides direct support to users. This ERD serves as a cohesive blueprint, outlining relationships that facilitate efficient data flow and enhance overall system functionality.

C. Schema

Our web application database schema is designed to efficiently capture and organize the various entities and their relationships, as identified in the Entity-Relationship Diagram (ERD). The schema reflects a well-structured foundation for storing, managing, and retrieving data associated with climate tracking and reporting.

The Users Table captures essential user information, including User-ID (Primary Key), Username, Password, UserType, Email, etc., distinguishing between user types. The Admin

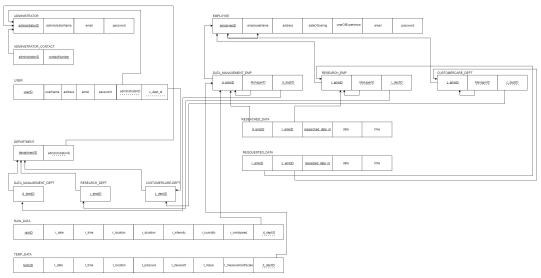

Fig. 4. Schema Picture.

Table, with attributes like Admin-ID, manages system administration, overseeing application integration and functionality. The Research Department Table stores researcher information, while the Data Manager Table, with Manager-ID, ensures climate data integrity and accessibility. The Customer Care Table, featuring Care-ID, provides user support. Relationships are defined using Foreign Key constraints for data integrity. This structured database schema serves as the backbone for our web application, facilitating seamless information flow and supporting diverse functionalities, ensuring effective collaboration among different

D. Normzalization

To ensure data integrity and eliminate redundancies, we embark on the normalization process for our web application database. This vital step refines the structure, reducing anomalies and optimizing storage efficiency.

Fig. 5. Normalization Picture.

The normalization process for the database schema involves ensuring atomic values in the 1st Normal Form (1NF), eliminating multivalued or composite attributes. Moving to the 2nd Normal Form (2NF), partial dependencies are addressed to ensure full functional dependence on the primary key. The 3rd Normal Form (3NF) is then applied to remove transitive dependencies. The resulting normalized database schema is presented in Figure 1, with the caption ”Figure 1: Normalized Database Schema for Web Application.” This structured schema enhances data reliability, reduces redundancy, and provides a scalable foundation for the web application. The normalization process ensures a seamless interaction between entities and optimizes data flow, reinforcing the robustness of the database design.

E. Data Dictionary

In delineating the architecture of our web application's database, the data dictionary serves as a comprehensive guide, defining each attribute's data type and constraints within the PHPMyAdmin environment.

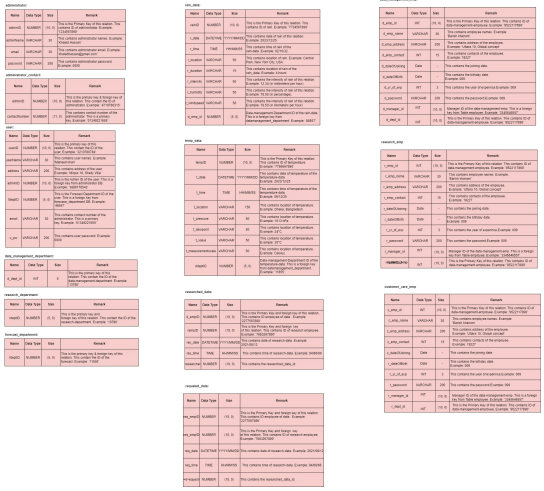

Fig. 6. To-Be Rich Picture.

The Users table comprises user-id (Primary Key), username, password, email, and role-id (Foreign Key) linking to assigned roles. The Admin table includes admin-id (Primary Key), user-id (Foreign Key), and admin-role. A similar structure is maintained for other entities like Research Department. Figure 2 presents a Data Dictionary detailing these entities and attributes.

This figure serves as a vital guide, defining each entity, its attributes, and their respective data types. It plays a crucial role in maintaining consistency and integrity within the database schema, fostering a clear understanding of the structured documentation.

V. Software Architecture and UI

In crafting the software architecture for our web application, we've strategically implemented a structured approach to data collection and analysis. This involves leveraging our user-friendly web interface for seamless data acquisition while utilizing backend CRUD operations via a localhost server, managed by MyAdminPHP.

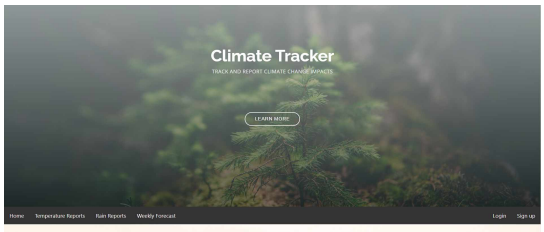

Fig. 7. Our Web Application's Home Page.

The integration of HTML, CSS, and JS in our frontend design complements this robust backend, delivering an aesthetically pleasing and responsive user interface. The harmonious connection between user interaction, data collection, and backend operations creates a cohesive framework for our web application's climate tracking and reporting. Emphasizing both functionality and visual appeal, our software architecture underscores the importance of a seamless marriage between frontend and backend components to provide a comprehensive and user-centric environmental tracking experience.

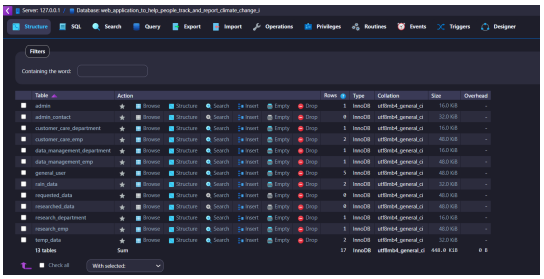

Fig. 8. To-Be Rich Picture.

Our web application serves as an intuitive gateway for seamless data collection, offering users an interactive platform to contribute real-time climate observations. This user-friendly interface fosters active engagement in environmental tracking, providing a pivotal means for users to actively participate in our growing data pool. Behind the scenes, our architecture operates through CRUD (Create, Read, Update, Delete) operations on a local server, orchestrated via PHPMyAdmin. This backend infrastructure, grounded in SQL methodologies, ensures the secure and efficient processing of collected data, managing creation, retrieval, updating, and deletion operations.

VI. Result Analysis

Our result analysis revolves around the core tables within our web application, offering a glimpse into the primary data table and a specialized temperature data table. The robust database structure empowers both users and administrators to extract valuable insights into climate patterns. Through our analysis, we've achieved significant results, providing a comprehensive understanding of the intricate relationships within the data. This success underscores the effectiveness of our approach in delivering meaningful and actionable information for users and administrators alike.

our web application excels in both analysis rate and user-driven data collection, showcasing flawless execution of database functions. This successful alignment of front-end dynamics with robust backend capabilities positions our application as a reliable and efficient tool for climate tracking and reporting.

The web application exhibits a remarkable analysis rate, efficiently presenting diverse data sets through a user-friendly interface. Its functionality allows users to seamlessly insert, edit, and delete data directly from the website, emphasizing the effectiveness of our database operations.

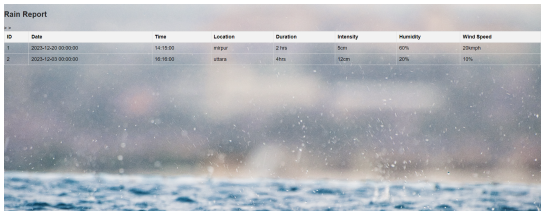

Fig. 9. Implimentation of Our Dataset.

Our data collection process has proven to be efficient, with users actively contributing real-time climate observations. Paired with meticulous data analysis, the application ensures a comprehensive understanding of environmental changes.

The seamless transition from the front-end interface to backend operations signifies a harmonious connection. CRUD operations seamlessly link user interactions to the backend database, providing users with a smooth and intuitive experience.

VII. Problem Analysis

Our weather tracking web application focusing solely on rain and temperature data has inherent limitations. While providing insights into basic weather conditions, the exclusion of critical factors like wind speed, humidity, and atmospheric pressure compromises the application's ability to offer a comprehensive understanding of meteorological phenomena. This limitation impacts the accuracy of storm predictions, hinders precision in outdoor planning, and may not meet the specific needs of users in industries such as agriculture or aviation, who require a more detailed range of meteorological information for decision-making. Additionally, the absence of data on health-related factors and other professional considerations may limit the application's overall relevance and utility, emphasizing the importance of incorporating a broader set of weather parameters for a more robust user experience. In addition to the limitations mentioned, the weather tracking web application may face barriers related to user engagement and satisfaction. The lack of diverse weather parameters could lead to reduced user retention, as individuals seeking a more comprehensive overview may turn to alternative platforms with broader datasets. Furthermore, without continuous updates and advanced features, the application might struggle to compete with more sophisticated weather services that offer detailed visualizations, historical data, and advanced forecasting models. To address these barriers, incorporating user feedback mechanisms, enhancing the user interface, and regularly updating the application with new features and data sources could contribute to improved user satisfaction and increased competitiveness in the crowded weather application market.

VIII. Conclusion

The purpose of our study is to understand the importance of tracking climate change around us.The studies explore climate change impacts on agriculture, infrastructure, biodiversity, and

cultural heritage, focusing on e-waste, electric infrastructure risks, and the link between climate change, population, and urbanization. The central question is how climate change affects sectors and potential mitigation. The literature review covers marine species disruption, tree importance, public perception of Terrace Greening Systems, and digitalization in agriculture. Results indicate significant impacts, emphasizing recycling, energy sector mitigation, water management, tree planting, urban greening, and adaptive strategies. We have greatly focused on tracking the climate of different areas for backing people. Tracking weather provides real-time updates and accurate forecasts, aiding users in planning activities and staying informed about changing weather conditions. With personalized alerts and location-specific information, it enhances safety, supports travel planning, and helps users make informed decisions based on current and predicted weather. In future we want to make sure that the app's versatility extends to outdoor activity planning, emergency preparedness, and providing valuable insights for professionals in various industries.Future work should address gaps, including climate change effects on building performance.

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