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EXTENDED ABSTRACT

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Universiti Teknologi MARA Cawangan Melaka
International Jasin Multimedia & Computer Science Invention and Innovation Exhibition
In Partnership with: Tadulako University

Development of Mobile Application : Digital Mutawwif

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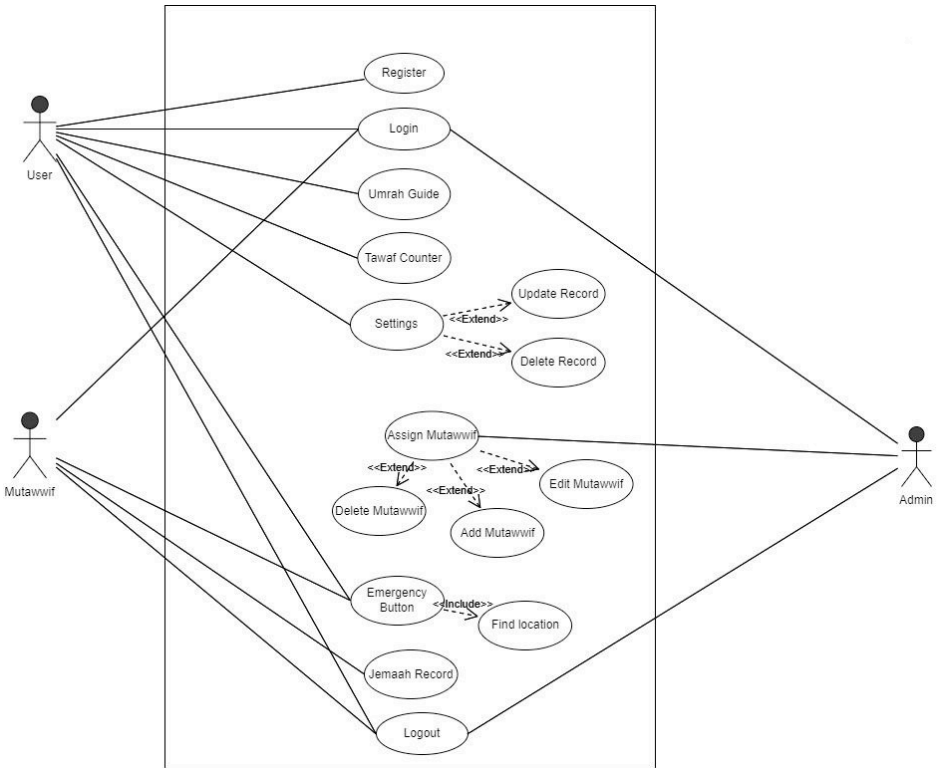
***Abstract*— The Digital Mutawwif System is a mobile application designed to assist Muslim pilgrims during their pilgrimage in Makkah and Madinah. The main problem addressed by this application is the possibility of pilgrims getting lost during the Tawaf ritual, coupled with the inconvenience of carrying physical books and guides. To overcome these challenges, the objective of the project was to develop a user-friendly mobile application that provides essential guidance to pilgrims. The application's functionality was thoroughly tested, and the results demonstrated a successful outcome. Pilgrims can now rely on the Digital Mutawwif app for accurate Tawaf counting and timely guidance throughout their journey, alleviating their concerns and enhancing their overall pilgrimage experience. In developing the Digital Mutawwif app, a comprehensive approach was employed to ensure its effectiveness and efficiency. The app was carefully designed to offer intuitive navigation and valuable resources for users, making it an essential tool for their spiritual journey. In our project, we thoroughly tested the app's features to ensure they work correctly. For example, we checked that the emergency button triggers the right actions and that user profiles show accurate information. We also made sure that emergency alerts are quickly sent to Mutawwifs and that the user's location is displayed accurately on their interface. We tested each feature in different situations and fixed any issues we found to make sure the app works well for users. The outcome showed that all tests were passed, indicating the app's reliability and functionality in assisting pilgrims during their pilgrimage. Looking to the future, further improvements in network performance and security measures are recommended to enhance the app's capabilities and user experience. With these enhancements, the Digital Mutawwif System can continue to serve as a valuable companion for pilgrims, providing seamless guidance and support during their sacred journey.**

Keywords*— *Mobile Application, Mutawwif, Pilgrims

I. INTRODUCTION

The gathering of Muslims in Mecca and Medina for Umrah presents challenges in managing and monitoring pilgrims, especially the elderly, parents with children, and first-timers. The Mutawwif, responsible for guiding and caring for pilgrims, plays a crucial role in ensuring a smooth pilgrimage experience. In the modern age, mobile applications have become integral, simplifying various tasks. Digital technology, with its discrete values, has transformed everyday life, making tasks more efficient and accessible (Phongtraychack & Dolgaya, 2018). Integrating digital technology into religious practices like Umrah could enhance the overall experience and accessibility for millions of Muslims worldwide. Performing Umrah, particularly the Tawaf ritual, poses challenges, including reliance on traditional guidebooks, crowded Tawaf areas leading to lost pilgrims, difficulties in counting Tawaf rounds, and language barriers. These issues affect various groups, such as the elderly, parents with children, and those performing Umrah for the first time. The official statistics estimate a significant number of children and elderly pilgrims in Umrah groups, with instances of lost pilgrims (Adnan Nadeem et al., 2020). Pilgrims who forget the number of Tawaf rounds can also face difficulties (Tengku Ibrahim Helmi, 2019). Moreover, those unable to read Arabic may struggle with prayers during Tawaf (Omar Ayoub, 2021).

II. METHODS



1. **User Registration**: In this use case, visitors can create a new account by providing personal information and credentials.

2. **Login**: Pilgrims, admins, and Mutawwif can log in using their respective credentials. Successful login directs each user type to their main menu, and incorrect login credentials trigger an error message.

3. **Umrah Guide**: Pilgrims can access information about acts of worship during their journey to Makkah/Madinah before Tawaf.

4. **Tawaf Counter**: Pilgrims can start a Tawaf counter that tracks the number of rounds they complete while circling the Tawaf. After seven rounds, a congratulatory message is displayed.

5. **Settings**: Pilgrims can edit their profile information, including name and identification number. They also have the option to delete their account, which removes their data from the database.

6. **Assign Mutawwif**: Admins can add new Mutawwif data to the database, edit existing Mutawwif data, and delete Mutawwif accounts.

7. **Jemaah Record**: Mutawwif can access a section that displays a list of pilgrims based on the groups assigned by the admin.

8. **Emergency Button**: Mutawwif and pilgrims can use an emergency button. Mutawwif can access the roster of pilgrims who have shared GPS-tracked locations through their smartphones. Pilgrims can transmit their GPS coordinates, allowing for location tracking.

9. **Logout**: Users, admins, and Mutawwif have the option to log out, ending their current session and returning them to the login screen.

These use cases and functionalities cover various aspects of the mobile application, from user management and guidance for pilgrims to administrative tasks like managing Mutawwif and handling emergencies through GPS tracking.

III. RESULTS AND DISCUSSION

The overall success of functionality testing across different user roles indicates that the software product is dependable, resilient, and user centric. It meets user needs and expectations, ensuring a satisfactory user experience. In the realm of network security for net-centric applications, our approach can be succinctly summarized as follows: In summary, our security framework seamlessly integrates these measures and protocols into the application's architecture. This integration guarantees data confidentiality, integrity, and availability while prioritizing user safety and trust.

A. Authentication and Authorization Mechanism

- We have integrated Firebase Authentication as a core element of our security strategy.
- Firebase Authentication adheres to industry standards and employs OAuth 2.0 for secure and delegated access.
- Integration of Firebase Authentication is seamless through Firebase CLI and SDKs.
- It provides secure user registration, login, and logout process.
- User roles are precisely managed within Firebase, ensuring granular authorization.

B. Data Encyrption

- Data encryption forms the bedrock of our security framework.
- Firebase Authentication seamlessly incorporates encryption using TLS protocols, including HTTPS.
- TLS ensures data encryption during transmission, safeguarding user credentials and authentication tokens.
- It relies on SSL/TLS certificates and robust encryption techniques.
- User roles are precisely managed within Firebase, ensuring granular authorization.

C. Phone to Internet Connection Security

- Securing connections between users' devices (phones) and the internet is paramount.
- We implement HTTPS with TLS encryption to protect data during transmission.
- This encompasses sensitive data such as login credentials, personal information, and emergency alerts.
- SSL/TLS certificates are employed to encrypt data in transit.
- Adherence to HTTPS enhances user confidence in the platform's security.

D. Cloud Database Integration and Management

- User profiles and authentication are pivotal components of our application's security.
- Firebase Authentication is the cornerstone, permitting access only to authorized users.
- Various identity verification methods are employed.
- Firebase Cloud Firestore effectively manages location data and supports a responsive emergency response system.
- Group assignment and management are streamlined via Firebase's Cloud Firestore, optimizing administrative functions, user experiences, and access control.

In summary, our security framework seamlessly integrates these measures and protocols into the application's architecture. This integration guarantees data confidentiality, integrity, and availability while prioritizing user safety and trust.

IV. CONCLUSIONS

The Digital Mutawwif system represents a successful development, offering a comprehensive and user-friendly platform for supporting pilgrims and Mutawwifs during their Umrah journeys. Tailored to meet the specific needs of each user role, the system provides a seamless experience, with features like the Tawaf Counter and User Setting Page enhancing the overall journey. Rigorous functionality testing resulted in all tests passing, affirming the system's reliability, accuracy, and security. Network security and cloud database integration principles were prioritized, ensuring data confidentiality, availability, and optimal performance. The Digital Mutawwif system fulfills its role as a valuable companion, streamlining the Umrah journey and offering guidance. Continuous updates and enhancements will be essential to maintain relevance and efficiency.Future work includes multilingual support, expanded user profiles, real-time location services, offline access, feedback mechanisms, augmented reality guides, enhanced security, wearable device integration, a pilgrim community platform, and ongoing system improvements. These developments aim to enrich the pilgrimage experience for pilgrims and Mutawwifs, ensuring a spiritually fulfilling journey.

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