# Design of a Boolean Information Retrieval Model in an Android-Based Qur'an Interpretation Application

**Ahmad Yani[1*]**

## Abstract

Technological developments have had a significant impact on human life, including the learning process. The modern digital era has produced a wide range of devices that have indirectly reduced public interest in reading, including reading the Holy Qur'an. The COVID-19 pandemic further exacerbated this condition because religious learning activities that were previously conducted in places of worship were forced to shift to online learning. The Ministry of Religious Affairs of the Republic of Indonesia (Kementerian Agama Republik Indonesia) has provided a digital Qur'an application; however, it does not yet include a fast and accurate interpretation search feature. This study aimed to develop an Android-based Qur'an interpretation application by implementing a Boolean Information Retrieval (IR) model as the method for searching the interpretation index. The application was developed using the Dart programming language and the Flutter framework, with reference to Tafsir Ibn Kathir. The results indicate that the implementation of the Boolean IR model improved the effectiveness of interpretation searches and generated relevant results in accordance with user needs.

[1*] Universitas Bina Darma, Indonesia, Corresponding email: 171420192@ahmadyani.binadarma.ac.id

### Introduction

The Holy Qur'an is the primary and most authoritative source of Islamic law, containing the revelation of Allah SWT that serves as guidance for all aspects of human life. It encompasses principles related to faith, worship, ethics, and social relations. To fully comprehend the meanings and messages contained within the Qur'an, Muslims require not only recitation but also systematic and scientific interpretation (tafsir). According to Nasrudin (2017), Qur'anic interpretation plays a crucial role in helping individuals understand contextual meanings, legal implications, and moral values derived from the divine text. Without proper interpretation, the universal messages of the Qur'an may be misunderstood or applied inaccurately in daily life.

Various religious learning programs have been developed to encourage continuous engagement with the Qur'an, one of which is the widely known One Day One Juz movement. This program motivates Muslims to read one section (juz) of the Qur'an daily, fostering spiritual discipline and consistency. However, in practice, many Muslims encounter significant obstacles in maintaining regular participation in Qur'anic studies. Time limitations, demanding work schedules, and lifestyle changes, particularly during the COVID-19 pandemic, have greatly reduced opportunities for face-to-face religious learning. Social distancing policies and restrictions on religious gatherings further intensified the need for alternative, technology-based learning solutions.

In response to these challenges, numerous digital Qur'an applications have been developed by both private developers and official institutions, including the Ministry of Religious Affairs of the Republic of Indonesia. These applications generally provide basic features such as Qur'anic text, translations, audio recitations, and simple commentary. Despite their widespread availability, most existing applications do not yet offer fast, precise, and flexible interpretation search mechanisms. Users often experience difficulty in locating specific interpretations relevant to particular topics, verses, or thematic queries, which limits the effectiveness of these digital tools as comprehensive learning media.

Among various digital platforms, Android-based applications are considered one of the most effective solutions for modern Islamic learning. Android devices are widely used, affordable, and readily accessible to diverse social groups. Moreover, Android platforms support interactive application development, making them suitable for integrating advanced search mechanisms and learning features. Previous studies have shown that interactive learning applications significantly increase user interest and engagement in studying the Qur'an (Shodiq et al., 2021; Jaya et al., 2019). The combination of mobility, accessibility, and interactivity positions Android as an ideal medium for delivering Qur'anic interpretation services to a broad audience.

To improve the accuracy and relevance of interpretation searches, this study applies the Boolean Information Retrieval (IR) model. The Boolean model retrieves information using logical operators such as AND, OR, and NOT to filter and refine search results based on user queries. This model enables users to combine keywords logically, producing more precise and context-appropriate results. Prior research in Online Public Access Catalog (OPAC) systems confirms that Boolean-based searches offer high accuracy and effectiveness in retrieving relevant information (Marwiyah & Labibah, 2020). Therefore, this approach is considered highly suitable for Qur'anic interpretation indexing and searching.

Based on these considerations, this study aims to design and develop an Android-based Qur'an interpretation application by implementing the Boolean IR model as the primary interpretation index search method. The application is expected to assist users in obtaining explanations of Qur'anic verses more quickly, accurately, and relevantly. Through this development, the study seeks to contribute to the advancement of digital Islamic education, support independent religious learning, and provide a practical technological solution for Muslims in understanding the Qur'an amid modern lifestyle constraints.

**Methodology**

***Requirement Analysis***

The requirement analysis was conducted to determine the main functional features of the application, which include:
1. Users are able to log in to the application.
2. Users are able to access the Qur'an page.
3. Users are able to access the Qur'an interpretation page.
4. Users are able to use the search feature.
5. Users are able to access the application information page.

**System Design**
User Interface DesignThe main page interface was designed to display four primary menus, namely the Qur'an, Qur'an Interpretation, Search, and About menus.

**Use Case Diagram**
The use case diagram illustrates user activities, including logging in, selecting surahs, viewing interpretations, performing Boolean-based searches, and accessing application information.
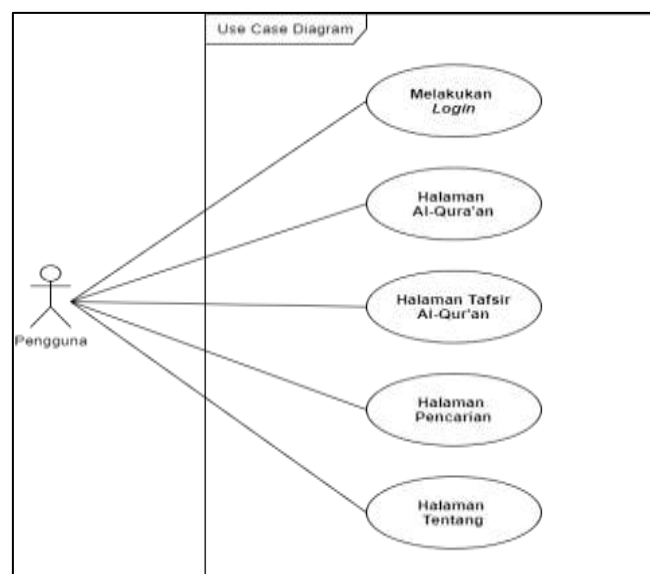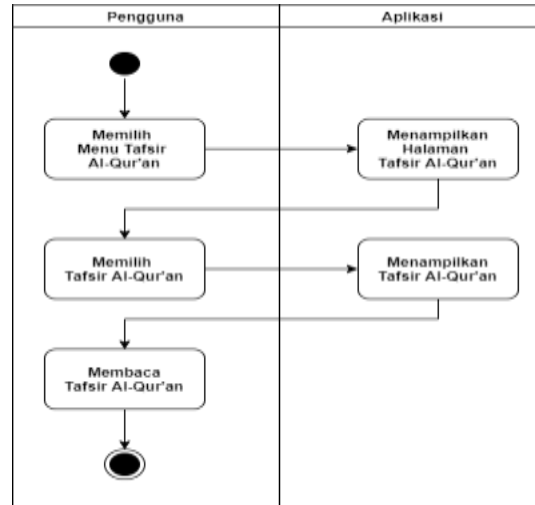


Figure 1. Usecase Diagram
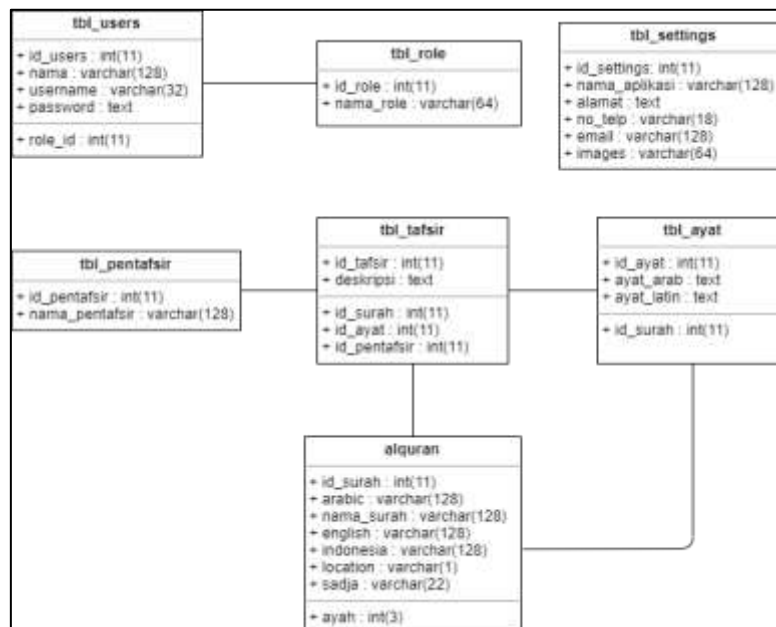
### Activity Diagram

The activity diagram describes the flow of user activities from the login process to the utilization of the search feature within the application.
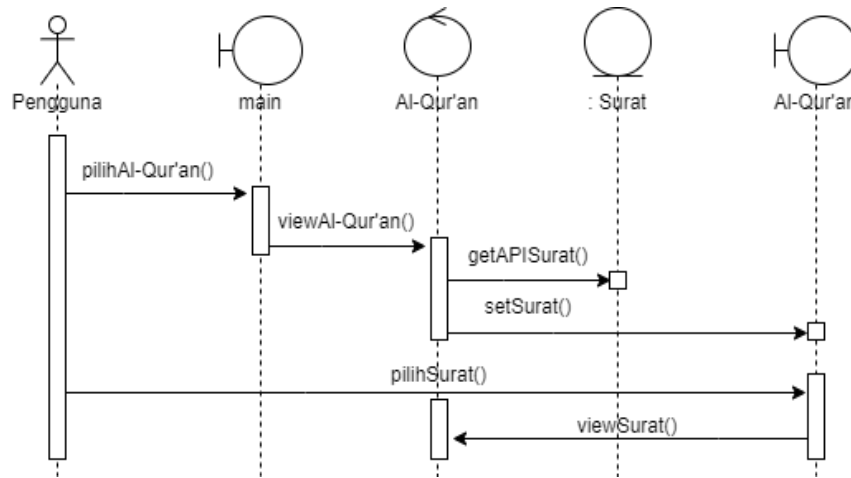


Figur 2. Activity Diagram

### Class Diagram

The application consists of seven classes, namely tbl_users, tbl_role, tbl_settings, tbl_pentafsir, tbl_tafsir, tbl_ayat, and tbl_alquran.



Figur 3. Class Diagram

### Sequence Diagram

The sequence diagram depicts inter-object communication in executing interpretation search functions and application navigation.



Figur 4. Sequence Diagram

### Entity Relationship Diagram (ERD)

The database consists of six main tables, namely tbl_users, tbl_role, tbl_pentafsir, tbl_tafsir, tbl_ayat, and tbl_alquran.



Figur 5. ERD Aplikasi

### Implementation of the Boolean IR Model

The Boolean IR model was implemented to perform interpretation index searches using the logical operators AND, OR, and NOT, thereby allowing users to obtain relevant results based on combinations of specified keywords.
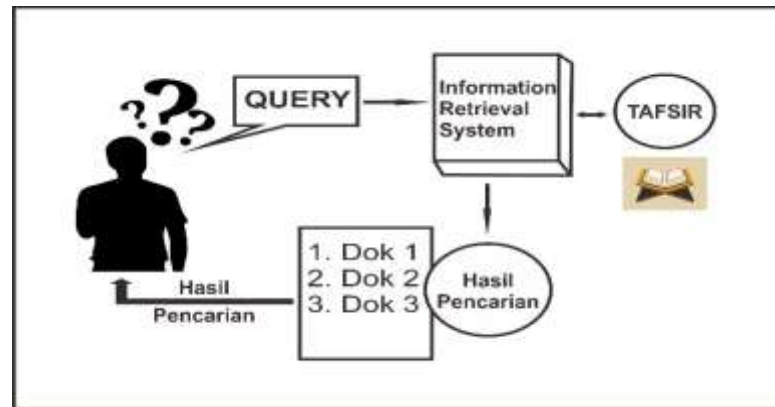


Figur 6. Search Flow using IR System

### Results
### Application Interface Implementation

### Main Page

The main page consists of four primary menus: Qur'an, Qur'an Interpretation, Search, and About.

### Qur'an Page

This page displays a list of surahs that users can select to view verses along with their corresponding interpretations.

### Search Page

This page contains a text input field and a search button with full support for Boolean operators.

### Surah Page

This page presents the verses of a selected surah together with their interpretations.

### About Page

This page provides information about the application and the identity of the developer.

### Testing Results

Application testing was conducted using white-box testing to verify functional correctness. Cyclomatic complexity analysis was performed through flowcharts and flow graphs. The results indicate that the logical flow of the application operated in accordance with the system design and functional requirements.

**Discussion**

The Android-based Qur'an interpretation application developed in this study demonstrates a significant contribution to facilitating users in accessing Qur'anic interpretations in a systematic, structured, and efficient manner. Compared to conventional printed tafsir books or static digital texts, this application allows users to search and retrieve interpretations based on specific keywords instantly. This capability directly addresses the limitations faced by many users who previously needed considerable time to locate relevant verses and their explanations manually. Thus, the application supports more effective self-directed learning and increases accessibility to Qur'anic knowledge in daily life.

The implementation of the Boolean Information Retrieval (IR) model proves to be a key strength of this system. By utilizing logical operators such as AND, OR, and NOT, users can refine their search queries and obtain more precise and relevant interpretations. This method minimizes irrelevant search results and enhances retrieval accuracy. These findings are consistent with the study by Marwiyah and Labibah (2020), which confirmed that Boolean-based search techniques produce high accuracy in information retrieval systems, particularly in structured digital catalogs. In the context of Qur'anic interpretation, this accuracy is essential to ensure that users receive reliable and contextually appropriate explanations.

From a technological perspective, the use of Flutter and Dart for application development offers important advantages in terms of interface responsiveness, cross-platform compatibility, and overall system performance. The application runs smoothly on various Android devices with different hardware specifications, making it accessible to a broad segment of users. The intuitive design also supports user-friendly navigation, allowing both technologically adept and novice users to operate the application without significant difficulty. This ease of use is a critical factor in promoting long-term user adoption and sustained learning engagement.

The results of this study also align with previous research by Shodiq et al. (2021) and Jaya et al. (2019), which found that interactive digital religious learning applications significantly increase user interest and motivation in studying the Qur'an. The interactive search feature, instant feedback, and systematic verse-indexing mechanism provide added value that cannot be easily obtained through traditional learning media. As a result, users are more encouraged to explore and deepen their understanding of Qur'anic teachings independently.

In addition to its pedagogical benefits, the developed application also supports the socio-religious needs of modern Muslim communities, particularly in the post-pandemic era where digital learning has become increasingly dominant. With time constraints, work commitments, and reduced access to face-to-face religious studies, this application functions as an alternative medium for Qur'anic learning that is flexible and accessible anytime and anywhere. This flexibility contributes to the democratization of access to Islamic knowledge and strengthens digital religious literacy among users.

Overall, the findings confirm that the integration of the Boolean IR model with an Android-based mobile platform constitutes an effective solution for improving the quality of digital Qur'an interpretation services. The system not only enhances search accuracy and efficiency but also strengthens user engagement in Qur'anic learning. However, future development can further expand the system by integrating semantic search, artificial intelligence-based recommendation features, and multilingual tafsir content to broaden the

application's scope and usability. Thus, this study provides both a practical contribution and a foundation for continued innovation in digital Islamic education systems.

### Conclusion and Recommendations

This study concludes that the Android-based Qur'an interpretation application was successfully developed by implementing the Boolean Information Retrieval model. The application provides an effective and relevant search feature for surah and interpretation indices. The Boolean IR model improves the accuracy of search results based on combinations of user-defined keywords, thereby enhancing the overall effectiveness of the interpretation search process.

### Disclosure Statement

No potential conflict of interest was reported by the authors.

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**Biographical Notes**

**AHMAD YANI** is a graduate of the Informatics Engineering Study Program, Universitas Bina Darma, Palembang, Indonesia. His research interests include mobile application development, information retrieval systems, and Islamic educational technology.