

Searching and Displaying Bukhari's Hadith from All Derivative Words Isim Makrifat in Quranpedia using Extreme Programming Method

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Abstract—Quranpedia is a website designed with a similar structure to Wikipedia. This website have goals to make it easier for users to find root words and verses of the Quran that contain this specific root. Despite using modern Arabic in its development, the website in Quranpedia still includes basic words that will later display all verses or contents of hadith with the same basic words. This study aims to evaluate the functionality of the Quranpedia website. The method used in this study is the black box testing and the use of CodeIgniter4. The results obtained from the testing reveal that the website achieves a high success rate of 97%, and the appearance of the resulting website proves to be user-friendly and in accordance with the presentation of the Bukhari Hadith. In addition, this study also tested word roots to see how accurate the search results for Bukhari Hadiths that have the same root word are. The results obtained from this test show that the accuracy rate is 83%. These results show that the website is very effective. Overall, this research demonstrates that Quranpedia effectively fulfills its main objective by providing a reliable and comprehensive reference source for the Muslim community. With a simple and user-friendly interface, as well as a commitment to continuously improve accuracy, Quranpedia is expected to be a valuable tool and can helping the Muslim community deepen their understanding and appreciation of hadith.

Keywords: Black Box Testing; Roots; Quranpedia; Website; Shahih Bukhari

1. INTRODUCTION

For a Muslim, hadith is a guide in carrying out Islamic law. Hadith is also one of the main sources of teachings which contain sayings, the behavior of the Prophet SAW, and references to teach good morals as a Muslim [1]. The hadith sentences become an explanation of the contents of the Qur'an, which is still regarded general. This highlights the significance of the hadith syarah's stance. It will be difficult to understand the meaning of the hadith if the hadith requirement does not present [2], [3]. Hadith etymologically means "new from everything". The terminology is the same as sunnah. It can be interpreted that hadith is everything that was narrated from Rasulullah SAW after his prophethood, whether in the form of sada, behavior, or taqdir. In the hadith is divided into three structures, namely sanad, matan, and mukharrij [2]. The first person who took the initiative to collect authentic hadiths was Abu Abdillah Muhammad bin Isma'il Al Bukhari or commonly known as Imam Al Bukhari and his friend and student, Muslim bin Al-Hajjaj bin Muslim Al-Qusyairi An-Naisaburi or commonly known as Imam Muslim. Two hadith books from Imam Bukhari-Muslim are considered by the scholars as the most authentic hadith books so that the authentic hadiths issued by the two hadith narrators are often nicknamed "Rowahu Bukhari-Muslim" or "Mutafaq'alah" [4]. The book is a collection of hadiths considered to be of the best quality and authentic by Sunni Muslims [5].

In the development of this technology, many software developers have created Al-Qur'an and Hadith Websites to make it easier for users to access or study the Al-Qur'an and Hadith. The language used in communicating today uses modern Arabic which has been processed from classical Arabic, which aims to facilitate communication in the outside world.

Arabic is the official language of Muslims and is one of the oldest languages in the world [6]. In 2018, Arabic also has a user population of 315 million people and Arabic is also spread in more than 25 countries. For the Indonesian people, especially Muslims, Arabic is not a "foreign language", because its contents are integrated with the needs of Muslims [7]. For Indonesians, especially Muslims, Arabic is not a "foreign language" because its content is relevant to their needs. Unfortunately, most Indonesian Muslims still believe that Arabic is solely a religious language, so the development of Arabic is limited to Muslims who desire to enhance their religious knowledge [8]. In Arabic there is a basic concept of language in order to understand the history and characteristics in it. By understanding these characteristics, of course it will be easy to determine the approach in the Arabic language process. In Arabic, there is nahwu science which regulates Arabic grammar. According to Jumhul Ulama, there are three types of words, namely isim (noun), fi'il (verb), and harf (words that have no meaning). In this study, it only refers to the root words to prevent the discussion from deviating from the issues raised [6].

When it comes to root words, Arabic words typically have three basic consonants. All three consonants can be used to create six tenses, each with its own meaning [9]. Pronunciation discrepancies will result in meaning differences. Arabic is also distinct in terms of numbers (mufrad, muthanna, and jama), gender (mudhakar and muannath), and other aspects [10].

Understanding the relationship between terms that share the same root can aid in comprehending the concept and context of Qur'anic verses [11]. Understanding the meaning of every word in the Qur'an is a vital part of understanding and extracting knowledge from the holy text [12].

A word root is a part of a word that forms the basis for the meaning of another word that is formed from that word. The root word comes from the root word. A root or root word is a core word that cannot be reduced to a more meaningful element. In grammar, a root is a grammatical unit that can be left blank or that can be attached at the beginning or end [13]. The traditional definition allows a root to be a free form or a bound form. The root sound shape is the building block for affixes and compounds. However, in polysynthetic languages with a very high level of inflectional sound form management, the term "root" is generally synonymous with "free form" [13].

Even though it uses modern Arabic in its development, the website in Quranpedia still includes root words which will later display all verses or contents of hadith with the same root word. Quranpedia is a website built to make it easier for Muslims to find nouns (Isim) and roots (Mashdar) contained in the Quran and the Books of Hadith. In this process, the methods used is Extreme Programming (XP) to provide solutions to current problems by developing a website-based system [14].

Previous research by [14], who used Extreme Programming (XP) in the development of web applications to select job training participants, demonstrated that the XP method can be used to build or develop software. Another study conducted by [15] stated that the XP method was used because information system designs needed to be completed quickly, and the results of this study also demonstrated that the system was successfully designed using XP. Based on the success of earlier studies using XP, the researcher in this study intended to apply the XP approach to the Quranpedia project so that it could reveal the roots of terms in Bukhari Hadith and further enhance the findings of prior studies using the XP method.

Therefore, the researcher wants to conduct research by designing a website that can provide an explanation of the root words that are sought in the Hadith, especially using modern Arabic Hadith from Bukhari and from this research it is hoped that later it can support the Quranpedia project and this root search feature can be applied in Quranpedia. This research has a specific objective, namely to develop software to find out the root words of a word in the Hadith Sahih Bukhari. So that this research has a contribution, namely:

- Detect the roots of words in Arabic in the hadith book sahih bukhari.
- Displays sahih bukhari hadith which contain the same root word as the selected verse of the Quran.

2. RESEARCH METHODOLOGY

2.1 Research Stages

The research stage is a series of systematic and organized investigations and is carried out to find out and analyze the problems that have been formulated so that they can find answers. In this research, the stages of research were carried out on system design. And at the system design stage, a design is carried out using the extreme programming method with the aim of being able to produce a system that can detect basic words.

Extreme Programming (XP) is a software engineering process with an object and target-oriented approach. This method is aimed at small to medium-sized teams [16]. This method is also ideal for use when the team is confronted with ambiguous or time-sensitive requirements [14]. Meanwhile, Extreme Programming (XP), also known as the "technical how to" method, is a method that demonstrates how a team can develop software efficiently using various principles and practical software development techniques [15].

XP focuses not only on coding but across all areas of software development [17]. XP is a method that has a good level of responsiveness to changes. The advantages of the method XP also offers stages in a short processing time according to the focus to be achieved [18]. There are five phases in Global Extreme Programming: Exploration, Planning, Iteration, Production, and Maintenance [19], [20].

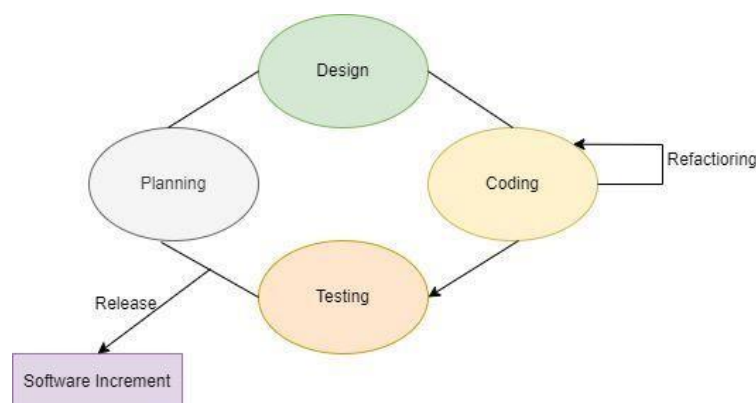


Figure 1. Extreme Programming Method

The Extreme Programming (XP) method requires four stages to be completed, including [17]:

- a. Preparation
This is the first stage in the development of a system. During this stage, various planning activities such as identifying problems, analyzing needs, and developing a schedule for system development can be carried out.
- b. Design
The design stage comes after planning. This stage involves modeling activities ranging from system modeling to architectural modeling to database modeling. This research uses UML (Unified Modeling Language) in designing the research.
- c. Coding
This stage involves the use of a programming language to implement a previously created model in the form of a user interface. In the coding stage, the front-end and back-end development of the website will be carried out using web programming like PHP, HTML, CSS, and JavaScript.
- d. Testing
After the coding stage is complete, the system must be tested. This is done to determine whether there are any errors that occur while the application is running and to determine whether the system built meets the needs of the users.

2.2 Unicode

In the unicoding process, Arabic sentences are converted into certain codes according to computer standard codes so that word processing can be processed. Unicoding process flow. In the unicoding process, the input sentence is converted into unicode first, then separated between unicode punctuation marks such as , ` and others with unicode letters, then the results of each unicode are accommodated in a variable with a semicolon (;) added at the end of the letter so it doesn't lose the original Unicode per character [7], [20].

2.3 Blackbox Testing

Black-Box Testing is a type of software test that is a functionality test of an application that does not refer to the internal structure or requires special understanding of application program code and programming skills [21]. Black box testing is significant in software testing since it validates whether the entire system functions properly. Black box testing is dynamic [22].

3. RESULT AND DISCUSSION

The results of the test are obtained from the previous stages that have been carried out. The results obtained from the previous stages will then be analyzed to determine whether they are in accordance with the expected output or not. Below is the result of implementing the Quranpedia website:

3.1 Homepage Display

The page display is the most important page in the navigation of the Quranpedia website users. Users can choose a hadith from the Bukhari collection on this page. To avoid distracting the user, the design of this page is kept as simple as possible. It is expected that users will be able to easily operate and use the provided features with a simple display.



Figure 2. Homepage Display

The image above is from the homepage and shows the option to view Bukhari's Hadith by clicking on it. To advance to the next page, users must click on the text. Otherwise, the display will remain static on that page.

3.2 Bukhari's Hadith Display

The most important section for users in Quranpedia is the hadiths page. This page allows users to learn more about each verse in the Bukhari Hadith by exploring and exploring it in greater depth. Users can access the root words of each hadith by clicking on them on this page. This allows the user to search for and comprehend every relationship between words in the hadith that share the same root, thereby deepening the user's understanding of Arabic and the meaning contained in the Bukhari's Hadith.

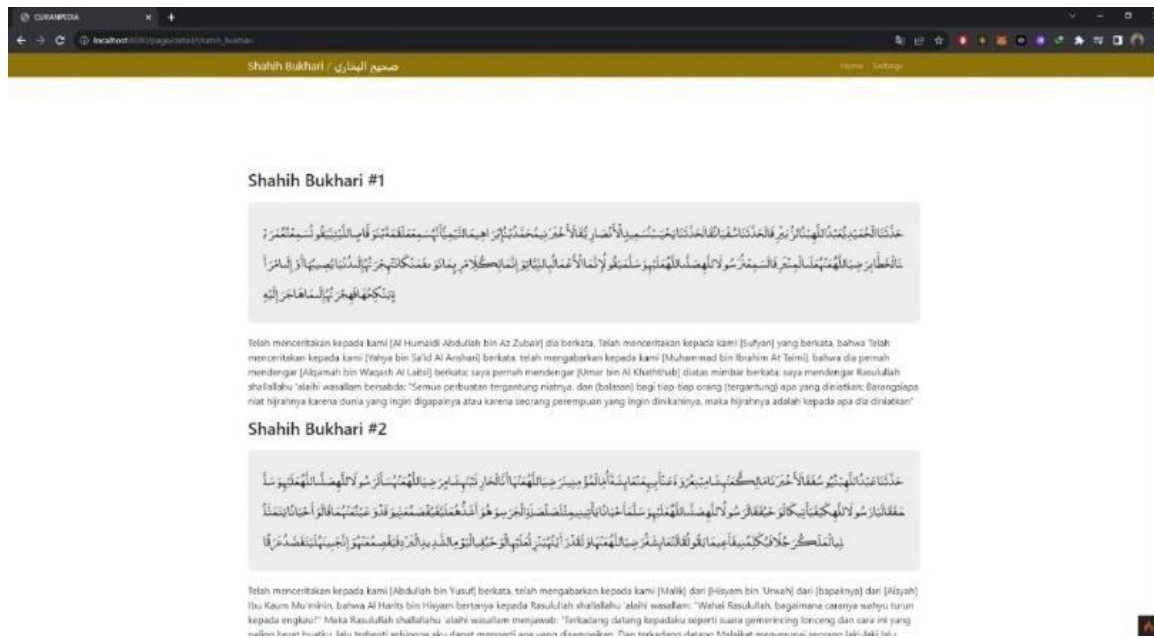


Figure 3. Bukhari's Hadith Display 1

The picture above shows the appearance of Bukhari's hadith. This page is the first display that appears after the user clicks on the Bukhari's Hadith option on the previous homepage. Then the user can direct the page up or down according to what he wants.

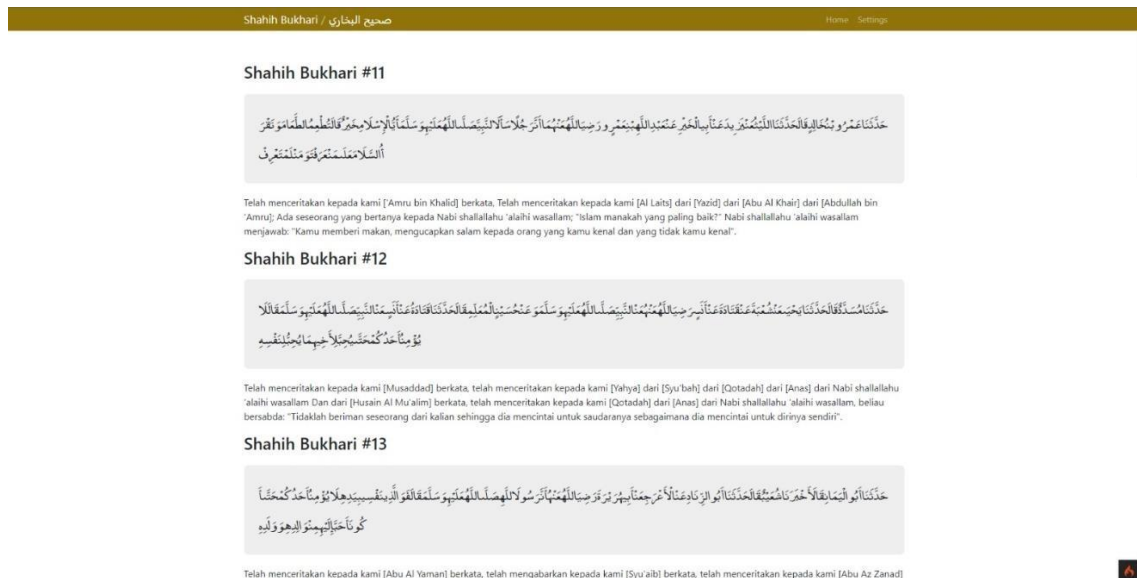


Figure 4. Bukhari's Hadith Display 2

The picture above is also a display of Bukhari's hadiths. Each page will display as many as 10 hadiths. Furthermore, the user can select navigation in the form of "next page" to search for other hadiths. The displayed sentences are written in Arabic and translated into Indonesian. More than 100 verses from Bukhari's Hadith are presented, which are divided into ten hadiths per page, requiring more than ten pages to display the entire hadith.

3.3 Root Word Display

The display of basic words in Quranpedia plays an important role in helping users understand the basic words they selected on the previous page. This page has been created specifically to provide the user with detailed information about the selected root word. Users can search for all words on this page that share the same root word as the word they previously clicked on. Every word with the same root is displayed in its entirety, allowing the user to learn more about these related words. By exploring different words that stem from the same root, users can improve their knowledge and understanding of the Arabic language and its structure. This feature allows the user to discover the connection and meaning of the words.

Figure 7 depicts the verses that use the same root word as the previously selected root word. The word stems displayed here differ from those shown in figures 4 and 5. The total number of root words in the hadith is 15, as shown in the figure.

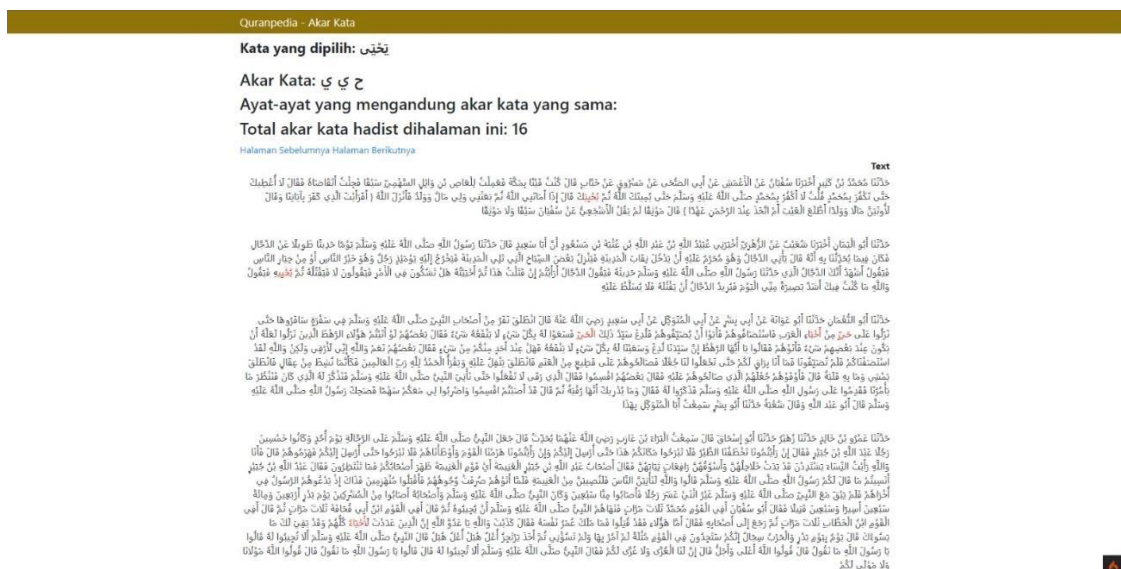


Figure 8. Roots Display 4

Figure 8 also includes the same root words as Figure 7. Figure 8, on the other hand, shows a total of 16 root words. After the feature coding is complete, the researcher continues with testing to assess the performance of the Quranpedia website in achieving the predetermined goals. To ensure reliability and functionality, testing is carried out using black box testing methods and basic word comparison tests.

a. Root Comparison Test

Root Word Comparison Testing involves selecting samples from each hijaiyah letter with the most derivatives. The purpose of this testing is to gain a representative overview of the consistency and accuracy of root word searches in Quranpedia, as well as in the reference corpus. The process of selecting samples includes choosing specific hijaiyah letters and identifying their most associated derivatives. Subsequently, root word searches are conducted on Quranpedia and the corpus to compare the results from both sources. By employing a sampling approach from each hijaiyah letter with the most derivatives, this testing provides a comprehensive understanding of the consistency and accuracy of root word searches in both Quranpedia and the reference corpus. As a result, this root word comparison testing offers valuable insights into Quranpedia's capability to provide precise and dependable root word search results. Consequently, users of Quranpedia can confidently access root word information of comparable quality to other trusted reference sources. Here are the results of the root comparison test:

Table 1. Root Word Comparison Table

Root Words	Corpus	Quranpedia Shahih Bukhari	Percentage
ا ت ي	549	233	42.44%
ا ل ه	2851	232	8.14%
ا م م	119	80	67.23%
ا م ن	879	174	19.82%
ح ي ي	184	94	51.09%
ر ج ل	73	73	100%
ر س ل	513	199	38.82%
ر ض و	73	61	83.56%
س ا ل	129	70	54.26%
س م ع	185	86	46.49%
ش د د	102	30	29.41%
ص ل و	99	99	100%
ع ب د	275	239	86.91%
ك ل ل	377	30	7.96%
ك ي ف	83	4	4.82%
م ث ل	169	126	74.56%
م ر ا	38	19	50%
ن ز ل	293	99	33.76%
ه ج ر	31	28	90.32%

ي و م	405	49	12.10%
		Total	83%

b. Analysis of Comparative Testing of Word Roots

After conducting root word comparison testing, it was found that the average score obtained was 83%. This score indicates that there is no significant difference in the search results for root words between Quranpedia Bukhari's Hadith and the corpus used as the reference source. The main goal of this testing was to assess the accuracy and dependability of root word search results from both Quranpedia and the corpus. With an average score of 83%, it can be inferred that both Quranpedia and the corpus yield similar outcomes when searching for root words in the Bukhari's Hadith. While there is a minor difference in the average score, the results consistently demonstrate that both sources offer reliable information regarding root words in the Bukhari's Hadith. As a result, users can confidently rely on either Quranpedia when seeking information about root words in the Bukhari's Hadith, depending on their preferences. In conclusion, both Quranpedia and the corpus serve as dependable and effective sources for understanding the root words found in the sacred text of the Bukhari's Hadith. Users have the flexibility to choose between the two based on their individual preferences, knowing that they will obtain consistent and reliable root word search results from either source.

c. Black Box Texting

During this testing, different aspects and functionalities of Quranpedia will be thoroughly examined to ensure that the website operates in accordance with the specified requirements and expectations. The testing process will yield valuable insights regarding the system's dependability, performance, and abilities in delivering an exceptional user experience. Through comprehensive black box testing, Quranpedia can be thoroughly evaluated to ensure the website operates according to established standards. Here are the results of the tests that have been done:

Table 2. Testing

No.	Description	Testing Procedure	Expected Output	Respondent Assessment
1.	Choosing Bukhari's Hadith	Testing is done by opening the website and observing how the system responds to user choices.	The Quranpedia system can directly respond and redirect the user to the selected hadith page	100%
2.	Looking for basic words from Bukhari's Hadith	The test was conducted by clicking on the words in Bukhari's Hadith and observing the system's response.	The Quranpedia system quickly and accurately redirects users to related root word pages and displays information about those root words	95%
3.	Navigation from Hadith Bukhari page to other pages	Testing is done by clicking on the next or previous page menu in the navigation and observing how the system handles the move	The Quranpedia system can smoothly redirect users to the selected page from the navigation menu.	96%
Total				97%

The first feature, Choosing Bukhari's Hadith, has a percentage of 100% of respondents, according to the table above. This demonstrates that The Quranpedia system's expected output of directly responding and redirecting the user to the selected hadith page can be implemented very well. Furthermore, the second feature, Looking for basic words in Bukhari's Hadith, has a 95% response rate. In this manner, the expected output in the form of The Quranpedia system quickly and accurately redirecting users to related root word pages and displaying information about those root words can also be very well implemented. Additionally, the third feature, Navigation from Hadith Bukhari page to other pages, has a percentage. With the current overall results, it is possible to conclude that the features displayed by the researcher are capable of producing output that is consistent with what is expected. As a result, it can help to improve the system on Quranpedia and is extremely useful for users who require these features.

d. Analysis of Test Results Black Box Testing

Based on data from previous black box testing, which included testing of 3 main features: selecting Bukhari Hadith, searching for the root word of Bukhari's Hadith, and navigating from one page to another, respondents gave an average rating of 97%. Additionally, through root word testing, the website achieved an accuracy level of 83% in displaying Bukhari's Hadith that share the same root words. From these scores, it can be concluded that every feature in Quranpedia works according to the expected output.

Black box testing has proven that every feature tested on Quranpedia successfully meets the expectations of users. The feature to select Bukhari Hadith allows users to easily and accurately navigate to the desired hadith. The feature to search for root words from Bukhari Hadith provides a responsive experience and comprehensive information about the selected root word. The page exposure navigation feature facilitates smooth transition from one page to another.

With an average rating of 97%, it can be concluded that Quranpedia meets the expected standards and provides a satisfactory user experience. This test confirms that every feature in Quranpedia works well and provides output that matches the user's expectations. This reinforces that Quranpedia is a reliable and effective platform that facilitates users in learning and exploring Quran easily and enjoyably.

4. CONCLUSION

The main objective of this research was to create the Quranpedia website, which resembles Wikipedia in structure and presents information according to the Bukhari Hadiths. By using the black box testing method, the website was thoroughly tested, and the results showed a satisfactory success rate of 97%. The main goal of this research is to create a Quranpedia website that is structured like Wikipedia and presents information based on Bukhari's Hadith. The website is thoroughly tested using the black box testing method, and the results show a satisfactory success rate of 97%. With the involvement of several aspects of the website's functionality, namely selecting Bukhari Hadith, with the output of the Quranpedia system successfully directing users to the selected Bukhari Hadith page with a 100% success rate; Looking for root words in the Bukhari Hadith with output the system successfully redirects users to related root word pages, displaying comprehensive information about root words, with a 95% success rate; with a 96% success rate, navigation from one page to another with system output leads users seamlessly and seamlessly to the selected page from the navigation menu. Furthermore, by employing the root word test, this website achieved an 83% accuracy rate in displaying hadith with the same root word. Furthermore, using root word testing, this website achieves an 83% accuracy rate in displaying hadiths with the same root word. Overall, this research significantly contributes to the development of Quranpedia as a comprehensive and valuable website for users seeking to deepen their understanding of hadiths and derivational forms of words (isim makrifat). With an attractive interface and ongoing efforts to improve accuracy, Quranpedia becomes a reliable and essential reference source for the Muslim community in their study and comprehension of hadiths.

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