

## A Web Development System for Producing an Interactive Electronic Book

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**ABSTRACT**

In light of technological advances and the massive amount of published information available (including both reliable, accurate information and much that is not accurate), researchers need to be able to go back to original books and research published in scientific journals. This would be much easier if there were an interactive system to facilitate communication between readers and researchers. Many times, while reading a book or research study, we have needed to ask about ambiguous points, but we had no fast means of interacting with the author or other readers.

Nowadays, there are many e-books and interactive communications across sites and smartphone programs, but all of them are poor with regard to communication among the readers of those books. We have worked to create a new way to benefit from communication.

Our system can create truly interactive e-books that can answer queries through the use of a chat program that integrates with every book. This allows an author to publish his or her books as well as a publishing house could, and it also provides a source of information that makes inquiries easy. The person who answers the questions (the author) is a trustworthy source. The site also provides a set of exercises at the end of each book for the user to answer and test his or her understanding of the book. In addition, the website offers a chance for readers to evaluate each book, in order to enable sorting by quality and to gather the best suggestions from users.

We are working to ensure the ability to form an electronic interactive library that has the largest number of e-books and is an excellent reference for readers and researchers.

We found that our project can give readers many advantages over other programs, that makes information exchange easier because it allows for communication among the readers of the books. As a result, it saves much of the reader's time that would be spent searching for information.

**Key words :** Electronic Book; Web Application; Chat; Interactive

**1. INTRODUCTION**

We were inspired by the absence of any site or book application that allows chat communication among readers and makes it easy to understand the book and exchange information about it.

When it is difficult to understand some parts of a book, one must spend time searching for an explanation of these parts or

looking for the author or anyone else who can provide an explanation. This process costs the reader much time.

Our goal is to design a website to communicate with the author and other readers of a book and share information with them.

We also aim to reduce the time that is consumed by exchanging information and trying to understand books. Readers also need exercises to increase their understanding of the book.

The proposed idea allows readers to read e-books and complete some exercises that will help them understand the book and explain information to other readers. The author can sell his or her book directly to readers and add exercises, if desired.

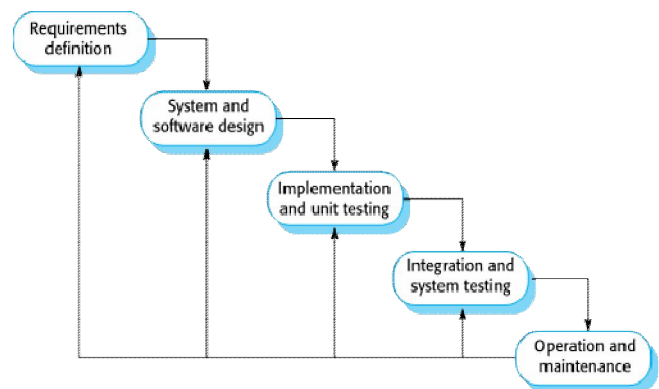
A reader would be able to see or do the following:

- Registration page
- Book names and descriptions
- Book ratings
- Answer exercises
- Chat
- Edit his/her own data

An author would be able to see or do the following:

- His/her own books
- Questions for each book he/she owns
- Add and remove books
- Edit his/her own data

We use a waterfall model, because the requirements are very well known, clear, and fixed [12] (figure 1).



**Figure 1:** Research methodology

## 2. LITERATURE REVIEW

### A. Introduction

In this section, we examine different types of e-books and review their advantages and disadvantages, their type, how they are displayed, and which platform they are based on. Our project will have the ability to avoid most of the disadvantages seen in other platforms. These are the platforms we will review:

Internet Archive Digital Library of Free Book [1].

Google Play Books [4].

Rawafed [7].

Mybook4u [5].

### B. Review

#### 1) Internet Archive Digital Library of Free Books:

The Internet Archive is a website and open library that offers over 10,000,000 freely accessible books and texts. There is also a collection of 300,000 modern e-books that can be downloaded (figure 2).

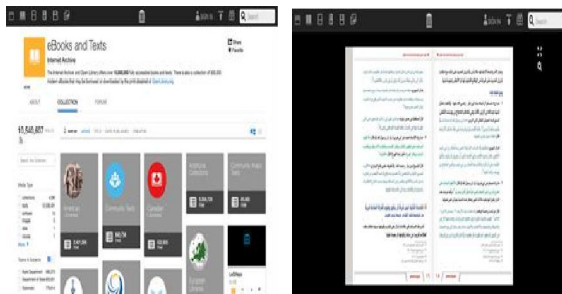


Figure 2: E-books and texts

Advantages:

- Books can be viewed and downloaded or read online.
- Users can make comments and leave reviews.
- Users can save a favorite book to read later.
- Content can be shared on social media.

Disadvantages:

- Does not support categories.
- Does not support Arabic language interface.

#### 2) Google Play Books:

This is a mobile application that helps users download free books and browse many services electronically via smart devices running on the Android operating system. This makes it easier for users to read and control books (figure 3).

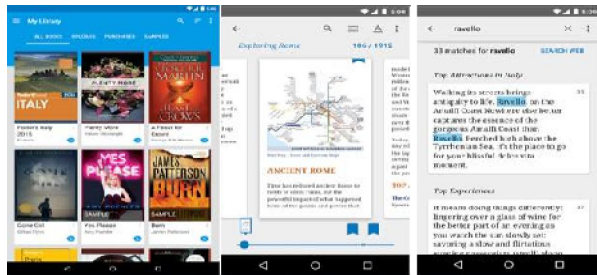


Figure 3: Google play books

Advantages:

- Readers can browse and search in pages and chapters.
- Readers can change font style and control book features.
- Users can listen to audio narration.
- Users can share books with friends.
- Readers can access a large number of books of various kinds (scientific, literary, recreational), including books in PDF and e-pub format.

Disadvantages:

- Works on the Android platform only.
- Lacks cloud storage for books, so depends on available smartphone memory.
- Users unable to interact with other users.

#### 3) Rawafed:

This is an electronic book application that is installed on the computer and allows users to browse other books (figure 4).



Figure 4: Rawafed

Advantages:

- Easy to use and comfortable to read.
- Contains photos, videos, and exercises to aid in understanding the book.

Disadvantages:

- The electronic book must be installed on a computer.
- You cannot interact with other users of the book.
- Can be used only on a desktop platform.

#### 4) Mybook4you:

This website provides books to be read online or downloaded (figure 5).

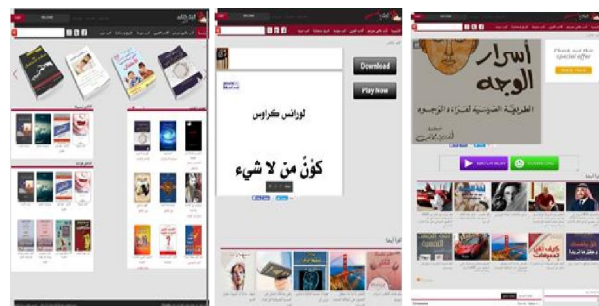


Figure 5: Mybook4you

Advantages:

Can read books without registering on the website.

- Easy to access many categories of books such as literature, history, religious, children's books, and other types.
- Site offers short descriptions of book contents.
- Users can add opinions about the book to the website or through Facebook.

Disadvantages:

- To register on the site, users must have an account on Facebook.
- The reader cannot interact with other readers.
- There are no videos, images, or audio with the books.

Some of the different types of e-books (desktop, website and mobile applications) allow users to browse, download, and view multimedia. There is no e-book that allows interaction and exchange of information between users via instant chat. Table 1 summarizes the features found in previous studies.

**Table 1:** Summary comparison of electronic book features

Feature	Archive	Google Play Books	Rawafed	Mybook4you
Arabic language support	x	✓	✓	✓
Platform	website	Android	desktop	website
Favorite books	✓	✓	x	x
Categories of books	x	✓	x	✓
Sharing URL	✓	✓	x	✓
Rate and review	✓	✓	x	✓
Instant chat among users	x	x	x	x

### 3. SYSTEM ANALYSIS

#### A. Introduction

In this section, we analyze the system and explain the functional and non-functional requirements, a sequence diagram, and use cases.

#### B. Functional and Non-functional Requirements

Functional requirements include any requirement that specifies what the system should do. These include the following:

Functional requirements as an admin:

- Login
- Manage authors (add/remove/modify authors)
- Remove users

Functional requirements as a user:

- Registration
- Login
- Read books
- Rate books
- Use chat
- Answer exercises
- Edit profile

Functional requirements as an author:

- Login
- Manage books (add/remove books, add exercises)

Non-functional requirements include any requirement that specifies how the system performs a certain function [3]. These include the following:

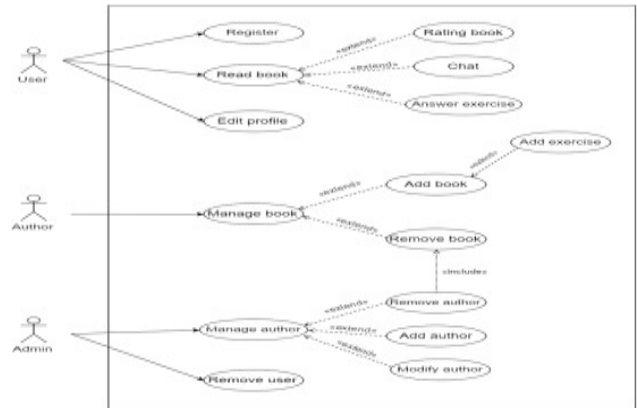
- Reliability
- Usability
- Security
- User authorization
- Simplicity in user interfaces

#### C. Use Case Diagram

The use case is a description of the steps or measures between the user and the system that help the user perform useful tasks. A use case can be a user or other person or something more abstract [11]. A use case diagram is used to display the functionality requirements for each user, as in Figure 6.

The actors in the system can be defined as follows:

- User: A person who owns an account and interacts with the site.
- Author: A person who manages the books.
- Admin: A user who has full authority.



**Figure 6:** Use case diagram

#### D. Sequence Diagram

Sequence diagrams describe interactions among classes in terms of exchange of messages over time; they are also called event diagrams. A sequence diagram is a good way to visualize and validate various runtime scenarios. These can help to predict how a system will behave and identify responsibilities that a class should have in the process of modeling a new system [8].

##### 1) Sequence Diagram Description for Registration:

As seen in Figure 7, when the user wants to register, he or she first opens the registration page. The website sends the request to the server, and the server replies by sending the registration page of the website, which the website displays to the user. Then the user enters his or her information. The website checks the information and sends it to the server in order to be sent to the database. The database checks the validity of the information. If it is valid, it will be saved in the

database. If not, the server will reject the registration, and the website will display an error message to the user.

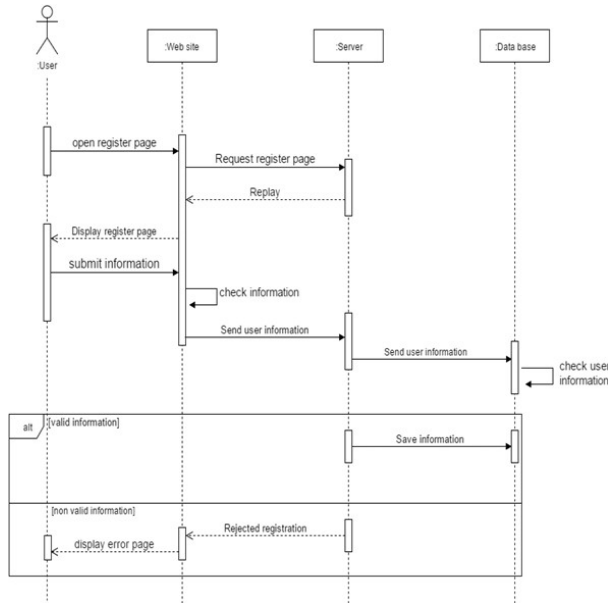


Figure 7. Registration sequence diagram

2) Sequence Diagram Description for User:

As seen in Figure 8, when the user wants to use the website, he or she must log in. The user enters the username and password, which are checked for validity. If the information is valid, the user will be able to see the books and can also select any book. The user makes a request to the server, which inturn replies by making the website display the book. The user can also benefit from the chat service, either by chatting or answering exercises.

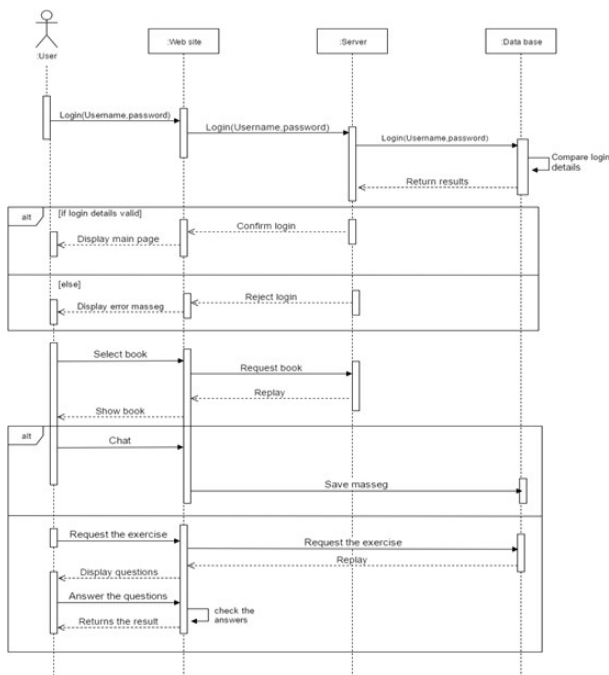


Figure 8: User sequence diagram

4. DESIGN

A. Systematic Design

The systematic design is a structure and a process to identify modules, map entity relationships, and design interface systems, components, and data to meet specific requirements [6].

B. Entity Relationship Diagram

An entity relationship diagram (ERD) shows the relationships of entity sets stored in a database. An entity in this context is a component of the data. In other words, ERDs illustrate the logical structure of databases.

At first glance, an entity relationship diagram looks very much like a flowchart. It is the specialized symbols, and the meanings of those symbols, that make it different. [9].

C. Entity Relationship Description

In Figure 9, we have developed a special user part in our system so that a manager entity, an author entity, and a reader entity can inherit all the characteristics and qualities from its main entity (user entity). We have proposed many relationships between these entities. The book entity contains the book information; the questions entity includes the questions. The chat entity holds the chat message and its information. The reader can browse the book, evaluate it, solve the exercises, and use the chat. The author can publish books and write the questions for the exercises.

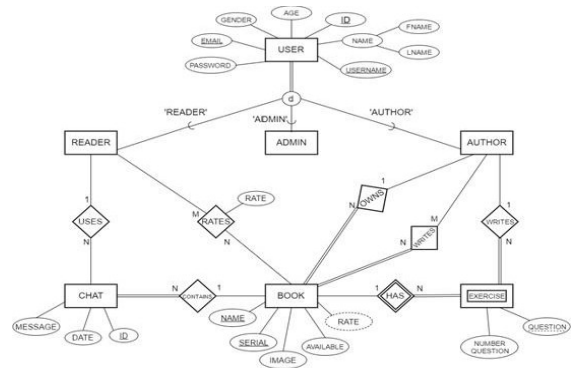


Figure 9: Entity relationship diagram

D. Relational Mapping (Schema)

A relational schema is the logical definition of a table; it defines what the name of the table is and what the name and type of each column is, as shown in Figure 10. It acts as a plan or blueprint. A database schema is the collection of relational schemas for a whole database [2].

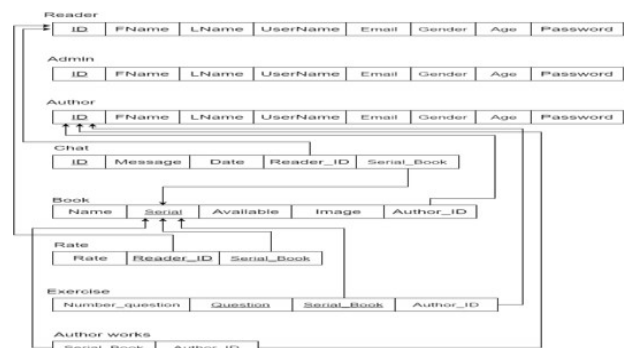


Figure 10: Relational mapping (schema)

**E. System Interface**

The user interface design (UI) is the design of user interfaces for machines and software such as computers, home appliances, mobile devices, and other electronic devices, with the focus on maximizing usability and the user experience. The goal of UI design is to make the user's interaction as simple and efficient as possible, in terms of accomplishing user goals [10] (figure 11).



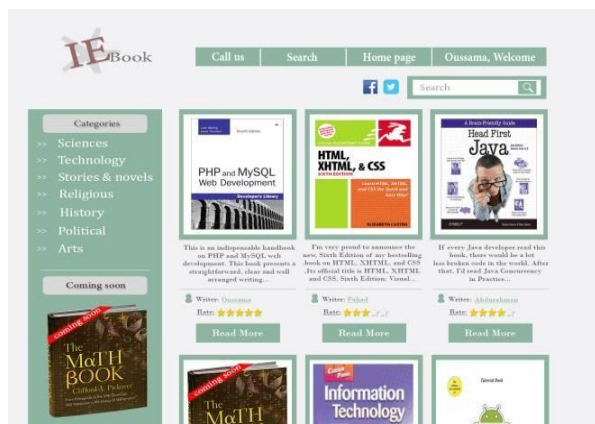
**Figure 11: Registration and Login Page**

**F. Registration and Login Page**

On this page, the user can sign in or sign up for the website. If the user wants to login, he or she must enter the username and password. If the user has not been registered on the website before, he or she will be asked to fill out the registration form in the registration box.

**G. Homepage**

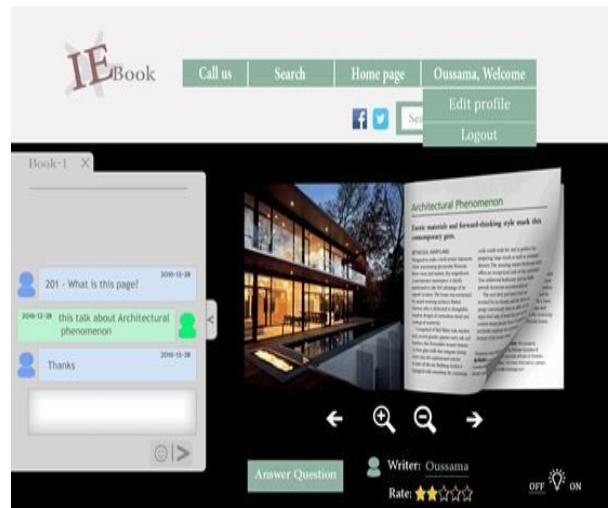
On the homepage, the user can access the books available on the site. He or she can also see the author of a book and ratings and a brief summary of the book. The user can navigate within the site through the categories of available books, look for books that will be available soon, and search by using the search bar at the top (figure 12).



**Figure 12: Homepage**

**H. Book and Chat Page**

On this page, the book and the chat window are shown only to registered users of the website. The user can use the chat in case he or she had difficulty understanding some of the content. The user can also view the author of the book and rate the book, as shown in Figure 13.



**Figure 13: Book and chat page**

**I. Admin Control Page**

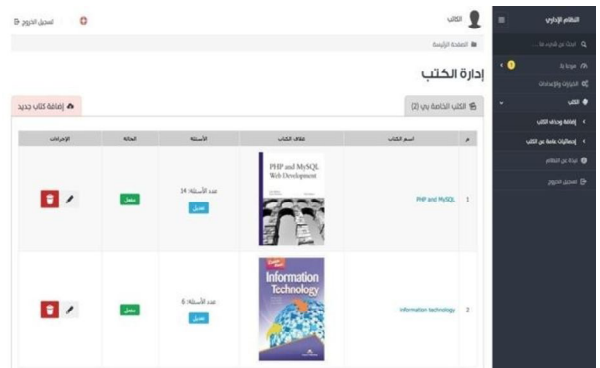
The admin control page allows one to control the site by adding or deleting admins, users, or authors. The admin can also edit his or her own data (figure 14).



**Figure 14: Admin control page**

**J. Author Control Page**

The author control page enables the author to control the books, including deleting and adding them, and he or she is also able to modify the book information and answer any inquiries in the chat window. He or she can also add questions to the book by pressing question-adding buttons (figure 15).



**Figure 15: Author control page**

### K. Manage Book Page

From this page, the author can upload books and make them available (figure 16).



Figure 16: Manage book page

## 5. CONCLUSION

In conclusion, we emphasize that reading books is very important in our lives. We provided a definition of the problem and the motivations that encouraged us to undertake this project. Then we compared our project with previous projects that share some of our aims. However, we found that our project can give readers many advantages that other programs cannot. Our system makes information exchange easier than before, because it allows for communication among the readers of these books. As a result, it saves much of the reader’s time that would be spent searching for information.

We hope that in the future, we can apply this idea to digital libraries and then circulate the idea to include educational institutions such as universities and schools. This would enable scientists to interact while reading scientific literature. It would also allow readers to exchange experiences with others who have read the book before them.

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