iBook: An Interactive Book System

Shafiq ur Rehman
FAST National University
Department of Computer Science
Islamabad, Pakistan
shafiq.rehman@nu.edu.pk

Abstract - **The main objective of developing iBook is to create a web-based application, which serves people with all the functionalities provided in a book store. Two main views are kept in consideration while developing this application, one is the user view and other is the administrator view. The users are facilitated with the functions of searching book, uploading and downloading a book, making annotations on the book etc. Mainly the content of the book and its ranking is recognized by the annotations made on that book. The administrator is facilitated with the functions of uploading a book, can delete the annotations and the users. The architecture of this web application is designed in a way that both the user and administrator have to verify their credentials before availing the facilities provided by the iBook. The application is developed using PHP and JSON whereas the SQL database is used to keep the records at the back end.**

Keywords - Online Book Store, Interactive Book, SQL Database Backend, PHP, JSON

I. INTRODUCTION

The Interactive online book website will help its user to read the books online and perform certain operations that includes Annotation, comments, highlights etc. both publically and privately. The requirement of synchronizing the public annotation and comments can affect the overall flow of data. In addition, filtering the comments and keep a check and balance of the authenticity and reliability of the annotations updated by different users is also an important and difficult task to handle. The Online Interactive Book Website is unique of its type. It is self-contained and doesn't require any integration from any other system to work. The major flow of the system comes from the outside or external users who upload and update the book present on the web. Likewise, users who are downloading the books play a major role in the ranking of the book. As compared with user perspective, the book is an interactive source of getting knowledge in an unusual way. Instead of just reading the book, the user can personified with the knowledge and comments of people around the world. In short, the user can see the book with the perspective of different users who are reading and can benefit other users with his comments, annotations and feedback.

II. RELATED WORK

The major works done on this niche are some real world projects, which are as follows:

a) Interactive e-book

Best interactive e-book is an online interactive e-book project initiated by some developers of America University. Interactive e-book was aim to make user experience more interactive and user friendly. The application was design by some very talented user experience designer. The application supports to run on tablet for the time being. The application was design so that users can enjoy their reading experience with interesting interactive design patters techniques that enhance the compatibility and maturity [8].

User can read the book through its tablet like it is in hard form, after reading the book user can rate the book based on its interactivity and design. During the reading, user can enjoy animated pictures and videos related to the topic. In addition, user can zoom in particular picture and found related information about the book if needed. Colorful pictures, interactive design and bright animations create interest in kids so that they can learn more accurately [1].

b) Sensory Fiction

Co-design is the project created by MIT student. Interactive book projects that make you feel characters pain [2]. The project aimed to blur the line between user's reality and books fiction world. According to the website, they have designed a wearable book and neuron-scientific hacking to generate a type of cyberpunk. The project was made by four MIT students as their class project of the subject 'Science fiction to science fabrication'. The project was inspired by two sci-fi visionary novels named The Diamond Age and The Girl Who Was Plugged In [3].

III. REQUIREMENTS

The Interactive Book is an innovative product that allows users to read a book on-line and express their views about the literature they are reading. This is done by adding annotations at certain points in the book. The points to insert annotations are decided by the users. The users have a set of options when inserting annotations; they can add new annotations, remove their annotations and set the privacy of those annotations.

The Interactive Book is ideal for a learning environment where reading the book is not enough. It may require further elicitation for a reader to understand the content of the book. This can be done by the use of annotations. Another application where Interactive Book proves to be useful is like a discussion forum where people can express their views about a story or a certain "gray" topics. Some topics require diversity of opinion such as food choices, political ideologies. [6] The Interactive Book platform will provide an on spot

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discussion for people who can point out and discuss the views of an author on an article/chapter of a book.

Currently the interactive forums do the job of discussions and information exchange when it comes to views. The same idea applies to the discussion forums where professionals try to help the new-bees regarding technicalities of a subject [5] or a teacher trying to take part in student discussion where specific topic counseling is difficult to get [4].

There were two more categories namely the functional part (ones which were necessary features) and the non-functional requirements (which were not explicit but were necessary for the Interactive Book to function properly)

A. Functional Requirements

a) Inputs:

- User Login Credentials.
- Book Searching Queries.
- Book Reporting.
- Annotation Entry.
- Request to Open A Book.
- Requesting a download.
- Rate a book.

b) Processes

- Authenticating User credentials.
- Searching the results for users book request.
- Analyzing the reported book and reasons for its reports.
- Validating annotations for correct length, relevance.
- Asking user the type of download (with or without annotation).
- Analyzing the number of users and ratings of each book.

c) Outputs

- Allowing users to login given the credentials were correct.
- If the searched book was found then display its result.
- Display close related results if the search query matched many books.
- Download the book with added annotation if user requested annotations.
- Remove a book if the content reported was incorrect, malicious or irrelevant.

B. Non-Functional Requirements

These requirements are not explicit for the given project, but are necessary in order to make the product use-able on the long run. The non-functional requirements take into account the following considerations.

a) Reliability

The interactive book system is intended to provide reliability to its users by preserving their annotations and keeping the record of updated annotations on downloaded books.

b) Availability

The availability of the interactive book has been enhanced according to the specifications mentioned before; these specifications mention the expected load that the website will be able to cater to, both under normal and heavy load conditions. The idea is to maintain a mirror copy of the recent data as a backup, so that in case of temporary unavailability, the recent data is still accessible.

c) Security

The website uses the conventional system of user-id's and passwords for authentications. We have taken the following measures to ensure the integrity and security of the information

- Utilized cryptographic technique MD5 hashing to encrypt the user passwords.
- A log of user's activity and annotation history, to investigate possible malicious activity.
- Security class is being handled with a separate class and is not coupled.
- Sessions are being maintained , so if the user closes the browser window, they will have to re-login instead of old login being preserved.

d) Maintainability

It is important to consider the growth and scalability of the website once the number of users on it starts to build, therefore the website needs to be both scalable, hence it is supposed to be maintainable. Maintainability is achieved by dividing modules amongst the developers, and each developer is responsible for one module. Same has been done for the designers. Each designer is responsible for maintaining a view and updating it on the run.

e) Portability

The website has been designed to be compatible with browsers that support PHP and html5. These include

- Google Chrome
- Mozilla Firefox
- Opera
- Netscape Navigator
- Safari
- Internet Explorer 11

The code is not operating system dependent and will work on following operating systems.

- Linux (Fedora, Ubuntu, Mint)
- Windows (XP or later)
- Mac OSx

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IV. PROTOTYPE

In order to develop the interactive book, the following considerations were taken into account. The inputs, the processes computed on those inputs and the outputs.

Following steps were carried out to gather the requirements for the Interactive Book.

- Reading related research papers.
- Evaluating current interactive book options such as https://medium.com/life-learning/2a1841f1335d.
- Weekly meetings were carried out to judge the changing requirements.
- Any change of requirements was based on response from the supervisors, those being the teachers/instructors for the course.
- After repeated meetings, a list of requirements was decided which are described later in this section.

a) Product at Work

A new user first registers them to use the product and then makes a login to the system. Upon logging in the user is taken to the main screen where they can search books as per their requirement.

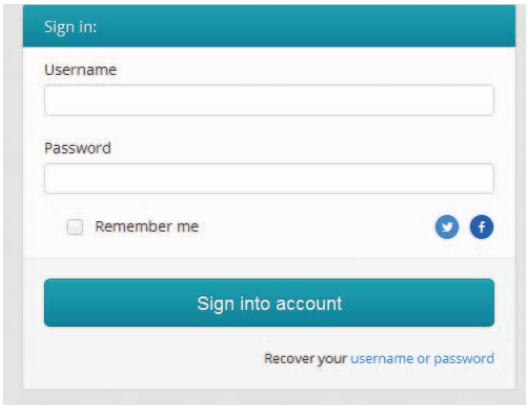
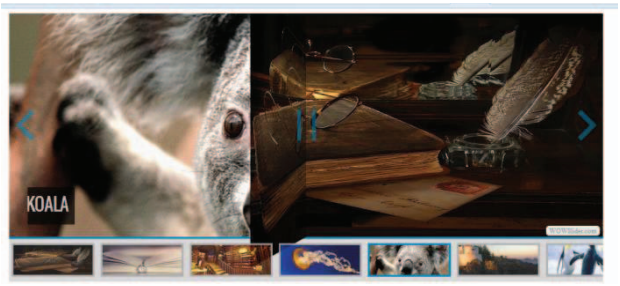


Figure1. Login Screen

The user can also flip through the trending books using the slider on the main screen.



1: Slider to Browse Books

The slider has been made to flip pages like book in order to make it closer to the real experience.
The main task bar and search screen are responsible for navigating the user around the Interactive Book system.

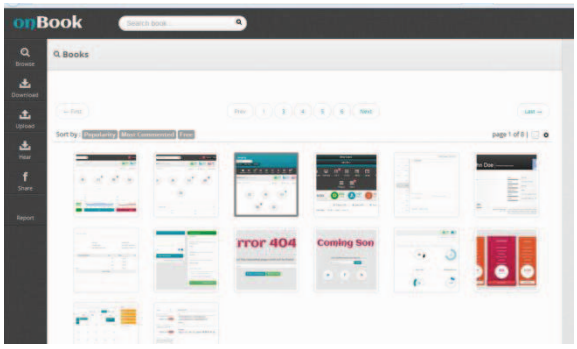


Figure 2. Searching Screen

Once a book is opened the user can read and add annotations to the book. The user also has an option to keep their annotations public or private.

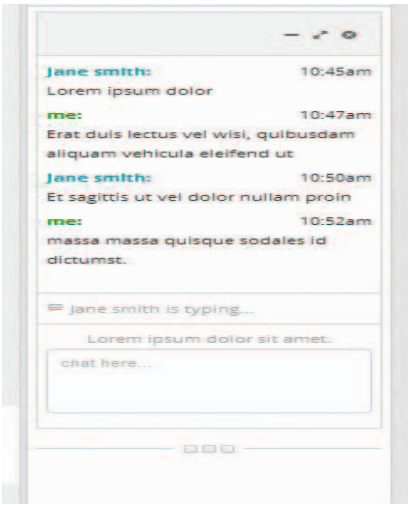


Figure 3. User Annotation Screen

V. COMPUTING COMPONENTS

There were two main aspects of the system.

1) Programming
2) Database

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1) Programming: The main components that were used to make the project monitoring systems programming and processing unit were primarily PHP and JSON. The reason behind usage of PHP was its generality with the current web based applications.

b) Justification: PHP and JSON are currently the De facto tools used for making web based applications. Also PHP is open source and is platform independent since the code runs on the server's side and not the client's side. PHP also enjoys a wide community and numerous online forums which help to resolve problems if they were encountered on the way.

c) Restrictions: The object oriented programming support in PHP is somewhat loose. While on the code-organization level the syntax of PHP can be a mess sometimes. Some community responses are late and more complex questions tend to remain unanswered.

2) *Database:* SQL, an open source database was used. SQL is a relational database management system (RDBMS). Tables were made to facilitate records of users and books. Data was fetched from the tables using the structured query language, and parsed using JSON and PHP. CSS was used to arrange/display the result on screen.

a) Justification: SQL Queries *easily handle the* large amounts of records from a database. Since a well-defined standard exists for SQL there are many tutorials available online for resolving any issues that may arise.

b) Architecture

iBook is a web-based application which has been designed to provide the users the facility of reading or searching the books online, thus its architecture deploys all the modules of the application on the single platform. The system consist two main views, one if of user and the other is of administrator. Both of the views are well defined in the architecture and their functions are highlighted in the diagram shown below. Apart from the views stated, a data base system has been accomplished with the application which keeps track of the flow of data on the website. The architecture is designed in such a way that both user and administrator have to first register themselves on the website before availing the facilities provided by the iBook.

- Web Interface: An online web-based application is designed, so that the user can access the application easily.

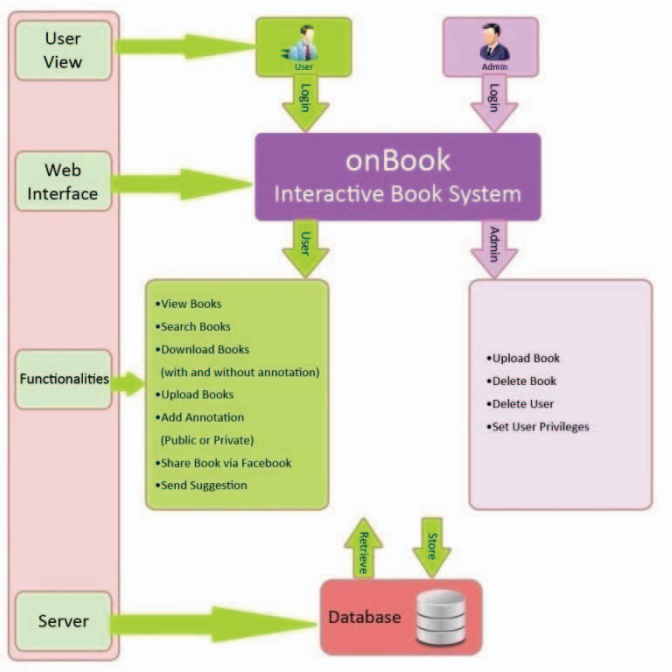

Figure 4. Architecture

VI. iBook In Use

A new user first registers them to use the product and then makes a login to the system. Upon logging in the user is taken to the main screen where they can search books as per their requirement.

A. Use of Interactive Book System, in Medical Environment.

In situations where environment is more suitable to medical and clinical needs and interactive books system can provide a mechanism for dominantly the doctors to discuss methods of treatment for the patients, especially in cases where there can be more than one approaches to it. In such environments the user and the reader themselves need to be aware of the content they are reading since any incorrect advice may be the difference between life and death [7]. Unlike semi-reliable discussion forums available on the Internet, the Interactive Book system will enable users to question what is actually present in a certain book rather than focusing on opinions and suggestions of people.

The use of Interactive Book will enable users to rate the book as well, hence the book with more clear and useful information regarding a particular subject will come into highlight and more people can benefit from it.

Since the trend of people using E-books from different sources is also high. It is a potentially innovative idea to bring books related to similar categories together so that it forms both a library and discussion forum. A survey carried out by Li *et al.* For California University, proves the claim by providing the number of people who have awareness and also

Respondent's Area of Study or Research Cross-Tabulated with University Status							
	Arts & Humanities	Business or Law	Life & Health Sciences	Physical Sciences & Engineering	Social Sciences	Undeclared	Other
Undergraduate student	21%	30%	14%	20%	31%	39%	14%
Graduate student	28%	41%	29%	40%	32%	0	31%
Postdoctoral scholar / researcher	<1%	1%	18%	11%	3%	0	<1%
Faculty / lecturer	31%	6%	25%	20%	16%	0	9%
Librarian / library staff	5%	1%	1%	1%	5%	0	10%
Staff	13%	19%	9%	7%	12%	61%	28%
Other	2%	2%	5%	2%	1%	0	8%
Total	100%	100%	100%	100%	100%	100%	100%

read on line books for one reason or the other.

Figure 5. Study Research

VII. Limitations

Following are the imitations of the iBook application that can be kept in consideration while using the iBook application.

1) *Internet accessibility:* Availability of the internet is essential for using the iBook application as the application is designed using the web architecture.

2) *User's limitations:* User has to first register himself before using iBook, and then he is only allowed to avail all the functionalities provided by the iBook. Secondly the user cannot delete any content published on the website; thirdly the user cannot delete or block any other user of the iBook. All these rights are possessed by the administrator. Uploading Content: Either user or administrator is not allowed to upload the book or any other content exceeding the length of 2 MB.

VIII. Future Enhancements

iBook is the web application designed for various types of users to avail all the feasible facilities online provided by a book store. The recent version of iBook offers wide range of functions that a user can perform. In future, the payment system method can be added in the iBook application as if any user wants to buy the hard copy of the book he may easily request the administrator to deliver him the book. Further other features like audio, spell check, dictionary features can also be included in the application. As the iBook has its own PDF viewer thus improvisations can be made in that. The user cannot print the book online, thus this feature can also be included in the upcoming versions of the iBook.

IX. Conclusion

iBook is the web application designed for various types of users to avail all the feasible facilities online provided by a book store. The recent version of iBook offers wide range of functions that a user can perform. In future, the payment system method can be added in the IBook application as if any user wants to buy the hard copy of the book he may easily request the administrator to deliver him the book. Further other features like audio, spell check, dictionary features can also be included in the application. As the iBook has its own PDF viewer thus improvisations can be made in that. The user cannot print the book online, thus this feature can also be included in the upcoming versions of the iBook.

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