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Catalog of publishers, books and authors

CS2102 DATABASE SYSTEMS

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Introduction

Internet is becoming increasingly common in the fast paced life of today. Technology has become an essential element in any and everyone's life. Internet being a major and independent section of that technology is making advancements with increasing accuracy and pace.

Online catalogs, informative websites, and reference pages, are replacing magazines, pamphlets, and other methods that tend to provide information, and make user aware of a certain type of data, such as music, books, or movies. These catalogs are much more convenient and easily accessible than other means such as magazines and brochures that would cost users a lot of time on searching. Moreover, these catalogs help the user, by providing updated information, whereby adding and editing details of a particular record is a easy process unlike other available means which cannot be edited and would just require a new set of printing.

Our project aims at designing and developing a catalog of books, journals, and other informative published materials for readers, for knowledge, interest, entertainment etc. The catalog aims to provide users information with ease, accurate and updated information. Such a system on the web would require from us extensive and valuable utilization of database management systems. Thus, hereby, we would make use of our knowledge and skills learnt from the module CS2102. We would also be using technologies such as PHP, HTML, Flash, MySQL and etc.

The catalog ***MOSSE BOOKS*** would be a user-friendly and up-to-date system implementing and making the most correct and definite information to users about books, publishers and authors using an attractive web interface.

Three Tier Model

The project will be implemented using the three-tier model: Presentation tier, Logic tier and Data tier[1]. Below are the illustrations of the three tier model.

1. Presentation Tier

The presentation tier displays information related to such services as browsing and searching books. It communicates with other tiers by outputting results to the browser/client tier and all other tiers in the network. In our case, we use HTML and Flash to provide an interface for the users.

2. Logic Tier

The logic tier processes information requests from the client, such as book searches and entries of book information. It is also known as business logic tier. PHP is used to perform these functions. Apache is used as the platform for PHP and MySQL. MySQL will be discussed in the next section.

3. Data Tier

This tier consists of Relational Database Management Systems (RDBMS). It keeps data neutral and independent from application servers or business logic. This provides scalability and performance as it allows data to be managed independently from application tier or logic tier. MySQL is the main RDBMS used for storing and querying information to and from database.

[1] Three Tier reference: Wikipedia - http://en.wikipedia.org/wiki/Multitier_architecture

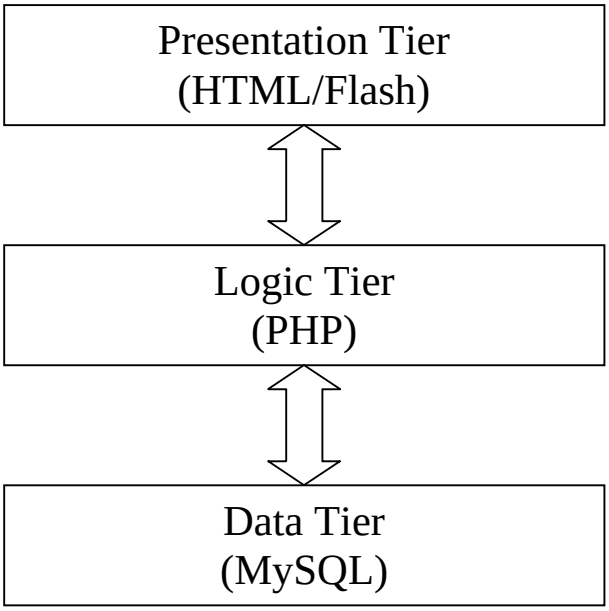


Figure 1: Three Tier Model

Refer to appendix A for details of applications used.

The Development of the System

Mosse Books online catalog system is divided into two sections: administration site and user website.

Administration Site

The administration site allows administrators of the online catalog system to manage the contents. They are able to add, update and delete information for the online catalog. The information includes: books, publishers, author, category and country.

- **Books**

A new book could be added into the database system. The details of a book could also be updated or edited. These changes will be reflected on the website. Moreover, a book record could be deleted depicting the book is no longer available or withdrawn from the market.

- **Publisher**

A new publisher who just entered the novels and books industry could be added into the database. Another publisher could just change his contact, and thus required updating in the database. On the other hand, a publisher could also move out of the industry being no longer associated with books or even withdraw from publishing a book. Deletion of a publisher is possible in such scenarios.

- **Author**

Similarly, a new author would require addition into the database records, while another author changing his name could require an update of records. The case is Similar for deletion of records.

- **Category**

Category on the other hand could require a lot of management such as addition of a new category, a new genre that has recently been explored. Editing of the description of a category could be done regularly depending on the kind of search

words and phrases people use for their favorite category and thus need more or less number of tags.

- **Country**

The country here would refer to the country of a publisher. Addition of a country to the records, editing of a country's name or deletion of a country from the records could be another part of the content management done by the administrators in the administration site.

- ***Access Privileges***

  The administrator(s) is/are able to grant access to other developers of the catalog, by adding them as new administrators. They are able to update and edit their own profile. An administrator would be the only one having access to the administration section of the site, and would require logging in.

- ***Password Retrieval***

  Forgotten passwords can be also be retrieved using the administration site.

User Web Site

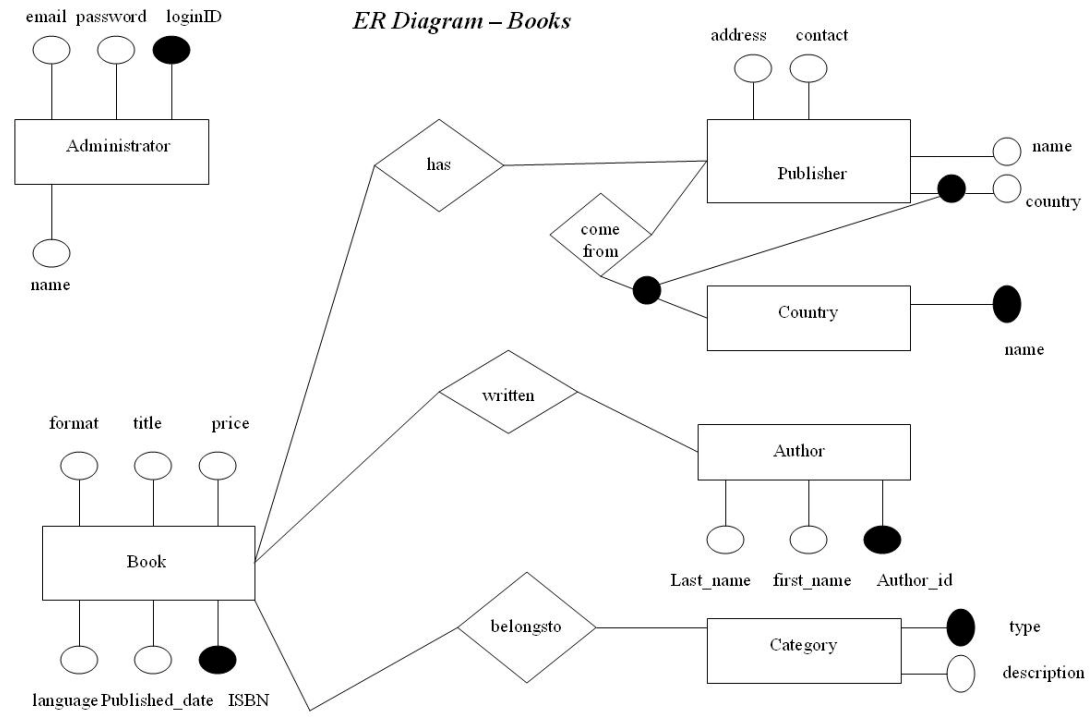
The user web site is the main access point for our users. Through this website, they are able to browse the books by titles, authors, publishers and category. Below is the detailed description:

1. The name of our catalog is Mosse. The homepage displays an interactive section for the user to choose from various options by a click. The user can opt to either go and read the “About Us” column, or click on the book, author or publisher, to view the lists of books, authors, and publishers that are recorded within our catalog respectively.

2. Also the user can decide to search the catalog “Mosse” for a particular book, author, or publisher to which he/she wishes using a key word. Moreover, an advance search option is also available where the user can search exactly for a particular record according to entering of fine details such as the exact book title, isbn code, language, author, country, category etc.

3. By clicking on either the book, author or the publisher the user can select from a list of books, authors, or publishers, and even quicken their search by selecting the first alphabet of the respective record they are searching for. They can further click on a specific record and view its details.

Entity Relationship Diagram



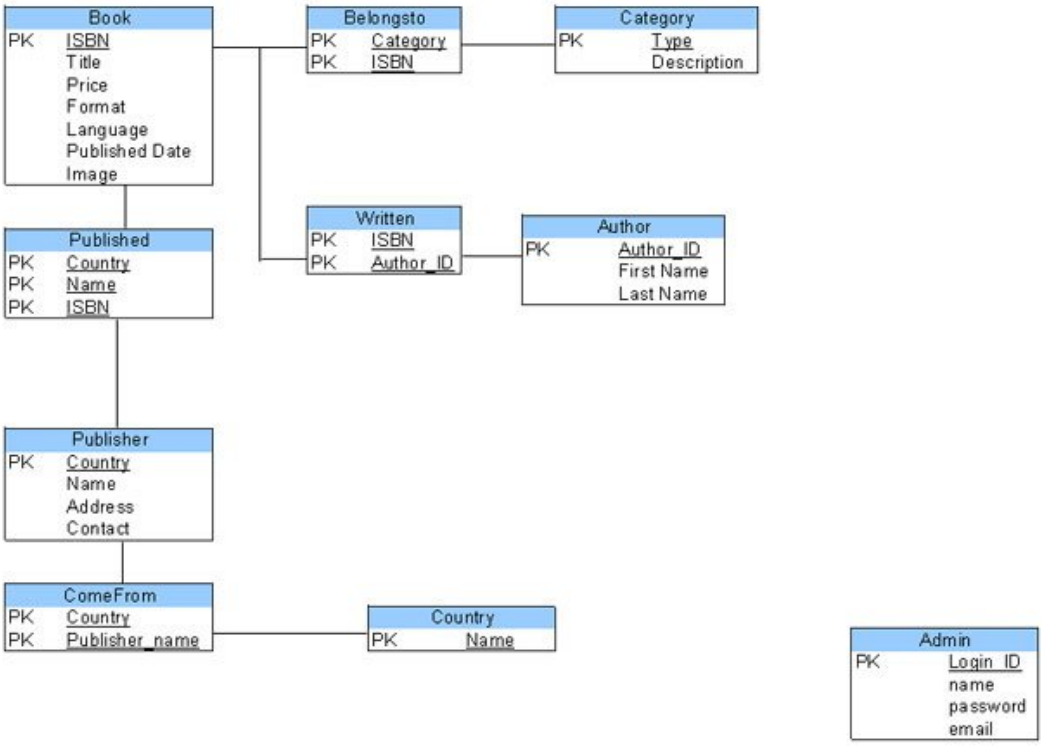
The ***Entity - Relationship Diagram*** above shows the conceptual and data oriented features of the project. The diagram is designed to cater to the basic attributes of the Publisher, Book, and the Author. The schema includes various and multiple relations so as to ensure no duplicating of entities and also at the same time allowing a more conceptualized model to be generated. Primary keys and individual entities are carefully chosen to avoid misunderstanding. Unnecessary use of ID's has been avoided throughout the project, and the primary keys have been generated by using the details of the different entities. For instance, the admin table has user_name as its primary key since user name for all the administrators is different and unique. However, the author table uses author_id as a primary key. This is because an author's full name could be the same as some other author's full name. Since no combination of the attributes here is suitable to be identifier, every author was thus given an id in the project to allow for the primary key feature to enable. In the publisher table, name and country are combined together as its primary key, since otherwise both of them alone may not ensure uniqueness to the table. This is due to

our assumption that a country does not allow 2 publishers of the same name to exist within the same country and yet it may be possible for publishers to have the same name in the global context as there are no restrictions. Moreover, in order to ensure that the country attribute of the publisher table is reasonably given, we decide to put country as a separate entity set and use the weak entity relationship for the country and publisher.

The administrator entity is not related to any other entities by a relation. This is because the entity set is used for storing administrator details. Also, administrators are in charge of adding, deleting, updating not only the administrators but also the content of the catalog and the whole database. The administrator entity mainly maintains the back - end of the site and has access to the whole database attributes and structure.

The whole diagram portrays a complete image of the catalog structure and how it functions in regard to all the entities and their relationships.

Schema Diagram



Relational Schema

Creating the Admin Table

```
CREATE TABLE admin (
  loginID varchar(10) NOT NULL,
  name varchar(30) NOT NULL,
  password varchar(10) NOT NULL,
  email varchar(30) NOT NULL,
  PRIMARY KEY  (loginID)
)
```

Creating the Author Table

```
CREATE TABLE author (
  last_name varchar(20) default NULL,
  first_name varchar(20) default NULL,
  author_id smallint(6) NOT NULL,
  PRIMARY KEY  (author_id)
)
```

Creating the BelongsTo Table

```
CREATE TABLE belongsto (
  category varchar(15) NOT NULL REFERENCES category(type) ON DELETE
CASCADE,
  book_isbn decimal(13,0) NOT NULL REFERENCES book(ISBN) ON DELETE
CASCADE,
  PRIMARY KEY  (category, book_isbn)
)
```

Creating the Book Table

```
CREATE TABLE book (
  ISBN decimal(13,0) NOT NULL,
  title text NOT NULL,
  price decimal(10,0) default NULL,
```

```
  format varchar(15) default NULL,
  language varchar(10) default NULL,
  published_date date default NULL,
  PRIMARY KEY  (`ISBN`)
)
```

Creating the Category Table

```
CREATE TABLE category (
  type varchar(15) NOT NULL,
  description text,
  PRIMARY KEY  (type)
)
```

Creating the ComeFrom Table

```
CREATE TABLE comefrom (
  country varchar(100) NOT NULL REFERENCE country(name) ON DELETE
CASCADE,
  publisher_name varchar(50) NOT NULL
  PRIMARY KEY  (country, publisher_name)
)
```

Creating the Country Table

```
CREATE TABLE country (
  name varchar(100) NOT NULL,
  PRIMARY KEY  (name)
)
```

Creating the Published Table

```
CREATE TABLE published (
  country varchar(100) NOT NULL REFERENCES country(name) ON DELETE
CASCADE,
  name varchar(50) NOT NULL REFERENCES publisher(name) ON DELETE
CASCADE,
```

```
  ISBN decimal(13,0) NOT NULL REFERENCES book(ISBN) ON DELETE
CASCADE,
  PRIMARY KEY  (country, name, ISBN)
)
```

Creating the Publisher Table

```
CREATE TABLE publisher (
  country varchar(100) NOT NULL,
  name varchar(50) NOT NULL,
  address text,
  contact decimal(10,0) default NULL,
  PRIMARY KEY  (country, name)
)
```

Creating the Written Table

```
CREATE TABLE written (
  ISBN decimal(13,0) NOT NULL REFERENCES book(ISBN) ON DELETE
CASCADE ,
  author_id smallint(6) NOT NULL REFERENCES author(author_id) ON DELETE
CASCADE ,
  PRIMARY KEY  (ISBN, author_id)
)
```

SQL Codes used during development

During the development of the catalog, we had to use SQL along with PHP and HTML codes for the web designing. Examples of SQL Codes are shown here to evaluate as to how we used the concept of SQL learnt from the module.

SQL Examples of Insertion

1. Insert a new administrator

INSERT INTO admin (loginID, password, name, email) VALUES ('".$loginID."','".$password."','".$adminName."','".$email."')

2. Insert a new book

INSERT INTO book (ISBN,title,price,format,language,published_date) VALUES ('".$isbn."','".$title."','".$price."','".$format."','".$lan."','".$pdate."')

3. Insert a new author

INSERT INTO author (author_id, last_name, first_name) VALUES ('".$author_id."','".$last_name."' , '".$first_name."')

4. Insert a new publisher

INSERT INTO `publisher` (`country`, `name`, `address`, `contact`) VALUES ('".$sCountry."','".$cname."','".$address."','".$contact."')

5. Insert a new category

INSERT INTO category (type, description) VALUES ('".$type."','".$description."')

6. Insert a new country

INSERT INTO country (name) VALUES ('".$name."')

SQL Examples - Update

1. Edit admin table

UPDATE admin SET password = '".$password."', name = '".$adminName."', email = '".$email."' WHERE loginID = '".$loginID."'

2. Edit category table

UPDATE category SET description = '".$description."'

3. Edit publisher table

UPDATE publisher SET address = '".$address."', contact = '".$contact."' WHERE country = '".$sCountry."' AND name='".$cname."'

4. Edit country table

Update country SET name = '".$name2."' WHERE name = '".$name."'

5. Edit author table

UPDATE author SET last_name = '".$last_name."', first_name = '".$first_name."' WHERE author_id = '".$author_id."'

6. Edit book table

UPDATE book SET title = '".$title."', ISBN = '".$isbn."', price = '".$price ."',format = '".$format ."',language = '".$lan ."',published_date = '".$pdate ."' WHERE ISBN = '".$isbn.""

SQL Examples - Deletion

1. Delete record from admin table

DELETE FROM admin WHERE loginID = '".$loginID."'

2. Delete record from country table

DELETE FROM country WHERE name = '".$name."'

3. Delete record from publisher table

DELETE FROM publisher WHERE country = '".$country."' AND name = '".$name."'

4. Delete record from category table

DELETE FROM category WHERE type = '".$type."'

5. Delete record from books table

```
DELETE FROM book WHERE ISBN = '".$isbn."'"
```

6. Delete from author table

```
DELETE FROM author WHERE author_id = '".$author_id."'"
```

SQL Examples - Complex SQL Codes

1. Advance Search of Books using book, publisher, category and author information

```
SELECT bp.title, bp.ISBN, bp.image, bp.country, bp.name
FROM `book_publisher` bp, belongsto bt, written wr, author a
WHERE bp.ISBN = bt.book_ISBN
AND bp.ISBN = wr.ISBN
AND wr.author_Id = a.author_Id
AND (
bp.title LIKE 'new%'
OR bp.title LIKE '%new%'
OR bp.title LIKE '%new'
)
AND (
bp.country = 'United States'
)
AND (
CONCAT( a.first_name, " ", a.last_name ) LIKE 'william%'
OR CONCAT( a.first_name, " ", a.last_name ) LIKE '%william%'
OR CONCAT( a.first_name, " ", a.last_name ) LIKE '%william'
)
AND (
bt.category = 'Psychology'
)

ORDER BY bp.title
```

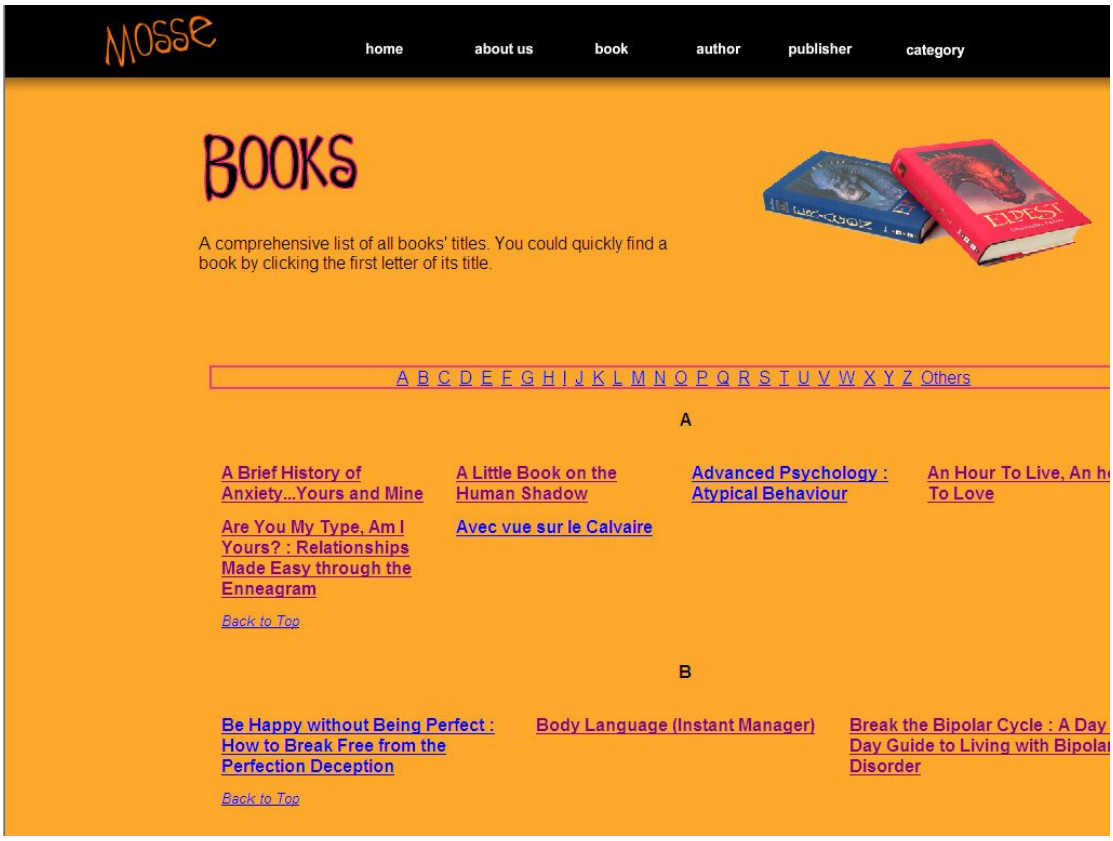
Screen - Shots

Some screen shots of the catalog available online at www.kelvinccs.com/books/ are shown below. These screen shots show how the catalog looks at how it carries out the different procedures that have been implemented using SQL and PHP as shown above in certain examples. The catalog maintains an interactive, user - friendly and attractive view throughout to make the Mosse Books an easy to use and comfortable search catalog site.

- ✓ ***Home Page of Mosse Books***

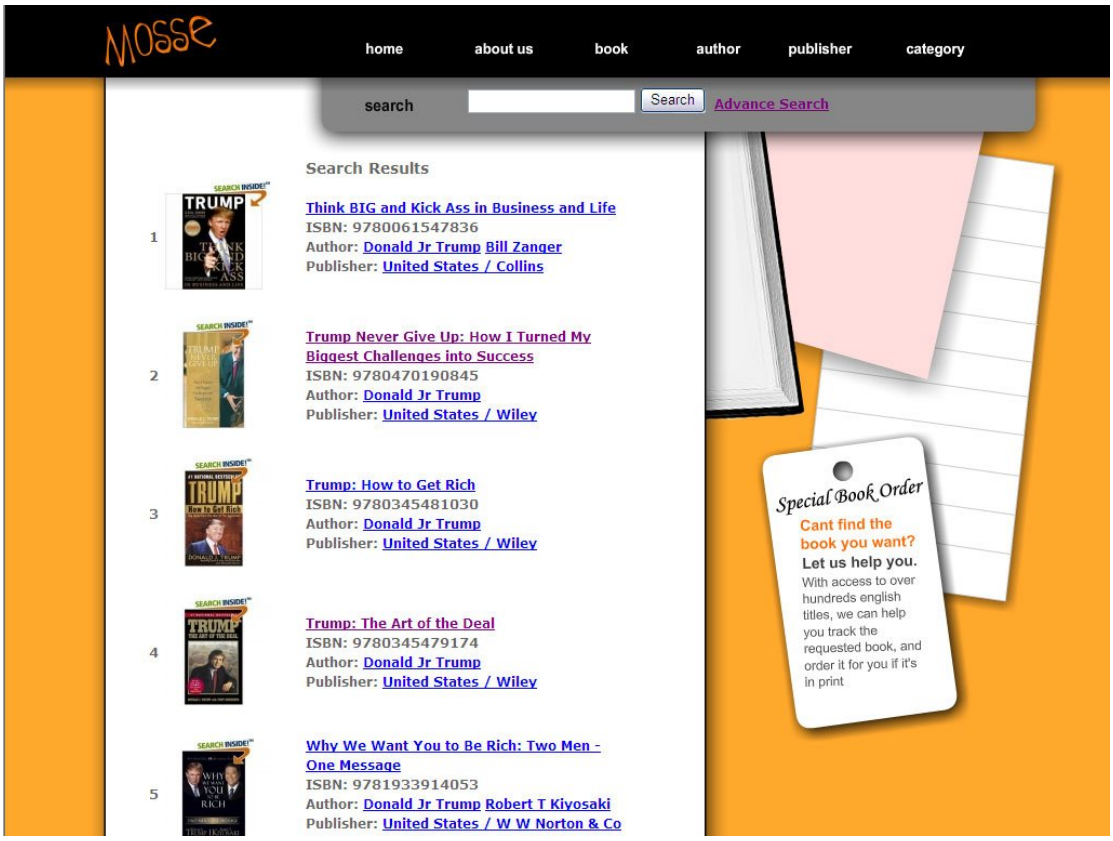
The homepage snapshot above shows how the website looks at first when a user enters the link. The website is related to books, publishers and authors, and tries to give out a bookish, at the same time interactive image. Also it displays the latest additions of books to our database, along with options like About Us, book, author, publisher, and category to read through about the website and search from a database of several books, publishers, authors, and categories

✓ ***List of books available***



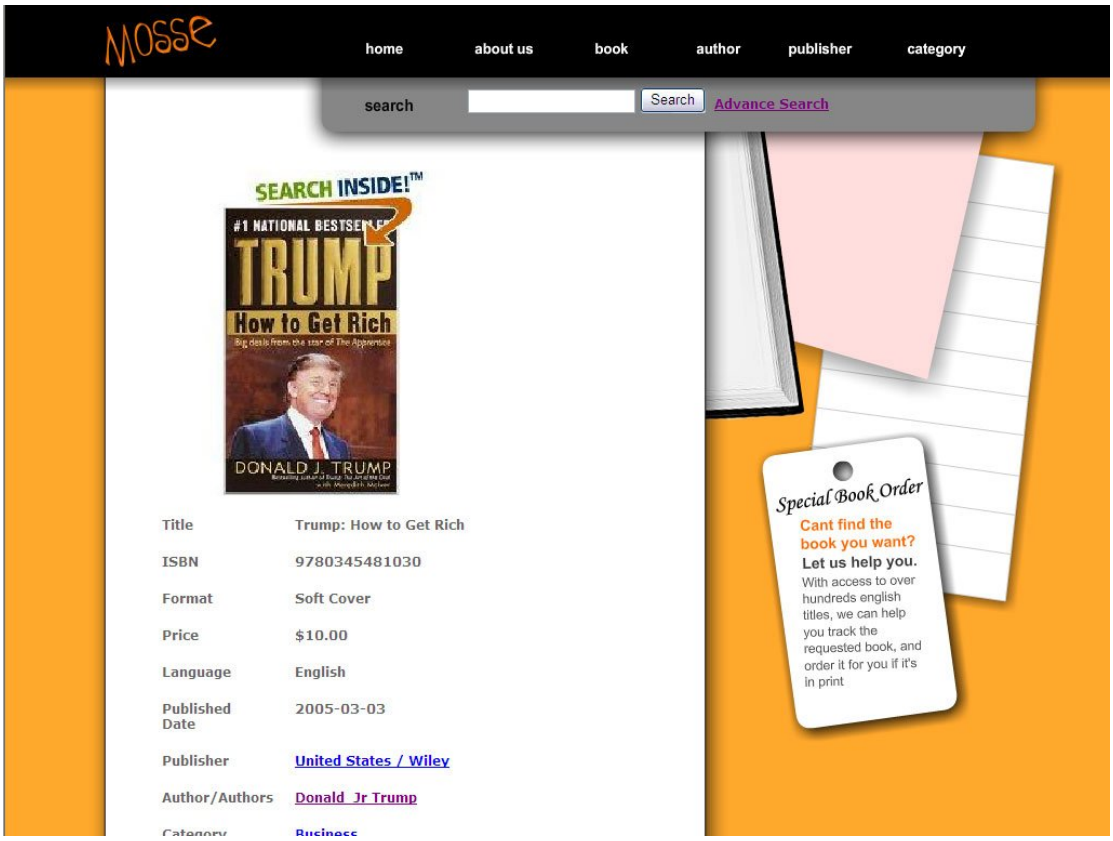
On clicking the tag books for instance a user sees an interactive web page displaying all the books stored in the database and a user can scroll through them alphabetically reducing time to search for a particular book and also making it much more convenient and organized. The snapshot of the webpage is as shown above.

✓ ***Search Result Page***



However, one can also directly use the search section available on the top center on the homepage to retrieve a particular record of book, author or a publisher. Entering a related key-word, would result in several options and related information to choose from for the user. Moreover, an advance search option is also available to make the search more concise and quick. A search page would result in something like the snapshot shown above. The website throughout maintains a user - friendly and happy image rear.

✓ ***Book information***



After going through the search process either through directly searching through the available tool, or through scrolling under different web pages of authors, books and publishers, fine details about records can be found by further clicking on them. For instance the snapshot above shows a book record containing all the details of the book. For example, the title, the ISBN, the Format, the Price and many more details including the publisher and author ones. Additionally a preview of the book is also provided to make sure the user is comfortable and satisfied with the search. It also enhances the beauty of the website.

Conclusion

The project on the whole involved a lot designing, implementing, and then testing. The processes individually required understanding of several different applications and also suitable platforms to work on. The project was successfully modeled and then implemented with references to several books, and software and technologies that were new to us. In order to achieve this, we have spent time on looking for suitable web server, taught ourselves a server page language which we have not learnt before, brainstormed the most sensible schema for the database, struggled in writing the correct SQL query code in our own “search engine” and painstakingly tried to correct all the bugs in the website etc. All these cost us a lot of time but it was really a fruitful learning experience in our computing studies.

Appendix A – Applications Used

For a successful project we needed to use several applications making it a complete mixture of several technologies implementing database systems as well as effective scripting at all times.

1. Apache - Xampp web server on Macintosh

Apache is easily accessible and with freely available source codes. Moreover, apache is also very popular and easy to use.

2. Wamp Server on Windows

Wamp Server was used as the application to setup the database and use PHP, MySQL, and several other database functions for its convenient usage.

3. MySQL

MySQL was also be used throughout the project for the main data definition and manipulation. It is easy to use. (deleted repeating sentences) Also, since MySQL deals extensively with SQL, it is much more in relation to the concepts of the module than any other database querying system.

4. Hypertext Markup Language (HTML)

HTML is a basic construct of our web pages. Its various features such as table, form and anchor functions have been exploited in order to make the information on web pages display neater and more orderly.

5. Hypertext Preprocessor (PHP)

PHP is a computer scripting language. Usage of PHP in this project was highly essential. By combining it with HTML, we are able to produce the dynamic web pages of the administration site and the user - viewed site to a major extent.

6. Cascading Style Sheets (CSS)

Although CSS is only used for a few times throughout our website, it did save us a lot of time in formatting the website as a whole. By using it, our website looks more consistent on different web pages and thus more professional.

7. Macromedia Dreamweaver 8

This application was used to be able to write PHP, and HTML codes for developing the front - end catalog as well as the administration website.

8. Flash CS3 Professional

The main usage of the Flash software is to make the web browser displays much more interactive, and eye - catchy. It allows the information displayed that is mainly setup by using PHP, and HTML, in an attractive manner encouraging users to visit the website, and also find it easy - to - use.

9. Adobe Photoshop

Undoubtedly, this application allow us to produce fascinating pictures which decorate our website.