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Mini Project Report

KCA353:

"Book Recommendation System"

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Abstract

Recommendation systems are widely used to recommend products to the end users that are most appropriate and related to end user's interest. Online book selling websites now-a-days are competing with each other by many means. Recommendation system is one of the stronger tools to increase profit and retaining buyer.

This proposed Book Recommendation System provides book recommendation system which is capable of recommending books to users. It uses dataset obtained from Goodreads and stores it in MySQL database. The system reads a book title from users and tries to recommend similar books to the users, the system focuses on the ratings and genres of the books while providing recommendations to users.

The users could be either guest users or registered users. The registered ones act as the source of data for the system, their activity includes updating their reading list by rating books and adding new books to the database, using this data the system adapts and learns to provide better recommendations.

Introduction

Nowadays the amount of information, especially in Internet grows very rapidly. Finding necessary information becomes more difficult. Recommendation systems aim to solve this kind of problems. With the help of them one can quickly access relevant information without searching the web manually. As such many web sites today benefit from recommendation systems to promote and sell their products. There is a wide range of products like music, movies, articles and etc. that can be recommended to the customer based on their profiles in internet shops or even social networks, browsing history such as visited links, browsing activity like number and time of visits and other online behavior. Online shops are increasing their sales using such technologies.

Recommendation System is basically software or module that suggests similar items to a purchaser based on his/her earlier purchases or preferences. It examines huge data of objects and compiles a list of those objects which would fulfill the requirements of the buyer. Nowadays most e-commerce companies are using Recommendation systems to lure buyers to purchase more by offering items that the buyer is likely to prefer.

Book Recommendation System is being used by Amazon, Flipkart, Goodreads, etc. to recommend books the customer would be tempted to buy as they are matched with his/her choices. The challenges they face are to filter, set a priority and give recommendations which are accurate.

Related Works

- ## Book Recommendation System

Ms. Sushama Rajpurkar, Ms. Darshana Bhatt and **Ms. Pooja Malhotra, Department of Information Technology KJSCE, Vidyavihar(E), Mumbai, India.**
The proposed system is to predict the buyer's interest and recommends the books accordingly. This book recommendation has considered many parameters like content of the book and quality of the book by doing collaborative filtering of ratings by the other buyers. This recommender system also uses associative model to give stronger recommendations. This system does not have performance problem since it built the recommendations offline.

- ## Online Book Recommendation System

Nursultan Kurmashov, Konstantin Latuta and **Abay Nussipbekov, Faculty of Engineering and Natural Sciences Suleyman Demirel University Kaskelen, Kazakhstan.**
They presented a recommendation system that is based on Collaborative Filtering method. The main goal was the speed of recommendation i.e. to create such a system, which can give qualitative recommendations to their users without need to be registered for a long time and have big profile information, browsing history and etc. The proposed system can be applied for other domains to suggest such items like movies, music and other products.

Proposed System

The Primary Objective is to develop a system that can recommend books to user based on their search. And also learns user preferences by asking to rate books and choosing favorite categories and then generate the list of books user most probably would like to read.

In this proposed system, we collect the data by crawling web sites like Goodreads. The collected data is stored into CSV files and then transferred into MySQL database.

There are two types of users in the system:

- **Guest users:** they can search for appropriate books, get recommendations and read descriptions. They can also browse through books which are recommended by the system based on their popularity according to their ratings in various genres.

- **Registered users:** they can rate books according to their likes and dislikes and according to their ratings the recommendation system will learn and try to recommend more accurately from next time onwards. The higher is the number of registered users and their reading list, the better and more qualitative will be the recommendations.

In this particular system we analyze the ratings of the book, provided by the registered users, and the genre of each book, which categorizes them distinctively.

Whenever a book is searched to get recommendations, the system analyzes its genres and rating, further more the system tries to gather books of the genres that are related or is similar to the searched one. Then a cluster or group of books is prepared which are good enough to be recommended based on their ratings and is presented to the user as recommendations.

Technical Specifications

- **Hardware and Software Requirements:**
  - **Operating System:** 64-bit Windows 10
  - **RAM:** 4 GB
  - **Processor:** Intel i3 6th Gen 2 GHz
  - **Disk Space:** 10 GB
  - **Display:** 1366 x 768 Minimum

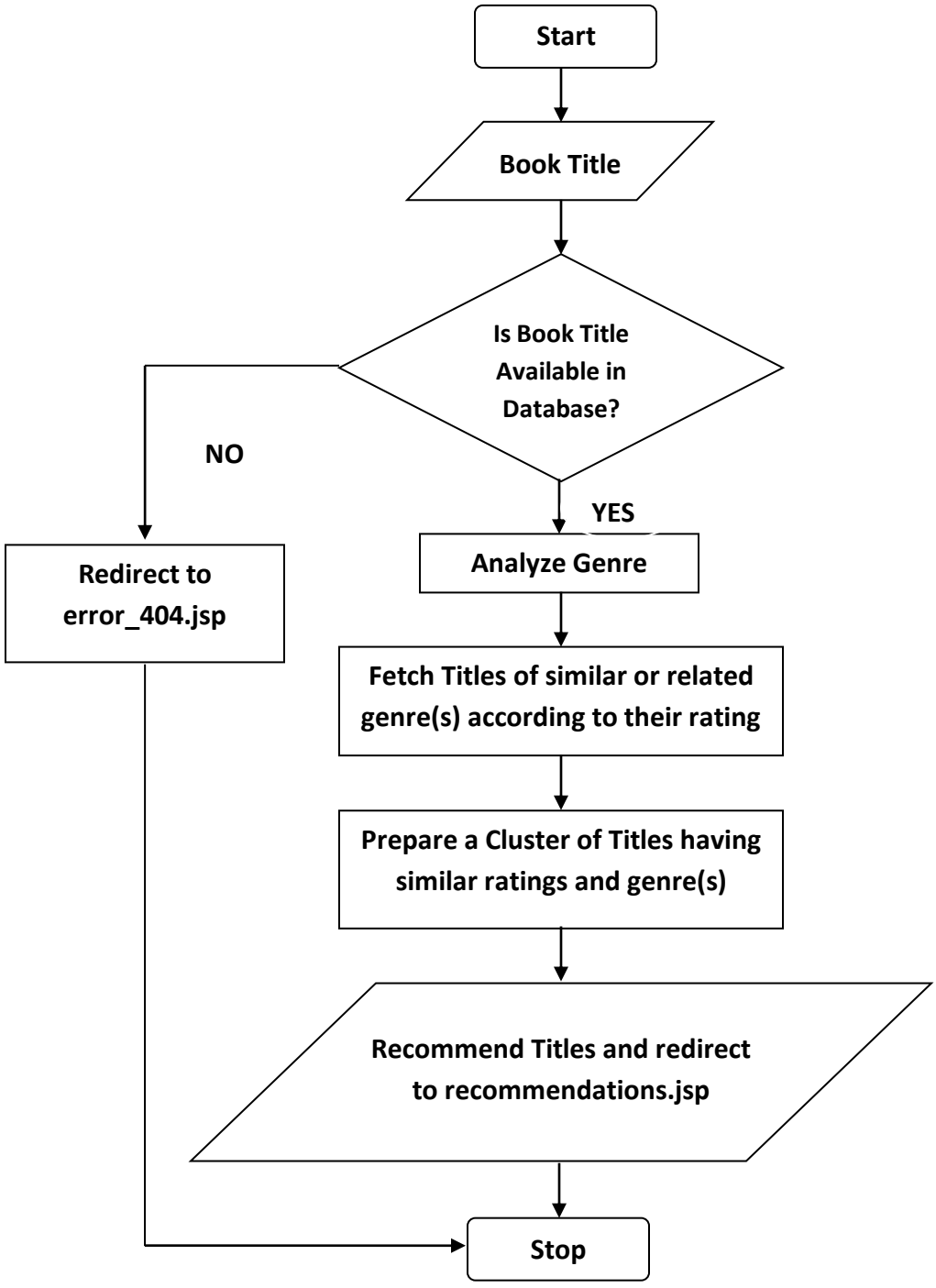
- **Tools and Technologies:**
  - **Front-end:** HTML5, CSS3, Sass/Scss, JavaScript, Java Server Pages
  - **Back-end:** Java (Servlets), Python, XML
  - **Database:** MySQL
  - **IDE(s):** Eclipse, Visual Studio Code, MySQL Workbench
  - **Others:** MS Excel

Methodology

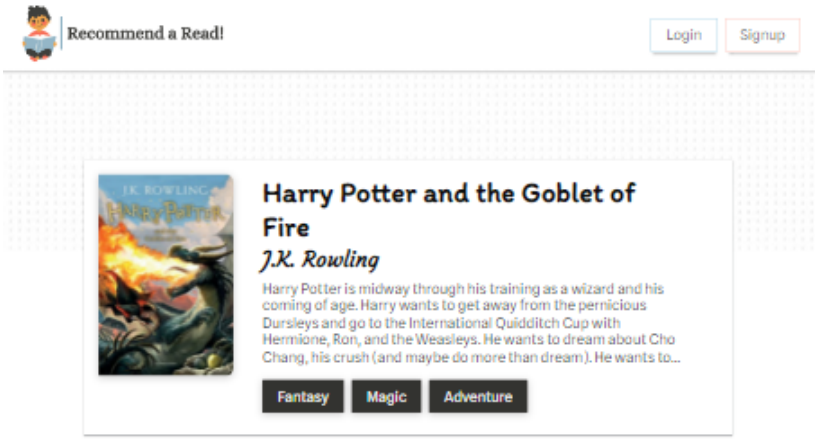
- **Guest User**

  The Methodology of providing recommendations for a Guest User works in the following way:

  Flow chart:



Recommendations:



If you loved reading Harry Potter and the Goblet of Fire by J.K. Rowling, try reading our recommendations too...

Harry Potter and the Philosopher's Stone

J.K. Rowling

Harry Potter's life is miserable. His parents are dead and he's stuck with his heartless relatives, who force him to live in a tiny closet under the stairs. But his fortune changes when he receives a letter that tells him the truth about himself: he's a wizard. A mysterious visitor rescues him from his relatives and takes him to his new home, Hogwarts School of Witchcraft and Wizardry.

Fantasy Magic Adventure

Harry Potter and the Half Blood Prince

J.K. Rowling

The war against Voldemort is not going well; even Muggle governments are noticing. Ron scans the obituary pages of the Daily Prophet, looking for familiar names. Dumbledore is absent from Hogwarts for long stretches of time, and the Order of the Phoenix has already suffered losses. As in all wars, life goes on. The Weasley twins expand their business. Sixth-year students learn to Apparate - and lose a few eyebrows in the proces...

Fantasy Magic Adventure

Harry Potter and the Prisoner of Azkaban

J.K. Rowling

For twelve long years, the dread fortress of Azkaban held an infamous prisoner named Sirius Black. Convicted of killing thirteen people with a single curse, he was said to be the heir apparent to the Dark Lord, Voldemort.Now he has escaped, leaving only two clues as to where he might be headed: Harry Potter's defeat of You-Know-Who was Black's downfall as well. And the Azkaban guards heard Black muttering in his sleep, "He's at...

Fantasy Magic Adventure

Harry Potter and the Chamber of Secrets

J.K. Rowling

Ever since Harry Potter had come home for the summer, the Dursleys had been so mean and hideous that all Harry wanted was to get back to the Hogwarts School for Witchcraft and Wizardry. But just as he?s packing his bags, Harry receives a warning from a strange impish creature who says that if Harry returns to Hogwarts, disaster will strike.And strike it does. For in Harry?s second year at Hogwarts, fresh torments and horrors arise,...

Fantasy Magic Adventure

- **Registered User**

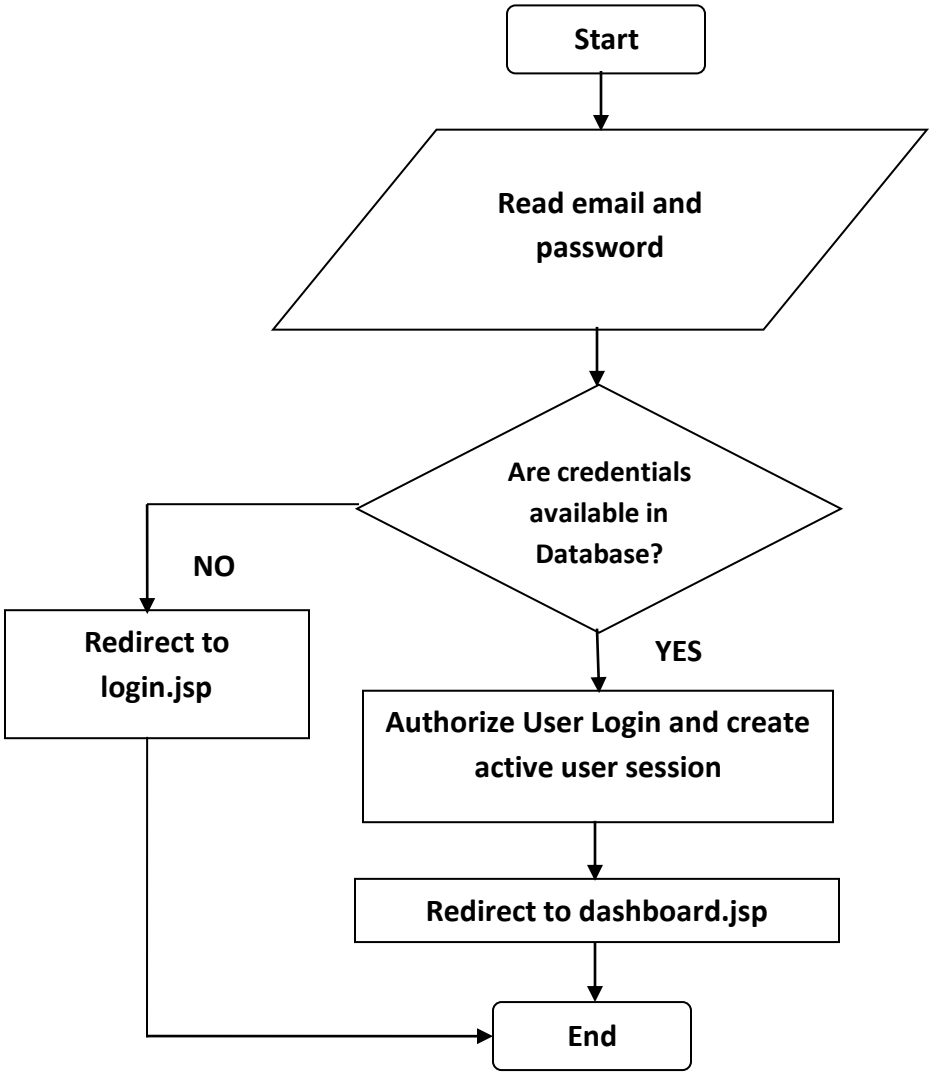
  The Methodology of providing recommendations for a Registered User executes similarly to that of a Guest user.

  The Registered user has access to some more modules in the Book Recommendation System, which are:

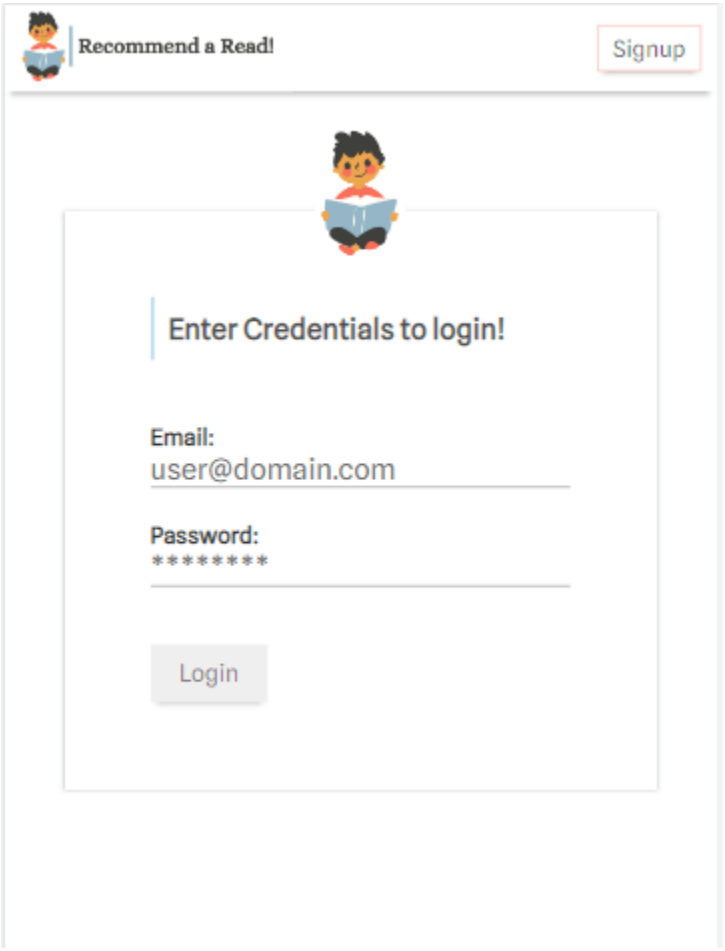
  - Login Module
  - Add Book Module
  - Rate Book Module
  - Dashboard

  The working of these modules is as follows:

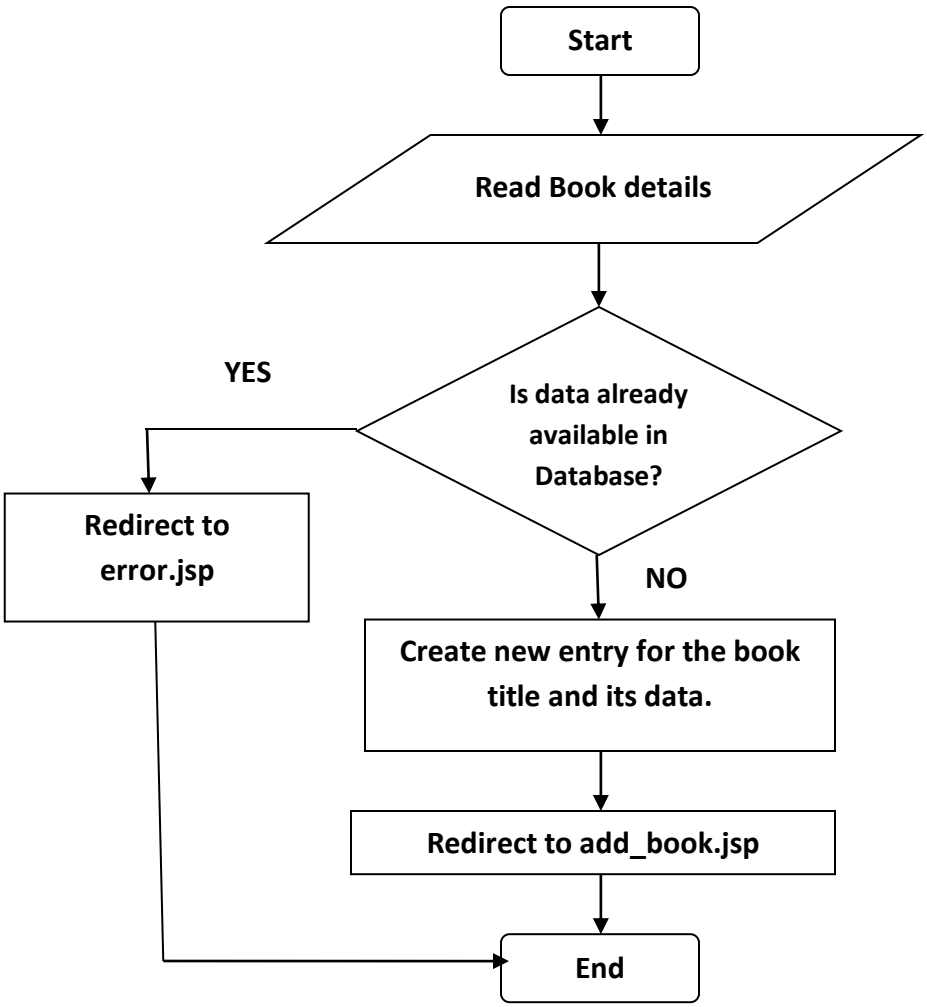
- **Login Module Flow Chart:**



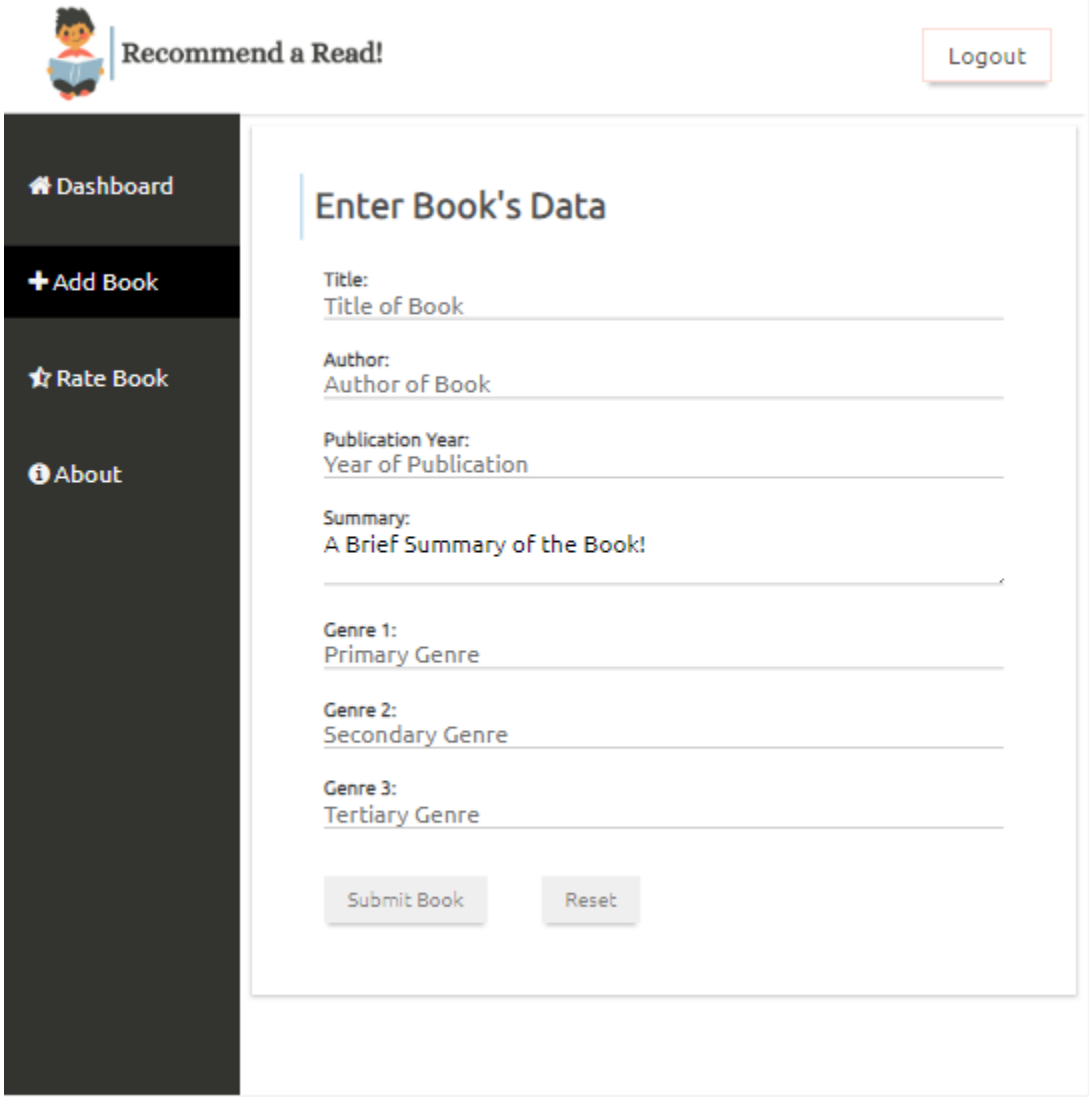
- **Login Module User Interface:**



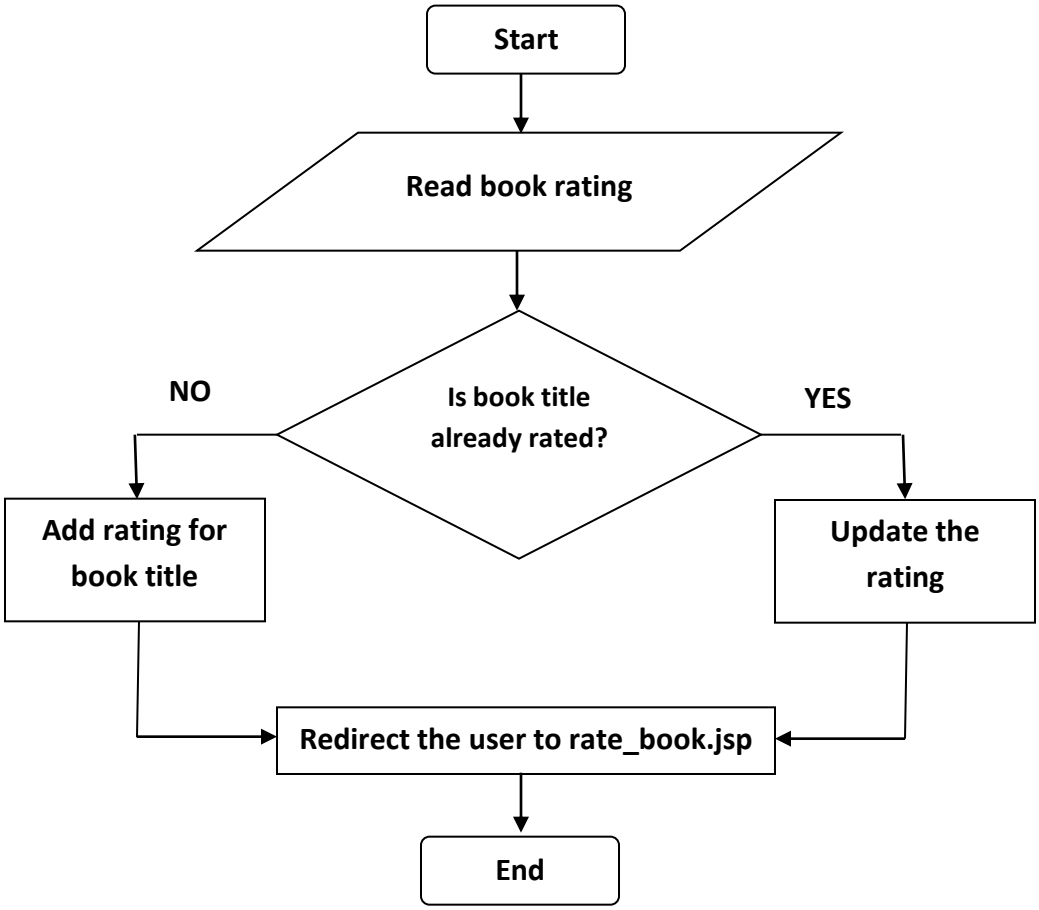
- **Add Book Module Flow-Chart:**



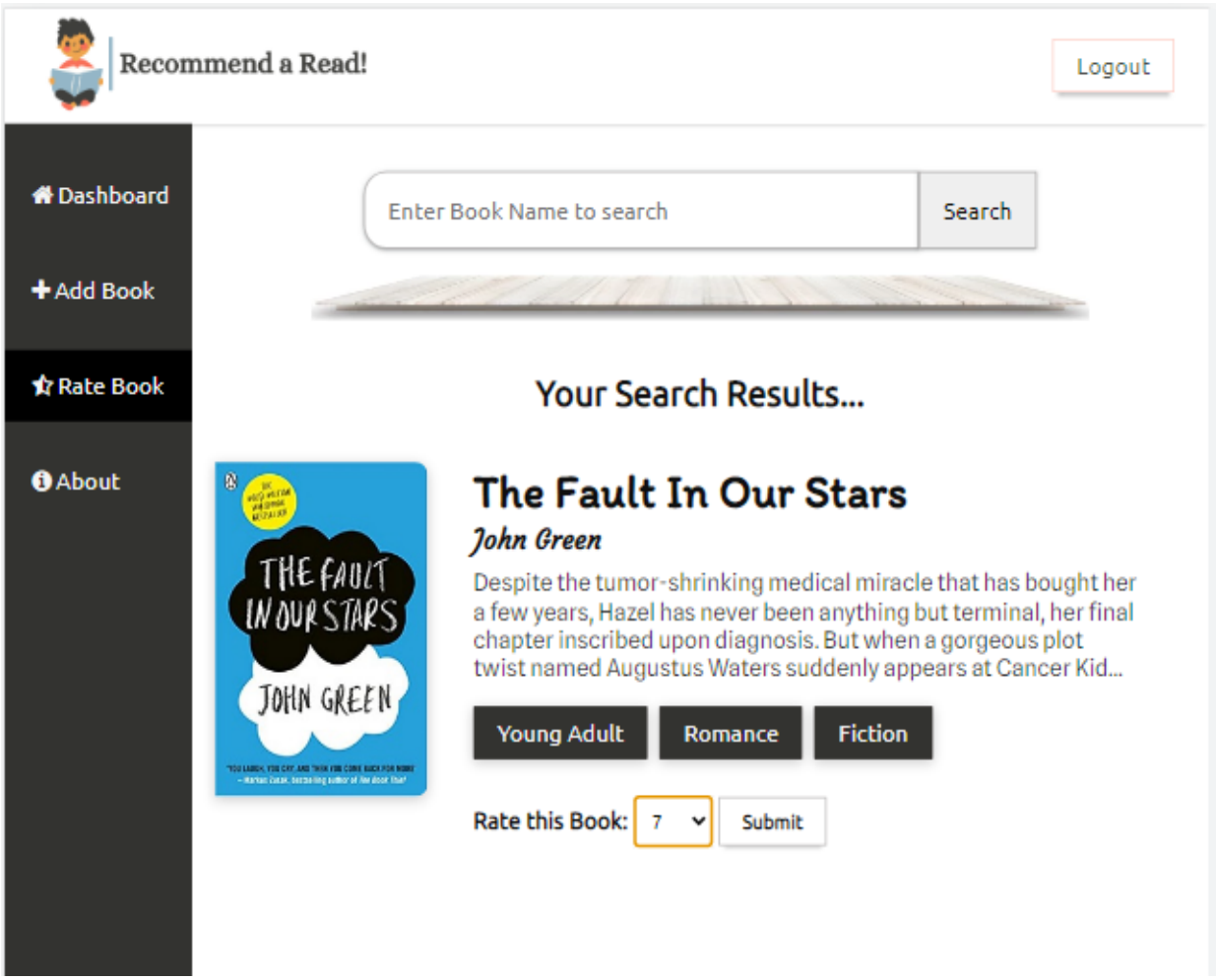
- **Add Book Module User Interface:**



- **Rate Book Module Flow-Chart:**

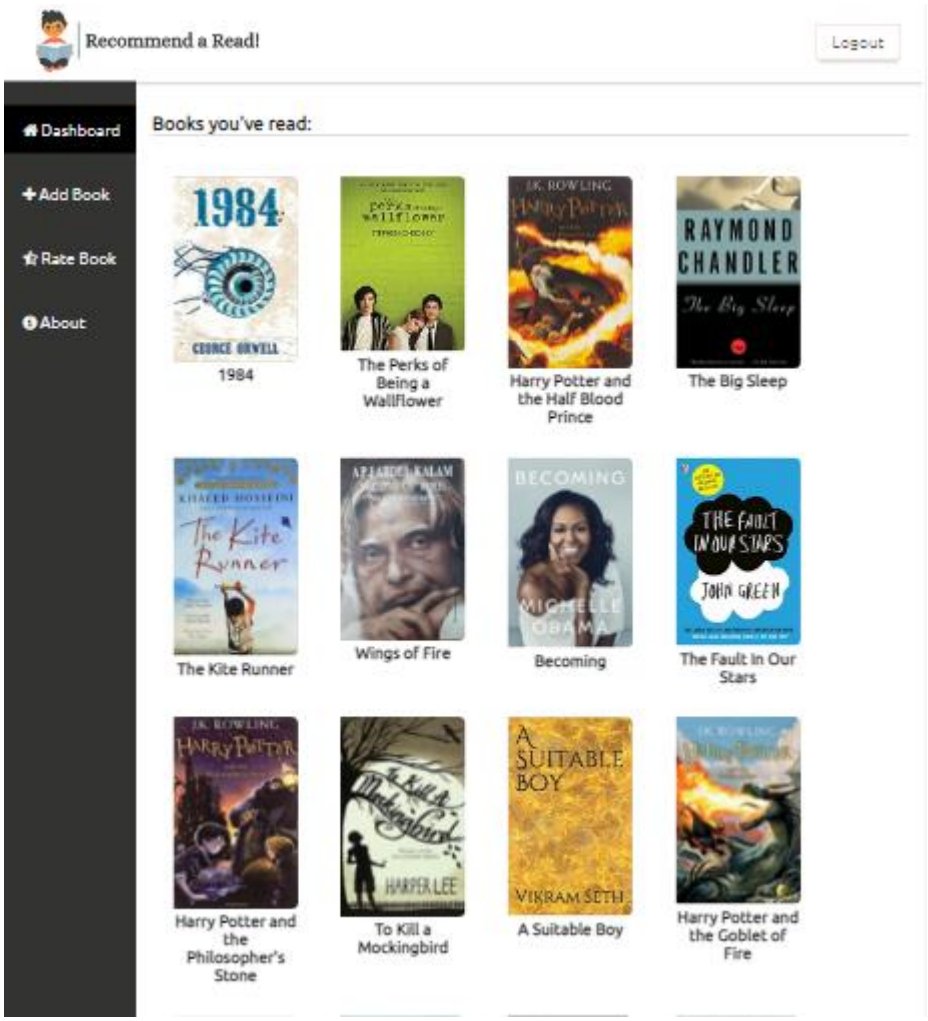


- **Rate Book User Interface:**
  The registered user can rate book that they have read. Once rated the book titles will appear in the dashboard according to their rating in a sorted manner.



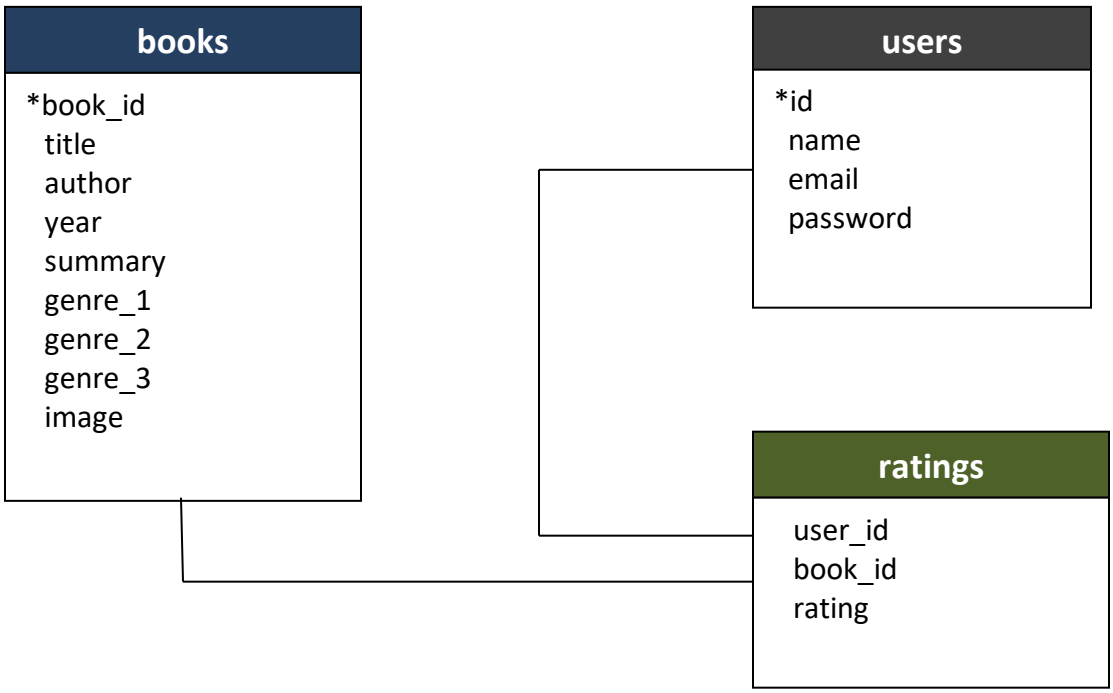
- **Dashboard User Interface:**

The Dashboard was created to keep record of all the books that the registered user has read till date, by default the book not read are rated zero. Whenever a user rates a book more than 1, it is assumed that the user has read the book and the database is updated with the same. In case the user rates a book already read by him in past, the rating is simply updated with the new value provided by him.



Database Schema

The database schema for the Book Recommendation System is given below:



Primary keys:

- books (book_id)
- users (user_id)

Foreign Keys:

- ratings (book_id) references books (book_id)
- ratings (user_id) references users (user_id)

Dataset

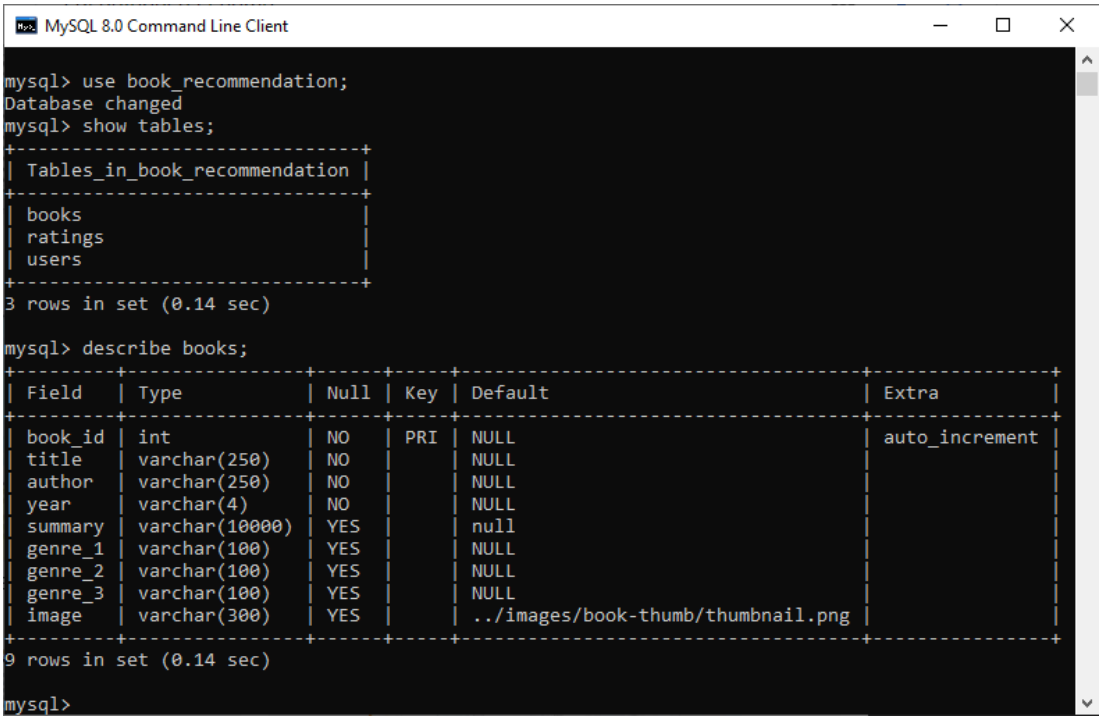
The dataset used here was collected from Goodreads. An Excel file was prepared to store the data in a structured manner and post population a CSV file was prepared as a raw dataset. Then MySQL database with required tables was created to import the CSV files and store the data in a relational manner.

The CSV view of Dataset for Books is as follows:

Books.csv

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
book_id	title	author	year	summary	genre_1	genre_2	genre_3	image						
1	1984	George Orwell	1949	ttempt to find individu	Classics	Fiction	Science Fiction	ook-thumbs/1984.png						
2	Fahrenheit 451	Ray Bradbury	1953	her television "family."	Classics	Fiction	Science Fiction	../images/book-thumbs/Fahrenheit 451.png						
3	Earth Abides	George R. Stewart	1949	ine to the effects of the	Science Fiction	Fiction	Adventure	../images/book-thumbs/Earth Abides.png						
4	Childhood's End	Arthur C. Clarke	1953	and end war. With little	Science Fiction	Fiction	Fantasy	../images/book-thumbs/Childhood's End.png						
5	Dune	Frank Herbert	1965	y thing of value is the "	Science Fiction	Fiction	Fantasy	../images/book-thumbs/Dune.png						
6	The Pillars of the Earth	Ken Follett	1989	ves: Tom, the master b	Fiction	Historical	Fantasy	../images/book-thumbs/The Pillars of the Earth.png						
7	Alice's Adventure in Wonderland	Lewis Carroll	1865	d of Wonderland. As m	Classics	Adventure	Fiction	../images/book-thumbs/Alice's Adventure in Wonderland.png						
8	The Call of the Wild	Jack London	1903	First published in 19	Adventure	Fiction	Young Adult	../images/book-thumbs/The Call of the Wild.png						
9	Into The Wild	John Krakauer	1996	In April, 1992, a you	Adventure	Non Fiction	Adventure	../images/book-thumbs/Into The Wild.png						
10	Treasure Island	Robert Louis Stevenson	1883	"For sheer storytellin	Adventure	Classics	Fiction	../images/book-thumbs/Treasure Island.png						
11	The Name of the Wind	Patrick Rothfuss	2007	Told in Kvothe's own	Fantasy	Adventure	Magic	../images/book-thumbs/The Name of the Wind.png						
12	Five Children and It	E. Nesbit	1902	The five children find	Fantasy	Classics	Children	../images/book-thumbs/Five Children and It.png						
13	Six of Crows	Leigh Bardugo	2015	Ketterdam: a bustling	Fantasy	Young Adult	Fiction	../images/book-thumbs/Six of Crows.png						
14	Good Omens	Neil Gaiman	1990	It's a predicament tha	Fantasy	Fiction	Humour	../images/book-thumbs/Good Omens.png						
15	Harry Potter and the Philosopher's Stone	J.K. Rowling	1997	Harry Potter's life is n	Fantasy	Magic	Adventure	../images/book-thumbs/Harry Potter and the Philosopher's Stone.png						
16	Harry Potter and the Chamber of Secrets	J.K. Rowling	1998	Ever since Harry Pot	Fantasy	Magic	Adventure	../images/book-thumbs/Harry Potter and the Chamber of Secrets.png						
17	Harry Potter and the Prisoner of Azkaban	J.K. Rowling	1999	For twelve long years	Fantasy	Magic	Adventure	../images/book-thumbs/Harry Potter and the Prisoner of Azkaban.png						
18	Harry Potter and the Goblet of Fire	J.K. Rowling	2000	Harry Potter is midw	Fantasy	Magic	Adventure	../images/book-thumbs/Harry Potter and the Goblet of Fire.png						
19	Harry Potter and the Order of the Phoeni	J.K. Rowling	2003	There is a door at the	Fantasy	Magic	Adventure	../images/book-thumbs/Harry Potter and the Order of the Phoenix.png						
20	Harry Potter and the Half Blood Prince	J.K. Rowling	2005	The war against Vold	Fantasy	Magic	Adventure	../images/book-thumbs/Harry Potter and the Half Blood Prince.png						
21	Harry Potter and the Deathly Hallows	J.K. Rowling	2007	It's no longer safe for	Fantasy	Magic	Adventure	../images/book-thumbs/Harry Potter and the Deathly Hallows.png						
22	Here and Now and Then	Mike Chen	2019	Kin Stewart is an eve	Time Travel	Science Fictior	Fantasy	../images/book-thumbs/Here and Now and Then.png						
23	The Future of Another Timeline	Annalee Newitz	2019	1992: After a confror	Time Travel	Fiction	Fantasy	../images/book-thumbs/The Future of Another Timeline.png						
24	The Psychology of Time Travel	Kate Mascarenhas	2017	In 1967, four female	Time Travel	Mystery	Fiction	../images/book-thumbs/The Psychology of Time Travel.png						
25	The Time Keeper	Mitch Albom	2012	The inventor of the w	Fiction	Fantasy	Inspirational	../images/book-thumbs/The Time Keeper.png						
26	Paper Town	John Green	2008	Quentin Jacobsen ha	Young Adult	Romance	Fiction	../images/book-thumbs/Paper Town.png						
27	The Perks of Being a Wallflower	Stephen Chbosky	1999	standing on the fring	Young Adult	Fiction	Classics	../images/book-thumbs/The Perks of Being a Wallflower.png						
28	The Fault In Our Stars	John Green	2012	Despite the tumor-sh	Young Adult	Romance	Fiction	../images/book-thumbs/The Fault In Our Stars.png						

The Relational Database for the Book Recommendation System has the given structure:

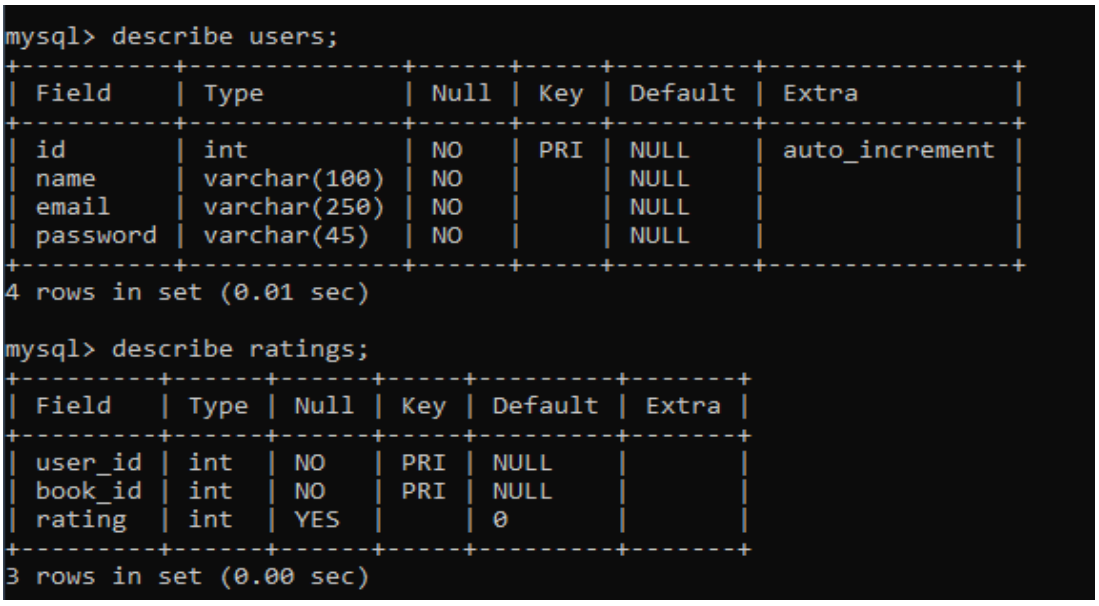


```
MySQL 8.0 Command Line Client

mysql> use book_recommendation;
Database changed
mysql> show tables;
+------------------------------+
| Tables_in_book_recommendation |
+------------------------------+
| books                        |
| ratings                      |
| users                        |
+------------------------------+
3 rows in set (0.14 sec)

mysql> describe books;
+---------+---------------+------+-----+---------------------------------+----------------+
| Field   | Type          | Null | Key | Default                         | Extra          |
+---------+---------------+------+-----+---------------------------------+----------------+
| book_id | int           | NO   | PRI | NULL                            | auto_increment |
| title   | varchar(250)  | NO   |     | NULL                            |                |
| author  | varchar(250)  | NO   |     | NULL                            |                |
| year    | varchar(4)    | NO   |     | NULL                            |                |
| summary | varchar(10000)| YES  |     | null                            |                |
| genre_1 | varchar(100)  | YES  |     | NULL                            |                |
| genre_2 | varchar(100)  | YES  |     | NULL                            |                |
| genre_3 | varchar(100)  | YES  |     | NULL                            |                |
| image   | varchar(300)  | YES  |     | ../images/book-thumb/thumbnail.png |             |
+---------+---------------+------+-----+---------------------------------+----------------+
9 rows in set (0.14 sec)

mysql>
```



```
mysql> describe users;
+----------+--------------+------+-----+---------+----------------+
| Field    | Type         | Null | Key | Default | Extra          |
+----------+--------------+------+-----+---------+----------------+
| id       | int          | NO   | PRI | NULL    | auto_increment |
| name     | varchar(100) | NO   |     | NULL    |                |
| email    | varchar(250) | NO   |     | NULL    |                |
| password | varchar(45)  | NO   |     | NULL    |                |
+----------+--------------+------+-----+---------+----------------+
4 rows in set (0.01 sec)

mysql> describe ratings;
+---------+------+------+-----+---------+-------+
| Field   | Type | Null | Key | Default | Extra |
+---------+------+------+-----+---------+-------+
| user_id | int  | NO   | PRI | NULL    |       |
| book_id | int  | NO   | PRI | NULL    |       |
| rating  | int  | YES  |     | 0       |       |
+---------+------+------+-----+---------+-------+
3 rows in set (0.00 sec)
```

Risks

Each and every software project has some risks to take care of; similarly this proposed book recommendation system is also prone to some risks.

The biggest risk associated with this system is **spamming of data by registered users**. In case if the users try to **rate the book titles randomly** without any knowledge or with bad intentions, then the **algorithm and the recommendation system may fail and produce unacceptable results**.

The algorithm is **completely dependent upon the behavior of the users and the data obtained from them**. It learns and grows along with the database.

To **tackle this risk we can offer few solutions** like:

- **Introducing a moderator:** to filter and approve the ratings. It can be devised by an algorithm or a person manually.
- **Assigning time limits** before rating any subsequent titles.
- Introducing an **algorithm to trace the user who is responsible for spamming** and restoring the database to a previous savepoint.
- **Banning the user responsible for spamming** the database permanently.
- **Moderating and filtering the registrations** made by users to stop fake registrations and keeping an eye on suspicious users.

Future Scope

This system can be extended to study the accuracy for the recommendation list. The given recommendation list can be enhanced by analyzing the user reviews and working on the security issues. The recommendations can be provided to the user based on user's profession.

This kind of recommendation systems are already used intensively by many tech giants in present date, it could be recommending books, movies, TV-shows or even regular items. Few examples are Amazon, Goodreads, Netflix, Prime Video, etc.

This particular book recommendation system has a considerable future scope in following areas:

- It can be developed **as a web-based API** so that other applications can call the module and use the recommendations generated by it.
- It can be **employed in an ecommerce website or sales portal** to provide users with recommendations they might be interested in.
- It can be **integrated in library or book stores** to track users reading style and habits and could possibly generate some reading recommendations.

Other considerable advantages that this book recommendation system can provide are:

- Drive Traffic to your website.
- Provide Relevant Material.
- Engage Customers.
- Transform Shoppers to Clients.
- Increase Average Order Value.

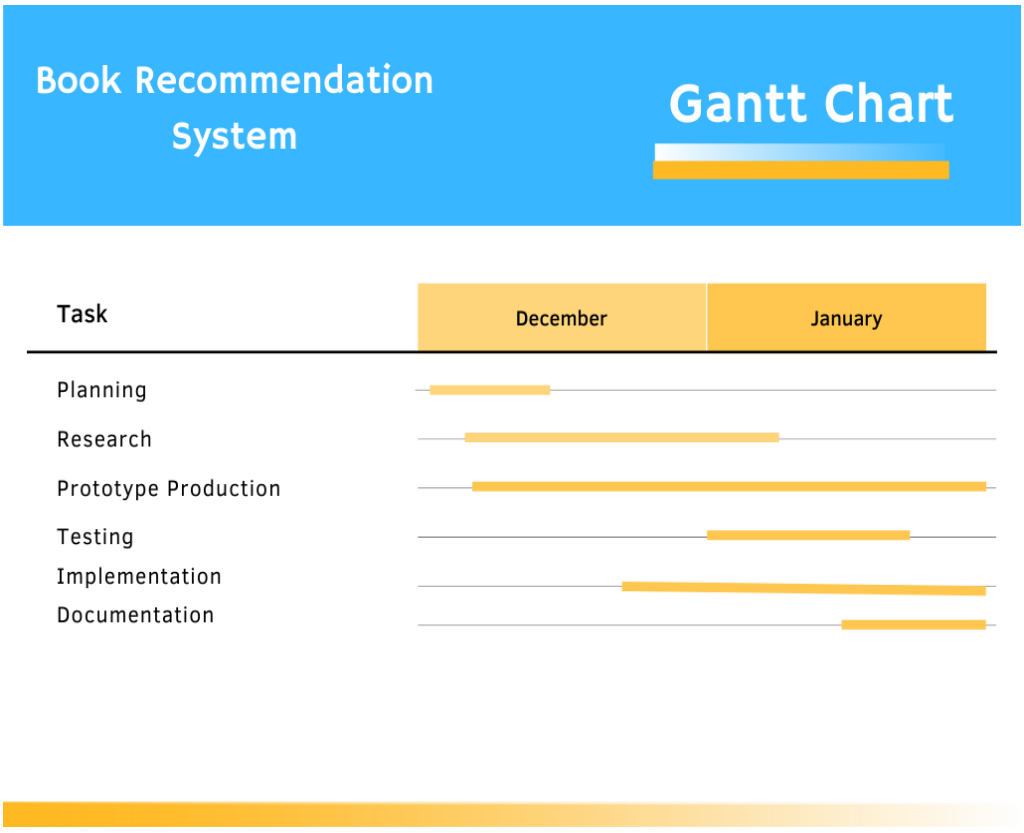
Conclusion

The proposed Book Recommendations uses a small dataset as of now and the results during the testing phase have shown satisfactory results. The system is dependent upon the ratings provided by the users who are registered and actively updating their reading list. The algorithm employed in the system uses the genres and ratings provided by registered users to learn and adapt according to growing dataset and the recommendations will definitely keep changing with now and then.

The main goal is to create such a system, which can give qualitative recommendations to the users without need to be registered for a long time and have big profile information, browsing history and etc. The proposed system can be applied for other domains to suggest items like movies, music and other products.

Plan of Work

The Following Gantt-Chart shows the duration and plan of work done during the life cycle of the Book Recommendation System project.



Source Code

The complete source code of the proposed system has been made available on the following **Github Repository.**

References

1. **Nursultan Kurmashov, Konstantin Nikoleyevich Latuta and Abay Nussipbekov**: Suleyman Demirel University "**Online Book Recommendation System"** Conference: 2015 Twelve International Conference on Electronics Computer and Computation (ICECCO).

2. **Ms. Sushama Rajpurkar, Ms. Darshana Bhatt and Ms. Pooja Malhotra**: Department of Information Technology KJSCE, Vidyavihar (E), Mumbai, India. "**Book Recommendation System**", IJIRST , Volume 1, Issue 11, 2015.

3. **What Should I read next?** This is a Book recommendation website that recommends books to users based on ratings of the books available in their dataset. **https://www.whatshouldireadnext.com/**