



COMP9900: Computer Science / Information Technology Project

Project Final Report

Topic: Read-Recommend

Group Name: LIM

Name	Student No.	Email	Position
Xiuye Yuan	z3485805	z3485805@ad.unsw.edu.au	Scrum Master
Daifei Zhang	z5185668	z5185668@ad.unsw.edu.au	Developer
Haotian Chu	z5188746	z5188746@ad.unsw.edu.au	Developer
Xinchen Wang	z5197409	z5197409@ad.unsw.edu.au	Developer
Yifan Wang	z5132312	z5132312@ad.unsw.edu.au	Developer

Master of Information Technology

Submitted: 3 Aug 2020

Table of Contents

1. Overall.....	1
1.1 Background	1
1.2 Software Architecture	2
2. Data Model.....	3
2.1 Data Preparation	3
2.1.1 Create Table	3
2.1.2 Database Migration.....	4
2.1.3 Test Data Collection.....	4
2.1.4 Data Visualization Management	5
2.2 Database Construction	6
3. Functionalities.....	7
3.1 Authentication Module	7
3.1.1 Registration	7
3.1.2 Login	8
3.1.3 Visitor	8
3.1.4 Log out.....	8
3.2 Search Module.....	8
3.2.1 Search books	9
3.2.2 Add books.....	10
3.2.3 Search users	10
3.2.4 Details of Result	11
3.2.5 Visitor search mode	11
3.3 Filter Module	12
3.4 Collection Module.....	13
3.4.1 Collection added and deleted	13
3.4.2 Collection general view	14
3.5 Book's Review & Rating	14
3.5.1 Add review	15
3.5.2 Update rating	15
3.6 Recommendation Module.....	15
3.6.1 According to the selected book's author	16

3.6.2	According to the selected book's category	17
3.6.3	According to the rating score	18
3.6.4	According to the popularity	18
3.7	Monthly Goal Module	19
3.7.1	Set a reading goal	19
3.7.2	Mark a start date	20
3.7.3	Mark an end date	20
3.7.5	Reading goal status	21
4.	Implementation Challenges	22
4.1	Data Preparation	22
4.2	Search Result Page Maintenance	22
4.3	Dynamic Ratings	23
4.4	Trigger Pop-up Window Element	23
5.	User Document	24
5.1	Tools Setup	24
5.1.1	Python 3	24
5.1.2	Django	24
5.1.3	MySQL	24
5.1.4	PyCharm	25
5.2	Project Configuration	26
5.2.1	Database Configuration	26
5.2.2	Visitor Manual	27
5.2.3	User Manual	28
5.2.4	Admin Manual	30
6.	Reference	32

LIST OF FIGURES

FIGURE 1. GENERAL STRUCTURE	2
FIGURE 2 EXAMPLES IN 'MODELS.PY'	3
FIGURE 3 TABLE EXAMPLE (COLLECTION) AFTER MIGRATION.	3
FIGURE 4 'ON_DELETE' OPTION IN DJANGO DOCUMENT	4
FIGURE 5 FILES GENERATED AUTOMATICALLY BY DJANGO	4
FIGURE 6 COMMANDS FOR DATABASE MIGRATION	4
FIGURE 7 EXCEL SAMPLES FOR INSERTING RECORDS INTO DATABASE	5
FIGURE 8 STEPS TO CONFIGURE DATA SOURCE IN PYCHARM.....	5
FIGURE 9 VISUALIZED DATABASE IN PYCHARM.....	5
FIGURE 10 THE OVERVIEW OF OUR DATABASE CONSTRUCTION.....	6
FIGURE 11 POP-UP INFORMATION WHEN REGISTRATION WITH AN EXISTED USERNAME.....	7
FIGURE 12 THE INFORMATION FOR CHECKING PASSWORDS CONFIRMED.	7
FIGURE 13 LOGIN WINDOW AND POPUP INFORMATION WHEN INPUTTED WRONG PASSWORD.	8
FIGURE 14 THE SEARCH PAGE AFTER USER LOGIN.	9
FIGURE 15 THE POP-UP INFORMATION ABOUT ADDING BOOKS INTO COLLECTION	10
FIGURE 16 THE RETURN RESULT AFTER USER SEARCHED ANOTHER USER OF 123.	10
FIGURE 17 SAMPLE SEARCHED USER PAGE WITH COLLECTIONS AND RECENTLY ADDED BOOKS.....	11
FIGURE 18 FILER BUTTON WITH THREE DIFFERENT FILTER BASES.	12
FIGURE 19 (A) IS THE CREATION FUNCTION, (B) IS COLLECTIONS LIST WITH DELETE FUNCTION.	13
FIGURE 20 A SAMPLE VIEW OF ONE COLLECTION CONTENT.....	14
FIGURE 21 ADD REVIEW BUTTON AND ADD RATING SECTION.	14
FIGURE 22 SAMPLE OF ADDING A REVIEW	15
FIGURE 23 A REVIEW EXAMPLE.....	15
FIGURE 24 RECOMMEND SYSTEM WITH 4 SELECTABLE MODES.....	16
FIGURE 25 SAMPLE RECOMMENDED RESULTS ACCORDING TO AUTHOR, SORTED BY POPULARITY.	16
FIGURE 26 SAMPLE RECOMMENDED RESULTS ACCORDING TO BOOK'S CATEGORY, SORTED BY POPULARITY.	17
FIGURE 27 SAMPLE RECOMMENDED RESULTS ACCORDING TO BOOK'S AVERAGE RATING, SORTED BY POPULARITY.....	18
FIGURE 28 SAMPLE OF USER'S PERSONAL PAGE.....	19
FIGURE 29 SET A READING DAYS BEFORE BOOK WAS ADDED IN ANY COLLECTION.	20
FIGURE 30 SAMPLE OF AN ADDED BOOK WITH ADDED TIME, READING DUE TIME AND READING STATUS.	20
FIGURE 31 SAMPLE OF AN ADDED BOOK WITH ADDED TIME, READING DUE TIME AND FINISHED STATUS.....	20
FIGURE 32 SAMPLE OF READING GOAL HISTORY AND GOAL'S IN PROGRESS STATUS	21
FIGURE 33 SAMPLE OF READ BOOK DURING CURRENT MONTH.	21
FIGURE 34 THE OFFICIAL WEBSITE OF PYTHON3 WE USED.....	24
FIGURE 35 THE OFFICIAL WEBSITE OF DJANGO WE USED IN WEB FRAME BUILDING.....	24
FIGURE 36 THE OFFICIAL WEBPAGE OF MYSQL DATABASE.....	25
FIGURE 37 THE OFFICIAL WEBSITE OF PYCHARM, A PYTHON-BASE IDE.....	25

FIGURE 38 CODES NEED TO BE MODIFIED IN SETTINGS.PY	26
FIGURE 39 STEPS TO MIGRATE THE DATABASE CONFIGURATION	26
FIGURE 40 RESULTS WHEN RUNNING THE SERVER SUCCESSFULLY.	26
FIGURE 41 ONE EXAMPLE SEARCH RESULT AS A VISITOR.....	27
FIGURE 42 REGISTER PAGE	27
FIGURE 43 LOGIN PAGE	28
FIGURE 44 SEARCH BAR	28
FIGURE 45 OPERATIONS FOR SEARCH RESULT.	28
FIGURE 46 COLLECTION CREATION BAR	29
FIGURE 47 COLLECTION DETAIL PAGE.....	29
FIGURE 48 BOOK DETAIL PAGE.....	29
FIGURE 49 COMMAND TO RUN SERVER	30
FIGURE 50 RESULT WHEN RUNNING THE SERVER SUCCESSFULLY	30
FIGURE 51 ADMIN LOGIN PAGE OF DJANGO	30
FIGURE 52 ADMIN PAGE OF DJANGO	30
FIGURE 53 ONE OF ADMIN OPERATION PAGE OF DJANGO.....	31
FIGURE 54 DIRECTORY FOR THE BOOK COVERS.....	31

1. Overall

1.1 Background

Nowadays, ways of publishing and buying books are way more convenient than before, a growing number of readers choose to keep track on their readings online. Readers tend to search their favourite books online instead of visiting the physical bookstore. It is a great convenience to people's life and helps empty up storage of physical books. Readers have a more efficient way to share their books collection and reading history in time. Furthermore, as there is a high demand on recommending books, many websites, such as Amazon, Books, NY times, Douban, provide the functionality including book collection, searching books, recording reading history and making recommendations on reading books. Reading recommendations becomes one of the key requirements within a majority of readers. Users can look through the reviews of books that they are interested in and also the average rating grade left by previous readers, these can provide a better assistance on finding the suitable book.

Readers are often spending much time of looking for the next interesting book to read. According to this requirement, ReadRecommend, a platform that allows readers to keep their book-reading history and get recommendations on books that they might be interested in based on multiple modes of recommendations.

Our team's overarching goal and starting point is to create a reliable, convenient and user-friendly online reading recommendation system for recording read history, creating reading list, searching wanted books, getting book recommendations and sharing reviews & rating on read books.

Based on the technical requirements, our online ReadRecommend system has the following properties:

- **Reliable:** Provides a reliable and stable book adding, searching, rating and recommending environment for users.
- **Fast:** When visitor searching books by book or author name, the matched result should be presented immediately. Registered user can add book, create book collection, search books or other users, get the interesting books recommended result in a short time.
- **Multiple recommend mode:** According to different users have different demands toward read recommendation, it should provide multiple choice on book recommendation, such as based on average rating, based on interesting author, based on book categories and based on book's popularity.

- **User friendly:** Provides an interface that can be skilled use easily without taking much time to understand the website features.
- **Fully functional:** Aiming to build an interface that contains all the features readers need. It will be an integrated website includes adding collection, making recommendations, recording read history, setting a reading goal, searching, adding review and rating.

1.2 Software Architecture

For the front-end, HTML, CSS, JavaScript and Bootstrap are used to build the frame of the read recommend website.

Refers to the back-end server, it is constructed by Django, a python-based framework. MySQL is the used database for recording users' and books' information.

A brief design overview was summarised below:

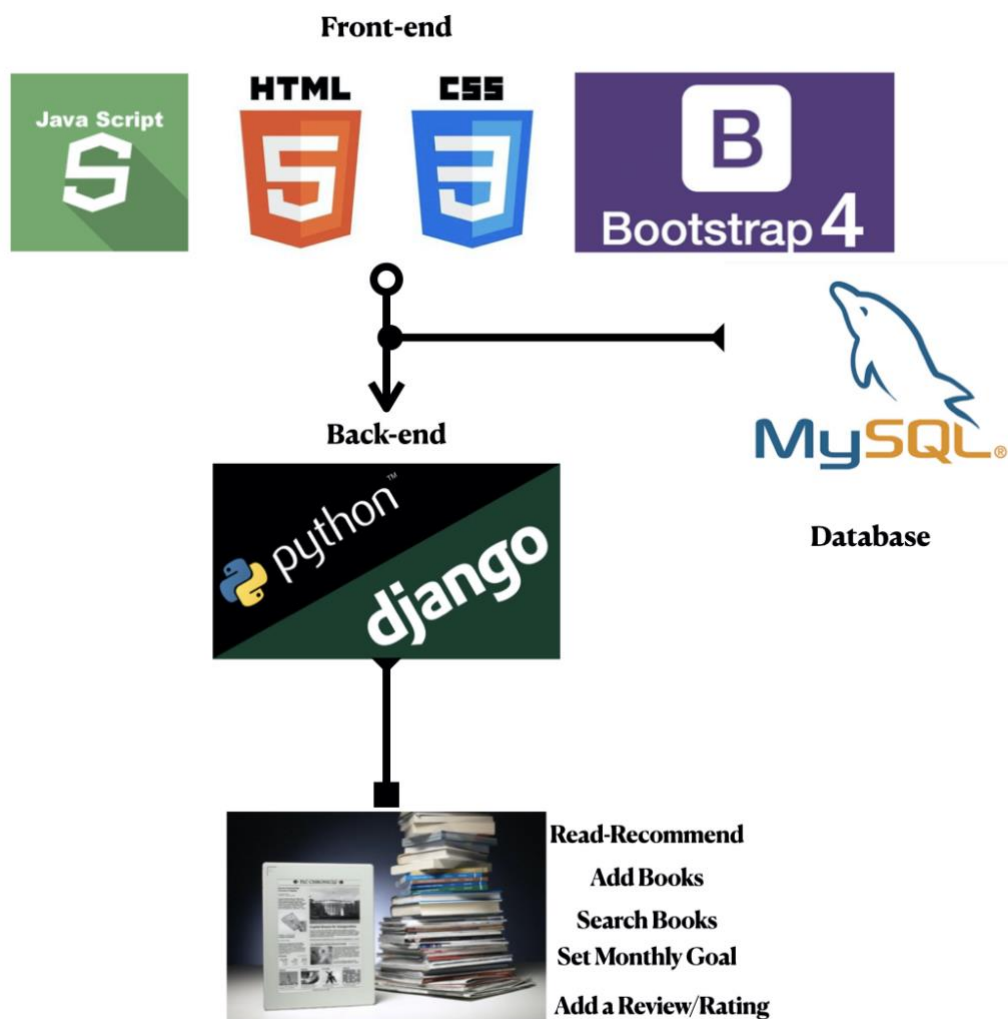


Figure 1. General Structure

2. Data Model

2.1 Data Preparation

2.1.1 Create Table

Developing web projects with Django enables developers to configure all the database settings in the file named 'Models.py'. As the example shown below, the configuration of the attribute and table name is easy to master.

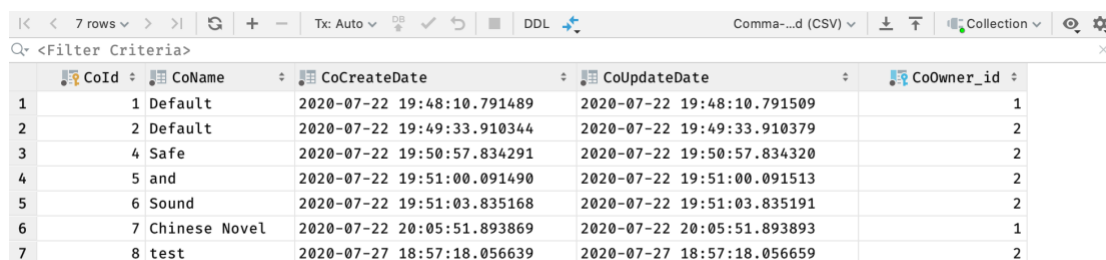
```
51 class Collection(models.Model):
52     # collectionId
53     CoId = models.AutoField('CoId', primary_key=True)
54     # collection Name set by the owner
55     CoName = models.CharField('CoName', max_length=15)
56     # owner --foreign key of user
57     CoOwner = models.ForeignKey('User', on_delete=models.CASCADE)
58     # createtime --won't change after set
59     CoCreateDate = models.DateTimeField(auto_now_add=True)
60     # updatedate --Everytime being update the time will change
61     CoUpdateDate = models.DateTimeField(auto_now=True)
62
63     # change the default name of the table
64     class Meta:
65         db_table = 'Collection'
66
```

Attribute name

Table name

Figure 2 Examples in 'models.py'

Each attribute in our database are named in camel-case. It will make it easy for the front end to fetch the data if needed. The table generated is strictly the same as our configuration in 'Models.py'.



	CoId	CoName	CoCreateDate	CoUpdateDate	CoOwner_id
1	1	Default	2020-07-22 19:48:10.791489	2020-07-22 19:48:10.791509	1
2	2	Default	2020-07-22 19:49:33.910344	2020-07-22 19:49:33.910379	2
3	4	Safe	2020-07-22 19:50:57.834291	2020-07-22 19:50:57.834320	2
4	5	and	2020-07-22 19:51:00.091490	2020-07-22 19:51:00.091513	2
5	6	Sound	2020-07-22 19:51:03.835168	2020-07-22 19:51:03.835191	2
6	7	Chinese Novel	2020-07-22 20:05:51.893869	2020-07-22 20:05:51.893893	1
7	8	test	2020-07-27 18:57:18.056639	2020-07-27 18:57:18.056659	2

Figure 3 Table example (Collection) after migration.

The 'auto_now_add' option enables the database to record the create time of a data record while the 'auto_now' option enables the database to have a recording of the update time spot. 'On_delete' option is one thing that needs to pay more attention to. When configuring foreign keys for the database tables, this option should not be ignored.

ForeignKey

`class ForeignKey(to, on_delete, **options)`

A many-to-one relationship. Requires two positional arguments: the class to which the model is related and the `on_delete` option.

To create a recursive relationship – an object that has a many-to-one relationship with itself – use `models.ForeignKey('self', on_delete=models.CASCADE)`.

If you need to create a relationship on a model that has not yet been defined, you can use the name of the model, rather than the model object itself:

```
from django.db import models

class Car(models.Model):
    manufacturer = models.ForeignKey(
        'Manufacturer',
        on_delete=models.CASCADE,
    )
    # ...

class Manufacturer(models.Model):
    # ...
    pass
```

Figure 4 'on_delete' option in Django Document

2.1.2 Database Migration

Migrations are Django's way of propagating changes we make to our models (adding a field, deleting a model, etc.) into our database schema. They're designed to be mostly automatic.

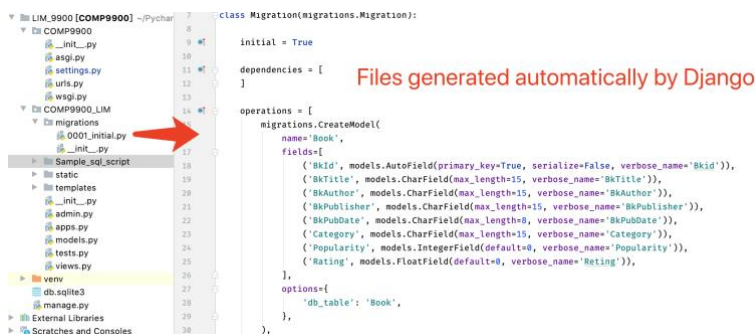


Figure 5 Files generated automatically by Django

With the commands in the document, it's very easy to finish basic database configuration.

The Commands

There are several commands which you will use to interact with migrations and Django's handling of database schema:

- **migrate**, which is responsible for applying and unapplying migrations.
- **makemigrations**, which is responsible for creating new migrations based on the changes you have made to your models.
- **sqlmigrate**, which displays the SQL statements for a migration.
- **showmigrations**, which lists a project's migrations and their status.

Figure 6 Commands for database migration

2.1.3 Test Data Collection

We use Excel to help us create the test data script for higher efficiency. Input the content of the attributes, and you will get the 'Insert' script in the column H. Copy and execute the script

in the database console window, you will get your record inserted in the specific table immediately.

	A	B	C	D	E	F	G	H	I
	BkTitle	BkAuthor	BkPublisher	BkPubDate	Category	Popularity	Rating		
1	Pride and Prejudice	Jane Austen	United Kingdom	1813.01	Novel	3	3.6		
2	Jane Eyre	Charlotte Brontë	England	1847.01	Novel	3	3		
3	The Kite Runner	Khaled Hosseini	United States	2003.05	Novel	3	3		
4	Empresses in the Palace	Liu Lianzi	China	2007.01	Novel	3	3		
5	Ruyi Royal Love in the Palace	Liu Lianzi	China	2011.01	Novel	3	3		

Formula bar: =CONCATENATE("INSERT INTO Book(BkTitle,BkAuthor,BkPublisher,BkPubDate,Category,Popularity,Rating) VALUES('"&A2&"','"&B2&"','"&C2&"','"&D2&"','"&E2&"','"&F2&"','"&G2&"')")

Figure 7 Excel samples for inserting records into database

2.1.4 Data Visualization Management

We use the data source management plugins provided by JetBrains in PyCharm [1].

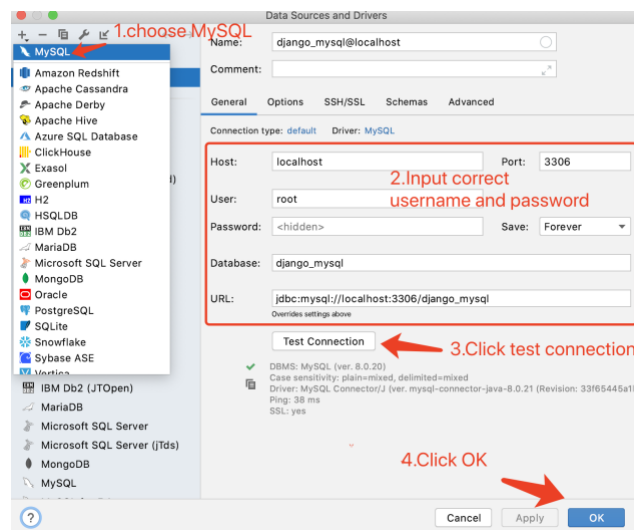


Figure 8 Steps to configure data source in PyCharm

With visualized database, we can manage and test our codes much more easily than before.

BkId	BkTitle	BkAuthor	BkPublisher	BkPubDate	Category	Popularity	Rating
1	Pride and Prejudice	Jane Austen	United Kingdom	1813.01	Novel	3	3.6
2	Jane Eyre	Charlotte Brontë	England	1847.01	Novel	3	3
3	The Kite Runner	Khaled Hosseini	United States	2003.05	Novel	3	3
4	Empresses in the Palace	Liu Lianzi	China	2007.01	Novel	3	3
5	Ruyi Royal Love in the Palace	Liu Lianzi	China	2011.01	Novel	3	3
6	Fantastic Beasts and Where to Find Them	J.K. Rowling	United Kingdom	2001.01	Fantasy	3	3
7	Harry Potter 1	J.K. Rowling	United Kingdom	1997.01	Fantasy	3	3
8	Harry Potter 2	J.K. Rowling	United Kingdom	1998.03	Fantasy	3	3
9	Call Me by Your Name	André Aciman	United States	2007.01	Novel	3	3
10	A Tale of Two Cities	Charles Dickens	England	1859.04	Novel	4	4
11	Oliver twist	Charles Dickens	England	1838.1	Novel	5	5
12	The Old Curiosity Shop	Charles Dickens	England	1840.04	Novel	4	4
13	The Cricket on the Hearth	Charles Dickens	England	1845.12	Novel	4	4
14	Dombey and Son	Charles Dickens	England	1849.08	Novel	5	5
15	One Piece	Oda Eiichiro	Japan	1997.07	Comic	4	4

Figure 9 Visualized database in PyCharm

2.2 Database Construction

The below graph gives a clear illustration of our database construction. All the tables are connected with one or more foreign keys. With the functions provided in the Django data service, we can keep a record on the create time and update time automatically. The attribute configurations are all set in the file called ‘models.py’.

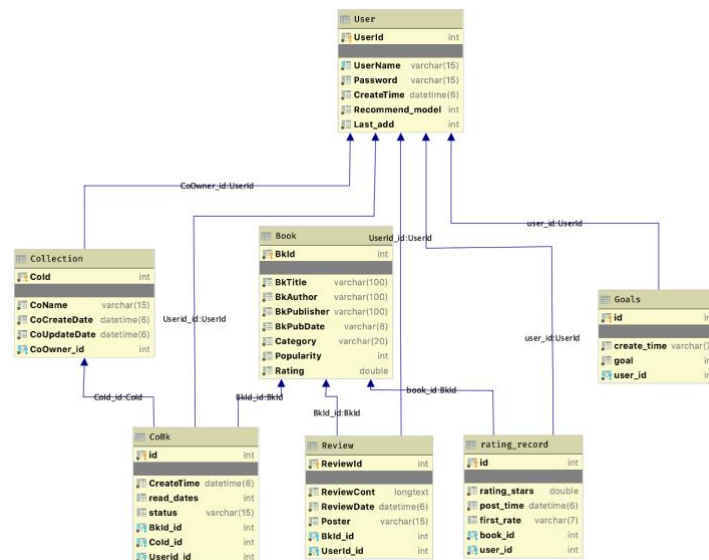


Figure 10 The overview of our database construction

3. Functionalities

3.1 Authentication Module

In this section, authentication module including sign up, sign in and visit website as unregistered user is presented in detail. Reader can look through the website as a registered user. If the new user only wants to use some basic functions, such as search a book to get its basic information, search a book by book's name or author's name, search a user to get his/her reading collections. The visitor does not have any access to add books into collection, create own collections, review or give a rating to books.

He/she will have full access on the page, which means the functions of adding new books into any collection, created as many as specific collections, set a monthly reading goal, leave a review & rating to read books.

3.1.1 Registration

A new user needs to create a new count with a unique username. If user inputs a username which other user has used it, there will be a popup to remind users the username has been used as Figure 11 shown below. Once user creates account successfully, the page will redirect to the web's main page automatically.

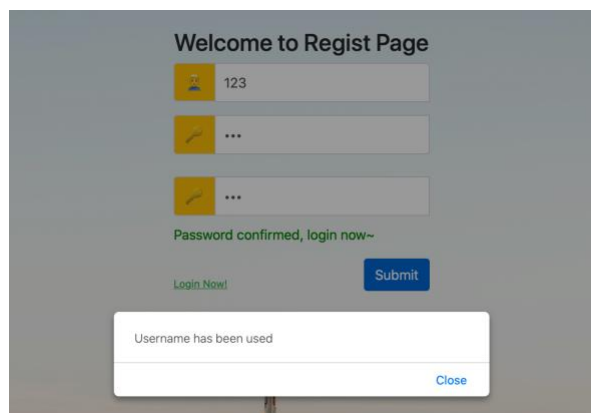


Figure 11 Pop-up information when registration with an existed username.

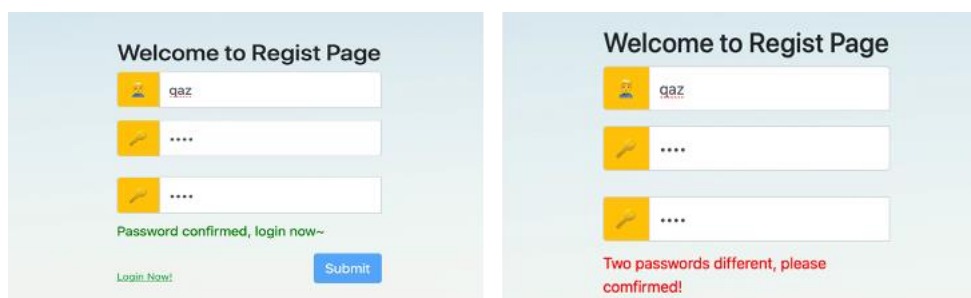


Figure 12 The information for checking passwords confirmed.

As above figure shown, the registration page provides a password checking function. User needs to input a password twice. If two passwords matched successfully, a green information will print on screen. Otherwise, there will be an alter inform user tow check both passwords are same.

3.1.2 Login

When user has a registered account, he/she can login with username and password. If entered an invalid username, there will be a popup to inform user that this username does not exist. In addition, if the username and password do not match, another popup will be presented reminding user to try again. Figure 13 indicates the login window and the popup when user used a wrong password.

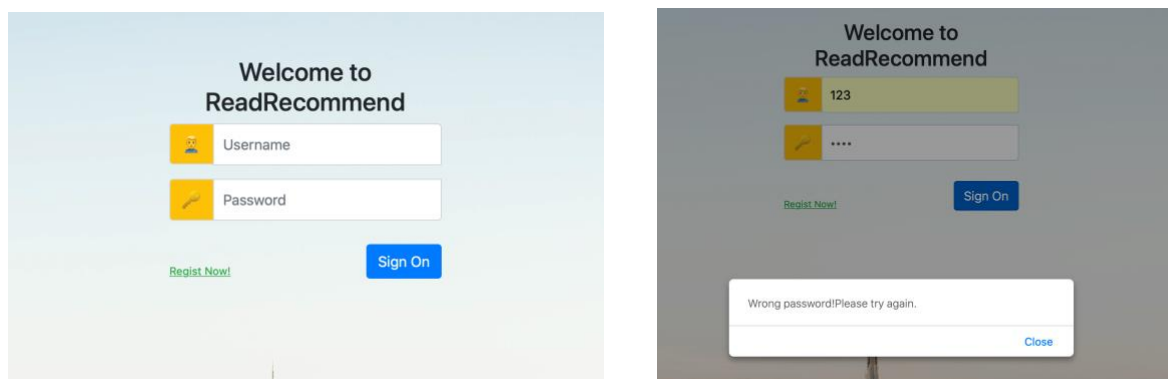


Figure 13 Login window and popup information when inputted wrong password.

3.1.3 Visitor

Once visitor/user visit the read-recommend main page, he/she can use some basic functions without login. As aforementioned, visitor mode has less access than login.

3.1.4 Log out

On the login page, there is a “Sign out” button on the top-right corner which will redirect user to visitor mode and the top-right button will be swapped to log in button.

3.2 Search Module

Search module contains searching books based on books' title or author's name, and searching other's username to view his/her collections. Both visitor and user are able to search books by its name or author. The search result is based on fuzzy search which means if users entered a word or letters, all books title and author's name contain this word will be listed out. Furthermore, they can search other user by username to view the user's personal page with collections list and books. The search module enables users not only to search the interested books, but also to add books in any collection they created. As the below Figure 14 shown, there is a search bar on the top of the web page.

ReadRecommend
123
Sign out

Author name:
Category:
Rating score:

Title	Author	Category	Publisher	Publish Date	Detail	Operation		
Recommend								
Pride and Prejudice	Jane Austen	Novel	United Kingdom	1813.01	<input type="button" value="detail"/>	Default	reading	<input type="button" value="Add"/>
Ruyi Royal Love in the Palace	Liu Lianzi	Novel	China	2011.01	<input type="button" value="detail"/>	Default	reading	<input type="button" value="Add"/>
Empresses in the Palace	Liu Lianzi	Novel	China	2007.01	<input type="button" value="detail"/>	Default	reading	<input type="button" value="Add"/>
Oliver twist	Charles Dickens	Novel	England	1838.1	<input type="button" value="detail"/>	Default	reading	<input type="button" value="Add"/>
The Kite Runner	Khaled Hosseini	Novel	United States	2003.05	<input type="button" value="detail"/>	Default	reading	<input type="button" value="Add"/>
Call Me by Your Name	André Aciman	Novel	United States	2007.01	<input type="button" value="detail"/>	Default	reading	<input type="button" value="Add"/>
Jane Eyre	Charlotte Brontë	Novel	England	1847.01	<input type="button" value="detail"/>	Default	reading	<input type="button" value="Add"/>
Dombey and Son	Charles Dickens	Novel	England	1849.08	<input type="button" value="detail"/>	Default	reading	<input type="button" value="Add"/>
The Old Curiosity Shop	Charles Dickens	Novel	England	1840.04	<input type="button" value="detail"/>	Default	reading	<input type="button" value="Add"/>
The Cricket on the Hearth	Charles Dickens	Novel	England	1845.12	<input type="button" value="detail"/>	Default	reading	<input type="button" value="Add"/>

Figure 14 The search page after user login.

3.2.1 Search books

If users/visitors know the interested book's title or its author's name, after users enter a book or author name and click the search icon (Q), there will be a list if multiple results matched, containing the matched book(s). The information area will present the book's basic information containing book's title, author name, category, publisher, publication date respectively.

There are two functional bars on the right of the result area. One is the detail icon for showing the full details of book, another one is operation bar. Users can add books in any collection

easily by the operation bar where users can choose one of the collections and reading days for this book.

3.2.2 Add books

User can add books into any collection including a default collection. A preferred collection and an expected reading date must be selected if user decided to add the book in his/her book's collection. There are two dropdown menus of all created collections and a series reading days above the add icon.

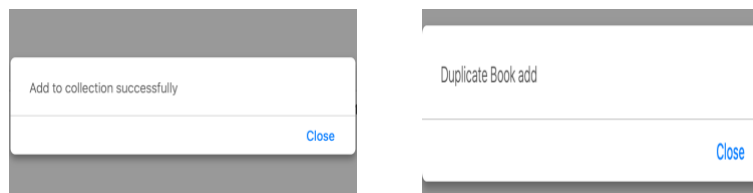


Figure 15 The pop-up information about adding books into collection

Once user added a new book into the default collection or created one, there will be a pop-up box to inform adding operation successful. If users try to add a book which has already existed in the chosen collection, this operation will fail, and a pop-up message indicates it as the right part of Figure 15 shown. Users can also add book in book's detail page under the rating section as Figure 21 presented.

3.2.3 Search users

Both registered users and visitors are permitted to search another user if you know the user's name. If the searched user's name and book's author are same, the all matched author's books will be listed as well as the user's information. You can click the searched user's name to redirect into the user's personal page as shown the red circle in Figure 16 that is a sample result of searching user 123. In the searched user's personal page, only browsing operation can be implemented. All collection lists including the books inside can be viewed, the details of any book can be checked, and the top 10 books that this user has recently added in collections will be presented.

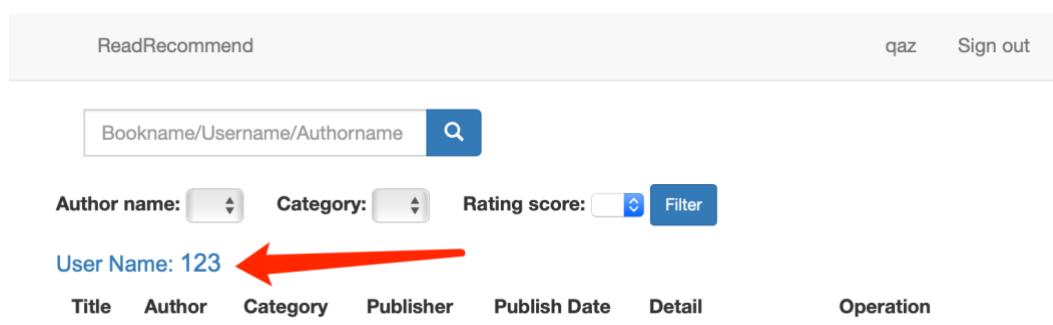


Figure 16 The return result after user searched another user of 123.

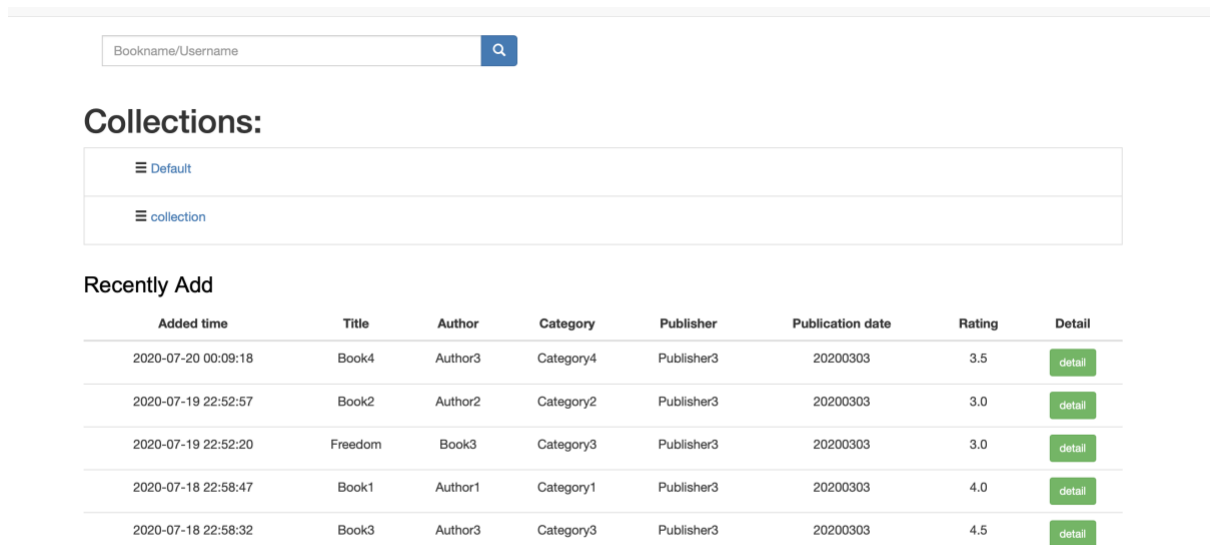


Figure 17 Sample searched user page with collections and recently added books.

3.2.4 Details of Result

Registered users or visitors can look through any book's full details by clicking detail icon on the right of the book's information bar. Except for the book's basic information, the detail page will show more data including the book's reviews by readers, the average rating, the total count of this book's readers, a rating bar, an add to collection button and a dropdown list with series of recommendation model as the Figure 21 shown.

3.2.5 Visitor search mode

On the visitor search mode, there is no recommendation section and operation list. Other page layouts are similar with registered user's page contains a search bar, three filter bars, and a section with 10 books, as shown in Figure 41. The list of 10 books are sorted by popularity (the total number users who read this book) firstly, if books have same popularity, it is sorted by book's rating with descending. The default order is by the time the book was joined. Visitors can search all books and view the book's details. However, visitors are not able to add books into a collection, create collections, add reviews to a book and rate a book out of 5.

3.3 Filter Module

Filer module contains three bases to provide readers more help with finding the right book. Users/visitors are able to filter out any books from search results that are written by a given author, under a chosen category or under a given average rating. Reader can filter any books out of the search results with any one of the three base or combine all three or any two of the criteria. All of the filter conditions will be applied after the user click the filter button. The matched results will be caught from database and print on the screen.

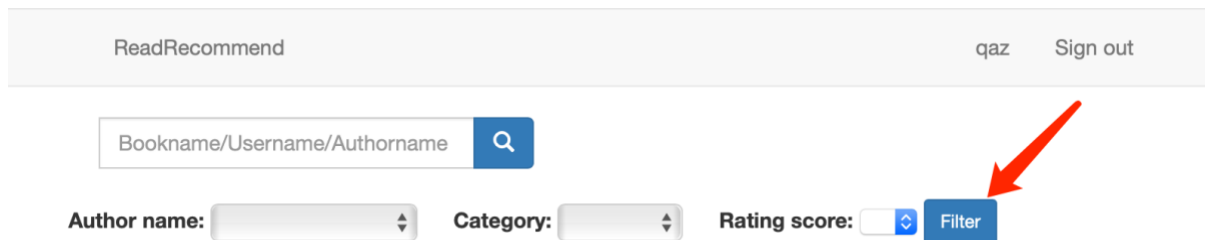


Figure 18 Filer button with three different filter bases.

- Based on average rating score

A dropdown menu named with rating which shows a numerical list contains ratings from 5 to 1. Users can choose one of the five numbers to filter out any book under this rating.

- Based on author

A dropdown menu which lists all authors whose name contains the entered text. Users can choose one of the names to filter out any book which are not written by chosen author.

- Based on category

A dropdown menu which presents all matched categories of the user's search result. Users can click one of them to filter out other categories.

3.4 Collection Module

Once reader registered on ReadRecommend successfully, it will create a default collection automatically. Users are able to create as many collections as he/she want to. Collection module provides a basic function that user can keep his/her reading books history and classify the books in named collections.

3.4.1 Collection added and deleted

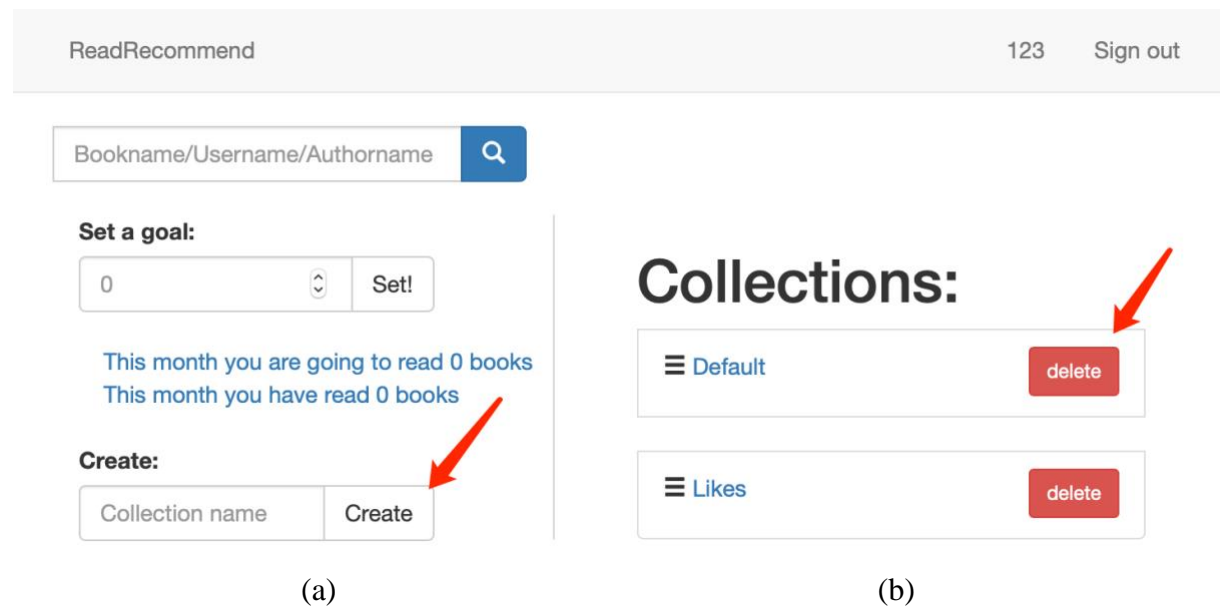


Figure 19 (a) is the creation function, (b) is collections list with delete function.

As above Figure 19 (a) shown, user can enter a liked name in the 'collection name' bar, then click 'Create' button. The created collection will appear at the Collections section. But user cannot name a new collection with the name of an existing collection. Figure 19 (b) lists the collections after user created a list named as 'Likes'. The Default collection cannot be deleted. If user want to remove any created collection, click the delete button next to the right of the name which user want to delete. The record of books added to this collection and this collection's information will be deleted directly.

3.4.2 Collection general view

ReadRecommend

123

Sign out

Bookname/Username

🔍

Books in :

title	author	category	publisher	publication date	rating	popularity	operation	
Empresses in the Palace	Liu Lianzi	Novel	China	2007.01	4.0	7	detail	remove
Pride and Prejudice	Jane Austen	Novel	United Kingdom	1813.01	5.0	8	detail	remove
Call Me by Your Name	André Aciman	Novel	United States	2007.01	5.0	5	detail	remove
Harry Potter 1	J.K. Rowling	Fantasy	United Kingdom	1997.01	5.0	4	detail	remove

Figure 20 A sample view of one collection content.

Users can view the added books of any collection by clicking the name of collection. As above figure shows, all books and their basic information will be presented. Users are able to remove the book out of collection by clicking the remove button. Then, the record of this book added to the current collection will be deleted.

3.5 Book's Review & Rating

Book's reviews and average rating provide other indicators for helping reader to select the right book to read. To improve the experience on ReadRecommend, registered users are able to add a review for any books they have read and add a rating out of five. The added ratings will be calculated for showing the average grade.

ReadRecommend				justin	Sign out	
A Tale of Two Cities						ratings:
						3 from 2 readers
Author:Charles Dickens						Rate:
Publisher:England						Popularity Index: 4
Publication Date:1859.04						Add to collection
Category:Novel						
<div>Reviews Add review</div>						<div>Recommend System</div>
						recommend mode:
						1-based on author
						submit

Figure 21 Add review button and add rating section.

3.5.1 Add review

Users can add a review by clicking ‘add review’ button on the left side bar as shown in Figure 21. The reviews section will list all this book’s reviews left by readers who have read it. As the below Figure 23 shown, in the review section, users can get details of the review including the time it created, the person who left it and the content.

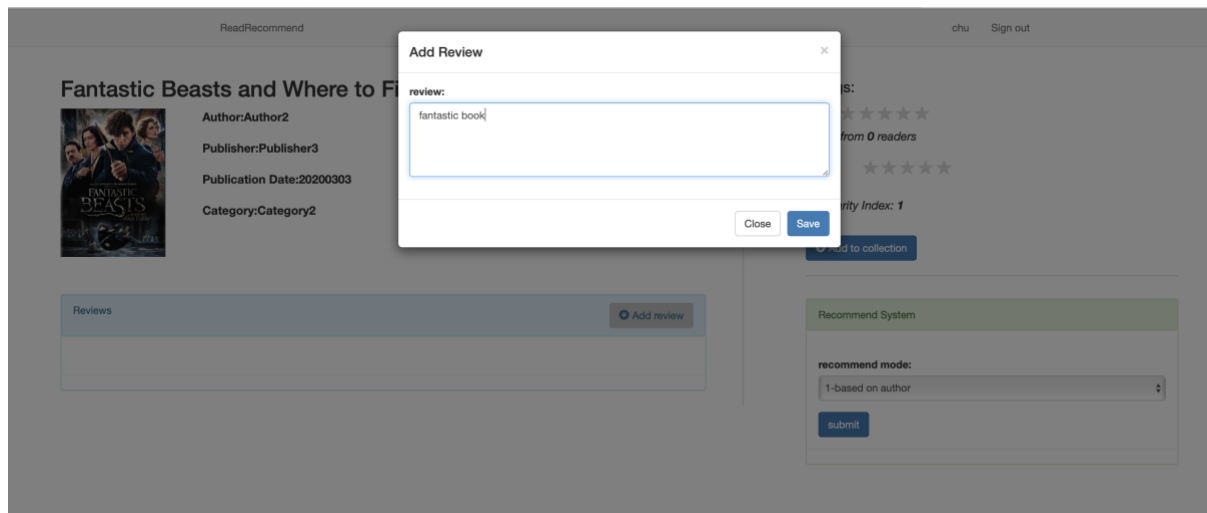


Figure 22 Sample of adding a review

user:123 post time:July 26, 2020, 6:58 p.m.

This book is very interesting, I learned a lot useful knowledge from it!

Figure 23 A review example.

3.5.2 Update rating

The right part of Figure 21 shows two lines and each line has 5 stars. Yellow stars indicate its rating. The first star’s line is the book’s average rating, the number of readers who rated it also is shown. The second star’s line will be used for rating it by users. Users can put mouse pointer on it to light it. Light up four stars means users want to give a rating with 4. User could rate a book multiple time. Popularity index points how many readers add this book in their collection.

3.6 Recommendation Module

Making recommendations based on multiple modes is a core feature of ReadRecommend website. It provides a way for readers to find new interesting books to read. According to different requirement and user’s priorities different, ReadRecommend is providing four different modes of recommendations that readers are able to choose any one of them. In order

to meet as much as possible different requirement, four alternative variables including average rating for a book, categories of books, author and how often books appear in other reader's collection are provided in recommend system as the below Figure 24 shown.



Figure 24 Recommend system with 4 selectable modes.

3.6.1 According to the selected book's author

Users are able to get recommendation based on the current book's author. From the dropdown list in recommend mode section, the first one is based on author. After user click submit button, the page will be redirected to recommended page. The top 10 most popular books written by the chosen author will be listed. If the number of books is fewer than ten, then show these books directly. As below figure shown, user determined books to be recommended based on author, the author's three books were listed and sorted by how often books appear in other reader's collection. User can add any book into any collection easily.

ReadRecommend

123Sign out

Bookname/Username/Authorname

Q

Title	Author	Category	Publisher	Publish Date	Detail	Operation
Recommendation based on author						
Harry Potter 2	J.K. Rowling	Fantasy	United Kingdom	1998.03	<div>detail</div>	<div>Default</div> <div>reading</div> <div>Add</div>
Harry Potter 1	J.K. Rowling	Fantasy	United Kingdom	1997.01	<div>detail</div>	<div>Default</div> <div>reading</div> <div>Add</div>
Fantastic Beasts and Where to Find Them	J.K. Rowling	Fantasy	United Kingdom	2001.01	<div>detail</div>	<div>Default</div> <div>reading</div> <div>Add</div>

Figure 25 Sample recommended results according to author, sorted by popularity.

3.6.2 According to the selected book's category

If users want to get read recommendations by same category, just select the second one from recommend modes list. Similarly, the top-ten (if there are 10 books in this category) books will be listed in the result page under the chosen category. The below figure presents the recommendation results based on “Novel” category.

ReadRecommend123Sign out

Bookname/Username/Authorname

Q

Title	Author	Category	Publisher	Publish Date	Detail	Operation
Recommendation based on category						
Pride and Prejudice	Jane Austen	Novel	United Kingdom	1813.01	<div>detail</div>	<div>Default ▾</div> <div>reading ⌵</div> <div>Add</div>
Ruyi Royal Love in the Palace	Liu Lianzi	Novel	China	2011.01	<div>detail</div>	<div>Default ▾</div> <div>reading ⌵</div> <div>Add</div>
Empresses in the Palace	Liu Lianzi	Novel	China	2007.01	<div>detail</div>	<div>Default ▾</div> <div>reading ⌵</div> <div>Add</div>
Oliver twist	Charles Dickens	Novel	England	1838.1	<div>detail</div>	<div>Default ▾</div> <div>reading ⌵</div> <div>Add</div>
The Kite Runner	Khaled Hosseini	Novel	United States	2003.05	<div>detail</div>	<div>Default ▾</div> <div>reading ⌵</div> <div>Add</div>
Call Me by Your Name	André Aciman	Novel	United States	2007.01	<div>detail</div>	<div>Default ▾</div> <div>reading ⌵</div> <div>Add</div>
Jane Eyre	Charlotte Brontë	Novel	England	1847.01	<div>detail</div>	<div>Default ▾</div> <div>reading ⌵</div> <div>Add</div>
Dombey and Son	Charles Dickens	Novel	England	1849.08	<div>detail</div>	<div>Default ▾</div> <div>reading ⌵</div> <div>Add</div>
The Old Curiosity Shop	Charles Dickens	Novel	England	1840.04	<div>detail</div>	<div>Default ▾</div> <div>reading ⌵</div> <div>Add</div>
The Cricket on the Hearth	Charles Dickens	Novel	England	1845.12	<div>detail</div>	<div>Default ▾</div> <div>reading ⌵</div> <div>Add</div>

Figure 26 Sample recommended results according to book's category, sorted by popularity.

3.6.3 According to the rating score

Furthermore, users are able to get recommendations according to the rating score if users selected the third choice. The recommended result will be maintained within 0.5 of the current book's rating score. For example, if the current book's average rating is 4, the recommended books' rating will be in range of 3.5 to 4.5 which is the closest rating region about the chosen book. Figure 27 shows the recommendations based on chosen book's rating, which contains all categories and authors. The results were sorted by popularity firstly, then by rating.

ReadRecommend

123

Sign out

Bookname/Username/Authorname

Q

Title	Author	Category	Publisher	Publish Date	Detail	Operation	
Recommendation based on rating							
Oliver twist	Charles Dickens	Novel	England	1838.1	<div>detail</div>	<div>Default</div>	<div>reading</div> <div>Add</div>
The Kite Runner	Khaled Hosseini	Novel	United States	2003.05	<div>detail</div>	<div>Default</div>	<div>reading</div> <div>Add</div>
Jane Eyre	Charlotte Brontë	Novel	England	1847.01	<div>detail</div>	<div>Default</div>	<div>reading</div> <div>Add</div>
Dombey and Son	Charles Dickens	Novel	England	1849.08	<div>detail</div>	<div>Default</div>	<div>reading</div> <div>Add</div>
The Old Curiosity Shop	Charles Dickens	Novel	England	1840.04	<div>detail</div>	<div>Default</div>	<div>reading</div> <div>Add</div>
The Cricket on the Hearth	Charles Dickens	Novel	England	1845.12	<div>detail</div>	<div>Default</div>	<div>reading</div> <div>Add</div>
Fantastic Beasts and Where to Find Them	J.K. Rowling	Fantasy	United Kingdom	2001.01	<div>detail</div>	<div>Default</div>	<div>reading</div> <div>Add</div>

Figure 27 Sample recommended results according to book's average rating, sorted by popularity.

3.6.4 According to the popularity

Lastly, users can also be provided recommendations based on book's popularity, an indicator showing how often books appear in other readers' collections. Its recommended result is similar with mode based on average rating. The range of popularity used in recommendation will be limited within 2 difference. Meanwhile, all authors' and categories' books in this range will be listed. The recommended books will be sorted by popularity from highest to lowest firstly, if there are books with same popularity, sort them by time added in database.

3.7 Monthly Goal Module

In order to remind users to read books regularly, registered users are able to set a goal at the user's personal page for the number of books they would like to read per month.

3.7.1 Set a reading goal

As Figure 28 presented, users can enter an number in the bar where a red arrow indicates and press the 'Enter' key, the number of books users want to read in this month will be set. The blue words below the set a goal bar are goal's status. The first line is the number of books that user is going to read this month, the second line is the number of books that user has read.

The screenshot shows a user's personal page with a header 'ReadRecommend' and a search bar. A red arrow points to the 'Set a goal' input field, which contains the number '0'. Below the input field, the status is displayed: 'This month you are going to read 0 books' and 'This month you have read 0 books'. To the right, there are 'Collections' for 'Default' and 'Likes', each with a 'delete' button. At the bottom, a 'Recently Add' table lists books added recently.

Added time	Title	Author	Category	Publisher	Publication date	Rating	Detail
2020-07-31 00:43:26	Ruyi Royal Love in the Palace	Liu Lianzi	Novel	China	2011.01	5.0	detail
2020-07-27 21:14:11	Oliver twist	Charles Dickens	Novel	England	1838.1	3.0	detail
2020-07-27 20:14:59	Pride and Prejudice	Jane Austen	Novel	United Kingdom	1813.01	5.0	detail
2020-07-27 18:47:11	Harry Potter 1	J.K. Rowling	Fantasy	United Kingdom	1997.01	5.0	detail
2020-07-27 18:47:06	Call Me by Your Name	André Aciman	Novel	United States	2007.01	5.0	detail
2020-07-27 18:46:53	Empresses in the Palace	Liu Lianzi	Novel	China	2007.01	4.0	detail

Figure 28 Sample of user's personal page.

3.7.2 Mark a start date

Users must set a reading period before adding it in any collection. The below figure shows that users can set the days for reading a book that users want to add it in a collection named 'Likes'. Left side is on the search page, the right side is on the book's detail page. The maximum days can be set as 60.

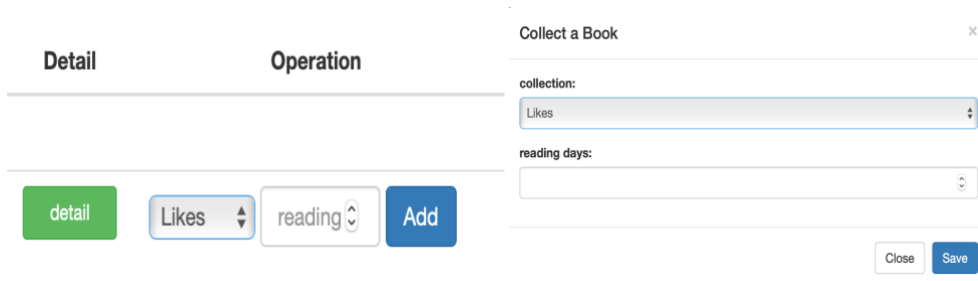


Figure 29 Set a reading days before book was added in any collection.

Furthermore, the start date for this added book is based on when this book is added to a collection. After user click the detail button on their own collection page In the detail page of an added book, the added date, the end reading date and read status will be listed on the right of book's cover as the below figure shown.

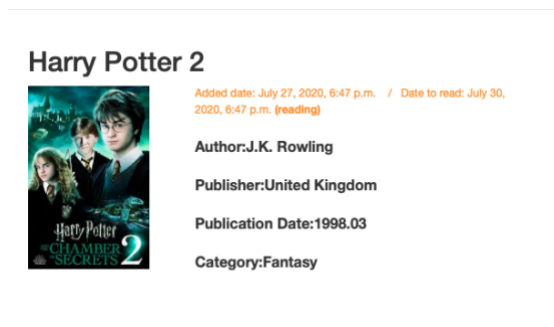


Figure 30 Sample of an added book with added time, reading due time and reading status.

3.7.3 Mark an end date

Users can mark a book that has been read if users rated this book. As long as the user rates it, the reading status will become finished immediately.




Figure 31 Sample of an added book with added time, reading due time and finished status.

3.7.5 Reading goal status

Users are able to check the reading goal history and current status by clicking the line “This month you are going to read X books” under the set a goal bar. If user has not finished the reading goal, there will show the status as “not completed”.

Bookname/Username

Q

Date	Settled goal	Books you read	Status
2020-07	6	6	completed
2020-06	4	0	not completed
2020-05	5	0	not completed

Figure 32 Sample of reading goal history and goal's in progress status

As Figure 32 shown, the month of goal set, reading goal, books have been read and the reading goal's status are listed respectively. If the user finished reading, the read goal status will become “completed”.

Users can also check the read history this month by clicking the second line under the set a goal bar, which likes “This month you have X read books”. The result returned shows as below:

ReadRecommend

123Sign out

Bookname/Username

Q

Books You've Read at This Month:

title	author	category	publisher	publication date	rating	popularity	detail
Empresses in the Palace	Liu Lianzi	Novel	China	2007.01	4.0	7	detail
Pride and Prejudice	Jane Austen	Novel	United Kingdom	1813.01	5.0	8	detail
Call Me by Your Name	André Aciman	Novel	United States	2007.01	5.0	5	detail
Harry Potter 1	J.K. Rowling	Fantasy	United Kingdom	1997.01	5.0	4	detail
Harry Potter 2	J.K. Rowling	Fantasy	United Kingdom	1998.03	4.0	6	detail
Jane Eyre	Charlotte Brontë	Novel	England	1847.01	3.0	5	detail

Figure 33 Sample of read book during current month.

4. Implementation Challenges

4.1 Data Preparation

In the early stage of project development, we decided to sort out all the needs of the entire project. We have designed the fundamental database model and draw some concept diagrams about how these needs should be implemented. But as the project progresses, we realized that almost every time we need to complete a project requirement, we have to change (add or delete some fields of the existing tables in our database) the structure of our database or redesign the structure of the tables in our database, which increase the burden of our project to a certain extent and slow down the progress of our project. So, after discussion, we classify all the project requirements to different types and for each type of requirements we designed the structure of fields and tables which is necessary to complete this kind of requirements. After dividing the whole project into some small parts, we can focus on a certain type of requirements and according to different specific requirements we can create some new tables which contain some foreign keys to those designed tables and some other required fields. Focusing on one type of requirements could help us to design and understand this part of structure of database better and according to the single specific requirement, we can create a specific table to satisfy it to avoid the conflicts among all requirements.

4.2 Search Result Page Maintenance

When implementing the adding books to users' collection function, we hope to return to the user's search result page or filter result page after adding books function. Firstly, we want to implement the Ajax method to send the adding books form request instead of changing the original page. However, when we implement ajax at search page, we found we cannot transfer the form request through ajax to the backend. After spending near a week to debug and do some research, we still cannot implement ajax function. But after adding function, if we re-search the user search content and filter the search result, our adding function code will contain lots of repetitive filter function code and search function code, which affects the readability and conciseness of our code. So, we choose to use a tricky method to deal with that problem. We notice that the query result of database will contain the primary key of this query set, so every time we operate the adding function, we transfer the string of the query set of user search result or filter result to the back-end and we can process the string to get the primary key of each book from the user search result or filter result and re-search each book with its primary key and return to the front-end. By using this method, we can shorten the number of lines of our code from 500 to 80, which increase the conciseness of our code.

4.3 Dynamic Ratings

When we need to implement dynamic rating function, we self-learned JavaScript. And after we did some research, we use *previousElementSibling* to implement the dynamic rating function by replacing the empty star pictures before the star picture we clicked with the shining star pictures. And we use a button to send the rating score back to the backend via ajax, but when we were implementing the function, we realize that we can't get the parameters transferred with ajax. After we spend a whole week to do research and attempts, we didn't solve the ajax problem. So, we changed our algorithm, we used static picture to show the user's rating score and JavaScript to get the rating score and send the form to the backend. The front-end pages will be rendered again after receiving the processed data from the backend.

4.4 Trigger Pop-up Window Element

When we started to implement the function, which is to add books to user's collections, we prefer to implement this function through a simple and beautiful interface. And finally, we decided to use pop-up window to achieve that. And we choose to use *data-target* to pop-up the modal window and use the modal window to send the form, which contains the information about how many days it will take for user to finish reading this book and which collection to add this book to. And we also set a button to close this modal window by using *data-dismiss*. And we use the same way to implement the adding review function instead of displaying too many input boxes and tables on the interface which makes the page look too cluttered. But at the search page, if user wants to add this book directly to their collection, we cannot use the pop-up modal window to send the form request. Because we cannot use the pop-up modal window to get which book user wants to add to their collection (the identification of the book user selected not just the name of book), so we have to use input boxes and buttons to send the form information to the back-end, which makes the page a little bit cluttered, but we cannot solve this problem until now.

5. User Document

5.1 Tools Setup

5.1.1 Python 3

The whole project backend is based on Python 3. Use the instruction on the Python 3 official website to download and install python to your device.



Figure 34 The official website of Python3 we used.

5.1.2 Django

When coding the web project, we chose Django as our web frame in the development. Use the instruction in the Django official Document to install and configure Django in your device.

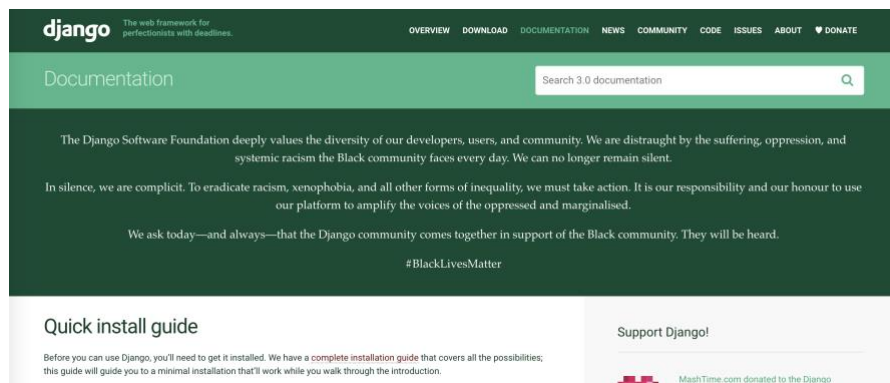


Figure 35 The official website of Django we used in web frame building.

5.1.3 MySQL

MySQL is chosen to be the database supporter of ReadRecommend. Install and configure MySQL with the help of their official page.



Figure 36 The official webpage of MySQL database.

5.1.4 PyCharm

PyCharm is an integrated development environment (IDE) used in computer programming, specifically for the Python language. It will help you develop your project and manage your database with higher efficiency. Install and purchase it from the official website.



Figure 37 The official website of PyCharm, a python-base IDE.

5.2 Project Configuration

5.2.1 Database Configuration

1. For the first time configuration, in `$Project_dir/COMP9900/Settings.py` modify the lines to your own MySQL configuration.

```
DATABASES = {  
    'default': {  
        'ENGINE': 'django.db.backends.mysql',  
        'NAME': 'Your database name',  
        'USER': 'Database username',  
        'PASSWORD': ' Password ',  
        'HOST': 'localhost',  
        'PORT': '3306'  
    }  
}
```

Figure 38 Codes need to be modified in settings.py

2. After modifying the code make sure you create the database in MySQL. Run the following lines to migrate the database.

```
1  """  
2  backend model  
3  Steps to migrate:  
4  1.makemigrations COMP9900_LIM  
5  2.sqlmigrate COMP9900_LIM 0001  
6  3.migrate  
7  """
```

Figure 39 Steps to migrate the database configuration

3. Start Server (Server is provided by Django): Change into the outer “LIM_9900” directory, if you haven’t already, and run the following commands:

```
$ python manage.py runserver
```

You will see the following output on the command line:

```
Performing system checks...  
  
System check identified no issues (0 silenced).  
  
You have unapplied migrations; your app may not work properly until they are applied.  
Run 'python manage.py migrate' to apply them.  
  
July 23, 2020 - 15:50:53  
Django version 3.0, using settings 'mysite.settings'  
Starting development server at http://127.0.0.1:8000/ ← url of the main page  
Quit the server with CONTROL-C.
```

Figure 40 Results when running the server successfully.

Open the <http://127.0.0.1:7000/index/> in the web browser, you can view the login page.

5.2.2 Visitor Manual

As a visitor you can only use the search. This bar support fuzzy search. The search results are in two parts, search the keyword by the book title and by the author name.

ReadRecommend

Bookname/Username/Authorname

Q

once signed out

login

Author name:

Category:

Rating score:

Filter

Title	Author	Category	Publisher	Publish Date	Detail	Operation
Book						
Ruyi Royal Love in the Palace	Liu Lianzi	Novel	China	2011.01	detail	
Pride and Prejudice	Jane Austen	Novel	United Kingdom	1813.01	detail	
Empresses in the Palace	Liu Lianzi	Novel	China	2007.01	detail	
Harry Potter 2	J.K. Rowling	Fantasy	United Kingdom	1998.03	detail	
Oliver twist	Charles Dickens	Novel	England	1838.1	detail	
Jane Eyre	Charlotte Brontë	Novel	England	1847.01	detail	
The Kite Runner	Khaled Hosseini	Novel	United States	2003.05	detail	
Dombey and Son	Charles Dickens	Novel	England	1849.08	detail	
Call Me by Your Name	André Aciman	Novel	United States	2007.01	detail	
Harry Potter 1	J.K. Rowling	Fantasy	United Kingdom	1997.01	detail	

Figure 41 One example search result as a visitor.

If you want to register in ReadRecommend, click the login page and choose ‘Register now’. You can register as a user in the register page.

Welcome to Regist Page

Username

Password

Password confirm

Login Now!

Submit

Figure 42 Register Page

5.2.3 User Manual

- Login Page

Input the correct username and password. Clicking ‘Register now’, you can register as a new user.

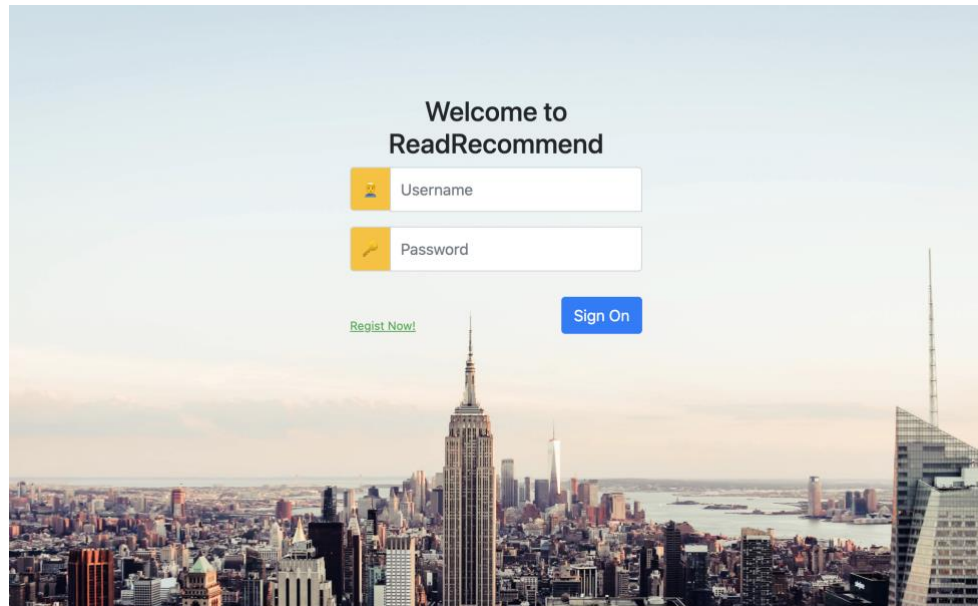


Figure 43 Login Page

- Search

With the search bar, you can search books or users. This bar support fuzzy search. The search results are in two parts, search the keyword by the book title and by the author name.



Figure 44 Search Bar

In the list of search result, several operations are provided to implement the ‘Book detail’, ‘User collection’ and the ‘Reading goal’ module. Collection named ‘Default’ will be created along with the user account.

Title	Author	Category	Publisher	Publish Date	Detail	Operation
Recommend	brief detail of the book		collections user want the book to be added in		days to read	
Pride and Prejudice	Jane Austen	Novel	United Kingdom	1813.01	detail	<div><div><input checked="" type="checkbox"/> Default</div><div>Safe and Sound test</div></div> <div>5</div> <div>days</div> <div>Add</div>
Oliver twist	Charles Dickens	Novel	England	1838.1	detail	<div>Default</div> <div>days</div> <div>Add</div>
The Kite Runner	Khaled Hosseini	Novel	United States	2003.05	detail	<div>Default</div> <div>days</div> <div>Add</div>
Dombey and Son	Charles Dickens	Novel	England	1849.08	detail	<div>Default</div> <div>days</div> <div>Add</div>

Figure 45 Operations for search result.

You can also create your own collection name apart of the one named ‘Default’ created along with your user account. Make sure the length your collection name is not too long (15 characters limit).

Figure 46 Collection creation bar

Books in Safe: Collection name							
title	author	category	publisher	publication date	rating	popularity	operation
Pride and Prejudice	Jane Austen	Novel	United Kingdom	1813.01	3.5	6	detail remove
Harry Potter 2	J.K. Rowling	Fantasy	United Kingdom	1998.03	2.5	5	detail remove
The Kite Runner	Khaled Hosseini	Novel	United States	2003.05	3.0	5	detail remove

- Book Detail

Clicking the green button 'Detail' in any page of the website will lead you to the detail of the given book. In the detail page, you can add reviews for the certain book and rating it with stars in the right side of page. 'Add to collection' button is also available here for you to add the book into your default collection. The left corner you can choose a recommend mode and click submit. Then the system will give you recommendation in our database according to the chosen book.

Figure 48 Book detail page

5.2.4 Admin Manual

Change into the outer “LIM_9900” directory, if you haven’t already, and run the following commands:

```
$ python manage.py runserver
```

Figure 49 Command to run server

You’ll see the following output on the command line:

```
Performing system checks...

System check identified no issues (0 silenced).

You have unapplied migrations; your app may not work properly until they are applied.
Run 'python manage.py migrate' to apply them.

July 23, 2020 - 15:50:53
Django version 3.0, using settings 'mysite.settings'
Starting development server at http://127.0.0.1:8000/
Quit the server with CONTROL-C.
```

← url of the main page

Figure 50 Result when running the server successfully

Open the <http://127.0.0.1:8000/admin/> in the web browser, you can view the admin login page.

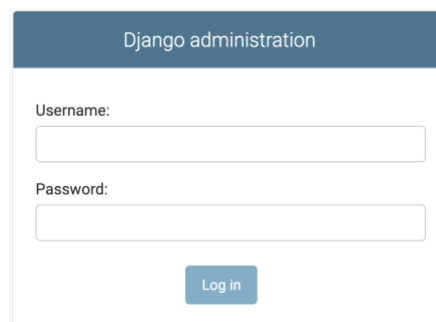
The image shows the Django administration login page. It has a dark blue header with the text "Django administration". Below the header, there are two input fields: "Username:" and "Password:". Below these fields is a blue button labeled "Log in".

Figure 51 Admin login page of Django

After logging in successfully, the Django administration table will be here for you to manage the database.

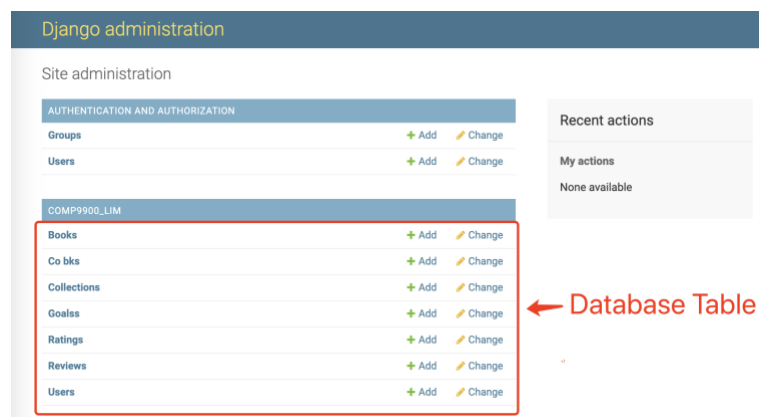
The image shows the Django administration site interface after a successful login. The header is dark blue with "Django administration" in yellow. Below the header, there's a "Site administration" section. Under "AUTHENTICATION AND AUTHORIZATION", there are links for "Groups" and "Users", each with "Add" and "Change" options. Below that, there's a section for "COMP9900_LIM" which contains a list of database tables: "Books", "Co bks", "Collections", "Goals", "Ratings", "Reviews", and "Users". Each table has "Add" and "Change" links. A red box highlights this list of tables, and a red arrow points to it with the text "Database Table". On the right side, there's a "Recent actions" section with "My actions" and "None available".

Figure 52 Admin page of Django

With the add/change buttons, you can edit the records in tables. You should obey the constraints among the attributes, otherwise errors will be thrown out.

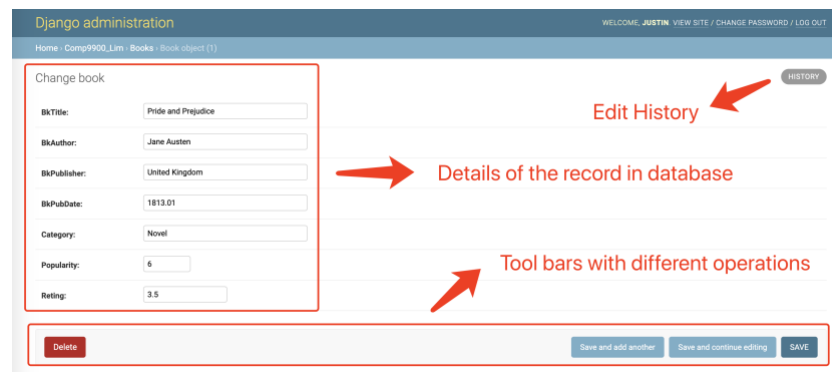


Figure 53 One of admin operation page of Django

Adding books in the ReadRecommend system is done by administrators. When adding a book cover, the cover file should be put in the directory “\$project_name/COMP9900_LIM/static/imgs” and it should be a JPG picture. As is shown below, the filename should be exactly the same as the record content in the attribute Book.BookTitle.

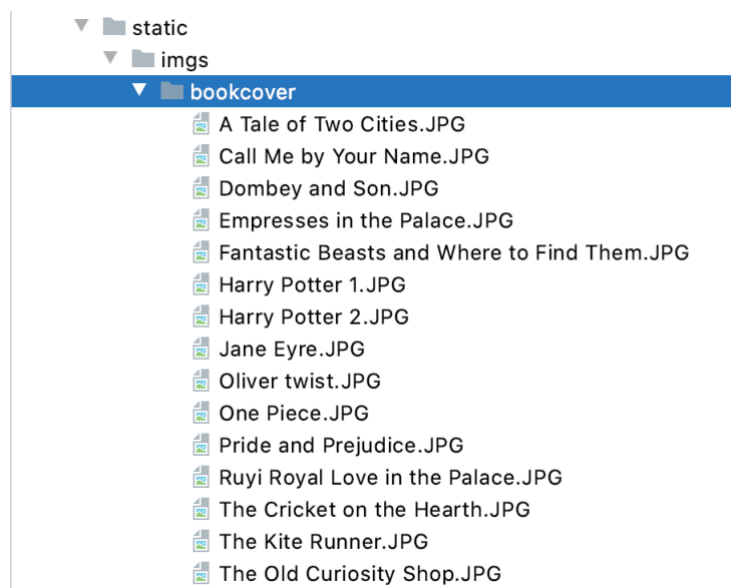


Figure 54 Directory for the book covers.

6. Reference

- [1] PyCharm, Database tools and SQL. [online] Available at: <https://www.jetbrains.com/help/pycharm/2019.2/relational-databases.html> [Accessed 29 July 2020]
- [2] Django Document, everything you need to know about Django. [online] Available at: <https://docs.djangoproject.com/en/3.0/> [Accessed 29 July 2020]
- [3] Mark Otto, a. (2019). CSS · Bootstrap. [online] [Getbootstrap.com](https://getbootstrap.com). Available at: <https://getbootstrap.com/docs/3.3/css/> [Accessed 29 July 2020]
- [4] Duckett, J., 2014. JavaScript and JQuery: interactive front-end web development. Wiley Publishing. [Accessed 29 July 2020]
- [5] Goodreads, The world's largest site for readers and book recommendations. [online]. Available: <https://www.goodreads.com> [Accessed 29 July 2020]
- [6] Python 3.0 [online]. Available: <https://www.python.org/download/releases/3.0/> [Accessed 29 July 2020]
- [7] MySQL, The world's most popular open source database. [online]. Available: <https://www.mysql.com/downloads/> [Accessed 29 July 2020]