CS487 – SOFTWARE ENGINEERING

PROJECT REPORT

My Book Tracker

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ABSTRACT

My book tracker is a project which aims is developing a computerized system to maintain all the daily work of library. This project has many features which are generally available in library management systems like facility of user login. It also has a facility of admin login through which the admin can monitor the entire system. It also has a facility that students can see list of issued books and its issue date and return date in their accounts. The Admin after logging into his account, He/she can add new books, delete books and add or delete a user etc. Overall this project is being developed to help the students as well as staff of library to maintain the library in the best possible way and reduce the human efforts.

1. INTRODUCTION

This project main aim is to develop a web-based application with book repository for a high school. The name of our application is “My Book Tracker”. This application has a book repository through which students and staff of the high school can check-in and check-out books. The Admin has overall control and supervision over the book repository. He is responsible for add/update/delete of books from the repository. He is also responsible for add/delete of users from the database. The books in the repository will be identified using a unique ID.

This high school book application is to maintain a small repository of school books. This will cover the tracking of books for a student/instructor. Also, it will track the courses in which the student is enrolled. It should also monitor the number of books remaining in the repository. The system must keep itself updated with the information. All the information need to be updated in the database. All the users will be granted access based on their roles. We will have three roles for the users: Admin, Instructor and Student. All the users will be able to enter using their user IDs and passwords.

1.1 PROJECT AIMS AND OBJECTIVES

The project aims and objectives that will be achieved after completion of this project are discussed here. The aims and objectives are as follows:

- Online book issue
- New Book addition by Admin
- Delete Book by Admin
- Creation and removal of Users
- Student login page where student can find books issued by him/her and date of return.
- A search column to search availability of books
- An Admin/Student/Instructor login page
- An authorization asked from instructor when a student clicks on issue a book

1.2 SCOPE OF THE PROJECT

The fields where this application can be used are:

- Educational institutes can use this application to display the list of books contained in their library.
- It can be used in offices with relevant modifications to be done in the code.

2. TECHNOLOGIES USED

Front End	Java scripts, HTML
Back End	Java, Servlets
Web Server	Tomcat Server
Java Container	Apache
Database	My SQL

Apache Tomcat Server: It is used for the implementation of java servlets and java server page (JSP) specifications in our code. It executes the java servlets and renders web pages include JSP coding.

My SQL: We are using this database for our application. It is a database management system (DBMS) and it manages database and connects them with our software.

The whole Project is divided in two parts the front end and the back end. 2.3.1 Front end- The front end is designed using of html, PHP, CSS, Java script

- ***HTML***- HTML or Hyper Text Markup Language is the main markup language for creating web pages and other information that can be displayed in a web browser.HTML is written in the form of HTML elements consisting of tags enclosed in angle brackets (like <html>), within the web page content. HTML tags most commonly come in pairs like <h1> and </h1>, although some tags represent empty elements and so are unpaired, for example <img>. The first tag in a pair is the start tag, and the second tag is the end tag (they are also called opening tags and closing tags). In between these tags web designers can add text, further tags, comments and other types of text-based content. The purpose of a web browser is to read HTML documents and compose them into visible or audible web pages. The browser does not display the HTML tags, but uses the tags to interpret the content of the page.HTML elements form the

building blocks of all websites. HTML allows images and objects to be embedded and can be used to create interactive forms. It provides a means to create structured documents by denoting structural semantics for text such as headings, paragraphs, lists, links, quotes and other items. It can embed scripts written in languages such as JavaScript which affect the behaviour of HTML web pages.

- ***CSS***- Cascading Style Sheets (CSS) is a style sheet language used for describing the look and formatting of a document written in a markup language. While most often used to style web pages and interfaces written in HTML and XHTML, the language can be applied to any kind of XML document, including plain XML, SVG and XUL. CSS is a cornerstone specification of the web and almost all web pages use CSS style sheets to describe their presentation.CSS is designed primarily to enable the separation of document content from document presentation, including elements such as the layout, colours, and fonts. This separation can improve content accessibility, provide more flexibility and control in the specification of presentation characteristics, enable multiple pages to share formatting, and reduce complexity and repetition in the structural content (such as by allowing for table less web design).CSS can also allow the same markup page to be presented in different styles for different rendering methods, such as on-screen, in print, by voice (when read out by a speech-based browser or screen reader) and on Braille-based, tactile devices. It can also be used to allow the web page to display differently depending on the screen size or device on which it is being viewed. While the author of a document typically links that document to a CSS file, readers can use a distinctive style sheet, perhaps one on their own computer, to override the one the author has specified. However, if the author or the reader did not link the document to a specific style sheet the default style of the browser will be applied.CSS specifies a priority scheme to determine which style rules apply if more than one rule matches against a particular element. In this so-called cascade, priorities or weights are calculated and assigned to rules, so that the results are predictable.

- ***JAVA SCRIPT***- JavaScript (JS) is a dynamic computer programming language. It is most commonly used as part of web browsers, whose implementations allow client-side scripts to interact with the user, control the browser, communicate asynchronously, and alter the document content that is displayed. It is also being used in server-side programming,

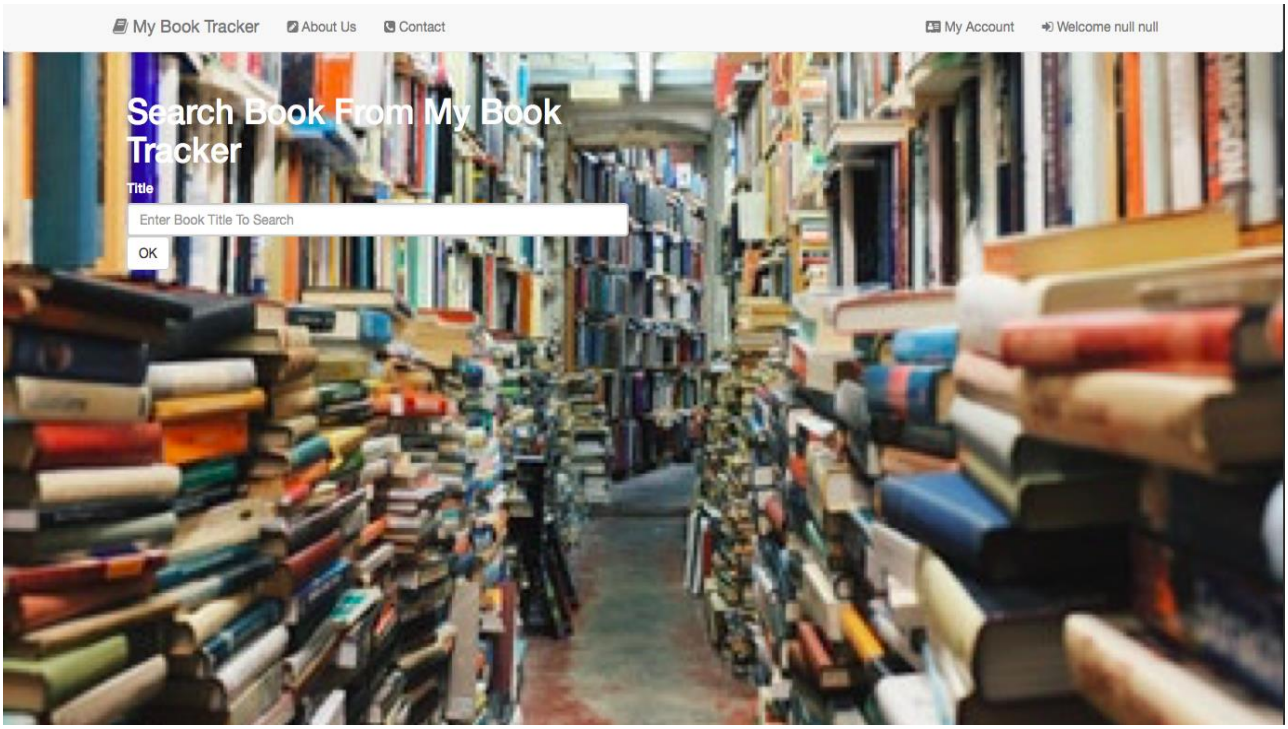
game development and the creation of desktop and mobile applications. JavaScript is a prototype-based scripting language with dynamic typing and has first class functions. Its syntax was influenced by C. JavaScript copies many names and naming conventions from Java, but the two languages are otherwise unrelated and have very different semantics. The key design principles within JavaScript are taken from the Self and Scheme programming languages. It is a multiparadigm language, supporting object-oriented, imperative, and functional programming styles. The application of JavaScript to use outside of web pages—for example, in PDF documents, site-specific browsers, and desktop widgets—is also significant. Newer and faster JavaScript VMs and platforms built upon them (notably Node.js) have also increased the popularity of JavaScript for server-side web applications. On the client side, JavaScript was traditionally implemented as an interpreted language but just-in-time compilation is now performed by recent (post-2012) browsers.

- ***MYSQL***- The back end is designed using mysql which is used to design the databases. MYSQL("My S-Q-L", officially, but also called "My Sequel") is (as of July 2013) the world's second most widely used open-source relational database management system (RDBMS). It is named after co-founder Michael Widenius daughter, My. The SQL phrase stands for Structured Query Language. The MySQL development project has made its source code available under the terms of the GNU General Public License, as well as under a variety of proprietary agreements. MySQL was owned and sponsored by a single for profit firm, the Swedish company MySQL AB, now owned by Oracle Corporation .MySQL is a popular choice of database for use in web applications, and is a central component of the widely used LAMP open source web application software stack (and other 'AMP' stacks). LAMP is an acronym for "Linux, Apache, MySQL, Perl/PHP/Python." Free-software-open source projects that require a full-featured database management system often use MySQL. For commercial use, several paid editions are available, and offer additional functionality. Applications which use MySQL databases include: TYPO3, MODx, Joomla, WordPress, phpBB, MyBB, Drupal and other software. MySQL is also used in many high-profile, large-scale websites, including Wikipedia, Google (though not for searches), Facebook, Twitter, Flickr, and YouTube.

3. SEARCH FUNCTIONALITY (AMAZON API GATEWAY)

Amazon API Gateway is a service which provides an easy way to developers create APIs. It is a front end applications for developers to access data from back end services.

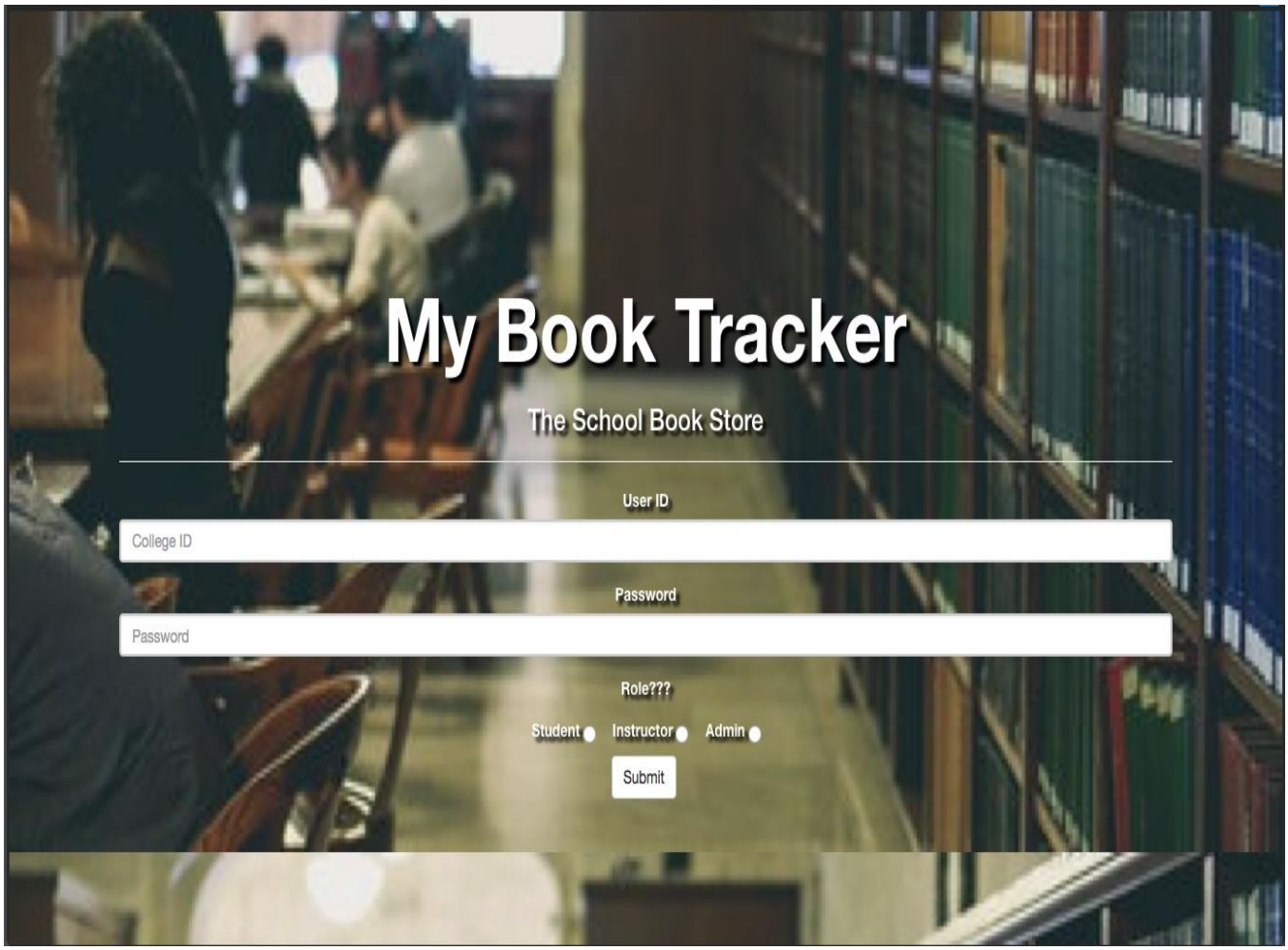
To retrieve the data we need to have Amazon associates account the data from Amazon using the Amazon Product Advertisement API where in the result is saved in the format of JSON file and using java we retrieve the information needed to us and loads the book details into the Database this role in our My book Tracker is performed by the Instructor.



This text inputs accepts any author or title or genre of the books available on amazon the code related to fetching of books and loading to database is present in the adminAddBook.java

4. USER FUNCTIONALITIES

We have three roles for a user in our application: Admin, Student, and Instructor. The functionalities of each user have been described deeply in the following section.



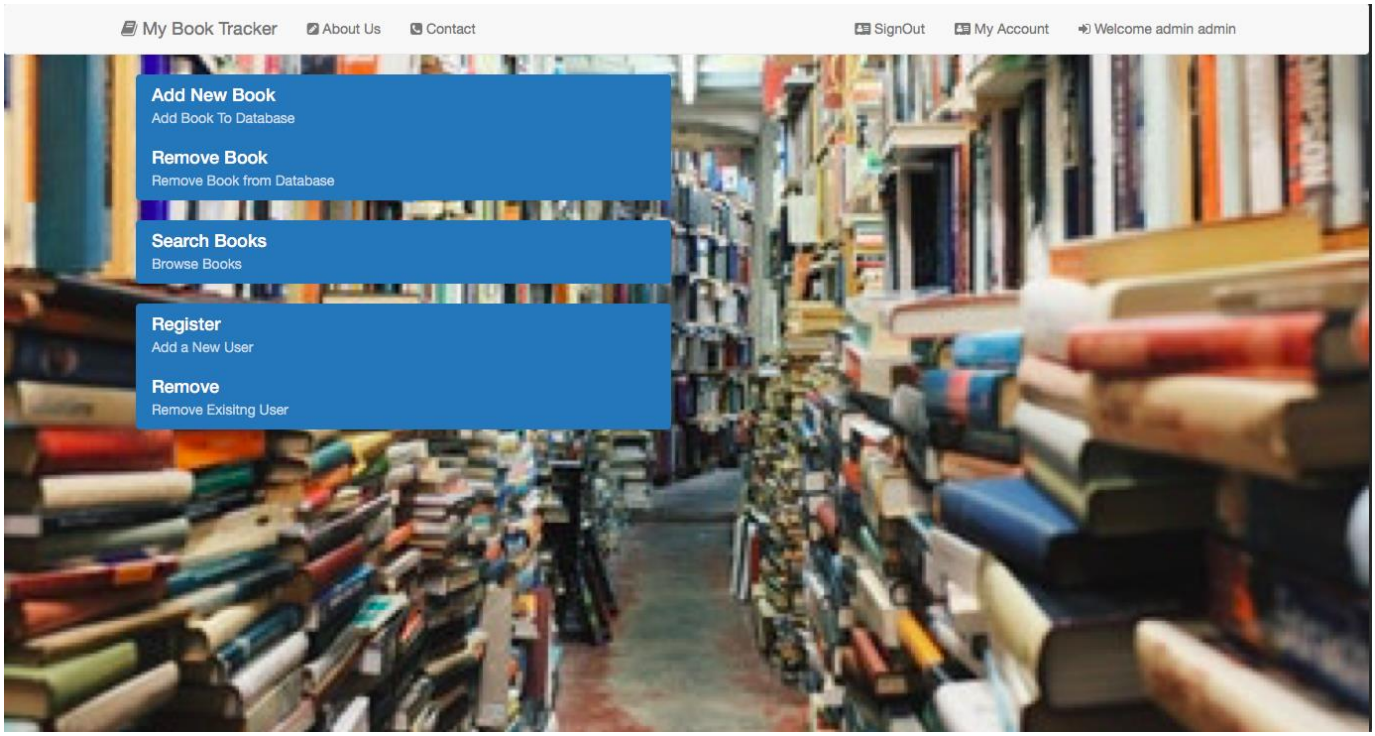
The above picture shows the Login page for a user. The user needs to enter his/her UserID and password to login. In addition to this, he/she needs to select the role. The role can be either of the three: Student, Instructor or Admin. The role can be selected and then the user can login to the application.

3.1 FUNCTIONALITY OF ADMIN

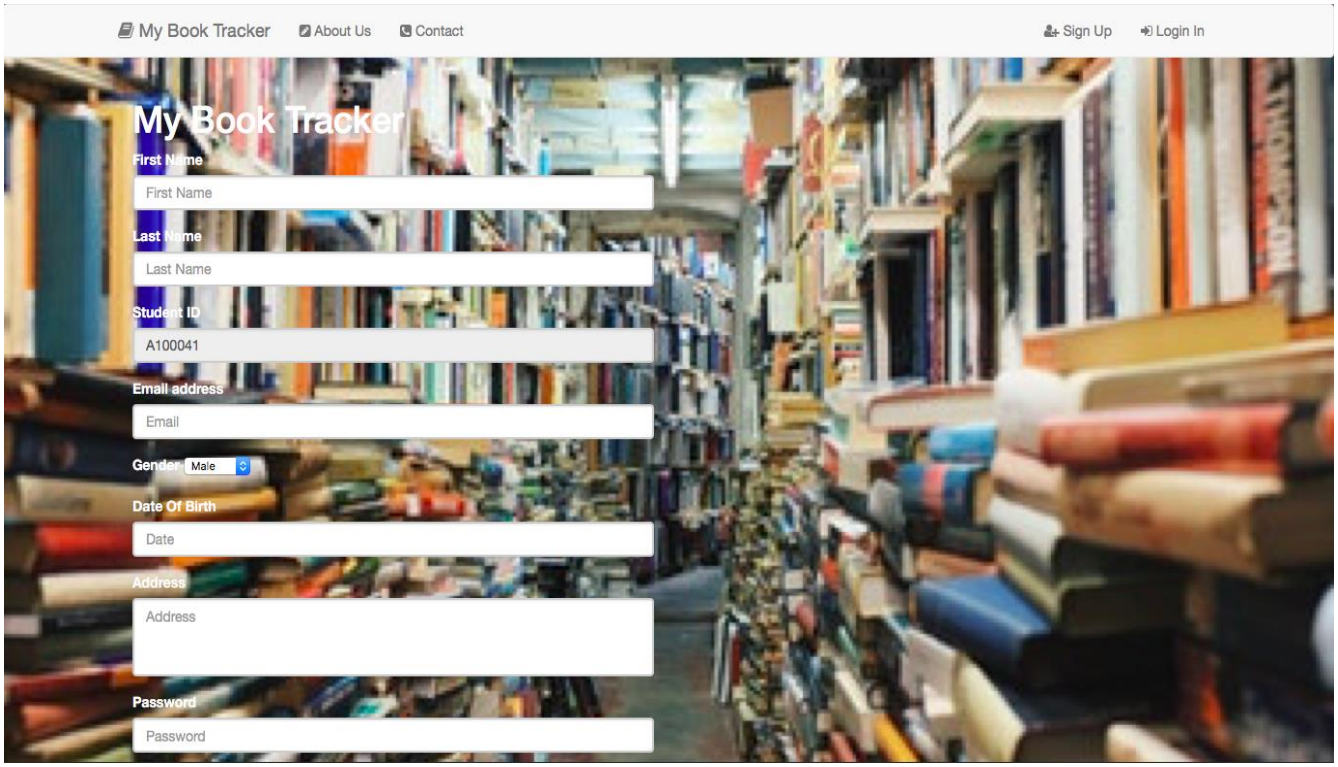
The Admin does the following functions.

- Add book(s) to the database
- Remove book(s) from the database
- Search/browse books from the database
- Register a new user to the database
- Remove an existing user from the database

Below is the home page for an Admin once he enters his/her credentials.

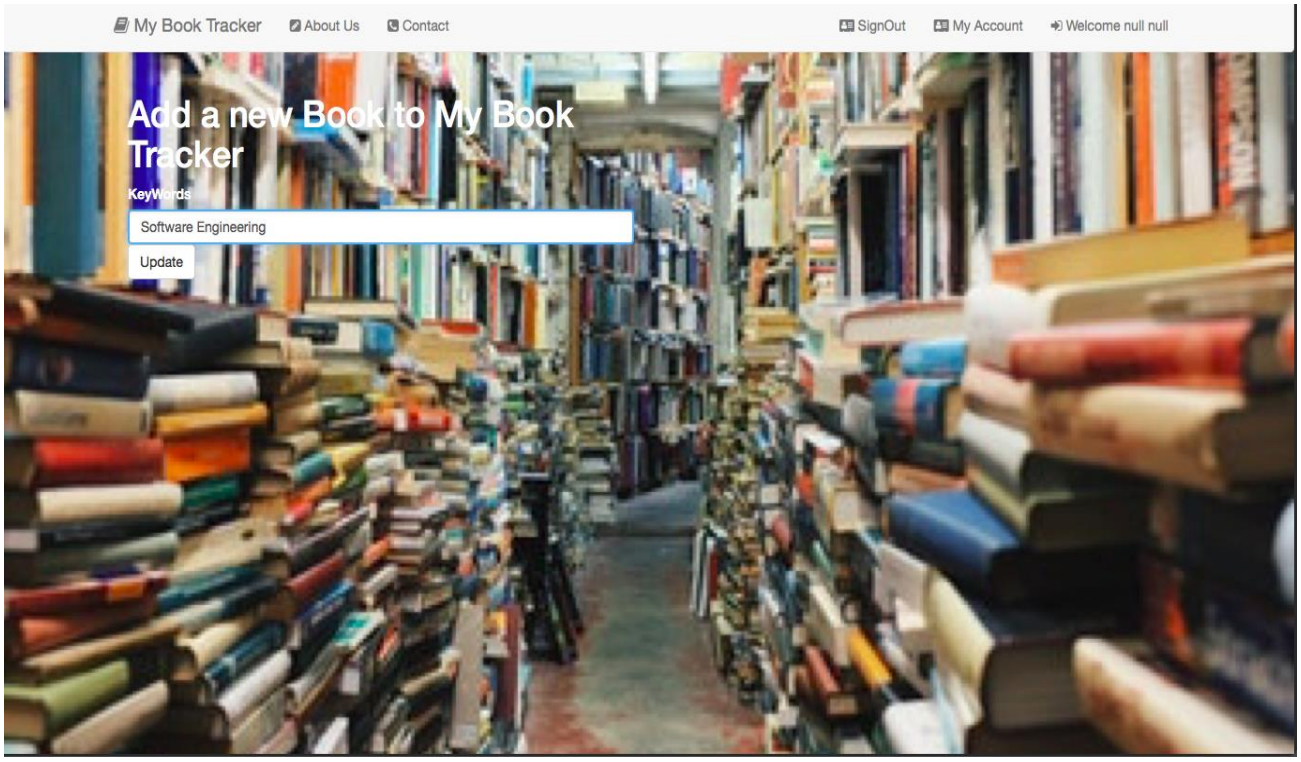


The above picture displays how the home page of the Admin looks. The tabs provided in the Admin home page perform all the functionalities of an Admin as listed above. The Student and the instructor can get their accounts users with the help of Admin. Admin can add or delete the user accounts.

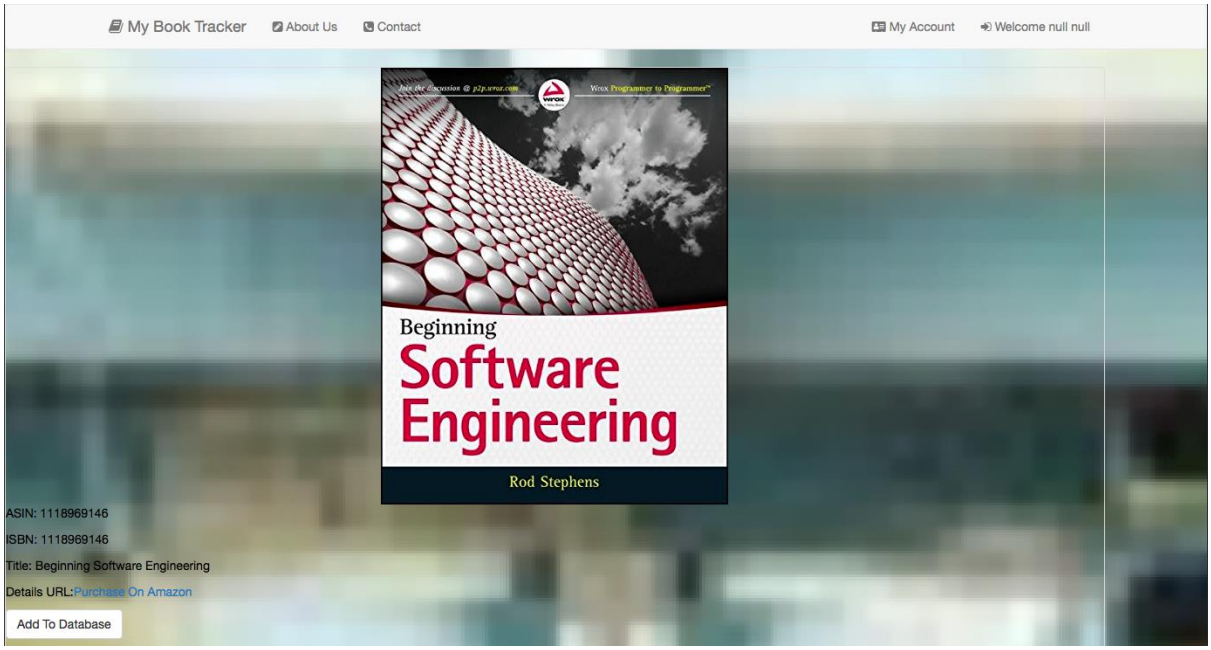


The above picture depicts the Admin page once he clicks on ‘Add User’ tab. The Admin must enter the user details as listed above in different tabs. This user account can be for either a Student or an Instructor. The default password for the user will be generated by the Admin. The user can change his/her password later.

The above picture is the page when Admin tries to remove an existing user from the database. The Admin can then enter the userID of the user to be removed and click on Go tab.



The above page shows the page when the Admin needs to add a book called ‘Software Engineering’ to the database. The search functionality uses Amazon API technique. The Admin can search for the book to be added using this technique and then click on ‘update’ tab to add that book to the database.



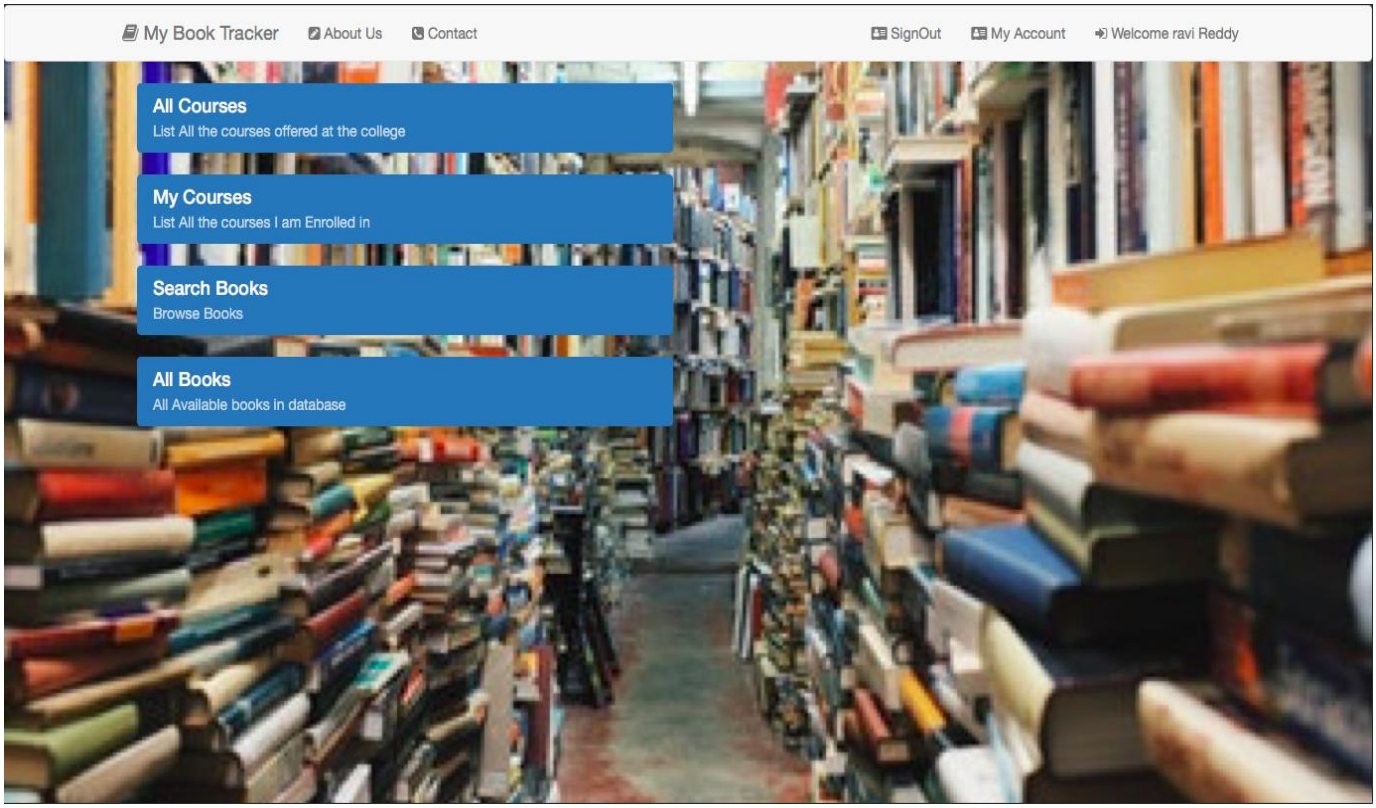
The above picture shows the result when the Admin enters 'Software Engineering' in the 'Keywords' tab while searching for a book with this keyword through Amazon API. The result is as shown in the picture. The Admin can then click on 'Add to Database' tab if he/she wishes to add this book to the database.

The above picture shows the page when the Admin clicks on 'Remove Book' tab. The Admin can click on the book to be deleted and the press 'Remove from Database' as shown in the above picture.

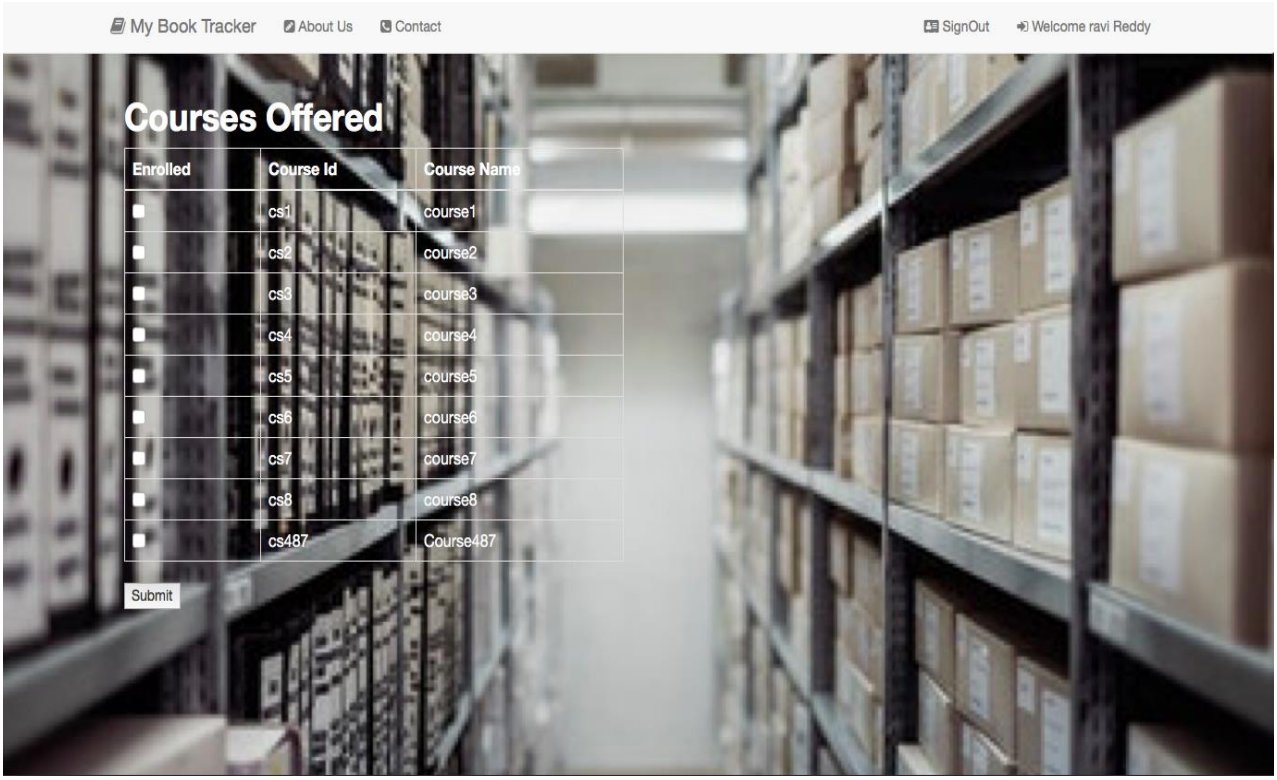
3.2 FUNCTIONALITY OF STUDENT

The Student does the following functions.

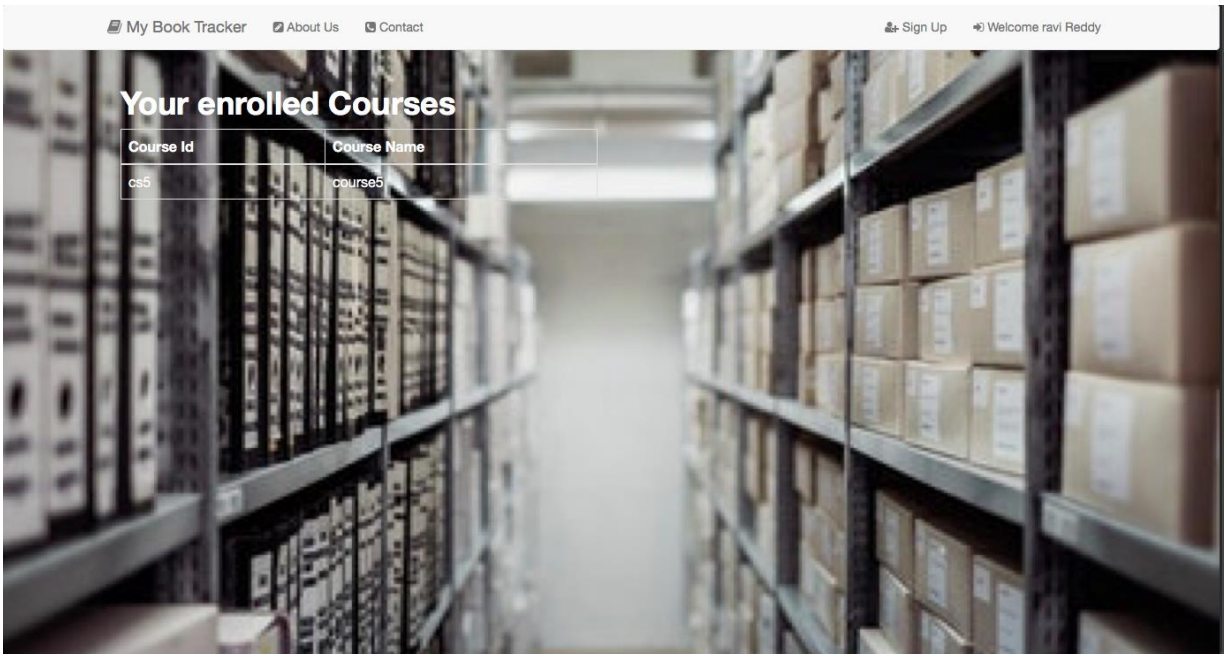
- Look at all the courses offered at the college
- List all the courses in which the student is enrolled
- Search for a book in the database
- See all the books available in the database



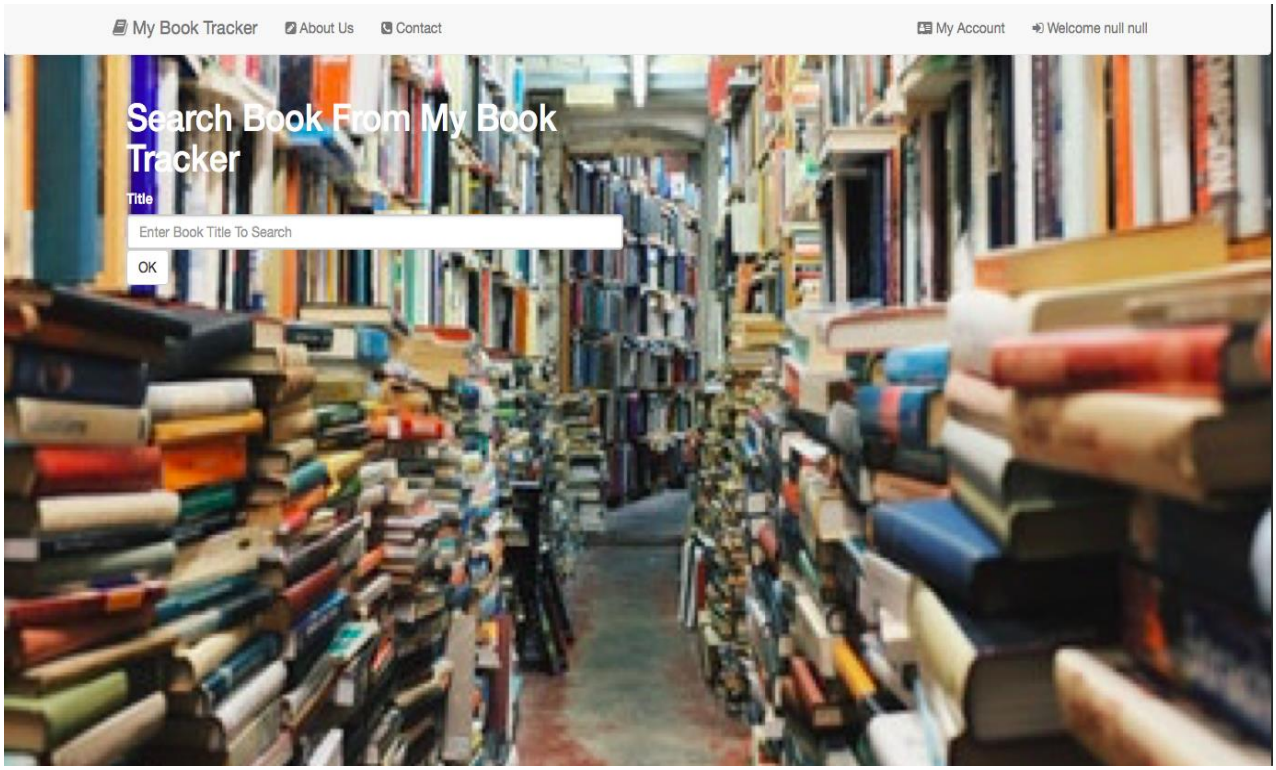
The above picture shows the Student home page. The student can see all the courses being offered at the college, see the list of all the courses he is enrolled in, search or browse for books in the database, see the list of all the available books in the database.



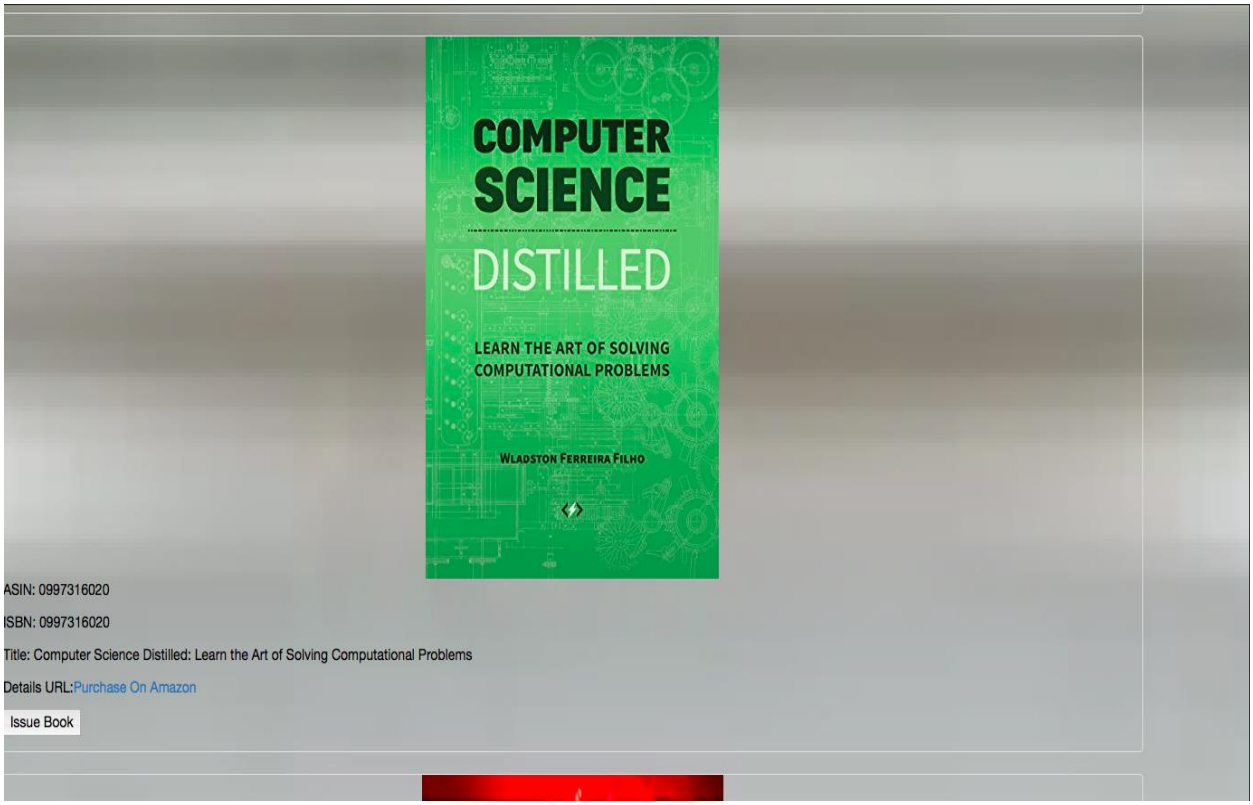
The above picture shows the student page when he/she clicks on 'All Courses' tab. The student can then see all the courses being offered at the college. When the student ticks the check box against a specific course and then clicks on submit, a request will go to the instructor to grant permission to the student to enrol to that course.



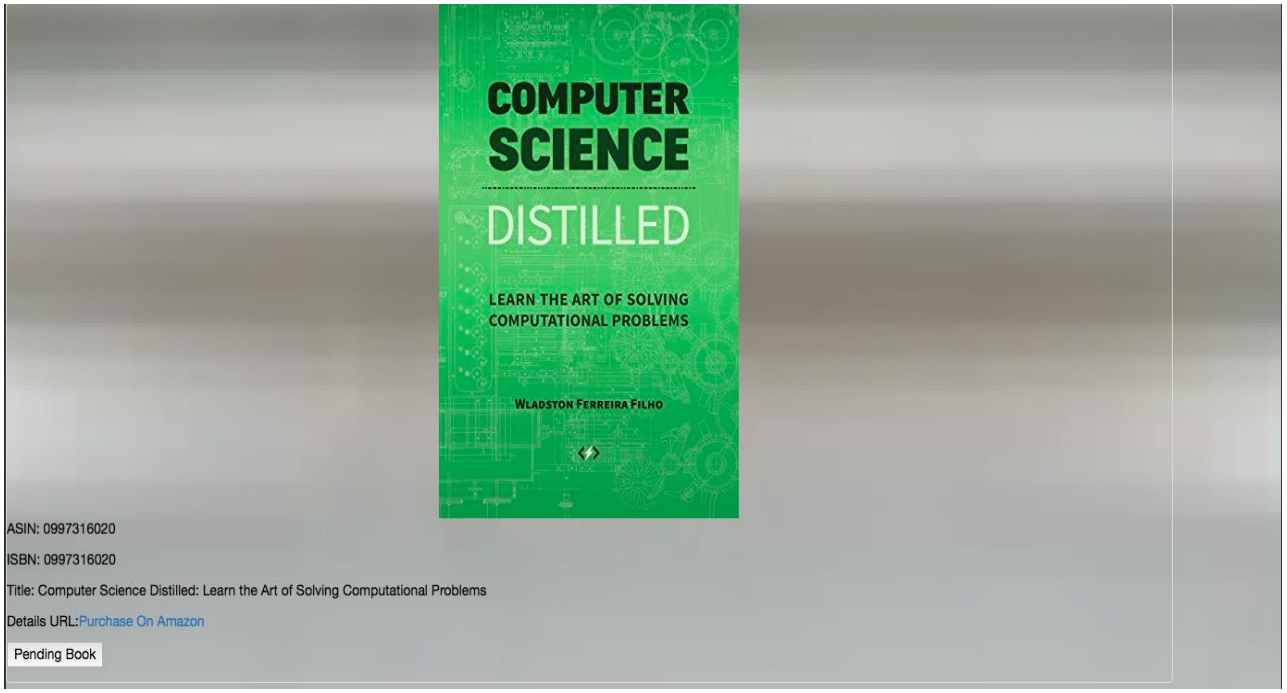
The above picture shows the student page once he/she clicks on ‘My Courses’ tab. The courses in which student is enrolled will be listed here.



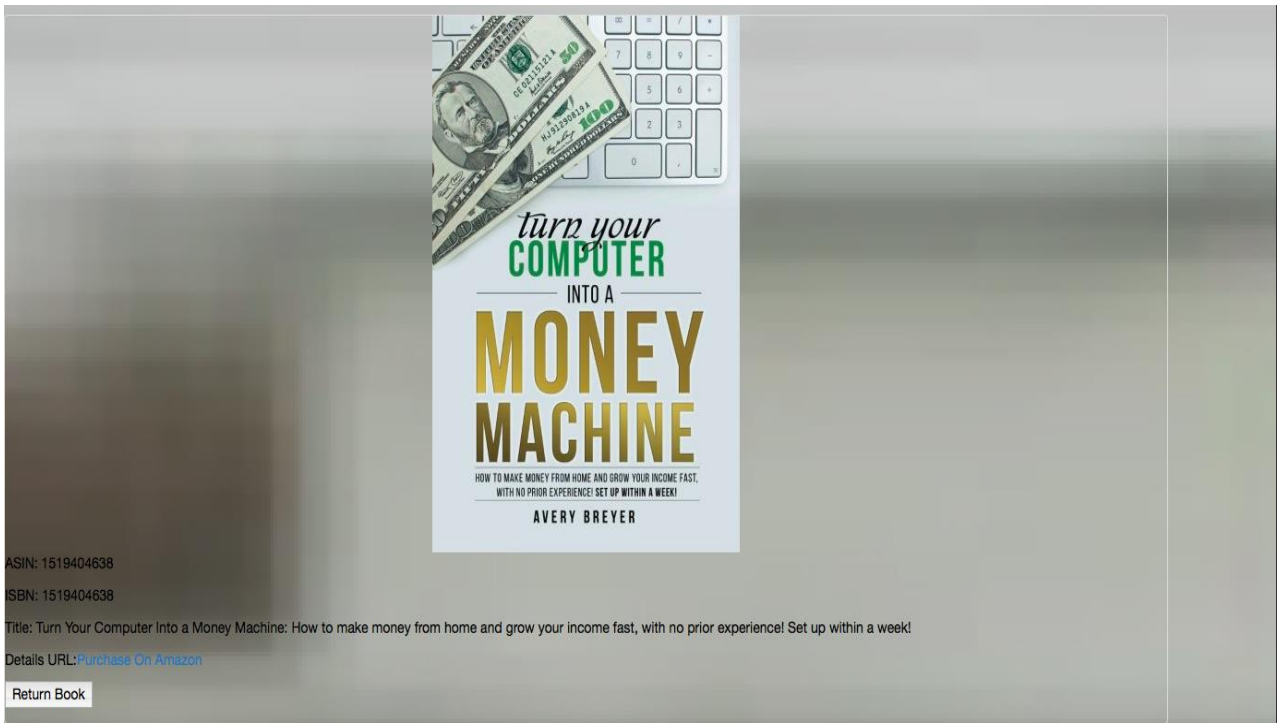
The above picture shows the page for a student when he/she clicks on ‘Search books’ tab. It enables a student to search for a particular book he wants to issue from the library by entering its boom title. This search functionality uses Amazon API technology.



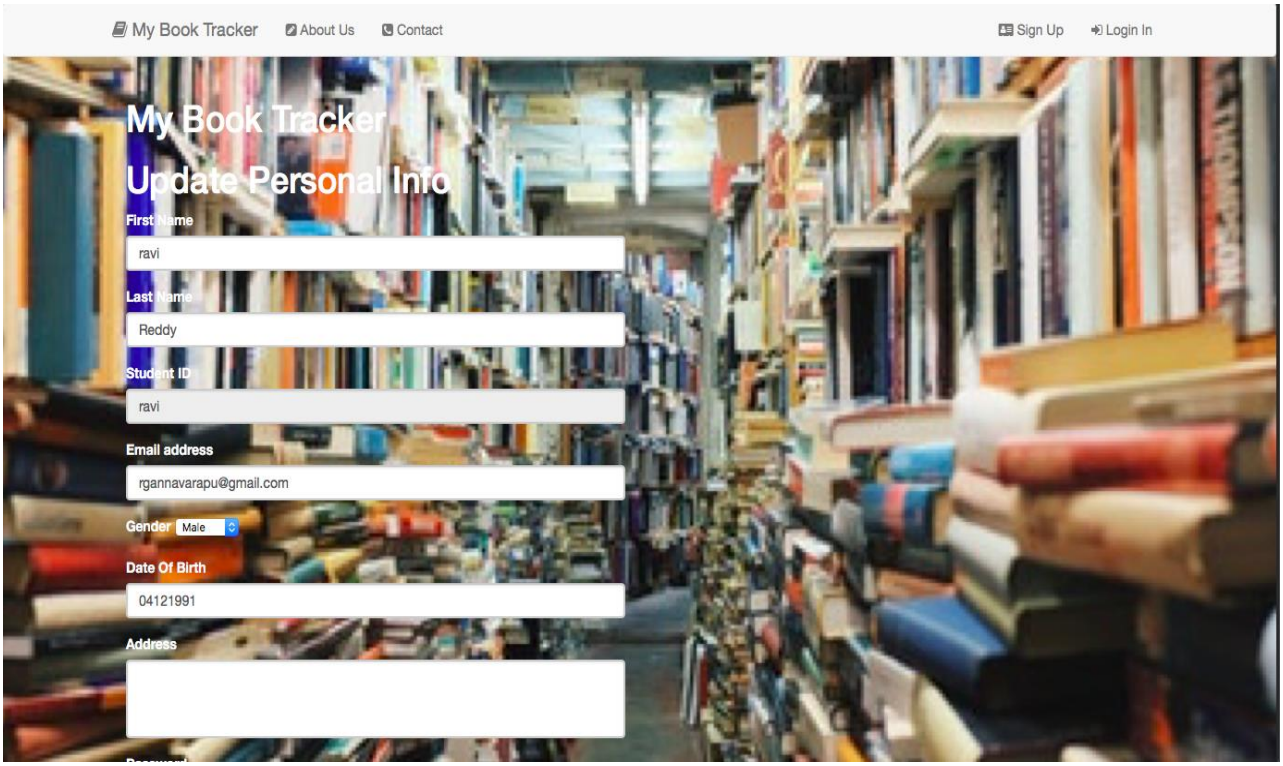
The above picture displays the student page once he/she has searched for the book 'Computer Science Distilled' in the database. If the students wants to issue the book then he/she needs to click on 'Issue Book' tab from where it will redirect to another page as illustrated below.



The above page shows the page for a student when he/she clicks on 'issue a book' tab for a particular book. The request is then automatically sent to the instructor to grant access to the student to issue the book. Until the instructor has not given the permit to the student, the student can see 'Pending Book' tab displayed for that particular book.



The above picture shows a student page when he/she has got the permit from the instructor to issue the book. This page then displays 'Return Book' tab to the student for the book which has been issued. The student needs to click on this tab to return that book.

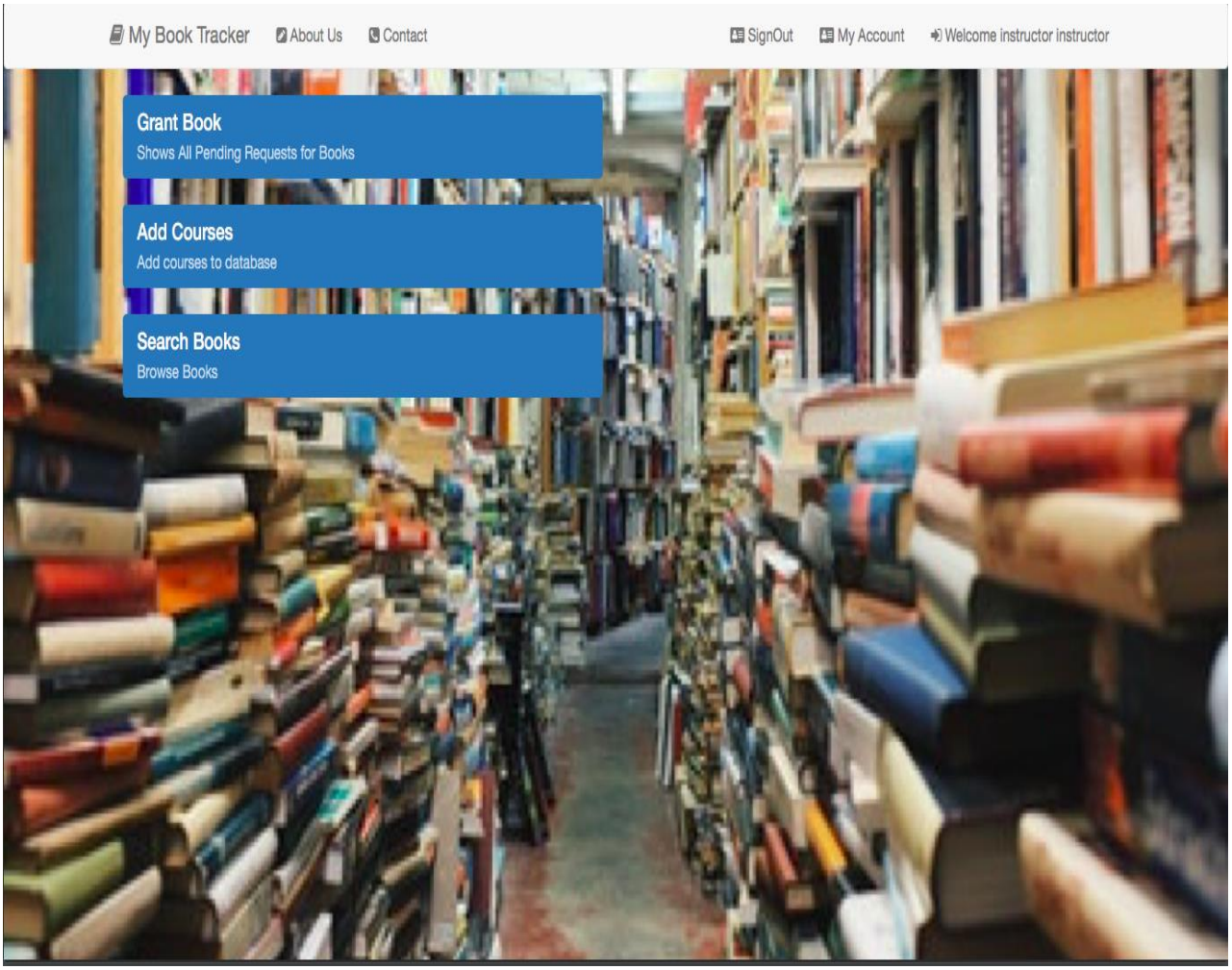


The above picture displays the update personal information page for the student. The student needs to enter all the required information to be updated and then click on submit to reflect those changes to the database of the user.

3.2 FUNCTIONALITY OF INSTRUCTOR

An instructor has the below functionalities.

- Grant a book to a student
- Add courses to the database
- Search for a book in the database

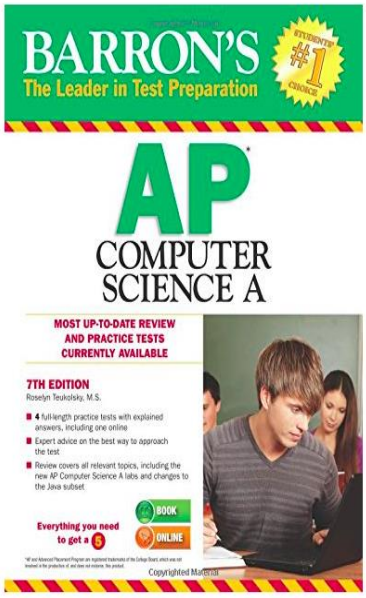


The above picture displays the instructor home page. The instructor can grant book to a student, add courses to the database, search for a book in the database.

Pending Request

CollegeID: ravi

Name: ravi

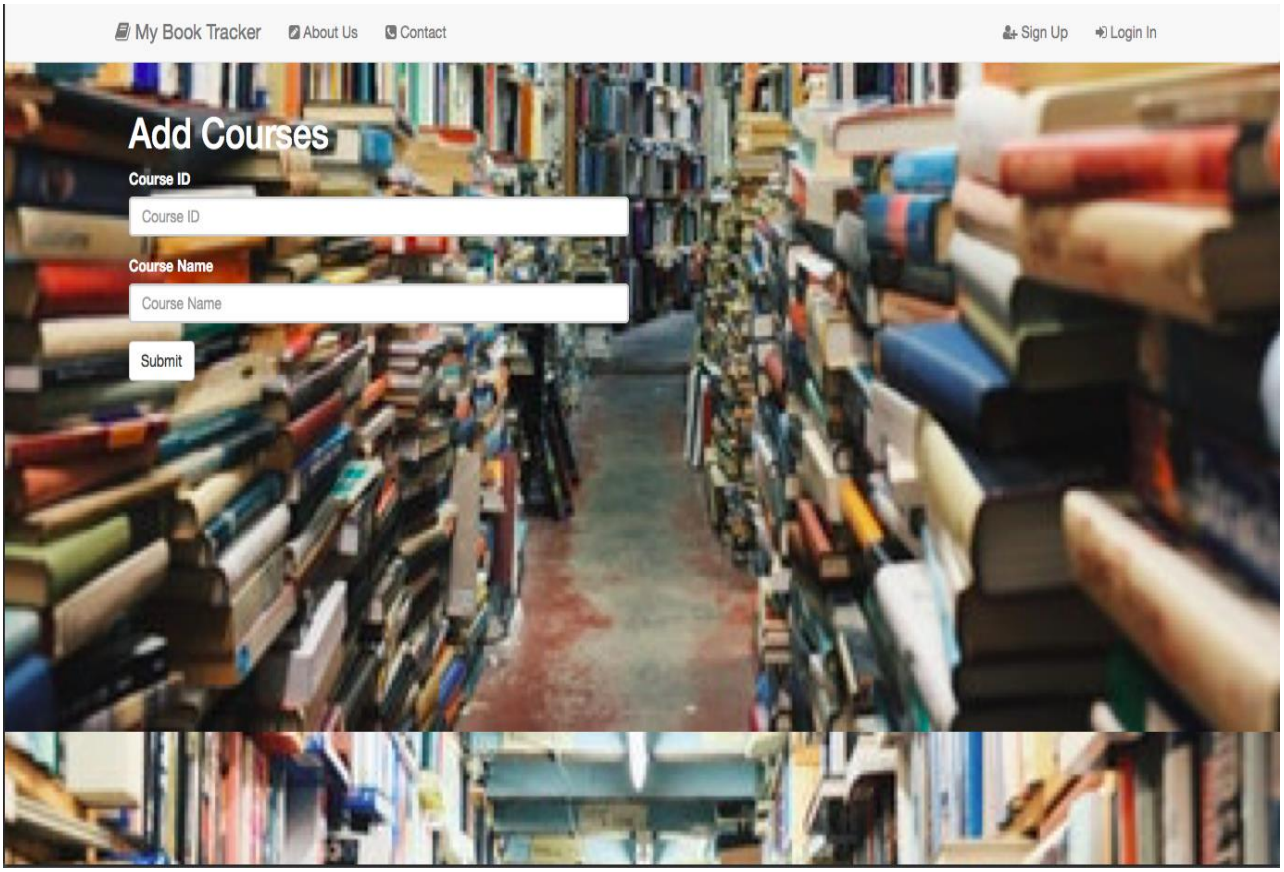


ISBN: 1438005946

Title: Barron's AP Computer Science A, 7th Edition

Submit

The above picture shows the instructor page when a student requests to issue a book. The student will be kept in pending state for the book issue. If the instructor wants to grant book to a student, he needs to click on the 'Submit' button displayed above.



The above page displays when the instructor clicks on ‘Add course’ tab. The instructor can enter the CourseID and the Course Name to add the course to the database by clicking on the ‘Submit’ tab.

5. CODING DOCUMENTATION

Various classes have been designed for different functionalities. Below is the list of main Java files used:

There are various object created like Users, Books etc. which have various fields that define the object.

AddBookToDatabase: New books are being added to the database, this functionality is present with admin where he searches the books based on title, author any other field that defines the books.

This functionality is done through Amazon Product Advertising API which fetches the result and stores in XML File format. The XML result is then read into java Book Object List and store in the database

The admin can add any number of books from the retrieved result of his search.

AddCourses: New courses are added by instructor. These courses are available for students to register.

AdminAddBookServlet: New books are fetched from Amazon API.

AdminRemoveBookServlet: Books are removed from Database after displaying the particular book.

CourseList, CousrselistServlet: These deal with getter and setter functions. To generate and display the courselist.

Enroll: Handles the course enrolment of students.

grantBook: Handles the functionality of pending request for student

when they request a book for issue. Here initially when the students issue the book the record is saved in the database with the status as pending and when the instructor gives the permit to student for a particular book the requests changes from pending to granted which reflects in the students all books functionality where the option now is return book instead of pending status.

HomeServlet: Handles the frontend display and total linking of pages to be called on request.

Admin, student and instructor all have custom homepages which depends on their role displaying there functionalities.

LoginFailure: In case of wrong password or any other validation going wrong, this handles the system from crashing.

myaccountServlet: Handles the personal information update in database.

MyCoursesServlet: All the registered courses can be viewed here.Which changes if any updation is done by the student in his courseList.

MySQLDataStoreUtilities: All the SQL procedures for various functions to be performed at database including insert, update, delete.

RegisterServlet: Handles all the registration process of user i.e. student, instructor.

RemoveBookfromDatabase: Removes book from Database.

removeUser: Handles removal of user from Database.

searchBook: Handles the search functionality for all users. Search is within the database for available books for particular user as well as all books.

Signout : Handles the sign out and session maintenance. Apart from this, Web.xml has been updated to include all the servlet pages to work on server. Various Libraries have been used. Html pages have been generated to make Front End/ GUI more interactive and consistent.

6. FUTURE ENHANCEMENTS

- Currently we are using Amazon API to fetch data for the books. We would maintain a separate database which will be implemented using AJAX Query.
- We would include one more feature to display the late fee to the student if he/she submits the book later
- We would keep a limit of 15 days for a student to keep the book with him/her
- Notifications should be sent to the student to return the book on time and the amount of late fee to be paid