Final Report: Library Management System

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***Abstract*—With the improvement in technology, there is a great need for automation in every aspect of life. The traditional library can also be made more efficient using technology. Previously, the librarian used to keep the log of books using traditional methods. But now, we can use relational database to keep track of the books in the library that are being borrowed.**

***Index Terms*—Database, Library Management System, PHP, HTML, CSS**

I. Introduction

Libraries have been part of the human civilization for centuries. The library stores knowledge and information in books. From ancient times, the libraries have designed ways of keeping the record of books. Previously, it was done in written form. But with the advancement in technologies, relational databases are used to track the books.

The library management system is a project that aims in developing a computerized system to maintain all the daily work of library. This system will include features like user management, book management, issuing books, calculating late fee and many more. This system will greatly help the library administration to maintain the records more effectively.

II. Literature Review

Extensive researches are being conducted in the area of Library Management. More advanced technologies are being used to make the system more efficient. Donghua Zhou has proposed an intelligent library management system that will utilize the help of RFID (Radio Frequency Identification) to improve the system in term of efficiency and cost effectiveness (Zhou, 2019).

III. Proposed Methodology

The proposed system will provide a complete Library management solution. It will include a user-friendly front end that will help the admin and users to interact with the system easily. The system includes a database that will keep record of the books and users. The backend will combine the front end and the database and will include functions like user authentication, registration, late fee calculation etc. The frontend will be designed using HTML and CSS. For system will be built using PHP and MySQL database.

In this project, a number of development tools would be used to complete this project. They are listed as follow.

A. Requirements:

Language Used: PHP
Database: MySQL
User Interface Design:
• HTML
• CSS
Web Browser: Mozilla, Google Chrome.
Software: XAMPP Server

HTML: HTML is the code that is used to structure a web page and its content. HTML is used to specify whether a web content should be recognized as a paragraph, list, heading, link, image, multimedia player, form, or one of many other available elements, or even a new element that you define. It is the globally accepted programming language for formatting web pages. It is mostly used by small and medium scale businesses that do not really need advanced functionality on their websites. HTML is free, supports all browsers on the client's machine, easy to use and understand hence, the choice in building the structure of our web pages.

CSS: CSS is a style sheet language used to describe the presentation of a document written in HTML or XML (including XML dialects such as SVG or XHTML). CSS describes how elements should be rendered on screen, on paper, in speech, or on other media. CSS is one of the core languages of the open web and is standardized across browsers according to the World Wide Web Consortium specification.

PHP: PHP (Hypertext Preprocessor) is known as a general-purpose scripting language that can be used to develop dynamic and interactive websites. It was among the first server-side languages that could be embedded into HTML, making it easier to add functionality to web pages without needing to call external files for data.

MYSQL: It is not a programming language rather it is software used for the database management system. MySQL

is a relational database management system based on SQL – Structured Query Language. The application is used for a wide range of purposes, including data warehousing, e-commerce, and logging applications.

DATABASE: A database is a systematic collection of data. They support electronic storage and manipulation of data. Databases make data management easy.

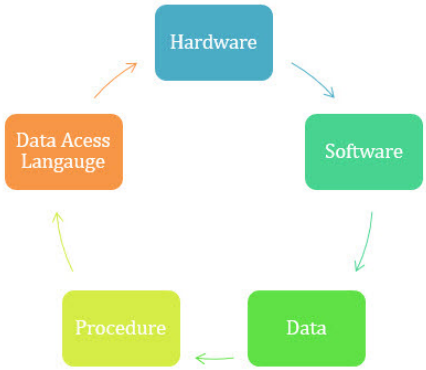

Fig. 1. Example of Database.

B. Library Management System has two modules:

1.Admin Module.
2.Student Module.

1.For Admin Module Features:

Admin Dashboard.
Can manage category.
Manage author.
Book Management.
Admin can issue a new book to a student.
Update the details when the student returns the book.
Search student by using their student ID.

2.For Students Module Features:

Register yourself and after registration,they will get student id.
Student can view the dashboard.
Update personal profile.
View issued book and book return date-time.

C. Advantages:

1.Time Saving.
2.Economical.
3.Faster and easier data retrieval.
4.Availability of data.

IV. Design and Coding:

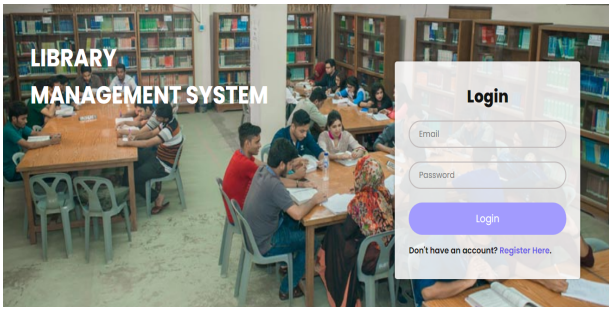

Fig. 2. Login Page Output.

index.php

```php
<?php

include 'config.php';

session_start();

error_reporting(0);

if(isset($_SESSION['id'])){
    if ($_SESSION['type'] == 0){
        header("Location: home.php");

    }
    else{
        header("Location:admin_home.php");
    }
}

if (isset($_POST['submit'])) {
    $email = $_POST['email'];
    $password =($_POST['password']);

    $sql = "SELECT * FROM users WHERE email='$email' AND password='$password' limit 1";
    $result = mysqli_query($conn, $sql);
    if ($result->num_rows > 0) {
        $row = mysqli_fetch_assoc($result);
        $_SESSION['id'] = $row['user_id'];
        $_SESSION['type'] = $row['user_type'];
        if($row['user_type'] == 0)
            header("Location: home.php");
        else
            header("Location: admin_home.php");
```

Fig. 3. Login Page Code.

```html
<!DOCTYPE html>
<html>
<head>
    <meta charset="utf-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">

    <link rel="stylesheet" href="https://stackpath.bootstrapcdn.com/font-awesome/4.7.0/css/font-awesome.min.css">

    <link rel="stylesheet" type="text/css" href="style.css">

    <title>LIBRARY MANAGEMENT</title>
</head>
<body>
<h1 class="text">LIBRARY<br>MANAGEMENT SYSTEM</h1>
    <div class="container">
        <form action="" method="POST" class="login-email">
            <p class="login-text" style="font-size: 2rem; font-weight: 800;">Login</p>
            <div class="input-group">
                <input type="email" placeholder="Email" name="email" value="<?php echo $email; ?>" required>
            </div>
            <div class="input-group">
                <input type="password" placeholder="Password" name="password" value="<?php echo $_POST['password']; ?>"
            </div>
            <div class="input-group">
                <button name="submit" class="btn">Login</button>
            </div>
            <p class="login-register-text">Don't have an account? <a href="registered.php">Register Here</a>.</p>
        </form>
    </div>
</body>
</html>
```

Fig. 4. Login Page Code.

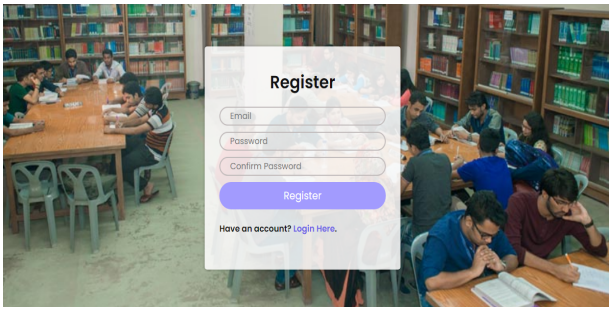

Fig. 5. Registration page Output.

registered.php

```php
<?php

include 'config.php';

error_reporting(0);

session_start();

if (isset($_SESSION['id'])) {
    header("Location: home.php");
}

if (isset($_POST['submit'])) {
    $name = $_POST['name'];
    $email = $_POST['email'];
    $student_id = $_POST['student_id'];
    $phone = $_POST['phone'];
    $department = $_POST['department'];
    $password = ($_POST['password']);
    $cpassword = ($_POST['cpassword']);
```

Fig. 6. Registration Page Code.

```php
    if ($password == $cpassword) {
        $sql = "SELECT * FROM users WHERE email='$email'";
        $result = mysqli_query($conn, $sql);
        if (!$result->num_rows > 0) {
            $sql = "INSERT INTO users (email, password, user_type)
                    VALUES ('$email', '$password', 0)";
            $result = mysqli_query($conn, $sql);
            if ($result) {
                echo "<script>alert('Wow! User Registration Completed.')</script>";
                $email = "";
                $_POST['password'] = "";
                $_POST['cpassword'] = "";
            } else {
                echo "$result <script>alert('Woops! asdfasdfsd Wrong Went.')</script>";
            }
        } else {
            echo "<script>alert('Woops! Email Already Exists.')</script>";
        }

    } else {
        echo "<script>alert('Password Not Matched.')</script>";
    }
}

?>
```

Fig. 7. Registration Page Code.

```html
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>LIBRARY MANAGEMENT</title>
    <link rel="stylesheet" href="registered.css">
    <link rel="stylesheet" href="https://stackpath.bootstrapcdn.com/font-awesome/4.7.0/css/font-awesome.min.css">
</head>
<body>
    <div class="container">
        <form action="" method="POST" class="login-email">
            <p class="login-text" style="font-size: 2rem; font-weight: 600;">Register</p>
            <div class="input-group">
                <input type="email" placeholder="Email" name="email" value="<?php echo $email; ?>" required>
            </div>
            <div class="input-group">
                <input type="password" placeholder="Password" name="password" value="<?php echo $_POST['password']; ?>
            </div>
            <div class="input-group">
                <input type="password" placeholder="Confirm Password" name="cpassword" value="<?php echo $_POST['cpass
            </div>
            <div class="input-group">
                <button name="submit" class="btn">Register</button>
            </div>
            <p class="login-register-text">Have an account? <a href="index.php">Login Here</a>.</p>
        </form>
    </div>
</body>
</html>
```

Fig. 8. Registration Page Code.

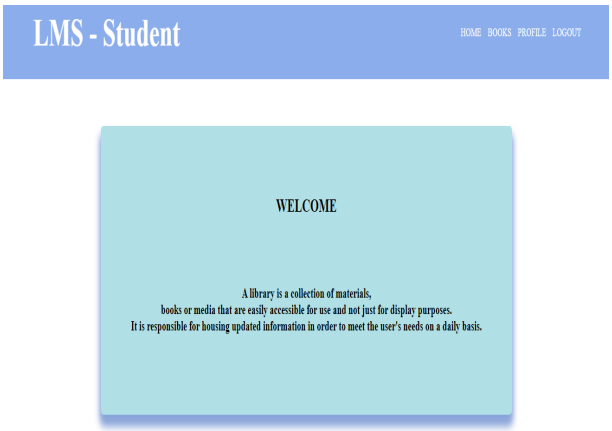

Fig. 9. Student Home Page Output.

home.php

```php
<?php
session_start();
if (!isset($_SESSION['id'])) {
    header("Location: index.php");
}
if ($_SESSION['type'] == 1){
  header("Location: admin_home.php");
}
?>
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Home</title>
    <link rel="stylesheet" href="main.css">
</head>
<body>
        <nav>
            <label class="logo">LMS - Student</label>
            <ul>
                <li><a href="home.php">Home</a></li>
                <li><a href="book_list.php">Books</a></li>
                <li><a href="myprofile.php">Profile</a></li>
                <li><a href="logout.php">Logout</a></li>
            </ul>
        </nav>
        <section >
            <div class="card">
            <h1 class="name">WELCOME</h1>
        <div class="desc">
            <h2>A library is a collection of materials,<br> books or media that are easily accessible for use and not just
```

Fig. 10. Student Home Page Code.

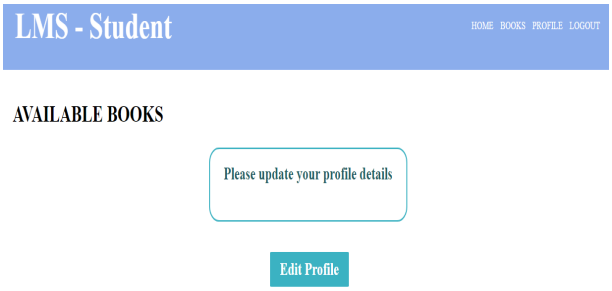

Fig. 11. Student Books Page Output

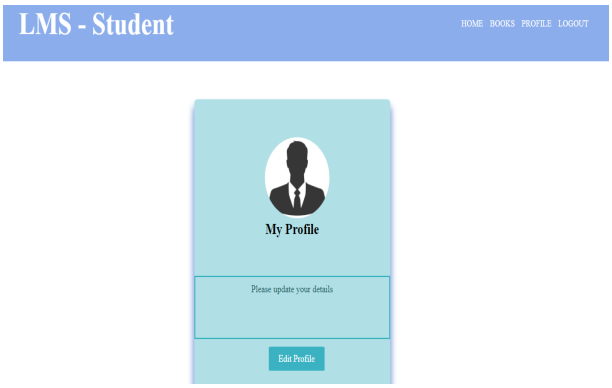

Fig. 12. Student Update Page Output.

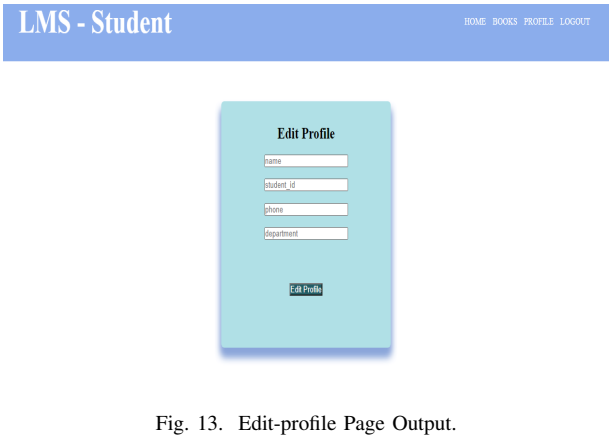

Fig. 13. Edit-profile Page Output.

```php
<?php

session_start();
include 'config.php';


if(!isset($_SESSION['id'])){
  header("location: index.php");
}

if ($_SESSION['type'] == 1){
    header("Location: admin_home.php");
}
```

Fig. 14. Edit-profile Page Code.

```php
if (isset($_POST['submit'])) {
    $name = $_POST['name'];
    $student_id = $_POST['student_id'];
    $phone = $_POST['phone'];
    $department = $_POST['department'];
    $user_id = $_SESSION['id'];
            $sql = "INSERT INTO user_details (name, student_id, phone, department, user_id)
                    VALUES ('$name', '$student_id', '$phone', '$department', '$user_id')";
            $res = mysqli_query($conn, $sql);
            if ($res) {
                echo "<script>alert('Wow! Inserted.')</script>";
                header("location: myprofile.php");
            } else {
                echo "$res <script>alert('Woops! asdfasdfsd Wrong Went.')</script>";
            }
        }

?>
```

Fig. 15. Edit-profile Page Code.

```html
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Edit-Profile</title>
    <link rel="stylesheet" href="edit_profile.css">

</head>
<body>
<nav>
        <label class="logo">LMS - Student</label>
        <ul>
            <li><a href="home.php">Home</a></li>
            <li><a href="book_list.php">Books</a></li>
            <li><a href="myprofile.php">Profile</a></li>
            <li><a href="logout.php">Logout</a></li>
        </ul>
    </nav>
```

Fig. 16. Edit-profile Page Code.

```
57      <section >
58      <div class="card">
59              <h1 class="name">Edit Profile</h1>
60              <div class="container">
61          <form action="" method="POST" class="login-email">
62              <div class="input-group">
63                  <input type="text" placeholder="name" name="name" required>
64              </div>
65              <div class="input-group">
66                  <input type="text" placeholder="student_id" name="student_id" required>
67              </div>
68              <div class="input-group">
69                  <input type="text" placeholder="phone" name="phone" required>
70              </div>
71              <div class="input-group">
72                  <input type="text" placeholder="department" name="department" required>
73              </div>
74              <div class="input-group">
75                  <button name="submit" class="btn">Edit Profile</button>
76              </div>
77          </form>
78      </div>          </div>
79  </section>
80  </body>
81  </html>
```

Fig. 17. Edit-profile Page Code.

```
book_list.php
1   <?php
2   include 'config.php';
3   session_start();
4
5   if(!isset($_SESSION['id'])){
6     header("location: index.php");
7   }
8
9   if ($_SESSION['type'] == 1){
10    header("Location: books.php");
11  }
12
13
14
15
16  $sql_user = "SELECT book_id, unresolved_fine FROM user_details where user_id='{$_SESSION['id']}' limit 1";
17  $sql_book = "SELECT book_id, book_name, author, subject, total, issued, (total-issued) as available  FROM books ";
18
19  $user = $conn->query($sql_user);
20  $book = $conn->query($sql_book);
21  ?>
```

Fig. 20. Books Page Code.

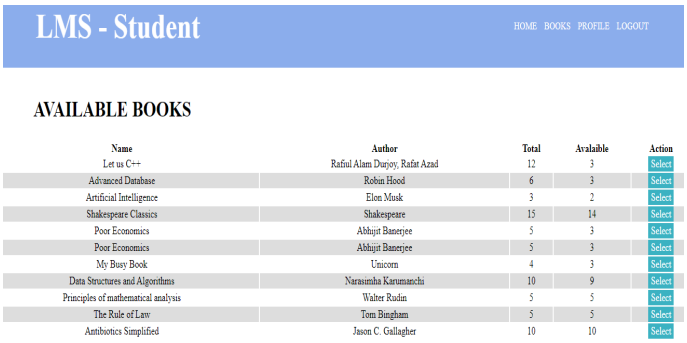

Fig. 18. Books Page Output.

```
22  <!DOCTYPE html>
23  <html lang="en">
24  <head>
25      <meta charset="UTF-8">
26      <meta http-equiv="X-UA-Compatible" content="IE=edge">
27      <meta name="viewport" content="width=device-width, initial-scale=1.0">
28      <title>Books</title>
29      <link rel="stylesheet" href="student_info.css">
30
31
32  </head>
33  <body>
34      <nav>
35          <label class="logo">LMS - Student</label>
36          <ul>
37              <li><a href="admin_home.php">Home</a></li>
38              <li><a href="book_list.php">Books</a></li>
39              <li><a href="myprofile.php">Profile</a></li>
40              <li><a href="logout.php">Logout</a></li>
41          </ul>
42      </nav>
43      <div class="container">
44      <h1 class="name">AVAILABLE BOOKS</h1>
45      <?php
46          if ($user->num_rows > 0){
47              while($users =$user->fetch_assoc()){
48
49  ?>
```

Fig. 21. Books Page Code.

```
select_book.php
1   <?php
2
3   session_start();
4   include 'config.php';
5
6
7   if(!isset($_SESSION['id'])){
8     header("location: index.php");
9   }
10
11
12  $book_id = $_GET['id'];
13  $sql_book = "UPDATE books SET issued = issued + 1 WHERE book_id = '$book_id'";
14
15  $sql = "UPDATE user_details SET book_id='$book_id' WHERE user_id='{$_SESSION['id']}' limit 1";
16
17  if (mysqli_query($conn, $sql_book)) {
18      if (mysqli_query($conn, $sql)) {
19          header("location: http://127.0.0.1/Library/book_list.php");
20
21      }
22  }
23
24
25
26
27  ?>
```

Fig. 19. Books Page Code.

```
50      <table class="table table-bordered">
51        <thead>
52          <tr>
53          <th>Name</th>
54          <th>Author</th>
55          <th>Total</th>
56          <th>Avalaible</th>
57          <th>Action</th>
58          <th></th>
59          </tr>
60        </thead>
61        <tbody>
62          <?php
63
64          if ($book->num_rows > 0){
65            while($books =$book->fetch_assoc()){
66              if($books['available'] > 1){
67              ?>
68              <tr>
69                <td><?php echo $books['book_name'];?></td>
70                <td><?php echo $books['author'];?></td>
71                <td><?php echo $books['total'];?></td>
72                <td><?php echo $books['available'];?></td>
73                <?php
74                  if (! isset($users['book_id'])){
75                  ?>
76                  <td><a  class="act" href="select_book.php/?id=<?php echo $books['book_id']; ?> ">Select</a> </td>
77                  <?php
78                  }
79                  else{
80                      if ($users['unresolved_fine']<= 0){
81                          ?>
```

Fig. 22. Books Page Code.

```
                                <td>Return book</td>
                                <?php
                            }
                            else{
                                ?>
                            <td>Contact with Accounts</td>
                            <?php
                            }
                        }
                    }}
                        ?>
                    </tr>
                    <?php } 

                }}
                else{
                    ?>
    <h2 class="test">Please update your profile details<h2>
        <a class="clr" href="edit_profile.php">Edit Profile</a>
                    <?php
                }
                ?>
            </tbody>
        </table>
    </div></body>
</html>
```

Fig. 23. Books Page Code.

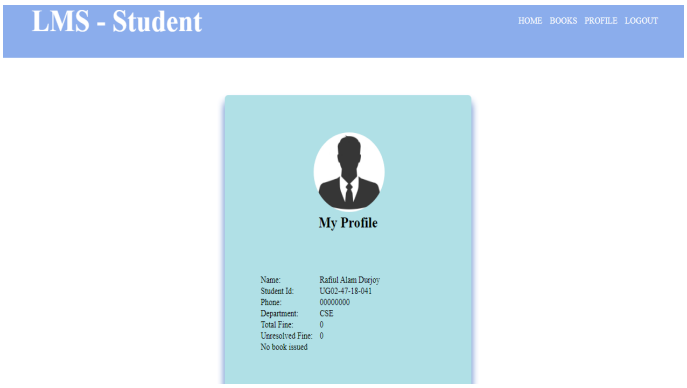

Fig. 24. Profile Page Output.

```
myprofile.php
<?php

session_start();
include 'config.php';


if(!isset($_SESSION['id'])){
  header("location: index.php");
}

if ($_SESSION['type'] == 1){
  header("Location: admin_home.php");
}




$sql ="SELECT * FROM user_details LEFT JOIN books ON user_details.book_id = books.book_id WHERE user_id='{$_SESSION['id']}'";
$result = $conn->query($sql);

?>
```

Fig. 25. Profile Page Code.

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Profile</title>
    <link rel="stylesheet" href="profile.css">

</head>
<body>
<nav>
        <label class="logo">LMS - Student</label>
        <ul>
            <li><a href="home.php">Home</a></li>
            <li><a href="book_list.php">Books</a></li>
            <li><a href="myprofile.php">Profile</a></li>
            <li><a href="logout.php">Logout</a></li>
        </ul>
    </nav>
    <section >
    <div class="card">
    <img src="images/profile-picture.jpg" alt="" class="img">
    <h1 class="name">My Profile</h1>
<div class="desc">
```

Fig. 26. Profile Page Code.

```
<?php
        if($result->num_rows>0) {
            while($row =$result->fetch_assoc()){
                ?>
<table width="100%">
    <col style="width:30%">
    <col style="width:60%">

    <tr>
      <td>Name:</td>
      <td><?php echo $row['name'];?></td>
    </tr>
      <tr>
      <td>Student Id:</td>
      <td><?php echo $row['student_id'];?></td>
    </tr>
    <tr>
    <td>Phone:</td>
    <td><?php echo $row['phone'];?></td>
    </tr>
    <tr>
    <td>Department:</td>
    <td><?php echo $row['department'];?></td>
    </tr>
    <tr>
    <td>Total Fine:</td>
    <td><?php echo $row['fine'];?></td>
    </tr>

      <tr>
    <td>Unresolved Fine:</td>
    <td><?php echo $row['unresolved_fine'];?></td>
    </tr>
```

Fig. 27. Profile Page Code.

```
    <?php
    if($row['book_id'] == NULL){
    ?>

      <tr>
      <td>
    No book issued       </td>
    </tr>
    <?php

    }
    else{
    ?>
      <tr>
      <td>Issued Book:</td>
      <td><?php echo $row['book_name'];?></td>
          </tr>
      <tr>
        <td>
          Subject:
            </td>
            <td><?php echo $row['subject'];?></td>
      </tr>
      <tr>
        <td>
          Author:
            </td>
            <td><?php echo $row['author'];?></td>
      </tr>
      <?php
    }
    ?>
```

Fig. 28. Profile Page Code.

Fig. 29. Admin home Page Output.

admin_home.php

```php
<?php
include 'config.php';

session_start();


if (!isset($_SESSION['id'])) {
    header("Location: index.php");
}

if ($_SESSION['type'] == 0){
    header("Location: home.php");
}

```

Fig. 30. Admin home Page Code.

```php
if (isset($_POST['submit'])) {
    $book_name = $_POST['book_name'];
    $author = $_POST['author'];
    $subject = $_POST['subject'];
    $total = $_POST['total'];

            $sql = "INSERT INTO books (book_name, author, subject, total)
            VALUES ('$book_name', '$author', '$subject', '$total')";

            $result = mysqli_query($conn, $sql);
            if ($result) {
                echo "<script>alert('Wow! Insert Completed.')</script>";
                $book_name = "";
                $author = "";
                $subject="";
                $total ="";
            } else {
                echo "$result <script>alert('Woops! Wrong Went.')</script>";
            }

}


?>
```

Fig. 31. Admin home Page Code.

Fig. 32. Admin Books Page Output.

```php
<body>
        <nav>
            <label class="logo">LMS - Admin</label>
            <ul>
                <li><a href="">Home</a></li>
                <li><a href="books.php">Books</a></li>
                <li><a href="logout.php">Logout</a></li>
            </ul>
        </nav>
        <section >
            <div class="card">
            <h1 class="name">Add New book</h1>
            <div class="container">
        <form action="" method="POST" class="login-email">
            <div class="input-group">
                <input type="text" placeholder="Book Name" name="book_name" required>
            </div>
            <div class="input-group">
                <input type="text" placeholder="Author" name="author" required>
            </div>
            <div class="input-group">
                <input type="text" placeholder="Subject" name="subject" required>
            </div>
            <div class="input-group">
                <input type="text" placeholder="Total" name="total" required>
            </div>
            <div class="input-group">
                <button name="submit" class="btn">Insert</button>
            </div>
    </div>        </div>
        </section>
</body>
```

Fig. 33. Admin Books Page Code.

config.php

```php
<?php

$server = "localhost";
$user = "root";
$pass = "";
$database = "database";

$conn = mysqli_connect($server, $user, $pass, $database);

if (!$conn) {
    die("<script>alert('Connection Failed.')</script>");
}

?>
```

Fig. 34. PHP connect Code.

V. Project Database Pictures

Containing the word:

Table	Action	Rows	Type	Collation	Size	Overhead
books	Browse Structure Search Insert Empty Drop	13	InnoDB	utf8mb4_general_ci	16.0 KiB	-
users	Browse Structure Search Insert Empty Drop	9	InnoDB	utf8mb4_general_ci	32.0 KiB	-
user_details	Browse Structure Search Insert Empty Drop	7	InnoDB	utf8mb4_general_ci	64.0 KiB	-
3 tables	Sum	29	InnoDB	utf8mb4_general_ci	112.0 KiB	0 B

Fig. 35. Project Database.

+ Options

	user_id	email	password	user_type
Edit Copy Delete	1	mdurjoy148@gmail.com	qwerty	0
Edit Copy Delete	2	admin@sub.edu.bd	qwerty	1
Edit Copy Delete	3	shuvodare@gmail.com	123	0
Edit Copy Delete	4	rafat0819@gmail.com	123	0
Edit Copy Delete	5	emon@gmail.com	qwerty	0
Edit Copy Delete	6	alam@gmail.com	qwerty	0
Edit Copy Delete	7	rafi@gmail.com	qwerty	0
Edit Copy Delete	8	any@gmail.com	qwerty	0
Edit Copy Delete	9	sobur@gmail.com	qwerty	0

Fig. 36. Users Table.

+ Options

	details_id	name	student_id	phone	department	fine	unresolved_fine	book_id	user_id
Edit Copy Delete	5	Rafiul Alam Durjoy	UG02-47-18-041	00000000	CSE	0	0	NULL	1
Edit Copy Delete	9	Shuvo	UG02-00-00-001	00000001	CSE	0	0	NULL	3
Edit Copy Delete	10	Jihanb	UG02-00-00-002	01723479081	CSE	0	0	NULL	4
Edit Copy Delete	11	evan khan emon	UG02-47-18-009	00000003	CSE	0	0	NULL	5
Edit Copy Delete	12	Rafi Haque	UG02-47-00-010	000000006	CSE	0	0	NULL	7
Edit Copy Delete	13	Mushiur Any	UG02-47-18-019	00000007	CSE	0	0	NULL	8
Edit Copy Delete	15	sayed abdus sobur	UG02-46-17-011	00000011	CSE	0	0	NULL	9

Check all With selected: Edit Copy Delete Export

Fig. 37. User Details Table.

+ Options

	book_id	book_name	author	subject	total	issued
Edit Copy Delete	1	Let us C++	Rafiul Alam Durjoy, Rafat Azad	Programming	12	9
Edit Copy Delete	2	Advanced Database	Robin Hood	Database	6	3
Edit Copy Delete	3	Artificial Intelligence	Elon Musk	AI	3	1
Edit Copy Delete	4	Shakespeare Classics	Shakespeare	Literature	15	1
Edit Copy Delete	5	asdfas	asdfsaasdfas	asfd1	1	0
Edit Copy Delete	6	Poor Economics	Abhijit Banerjee	Economics	5	2
Edit Copy Delete	7	Poor Economics	Abhijit Banerjee	Economics	5	2
Edit Copy Delete	8	My Busy Book	Unicorn	Kids	4	1
Edit Copy Delete	9	Python	Jack	Programming	3	2
Edit Copy Delete	10	Data Structures and Algorithms	Narasimha Karumanchi	programming	10	1
Edit Copy Delete	11	Principles of mathematical analysis	Walter Rudin	Math	5	0
Edit Copy Delete	12	The Rule of Law	Tom Bingham	LAW	5	0
Edit Copy Delete	13	Antibiotics Simplified	Jason C. Gallagher	Pharmacy	10	0

Check all With selected: Edit Copy Delete Export

Fig. 38. Books Data Table.

VI. Entity Relationship Diagram

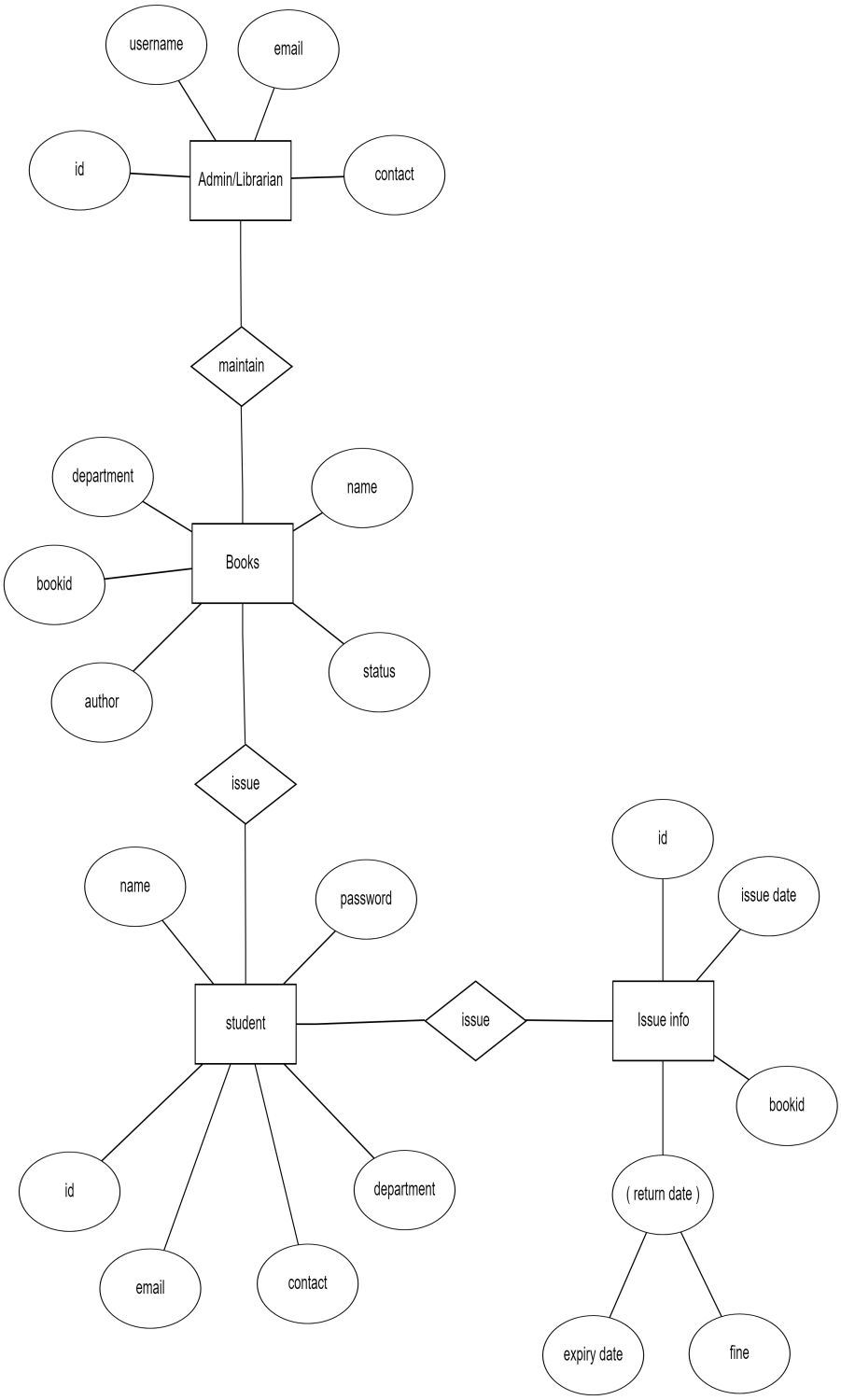

Fig. 39. ER-Diagram

VII. Conclusion and Future Work

There is a huge scope of improvement on this system. We can utilize computer vision to automatically issue a book when someone picks it from the shelf (Xi, Zhang, Hu & Xin, 2016). IOT devices can be used to keep track of books easily.

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