CS1106: DATABASE SYSTEMS

PROJECT REPORT

GROUP – 7

RESOLIB

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ACKNOWLEDGMENT

We would like to express our heartfelt gratitude to our professor, **Dr. Taruna Sunil** whose suggestions and encouragement provided us with the golden opportunity to work on this wonderful project. She also assisted us in conducting research and learning about many new things, which helped our team complete this project.

Yours Sincerely,

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1. INTRODUCTION

When was the last time you were trapped trying to find resources when you needed them and couldn't find the right platform, or you had a resource file that only you could share with others?

We've all been in similar circumstances. If only there was a website where we could find a wealth of information. We had the same thought and decided to put it into action on our university campus. We titled our application "ResoLib" since we developed a Web application where students from the same university may come and view the resource file as well as share it with others.

This application aims to provide a platform for college students to locate resources provided by instructors and students.

The services of this platform will include:

- User Accounts (Sing Up / Sign In) Functionality
- Ability to View Files
- Upload Files
- Database Connectivity
- Searching Files Functionality

1.1 Database Management System

1.1.1 What is a Database?

The database is a collection of interconnected data that is used to efficiently retrieve, insert, and delete data. It is also used to arrange data into tables, schema, views, reports etc. [1]

1.1.2 Introduction to Database Management System

Database Management System, or **DBMS**, is a system for storing and retrieving user data with maximum efficiency and suitable security measures.

MySQL, **Oracle**, and other well-known commercial databases are utilised in a variety of applications.

They provide an interface for performing different tasks such as database creation, data storage, data updating, table creation in the database, and much more.

1.1.2.1 DBMS allows users the following tasks:

- **Data Definition:** It is used to create, modify, and delete the definition that defines the data organisation in the database.
- **Data Updation:** It is used for inserting, modifying, and deleting actual data from the database.
- **Data Retrieval:** It is used to retrieve data from a database that can be utilised by applications for a variety of purposes.
- **User Administration:** It is used to register and monitor users, ensure data integrity, enforce data security, deal with concurrency management, monitor performance, and restore data corrupted by unexpected failure.

1.1.3 Characteristics of DBMS

- To store and manage the information, it makes use of a digital repository set up on a server.
- It can provide a clear and logical view of the data manipulation process.
- Automatic backup and recovery mechanisms are built into DBMS.
- It has ACID features that keep data in a healthy state in the event of a failure.
- It can simplify the complex interaction between data.
- It is used to help in data manipulation and processing.
- It's used to keep data secure.
- It can examine the database from several perspectives based on the user's needs.

1.1.4 Advantages of DBMS

- **Controls database redundancy:** It can control data redundancy because it keeps all of the data in a single database file, and the recorded data is stored in the database.
- **Data Sharing:** An organization's authorised users can distribute data among many users using DBMS.
- **Easily Maintenance:** Because of the centralised nature of the database system, it is easily maintainable.
- **Reduce Time:** It reduces development time and maintenance requirements.
- **Backup:** It includes backup and recovery subsystems that generate an automatic backup of data in the event of hardware or software failures and restore the data if necessary.
- **Multiple User Interface:** It offers several forms of user interfaces, including graphical user interfaces and application programme interfaces.

1.1.5 Disadvantages of DBMS

- **Cost of Hardware and Software:** To execute DBMS software, a high-speed data processor and a huge amount of memory is required.
- **Size:** To execute them efficiently, requires a considerable amount of storage space and memory.
- **Complexity:** A database system creates additional complexity and requirements.
- **Higher impact of failure:** Failure has had a significant impact on the database since, in most organisations, all data is saved in a single database, and if the database is damaged as a result of failure, If there is a power outage or database corruption, the data may be lost forever.

2. TECHNOLOGY STACK

2.1 HTML

HTML is an abbreviation for Hypertext Markup Language, which is a programming language used to create web pages and web applications.

A web page is a document that is typically written in HTML and then translated by a web browser. An URL can be used to locate a web page. A static or dynamic Web page can exist. Static web pages can be created entirely with HTML.

HTML5 is the most recent version of the Hypertext Markup Language.

Following are the features of HTML:

- It is a very simple and easy language. It is simple to understand and modify.
- Because HTML contains a plethora of formatting tags, it is quite simple to create an effective presentation.
- As it is a markup language, it allows for the creation of flexible web pages in addition to text.
- It makes it easier for programmers to provide a link on web pages (via the HTML anchor tag), which increases the user's interest in surfing.
- It is platform-agnostic, as it may be displayed on any platform, including Windows, Linux, and Macintosh.
- It makes it easier for programmers to add graphics, videos, and sound to websites, making them more appealing and dynamic.
- As HTML is a case-insensitive language, we can use tags in either lower-case or upper-case. [2]

2.2 CSS

CSS is an abbreviation for Cascading Style Sheets. It is a style sheet language that is used to describe the appearance and formatting of a markup-language document. HTML gains a new feature as a result of it. It is commonly used in conjunction with HTML to alter the appearance of web pages and user interfaces. It can also be used with any type of XML documents, such as plain XML, SVG, or XUL.

CSS3 is the most recent version of the Cascading Style Sheets.

Following are the features of CSS:

- Previously, tags such as font, colour, background style, element alignments, border, and size had to be repeated on each web page. This was a lengthy procedure. CSS was established to address this issue. It was a recommendation by the World Wide Web Consortium.
- CSS style definitions are saved in external CSS files, therefore updating one file can affect the entire website.
- CSS gives more detailed features for defining the look and feel of a website than simple HTML. [3]

2.3 MySQL

MySQL is a relational database management system based on the Structured Query Language, which is the most commonly used language for accessing and managing database records. MySQL is free and open-source software distributed under the GNU General Public License. Oracle Corporation backs it up.

MySQL operates on a Client-Server Architecture. This paradigm is intended for end-users known as clients to use network services to access resources from a central computer known as a server.

8.0 is the most recent stable version of MySQL.

Following are the features of MySQL:

- It gives us the ability to perform database operations on tables, rows, columns, and indexes.
- It defines the database relationship in the form of tables (collections of rows and columns), which are also referred to as relations.
- It maintains the Referential Integrity of various tables' rows or columns.
- It enables us to automatically update the table indexes.
- It employs a large number of SQL queries and integrates important information from several columns for end users. [4]

2.4 PHP

PHP is a server-side programming language that is open-source, interpreted, and object-oriented. PHP is an excellent choice for web development. As a result, it is used to create web apps (an application that executes on the server and generates the dynamic page.).

PHP 7.4.0 is the most recent version of PHP.

Following are the features of PHP:

- PHP scripts are much faster to execute than scripts written in other languages such as JSP and ASP. PHP uses its memory, which reduces server workload and loading time, resulting in faster processing speed and better performance.
- PHP has an easy-to-understand syntax. It is used by programmers who are at ease with it.
- PHP is available for the following operating systems: WINDOWS, MAC, LINUX, and UNIX. A PHP programme written in one operating system can be simply executed in another.
- PHP supports all of the major databases, including MySQL, SQLite, ODBC, and others.
- PHP is compatible with nearly all local servers in use today, including Apache, Netscape, Microsoft IIS, and others. [5]

2.5 Bootstrap

Bootstrap is a free and open-source CSS framework for front-end web development that is responsive and mobile-first. It includes design templates for typography, forms, buttons, navigation, and other interface components in HTML, CSS, and JavaScript.

A responsive website can automatically modify itself to look excellent on all devices, from smartphones to desktop computers, and so on.

Bootstrap 5 is the most recent version of Bootstrap.

Following are the features of Bootstrap:

- Bootstrap is the most popular HTML, CSS, and JavaScript framework for creating a mobile-friendly and responsive website.
- Downloading and using it is completely free.
- It is a front-end framework intended to make web development easier and faster.
- It includes HTML and CSS design templates for typography, forms, buttons, tables, navigation, modals, image carousels, and more.
- JavaScript plug-ins can also be used.
- It makes it easier to construct responsive designs. [6]

3. ANALYSIS & REQUIREMENT SPECIFICATIONS

3.1 Problem Statement

University students struggle to gather the resources for a course apart from the resources shared by the faculty.

3.2 Objective

To create an online platform where students can share educational resources to help and discuss with their peers and faculty.

3.3 Platform Features

- User Accounts (Sing Up / Sign In) Functionality
- Ability to View Files
- Upload Files
- Database Connectivity
- Searching Files Functionality
- Separate Dashboard for Admin

3.4 Technology Stack

To develop the Interactive Frontend Application we used HTML, CSS, Bootstrap and PHP to handle the logic, authentication, and communication with the database.

We used the MySQL database to store all the data required by our application.

3.5 System Requirements

- A computer (Laptop/Desktop/Smartphone).
- XAMPP Control Panel.
- A browser to access the localhost (preferred Google Chrome).
- A ".jklu.edu.in" email account, provided by the university.
- Basic knowledge of the Internet.

4. SYSTEM DESIGN

4.1 ER Model

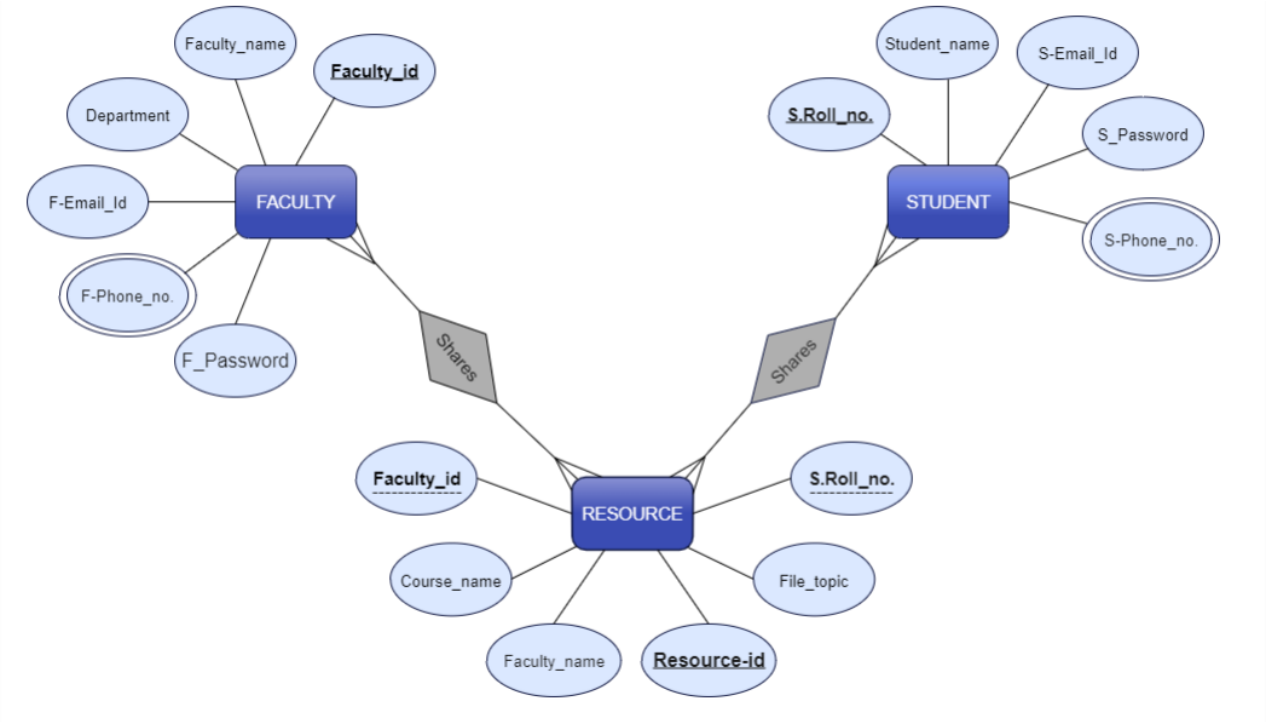

Figure 4.1: Final ER Model.

4.2 Relational Schema Diagram

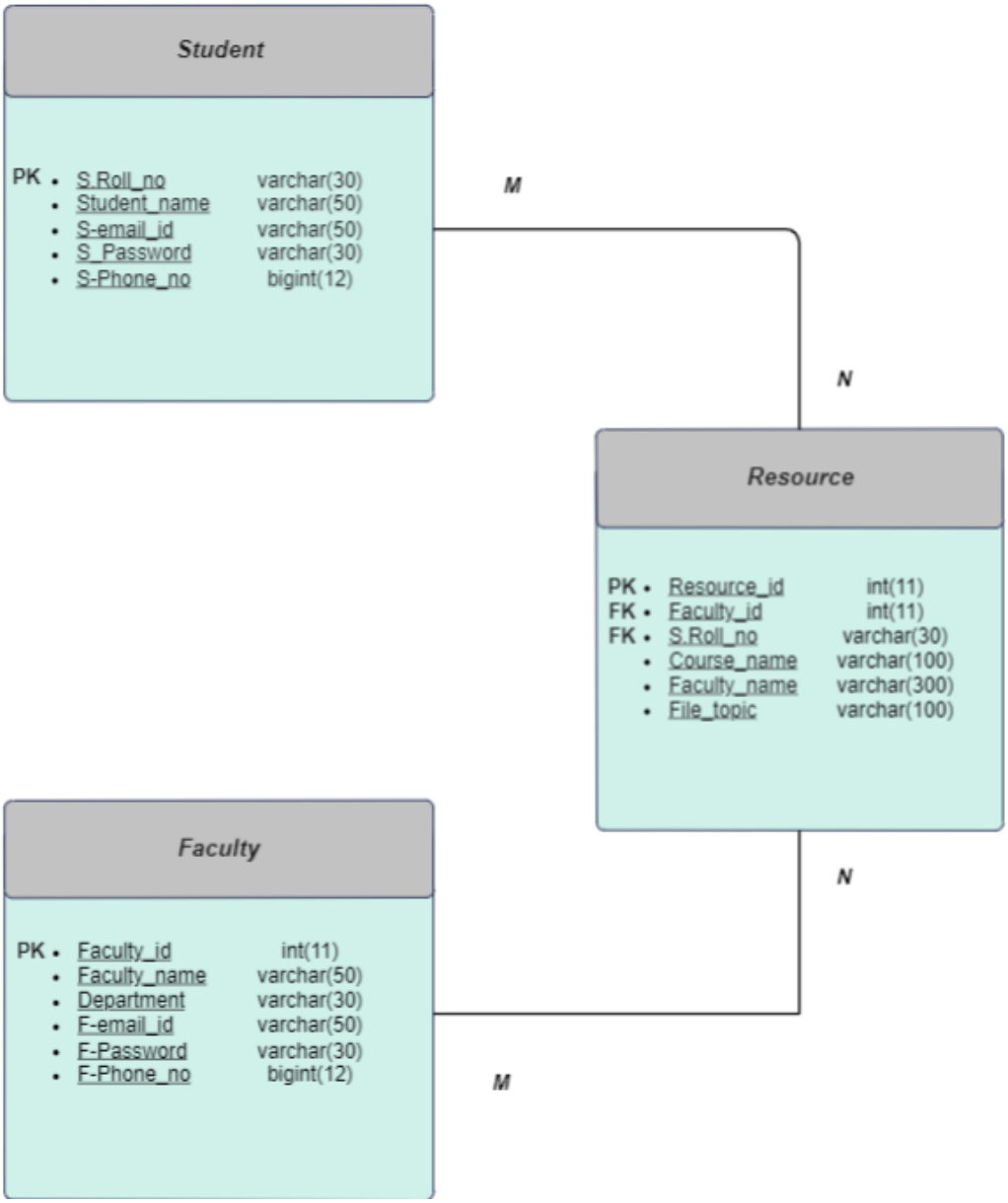

Figure 4.2: Final Relational Schema Diagram.

5. IMPLEMENTATION

5.1 SQL Queries Examples

This project uses MySQL as a database. The below code snippets are used to implement the database structure:

5.1.1 Database Creation

```
mysql> create database main_database;

mysql> use main_database;
```

5.1.2 Table Creation

- Student login

```
mysql> create table student_login(
        Roll_number varchar(30) primary key,
        username varchar(50) not null,
        email_id varchar(50) not null unique,
        password varchar(30) not null,
        phone_number bigint(12) not null);
```

- Faculty login

```
mysql> create table faculty_login(
        faculty_id int auto increment primary key,
        username varchar(50) not null,
        email_id varchar(50) not null unique,
        password varchar(30) not null,
        department varchar(30) not null,
        phone_number bigint(12) not null);
```

- ResoLib

```
mysql> create table resolib(
        resource_id int auto increment primary key,
        f_name varchar(300) not null,
        course_name varchar(100) not null,
        f_topic varchar(100) not null,
        faculty_id int,
        Roll_number varchar(30),
        foreign key (faculty_id) references faculty_login(faculty_id),
        foreign key (Roll_number) references student_login(Roll_number));
```

5.1.3 Data Insertion

Data can be inserted into the tables using the below mentioned SQL Query example.

- Student_login

```
mysql> insert into student_login (
        Roll_number,
        username,
        email_id,
        password,
        phone_number
)
values (
        '2020BTechCSE039',
        'Keshaw Soni',
        'keshawsoni@jklu.edu.in',
        'keshaw',
        9649054767
);
```

- Faculty_login

```
mysql> insert into faculty_login (
        username,
        email_id,
        password,
        department,
        phone_number
)
values (
        'Taruna',
        'staruna@jklu.edu.in',
        'taruna',
        'CSE',
        9414042566
);
```

5.2 Database Connection with Application

```
<?php
$host="localhost:3307";
$user="root";
$pass="";
$db="main_database";

$conn=mysqli_connect($host,$user,$pass,$db);

    if($conn -> connect_error){
        echo "$conn->connect_error";
        die('Connnection Failed : '.$conn->connect_error);
    }
    else{
        echo "Connection Successfull!";
    }

?>
```

6. PROJECT SNAPSHOTS

Below are some of the screenshots from the application.

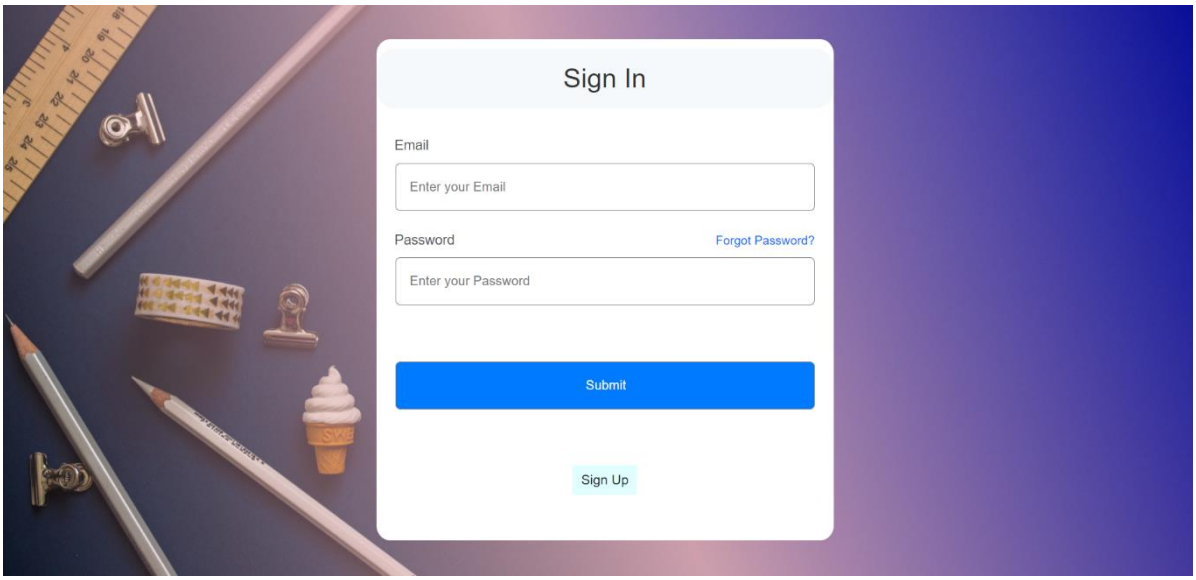

Figure 6.1: Sign In Page.

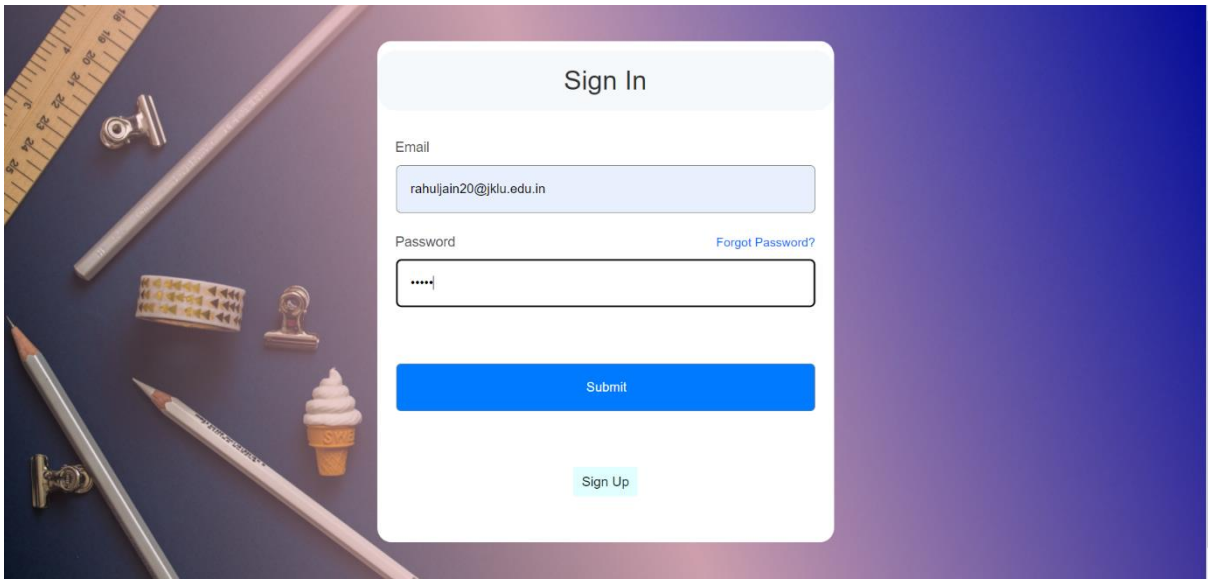

Figure 6.2: Sign In page with Data Entered.

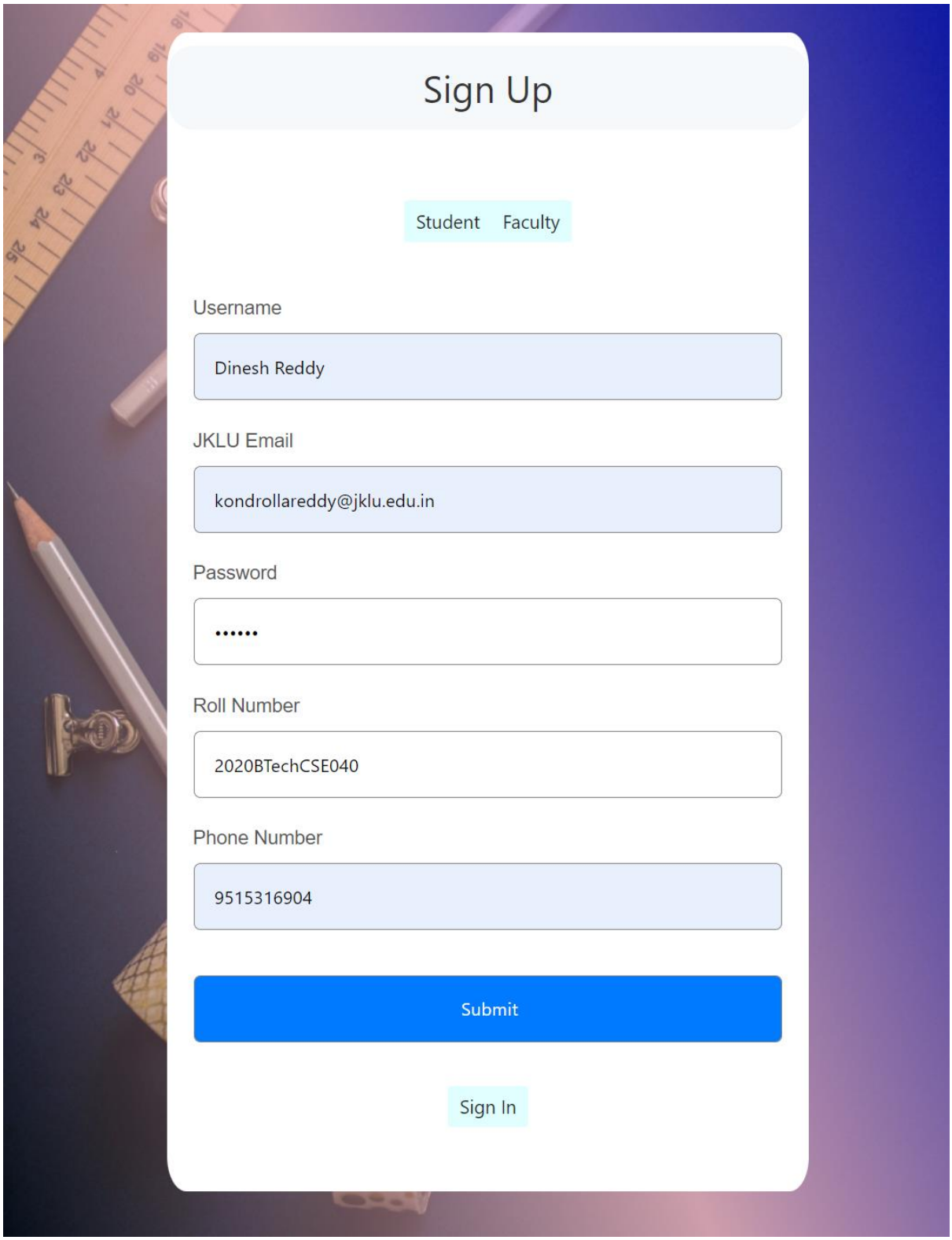

Figure 6.3: Student Sign up page.

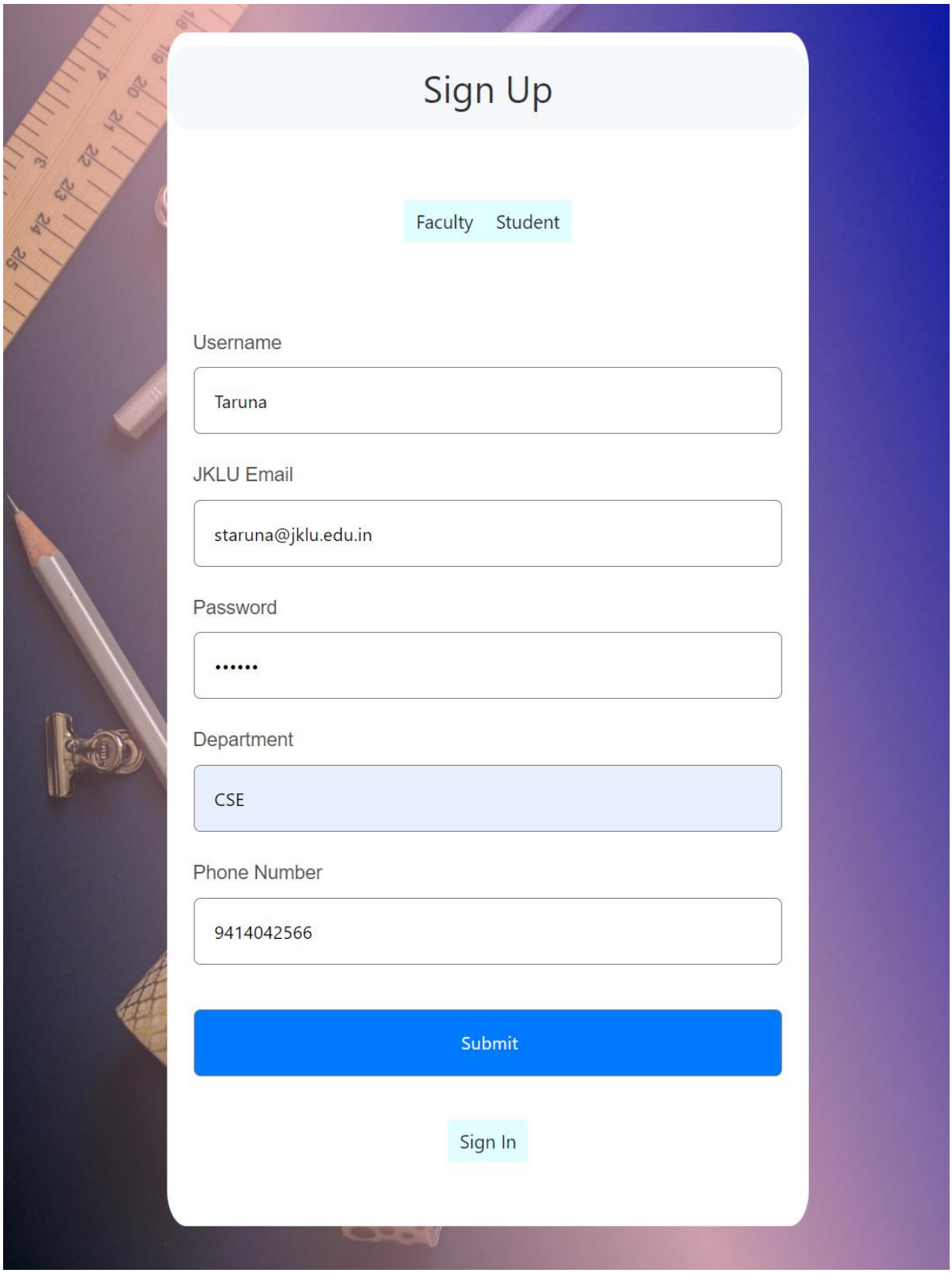

Figure 6.4: Faculty Sign Up Page.

Figure 6.5: User Dashboard.

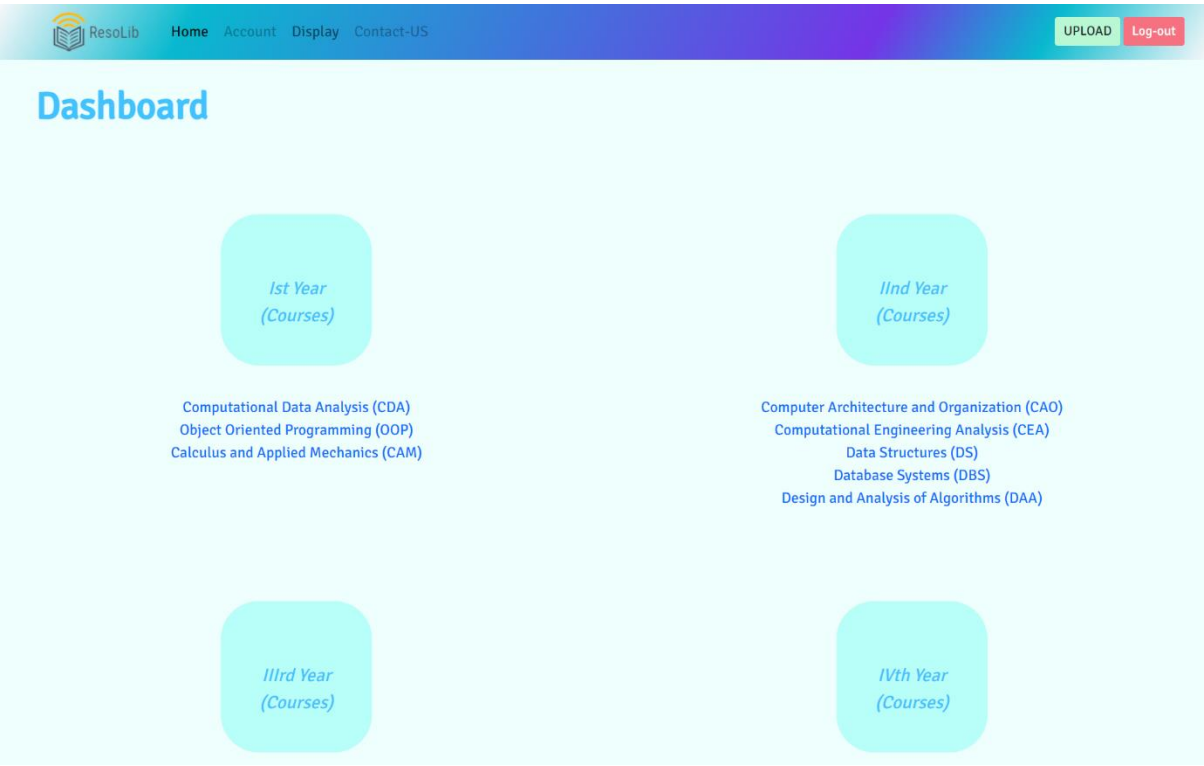

Figure 6.6: User Dashboard showing Courses and Subjects.

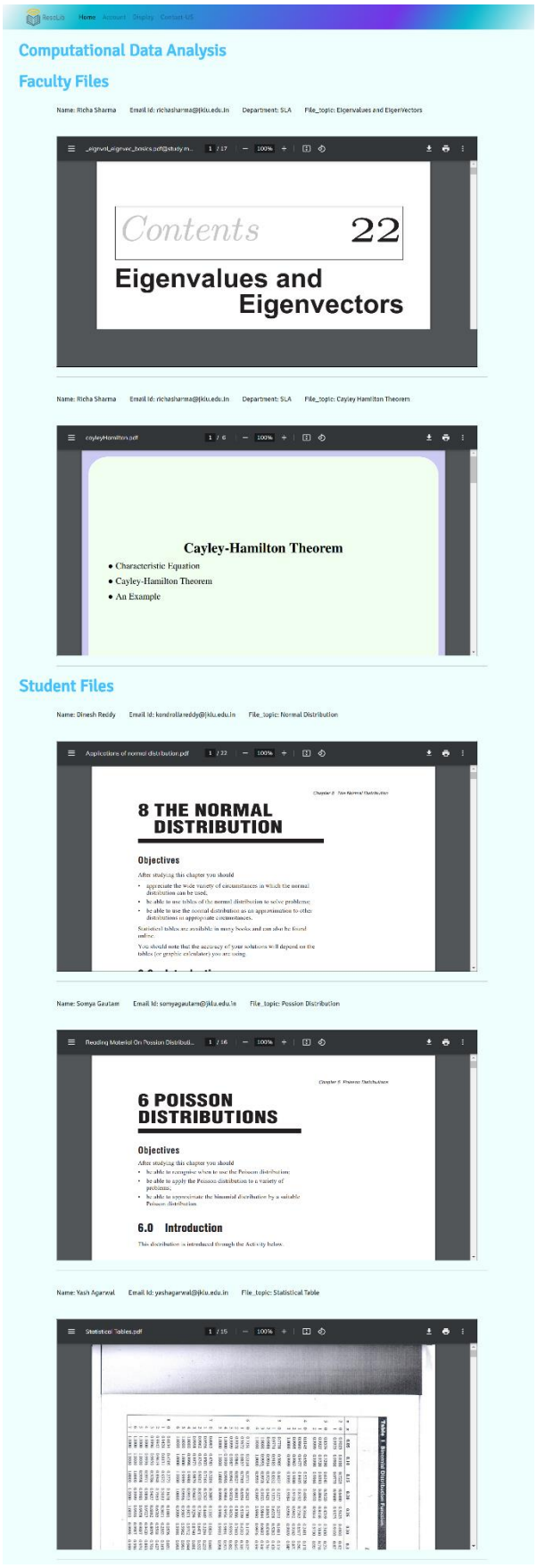

Figure 6.7: CDA course files uploaded by faculty and students.

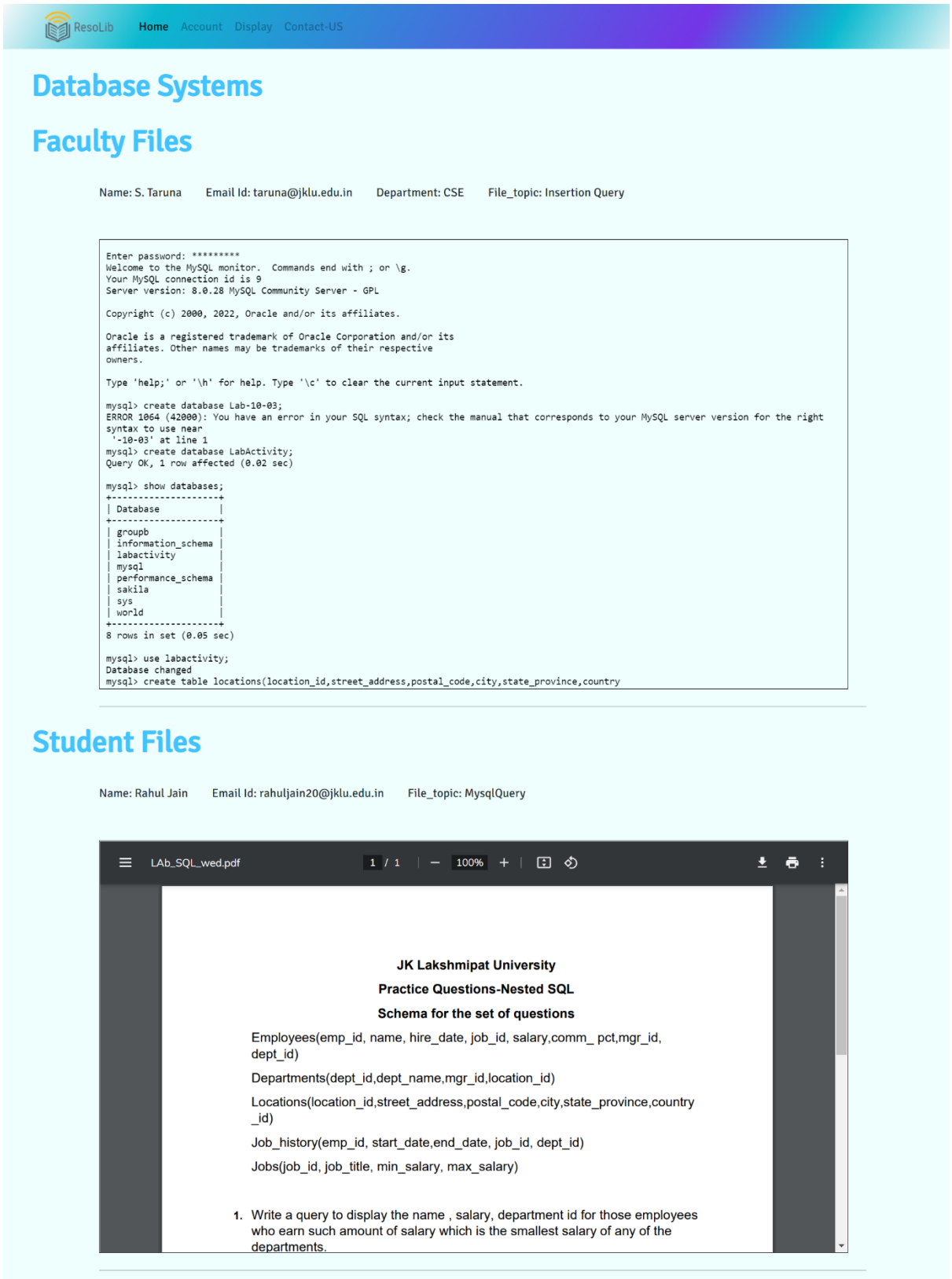

Figure 6.8: DS course files uploaded by faculty and students.

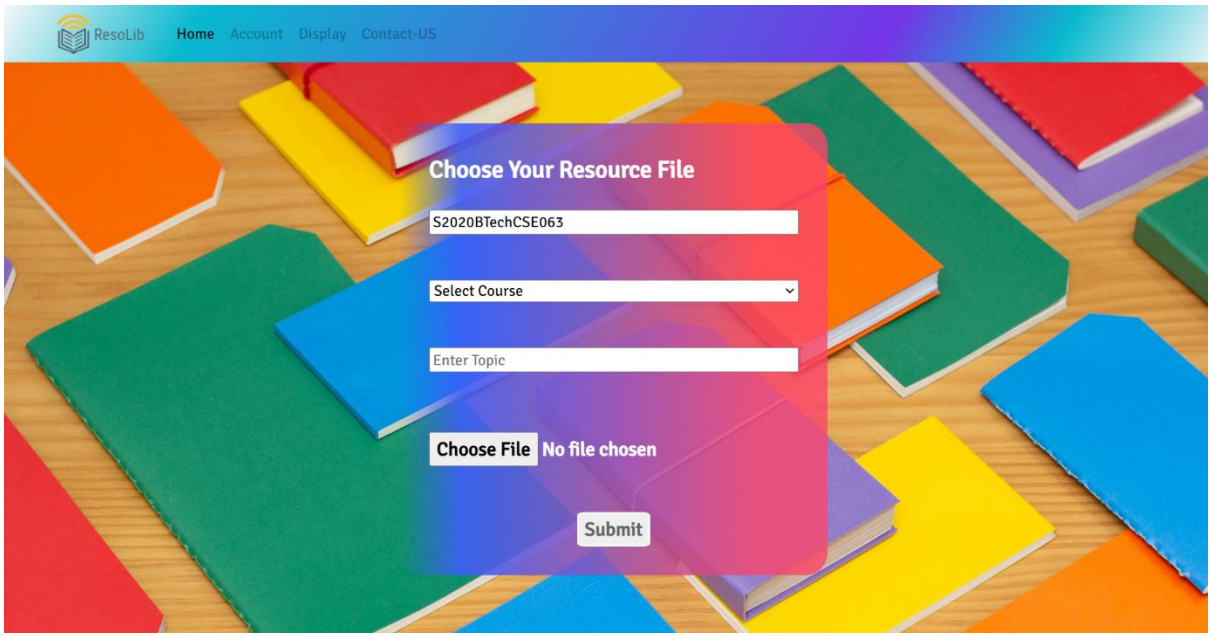

Figure 6.9: Page for uploading files.

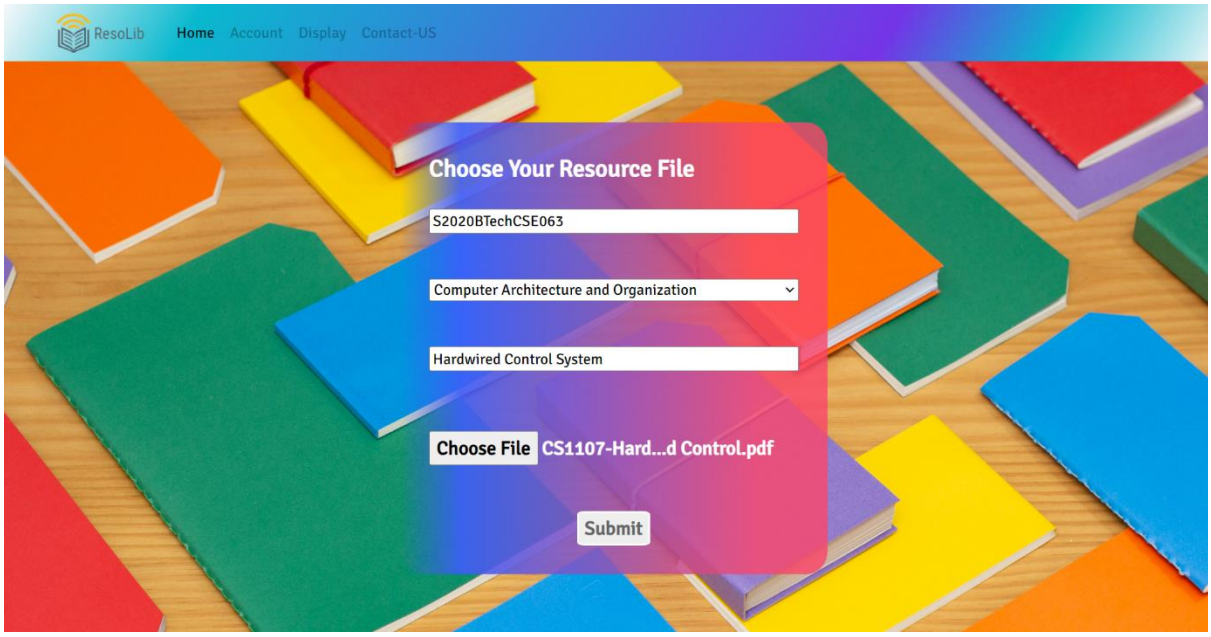

Figure 6.10: Upload page with the name of file entered.

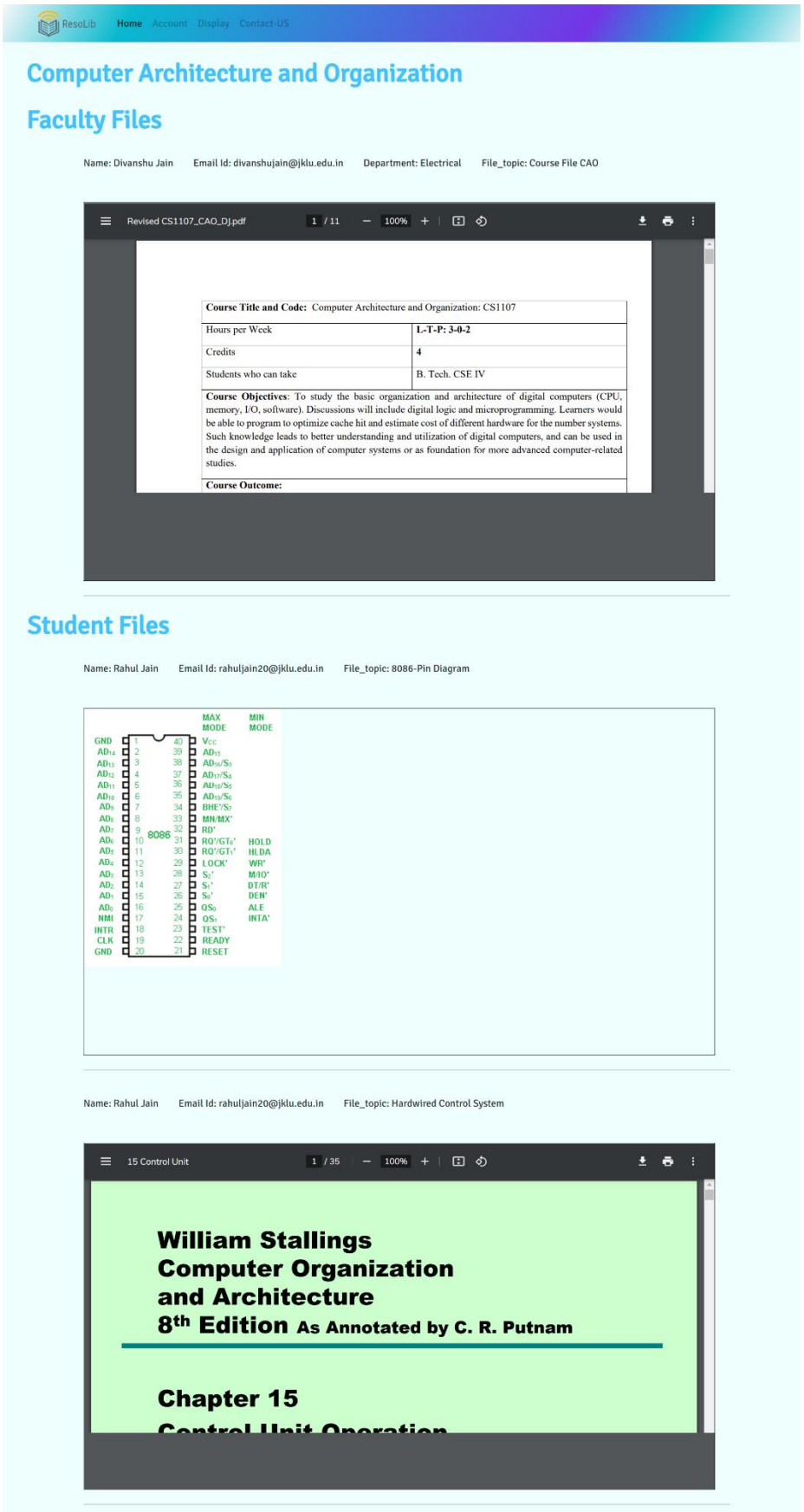

Figure 6.10: Showing file which was uploaded above.

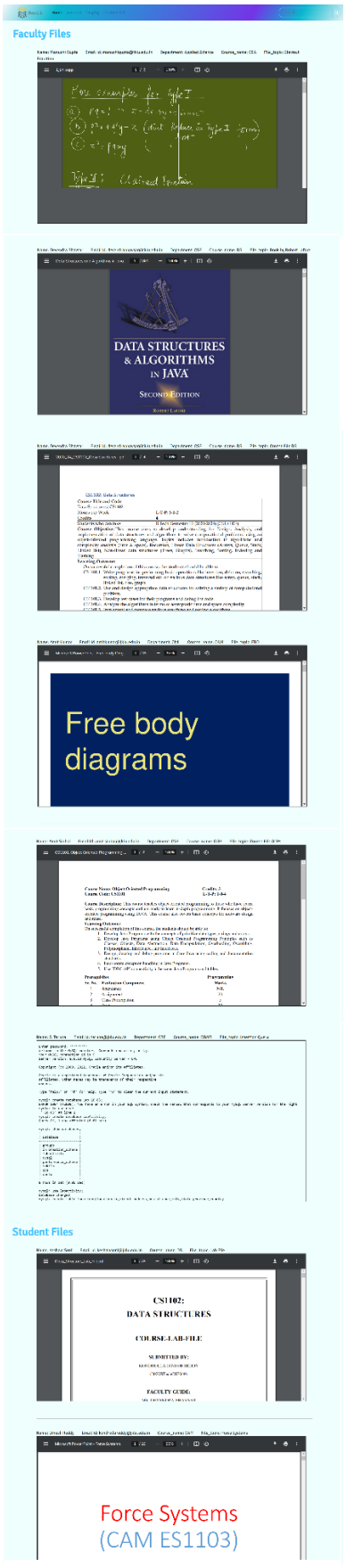

Figure 6.11: Display page where we can view all files at once.

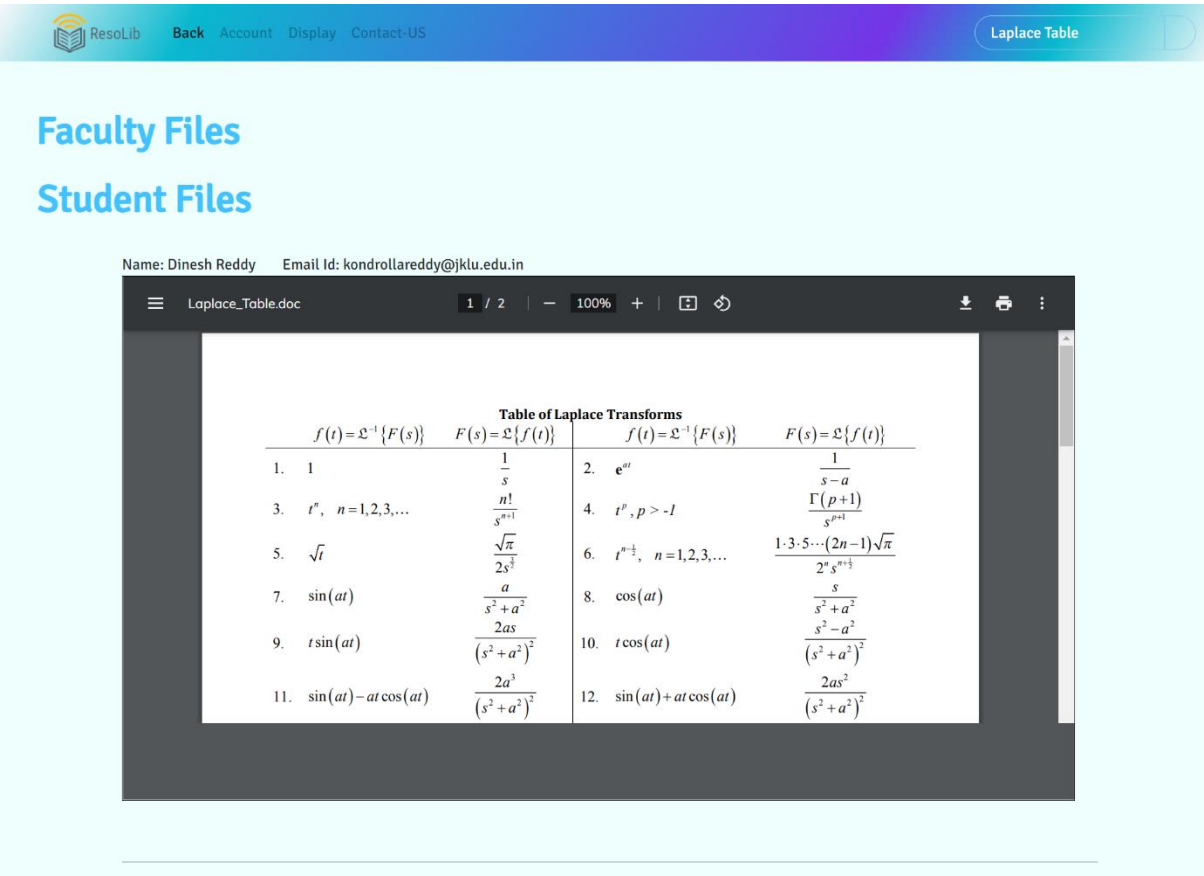

Figure 6.12: Showing files which were searched.

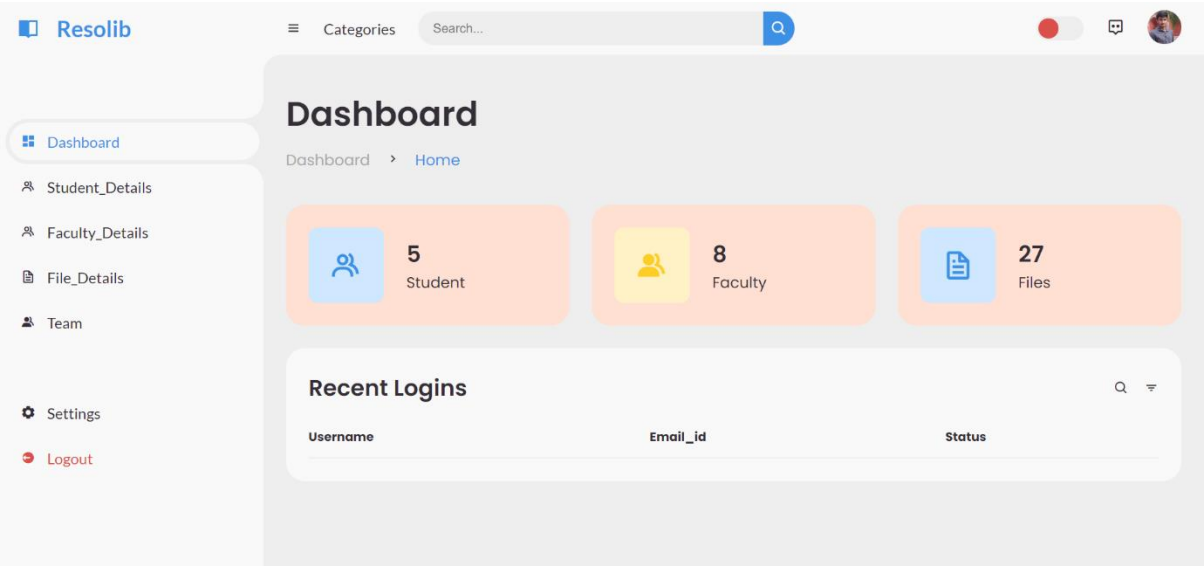

Figure 6.13: Admin Dashboard.

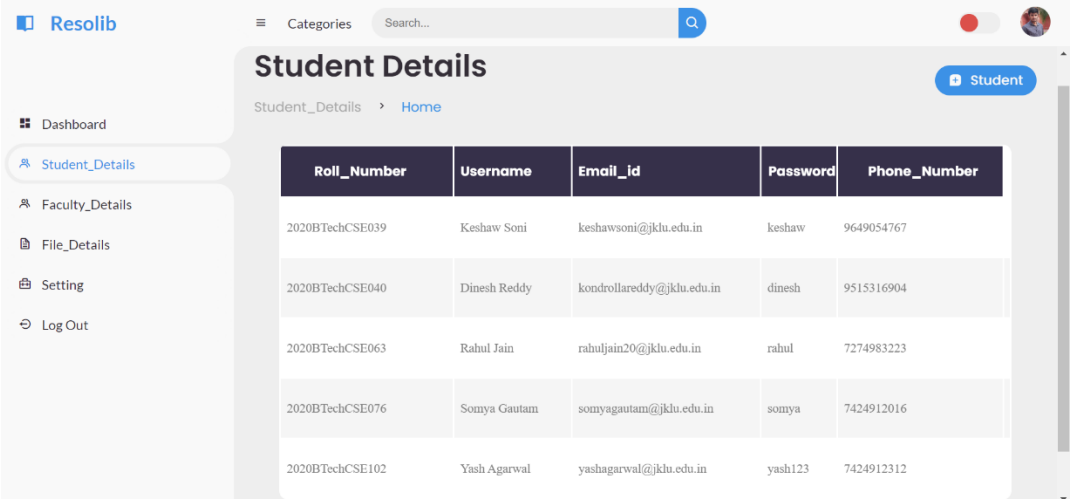

Figure 6.14: Admin can view all those students who are registered.

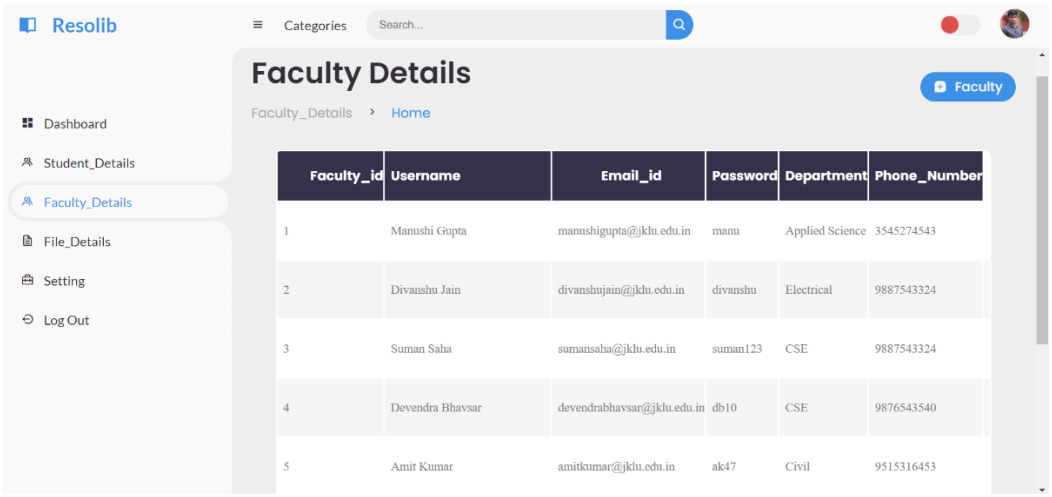

Figure 6.15: Admin can view all those faculties who are registered.

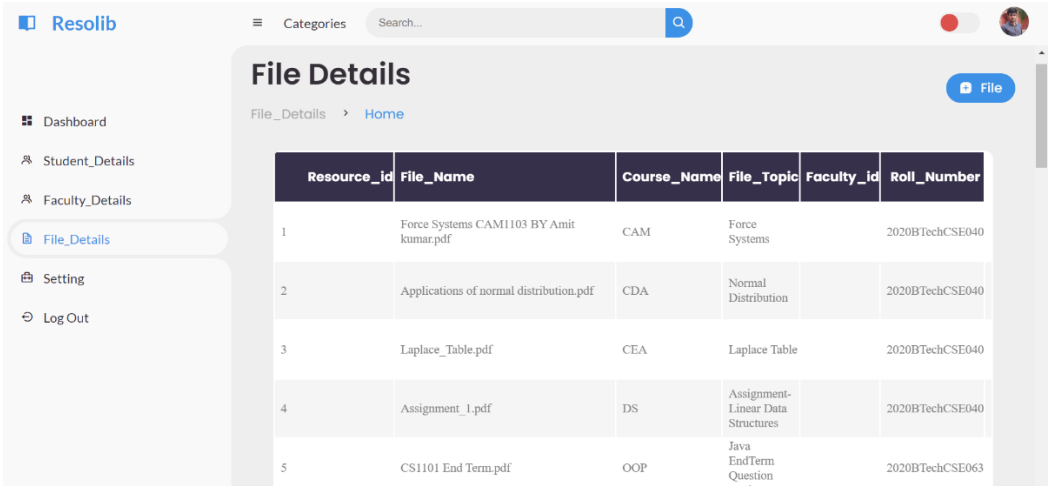

Figure 6.16: All the files which are uploaded.

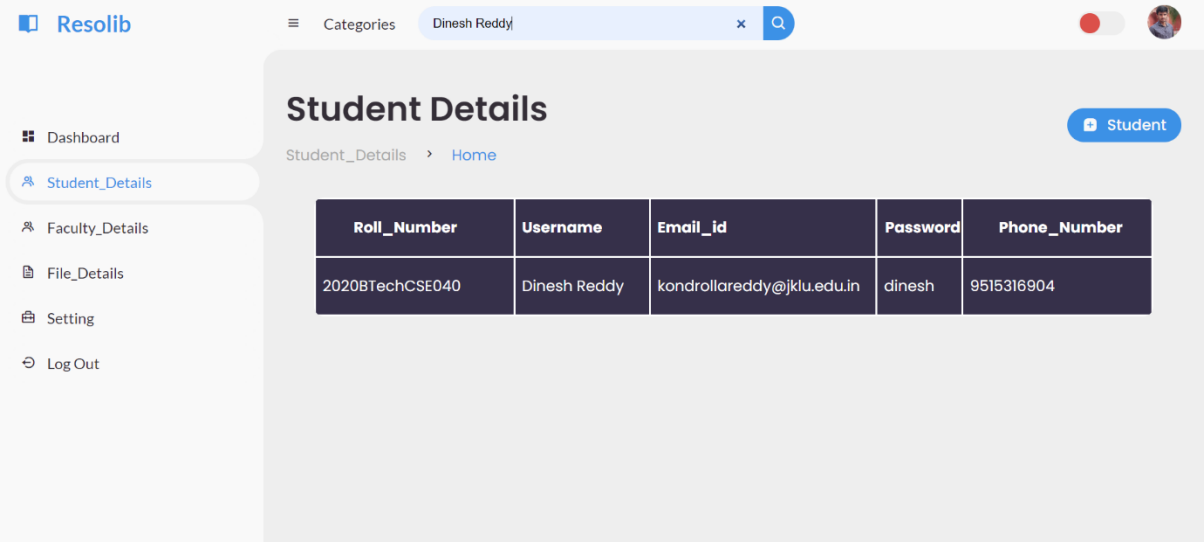

Figure 6.17: Admin can search students by name, roll number etc.

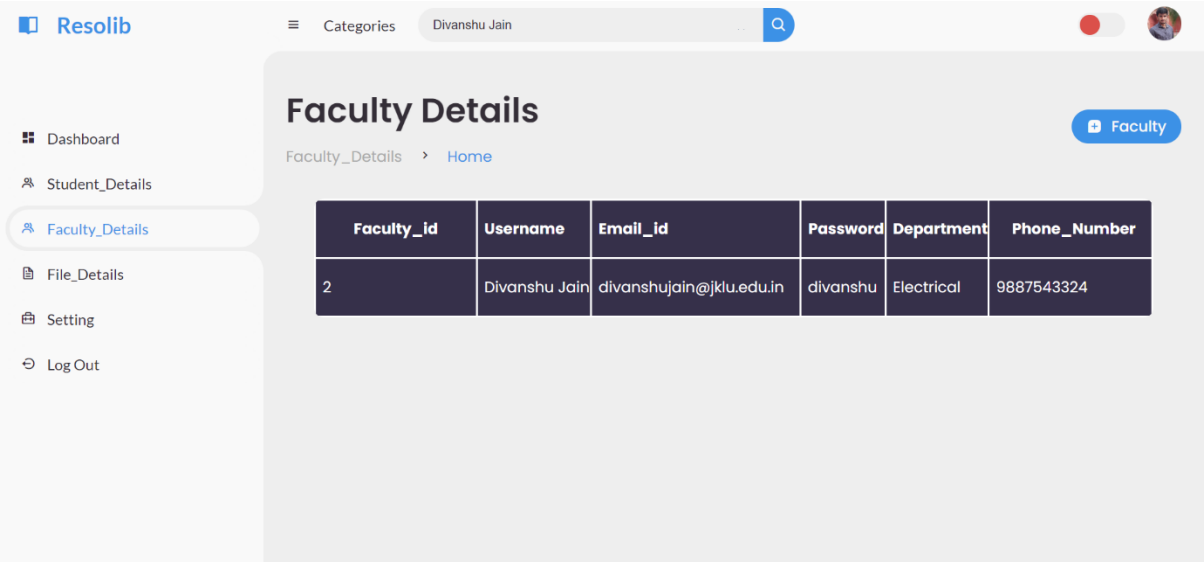

Figure 6.18: Admin can search faculty by name, email id etc.

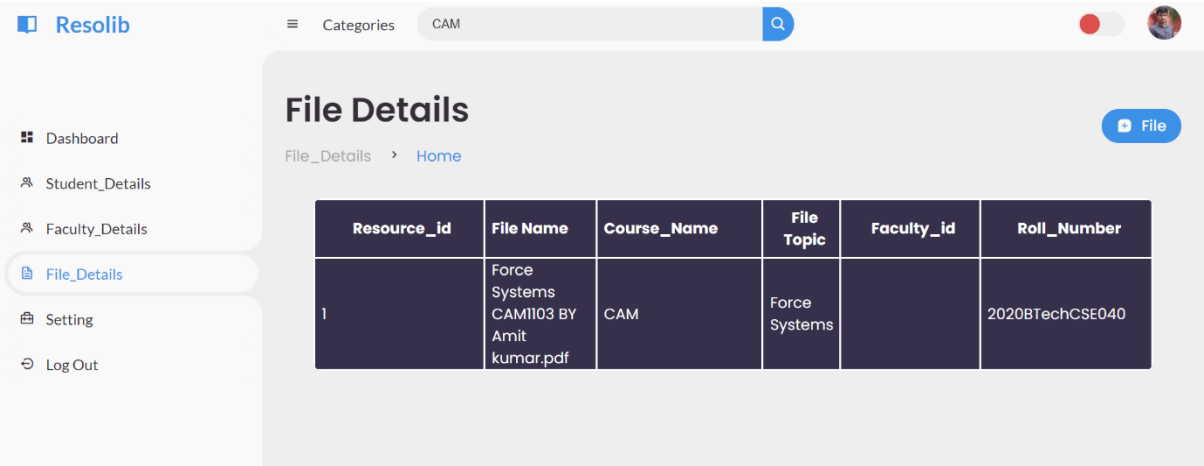

Figure 6.19: Admin can also search files.

7. FUTURE SCOPE

- Since we are considering this platform for an entire institution, we can include a variety of programmes such as BBA, B.Design, and MBA.
- As cybercrime is on the rise, we need to protect our website and the information of our users by implementing encryption (hashing).
- We need to include an account/profile section so that users may read and amend their information.
- We can include a section where all faculty members can send a message to all students who have registered on this website.
- We can include a section where students and faculty members can comment on and vote on the resource file.
- We can limit the number of files that a student or faculty member can upload.
- When a file is uploaded, we can include the date and time so that we can organize it more efficiently.

8. PROJECT GITHUB REPO

- GitHub Repository for ResoLib

  https://github.com/Keshaw08/ResoLib.git

9. REFERENCES

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