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CS5003NI Data Structure and Specialist Programming

Assessment Type
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Submitted to: Mr. Prithivi Maharjan
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I confirm that I understand my coursework needs to be submitted online via Google Classroom under the relevant module page before the deadline in order for my assignment to be accepted and marked. I am fully aware that late submissions will be treated as non-submission and a marks of zero will be awarded

Acknowledgement

I extend my sincere gratitude to out Prithvi Sir for granting me the opportunity to undertake this coursework. His guidance and support have been instrumental in navigating the complexities of web application development and Java EE technologies. Under his mentorship, I have gained valuable insights and skills that will undoubtedly shape my future endeavors.

Furthermore, I am indebted to London Metropolitan University and Islington College for providing an enriching academic environment. The resources and facilities offered by these institutions have facilitated my learning journey, allowing me to explore and engage with the subject matter deeply.

Lastly, I would like to express appreciation to my friends, classmates, and teachers for their unwavering support and collaboration throughout this project. Their encouragement, feedback have been invaluable, contributing significantly to the success of this coursework.

Thank you to all those involved for this enriching experience.

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1. Introduction

Welcome to our platform dedicated to empowering students globally. We serve as a nexus between university seekers and mentors, facilitating invaluable guidance for those embarking on their journey to study abroad. With personalized connections, seekers gain access to tailored advice on universities, scholarships, and more, while mentors seize the opportunity to share their expertise and earn income. Our mission is to simplify the application process and foster a diverse exchange of perspectives, transcending geographical barriers. Join us in revolutionizing the way students navigate the path to higher education, making dreams of studying abroad a tangible reality for all.

1.1. Business Model

The platform works as a two-sided marketplace connecting university seekers (students looking for guidance) with mentors (university students/ alumni offering for services). The revenue generation mostly comes from transaction fee, advertising, and partnerships with universities.

1.2. Target Audience

- University Searching Students:
  Undergraduate and graduate students seeking guidance, advice, and mentorship regarding university selection, scholarships, and other related matters.

- University Students/Alumni:
  Current students or alumni are willing to earn some money in exchange for their guidance, mentorship, and advice to prospective students.

1.3. Unique Selling Proposition

- This platform offers direct connection between searching students and university students.
- It provides seekers the ability to search mentors and services based on specific criteria such as university, price, location, and so on according to their preferences.

- This platform provides a convenient way for searching students to connect with university students from around the world, eliminating geographical barriers and offering a diverse range of perspectives.

1.4. Aim

The main aim of the platform is to simplify the university application process for students seeking to study abroad by connecting them with experienced university students or alumni who offer guidance and support.

1.5. Objectives

- To connect university seekers with students(mentors) from their dream university.
- To simplify the university application process.
- To offer guidance on universities, scholarships, and benefits.
- To provide access to a wide range of services offered by students from various universities worldwide.
- To provide a source of income for unemployed university students abroad.

2. User Interface Design

2.1. Wireframe

2.1.1. Home Page (Index)

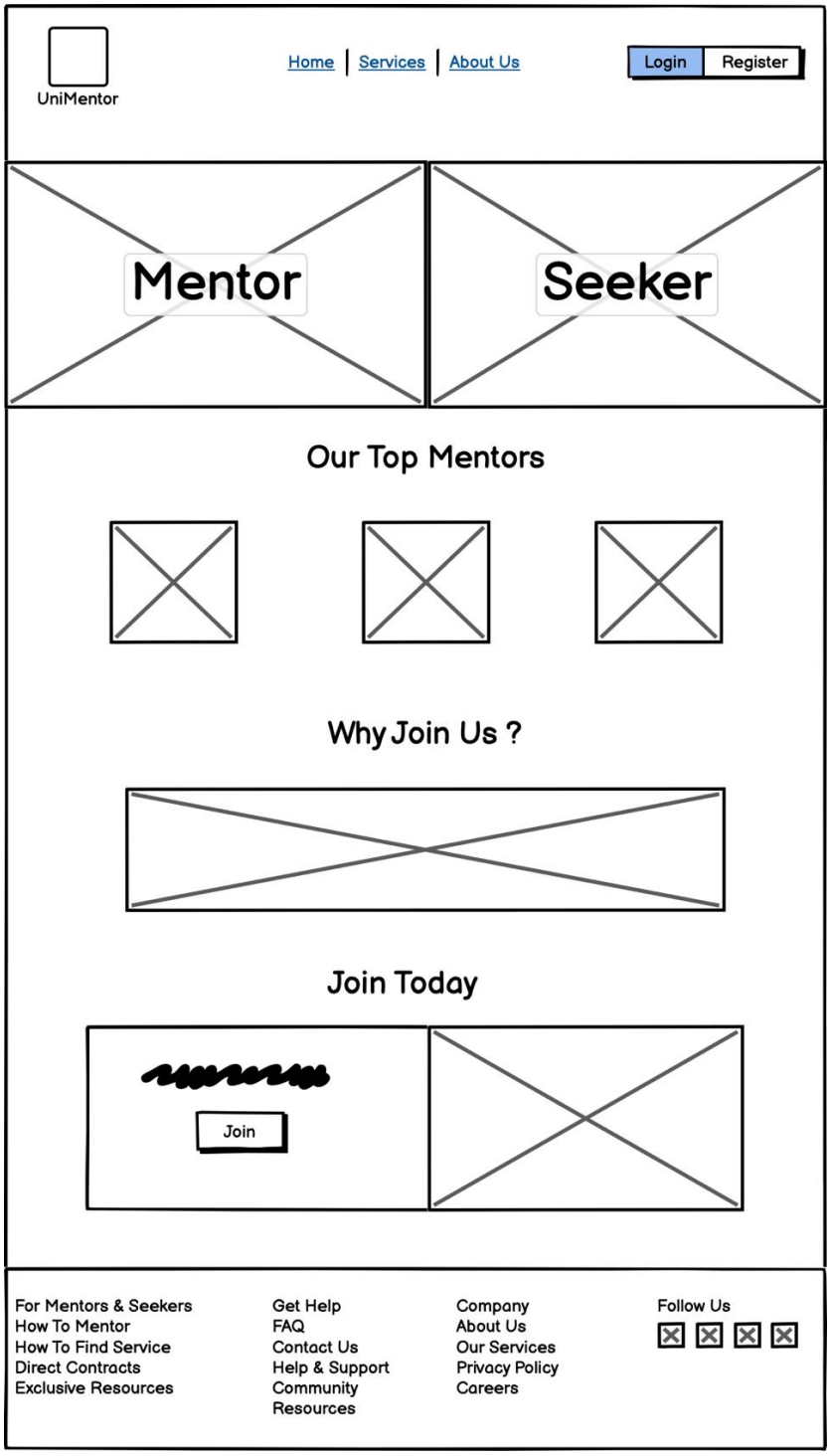


Figure 1: Wireframe of Home page

2.1.2. Services Page (For Seekers)

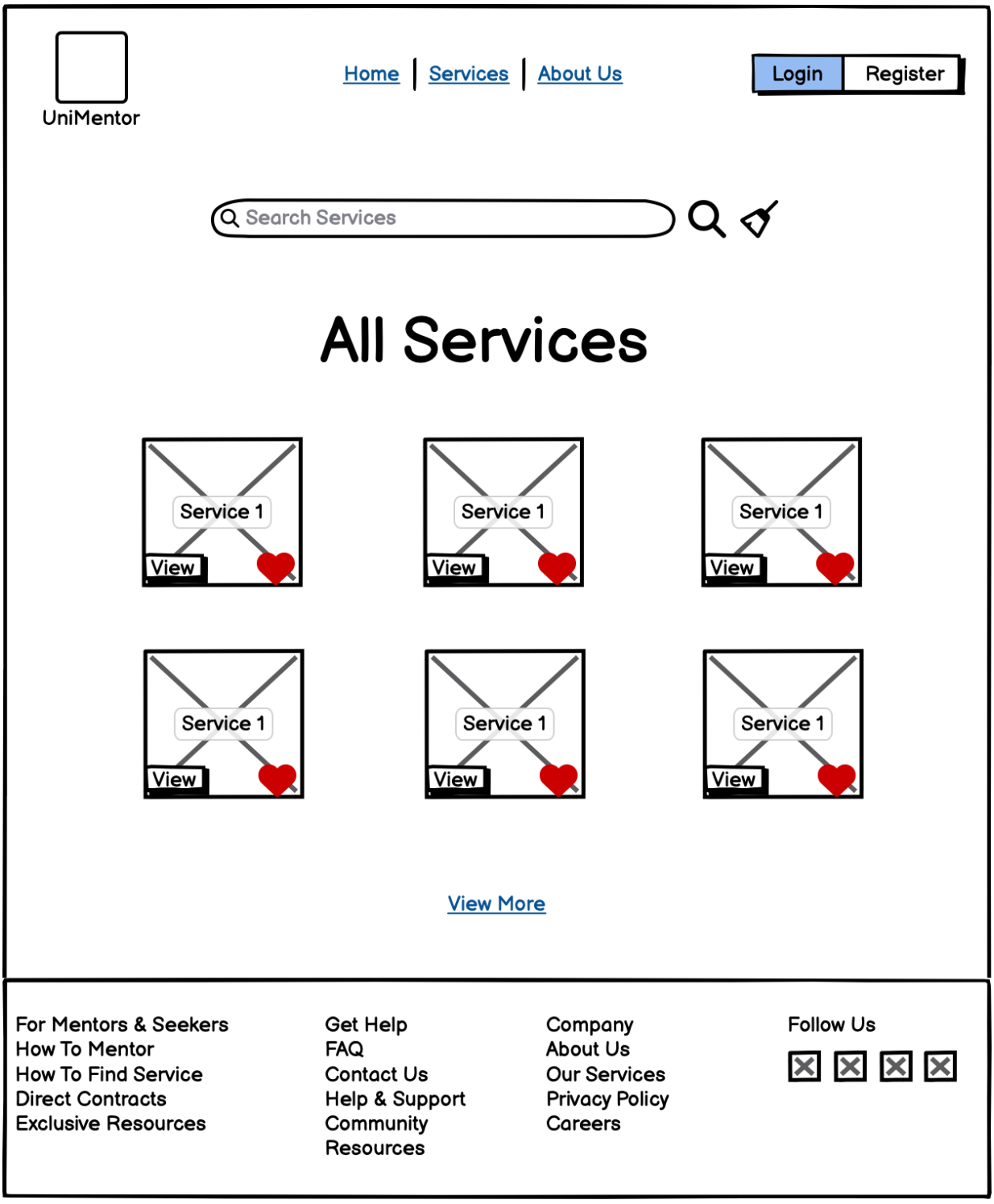


Figure 2: Wireframe of Services page

2.1.3. My Services Page (For Mentors)

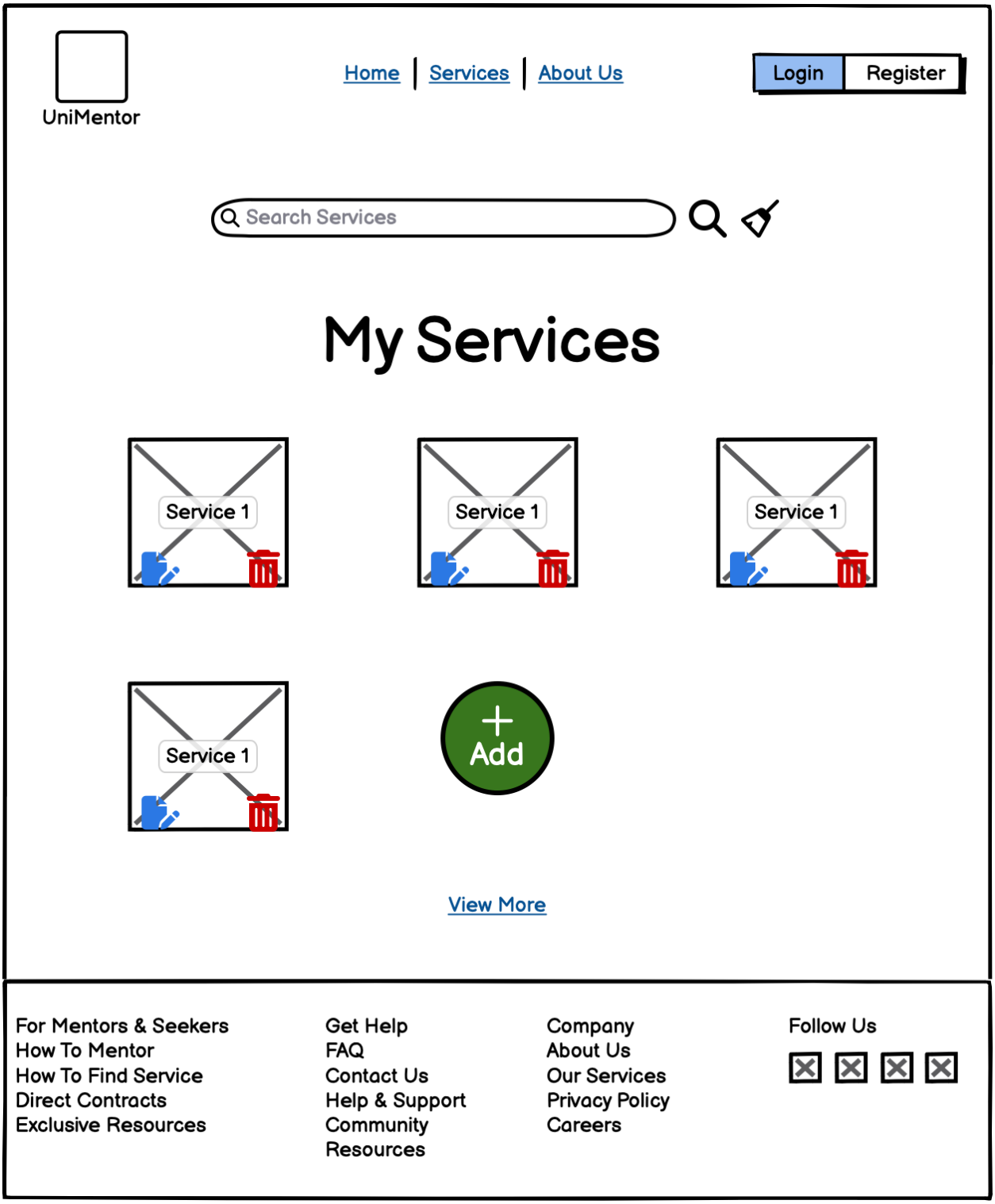


Figure 3: Wireframe of my services page

2.1.4. Welcome Page

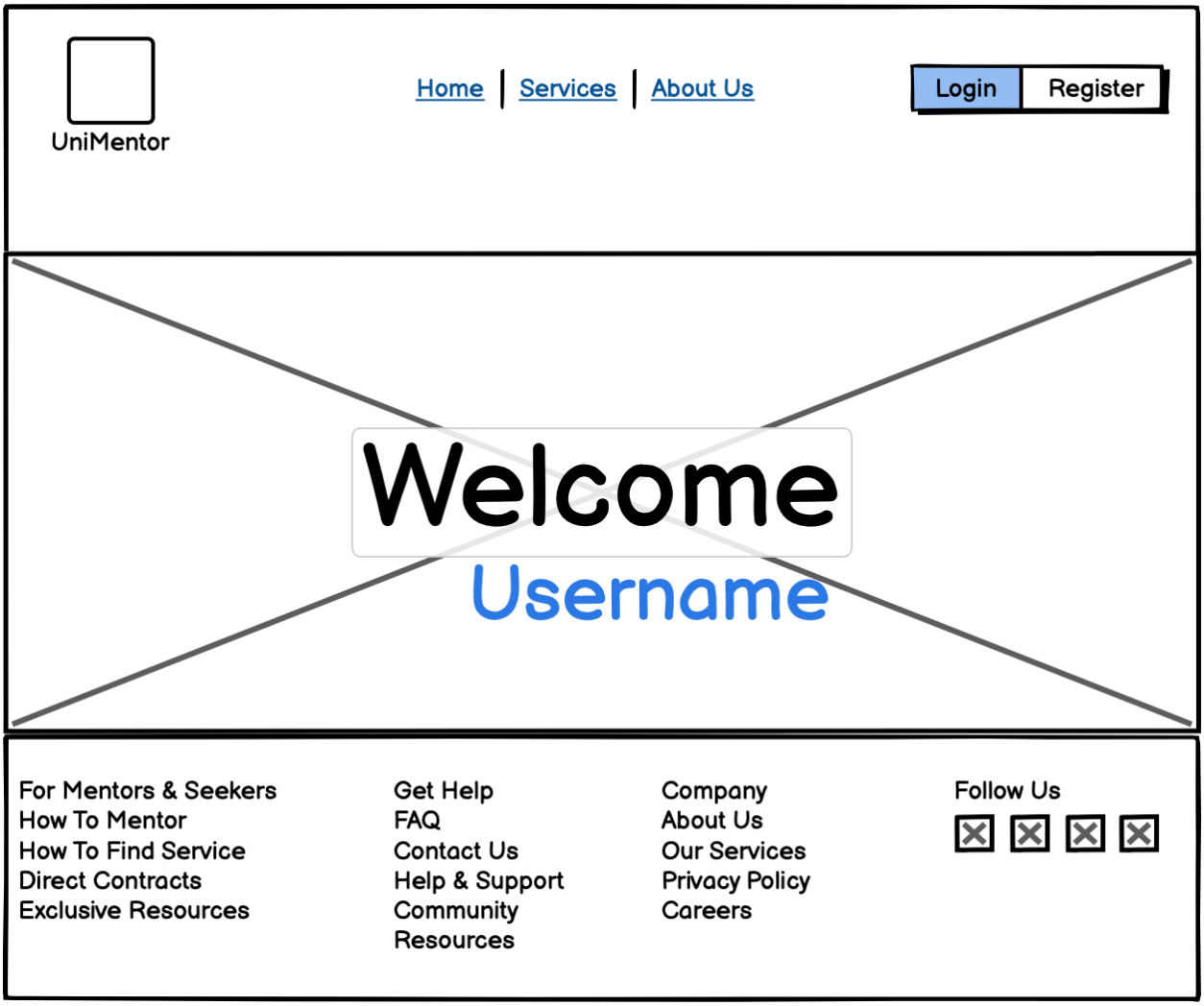


Figure 4: Wireframe of Welcome page

2.1.5. Login Page

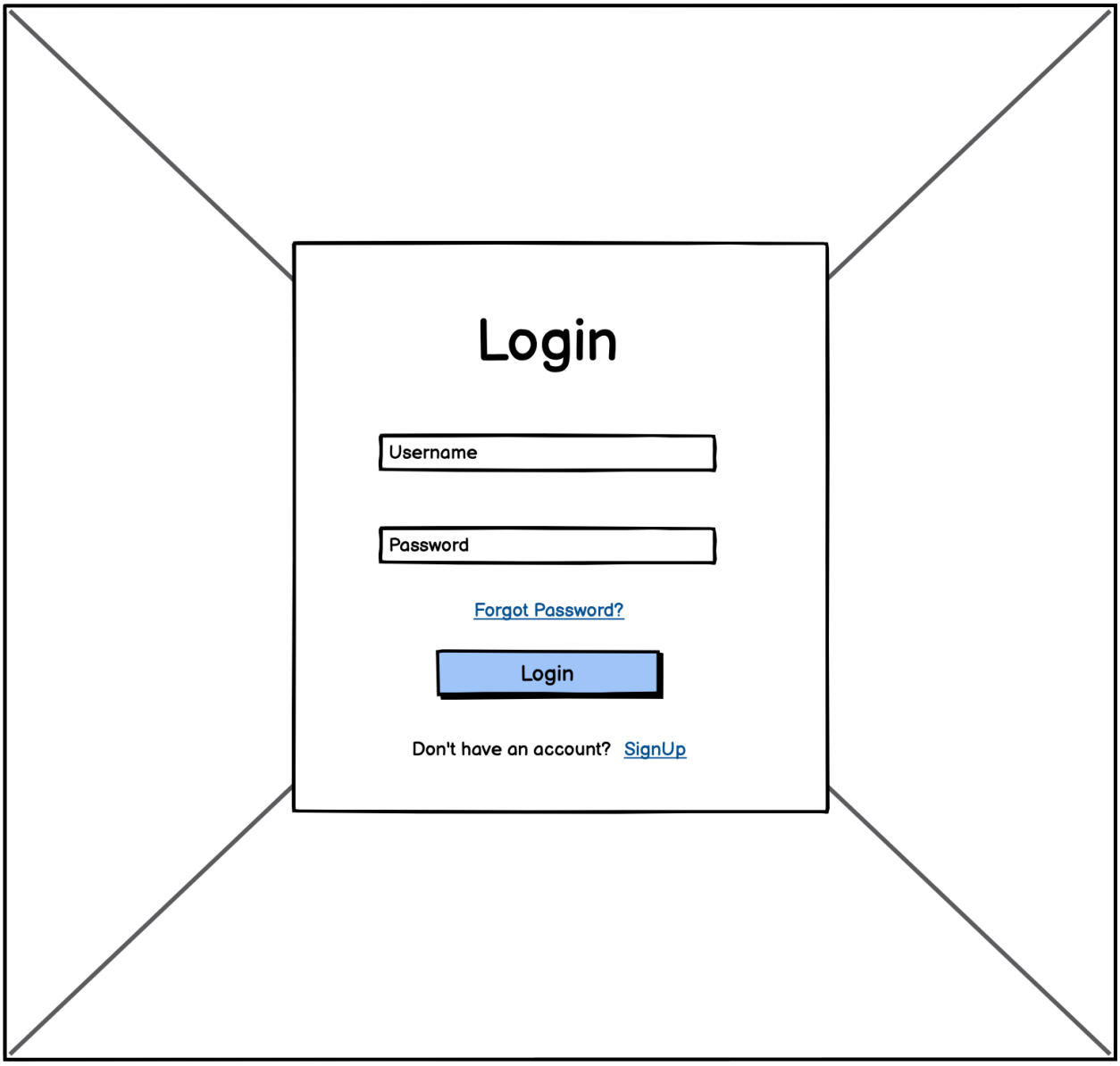


Figure 5: Wireframe of Login Page

2.1.6. Register Mentor Page

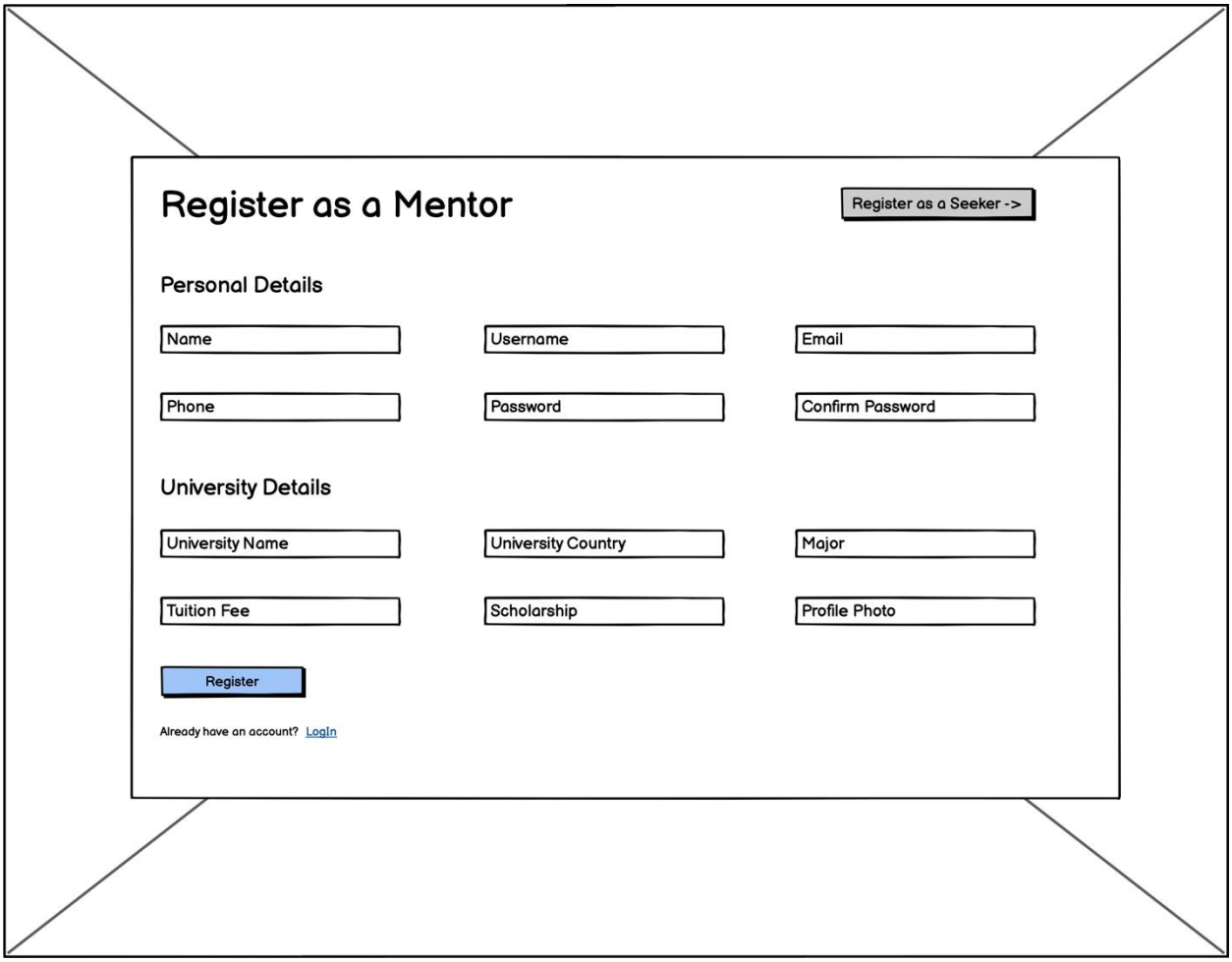


Figure 6: Wireframe of Register Mentor Page

2.1.7. Register Seeker Page

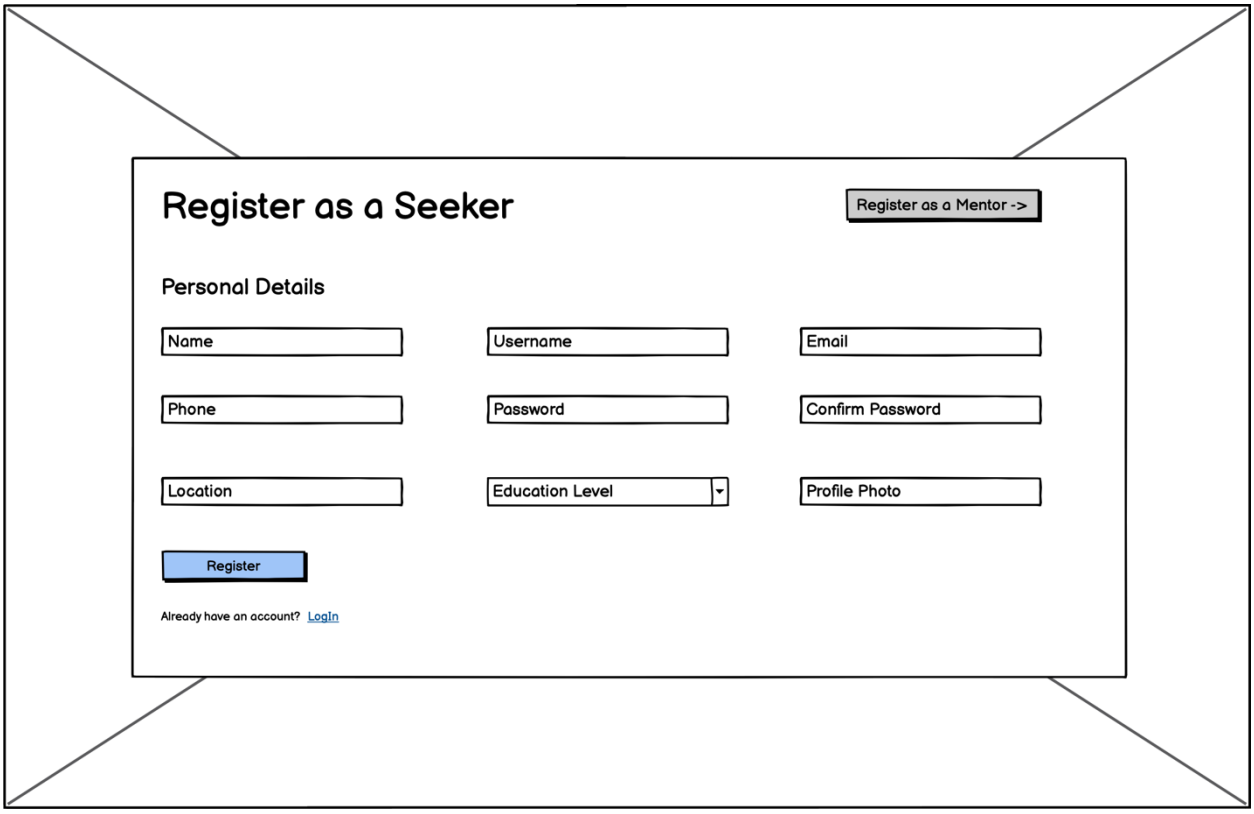


Figure 7: Wireframe of register seeker page

2.1.8. Profile Page

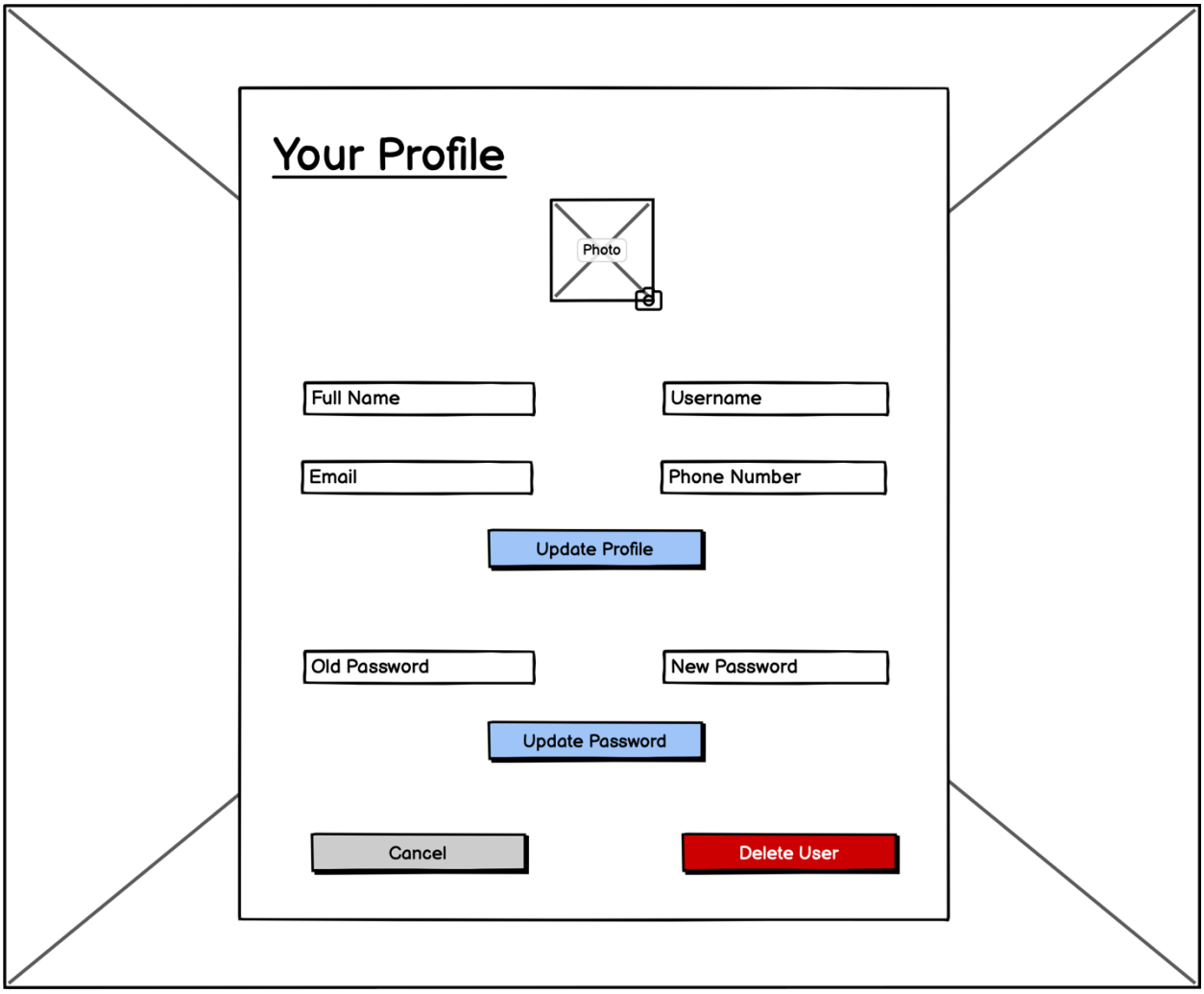


Figure 8: Wireframe of profile page

2.1.9. Add / Update Service Page

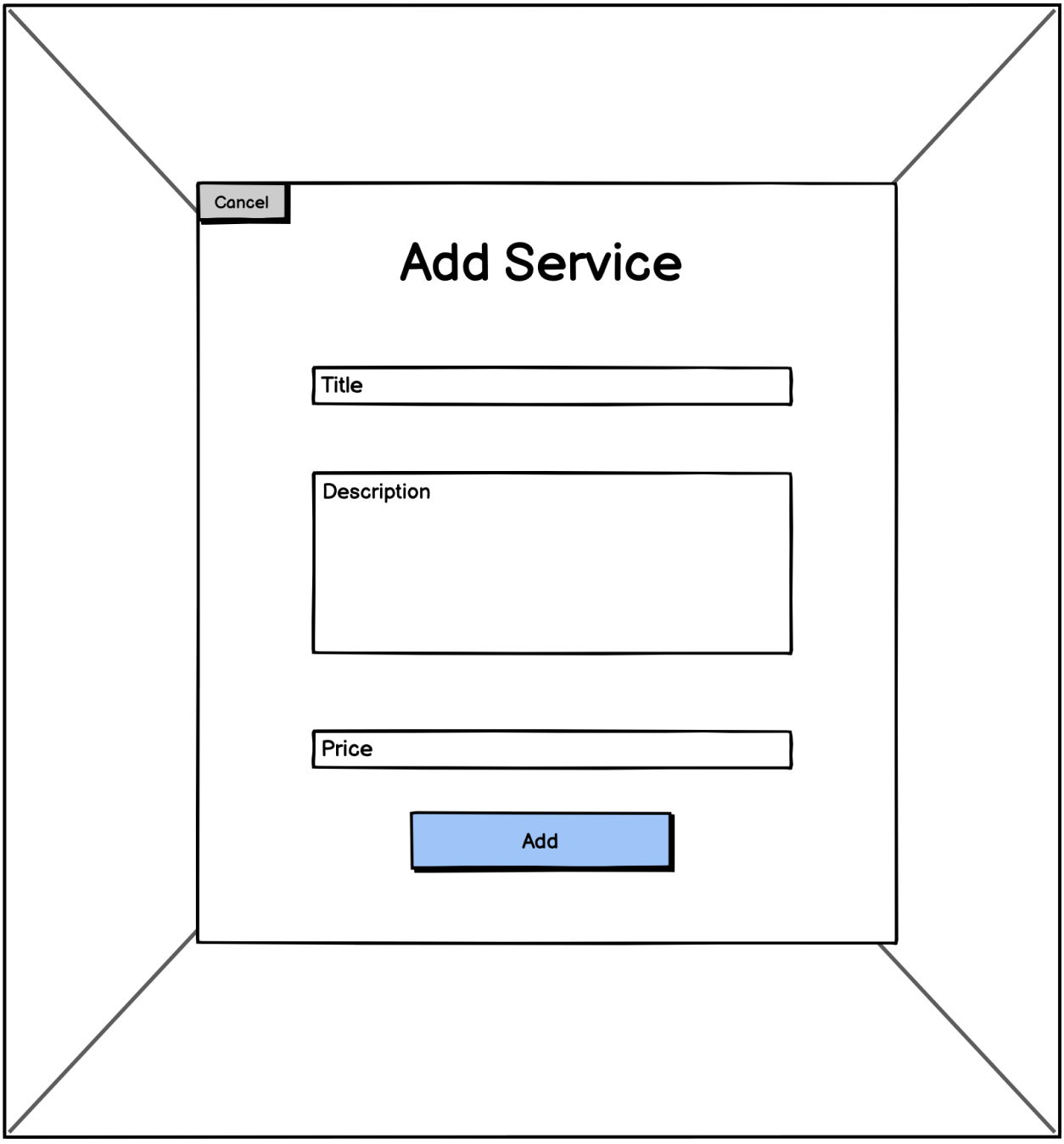
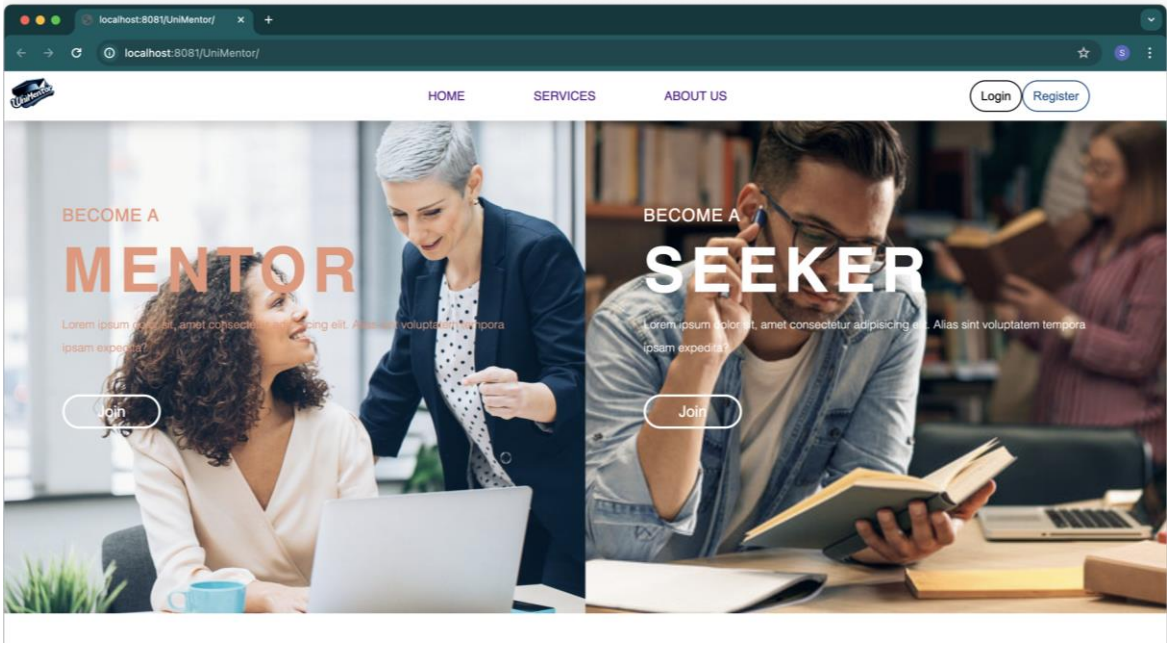
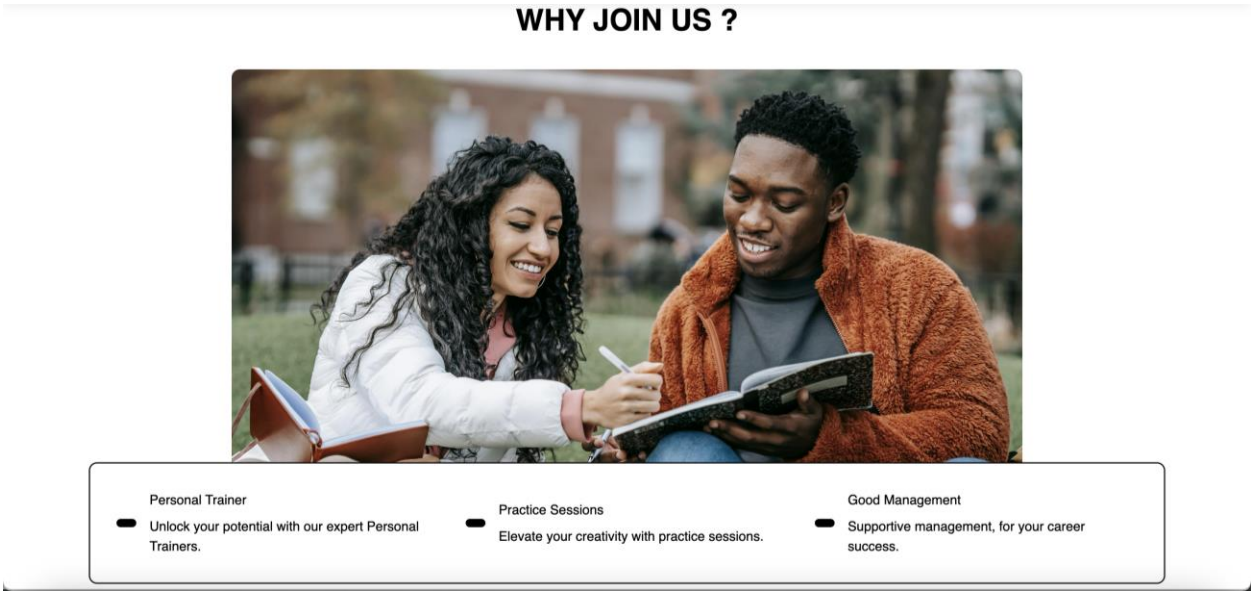


Figure 9: Wireframe of Add/Update service page

2.2. Actual design

2.2.1. Home Page (Index)





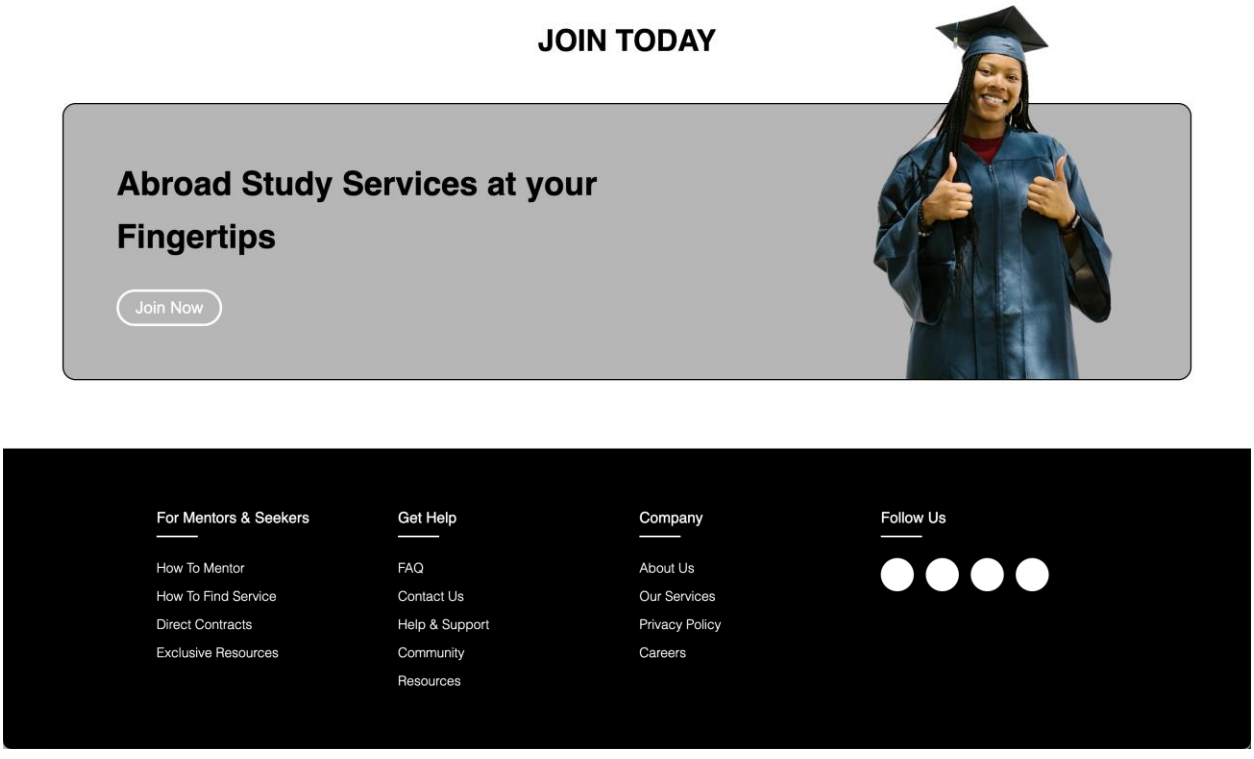


Figure 10: Actual Index Page

2.2.2. Services Page (For Seekers)

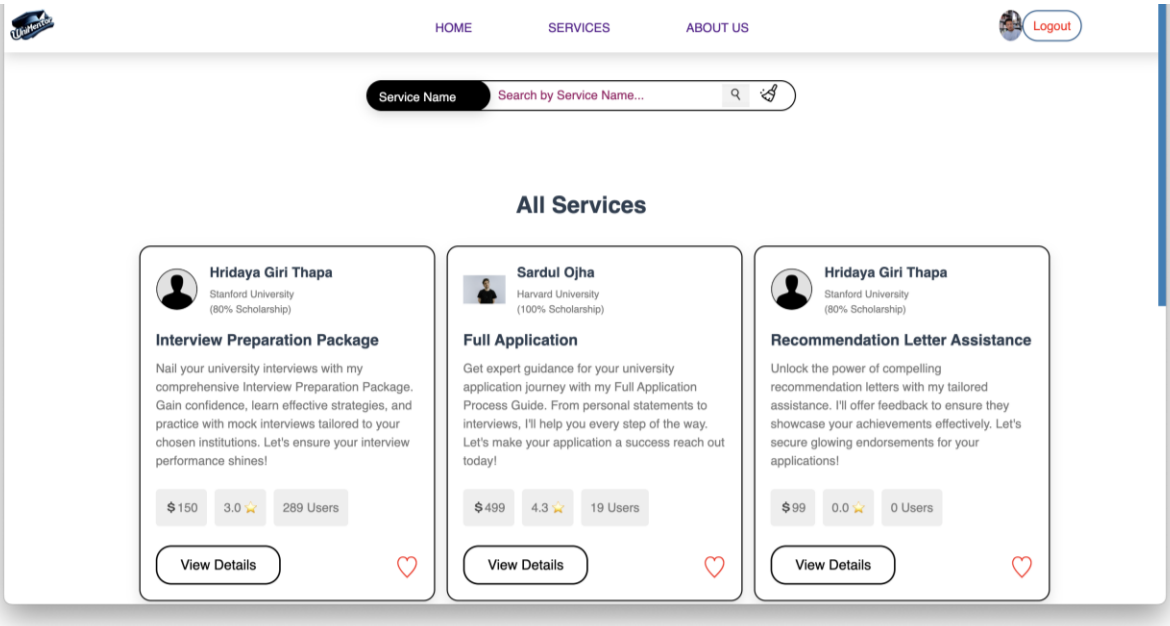


Figure 11: Actual service page

2.2.3. My Services Page (For Mentors)

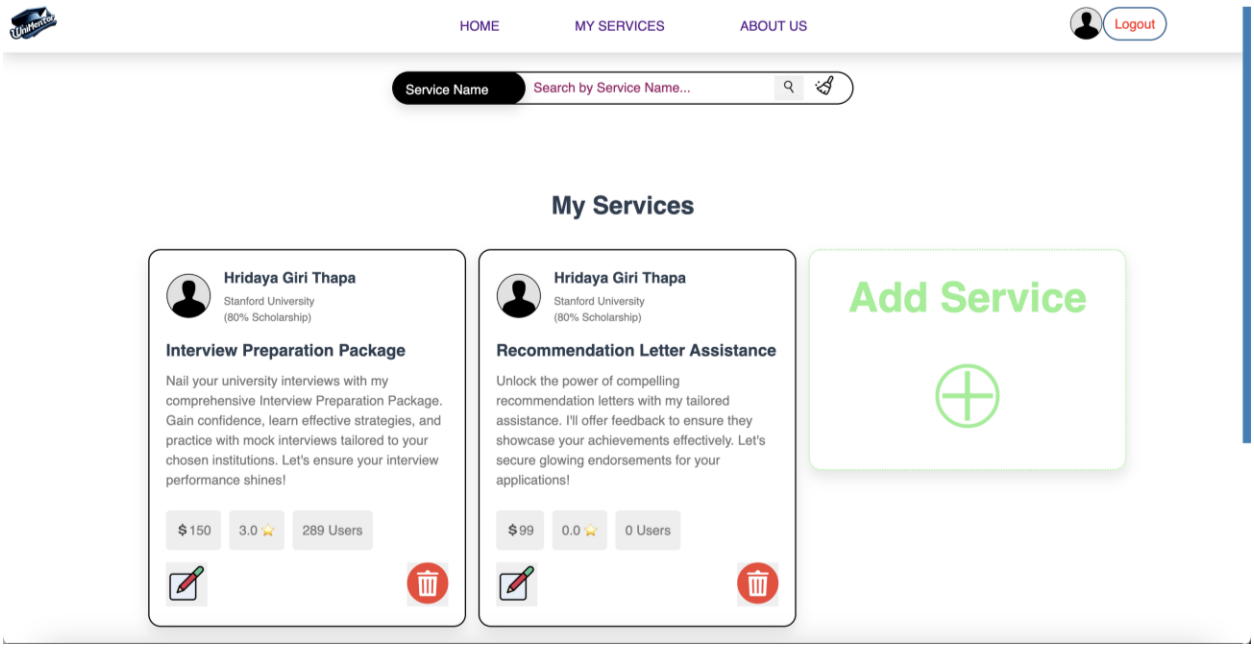


Figure 12: Actual my services page

2.2.4. Welcome Page

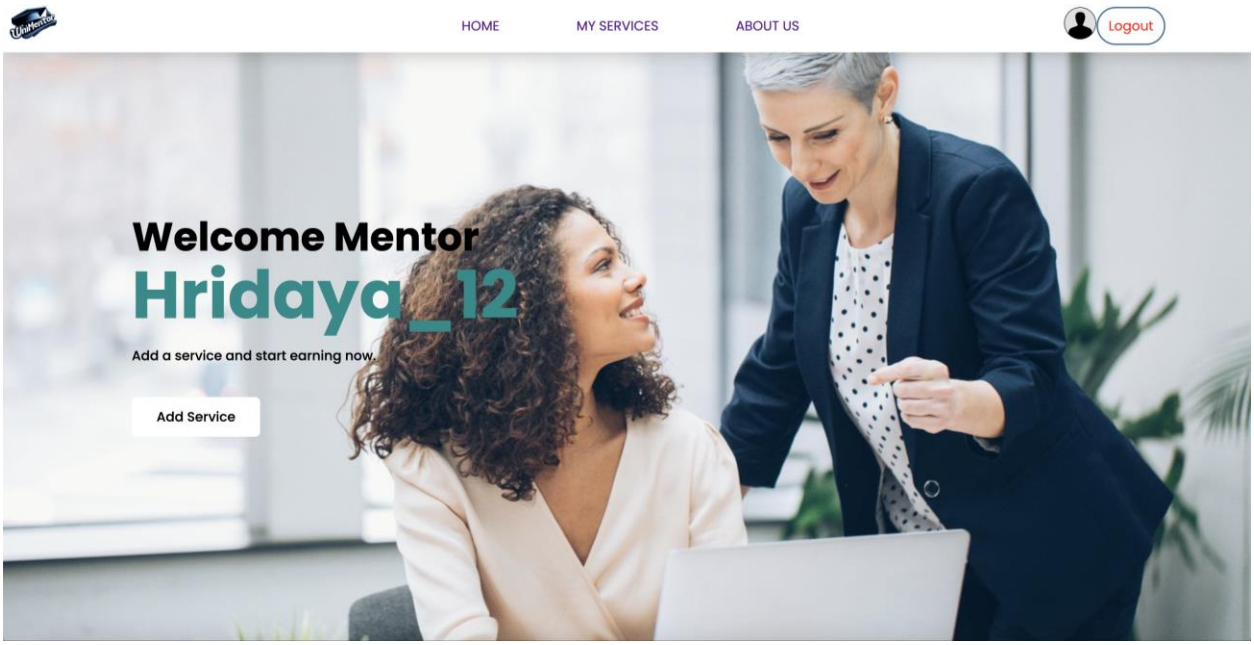


Figure 13: Actual welcome page

2.2.5. Login Page

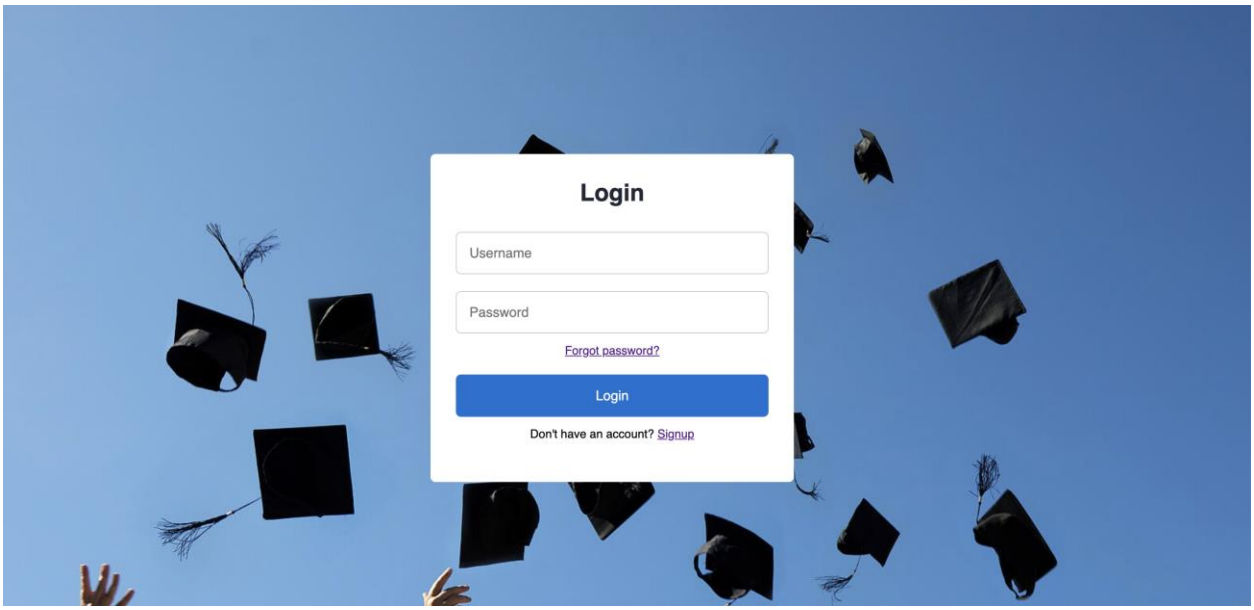


Figure 14: Actual login page

2.2.6. Register Mentor Page

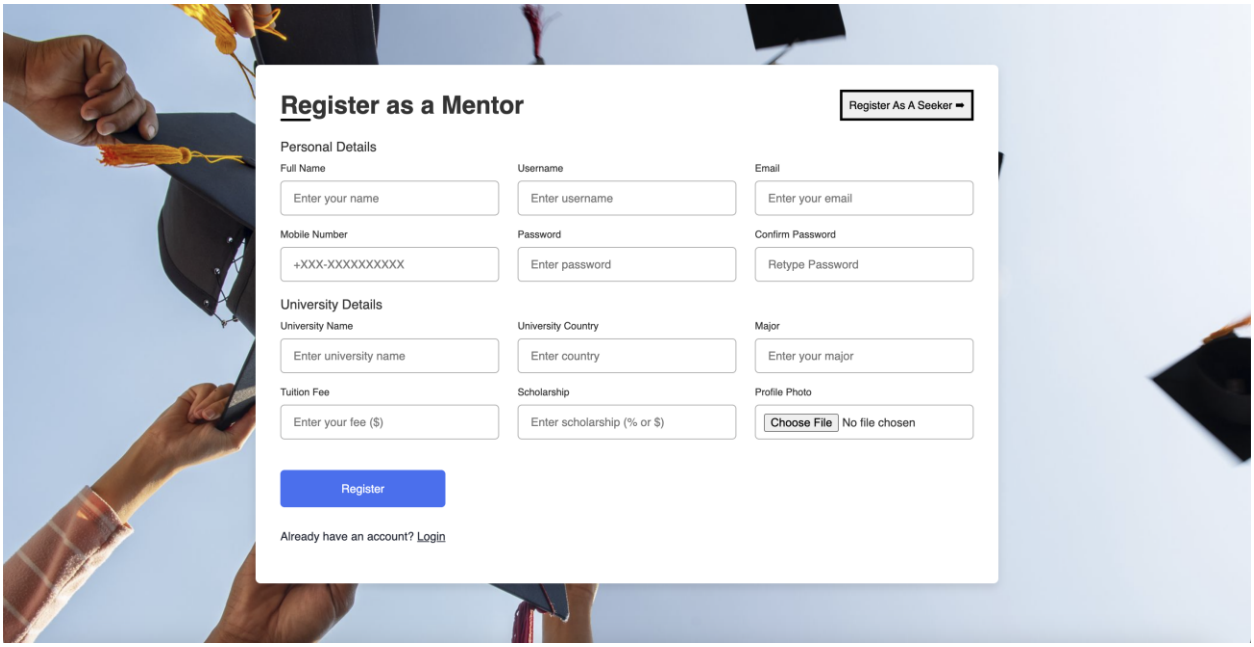


Figure 15: Actual register mentor page

2.2.7. Register Seeker Page

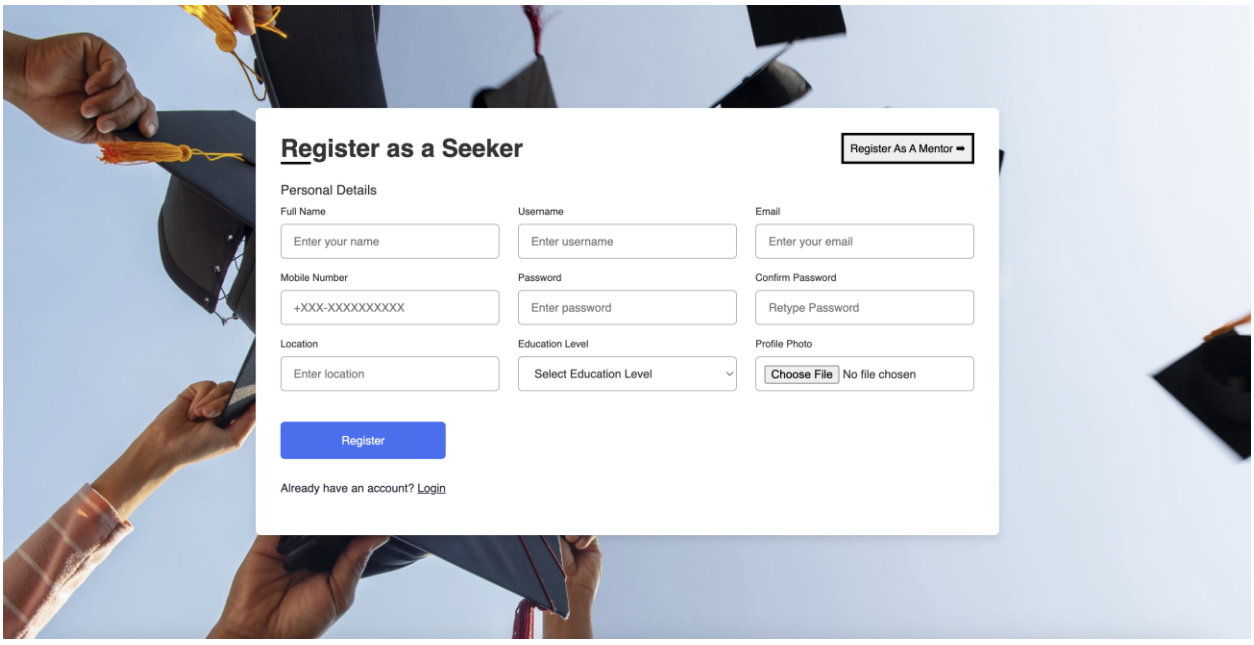


Figure 16: Actual register seeker page

2.2.8. Profile Page

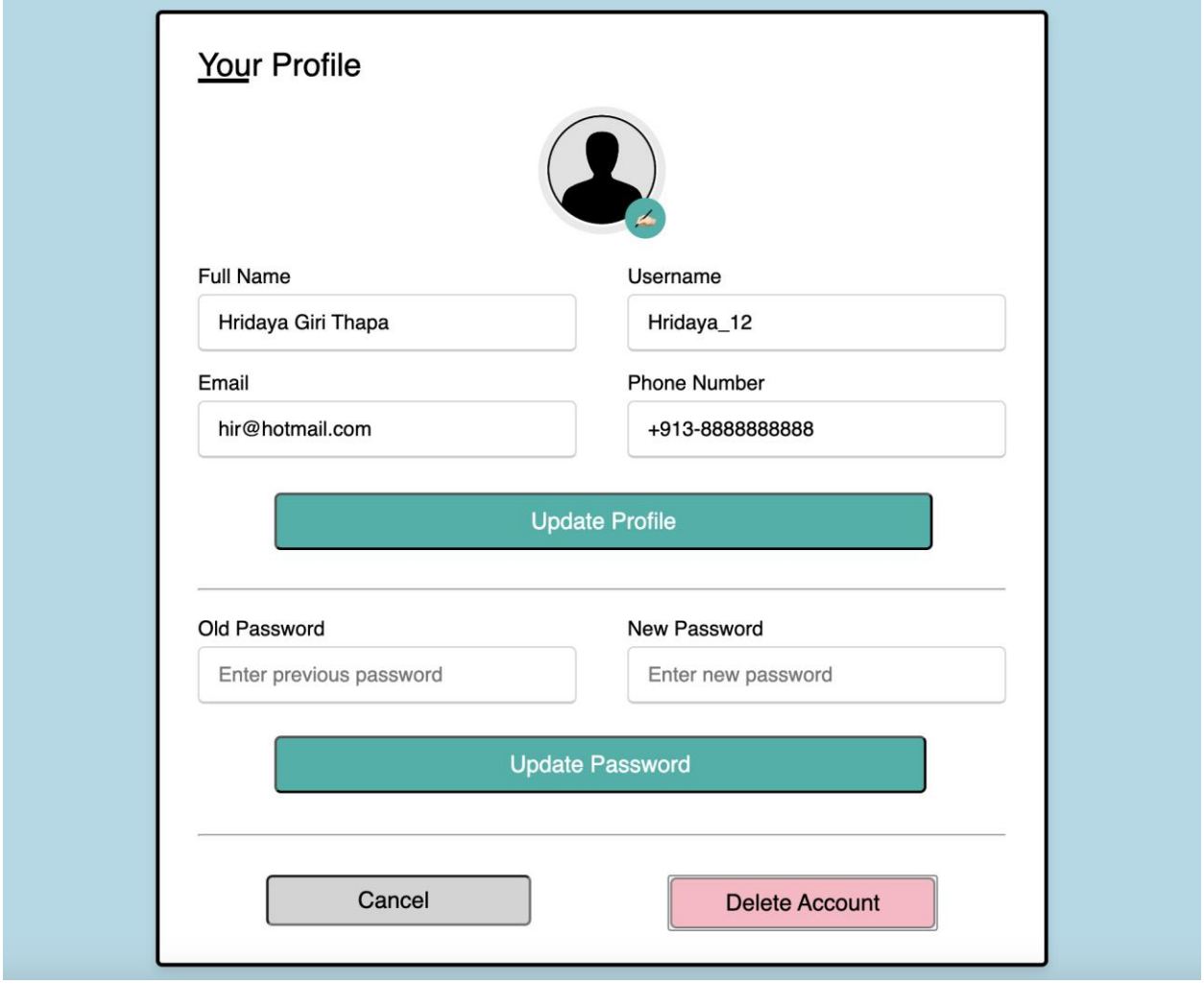


Figure 17: Actual profile page

2.2.9. Add / Update Service Page

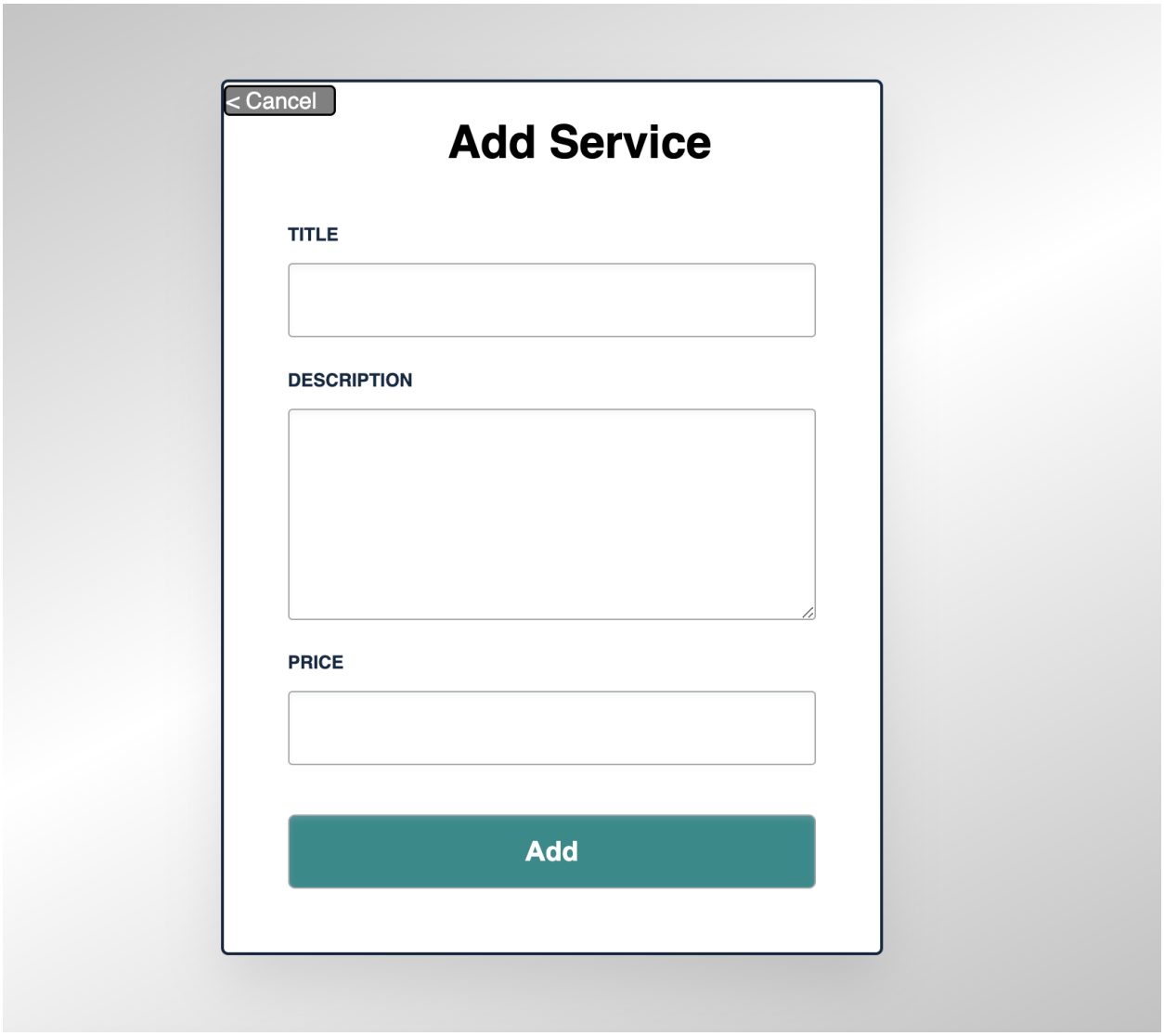


Figure 18: Actual add/update page

3. Class diagram

3.1. Combined Class Diagram

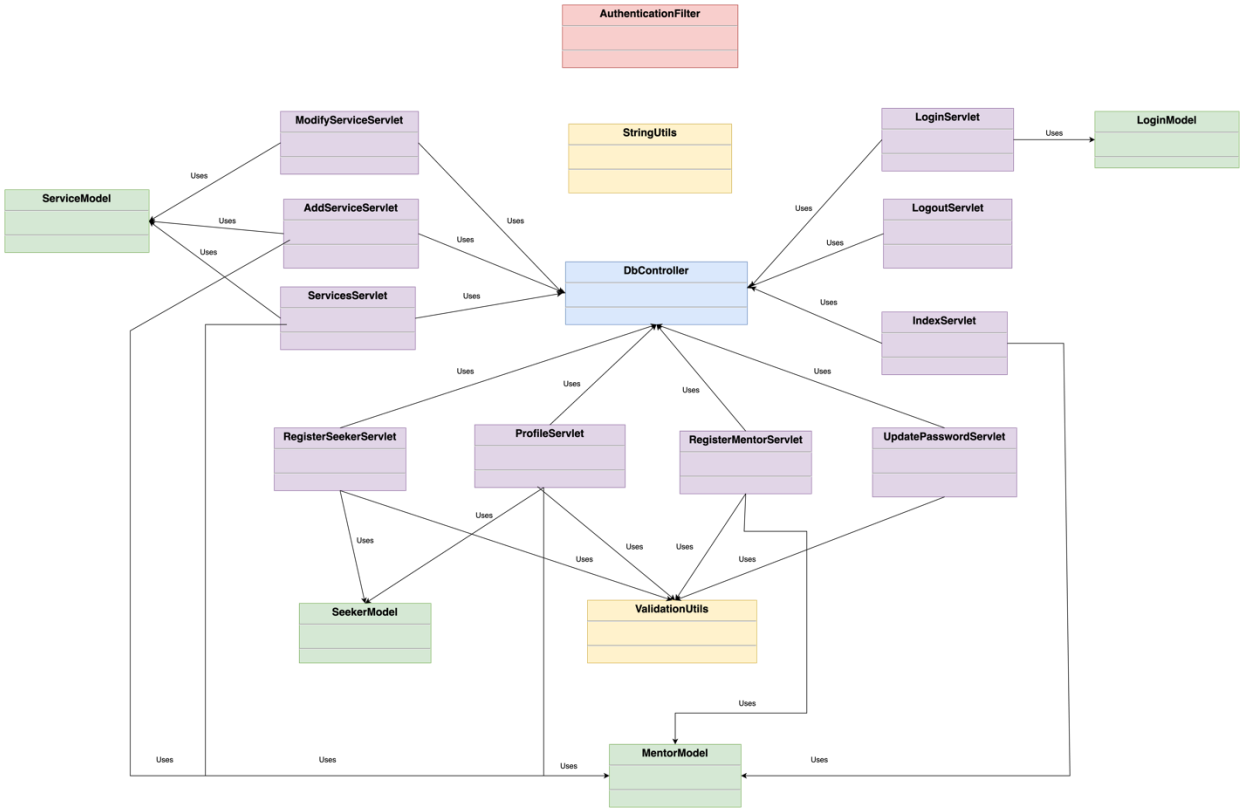


Figure 19: Overall Class diagram

3.2. Individual Class Diagram

3.2.1. DbController

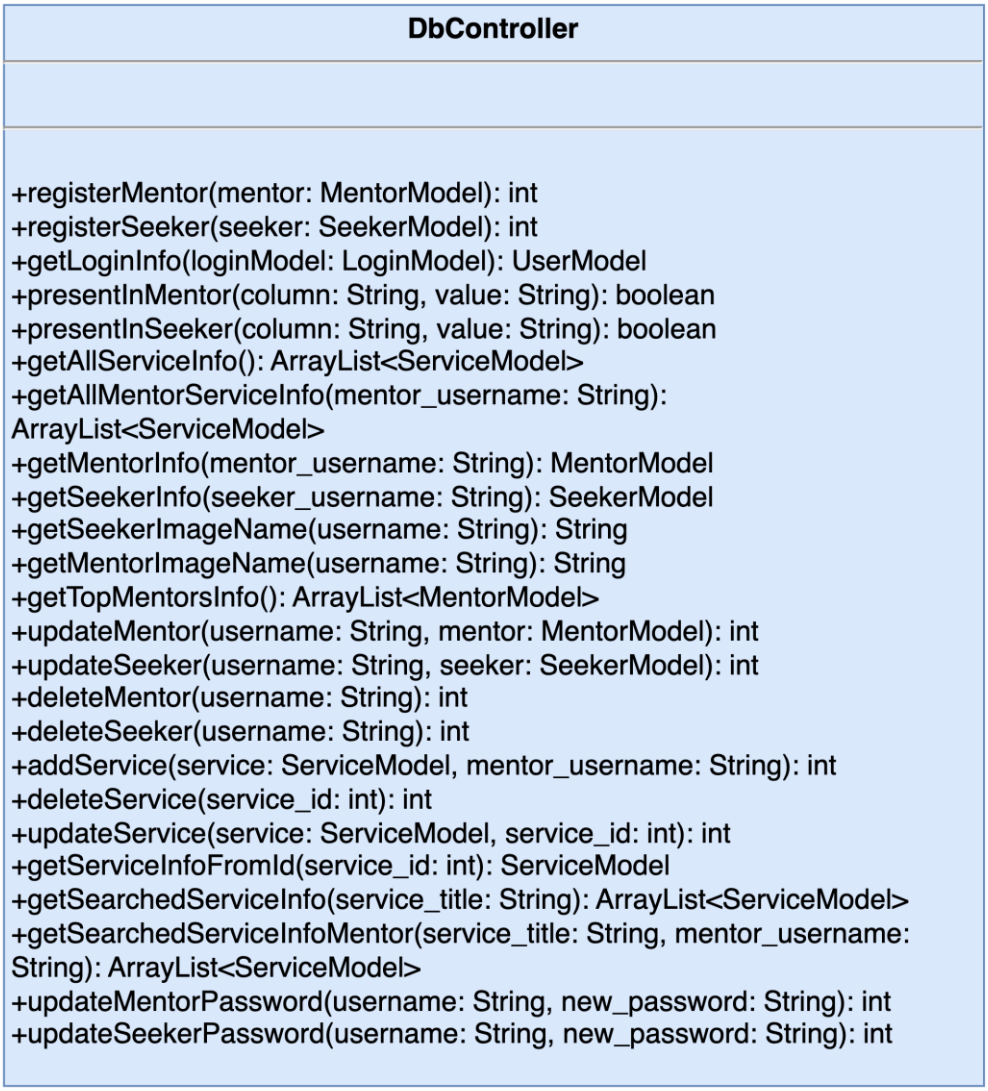


Figure 20: Class diagram of DbController Class

3.2.2. AuthenticationFilter

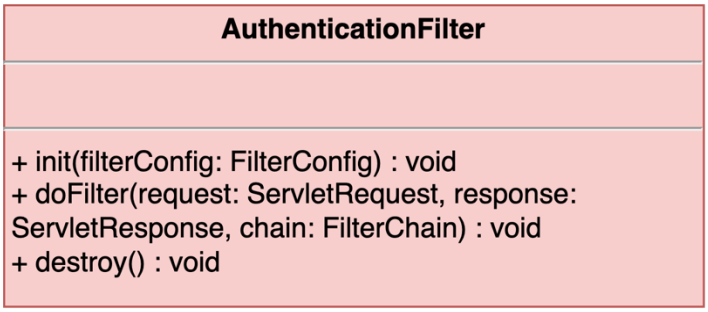


Figure 21: Class diagram of AuthenticationFilter Class

3.2.3. AddServiceServlet

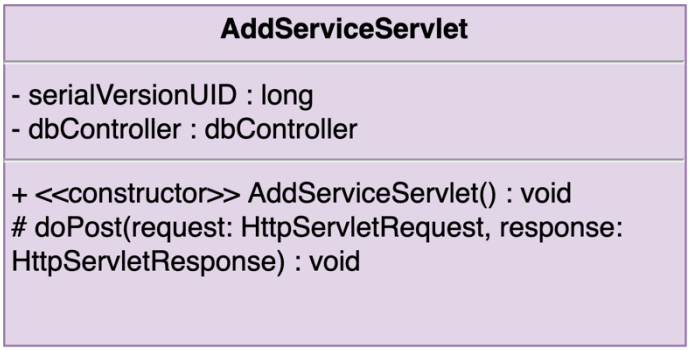


Figure 22: Class diagram of AddServiceServlet

3.2.4. IndexServlet

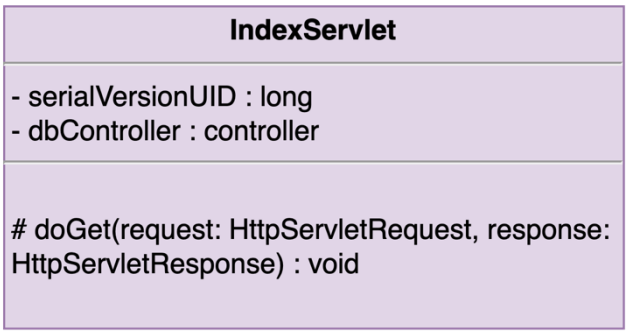


Figure 23: Class diagram of IndexServlet

3.2.5. LoginServlet

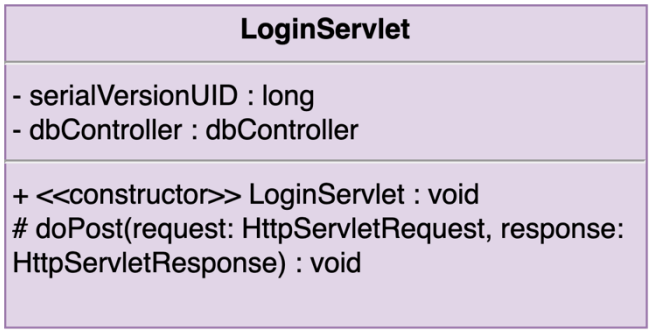


Figure 24: Class diagram of LoginServlet

3.2.6. LogoutServlet

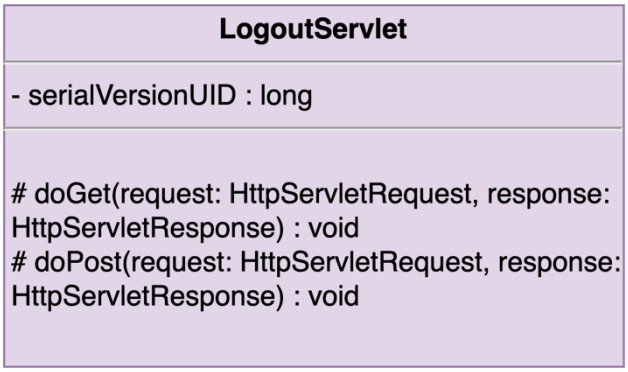


Figure 25: Class diagram of LogoutServlet

3.2.7. ModifyServiceServlet

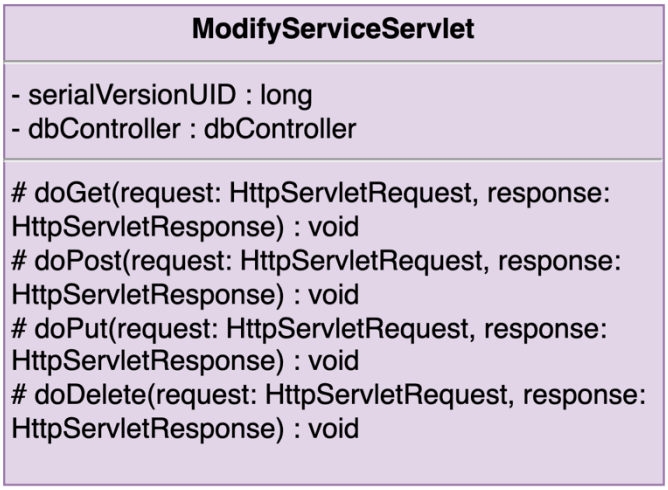


Figure 26: Class diagram of ModifyServiceServlet

3.2.8. ProfileServlet

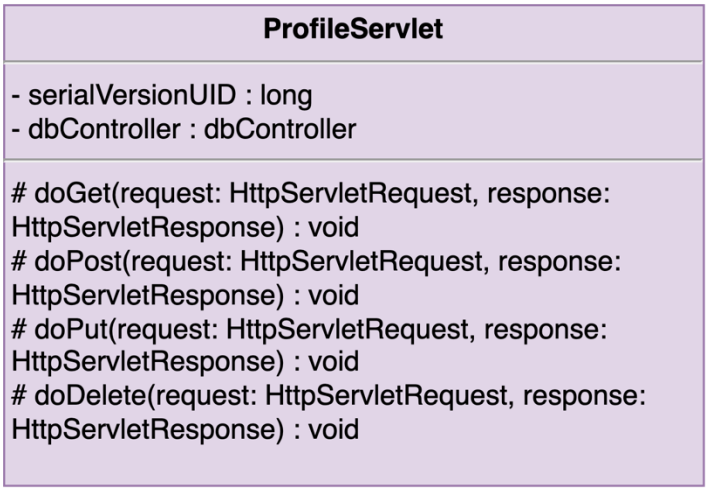


Figure 27: Class diagram of ProfileServlet

3.2.9. RegisterMentorServlet

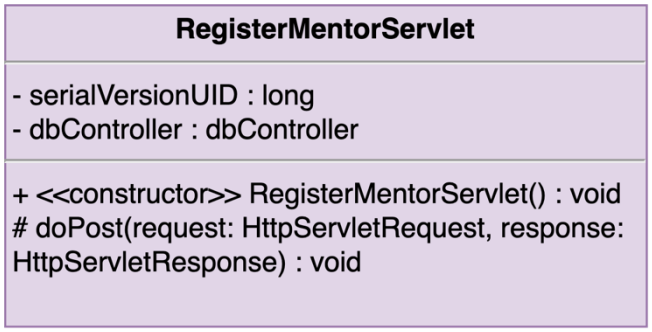


Figure 28: Class diagram of RegisterMentorServlet

3.2.10. RegisterSeekerServlet

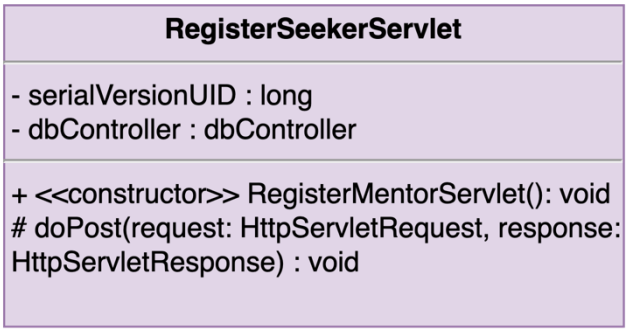


Figure 29: Class diagram of RegisterSeekerServlet

3.2.11. ServicesServlet

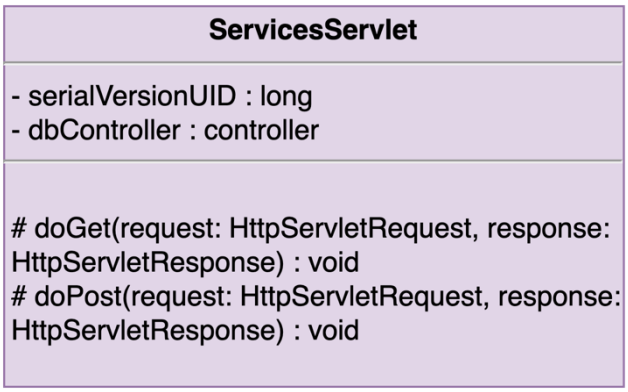


Figure 30: Class diagram of ServicesServlet

3.2.12. UpdatePasswordServlet

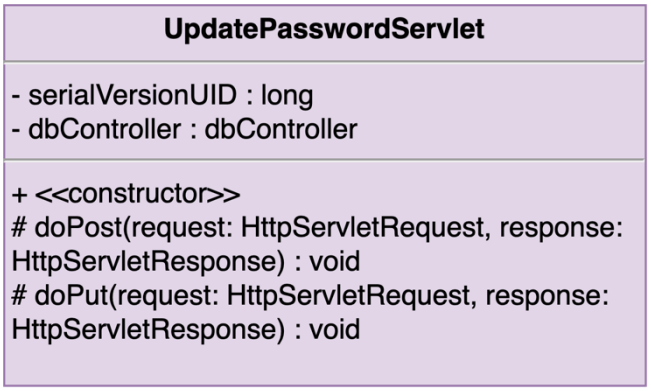


Figure 31: Class diagram of UpdatePasswordServlet

3.2.13. LoginModel

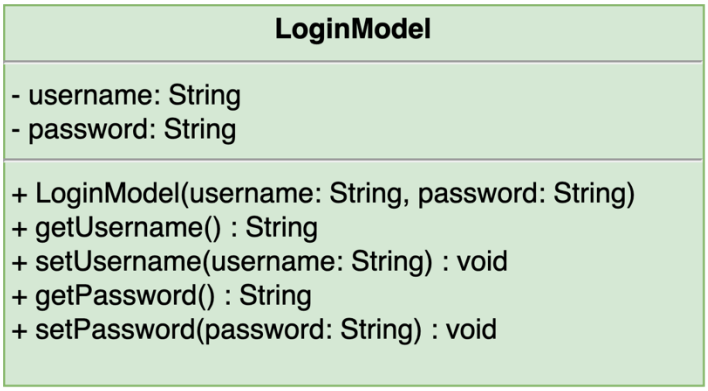


Figure 32: Class diagram of LoginModel

3.2.14. MentorModel

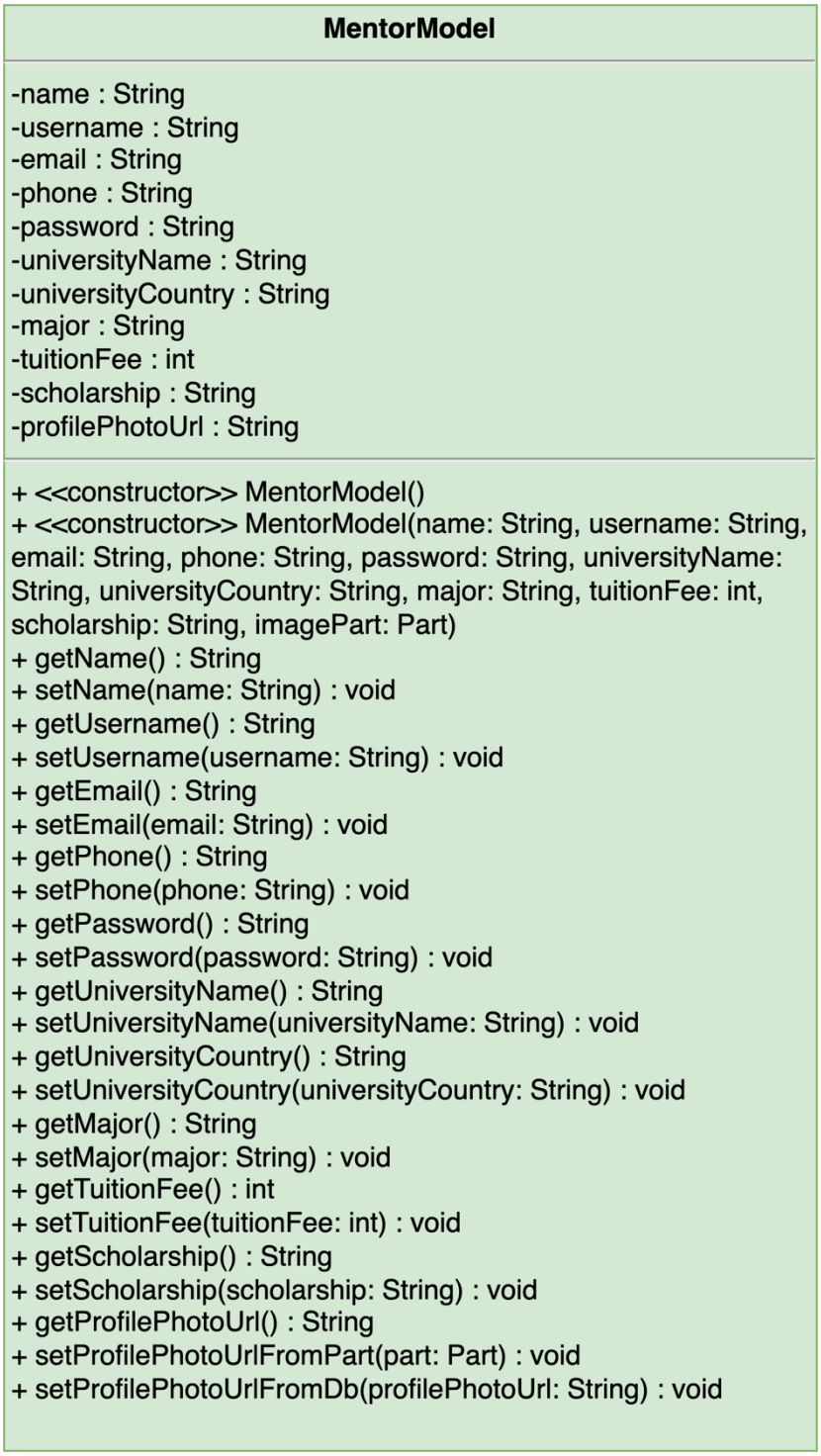


Figure 33: Class diagram of MentorModel

3.2.15. SeekerModel

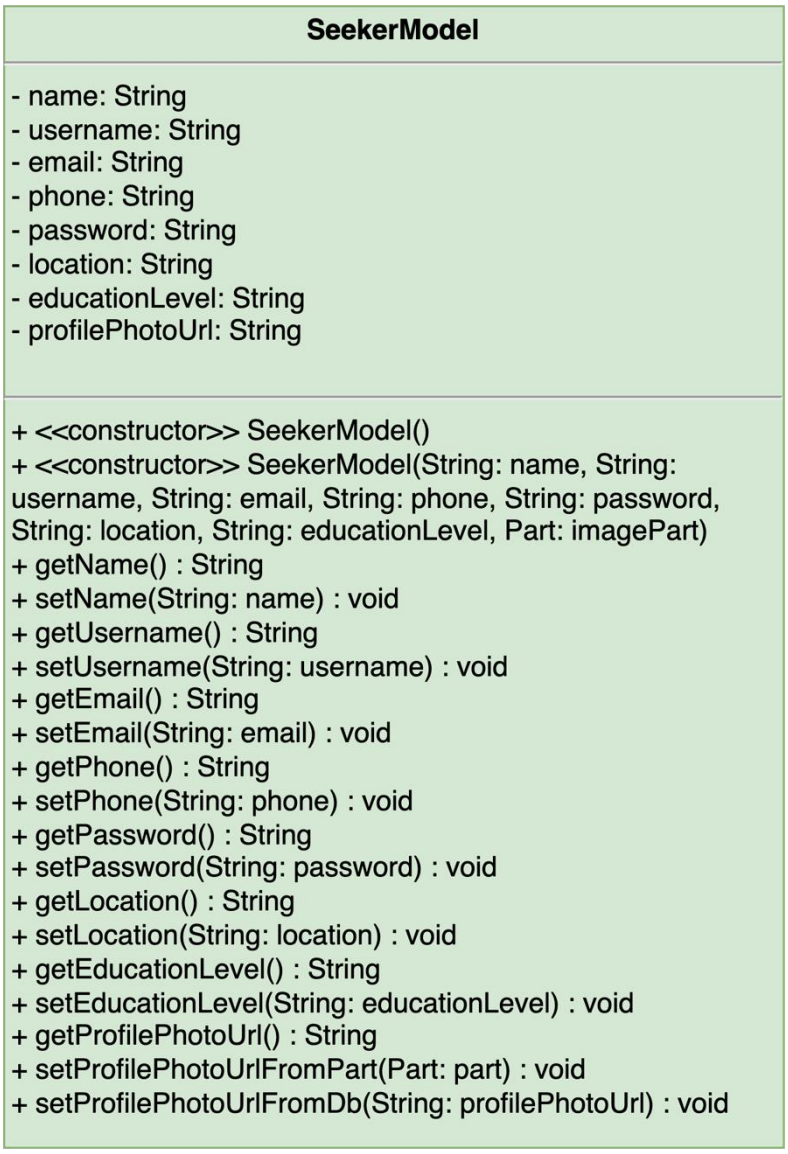


Figure 34: Class diagram of SeekerModel

3.2.16. ServiceModel

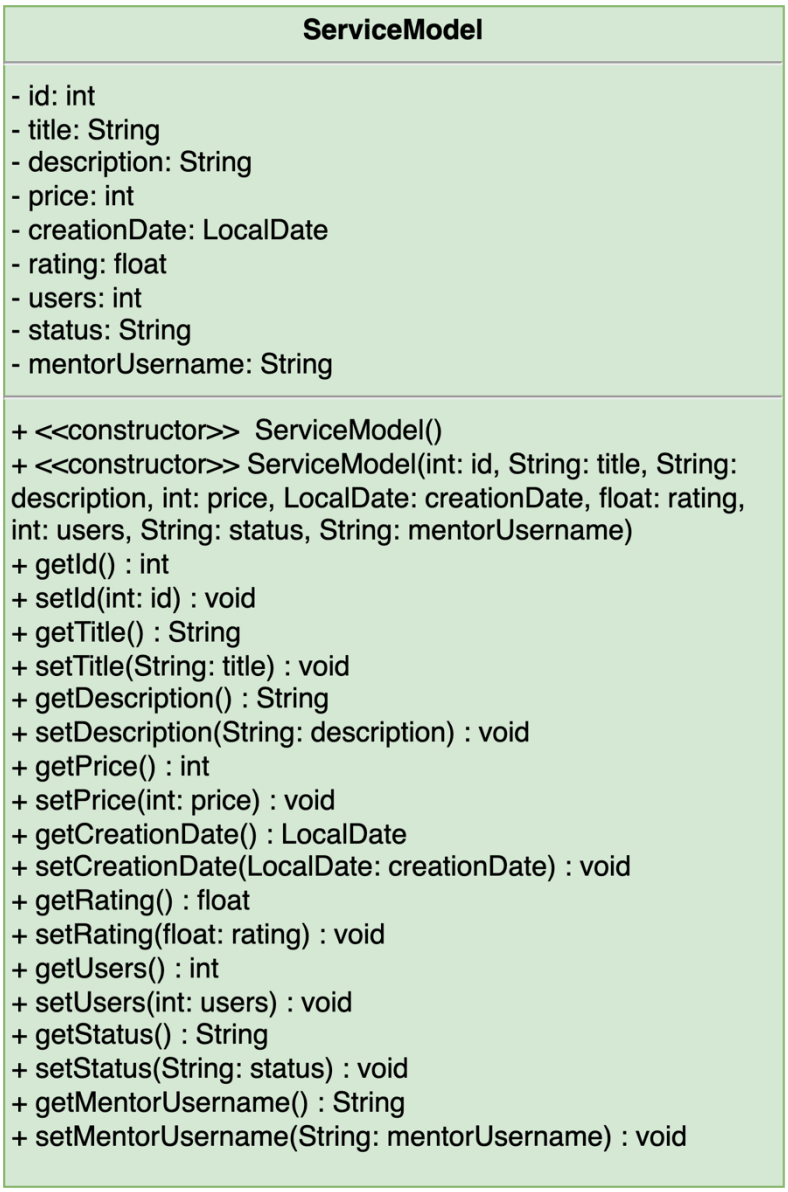


Figure 35: Class diagram of ServiceModel

3.2.17. StringUtils

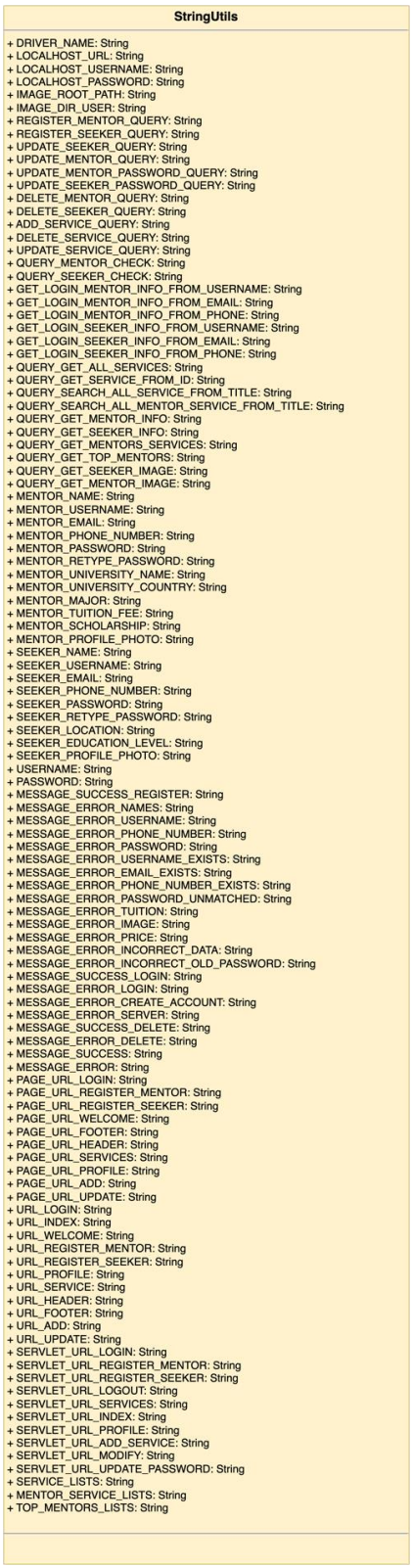


Figure 36: Class diagram of StringUtils

3.2.18. ValidationUtils

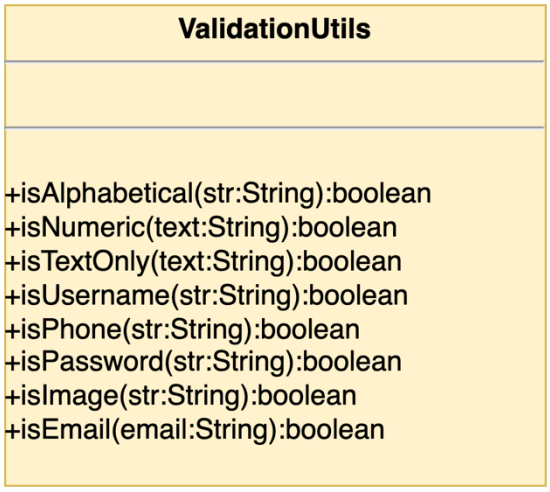


Figure 37: Class diagram of ValidationUtils

4. Method description

4.1. DbController

4.1.1. getConnection()

```
/**
 * Establishes a connection to the database.
 *
 * @return a Connection object representing the database connection.
 * @throws SQLException if a database access error occurs.
 * @throws ClassNotFoundException if the JDBC driver class is not found.
 */
public Connection getConnection() throws SQLException, ClassNotFoundException {

    Class.forName(StringUtils.DRIVER_NAME);
    return DriverManager.getConnection(StringUtils.LOCALHOST_URL, StringUtils.LOCALHOST_USERNAME,
            StringUtils.LOCALHOST_PASSWORD);

}
```

Figure 38: Screenshot of getConncetion() method

This method establishes a connection to a database using JDBC. It first loads the JDBC driver class specified in the StringUtils, and then creates a connection to the database using the URL, username, and password also specified in StringUtils. If an SQLException occurs during the connection process or if the JDBC driver class is not found, the method throws the corresponding exception.

4.1.2. registerMentor()

```
/**
 * Registers a mentor by adding their details to the database.
 *
 * @param mentor The MentorModel object containing the mentor's information.
 * @return 1 if the registration is successful, 0 if registration failed, -1 for internal errors,
 *         and -2 for server errors.
 */
public int registerMentor(MentorModel mentor) {
    try {
        // Prepare a statement using the predefined query for mentor registration
        PreparedStatement stmt = getConnection().prepareStatement(StringUtils.REGISTER_MENTOR_QUERY);

        // Set the student information in the prepared statement
        stmt.setString(1, mentor.getName());
        stmt.setString(2, mentor.getUsername());
        stmt.setString(3, mentor.getEmail());
        stmt.setString(4, mentor.getPhone());
        stmt.setString(5, PasswordEncryptionWithAes.encrypt(mentor.getUsername(), mentor.getPassword()));
        stmt.setString(6, mentor.getUniversityName());
        stmt.setString(7, mentor.getUniversityCountry());
        stmt.setString(8, mentor.getMajor());
        stmt.setInt(9, mentor.getTuitionFee());
        stmt.setString(10, mentor.getScholarship());
        stmt.setString(11, mentor.getProfilePhotoUrl());

        // Execute the update statement and store the number of affected rows
        int result = stmt.executeUpdate();

        // Check if the update was successful (i.e., at least one row affected)
        if (result > 0) {
            return 1; // Registration successful
        } else {
            return 0; // Registration failed (no rows affected)
        }

    } catch (ClassNotFoundException | SQLException ex) {
        // Print the stack trace for debugging purposes
        ex.printStackTrace();
        return -1; // Internal error
    } catch (Exception ex) {
        ex.printStackTrace();
        return -2; // Server error
    }
}
```

Figure 39: Screenshot of registerMentor() method

This method registers a mentor by inserting their details into the database using a prepared statement. It encrypts the mentor's password before storing it. The method returns 1 if the registration is successful, 0 if no rows are affected, -1 for internal errors such as ClassNotFoundException or SQLException, and -2 for server errors caused by other exceptions.

4.1.3. registerSeeker()

```
/**
 * Registers a seeker by adding their details to the database.
 *
 * @param seeker The SeekerModel object containing the seeker's information.
 * @return 1 if the registration is successful, 0 if registration failed, -1 for internal errors,
 *         and -2 for server errors.
 */
public int registerSeeker(SeekerModel seeker) {
    try {
        // Prepare a statement using the predefined query for mentor registration
        PreparedStatement stmt = getConnection().prepareStatement(StringUtils.REGISTER_SEEKER_QUERY);

        // Set the student information in the prepared statement
        stmt.setString(1, seeker.getName());
        stmt.setString(2, seeker.getUsername());
        stmt.setString(3, seeker.getEmail());
        stmt.setString(4, seeker.getPhone());
        stmt.setString(5, PasswordEncryptionWithAes.encrypt(seeker.getUsername(), seeker.getPassword()));
        stmt.setString(6, seeker.getLocation());
        stmt.setString(7, seeker.getEducationLevel());
        stmt.setString(8, seeker.getProfilePhotoUrl());

        // Execute the update statement and store the number of affected rows
        int result = stmt.executeUpdate();

        // Check if the update was successful (i.e., at least one row affected)
        if (result > 0) {
            return 1; // Registration successful
        } else {
            return 0; // Registration failed (no rows affected)
        }

    } catch (ClassNotFoundException | SQLException ex) {
        // Print the stack trace for debugging purposes
        ex.printStackTrace();
        return -1; // Internal error
    } catch (Exception ex) {
        ex.printStackTrace();
        return -2; // Server error
    }
}
```

Figure 40: Screenshot of registerSeeker() method

This method facilitates the registration of a seeker by inserting their details into the database using a prepared statement. It alos encrypts the seeker's password before storing it. The method returns 1 if the registration is successful, 0 if no rows are affected, -1 for internal errors such as ClassNotFoundException or SQLException, and -2 for server errors caused by other exceptions.

4.1.4. getLoginInfo()

```
/**
 * Validates the username and password provided during login.
 *
 * @param loginModel The LoginModel object containing the username and password.
 * @return 1 if the login is successful for a mentor, 2 if successful for a seeker,
 *         0 if the username or password is incorrect, and -1 if the username is not found,
 *         -2 for internal errors.
 */
public int getLoginInfo(LoginModel loginModel) {

    // Try-catch block to handle potential SQL or ClassNotFound exceptions
    try {
        // Prepare a statement using the predefined query for mentor's login check
        PreparedStatement st_mentor = getConnection().prepareStatement(StringUtils.QUERY_MENTOR_CHECK);

        // Set the username in the first parameter of the prepared statement
        st_mentor.setString(1, loginModel.getUsername());

        // Execute the query and store the result set
        ResultSet result_m = st_mentor.executeQuery();

        // Check if there's a record returned from the query
        if (result_m.next()) {
            // Get the mentor's username from the database
            String userDb = result_m.getString(StringUtils.MENTOR_USERNAME);

            // Get the password from the database
            String passwordDb = result_m.getString(StringUtils.MENTOR_PASSWORD);

            // Decrypted password
            String decryptedPwd = PasswordEncryptionWithAes.decrypt(passwordDb, userDb);

            // Check if the username and password match the credentials from the database
            if (userDb.equals(loginModel.getUsername()) && decryptedPwd.equals(loginModel.getPassword())) {
                // Login successful, return 1
                return 1;
            } else {
                // Username or password mismatch, return 0
                return 0;
            }
        } else {
            // Username not found in the mentor table, try seeker table

            // Prepare a statement using the predefined query for mentor's login check
            PreparedStatement st_seeker = getConnection().prepareStatement(StringUtils.QUERY_SEEKER_CHECK);

            // Set the username in the first parameter of the prepared statement
            st_seeker.setString(1, loginModel.getUsername());

            // Execute the query and store the result set
            ResultSet result = st_seeker.executeQuery();


            // Check if there's a record returned from the query
            if (result.next()) {
                // Get the mentor's username from the database
                String userDb = result.getString(StringUtils.SEEKER_USERNAME);

                // Get the password from the database
                String passwordDb = result.getString(StringUtils.SEEKER_PASSWORD);

                // Decrypted password
                String decryptedPwd = PasswordEncryptionWithAes.decrypt(passwordDb, userDb);


                // Check if the username and password match the credentials from the database
                if (userDb.equals(loginModel.getUsername()) && decryptedPwd.equals(loginModel.getPassword())) {
                    // Login successful, return 1
                    return 2;
                } else {
                    // Username or password mismatch, return 0
                    return 0;
                }
            } else {
                // Username not found in the seeker table (both),  return -1
                return -1;
            }

        }

        // Catch SQLException and ClassNotFoundException if they occur
    } catch (SQLException | ClassNotFoundException ex) {
        // Print the stack trace for debugging purposes
        ex.printStackTrace();
        // Return -2 to indicate an internal error
        return -2;
    }
}
```

Figure 41: Screenshot of getAllLoginInfo() method

This method verifies login credentials for mentors and seekers by checking the provided username and password against stored data. It first attempts to authenticate mentors, then seekers if no mentor account matches. If authentication is successful for mentors, it returns 1; for seekers, it returns 2. If the provided credentials are incorrect or the username is not found, it returns 0 or -1, respectively. Internal errors result in a return of -2.

4.1.5. presentInMentor()

```
/**
 * Checks if the given value is present in the specified column of the mentor table.
 *
 * @param column The column in which to search for the value (username, email, or phone).
 * @param value  The value to search for in the specified column.
 * @return true if the value is found in the specified column, false otherwise.
 */
public boolean presentInMentor(String column, String value) {
    try {
        PreparedStatement stmt;

        // preparing statement for getting info on the basis of column i.e user name,
        // email or phone
        switch (column) {
        case "mentor_username":
            stmt = getConnection().prepareStatement(StringUtils.GET_LOGIN_MENTOR_INFO_FROM_USERNAME);
            break;
        case "mentor_email":
            stmt = getConnection().prepareStatement(StringUtils.GET_LOGIN_MENTOR_INFO_FROM_EMAIL);
            break;
        case "mentor_phone":
            stmt = getConnection().prepareStatement(StringUtils.GET_LOGIN_MENTOR_INFO_FROM_PHONE);
            break;
        default:
            stmt = null;
            break;
        }

        // Set the user name, email or phone number value in the prepared statement
        stmt.setString(1, value);

        // Execute the query and store the result set
        ResultSet result = stmt.executeQuery();

        // Return true if value found false otherwise
        return result.next();

    } catch (ClassNotFoundException | SQLException ex) {
        // Print the stack trace for debugging purposes
        ex.printStackTrace();
        return false; // Internal error
    } catch (Exception ex) {
        ex.printStackTrace();
        return false; // Server error
    }
}
```

Figure 42: Screenshot of presentInMentor() method

This method checks whether a given value is present in the specified column of the mentor table. It accepts parameters for the column to search in (username, email, or phone) and the corresponding value to search for. The method dynamically prepares a

SQL statement based on the specified column and executes it to query the database. If the value is found in the specified column, it returns true; otherwise, it returns false. It handles potential exceptions such as ClassNotFoundException or SQLException and returns false in case of internal or server errors.

4.1.6. presentInSeeker()

```
/**
 * Checks if the given value is present in the specified column of the seeker table.
 *
 * @param column The column in which to search for the value (username, email, or phone).
 * @param value  The value to search for in the specified column.
 * @return true if the value is found in the specified column, false otherwise.
 */
public boolean presentInSeeker(String column, String value) {
    try {
        PreparedStatement stmt;

        // preparing statement for getting info on the basis of column i.e user name,
        // email or phone
        switch (column) {
        case "seeker_username":
            stmt = getConnection().prepareStatement(StringUtils.GET_LOGIN_SEEKER_INFO_FROM_USERNAME);
            break;
        case "seeker_email":
            stmt = getConnection().prepareStatement(StringUtils.GET_LOGIN_SEEKER_INFO_FROM_EMAIL);
            break;
        case "seeker_phone":
            stmt = getConnection().prepareStatement(StringUtils.GET_LOGIN_SEEKER_INFO_FROM_PHONE);
            break;
        default:
            stmt = null;
            break;
        }

        // Set the user name, email or phone number value in the prepared statement
        stmt.setString(1, value);

        // Execute the query and store the result set
        ResultSet result = stmt.executeQuery();

        // Return true if value found false otherwise
        return result.next();

    } catch (ClassNotFoundException | SQLException ex) {
        // Print the stack trace for debugging purposes
        ex.printStackTrace();
        return false; // Internal error
    } catch (Exception ex) {
        ex.printStackTrace();
        return false; // Server error
    }
}
```

Figure 43: Screenshot of presentInSeeker() method

This method checks whether a given value is present in the specified column of the seeker table. It accepts parameters for the column to search in (username, email, or phone) and the corresponding value to search for. The method dynamically prepares a SQL statement based on the specified column and executes it to query the database. If the value is found in the specified column, it returns true; otherwise, it returns false. It handles potential

exceptions such as ClassNotFoundException or SQLException and returns false in case of internal or server errors.

4.1.7. getAllServiceInfo()

```
/**
 * Retrieves information for all services present in the service table.
 *
 * @return An ArrayList containing ServiceModel objects representing the services.
 *         Returns null if an error occurs during database access.
 */
public ArrayList<ServiceModel> getAllServiceInfo(){
    try {
        PreparedStatement stmt = getConnection()
                .prepareStatement(StringUtils.QUERY_GET_ALL_SERVICES);
        ResultSet result = stmt.executeQuery();

        ArrayList<ServiceModel> services = new ArrayList<ServiceModel>();

        while(result.next()) {
            ServiceModel service = new ServiceModel();
            service.setId(result.getInt("service_id"));
            service.setTitle(result.getString("service_title"));
            service.setDescription(result.getString("description"));
            service.setPrice(result.getInt("price"));
            service.setCreationDate(result.getDate("creation_date").toLocalDate());
            service.setRating(result.getFloat("rating"));
            service.setUsers(result.getInt("service_users"));
            service.setStatus(result.getString("status"));
            service.setMentorUsername(result.getString("mentor_username"));

            services.add(service);
        }
        return services;
    }catch (SQLException | ClassNotFoundException ex) {
        ex.printStackTrace();
        return null;
    }
}
```

Figure 44: Screenshot of getAllServiceInfo() method

This method retrieves information for all services stored in the service table of the database. It constructs an ArrayList of ServiceModel objects, creating each object with data retrieved from the database. Each ServiceModel object represents a service and contains attributes such as ID, title, description, price, creation date, rating, number of users, status, and mentor's username. If an error occurs during database access, such as SQL or class not found exceptions, the method returns null.

4.1.8. getAllMentorServiceInfo()

```
/**
 * Retrieves information for all services offered by a specific mentor.
 *
 * @param mentor_username The username of the mentor whose services are to be retrieved.
 * @return An ArrayList containing ServiceModel objects representing the mentor's services.
 *         Returns null if an error occurs during database access.
 */
public ArrayList<ServiceModel> getAllMentorServiceInfo(String mentor_username){
    try {
        PreparedStatement stmt = getConnection()
                .prepareStatement(StringUtils.QUERY_GET_MENTORS_SERVICES);

        // Set the username in the prepared statement
        stmt.setString(1, mentor_username);

        ResultSet result = stmt.executeQuery();

        ArrayList<ServiceModel> mentor_services = new ArrayList<ServiceModel>();

        while(result.next()) {
            ServiceModel mentor_service = new ServiceModel();
            mentor_service.setId(result.getInt("service_id"));
            mentor_service.setTitle(result.getString("service_title"));
            mentor_service.setDescription(result.getString("description"));
            mentor_service.setPrice(result.getInt("price"));
            mentor_service.setCreationDate(result.getDate("creation_date").toLocalDate());
            mentor_service.setRating(result.getFloat("rating"));
            mentor_service.setUsers(result.getInt("service_users"));
            mentor_service.setStatus(result.getString("status"));
            mentor_service.setMentorUsername(result.getString("mentor_username"));

            mentor_services.add(mentor_service);
        }
        return mentor_services;
    }catch (SQLException | ClassNotFoundException ex) {
        ex.printStackTrace();
        return null;
    }
}
```

Figure 45: Screenshot of getAllMentorServiceInfo() method

This method retrieves information for all services offered by a specific mentor, identified by their username. It prepares a SQL statement to query the database for services associated with the given mentor username, sets the username parameter, and executes the query. The method then constructs an ArrayList of ServiceModel objects, each representing a service offered by the mentor. If any error occurs during database access, it returns null.

4.1.9. getMentorInfo()

```
/**
 * Retrieves mentor details from the database based on the passed username.
 *
 * @param mentor_username The username of the mentor whose details are to be retrieved.
 * @return A MentorModel object containing the mentor's details if found, or null if not found
 *         or if an error occurs during database access.
 */
public MentorModel getMentorInfo(String mentor_username){
    try {
        PreparedStatement stmt = getConnection()
                .prepareStatement(StringUtils.QUERY_GET_MENTOR_INFO);

        // Set the username in the prepared statement
        stmt.setString(1, mentor_username);

        ResultSet result = stmt.executeQuery();

        if (result.next()) { // Move cursor to the first row
            MentorModel mentor_info = new MentorModel();
            mentor_info.setName(result.getString("mentor_name"));
            mentor_info.setUsername(result.getString("mentor_username"));
            mentor_info.setEmail(result.getString("mentor_email"));
            mentor_info.setPhone(result.getString("mentor_phone"));
            mentor_info.setPassword(PasswordEncryptionWithAes.decrypt(result.getString("mentor_password"), mentor_username));
            mentor_info.setUniversityName(result.getString("university_name"));
            mentor_info.setUniversityCountry(result.getString("university_country"));
            mentor_info.setMajor(result.getString("major"));
            mentor_info.setTuitionFee(result.getInt("tuition_fee"));
            mentor_info.setScholarship(result.getString("scholarship"));
            mentor_info.setProfilePhotoUrlFromDb(result.getString("mentor_photo"));

            return mentor_info;

        }
        return null;

    }catch (SQLException | ClassNotFoundException ex) {
        ex.printStackTrace();
        return null;

    }
}
```

Figure 46: Screenshot of getMentorInfo() method

This method retrieves mentor details from the database based on the provided username. It prepares a SQL statement, sets the username parameter, executes the query, and processes the ResultSet. If mentor details are found, a MentorModel object is created and populated with the retrieved information, including name, username, email, phone number, university details, tuition fee, scholarship, and profile photo URL. The mentor's password is decrypted using AES encryption before being set in the MentorModel object. If no details are found or an error occurs during database access, null is returned.

4.1.10. getSeekerInfo()

```
/**
 * Retrieves seeker details from the database based on the passed username.
 *
 * @param seeker_username The username of the seeker whose details are to be retrieved.
 * @return A SeekerModel object containing the seeker's details if found, or null if not found
 *         or if an error occurs during database access.
 */
public SeekerModel getSeekerInfo(String seeker_username){
    try {
        PreparedStatement stmt = getConnection()
                .prepareStatement(StringUtils.QUERY_GET_SEEKER_INFO);

        // Set the username in the prepared statement
        stmt.setString(1, seeker_username);

        ResultSet result = stmt.executeQuery();

        if (result.next()) { // Move cursor to the first row
            SeekerModel seeker_info = new SeekerModel();
            seeker_info.setName(result.getString("seeker_name"));
            seeker_info.setUsername(result.getString("seeker_username"));
            seeker_info.setEmail(result.getString("seeker_email"));
            seeker_info.setPhone(result.getString("seeker_phone"));
            seeker_info.setPassword(PasswordEncryptionWithAes.decrypt(result.getString("seeker_password"), seeker_username));
            seeker_info.setLocation(result.getString("seeker_location"));
            seeker_info.setEducationLevel(result.getString("education_level"));
            seeker_info.setProfilePhotoUrlFromDb(result.getString("seeker_photo"));

            return seeker_info;

        }
        return null;

    }catch (SQLException | ClassNotFoundException ex) {
        ex.printStackTrace();
        return null;

    }
}
```

Figure 47: Screenshot of getSeekerInfo() method

This method retrieves seeker details from the database based on the provided username. It prepares a SQL statement, sets the username parameter, executes the query, and processes the ResultSet. If seeker details are found, a SeekerModel object is created and populated with the retrieved information, including name, username, email, phone number, location, and education level. The seeker's password is decrypted using AES encryption before being set in the SeekerModel object. If no details are found or an error occurs during database access, null is returned.

4.1.11. getSeekerImageName()

```
/**
 * Retrieves the image name (URL) of a seeker based on the passed username.
 *
 * @param username The username of the seeker whose image name is to be retrieved.
 * @return A string representing the image name (URL) of the seeker if found, or null if not found
 *         or if an error occurs during database access.
 */
public String getSeekerImageName(String username){

    try {
        PreparedStatement stmt = getConnection()
                .prepareStatement(StringUtils.QUERY_GET_SEEKER_IMAGE);

        // Set the username in the prepared statement
        stmt.setString(1, username);

        ResultSet result = stmt.executeQuery();

        if (result.next()) { // Move cursor to the first row
            return result.getString("seeker_photo");

        }
        return null;

    }catch (SQLException | ClassNotFoundException ex) {
        ex.printStackTrace();
        return null;

    }
}
```

Figure 48: Screenshot of getSeekerImageName() method

This method retrives the image name (URL) of a seeker associated with the given username. It prepares a SQL statement, sets the username parameter, executes the query, and processes the ResultSet. If the seeker's image name is found, it returns the corresponding URL; otherwise, it returns null. Any encountered database access errors, such as SQLException or ClassNotFoundException, lead to a null return value.

4.1.12. getMentorImageName()

```
/**
 * Retrieves the image name (URL) of a mentor based on the passed username.
 *
 * @param username The username of the mentor whose image name is to be retrieved.
 * @return A string representing the image name (URL) of the mentor if found, or null if not found
 *         or if an error occurs during database access.
 */
public String getMentorImageName(String username){

    try {
        PreparedStatement stmt = getConnection()
                .prepareStatement(StringUtils.QUERY_GET_MENTOR_IMAGE);

        // Set the username in the prepared statement
        stmt.setString(1, username);

        ResultSet result = stmt.executeQuery();

        if (result.next()) { // Move cursor to the first row
            return result.getString("mentor_photo");

        }
        return null;

    }catch (SQLException | ClassNotFoundException ex) {
        ex.printStackTrace();
        return null;

    }
}
```

Figure 49: Screenshot of getMentorImageName() method

This method retrives the image name (URL) of a mentor associated with the given username. It prepares a SQL statement, sets the username parameter, executes the query, and processes the ResultSet. If the mentor's image name is found, it returns the corresponding URL; otherwise, it returns null. Any encountered database access errors result in a null return value.

4.1.13. getTopMentorsInfo()

```
/**
 * Retrieves information for the top five mentors based on their average service rating.
 *
 * @return An ArrayList containing MentorModel objects representing the top five mentors.
 *         Returns null if an error occurs during database access.
 */
public ArrayList<MentorModel> getTopMentorsInfo() {
    try {
        PreparedStatement stmt = getConnection()
                .prepareStatement(StringUtils.QUERY_GET_TOP_MENTORS);

        ResultSet result = stmt.executeQuery();

        ArrayList<MentorModel> topMentors = new ArrayList<MentorModel>();

        while(result.next()) {
            MentorModel mentor = new MentorModel();

            mentor.setName(result.getString("mentor_name"));
            mentor.setUsername(result.getString("mentor_username"));
            mentor.setEmail(result.getString("mentor_email"));
            mentor.setPhone(result.getString("mentor_phone"));
            mentor.setPassword(result.getString("mentor_password"));
            mentor.setUniversityName(result.getString("university_name"));
            mentor.setUniversityCountry(result.getString("university_country"));
            mentor.setMajor(result.getString("major"));
            mentor.setTuitionFee(result.getInt("tuition_fee"));
            mentor.setScholarship(result.getString("scholarship"));
            mentor.setProfilePhotoUrlFromDb(result.getString("mentor_photo"));

            topMentors.add(mentor);
        }
        return topMentors;

    }catch (SQLException | ClassNotFoundException ex) {
        ex.printStackTrace();
        return null;

    }
}
```

Figure 50: Screenshot of getTopMentorsInfo() method

This method fetches information for the top five mentors based on their average service rating. It prepares a SQL statement, executes the query, and constructs an ArrayList of MentorModel objects representing these mentors. Each MentorModel object contains details such as name, username, email, phone number, university information, tuition fee, scholarship, and profile photo URL. If any error occurs during database access, null is returned.

4.1.14. updateMentor()

```
/**
 * Updates a mentor's details in the database based on the old username and the updated MentorModel.
 *
 * @param username The old username of the mentor to be updated.
 * @param mentor   The MentorModel object containing the updated mentor's information.
 * @return 1 if the update is successful, 0 if update failed, -1 for internal errors,
 *         and -2 for server errors.
 */
public int updateMentor(String username, MentorModel mentor) {
    try {
        // Prepare a statement using the predefined query for mentor registration
        PreparedStatement stmt = getConnection().prepareStatement(StringUtils.UPDATE_MENTOR_QUERY);

        // Set the student information in the prepared statement
        stmt.setString(1, mentor.getName());
        stmt.setString(2, mentor.getUsername());
        stmt.setString(3, mentor.getEmail());
        stmt.setString(4, mentor.getPhone());
        stmt.setString(5, PasswordEncryptionWithAes.encrypt(mentor.getUsername(), mentor.getPassword()));
        stmt.setString(6, mentor.getProfilePhotoUrl());

        stmt.setString(7, username);

        // Execute the update statement and store the number of affected rows
        int result = stmt.executeUpdate();

        // Check if the update was successful (i.e., at least one row affected)
        if (result > 0) {
            return 1; // Registration successful
        } else {
            return 0; // Registration failed (no rows affected)
        }

    } catch (ClassNotFoundException | SQLException ex) {
        // Print the stack trace for debugging purposes
        ex.printStackTrace();
        return -1; // Internal error
    } catch (Exception ex) {
        ex.printStackTrace();
        return -2; // Server error
    }
}
```

Figure 51: Screenshot of updateMentor() method

This method updates a mentor's details in the database based on the old username and the updated MentorModel. It prepares a SQL statement using a predefined query for mentor updates. After setting the updated mentor's information in the prepared statement, including name, username, email, phone number, encrypted password, and profile photo URL, it executes the update statement. The method returns 1 if the update is successful, 0 if the update failed (no rows affected), -1 for internal errors such as ClassNotFoundException or SQLException, and -2 for server errors caused by other exceptions.

4.1.15. updateSeeker()

```
/**
 * Updates a seeker's details in the database based on the old username and the updated SeekerModel.
 *
 * @param username The old username of the seeker to be updated.
 * @param seeker   The SeekerModel object containing the updated seeker's information.
 * @return 1 if the update is successful, 0 if update failed, -1 for internal errors,
 *         and -2 for server errors.
 */
public int updateSeeker(String username, SeekerModel seeker) {
    try {
        // Prepare a statement using the predefined query for mentor registration
        PreparedStatement stmt = getConnection().prepareStatement(StringUtils.UPDATE_SEEKER_QUERY);

        // Set the student information in the prepared statement
        stmt.setString(1, seeker.getName());
        stmt.setString(2, seeker.getUsername());
        stmt.setString(3, seeker.getEmail());
        stmt.setString(4, seeker.getPhone());
        stmt.setString(5, PasswordEncryptionWithAes.encrypt(seeker.getUsername(), seeker.getPassword()));
        stmt.setString(6, seeker.getProfilePhotoUrl());

        stmt.setString(7, username);

        // Execute the update statement and store the number of affected rows
        int result = stmt.executeUpdate();

        // Check if the update was successful (i.e., at least one row affected)
        if (result > 0) {
            return 1; // Registration successful
        } else {
            return 0; // Registration failed (no rows affected)
        }

    } catch (ClassNotFoundException | SQLException ex) {
        // Print the stack trace for debugging purposes
        ex.printStackTrace();
        return -1; // Internal error
    } catch (Exception ex) {
        ex.printStackTrace();
        return -2; // Server error
    }
}
```

Figure 52: Screenshot of updateSeekerMethod()

This method updates a seeker's details in the database based on the old username and the updated SeekerModel. It prepares a SQL statement using a predefined query for seeker updates. After setting the updated seeker's information in the prepared statement, including name, username, email, phone number, encrypted password, and profile photo URL, it executes the update statement. The method returns 1 if the update is successful, 0 if the update failed (no rows affected), -1 for internal errors such as ClassNotFoundException or SQLException, and -2 for server errors caused by other exceptions.

4.1.16. deleteMentor()

```
/**
 * Deletes a mentor from the mentor table based on the passed username.
 *
 * @param username The username of the mentor to be deleted.
 * @return 1 if the deletion is successful, 0 if deletion failed, -1 for internal errors,
 *         and -2 for server errors.
 */
public int deleteMentor(String username) {
    try {
        // Prepare a statement using the predefined query for mentor registration
        PreparedStatement stmt = getConnection().prepareStatement(StringUtils.DELETE_MENTOR_QUERY);

        // Set the student information in the prepared statement
        stmt.setString(1, username);

        // Execute the update statement and store the number of affected rows
        int result = stmt.executeUpdate();

        // Check if the update was successful (i.e., at least one row affected)
        if (result > 0) {
            return 1; // Registration successful
        } else {
            return 0; // Registration failed (no rows affected)
        }

    } catch (ClassNotFoundException | SQLException ex) {
        // Print the stack trace for debugging purposes
        ex.printStackTrace();
        return -1; // Internal error
    } catch (Exception ex) {
        ex.printStackTrace();
        return -2; // Server error
    }
}
```

Figure 53: Screenshot of deleteMentor() method

This method deletes a mentor from the mentor table based on the passed username. It prepares a SQL statement using a predefined query for mentor deletion. After setting the username parameter in the prepared statement, it executes the delete statement. The method returns 1 if the deletion is successful, 0 if the deletion failed (no rows affected), -1 for internal errors such as ClassNotFoundException or SQLException, and -2 for server errors caused by other exceptions.

4.1.17. deleteSeeker()

```
/**
 * Deletes a seeker from the seeker table based on the passed username.
 *
 * @param username The username of the seeker to be deleted.
 * @return 1 if the deletion is successful, 0 if deletion failed, -1 for internal errors,
 *         and -2 for server errors.
 */
public int deleteSeeker(String username) {
    try {
        // Prepare a statement using the predefined query for mentor registration
        PreparedStatement stmt = getConnection().prepareStatement(StringUtils.DELETE_SEEKER_QUERY);

        // Set the student information in the prepared statement
        stmt.setString(1, username);

        // Execute the update statement and store the number of affected rows
        int result = stmt.executeUpdate();

        // Check if the update was successful (i.e., at least one row affected)
        if (result > 0) {
            return 1; // Registration successful
        } else {
            return 0; // Registration failed (no rows affected)
        }

    } catch (ClassNotFoundException | SQLException ex) {
        // Print the stack trace for debugging purposes
        ex.printStackTrace();
        return -1; // Internal error
    } catch (Exception ex) {
        ex.printStackTrace();
        return -2; // Server error
    }
}
```

Figure 54: Screenshot of deleteSeeker() method

This method deletes a seeker from the seeker table based on the passed username. It prepares a SQL statement using a predefined query for seeker deletion. After setting the username parameter in the prepared statement, it executes the delete statement. The method returns 1 if the deletion is successful, 0 if the deletion failed (no rows affected), -1 for internal errors such as ClassNotFoundException or SQLException, and -2 for server errors caused by other exceptions.

4.1.18. addService()

```
/**
 * Adds a service to the database in the service table based on the passed ServiceModel and mentor username.
 *
 * @param service        The ServiceModel object representing the service to be added.
 * @param mentor_username The username of the mentor offering the service.
 * @return 1 if the addition is successful, 0 if addition failed, -1 for internal errors,
 *         and -2 for server errors.
 */
public int addService(ServiceModel service, String mentor_username) {
    try {
        // Prepare a statement using the predefined query for mentor registration
        PreparedStatement stmt = getConnection().prepareStatement(StringUtils.ADD_SERVICE_QUERY);

        // Set the student information in the prepared statement
        stmt.setString(1, service.getTitle());
        stmt.setString(2, service.getDescription());
        stmt.setInt(3, service.getPrice());

        LocalDate currDate = LocalDate.now();
        stmt.setDate(4, Date.valueOf(currDate));

        stmt.setString(5, mentor_username);

        // Execute the update statement and store the number of affected rows
        int result = stmt.executeUpdate();

        // Check if the update was successful (i.e., at least one row affected)
        if (result > 0) {
            return 1; // Registration successful
        } else {
            return 0; // Registration failed (no rows affected)
        }

    } catch (ClassNotFoundException | SQLException ex) {
        // Print the stack trace for debugging purposes
        ex.printStackTrace();
        return -1; // Internal error
    } catch (Exception ex) {
        ex.printStackTrace();
        return -2; // Server error
    }
}
```

Figure 55: Screenshot of addService() method

This method adds a service to the database in the service table based on the passed ServiceModel and mentor username. It prepares a SQL statement using a predefined query for adding a service. After setting the service information in the prepared statement, including title, description, price, and creation date, it executes the update statement. The method returns 1 if the addition is successful, 0 if the addition failed (no rows affected), -1 for internal errors such as ClassNotFoundException or SQLException, and -2 for server errors caused by other exceptions.

4.1.19. deleteService()

```
/**
 * Deletes a service from the database in the service table based on the passed service ID.
 *
 * @param service_id The ID of the service to be deleted.
 * @return 1 if the deletion is successful, 0 if deletion failed, -1 for internal errors,
 *         and -2 for server errors.
 */
public int deleteService(int service_id) {
    try {
        // Prepare a statement using the predefined query for mentor registration
        PreparedStatement stmt = getConnection().prepareStatement(StringUtils.DELETE_SERVICE_QUERY);

        // Set the student information in the prepared statement
        stmt.setInt(1, service_id);

        // Execute the update statement and store the number of affected rows
        int result = stmt.executeUpdate();

        // Check if the update was successful (i.e., at least one row affected)
        if (result > 0) {
            return 1; // Registration successful
        } else {
            return 0; // Registration failed (no rows affected)
        }

    } catch (ClassNotFoundException | SQLException ex) {
        // Print the stack trace for debugging purposes
        ex.printStackTrace();
        return -1; // Internal error
    } catch (Exception ex) {
        ex.printStackTrace();
        return -2; // Server error
    }
}
```

Figure 56: Screenshot of deleteService() method

This method deletes a service from the database in the service table based on the passed service ID. It prepares a SQL statement using a predefined query for deleting a service. After setting the service ID parameter in the prepared statement, it executes the delete statement. The method returns 1 if the deletion is successful, 0 if the deletion failed (no rows affected), -1 for internal errors such as ClassNotFoundException or SQLException, and -2 for server errors caused by other exceptions.

4.1.20. updateService()

```
/**
 * Updates a service in the database based on the passed ServiceModel and service ID.
 *
 * @param service   The updated ServiceModel object representing the service.
 * @param service_id The ID of the service to be updated.
 * @return 1 if the update is successful, 0 if update failed, -1 for internal errors,
 *         and -2 for server errors.
 */
public int updateService(ServiceModel service, int service_id) {
    try {
        // Prepare a statement using the predefined query for mentor registration
        PreparedStatement stmt = getConnection().prepareStatement(StringUtils.UPDATE_SERVICE_QUERY);

        // Set the student information in the prepared statement
        stmt.setString(1, service.getTitle());
        stmt.setString(2, service.getDescription());
        stmt.setInt(3, service.getPrice());

        stmt.setInt(4, service_id);

        // Execute the update statement and store the number of affected rows
        int result = stmt.executeUpdate();

        // Check if the update was successful (i.e., at least one row affected)
        if (result > 0) {
            return 1; // Registration successful
        } else {
            return 0; // Registration failed (no rows affected)
        }

    } catch (ClassNotFoundException | SQLException ex) {
        // Print the stack trace for debugging purposes
        ex.printStackTrace();
        return -1; // Internal error
    } catch (Exception ex) {
        ex.printStackTrace();
        return -2; // Server error
    }
}
```

Figure 57: Screenshot of updateService() method

This method updates a service in the database based on the passed ServiceModel and service ID. It prepares a SQL statement using a predefined query for updating a service. After setting the updated service information, including title, description, and price, and the service ID in the prepared statement, it executes the update statement. The method returns 1 if the update is successful, 0 if the update failed (no rows affected), -1 for internal errors such as ClassNotFoundException or SQLException, and -2 for server errors caused by other exceptions.

4.1.21. getServiceInfoFromId()

```
/**
 * Retrieves service details from the database based on the given service ID.
 *
 * @param service_id The ID of the service to retrieve.
 * @return A ServiceModel object representing the service details if found, otherwise null.
 */
public ServiceModel getServiceInfoFromId(int service_id){
    try {
        PreparedStatement stmt = getConnection()
                .prepareStatement(StringUtils.QUERY_GET_SERVICE_FROM_ID);

        // Set the username in the prepared statement
        stmt.setInt(1, service_id);

        ResultSet result = stmt.executeQuery();

        if (result.next()) { // Move cursor to the first row
            ServiceModel service = new ServiceModel();
            service.setId(result.getInt("service_id"));
            service.setTitle(result.getString("service_title"));
            service.setDescription(result.getString("description"));
            service.setPrice(result.getInt("price"));
            service.setCreationDate(result.getDate("creation_date").toLocalDate());
            service.setRating(result.getFloat("rating"));
            service.setUsers(result.getInt("service_users"));
            service.setStatus(result.getString("status"));
            service.setMentorUsername(result.getString("mentor_username"));

            return service;
        }
        return null;

    }catch (SQLException | ClassNotFoundException ex) {
        ex.printStackTrace();
        return null;

    }
}
```

Figure 58: Screenshot of getServiceInfoFromId() method

This method retrieves service details from the database based on the given service ID. It prepares a SQL statement using a predefined query to fetch service information using the service ID. After setting the service ID in the prepared statement, it executes the query and retrieves the result set. If a record is found, it creates a ServiceModel object and sets its attributes with the retrieved data. Finally, it returns the ServiceModel object representing the service details if found, otherwise returns null.

4.1.22. getSearchedServiceInfo()

```
/**
 * Searches for services in the database based on the provided service title.
 *
 * @param service_title The title of the service to search for.
 * @return An ArrayList of ServiceModel objects representing the found services, or null if an error occurs.
 */
public ArrayList<ServiceModel> getSearchedServiceInfo(String service_title) {
    try {
        PreparedStatement stmt = getConnection()
                .prepareStatement(StringUtils.QUERY_SEARCH_ALL_SERVICE_FROM_TITLE);

        // Set the username in the prepared statement
        stmt.setString(1, service_title + "%");

        ResultSet result = stmt.executeQuery();

        ArrayList<ServiceModel> searched_services = new ArrayList<ServiceModel>();

        while(result.next()) {
            ServiceModel found_service = new ServiceModel();
            found_service.setId(result.getInt("service_id"));
            found_service.setTitle(result.getString("service_title"));
            found_service.setDescription(result.getString("description"));
            found_service.setPrice(result.getInt("price"));
            found_service.setCreationDate(result.getDate("creation_date").toLocalDate());
            found_service.setRating(result.getFloat("rating"));
            found_service.setUsers(result.getInt("service_users"));
            found_service.setStatus(result.getString("status"));
            found_service.setMentorUsername(result.getString("mentor_username"));

            searched_services.add(found_service);
        }
        return searched_services;

    }catch (SQLException | ClassNotFoundException ex) {
        ex.printStackTrace();
        return null;

    }
}
```

Figure 59: Screenshot of getSearchedServiceInfo() method

This method searches services in the database based on a given service title. It constructs a search query using the title provided, allowing for partial matches. After executing the query, it collects the results and creates ServiceModel objects for each found service, filling in their details. Finally, it returns a list of these ServiceModel objects representing the matched services, or null if there's an issue accessing the database.

4.1.23. getSearchedServiceInfoMentor()

```
/**
 * Searches for services offered by a specific mentor in the database based on the provided service title and mentor username.
 *
 * @param service_title   The title of the service to search for.
 * @param mentor_username The username of the mentor offering the service.
 * @return An ArrayList of ServiceModel objects representing the found services, or null if an error occurs.
 */
public ArrayList<ServiceModel> getSearchedServiceInfoMentor(String service_title, String mentor_username) {
    try {
        PreparedStatement stmt = getConnection()
                .prepareStatement(StringUtils.QUERY_SEARCH_ALL_MENTOR_SERVICE_FROM_TITLE);

        // Set the username in the prepared statement
        stmt.setString(1, mentor_username);
        stmt.setString(2, service_title + "%");

        ResultSet result = stmt.executeQuery();

        ArrayList<ServiceModel> searched_services = new ArrayList<ServiceModel>();

        while(result.next()) {
            ServiceModel found_service = new ServiceModel();
            found_service.setId(result.getInt("service_id"));
            found_service.setTitle(result.getString("service_title"));
            found_service.setDescription(result.getString("description"));
            found_service.setPrice(result.getInt("price"));
            found_service.setCreationDate(result.getDate("creation_date").toLocalDate());
            found_service.setRating(result.getFloat("rating"));
            found_service.setUsers(result.getInt("service_users"));
            found_service.setStatus(result.getString("status"));
            found_service.setMentorUsername(result.getString("mentor_username"));

            searched_services.add(found_service);
        }
        return searched_services;

    }catch (SQLException | ClassNotFoundException ex) {
        ex.printStackTrace();
        return null;

    }
}
```

Figure 60: Screenshot of getSearchedServiceInfoMentor() method

This method searches for services offered by a specific mentor in the database based on the provided service title and mentor username. It constructs a search query using both the service title and mentor username, allowing for partial matches in the title. After executing the query, it collects the results and creates ServiceModel objects for each found service, populating their details. Finally, it returns a list of these ServiceModel objects representing the matched services, or null if there's an issue accessing the database.

4.1.24. updateMentorPassword()

```
/**
 * Updates the password of a mentor in the database.
 *
 * @param username     The username of the mentor whose password is to be updated.
 * @param new_password The new password to set for the mentor.
 * @return 1 if the password update is successful, 0 if update failed, -1 for internal errors, and -2 for server errors.
 */
public int updateMentorPassword(String username, String new_password) {
    try {
        // Prepare a statement using the predefined query for mentor registration
        PreparedStatement stmt = getConnection().prepareStatement(StringUtils.UPDATE_MENTOR_PASSWORD_QUERY);

        // Set the student information in the prepared statement
        stmt.setString(1, PasswordEncryptionWithAes.encrypt(username, new_password));
        stmt.setString(2, username);


        // Execute the update statement and store the number of affected rows
        int result = stmt.executeUpdate();

        // Check if the update was successful (i.e., at least one row affected)
        if (result > 0) {
            return 1; // Registration successful
        } else {
            return 0; // Registration failed (no rows affected)
        }

    } catch (ClassNotFoundException | SQLException ex) {
        // Print the stack trace for debugging purposes
        ex.printStackTrace();
        return -1; // Internal error
    } catch (Exception ex) {
        ex.printStackTrace();
        return -2; // Server error
    }
}
```

Figure 61: Screenshot of updateMentorPassword() method

This method updates the password of a mentor in the database. It takes the mentor's username and the new password as input parameters. Upon execution, it encrypts the new password using AES encryption, updates the password in the database for the specified mentor, and returns 1 if the password update is successful. If the update fails, it returns 0. Internal errors are indicated by returning -1, and server errors are indicated by returning -2.

4.1.25. updateSeekerPassword()

```
/**
 * Updates the password of a seeker in the database.
 *
 * @param username     The username of the seeker whose password is to be updated.
 * @param new_password The new password to set for the seeker.
 * @return 1 if the password update is successful, 0 if update failed, -1 for internal errors, and -2 for server errors.
 */
public int updateSeekerPassword(String username, String new_password) {
    try {
        // Prepare a statement using the predefined query for mentor registration
        PreparedStatement stmt = getConnection().prepareStatement(StringUtils.UPDATE_SEEKER_PASSWORD_QUERY);

        // Set the student information in the prepared statement
        stmt.setString(1, PasswordEncryptionWithAes.encrypt(username, new_password));
        stmt.setString(2, username);

        // Execute the update statement and store the number of affected rows
        int result = stmt.executeUpdate();

        // Check if the update was successful (i.e., at least one row affected)
        if (result > 0) {
            return 1; // Registration successful
        } else {
            return 0; // Registration failed (no rows affected)
        }

    } catch (ClassNotFoundException | SQLException ex) {
        // Print the stack trace for debugging purposes
        ex.printStackTrace();
        return -1; // Internal error
    } catch (Exception ex) {
        ex.printStackTrace();
        return -2; // Server error
    }
}
```

Figure 62: Screenshot of updateSeekerPassword() method

This method is responsible for updating the password of a seeker in the database. It accepts the seeker's username and the new password as parameters. Upon execution, it encrypts the new password using AES encryption, updates the password in the database for the specified seeker, and returns 1 if the password update is successful. If the update fails, it returns 0. Internal errors are indicated by returning -1, and server errors are indicated by returning -2.

4.2. AuthenticationFilter

4.2.1. init()

```
/**
 * Initializes the filter.
 * @param filterConfig The filter configuration.
 * @throws ServletException If the initialization fails.
 */
@Override
public void init(FilterConfig filterConfig) throws ServletException {
}
```

Figure 63: Screenshot of init() method

This method initializes the filter with the provided configuration. It sets up any necessary resources or parameters needed for the filter to function. If initialization fails, it throws a ServletException.

4.2.2. doFilter()

```
/**
 * Filters incoming requests and performs authentication and authorization checks.
 * @param request The ServletRequest object.
 * @param response The ServletResponse object.
 * @param chain The FilterChain object for invoking the next filter in the chain.
 * @throws IOException If an I/O error occurs.
 * @throws ServletException If the request processing fails.
 */
@Override
public void doFilter(ServletRequest request, ServletResponse response, FilterChain chain)
        throws IOException, ServletException {

    // Cast request and response objects to HttpServletRequest and HttpServletResponse for type safety
    HttpServletRequest req = (HttpServletRequest) request;
    HttpServletResponse res = (HttpServletResponse) response;

    // Get the requested URI
    String uri = req.getRequestURI();

    // Allow access to static resources (CSS) and the index page without checking login
    if (uri.endsWith(".css") || uri.endsWith(".png") || uri.endsWith(".jpg")) {
        chain.doFilter(request, response);
        return;
    }

    if(uri.endsWith("/")) {
        request.getRequestDispatcher(StringUtils.SERVLET_URL_INDEX).forward(request, response);
        return;
    }

    // Separate flags for login, login/logout servlets, and register page/servlet for better readability
    boolean isLoginPage = uri.endsWith(StringUtils.PAGE_URL_LOGIN);
    boolean isLoginServlet = uri.endsWith(StringUtils.SERVLET_URL_LOGIN);
    boolean isLogoutServlet = uri.endsWith(StringUtils.SERVLET_URL_LOGOUT);

    boolean isRegisterPage = (uri.endsWith(StringUtils.PAGE_URL_REGISTER_MENTOR) || uri.endsWith(StringUtils.PAGE_URL_REGISTER_SEEKER));
    boolean isRegisterServlet = (uri.endsWith(StringUtils.SERVLET_URL_REGISTER_MENTOR) || uri.endsWith(StringUtils.SERVLET_URL_REGISTER_SEEKER));


    // Separate flag for index page and servlet for better readability
    boolean isIndexPage = uri.endsWith(StringUtils.URL_INDEX);
    boolean isIndexServlet = uri.endsWith(StringUtils.SERVLET_URL_INDEX);

    // Separate flag for other pages for better readability
    boolean isProfilePage = uri.endsWith(StringUtils.URL_PROFILE);
    boolean isServicePage = uri.endsWith(StringUtils.URL_SERVICE);
    boolean isHeaderPage = uri.endsWith(StringUtils.URL_HEADER);
    boolean isFooterPage = uri.endsWith(StringUtils.URL_FOOTER);
```

```
    // Separate flag for other pages for better readability
    boolean isProfilePage = uri.endsWith(StringUtils.URL_PROFILE);
    boolean isServicePage = uri.endsWith(StringUtils.URL_SERVICE);
    boolean isHeaderPage = uri.endsWith(StringUtils.URL_HEADER);
    boolean isFooterPage = uri.endsWith(StringUtils.URL_FOOTER);

    // Check if a session exists and if the username attribute is set to determine login status
    HttpSession session = req.getSession(false); // Don't create a new session if one doesn't exist
    boolean isLoggedIn = session != null && session.getAttribute(StringUtils.USERNAME) != null;

    //  FOR FOR NEW/LOGGED OUT USERS
    if (!isLoggedIn) {

        // Redirect to login if trying to access a protected resource
        if (!(isLoginPage || isLoginServlet || isRegisterPage || isRegisterServlet || isIndexServlet || isIndexPage)) {
            res.sendRedirect(req.getContextPath() + StringUtils.PAGE_URL_LOGIN);
        }

        // Redirect to index servlet if trying to access index page
        else if (isIndexPage) {
            request.getRequestDispatcher(StringUtils.SERVLET_URL_INDEX).forward(request, response);
        }

        // Allow access to the requested resource
        else {
            chain.doFilter(request, response);
        }
    }

    // FOR LOGGED IN USERS
    else if (isLoggedIn) {

        // Redirect to the welcome page if trying to access login page again
        if (isLoginPage || isRegisterPage || isHeaderPage || isFooterPage) {
            res.sendRedirect(req.getContextPath() + StringUtils.PAGE_URL_WELCOME);
        }

        // Redirect to index servlet if trying to access index page
        else if (isIndexPage) {
            request.getRequestDispatcher(StringUtils.SERVLET_URL_INDEX).forward(request, response);
        }

        // Redirect to services servlet if trying to access service page
        else if (isServicePage) {
            request.getRequestDispatcher(StringUtils.SERVLET_URL_SERVICES).forward(request, response);
        }

        // Redirect to services servlet if trying to access service page
        else if (isProfilePage) {
            request.getRequestDispatcher(StringUtils.SERVLET_URL_PROFILE).forward(request, response);
        }
```

```
            // Allow access to the requested resource
            else {
                chain.doFilter(request, response);
            }

        } else {
            // Allow access to the requested resource if user is logged in or accessing unprotected resources
            chain.doFilter(request, response);
        }

    }
```

Figure 64: Screenshot of doFilter() method

The doFilter method intercepts incoming requests, executes authentication and authorization checks, and then either allows the request to proceed or redirects the user as needed. It passes the request down the filter chain for further processing. This method may throw IOException or ServletException for errors.

4.2.3. destroy()

```
/**
 * Cleans up resources used by the filter.
 */
@Override
public void destroy() {
}
```

Figure 65: Screenshot of destory() method

The destroy method cleans up resources used by the filter. It's called when the filter is being taken out of service, releasing any held resources to ensure a graceful shutdown.

4.3. AddServiceServlet

4.3.1. AddServiceServlet()

```
/**
 * Initializes the AddServiceServlet by creating a new instance of DbController.
 * @see HttpServlet#HttpServlet()
 */
public AddServiceServlet() {
    this.dbController = new DbController();
}
```

Figure 66: Screenshot of AddServiceServlet() constructor

The AddServiceServlet begins by setting up a new object of DbController to deal with the database.

4.3.2. doPost()

```
/**
 * Handles HTTP POST requests sent to the servlet, adding a new service to the database.
 * Retrieves attributes from the current session, extracts service information from request parameters,
 * creates a ServiceModel object for the new service, and adds the service to the database using DbController.
 * @param request The HttpServletRequest object representing the request.
 * @param response The HttpServletResponse object representing the response.
 * @throws ServletException If the servlet encounters a ServletException.
 * @throws IOException If an I/O error occurs while processing the request.
 * @see HttpServlet#doPost(HttpServletRequest request, HttpServletResponse response)
 */
@Override
protected void doPost(HttpServletRequest request, HttpServletResponse response) throws ServletException, IOException {

    // Getting attributes from current session
    HttpSession userSession = request.getSession();
    String currentUser = (String) userSession.getAttribute("username");

    // Extract service information from add service page request parameters
    String title = request.getParameter("title");
    String description = request.getParameter("description");
    int price = Integer.parseInt(request.getParameter("price"));

    // creating a service model for new added service
    ServiceModel newService = new ServiceModel();
    newService.setTitle(title);
    newService.setDescription(description);
    newService.setPrice(price);

    // Adding the register mentor(model) in database
    int result = dbController.addService(newService, currentUser);

    //checking for exception
    if (result > 0) {
        response.sendRedirect(request.getContextPath() + StringUtils.SERVLET_URL_SERVICES);

    } else {
        // Code will be written in later weeks (ERROR 404 PAGE)
    }
}
```

Figure 67: Screenshot of doPost() method

This method handles HTTP POST requests by adding a new service to the database. It first retrieves attributes from the current session, such as the username of the current user. Then, it extracts service information from the request parameters, including the title, description, and price of the service. Next, it creates a ServiceModel object to represent the new service. This object is then passed to the DbController to add the service to the database. If the addition is successful, the method redirects to the services page. Otherwise, error handling will be implemented in future updates.

4.4. IndexServlet

4.4.1. doGet()

```
/**
 * Handles HTTP GET requests.
 * Retrieves top mentors' information from the database, adds it to the request attribute,
 * and forwards the request to the index page for display.
 * @param request The HttpServletRequest object representing the request.
 * @param response The HttpServletResponse object representing the response.
 * @throws ServletException If the servlet encounters a ServletException.
 * @throws IOException If an I/O error occurs while processing the request.
 * @see HttpServlet#doGet(HttpServletRequest request, HttpServletResponse response)
 */
protected void doGet(HttpServletRequest request, HttpServletResponse response) throws ServletException, IOException {

    // Get the top mentors info from database and store in topMentors arraylist
    ArrayList<MentorModel> topMentors = controller.getTopMentorsInfo();

    // adding the arraylist in request attribute to display in index page
    request.setAttribute(StringUtils.TOP_MENTORS_LISTS, topMentors);

    // Redirect to index page with attributes in request
    request.getRequestDispatcher(StringUtils.URL_INDEX).forward(request, response);
}
```

Figure 68: Screenshot of doGet() method

This method handles HTTP GET requests. It retrieves information about the top mentors from the database and stores it in an ArrayList named topMentors. This ArrayList is then added to the request attribute so that it can be displayed on the index page. Finally, the method forwards the request to the index page for display.

4.5. LoginServlet

4.5.1. LoginServlet()

```
/**
 * Initializes the LoginServlet by creating a new instance of DbController,
 * enabling interaction with the underlying database.
 *
 * @see HttpServlet#HttpServlet()
 */
public LoginServlet() {
    this.dbController = new DbController();
}
```

Figure 69: Screenshot of LoginServlet() constructor

This constructor initializes the LoginServlet with a new DbController instance, enabling database interaction for handling login requests and validating user credentials.

4.5.2. doPost()

```
/**
 * @see HttpServlet#doPost(HttpServletRequest request, HttpServletResponse response)
 * Handles HTTP POST requests.
 * Extracts username and password from the request parameters, validates login credentials,
 * sets session attributes for logged-in users, and redirects accordingly.
 * @param request The HttpServletRequest object representing the request.
 * @param response The HttpServletResponse object representing the response.
 * @throws ServletException If the servlet encounters a ServletException.
 * @throws IOException If an I/O error occurs while processing the request.
 */
protected void doPost(HttpServletRequest request, HttpServletResponse response) throws ServletException, IOException {

    // Extract username and password from the request parameters
    String userName = request.getParameter(StringUtils.USERNAME);
    String password = request.getParameter(StringUtils.PASSWORD);

    // Create a LoginModel object to hold user credentials
    LoginModel loginModel = new LoginModel(userName, password);

    // Call DBController to validate login credentials
    int loginResult = dbController.getLoginInfo(loginModel);

    // Handle login results with appropriate messages and redirects

    if (loginResult == 1) { // FOR MENTOR (LOGIN SUCCESS)

        // getting image from database
        String mentorImage = dbController.getMentorImageName(userName);

        // creating session and setting attributes
        HttpSession userSession = request.getSession();
        userSession.setAttribute("type", "mentor");
        userSession.setAttribute("username", userName);
        userSession.setAttribute("image", mentorImage);
        userSession.setMaxInactiveInterval(30*30);

        // creating cookie
        Cookie userCookie= new Cookie("user", userName);
        userCookie.setMaxAge(30*60);
        response.addCookie(userCookie);

        // redirect to welcome page
        response.sendRedirect(request.getContextPath() + StringUtils.PAGE_URL_WELCOME);

    } else if (loginResult == 2) {   // FOR SEEKER (LOGIN SUCCESS)

        // getting image from database
        String seekerImage = dbController.getSeekerImageName(userName);


        // creating session and setting attributes
        HttpSession userSession = request.getSession();
        userSession.setAttribute("type", "seeker");
        userSession.setAttribute("username", userName);
        userSession.setAttribute("image", seekerImage);
        userSession.setMaxInactiveInterval(30*30);

        // creating cookie
        Cookie userCookie= new Cookie("user", userName);
        userCookie.setMaxAge(30*60);
        response.addCookie(userCookie);

        // redirect to welcome page
        response.sendRedirect(request.getContextPath() + StringUtils.PAGE_URL_WELCOME);

    } else if (loginResult == 0) {
        // Username or password mismatch
        request.setAttribute(StringUtils.MESSAGE_ERROR, StringUtils.MESSAGE_ERROR_LOGIN);
        request.getRequestDispatcher(StringUtils.PAGE_URL_LOGIN).forward(request,
                response);

    } else if (loginResult == -1) {
        // Username not found
        request.setAttribute(StringUtils.MESSAGE_ERROR, StringUtils.MESSAGE_ERROR_CREATE_ACCOUNT);
        request.getRequestDispatcher(StringUtils.PAGE_URL_LOGIN).forward(request, response);

    } else {
        // Internal server error
        request.setAttribute(StringUtils.MESSAGE_ERROR, StringUtils.MESSAGE_ERROR_SERVER);
        request.getRequestDispatcher(StringUtils.PAGE_URL_LOGIN).forward(request,
                response);
    }
}
```

Figure 70: Screenshot of doPost() method

This method manages HTTP POST requests. It begins by extracting the username and password from the request parameters. Then, it creates a LoginModel object to hold these credentials and calls on the DBController to validate them. Depending on the result, it proceeds with appropriate actions: for successful logins (either mentor or seeker), it sets session attributes and redirects to the welcome page. If the username or password doesn't match, it displays an error message on the login page. If the username is not found, it prompts the user to create an account. Any other unexpected errors are handled with a generic server error message.

4.6. LogoutServlet

4.6.1. doGet()

```
/**
 * @see HttpServlet#doGet(HttpServletRequest request, HttpServletResponse response)
 * Handles HTTP GET requests by redirecting to the doPost method.
 * @param request The HttpServletRequest object representing the request.
 * @param response The HttpServletResponse object representing the response.
 * @throws ServletException If the servlet encounters a ServletException.
 * @throws IOException If an I/O error occurs while processing the request.
 */
protected void doGet(HttpServletRequest request, HttpServletResponse response)
        throws ServletException, IOException {
    // Redirect to doPost method
    doPost(request, response);
}
```

Figure 71: Screenshot of doGet() method

This method handles HTTP GET requests by redirecting them to the doPost method. When a GET request is received, it simply calls the doPost method to process the request.

4.6.2. doPost()

```
/**
 * @see HttpServlet#doPost(HttpServletRequest request, HttpServletResponse response)
 * Handles HTTP POST requests.
 * Clears existing cookies, invalidates user session (if it exists), and redirects to the index page.
 * @param request The HttpServletRequest object representing the request.
 * @param response The HttpServletResponse object representing the response.
 * @throws ServletException If the servlet encounters a ServletException.
 * @throws IOException If an I/O error occurs while processing the request.
 */
protected void doPost(HttpServletRequest request, HttpServletResponse response) throws ServletException, IOException {

    // Handle logout request

    //  Clearing existing cookies
    Cookie[] cookies = request.getCookies();
    if (cookies != null) {
        for (Cookie cookie : cookies) {
            // Set max age to 0 to effectively delete the cookie
            cookie.setMaxAge(0);
            response.addCookie(cookie);
        }
    }

    //  Invalidate user session (if it exists)
    HttpSession session = request.getSession(false);
    if (session != null) {
        session.invalidate();
    }

    // Redirect to index page
    response.sendRedirect(request.getContextPath() + StringUtils.SERVLET_URL_INDEX);
}
```

Figure 72: Screenshot of doPost() method

This method handles HTTP POST requests for logging out users. It clears existing cookies and invalidates the user session, if active, and then redirects to the index page. This ensures a secure logout process and returns users to the application's main page.

4.7. ModifyServiceServlet

4.7.1. doGet()

```
/**
 * @see HttpServlet#doGet(HttpServletRequest request, HttpServletResponse response)
 * Handles HTTP GET requests by retrieving service information and redirecting to the update page.
 * @param request The HttpServletRequest object representing the request.
 * @param response The HttpServletResponse object representing the response.
 * @throws ServletException If the servlet encounters a ServletException.
 * @throws IOException If an I/O error occurs while processing the request.
 */
protected void doGet(HttpServletRequest request, HttpServletResponse response) throws ServletException, IOException {

    // Get selected service from request, get all its info from database and store in service as service model
    ServiceModel service = dbController.getServiceInfoFromId(Integer.parseInt(request.getParameter("update_service_id")));

    // adding the service in request attribute to display in update page
    request.setAttribute("updateService", service);

    // Redirect to update page with attributes in request
    request.getRequestDispatcher(StringUtils.PAGE_URL_UPDATE).forward(request, response);
}
```

Figure 73: Screenshot of doGet() method

This method handles GET requests by retrieving details of a specific service for updating. It extracts the service's ID from the request, fetches its details from the database, and

stores them in a ServiceModel object. Then, it forwards this object to the update page for display. Users can conveniently modify service details through this page.

4.7.2. doPost()

```
/**
 * @see HttpServlet#doPost(HttpServletRequest request, HttpServletResponse response)
 * Handles HTTP POST requests by processing update or delete actions.
 * @param request The HttpServletRequest object representing the request.
 * @param response The HttpServletResponse object representing the response.
 * @throws ServletException If the servlet encounters a ServletException.
 * @throws IOException If an I/O error occurs while processing the request.
 */
protected void doPost(HttpServletRequest request, HttpServletResponse response) throws ServletException, IOException {

    // getting id's from hidden input parameters
    String updateId = request.getParameter("update_service_id");
    String deleteId = request.getParameter("delete_service_id");

    // if update button clicked
    if (updateId != null && !updateId.isEmpty()) {
        doPut(request, response);
    }

    // if delete button clicked
    if (deleteId != null && !deleteId.isEmpty()) {
        doDelete(request, response);
    }
}
```

Figure 74 : Screenshot of doPost() method

This method manages HTTP POST requests, specifically handling update or delete actions for services. Upon receiving a POST request, it first retrieves the IDs of services to be updated or deleted from hidden input parameters. If the update button is clicked and an ID is provided, the method invokes the doPut method to process the update action. Similarly, if the delete button is clicked and an ID is provided, the method invokes the doDelete method to handle the delete action.

4.7.3. doPut()

```
/**
 * @see HttpServlet#doPut(HttpServletRequest, HttpServletResponse)
 * Handles HTTP PUT requests by updating service information in the database.
 * @param request The HttpServletRequest object representing the request.
 * @param response The HttpServletResponse object representing the response.
 * @throws ServletException If the servlet encounters a ServletException.
 * @throws IOException If an I/O error occurs while processing the request.
 */
protected void doPut(HttpServletRequest request, HttpServletResponse response) throws ServletException, IOException {

    // Extract user information from update page request parameters
    String title = request.getParameter("title");
    String description = request.getParameter("description");
    int price = Integer.parseInt(request.getParameter("price"));

    // Create a service model for updated service
    ServiceModel updatedService = new ServiceModel();
    updatedService.setTitle(title);
    updatedService.setDescription(description);
    updatedService.setPrice(price);

    // Updating the service in database
    int result = dbController.updateService(updatedService, Integer.parseInt(request.getParameter("update_service_id")));

    //checking for exception when updating
    if (result > 0) {
        response.sendRedirect(request.getContextPath() + StringUtils.SERVLET_URL_SERVICES);

    } else {
        // Internal server error
        request.setAttribute(StringUtils.MESSAGE_ERROR, StringUtils.MESSAGE_ERROR_SERVER);
    }

}
```

Figure 75: Screenshot of doPut() method

This method handles HTTP PUT requests by updating service information in the database. It extracts details of the service to be updated from the request parameters, including the title, description, and price. These details are used to create a ServiceModel object representing the updated service. The method then updates the service in the database using the DbController. If the update is successful, the method redirects to the services page. Otherwise, it sets an internal server error message to be displayed.

4.7.4. doDelete()

```
/**
 * @see HttpServlet#doDelete(HttpServletRequest, HttpServletResponse)
 * Handles HTTP DELETE requests by deleting services from the database.
 * @param request The HttpServletRequest object representing the request.
 * @param response The HttpServletResponse object representing the response.
 * @throws ServletException If the servlet encounters a ServletException.
 * @throws IOException If an I/O error occurs while processing the request.
 */
protected void doDelete(HttpServletRequest request, HttpServletResponse response) throws ServletException, IOException {

    // Deleting the selected service from database
    if (dbController.deleteService(Integer.parseInt(request.getParameter("delete_service_id"))) == 1) {

        // send success message through request and redirect to services servlet
        request.setAttribute(StringUtils.MESSAGE_SUCCESS, StringUtils.MESSAGE_SUCCESS_DELETE);
        response.sendRedirect(request.getContextPath() + StringUtils.SERVLET_URL_SERVICES);

    // If deletion failed
    } else {
        // Internal server error
        request.setAttribute(StringUtils.MESSAGE_ERROR, StringUtils.MESSAGE_ERROR_SERVER);
    }
}
```

Figure 76: Screenshot of doDelete() method

This method handles HTTP DELETE requests by deleting services from the database. It retrieves the ID of the service to be deleted from the request parameters and proceeds to delete the corresponding service from the database using the DbController. If the deletion is successful, it sets a success message to be displayed and redirects to the services servlet, allowing users to view the updated list of services. If the deletion fails, it sets an internal server error message to be displayed.

4.8. ProfileServlet

4.8.1. doGet()

```
/**
 * @see HttpServlet#doGet(HttpServletRequest request, HttpServletResponse response)
 * Handles HTTP GET requests by retrieving user profile information and forwarding to the profile page.
 * @param request The HttpServletRequest object representing the request.
 * @param response The HttpServletResponse object representing the response.
 * @throws ServletException If the servlet encounters a ServletException.
 * @throws IOException If an I/O error occurs while processing the request.
 */
protected void doGet(HttpServletRequest request, HttpServletResponse response)
        throws ServletException, IOException {

    // Getting attributes from current session
    HttpSession userSession = request.getSession();
    String currentUser = (String) userSession.getAttribute("username");
    String currentUserType = (String) userSession.getAttribute("type");

    // FOR MENTOR (get current mentor info from database as mentor model and set attribute in request)
    if (currentUserType.equals("mentor")) {
        MentorModel mentor = dbController.getMentorInfo(currentUser);
        request.setAttribute("userProfile", mentor);
    }

    // FOR SEEKER (get current seeker info from database as seeker model and set attribute in request)
    else {
        SeekerModel seeker = dbController.getSeekerInfo(currentUser);
        request.setAttribute("userProfile", seeker);
    }

    // Redirect to profile page with attributes in request
    request.getRequestDispatcher(StringUtils.PAGE_URL_PROFILE).forward(request, response);
}
```

Figure 77: Screenshot of doGet() method

This method handles GET requests by fetching user profile information based on the current session. It distinguishes between mentor and seeker types, retrieves the respective profile data from the database, and sets it as a request attribute. Finally, it forwards the request to the profile page for display.

4.8.2. doPost()

```
/**
 * @see HttpServlet#doPost(HttpServletRequest request, HttpServletResponse response)
 * Handles HTTP POST requests for updating user profile or deleting user account.
 * @param request The HttpServletRequest object representing the request.
 * @param response The HttpServletResponse object representing the response.
 * @throws ServletException If the servlet encounters a ServletException.
 * @throws IOException If an I/O error occurs while processing the request.
 */
protected void doPost(HttpServletRequest request, HttpServletResponse response)
        throws ServletException, IOException {

    // Checking if update password button clicked
    Object isUpdate = request.getAttribute("isUpdate");
    if (isUpdate != null) {
        if((Integer)isUpdate == 1) {
            doGet(request, response);
        }

    // If update details or delete button clicked
    }else {

        // getting username from input parameters
        String updateUsername = request.getParameter("update_username");
        String deleteUsername = request.getParameter("delete_username");

        // if update button clicked
        if (updateUsername != null && !updateUsername.isEmpty()) {
            doPut(request, response);
        }

        // if delete button clicked
        if (deleteUsername != null && !deleteUsername.isEmpty()) {
            doDelete(request, response);
        }
    }
}
```

Figure 78: Screenshot of doPost() method

This method handles HTTP POST requests for updating user profiles or deleting user accounts. It checks if the update password button is clicked; if yes, it redirects to the doGet method. Otherwise, it processes update details or delete button clicks based on the provided username, invoking the doPut or doDelete method accordingly.

4.8.3. doPut()

```
/**
 * @see HttpServlet#doPut(HttpServletRequest, HttpServletResponse)
 * Handles HTTP PUT requests for updating user profile information.
 * @param request The HttpServletRequest object representing the request.
 * @param response The HttpServletResponse object representing the response.
 * @throws ServletException If the servlet encounters a ServletException.
 * @throws IOException If an I/O error occurs while processing the request.
 */
protected void doPut(HttpServletRequest request, HttpServletResponse response)
        throws ServletException, IOException {

    // Getting attributes from current session
    HttpSession userSession = request.getSession();
    String currentUser = (String) userSession.getAttribute("username");
    String currentUserType = (String) userSession.getAttribute("type");
    String currentImage = (String) userSession.getAttribute("image");

    // Extract user information from profile page request parameters
    String name = request.getParameter("name");
    String username = request.getParameter("update_username");
    String email = request.getParameter("email");
    String phone = request.getParameter("phone");
    String password = request.getParameter("password");
    Part photo = request.getPart("photo");

    // validation flag
    boolean is_valid = true;

    // full name validation
    if (!ValidationUtils.isAlphabetical(name)) {
        is_valid = false;
        request.setAttribute(StringUtils.MESSAGE_ERROR, StringUtils.MESSAGE_ERROR_NAMES);
    }

    // user name validation
    if (!ValidationUtils.isUsername(username)) {
        is_valid = false;
        request.setAttribute(StringUtils.MESSAGE_ERROR, StringUtils.MESSAGE_ERROR_USERNAME);
    }

    // phone validation
    if (!ValidationUtils.isPhone(phone)) {
        is_valid = false;
        request.setAttribute(StringUtils.MESSAGE_ERROR, StringUtils.MESSAGE_ERROR_PHONE_NUMBER);
    }

    // image extension validation
    if (!ValidationUtils.isImage(photo.getSubmittedFileName()) && !(photo.getSubmittedFileName() == "")) {
        is_valid = false;
        request.setAttribute(StringUtils.MESSAGE_ERROR, StringUtils.MESSAGE_ERROR_IMAGE);
    }
```

```
        // if not valid then send to do get method and return
        if (!is_valid) {
            doGet(request, response);
            return;
        }


        // FOR MENTOR
        if (currentUserType.equals("mentor")) {

            // Create a mentor model for updated mentor
            MentorModel updatedMentor = new MentorModel();
            updatedMentor.setName(name);
            updatedMentor.setUsername(username);
            updatedMentor.setEmail(email);
            updatedMentor.setPhone(phone);
            updatedMentor.setPassword(password);

            // checking if photo updated
            if (photo.getSize() == 0) {
                updatedMentor.setProfilePhotoUrlFromDb(currentImage);
            } else {
                updatedMentor.setProfilePhotoUrlFromPart(photo);
            }

            // Updating the registered mentor(model) in database
            int result = dbController.updateMentor(currentUser, updatedMentor);

            // checking for exception when updating
            if (result > 0) {

                // Upload new image in tomcat server
                String savePath = StringUtils.IMAGE_DIR_USER;
                String fileName = updatedMentor.getProfilePhotoUrl();

                if (!(photo.getSize() == 0))
                    photo.write(savePath + fileName);

                // updating username and image in session
                userSession.setAttribute("username", username);
                userSession.setAttribute("image", fileName);

                // redirect to welcome page
                request.getRequestDispatcher(StringUtils.PAGE_URL_WELCOME).forward(request, response);

            } else {
                // Internal server error
                request.setAttribute(StringUtils.MESSAGE_ERROR, StringUtils.MESSAGE_ERROR_SERVER);
            }
        }

        // FOR SEEKER
        else {
```

```
        // Create a seeker model for updated seeker
        SeekerModel updatedSeeker = new SeekerModel();
        updatedSeeker.setName(name);
        updatedSeeker.setUsername(username);
        updatedSeeker.setEmail(email);
        updatedSeeker.setPhone(phone);
        updatedSeeker.setPassword(password);

        // checking if photo updated
        if (photo.getSize() == 0) {
            updatedSeeker.setProfilePhotoUrlFromDb(currentImage);
        } else {
            updatedSeeker.setProfilePhotoUrlFromPart(photo);
        }

        // Updating the registered seeker(model) in database
        int result = dbController.updateSeeker(currentUser, updatedSeeker);

        // checking for exception when updating
        if (result > 0) {

            // Upload new image in tomcat server
            String savePath = StringUtils.IMAGE_DIR_USER;
            String fileName = updatedSeeker.getProfilePhotoUrl();
            if (!(photo.getSize() == 0))
                photo.write(savePath + fileName);

            // updating username and image in session
            userSession.setAttribute("username", username);
            userSession.setAttribute("image", fileName);

            // redirect to welcome page
            request.getRequestDispatcher(StringUtils.PAGE_URL_WELCOME).forward(request, response);

        } else {
            // Internal server error
            request.setAttribute(StringUtils.MESSAGE_ERROR, StringUtils.MESSAGE_ERROR_SERVER);
        }
    }
}
```

Figure 79: Screenshot of doPut() method

This method handles HTTP PUT requests for updating user profile information. It retrieves user attributes from the session and user input from request parameters. Validation checks are performed, and if data is invalid, it redirects to the doGet method. For mentors and seekers, respective model objects are created with updated information. If a new photo is uploaded, it's saved; otherwise, the current photo URL is retained. Updated user information is then sent to the database for updating. If successful, the session is updated, and users are redirected to the welcome page. Otherwise, an internal server error message is displayed.

4.8.4. doDelete()

```
/**
 * @see HttpServlet#doDelete(HttpServletRequest, HttpServletResponse)
 * Handles HTTP DELETE requests for deleting user account.
 * @param request The HttpServletRequest object representing the request.
 * @param response The HttpServletResponse object representing the response.
 * @throws ServletException If the servlet encounters a ServletException.
 * @throws IOException If an I/O error occurs while processing the request.
 */
protected void doDelete(HttpServletRequest request, HttpServletResponse response)
        throws ServletException, IOException {

    // Getting attributes from current session
    HttpSession userSession = request.getSession();
    String currentUser = (String) userSession.getAttribute("username");
    String currentUserType = (String) userSession.getAttribute("type");

    // FOR MENTOR
    if (currentUserType.equals("mentor")) {

        // deleting the registered mentor(model) from database
        int result = dbController.deleteMentor(currentUser);

        // checking for exception when deleting
        if (result > 0) {
            request.getRequestDispatcher(StringUtils.SERVLET_URL_LOGOUT).forward(request, response);

        } else {
            // Internal server error
            request.setAttribute(StringUtils.MESSAGE_ERROR, StringUtils.MESSAGE_ERROR_SERVER);
        }
    }

    // FOR SEEKER
    else {

        // deleting the registered seeker(model) from database
        int result = dbController.deleteSeeker(currentUser);

        // checking for exception when deleting
        if (result > 0) {
            request.getRequestDispatcher(StringUtils.SERVLET_URL_LOGOUT).forward(request, response);

        } else {
            // Internal server error
            request.setAttribute(StringUtils.MESSAGE_ERROR, StringUtils.MESSAGE_ERROR_SERVER);
        }
    }
}
```

Figure 80: Screenshot of doDelete() method

This method handles HTTP DELETE requests for deleting user accounts. It retrieves user attributes from the current session, including the username and user type. Depending on whether the user is a mentor or seeker, it proceeds to delete the corresponding user account from the database using the DbController. Upon successful deletion, the method redirects to the logout servlet to log the user out. If any exceptions occur during the deletion process, an internal server error message is displayed.

4.9. RegisterMentorServlet

4.9.1. RegisterMentorServlet()

```
/**
 * Constructs a new RegisterMentorServlet.
 * Initializes a new instance of DbController for database operations.
 * @see HttpServlet#HttpServlet()
 */
public RegisterMentorServlet() {
    this.dbController = new DbController();
}
```

Figure 81: Screenshot of RegisterMentorServlet() constructor

This method initializes a new instance of the RegisterMentorServlet class and creates a new DbController object for handling database operations.

4.9.2. doPost()

```
/**
 * @see HttpServlet#doPost(HttpServletRequest request, HttpServletResponse response)
 * Handles POST requests for registering mentors.
 *
 * @param request  The HttpServletRequest object
 * @param response The HttpServletResponse object
 * @throws ServletException if a servlet-specific error occurs
 * @throws IOException      if an I/O error occurs
 */
protected void doPost(HttpServletRequest request, HttpServletResponse response) throws ServletException, IOException {

    // Extract mentor information from register page request parameters
    String name = request.getParameter(StringUtils.MENTOR_NAME);
    String username = request.getParameter(StringUtils.MENTOR_USERNAME);
    String email= request.getParameter(StringUtils.MENTOR_EMAIL);
    String phone = request.getParameter(StringUtils.MENTOR_PHONE_NUMBER);
    String password = request.getParameter(StringUtils.MENTOR_PASSWORD);
    String retypePassword = request.getParameter(StringUtils.MENTOR_RETYPE_PASSWORD);
    String universityName = request.getParameter(StringUtils.MENTOR_UNIVERSITY_NAME);
    String universityCountry = request.getParameter(StringUtils.MENTOR_UNIVERSITY_COUNTRY);
    String major = request.getParameter(StringUtils.MENTOR_MAJOR);
    int tuitionFee = Integer.parseInt(request.getParameter(StringUtils.MENTOR_TUITION_FEE));
    String scholarship = request.getParameter(StringUtils.MENTOR_SCHOLARSHIP);
    Part profilePhoto = request.getPart(StringUtils.MENTOR_PROFILE_PHOTO);

    // validation flag
    boolean is_valid = true;

    // message to store all error messages
    StringBuilder errorMessage = new StringBuilder();


    // full name validation
    if (!ValidationUtils.isAlphabetical(name)) {
        is_valid = false;
        errorMessage.append(StringUtils.MESSAGE_ERROR_NAMES);
    }

    // user name validation
    if (!ValidationUtils.isUsername(username)) {
        is_valid = false;
        errorMessage.append(StringUtils.MESSAGE_ERROR_USERNAME);
    }

    // phone validation
    if (!ValidationUtils.isPhone(phone)) {
        is_valid = false;
        errorMessage.append(StringUtils.MESSAGE_ERROR_PHONE_NUMBER);
    }
```

```
        // password validation
        if (!ValidationUtils.isPassword(password)) {
            is_valid = false;
            errorMessage.append(StringUtils.MESSAGE_ERROR_PASSWORD);
        }
        if (!password.equals(retypePassword)) {
            is_valid = false;
            errorMessage.append(StringUtils.MESSAGE_ERROR_PASSWORD_UNMATCHED);
        }

        // tuition fee validation
        if (!ValidationUtils.isNumeric(Integer.toString(tuitionFee))) {
            is_valid = false;
            errorMessage.append(StringUtils.MESSAGE_ERROR_TUITION);
        }

        // image extension validation
        if (!ValidationUtils.isImage(profilePhoto.getSubmittedFileName()) && !(profilePhoto.getSubmittedFileName() == "")) {
            is_valid = false;
            errorMessage.append(StringUtils.MESSAGE_ERROR_IMAGE);
        }

        // checking if user name exists
        boolean username_exist = dbController.presentInMentor("mentor_username", username);
        if (username_exist) {
            is_valid = false;
            errorMessage.append(StringUtils.MESSAGE_ERROR_USERNAME_EXISTS);
        }

        // checking if email exists
        boolean email_exist = dbController.presentInMentor("mentor_email", email);
        if (email_exist) {
            is_valid = false;
            errorMessage.append(StringUtils.MESSAGE_ERROR_EMAIL_EXISTS);
        }

        // checking if number exists
        boolean number_exist = dbController.presentInMentor("mentor_phone", phone);
        if (number_exist) {
            is_valid = false;
            errorMessage.append(StringUtils.MESSAGE_ERROR_PHONE_NUMBER_EXISTS);
        }

        // if input is invalid then
        if (!is_valid) {
            //  set error request attribute
            request.setAttribute(StringUtils.MESSAGE_ERROR, errorMessage.toString());
        }

        // if every input is valid then
        else {

            // Create model for registered mentor
            MentorModel mentor = new MentorModel(name, username, email, phone, password, universityName,
                    universityCountry, major, tuitionFee, scholarship, profilePhoto);

            // Adding the register mentor(model) in database
            int result = dbController.registerMentor(mentor);

            //checking for exception
            if (result > 0) {

                // Upload image in tomcat server
                String savePath = StringUtils.IMAGE_DIR_USER;
                String fileName = mentor.getProfilePhotoUrl();
                if(!(fileName.equals("default-profile.png")))
                    profilePhoto.write(savePath + fileName);


                //  set success request attribute
                request.setAttribute(StringUtils.MESSAGE_SUCCESS, StringUtils.MESSAGE_SUCCESS_REGISTER);

            } else {
                // Internal server error
                request.setAttribute(StringUtils.MESSAGE_ERROR, StringUtils.MESSAGE_ERROR_SERVER);
            }
        }

        //  Redirect to register mentor page with request attributes
        request.getRequestDispatcher(StringUtils.PAGE_URL_REGISTER_MENTOR).forward(request, response);

    }
```

Figure 82: Screenshot of doPost() method

This method handles POST requests for registering mentors. It extracts mentor information from the request parameters, performs validation checks, and processes the registration accordingly. If the input is valid, it creates a MentorModel object and adds it to the database. Upon successful registration, it uploads the profile photo to the server and sets a success message attribute. If any errors occur during the process, it sets an error message attribute. Finally, it redirects to the register mentor page with the appropriate request attributes.

4.10. RegisterSeekerServlet

4.10.1. RegisterSeekerServlet()

```
/**
 * Constructs a new RegisterSeekerServlet.
 * Initializes a new instance of DbController for database operations.
 * @see HttpServlet#HttpServlet()
 */
public RegisterSeekerServlet() {
    this.dbController = new DbController();
}
```

Figure 83: Screenshot of RegisterSeekerServlet() constructor

This method initializes a new instance of the RegisterSeekerServlet class and creates a new DbController object for handling database operations.

4.10.2. doPost()

```
/**
 * @see HttpServlet#doPost(HttpServletRequest request, HttpServletResponse response)
 * Handles POST requests for registering seekers.
 *
 * @param request  The HttpServletRequest object
 * @param response The HttpServletResponse object
 * @throws ServletException if a servlet-specific error occurs
 * @throws IOException      if an I/O error occurs
 */
protected void doPost(HttpServletRequest request, HttpServletResponse response) throws ServletException, IOException {

    // Extract mentor information from register page request parameters
    String name = request.getParameter(StringUtils.SEEKER_NAME);
    String username = request.getParameter(StringUtils.SEEKER_USERNAME);
    String email= request.getParameter(StringUtils.SEEKER_EMAIL);
    String phone = request.getParameter(StringUtils.SEEKER_PHONE_NUMBER);
    String password = request.getParameter(StringUtils.SEEKER_PASSWORD);
    String retypePassword = request.getParameter(StringUtils.SEEKER_RETYPE_PASSWORD);
    String location = request.getParameter(StringUtils.SEEKER_LOCATION);
    String educationLevel = request.getParameter(StringUtils.SEEKER_EDUCATION_LEVEL);
    Part profilePhoto = request.getPart(StringUtils.SEEKER_PROFILE_PHOTO);

    // validation flag
    boolean is_valid = true;

    // message to store all error messages
    StringBuilder errorMessage = new StringBuilder();

    // full name validation
    if (!ValidationUtils.isAlphabetical(name)) {
        is_valid = false;
        errorMessage.append(StringUtils.MESSAGE_ERROR_NAMES);
    }

    // user name validation
    if (!ValidationUtils.isUsername(username)) {
        is_valid = false;
        errorMessage.append(StringUtils.MESSAGE_ERROR_USERNAME);
    }

    // phone validation
    if (!ValidationUtils.isPhone(phone)) {
        is_valid = false;
        errorMessage.append(StringUtils.MESSAGE_ERROR_PHONE_NUMBER);
    }
```

```
        // password validation
        if (!ValidationUtils.isPassword(password)) {
            is_valid = false;
            errorMessage.append(StringUtils.MESSAGE_ERROR_PASSWORD);
        }
        if (!password.equals(retypePassword)) {
            is_valid = false;
            errorMessage.append(StringUtils.MESSAGE_ERROR_PASSWORD_UNMATCHED);
        }

        // image extension validation
        if (!ValidationUtils.isImage(profilePhoto.getSubmittedFileName()) && !(profilePhoto.getSubmittedFileName() == "")) {
            is_valid = false;
            errorMessage.append(StringUtils.MESSAGE_ERROR_IMAGE);
        }

        // checking if user name exists
        boolean username_exist = dbController.presentInSeeker("seeker_username", username);
        if (username_exist) {
            is_valid = false;
            errorMessage.append(StringUtils.MESSAGE_ERROR_USERNAME_EXISTS);
        }

        // checking if email exists
        boolean email_exist = dbController.presentInSeeker("seeker_email", email);
        if (email_exist) {
            is_valid = false;
            errorMessage.append(StringUtils.MESSAGE_ERROR_EMAIL_EXISTS);
        }

        // checking if number exists
        boolean number_exist = dbController.presentInSeeker("seeker_phone", phone);
        if (number_exist) {
            is_valid = false;
            errorMessage.append(StringUtils.MESSAGE_ERROR_PHONE_NUMBER_EXISTS);
        }

        // if input is invalid then
        if (!is_valid) {
            //  set error request attribute
            request.setAttribute(StringUtils.MESSAGE_ERROR, errorMessage.toString());
        }

        // if every input is valid then
        else {

            // Create model for registered seeker
            SeekerModel seeker = new SeekerModel(name, username, email, phone, password, location, educationLevel, profilePhoto);

            // Adding the register seeker(model) in database
            int result = dbController.registerSeeker(seeker);


            //checking for exception
            if (result == 1) {

                // Upload image in tomcat server
                String savePath = StringUtils.IMAGE_DIR_USER;
                String fileName = seeker.getProfilePhotoUrl();
                if(!(fileName.equals("default-profile.png")))
                    profilePhoto.write(savePath + fileName);

                //  set success request attribute
                request.setAttribute(StringUtils.MESSAGE_SUCCESS, StringUtils.MESSAGE_SUCCESS_REGISTER);

            } else {
                // Internal server error
                request.setAttribute(StringUtils.MESSAGE_ERROR, StringUtils.MESSAGE_ERROR_SERVER);
            }
        }

        //  Redirect to register seeker page with request attributes
        request.getRequestDispatcher(StringUtils.PAGE_URL_REGISTER_SEEKER).forward(request, response);

    }
```

Figure 84: Screenshot of doPost() method

This method handles POST requests for registering seekers. It extracts seeker information from the request parameters, performs validation checks, and processes the registration accordingly. If the input is valid, it creates a SeekerModel object and adds it to the database. Upon successful registration, it uploads the profile photo to the server

and sets a success message attribute. If any errors occur during the process, it sets an error message attribute. Finally, it redirects to the register seeker page with the appropriate request attributes.

4.11. ServicesServlet

4.11.1. doGet()

```
/**
 * Handles GET requests to display services based on user type (seeker or mentor)
 *
 * @param request  The HttpServletRequest object
 * @param response The HttpServletResponse object
 * @throws ServletException if a servlet-specific error occurs
 * @throws IOException      if an I/O error occurs
 * @see HttpServlet#doGet(HttpServletRequest request, HttpServletResponse response)
 */
protected void doGet(HttpServletRequest request, HttpServletResponse response) throws ServletException, IOException {

    // Getting attributes from current session
    HttpSession userSession = request.getSession();
    String currentUser = (String) userSession.getAttribute("username");
    String currentUserType = (String) userSession.getAttribute("type");

    // Extract search information from register page request parameters
    String searchKey = request.getParameter("search");

    // FOR SEEKER
    if (currentUserType.equals("seeker")) {

        // Declaring services arraylist to store all services
        ArrayList<ServiceModel> services;

        // Get searched services if search button clicked
        if (searchKey == null) {
            services = controller.getAllServiceInfo();
        }

        // Get all services for default
        else {
            services = controller.getSearchedServiceInfo(searchKey);
        }

        // adding arraylist of services in request attribute to display in  services jsp
        request.setAttribute(StringUtils.SERVICE_LISTS, services);
        request.setAttribute("isSeeker", true);

        // Initializing and declaring hashMap to connect mentor details with their service
        HashMap<String, MentorModel> hashMap = new HashMap<>();

        // Loop on each items on arraylist
        for (ServiceModel service: services) {
            // Add mentor name as key and its model as value
            String currUsername = service.getMentorUsername();
            MentorModel mentor = controller.getMentorInfo(currUsername);
            hashMap.put(service.getMentorUsername(), mentor);
        }

        // adding the mentor hashmap in request attribute to display in services page
        request.setAttribute("mentorMap", hashMap);
    }
```

```
    // FOR MENTOR
    else {

        // Declaring services arraylist to store mentor's all services
        ArrayList<ServiceModel> mentor_services;

        // Get searched services if search button clicked
        if (searchKey == null) {
            mentor_services = controller.getAllMentorServiceInfo(currentUser);
        }

        // Get all mentor's services for default
        else {
            mentor_services = controller.getSearchedServiceInfoMentor(searchKey, currentUser);
        }

        // adding arraylist of mentor's services in request attribute to display in  services jsp
        request.setAttribute(StringUtils.MENTOR_SERVICE_LISTS, mentor_services);
        request.setAttribute("isMentor", true);

        // Initializing and declaring hashMap to connect mentor details with their service
        HashMap<String, MentorModel> hashMap = new HashMap<>();

        // Loop on each items on arraylist
        for (ServiceModel service: mentor_services) {
            // Add mentor name as key and its model as value
            String currUsername = service.getMentorUsername();
            MentorModel mentor = controller.getMentorInfo(currUsername);
            hashMap.put(service.getMentorUsername(), mentor);
        }

        // adding the mentor hashmap in request attribute to display in services page
        request.setAttribute("mentorMap", hashMap);
    }

    // Redirect to services page with attributes in request
    request.getRequestDispatcher(StringUtils.PAGE_URL_SERVICES).forward(request, response);
}
```

Figure 85: Screenshot of doGet() method

This method handles GET requests to display services based on the user type, either seeker or mentor. It retrieves attributes from the current session to determine the user type. Then, it extracts search information from the request parameters. For seekers, it retrieves and displays all services or searched services, along with associated mentor details. For mentors, it retrieves and displays the mentor's services or searched services, also with associated mentor details. Finally, it redirects to the services page with the necessary attributes in the request.

4.11.2. doPost()

```
/**
 * Handles POST requests by delegating to doGet method
 *
 * @param request  The HttpServletRequest object
 * @param response The HttpServletResponse object
 * @throws ServletException if a servlet-specific error occurs
 * @throws IOException      if an I/O error occurs
 * @see HttpServlet#doPost(HttpServletRequest request, HttpServletResponse response)
 */
protected void doPost(HttpServletRequest request, HttpServletResponse response) throws ServletException, IOException {
    doGet(request, response);
}
```

Figure 86: Screenshot of doPost() method

This method handles POST requests by simply delegating to the doGet method.

4.12. UpdatePasswordServlet

4.12.1. doPost()

```
/**
 * Handles POST requests to update passwords
 *
 * @param request  The HttpServletRequest object
 * @param response The HttpServletResponse object
 * @throws ServletException if a servlet-specific error occurs
 * @throws IOException      if an I/O error occurs
 * @see HttpServlet#doPost(HttpServletRequest request, HttpServletResponse response)
 */
protected void doPost(HttpServletRequest request, HttpServletResponse response) throws ServletException, IOException {

    // Getting attributes from current session
    HttpSession userSession = request.getSession();
    String currentUser = (String) userSession.getAttribute("username");
    String currentUserType = (String) userSession.getAttribute("type");

    // getting old and new password from request parameters
    String oldPassword = request.getParameter("old_password");
    String newPassword = request.getParameter("new_password");

    // Getting the correct(previous) password from the database
    String correctPassword;
    if (currentUserType.equals("mentor")) { // FOR MENTOR
        correctPassword = dbController.getMentorInfo(currentUser).getPassword();
    }
    else { // FOR SEEKER
        correctPassword = dbController.getSeekerInfo(currentUser).getPassword();
    }


    //  If old password entered matches password in database
    if (oldPassword.equals(correctPassword)) {

        // validation for new password
        if(!ValidationUtils.isPassword(newPassword)) {
            request.setAttribute(StringUtils.MESSAGE_ERROR, StringUtils.MESSAGE_ERROR_PASSWORD);
            request.setAttribute("isUpdate", 1);
            request.getRequestDispatcher(StringUtils.SERVLET_URL_PROFILE).include(request, response);
            return;
        }

        // Put method if successful validation
        doPut(request, response);
    }

    // redirect to profile servlet with error message if old password does not match
    else {
        request.setAttribute(StringUtils.MESSAGE_ERROR, StringUtils.MESSAGE_ERROR_INCORRECT_OLD_PASSWORD);
        request.setAttribute("isUpdate", 1);
        request.getRequestDispatcher(StringUtils.SERVLET_URL_PROFILE).include(request, response);
    }
}
```

Figure 87: Screenshot of doPost() method

This method handles POST requests for updating passwords. It verifies the old password provided by the user against the one stored in the database. If the old password matches, it validates the new password and delegates to the doPut method for updating the password. If the old password does not match, it redirects to the profile servlet with an error message.

4.12.2. doPut()

```
/**
 * Handles PUT requests to update passwords in the database
 *
 * @param request  The HttpServletRequest object
 * @param response The HttpServletResponse object
 * @throws ServletException if a servlet-specific error occurs
 * @throws IOException      if an I/O error occurs
 * @see HttpServlet#doPut(HttpServletRequest, HttpServletResponse)
 */
protected void doPut(HttpServletRequest request, HttpServletResponse response) throws ServletException, IOException {

    // Getting attributes from current session
    HttpSession userSession = request.getSession();
    String currentUser = (String) userSession.getAttribute("username");
    String currentUserType = (String) userSession.getAttribute("type");

    // FOR MENTOR
    if (currentUserType.equals("mentor")) {

        // Update the mentor in database
        int result = dbController.updateMentorPassword(currentUser, request.getParameter("new_password"));

        //checking for exception when updating
        if (result > 0) {
            request.setAttribute("isUpdate", 1);
            request.getRequestDispatcher(StringUtils.PAGE_URL_WELCOME).include(request, response);
        } else {
            // Internal server error
            request.setAttribute(StringUtils.MESSAGE_ERROR, StringUtils.MESSAGE_ERROR_SERVER);
        }
    }

    // FOR SEEKER
    else {

        // Update the seeker in database
        int result = dbController.updateSeekerPassword(currentUser, request.getParameter("new_password"));

        //checking for exception when updating
        if (result > 0) {
            request.setAttribute("isUpdate", 1);
            request.getRequestDispatcher(StringUtils.PAGE_URL_WELCOME).include(request, response);
        } else {
            // Internal server error
            request.setAttribute(StringUtils.MESSAGE_ERROR, StringUtils.MESSAGE_ERROR_SERVER);
        }
    }

}
```

Figure 88: Screenshot of doPut() method

This method handles PUT requests to update passwords in the database. It retrieves the current user's information from the session, determines the user type (mentor or seeker), and updates the password accordingly in the database. If the password update is successful, it redirects to the welcome page. Otherwise, it sets an internal server error message.

4.13. LoginModel

4.13.1. LoginModel

```
/**
 * Constructs a new LoginModel object with the given username and password.
 *
 * @param username The username of the user
 * @param password The password of the user
 */
public LoginModel(String username, String password) {
    this.username = username;
    this.password = password;
}
```

Figure 89: Screenshot of LoginModel() constructor

This constructor initializes a new instance of the LoginModel class with the provided username and password.

4.13.2. Getter and Setter methods

```
/**
 * Returns the username of the user.
 *
 * @return The username of the user
 */
public String getUsername() {
    return username;
}

/**
 * Sets the username of the user.
 *
 * @param username The new username to set
 */
public void setUsername(String username) {
    this.username = username;
}

/**
 * Returns the password of the user.
 *
 * @return The password of the user
 */
public String getPassword() {
    return password;
}

/**
 * Sets the password of the user.
 *
 * @param password The new password to set
 */
public void setPassword(String password) {
    this.password = password;
}
```

Figure 90: Screenshot of getter and setter methods

The getUsername() method retrieves the username of the user, while setUsername(String username) sets a new username. Similarly, getPassword() retrieves the user's password, and setPassword(String password) updates it. These methods facilitate access to and modification of user credentials, ensuring smooth authentication and account management within the application.

4.14. MentorModel

4.14.1. MentorModel

```
/**
 * Default constructor for MentorModel.
 */
public MentorModel() {
}

/**
 * Constructs a MentorModel object with the specified attributes.
 *
 * @param name              The name of the mentor
 * @param username          The username of the mentor
 * @param email             The email of the mentor
 * @param phone             The phone number of the mentor
 * @param password          The password of the mentor
 * @param universityName    The name of the mentor's university
 * @param universityCountry The country of the mentor's university
 * @param major             The major of the mentor
 * @param tuitionFee        The tuition fee of the mentor
 * @param scholarship       The scholarship information of the mentor
 * @param imagePart         The image part for the mentor's profile photo
 */
public MentorModel(String name, String username, String email, String phone, String password, String universityName,
        String universityCountry, String major, int tuitionFee, String scholarship, Part imagePart) {
    super();
    this.name = name;
    this.username = username;
    this.email = email;
    this.phone = phone;
    this.password = password;
    this.universityName = universityName;
    this.universityCountry = universityCountry;
    this.major = major;
    this.tuitionFee = tuitionFee;
    this.scholarship = scholarship;
    this.profilePhotoUrl = getImageUrl(imagePart);
}
```

Figure 91: Screenshot of MentorModel() constructor

The MentorModel class comprises two constructors. The default constructor initializes a new instance of MentorModel without requiring any parameters. The second constructor is more detailed, accepting parameters for attributes such as the mentor's name, username, email, phone number, password, university details, tuition fee, scholarship information, and profile photo. This constructor allows for the creation of MentorModel objects with specific attribute values, facilitating ease of use and flexibility in the initialization process

4.14.2. Getter and Setter methods

```
/**
 * Returns the name of the mentor.
 *
 * @return The name of the mentor
 */
public String getName() {
    return name;
}

/**
 * Sets the name of the mentor.
 *
 * @param name The name of the mentor to set
 */
public void setName(String name) {
    this.name = name;
}

/**
 * Returns the username of the mentor.
 *
 * @return The username of the mentor
 */
public String getUsername() {
    return username;
}

/**
 * Sets the username of the mentor.
 *
 * @param username The username of the mentor to set
 */
public void setUsername(String username) {
    this.username = username;
}


/**
 * Returns the email of the mentor.
 *
 * @return The email of the mentor
 */
public String getEmail() {
    return email;
}
```

```java
/**
 * Sets the email of the mentor.
 *
 * @param email The email of the mentor to set
 */
public void setEmail(String email) {
    this.email = email;
}

/**
 * Returns the phone number of the mentor.
 *
 * @return The phone number of the mentor
 */
public String getPhone() {
    return phone;
}

/**
 * Sets the phone number of the mentor.
 *
 * @param phone The phone number of the mentor to set
 */
public void setPhone(String phone) {
    this.phone = phone;
}

/**
 * Returns the password of the mentor.
 *
 * @return The password of the mentor
 */
public String getPassword() {
    return password;
}

/**
 * Sets the password of the mentor.
 *
 * @param password The password of the mentor to set
 */
public void setPassword(String password) {
    this.password = password;
}

/**
 * Returns the name of the mentor's university.
 *
 * @return The name of the mentor's university
 */
public String getUniversityName() {
    return universityName;
}
```

```java
/**
 * Sets the name of the mentor's university.
 *
 * @param universityName The name of the mentor's university to set
 */
public void setUniversityName(String universityName) {
    this.universityName = universityName;
}

/**
 * Returns the country of the mentor's university.
 *
 * @return The country of the mentor's university
 */
public String getUniversityCountry() {
    return universityCountry;
}

/**
 * Sets the country of the mentor's university.
 *
 * @param universityCountry The country of the mentor's university to set
 */
public void setUniversityCountry(String universityCountry) {
    this.universityCountry = universityCountry;
}

/**
 * Returns the major of the mentor.
 *
 * @return The major of the mentor
 */
public String getMajor() {
    return major;
}

/**
 * Sets the major of the mentor.
 *
 * @param major The major of the mentor to set
 */
public void setMajor(String major) {
    this.major = major;
}

/**
 * Returns the tuition fee of the mentor.
 *
 * @return The tuition fee of the mentor
 */
public int getTuitionFee() {
    return tuitionFee;
}
```

```java
/**
 * Sets the tuition fee of the mentor.
 *
 * @param tuitionFee The tuition fee of the mentor to set
 */
public void setTuitionFee(int tuitionFee) {
    this.tuitionFee = tuitionFee;
}

/**
 * Returns the scholarship information of the mentor.
 *
 * @return The scholarship information of the mentor
 */
public String getScholarship() {
    return scholarship;
}

/**
 * Sets the scholarship information of the mentor.
 *
 * @param scholarship The scholarship information of the mentor to set
 */
public void setScholarship(String scholarship) {
    this.scholarship = scholarship;
}

/**
 * Returns the profile photo url of the mentor.
 *
 * @return The profile photo url of the mentor
 */
public String getProfilePhotoUrl() {
    return profilePhotoUrl;
}

/**
 * Sets the profile photo URL of the mentor using a Part object.
 *
 * @param part The Part object representing the mentor's profile photo
 */
public void setProfilePhotoUrlFromPart(Part part) {
    this.profilePhotoUrl = getImageUrl(part);
}

/**
 * Sets the profile photo URL of the mentor from a database value.
 *
 * @param profilePhotoUrl The URL of the mentor's profile photo from the database
 */
public void setProfilePhotoUrlFromDb(String profilePhotoUrl) {
    this.profilePhotoUrl = profilePhotoUrl;
}
```

Figure 92: Screenshot of getter and setter methods

These methods handle the retrieval and modification of various attributes of a MentorModel object. For personal details, getName(), getUsername(), getEmail(), getPhone(), and getPassword() retrieve the mentor's name, username, email, phone

number, and password, respectively. Corresponding setter methods allow for modification.

Academic details are managed by getUniversityName(), getUniversityCountry(), getMajor(), and getTuitionFee(), while getScholarship() handles scholarship information. The method getProfilePhotoUrl() retrieves the URL of the mentor's profile photo, and setProfilePhotoUrlFromPart(Part part) and setProfilePhotoUrlFromDb(String profilePhotoUrl) set the profile photo URL using either a Part object or a database value, respectively.

4.14.3. getImageUrl()

```
/**
 * Utility method to extract the image URL from a Part object.
 *
 * @param part The Part object representing the mentor's profile photo
 * @return The URL of the mentor's profile photo
 */
private String getImageUrl(Part part) {
    String savePath = StringUtils.IMAGE_DIR_USER;
    File fileSaveDir = new File(savePath);
    String imageUrlFromPart = null;
    if (!fileSaveDir.exists()) {
        fileSaveDir.mkdir();
    }

    String contentDisp = part.getHeader("content-disposition");
    String[] items = contentDisp.split(";");
    for (String s : items) {
        if (s.trim().startsWith("filename")) {
            imageUrlFromPart = s.substring(s.indexOf("=") + 2, s.length() - 1);
        }
    }

    if (imageUrlFromPart == null || imageUrlFromPart.isEmpty()) {
        imageUrlFromPart = "default-profile.png";
    }
    return imageUrlFromPart;
}
```

Figure 93: Screenshot of getImageUrl() method

This method extracts the image URL from a Part object, representing the mentor's profile photo. It checks if the directory to save the image exists, creates it if not, retrieves the filename from the content-disposition header of the Part object, and sets it as the image URL. If no filename is found or it's empty, it sets a default image URL.

4.15. SeekerModel

4.15.1. SeekerModel

```
/**
 * Default constructor for SeekerModel.
 */
public SeekerModel() {
}

/**
 * Constructs a SeekerModel with the specified parameters.
 *
 * @param name           The name of the seeker
 * @param username       The username of the seeker
 * @param email          The email of the seeker
 * @param phone          The phone number of the seeker
 * @param password       The password of the seeker
 * @param location       The location of the seeker
 * @param educationLevel The education level of the seeker
 * @param imagePart      The profile photo part of the seeker
 */
public SeekerModel(String name, String username, String email, String phone, String password, String location,
        String educationLevel, Part imagePart) {
    super();
    this.name = name;
    this.username = username;
    this.email = email;
    this.phone = phone;
    this.password = password;
    this.location = location;
    this.educationLevel = educationLevel;
    this.profilePhotoUrl = getImageUrl(imagePart);
}
```

Figure 94: Screenshot of SeekerModel() constructor

The SeekerModel class provides two constructors for object instantiation. The default constructor initializes a new instance of SeekerModel without any parameters. On the other hand, the second constructor allows for the creation of a SeekerModel object with specific attribute values. It accepts parameters such as the seeker's name, username, email, phone number, password, location, education level, and profile photo. This constructor facilitates the creation of SeekerModel instances with predefined attribute values, providing flexibility and ease of use in the initialization process.

4.15.2. Getter and Setter methods

```
/**
 * Returns the name of the seeker.
 *
 * @return The name of the seeker
 */
public String getName() {
    return name;
}

/**
 * Sets the name of the seeker.
 *
 * @param name The name of the seeker to set
 */
public void setName(String name) {
    this.name = name;
}

/**
 * Returns the username of the seeker.
 *
 * @return The username of the seeker
 */
public String getUsername() {
    return username;
}

/**
 * Sets the username of the seeker.
 *
 * @param username The username of the seeker to set
 */
public void setUsername(String username) {
    this.username = username;
}

/**
 * Returns the email of the seeker.
 *
 * @return The email of the seeker
 */
public String getEmail() {
    return email;
}

/**
 * Sets the email of the seeker.
 *
 * @param email The email of the seeker to set
 */
public void setEmail(String email) {
    this.email = email;
}
```

```java
/**
 * Returns the education level of the seeker.
 *
 * @return The education level of the seeker
 */
public String getEducationLevel() {
    return educationLevel;
}

/**
 * Sets the education level of the seeker.
 *
 * @param educationLevel The education level of the seeker to set
 */
public void setEducationLevel(String educationLevel) {
    this.educationLevel = educationLevel;
}

/**
 * Returns the profile photo URL of the seeker.
 *
 * @return The profile photo URL of the seeker
 */
public String getProfilePhotoUrl() {
    return profilePhotoUrl;
}

/**
 * Sets the profile photo URL of the seeker from the provided Part.
 *
 * @param part The Part containing the profile photo of the seeker
 */
public void setProfilePhotoUrlFromPart(Part part) {
    this.profilePhotoUrl = getImageUrl(part);
}

/**
 * Sets the profile photo URL of the seeker from the provided URL.
 *
 * @param profilePhotoUrl The profile photo URL of the seeker to set
 */
public void setProfilePhotoUrlFromDb(String profilePhotoUrl) {
    this.profilePhotoUrl = profilePhotoUrl;
}
```

```java
/**
 * Returns the phone number of the seeker.
 *
 * @return The phone number of the seeker
 */
public String getPhone() {
    return phone;
}

/**
 * Sets the phone number of the seeker.
 *
 * @param phone The phone number of the seeker to set
 */
public void setPhone(String phone) {
    this.phone = phone;
}

/**
 * Returns the password of the seeker.
 *
 * @return The password of the seeker
 */
public String getPassword() {
    return password;
}

/**
 * Sets the password of the seeker.
 *
 * @param password The password of the seeker to set
 */
public void setPassword(String password) {
    this.password = password;
}

/**
 * Returns the location of the seeker.
 *
 * @return The location of the seeker
 */
public String getLocation() {
    return location;
}

/**
 * Sets the location of the seeker.
 *
 * @param location The location of the seeker to set
 */
public void setLocation(String location) {
    this.location = location;
}
```

Figure 95: Screenshot of getter and setter methods

These methods manage the attributes of a SeekerModel object. The getters and setters handle various aspects of the seeker's information. getName(), getUsername(), getEmail(), getPhone(), getPassword(), getLocation(), and getEducationLevel() retrieve the seeker's name, username, email, phone number, password, location, and education level, respectively. Corresponding setter methods allow for modification. Additionally, getProfilePhotoUrl() retrieves the URL of the seeker's profile photo, and setProfilePhotoUrlFromPart(Part part) sets the profile photo URL using a Part object containing the seeker's profile photo. Lastly, setProfilePhotoUrlFromDb(String profilePhotoUrl) sets the profile photo URL from a provided URL.

4.15.3. getImageUrl()

```
/**
 * Utility method to extract the image URL from a Part object.
 *
 * @param part The Part object representing the seeker's profile photo
 * @return The URL of the seeker's profile photo
 */
private String getImageUrl(Part part) {
    String savePath = StringUtils.IMAGE_DIR_USER;
    File fileSaveDir = new File(savePath);
    String imageUrlFromPart = null;
    if (!fileSaveDir.exists()) {
        fileSaveDir.mkdir();
    }

    String contentDisp = part.getHeader("content-disposition");
    String[] items = contentDisp.split(";");
    for (String s : items) {
        if (s.trim().startsWith("filename")) {
            imageUrlFromPart = s.substring(s.indexOf("=") + 2, s.length() - 1);
        }
    }

    if (imageUrlFromPart == null || imageUrlFromPart.isEmpty()) {
        imageUrlFromPart = "default-profile.png";
    }
    return imageUrlFromPart;
}
```

Figure 96: Screenshot of getImageUrl() method

This method extracts the image URL from a Part object, representing the seeker's profile photo. It checks if the directory to save the image exists, creates it if not, retrieves the filename from the content-disposition header of the Part object, and sets it as the image URL. If no filename is found or it's empty, it sets a default image URL.

4.16. ServiceModel

4.16.1. ServiceModel

```
/**
 * Default constructor for ServiceModel.
 */
public ServiceModel() {
}

/**
 * Constructs a ServiceModel with the specified parameters.
 *
 * @param id            The ID of the service
 * @param title         The title of the service
 * @param description   The description of the service
 * @param price         The price of the service
 * @param creationDate  The creation date of the service
 * @param rating        The rating of the service
 * @param users         The number of users of the service
 * @param status        The status of the service
 * @param mentorUsername The username of the mentor providing the service
 */
public ServiceModel(int id, String title, String description, int price, LocalDate creationDate, float rating,
        int users, String status, String mentorUsername) {
    super();
    this.id = id;
    this.title = title;
    this.description = description;
    this.price = price;
    this.creationDate = creationDate;
    this.rating = rating;
    this.users = users;
    this.status = status;
    this.mentorUsername = mentorUsername;
}
```

Figure 97: Screenshot of ServiceModel() constructor

The ServiceModel class offers two constructors for creating instances of service models. The default constructor initializes a new ServiceModel object without any parameters. Conversely, the second constructor allows for the instantiation of a ServiceModel with specific attribute values. It accepts parameters such as the service ID, title, description, price, creation date, rating, number of users, status, and mentor's username. This constructor facilitates the creation of ServiceModel instances with predefined attribute values, providing flexibility and convenience in the initialization process.

4.16.2. Getter and Setter methods

```
/**
 * Retrieves the ID of the service.
 *
 * @return The ID of the service
 */
public int getId() {
    return id;
}

/**
 * Sets the ID of the service.
 *
 * @param id The ID of the service
 */
public void setId(int id) {
    this.id = id;
}

/**
 * Retrieves the title of the service.
 *
 * @return The title of the service
 */
public String getTitle() {
    return title;
}

/**
 * Sets the title of the service.
 *
 * @param title The title of the service
 */
public void setTitle(String title) {
    this.title = title;
}

/**
 * Retrieves the description of the service.
 *
 * @return The description of the service
 */
public String getDescription() {
    return description;
}

/**
 * Sets the description of the service.
 *
 * @param description The description of the service
 */
public void setDescription(String description) {
    this.description = description;
}
```

```java
/**
 * Retrieves the price of the service.
 *
 * @return The price of the service
 */
public int getPrice() {
    return price;
}

/**
 * Sets the price of the service.
 *
 * @param price The price of the service
 */
public void setPrice(int price) {
    this.price = price;
}

/**
 * Retrieves the creation date of the service.
 *
 * @return The creation date of the service
 */
public LocalDate getCreationDate() {
    return creationDate;
}

/**
 * Sets the creation date of the service.
 *
 * @param creationDate The creation date of the service
 */
public void setCreationDate(LocalDate creationDate) {
    this.creationDate = creationDate;
}

/**
 * Retrieves the rating of the service.
 *
 * @return The rating of the service
 */
public float getRating() {
    return rating;
}

/**
 * Sets the rating of the service.
 *
 * @param rating The rating of the service
 */
public void setRating(float rating) {
    this.rating = rating;
}
```

```java
/**
 * Retrieves the number of users of the service.
 *
 * @return The number of users of the service
 */
public int getUsers() {
    return users;
}

/**
 * Sets the number of users of the service.
 *
 * @param users The number of users of the service
 */
public void setUsers(int users) {
    this.users = users;
}

/**
 * Retrieves the status of the service.
 *
 * @return The status of the service
 */
public String getStatus() {
    return status;
}

/**
 * Sets the status of the service.
 *
 * @param status The status of the service
 */
public void setStatus(String status) {
    this.status = status;
}

/**
 * Retrieves the mentor's username providing the service.
 *
 * @return The mentor's username providing the service
 */
public String getMentorUsername() {
    return mentorUsername;
}

/**
 * Sets the mentor's username providing the service.
 *
 * @param mentorUsername The mentor's username providing the service
 */
public void setMentorUsername(String mentorUsername) {
    this.mentorUsername = mentorUsername;
}
```

Figure 98: Screenshot of getter and setter methods

These methods deal with attributes of a ServiceModel object. The getters (getId(), getTitle(), getDescription(), getPrice(), getCreationDate(), getRating(), getUsers(), getStatus(), getMentorUsername()) retrieve specific attributes of the service. The setters (setId(), setTitle(), setDescription(), setPrice(), setCreationDate(), setRating(), setUsers(), setStatus(), setMentorUsername()) set the values of these attributes.

4.17. ValidationUtils

4.17.1. isAlphabetical()

```
/**
 * Validates if the provided string contains only alphabetical characters and spaces.
 *
 * @param str The string to be validated.
 * @return True if the string contains only alphabetical characters and spaces, false otherwise.
 */
public static boolean isAlphabetical(String str) {
    String pattern = "[a-zA-Z ]+";
    return str.toLowerCase().matches(pattern);
}
```

Figure 99: Screenshot of isAlphabetical() method

This method checks if a given string contains only alphabetical characters and spaces. It returns true if the string meets this condition, otherwise false.

4.17.2. isNumeric()

```
/**
 * Validates if the provided text contains only digits (0-9).
 *
 * @param text The text to be validated.
 * @return True if the text contains only digits, false otherwise.
 */
public static boolean isNumeric(String text) {
    return text.matches("\\d+"); // Match digits only
}
```

Figure 100: Screenshot of isNumeric() method

This method checks if a given string contains only numbers. It returns true if the string meets this condition, otherwise false.

4.17.3. isUsername()

```
/**
 * Validates if the provided string meets the criteria for a valid username.
 *
 * @param str The username to be validated.
 * @return True if the username meets the criteria, false otherwise.
 */
public static boolean isUsername(String str) {
    String pattern = "^(?=.*[a-zA-Z])[a-zA-Z0-9_]{6,}$";
    return str.matches(pattern);
}
```

Figure 101: Screenshot of isUsername() method

This method checks if a given string meets the criteria for username according to pattern. It returns true if the string meets this condition, otherwise false.

4.17.4. isPhone()

```
/**
 * Validates if the provided string is in a valid phone number format.
 *
 * @param str The phone number to be validated.
 * @return True if the phone number is in a valid format, false otherwise.
 */
public static boolean isPhone(String str) {
    String pattern = "^\\+\\d{3}\\-\\d{10}$";
    return str.matches(pattern);
}
```

Figure 102: Screenshot of isPhone() method

This method checks if a given string meets the criteria for phone number according to pattern. It returns true if the string meets this condition, otherwise false.

4.17.5. isPassword()

```
/**
 * Validates if the provided string meets the criteria for a valid password.
 *
 * @param str The password to be validated.
 * @return True if the password meets the criteria, false otherwise.
 */
public static boolean isPassword(String str) {
    String pattern = "^(?=.*[0-9])(?=.*[a-z])(?=.*[A-Z])(?=.*[@#$%^&+=])(?=\\S+$).{7,}$";
    return str.matches(pattern);
}
```

Figure 103: Screenshot of isPassword() method

This method checks if a given string meets the criteria for password according to pattern. It returns true if the string meets this condition, otherwise false.

4.17.6. isImage()

```
/**
 * Checks if the provided string represents a valid image file based on its extension.
 *
 * @param str The string representing the image file name.
 * @return True if the string represents a valid image file, false otherwise.
 */
public static boolean isImage(String str) {
    return str.endsWith(".jpg") || str.endsWith(".jpeg") || str.endsWith(".png") ||
           str.endsWith(".gif") || str.endsWith(".bmp") || str.endsWith(".tif") ||
           str.endsWith(".tiff") || str.endsWith(".svg");
}
```

Figure 104: Screenshot of isImage() method

This method checks if a given string meets the criteria for image suffix. It returns true if the string meets this condition, otherwise false.

4.17.7. isEmail()

```
/**
 * Validates if the provided text is a valid email address format.
 *
 * @param email The email address to be validated.
 * @return True if the email address has a valid format, false otherwise.
 */
public static boolean isEmail(String email) {
    return email.matches("^[\\w-\\.]+@([\\w-]+\\.)+[\\w-]{2,}$"); // Match standard email pattern
}
```

Figure 105: Screenshot of isEmail() method

This method checks if a given string meets the criteria for email according to pattern. It returns true if the string meets this condition, otherwise false.

5. Database

4.1. Assumptions

- A mentor can provide many services.
- A service can be used by one or more seekers.
- A service cannot exist without a mentor.
- Mentor's and Seeker's username are all unique.
- A service can be uniquely identified by their id.

4.2. Normalization

a. Unnormalized Form (UNF)

The Table in UNF is:

Mentor (Mentor Username, Mentor Name, Mentor Phone, Mentor Email, Mentor Password, Mentor Photo, University Name, University Country, Major, Tuition Fee, Scholarship, { Service ID, Service Title, Description, Price, Creation Date, Rating, Service Users, Status { Seeker Username, Seeker Name, Seeker Email, Seeker Password, Seeker Phone, Seeker Location, Seeker Photo, Education Level }})

b. First Normal Form (1NF)

The Tables in 1NF are:

Mentor-1 { Mentor Username (P.K.), Mentor Name, Mentor Phone, Mentor Email, Mentor Password, Mentor Photo, University Name, University Country, Major, Tuition Fee, Scholarship }

Service-1 { Service ID(P.K), Mentor Username(F.K), Service Title, Description, Price, Creation Date, Rating, Service Users, Status }

Seeker-1 { Seeker Username(P.K.), Mentor Username(F.K), Service ID(F.K), Seeker Name, Seeker Email, Seeker Password, Seeker Phone, Seeker Location, Seeker Photo, Education Level }

c. Second Normal Form (2NF)

Mentor -1 table has only one key attribute, so it remains the same in second normal form.

For Service-1 Table (Two key columns), checking for partial dependencies for (2^2-1) = 3 combinations :
Service ID --> X
Mentor Username --> X
Service ID, Mentor Username --> Service Title, Description, Price, Creation Date, Rating, Service Users, Status

Similarly, For Seeker-1 Table (Three key columns), checking for partial dependencies for (2^3-1) = 7 combinations:
Seeker Username --> Seeker Name, Seeker Email, Seeker Phone, Seeker Password, Seeker Location, Seeker Photo, Education Level
Mentor Username --> X
Service ID --> X
Seeker Username, Mentor Username --> X
Service ID, Seeker Username --> X
Mentor Username, Service ID --> X
Seeker Username, Mentor Username, Service ID --> X

The Tables in 2NF are:
Mentor-2 { Mentor Username (P.K.), Mentor Name, Mentor Phone, Mentor Email, Mentor Password, Mentor Photo, University Name, University Country, Major, Tuition Fee, Scholarship }

Seeker-2 { Seeker Username(P.K.), Seeker Name, Seeker Email, Seeker Password, Seeker Phone, Seeker Location, Seeker Photo, Education Level }

Service-2 { Service ID(P.K), Mentor Username(F.K), Service Title, Description, Price, Creation Date, Rating, Service Users, Status }

Service-Details-2 { Service ID (F.K.), Seeker Username (F.K.) }

The rest of the unwanted bridge tables are removed.

d. Third Normal Form (3NF)

None of the tables in 2NF have transitive dependencies so they remain the same. Hence,

The Tables in 3NF are:

- Mentor-3 { Mentor Username (P.K.), Mentor Name, Mentor Phone, Mentor Email, Mentor Password, Mentor Photo, University Name, University Country, Major, Tuition Fee, Scholarship }
- Service-3 { Service ID(P.K), Mentor Username(F.K), Service Title, Description, Price, Creation Date, Rating, Service Users, Status }
- Seeker-3 { Seeker Username(P.K.), Seeker Name, Seeker Email, Seeker Password, Seeker Phone, Seeker Location, Seeker Photo, Education Level }
- Service-Details-3 { Service ID (F.K.), Seeker Username (F.K.) }

4.2. Final Entity Relationship Diagram (ERD)

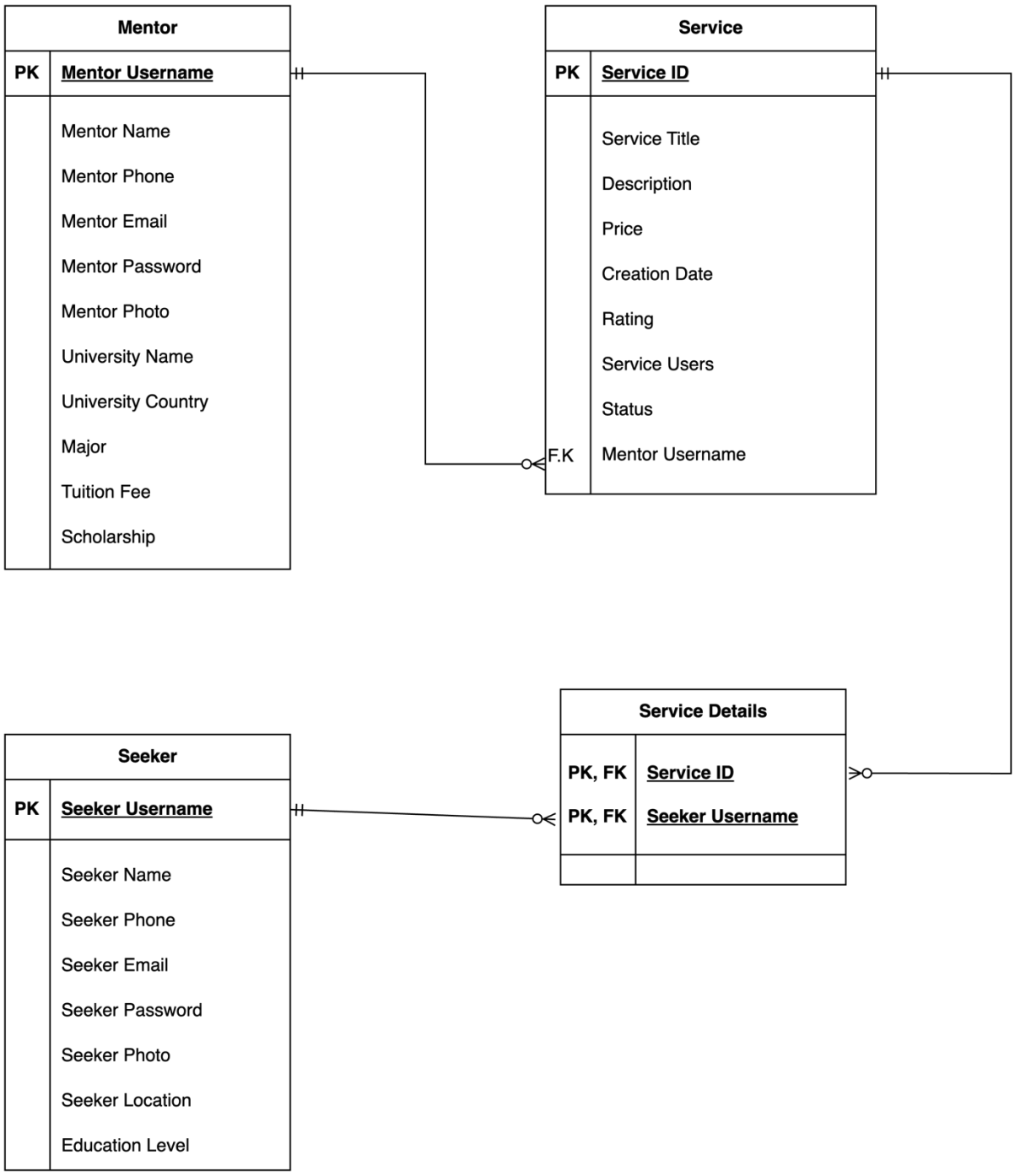


Figure 106: Final Entity Relationship Diagram

4.3. Database design

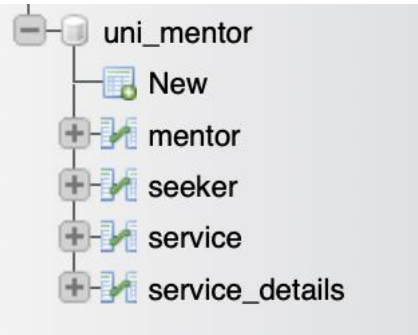


Figure 107: Database and database tables

Figure 108: Database design

4.4. Table design

i. Mentor Table:

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	mentor_username	varchar(25)	utf8mb4_general_ci		No	None			Change Drop More
2	mentor_name	varchar(35)	utf8mb4_general_ci		No	None			Change Drop More
3	mentor_phone	varchar(15)	utf8mb4_general_ci		No	None			Change Drop More
4	mentor_email	varchar(50)	utf8mb4_general_ci		No	None			Change Drop More
5	mentor_password	varchar(200)	utf8mb4_general_ci		No	None			Change Drop More
6	mentor_photo	varchar(200)	utf8mb4_general_ci		No	None			Change Drop More
7	university_name	varchar(25)	utf8mb4_general_ci		No	None			Change Drop More
8	university_country	varchar(20)	utf8mb4_general_ci		No	None			Change Drop More
9	major	varchar(25)	utf8mb4_general_ci		No	None			Change Drop More
10	tuition_fee	int(10)			No	None			Change Drop More
11	scholarship	varchar(25)	utf8mb4_general_ci		No	None			Change Drop More

Figure 109: Mentor table

ii. Seeker Table:

Table structure Relation view

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	seeker_username	varchar(25)	utf8mb4_general_ci		No	None			Change Drop More
2	seeker_name	varchar(35)	utf8mb4_general_ci		No	None			Change Drop More
3	seeker_phone	varchar(15)	utf8mb4_general_ci		No	None			Change Drop More
4	seeker_email	varchar(50)	utf8mb4_general_ci		No	None			Change Drop More
5	seeker_password	varchar(200)	utf8mb4_general_ci		No	None			Change Drop More
6	seeker_photo	varchar(200)	utf8mb4_general_ci		No	None			Change Drop More
7	seeker_location	varchar(25)	utf8mb4_general_ci		No	None			Change Drop More
8	education_level	varchar(20)	utf8mb4_general_ci		No	None			Change Drop More

Figure 110: Seeker Table

iii. Service Table:

Table structure Relation view

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	service_id	int(11)			No	None		AUTO_INCREMENT	Change Drop More
2	service_title	varchar(35)	utf8mb4_general_ci		No	None			Change Drop More
3	description	varchar(1000)	utf8mb4_general_ci		No	None			Change Drop More
4	price	int(11)			No	None			Change Drop More
5	creation_date	date			No	None			Change Drop More
6	rating	decimal(10,1)			No	None			Change Drop More
7	service_users	int(15)			No	None			Change Drop More
8	status	varchar(10)	utf8mb4_general_ci		No	None			Change Drop More
9	mentor_username	varchar(25)	utf8mb4_general_ci		No	None			Change Drop More

Figure 111: Service Table

iv. Service-Details Table:

Table structure | Relation view

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	service_id	int(11)			No	*None*			Change Drop More
2	seeker_username	varchar(25)	utf8mb4_general_ci		No	*None*			Change Drop More

Figure 112: Service-details table

5. Test cases

5.1. Test 1: Test for Register (mentor & seeker)

Test 1.1. : Test for input register details validation

Objective	To display error message when invalid details are entered for registration.
Action	➢ Invalid details are entered in register-mentor and register-seeker pages. ➢ Register button is clicked.
Expected Result	Error message indicating error input should be displayed.
Actual Result	Error message was displayed.
Conclusion	The test is successful.

Table 1: Test table for register details validation

Proofs:

1) Entering invalid details in register-mentor page:

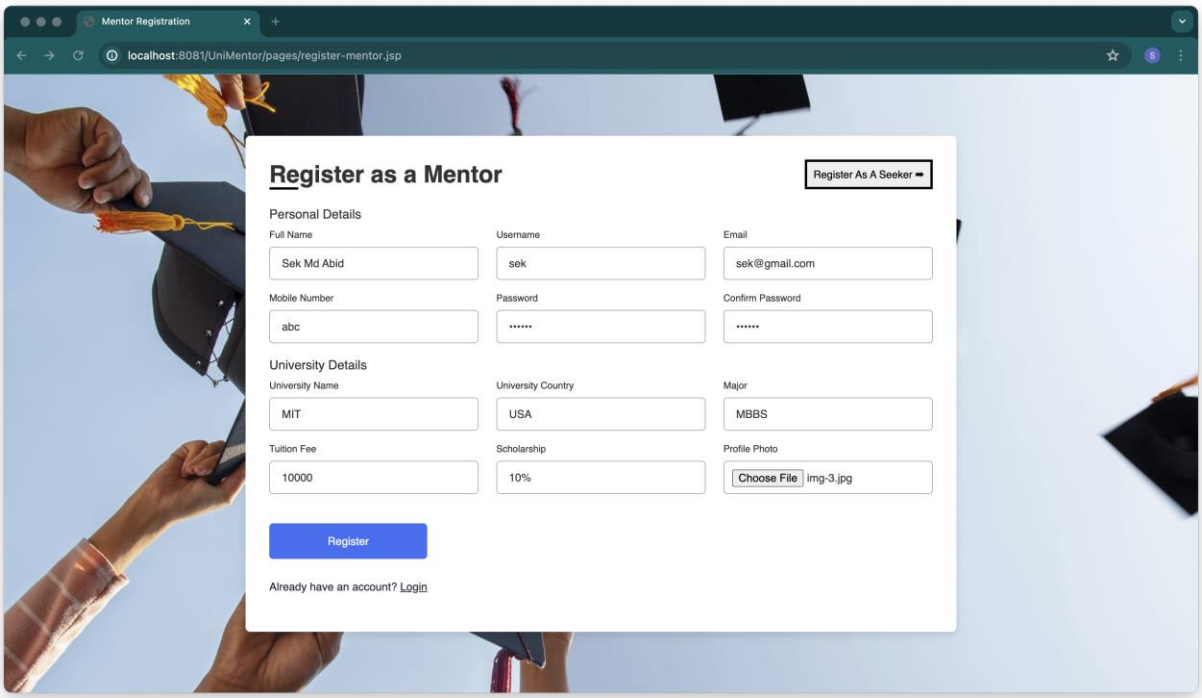


Figure 113: Screenshot of entering invalid details

2) Register button is clicked:

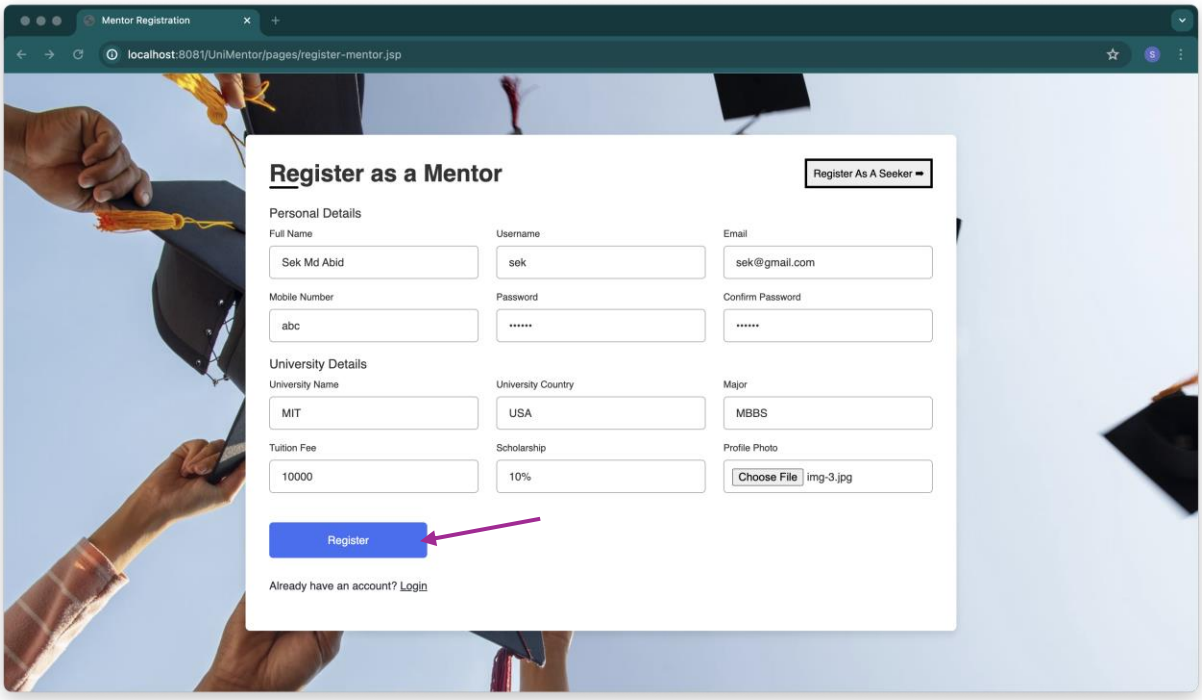


Figure 114: Screenshot of register button clicked

3) Error message displayed:

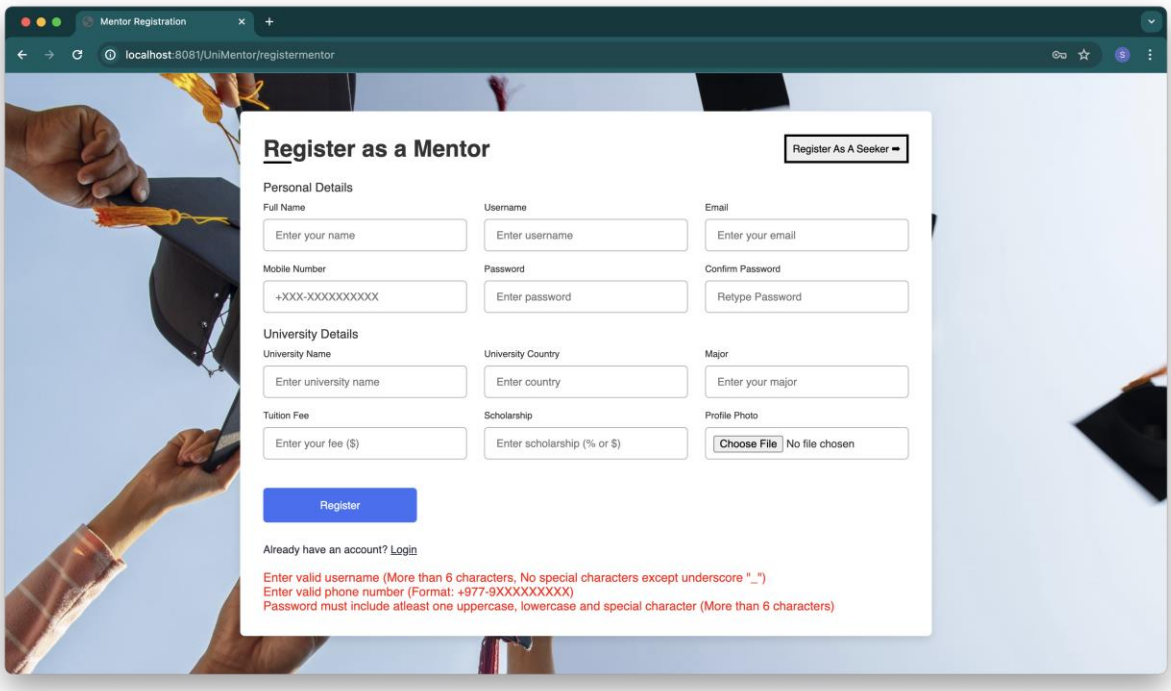


Figure 115: Screenshot of error message displayed

4) Entering invalid details in register-seeker page:

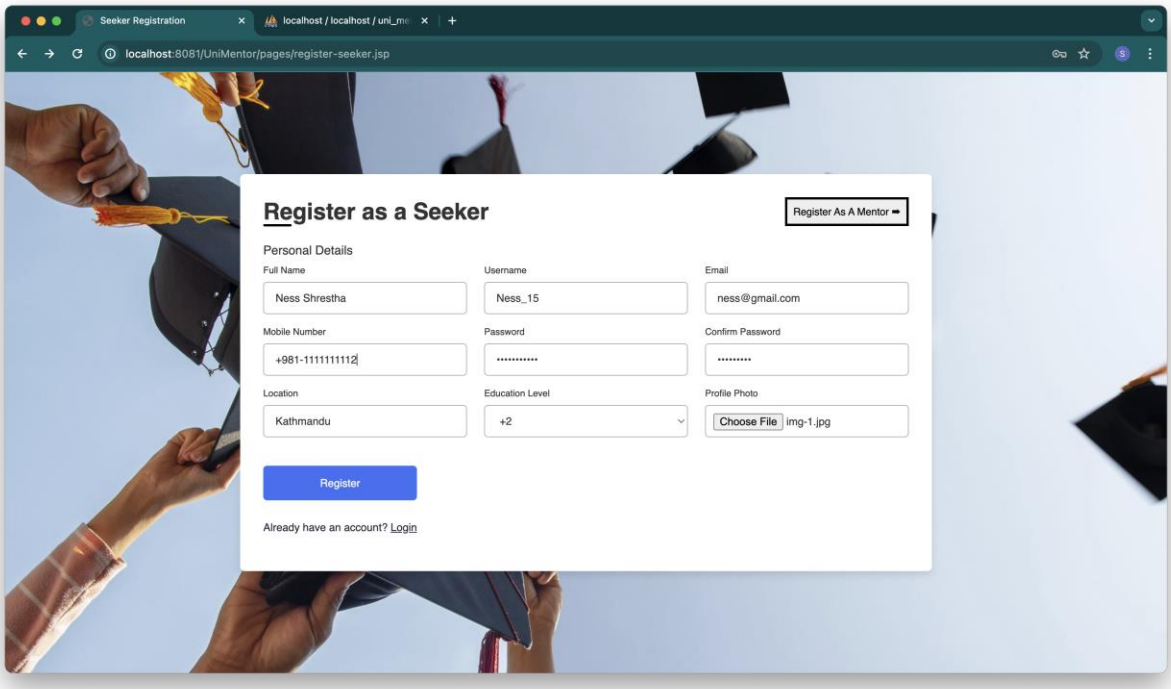


Figure 116: Screenshot of details entered in register seeker

5) Register button is clicked:

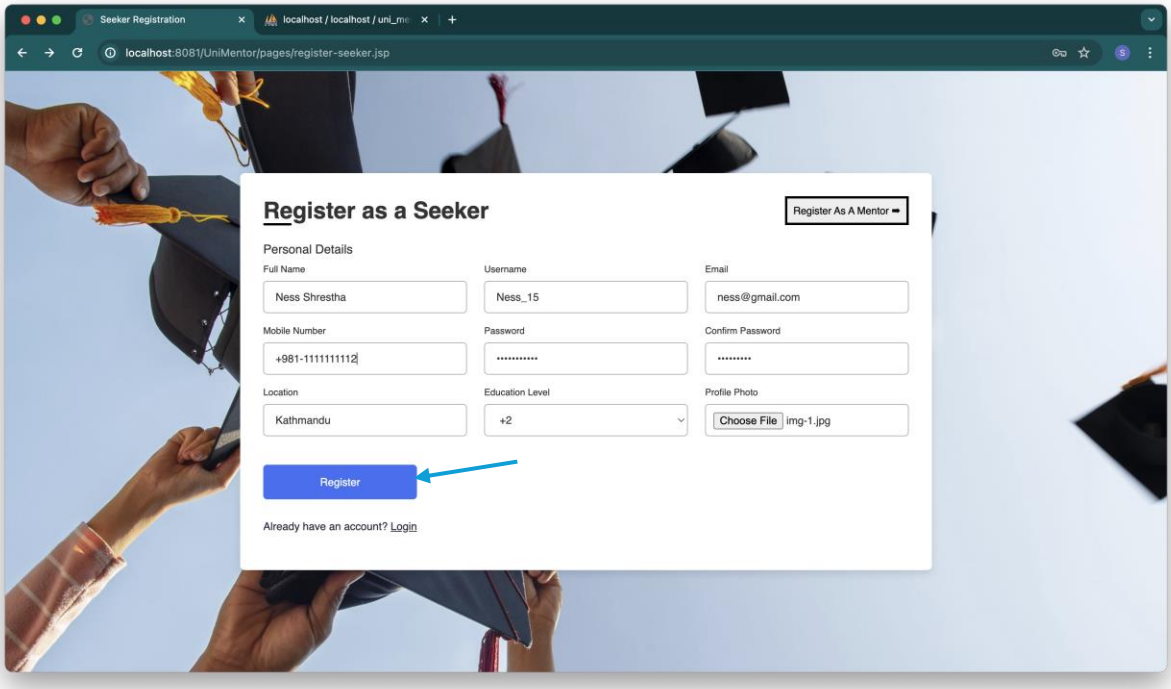


Figure 117: Screenshot of register button clicked

6) Error message displayed:

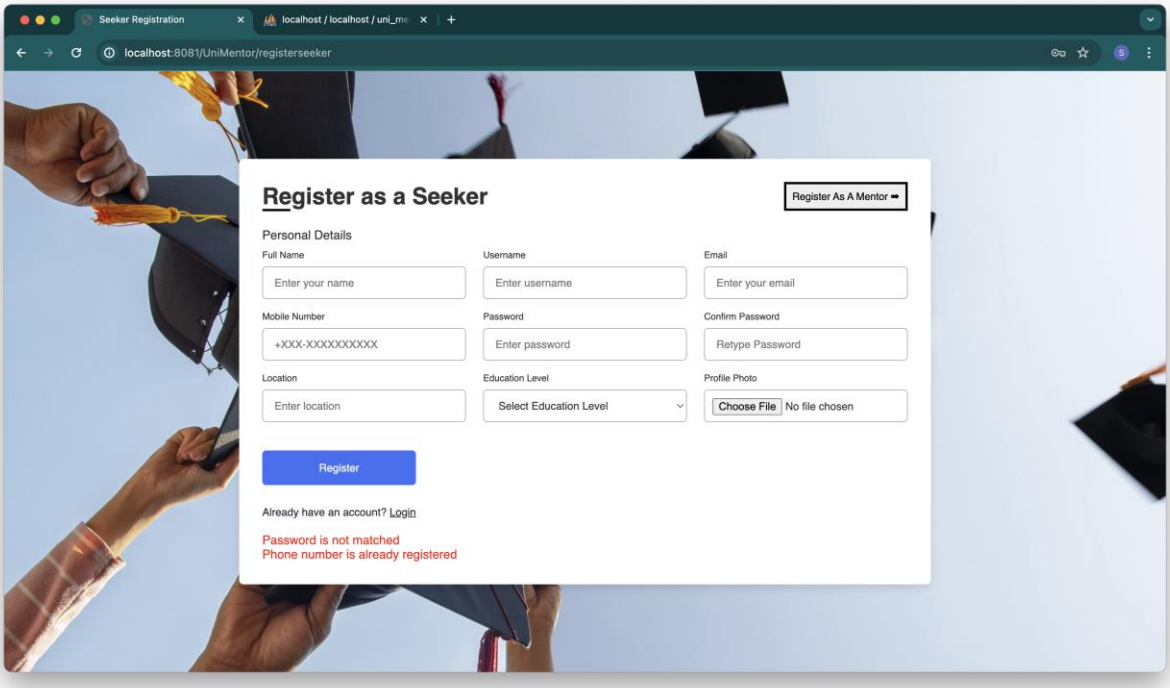


Figure 118: Screenshot of Error message displayed

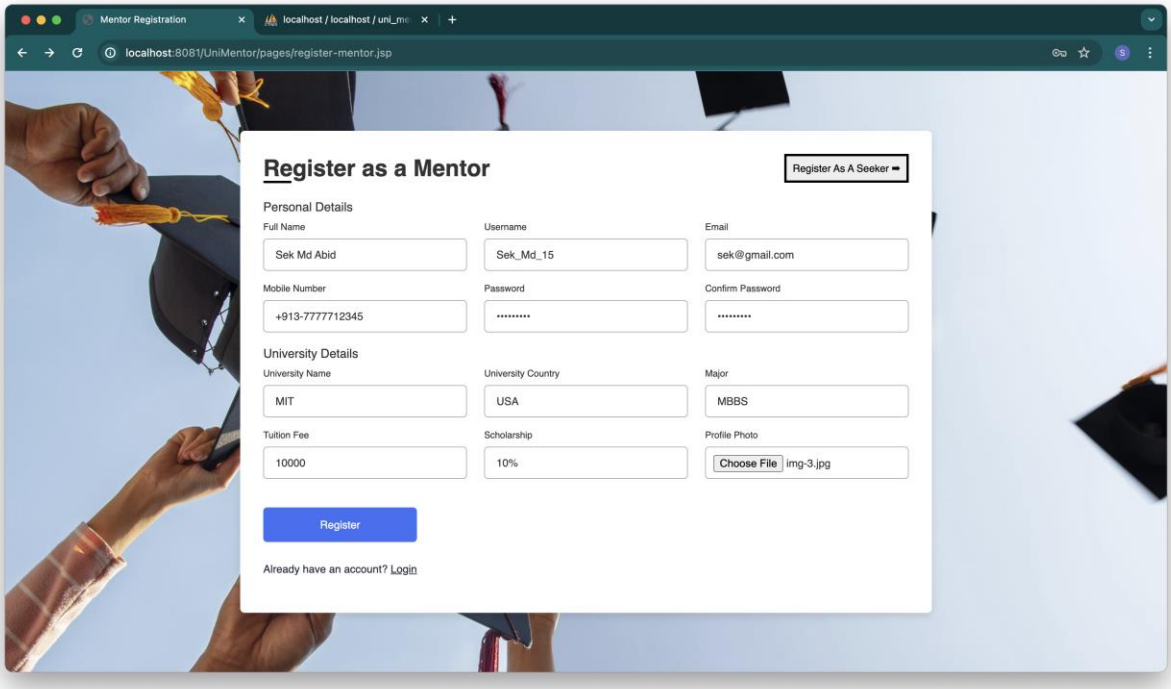
Test 1.2. : Test for successful registration

Objective	To display success message when registration process is successful.
Action	➢ Correct details are entered in register-mentor and register-seeker pages. ➢ Register button is clicked.
Expected Result	Success message indicating successful registration should be displayed.
Actual Result	Success message was displayed.
Conclusion	The test is successful.

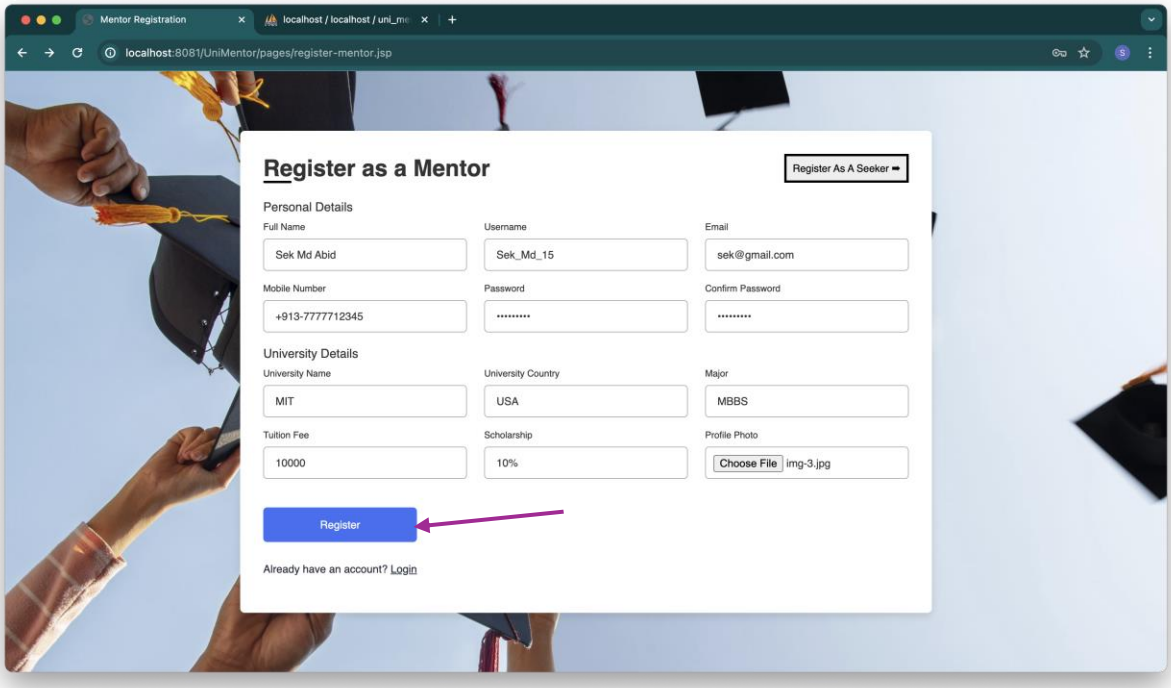
Table 2: Test table for success reigstration

Proofs:

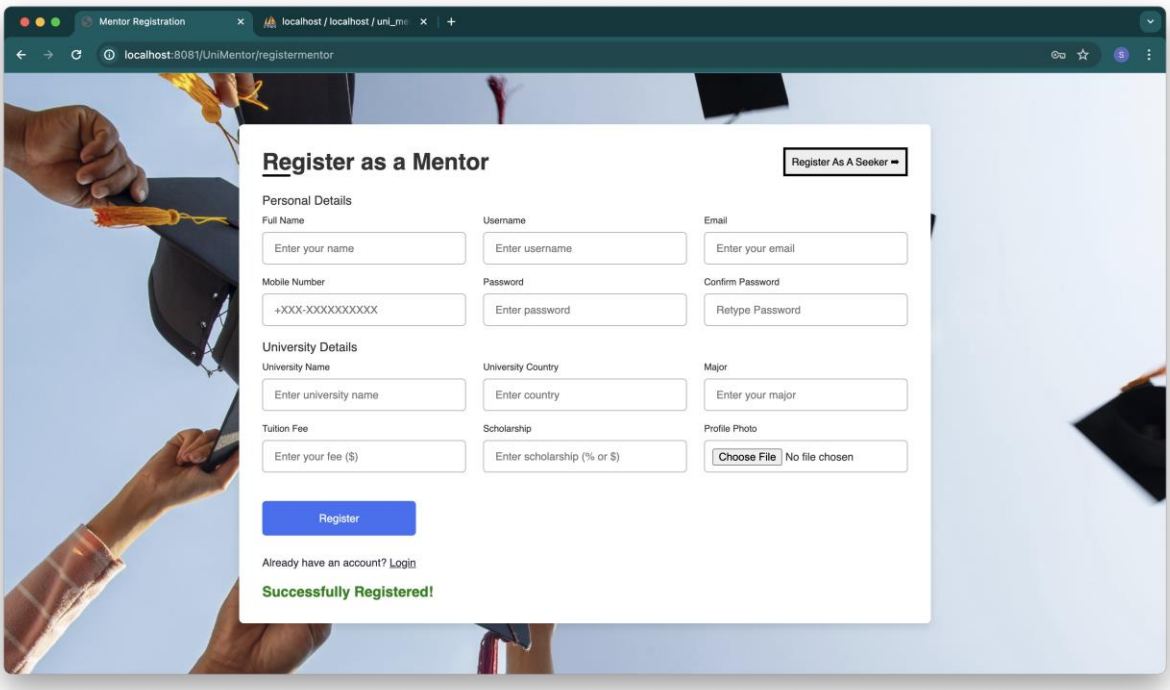
1) Entering correct details in register-mentor page:



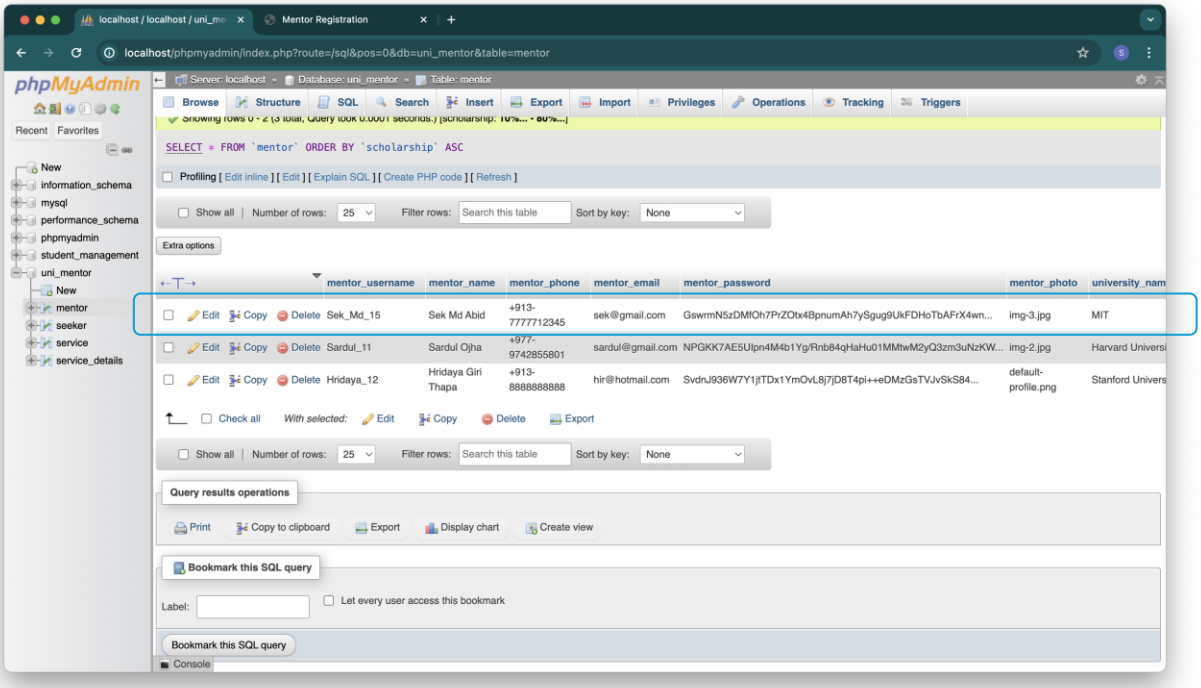
2) Register button is clicked:



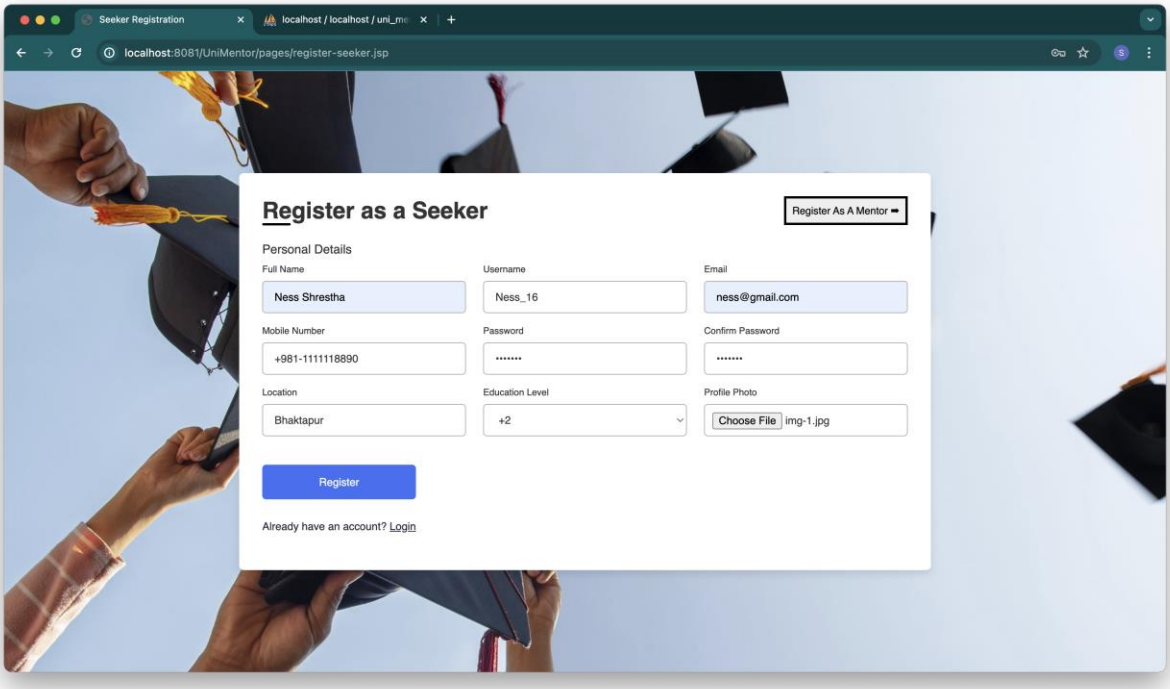
3) Success message displayed:



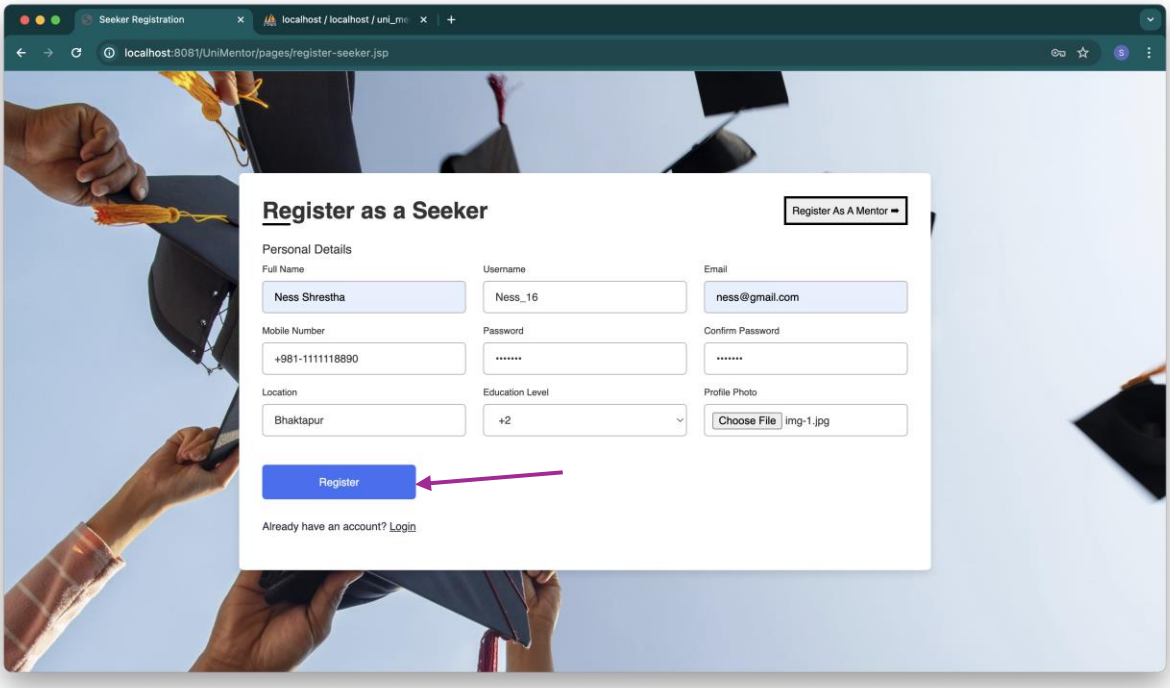
4) Mentor registered in database



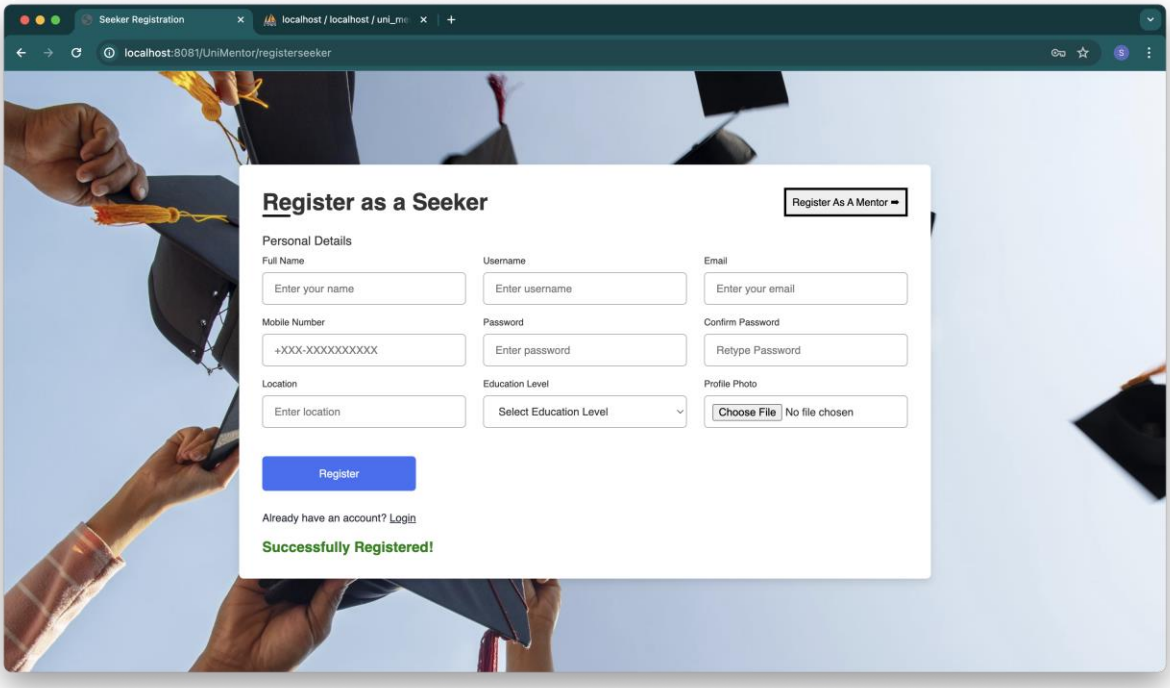
5) Entering correct details in register-seeker page:



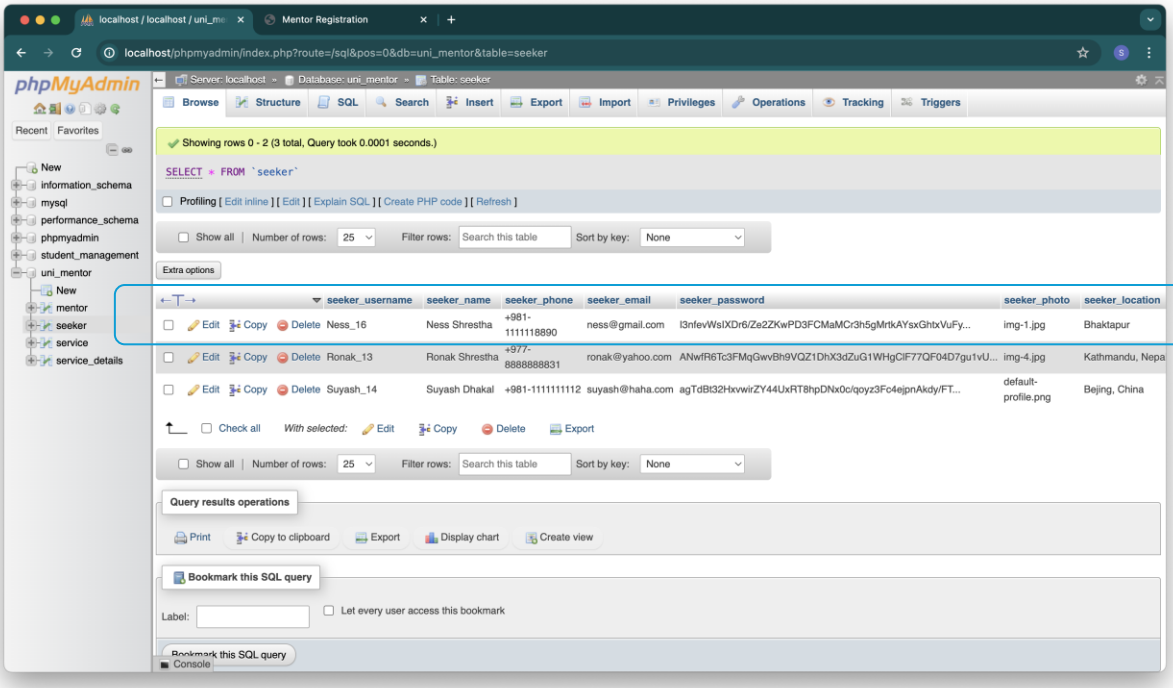
6) Register button is clicked:



7) Success message displayed:



8) Seeker Registered in database:



5.2. Test 2: Test for Login

Test 2.1. : Test for input login details validation

Objective	To display error message when invalid details are entered for login.
Action	➢ Invalid login details are entered in login page. ➢ Login button is clicked.
Expected Result	Error message indicating error login details should be displayed.
Actual Result	Error message was displayed.
Conclusion	The test is successful.

Table 3: Test table for login details validation

Proofs:

1) Entering invalid details in login page:

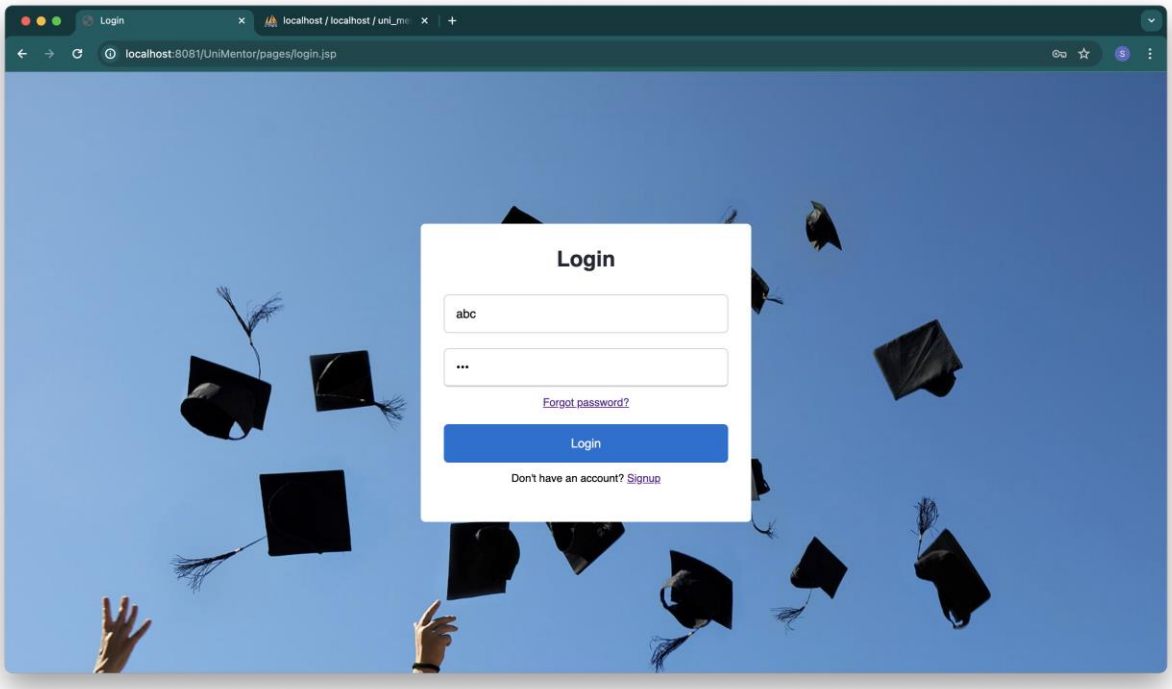


Figure 119: Screenshot of entering invalid details

2) Login button is clicked:

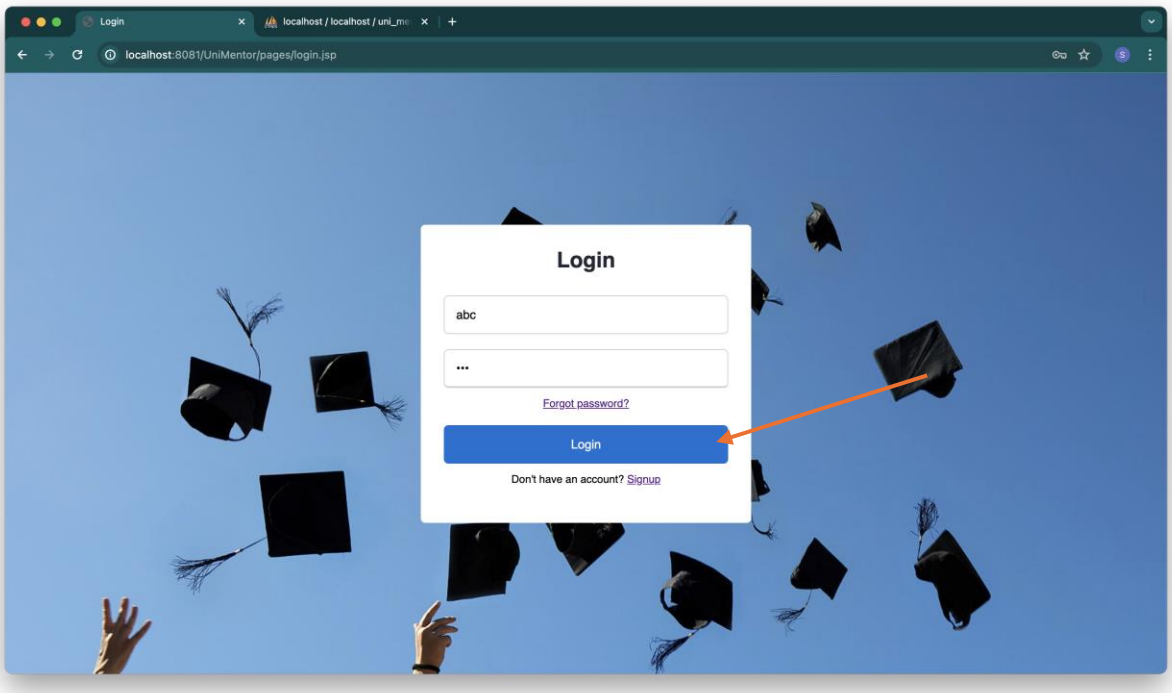


Figure 120: Screenshot of login button clicked

3) Error message displayed:

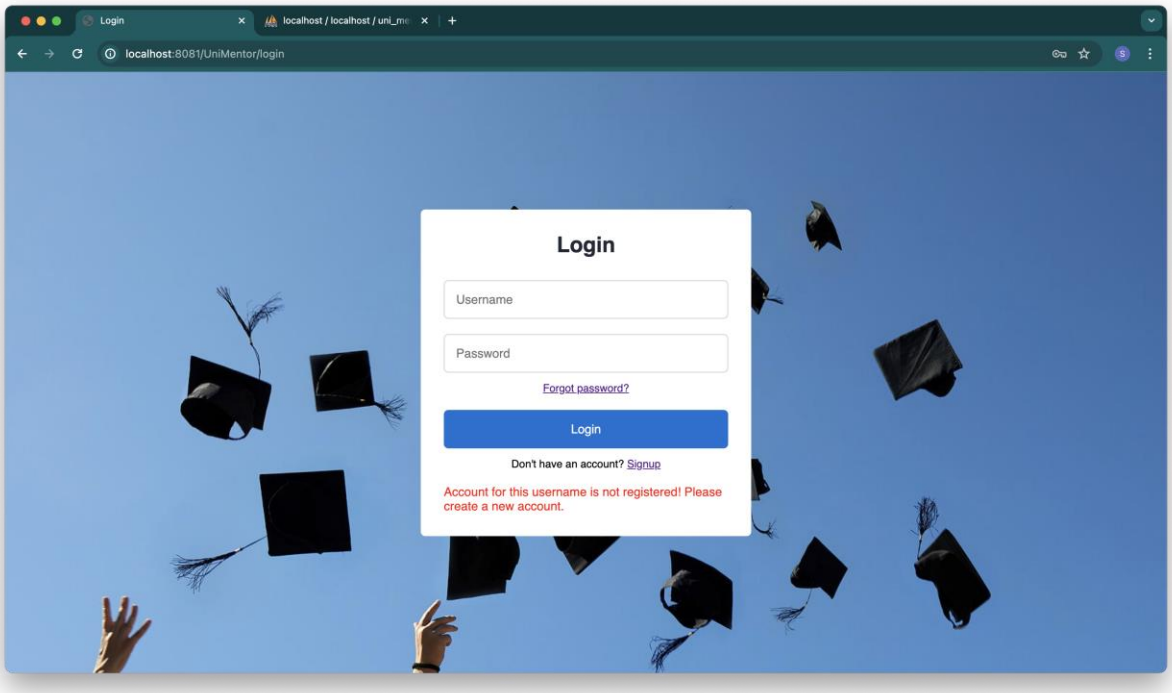


Figure 121: Screenshot of error message displayed

Test 2.2. : Test for successful login

Objective	To login successful when valid username and password is entered.
Action	➢ Correct login details are entered in login page. ➢ Login button is clicked.
Expected Result	Welcome page welcoming the user should be displayed.
Actual Result	The user was navigated to welcome page.
Conclusion	The test is successful.

Table 4: Test table for login success

Proofs:

1) Entering valid login details in login page:

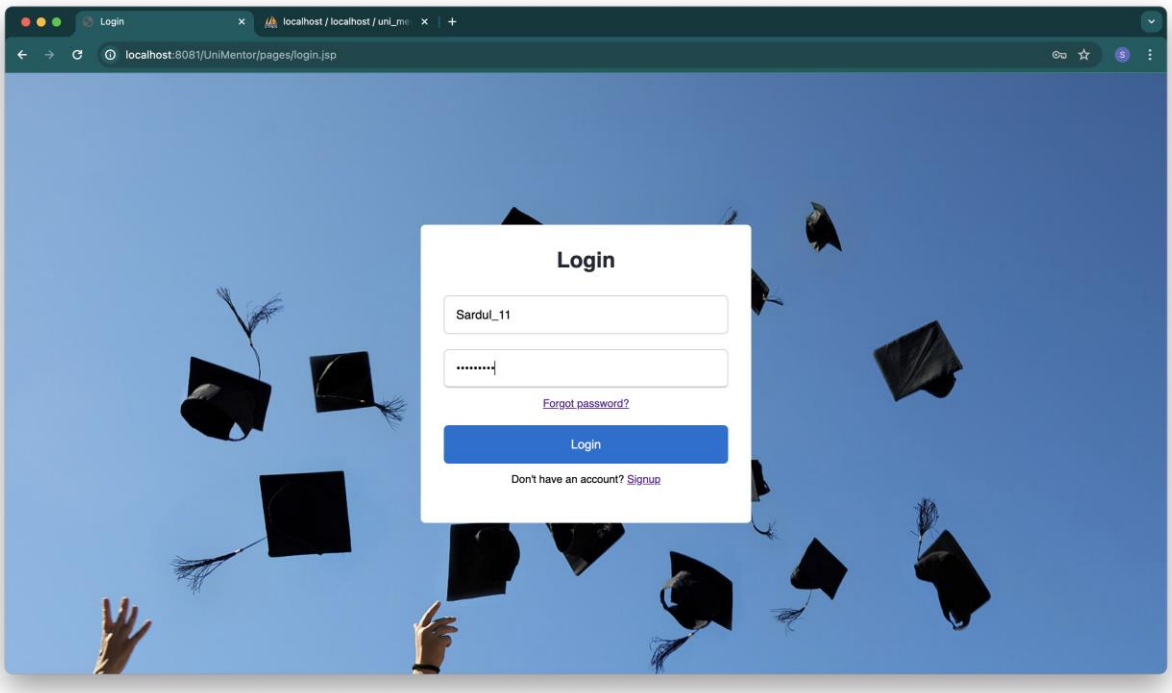


Figure 122: Screenshot of entering valid login details

2) Login button is clicked:

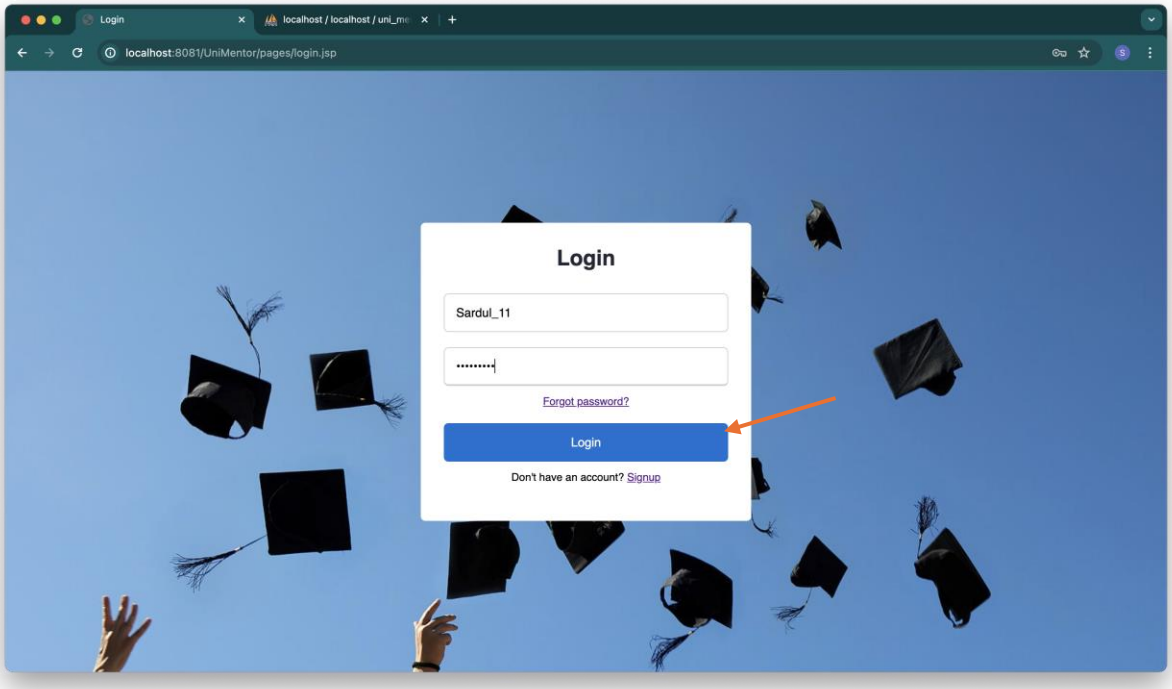


Figure 123: Screenshot of login button clicked

3) Welcome page displayed:

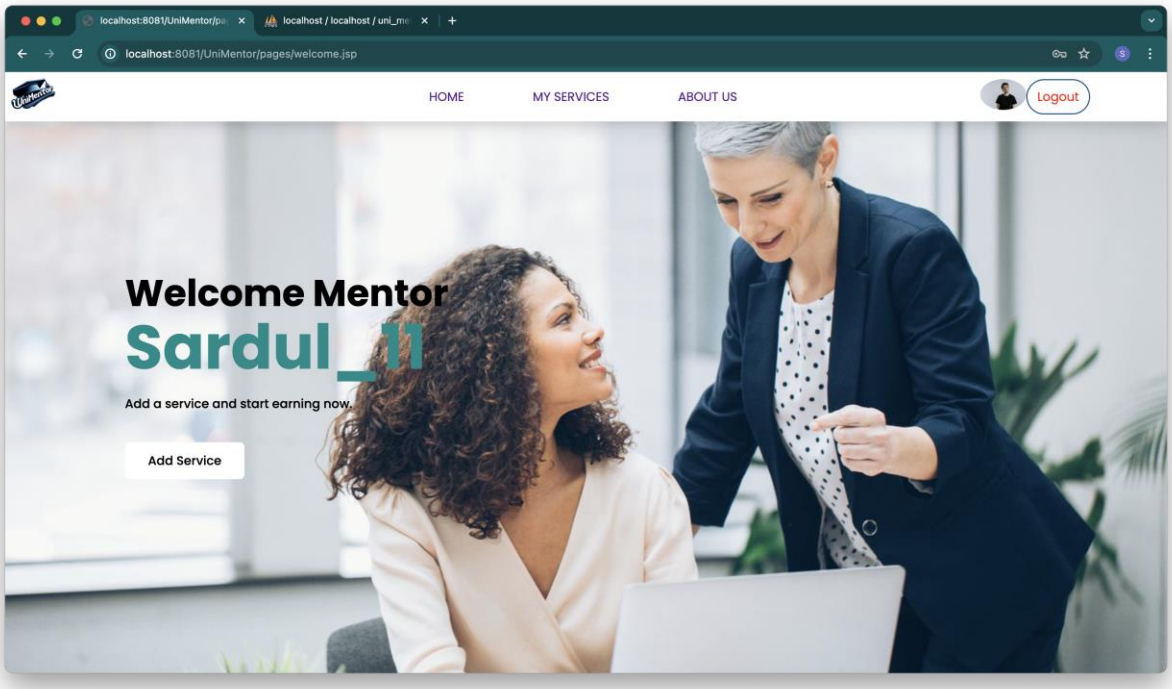


Figure 124: Screenshot of welcome page displayed

5.3. Test 3: Test for Display

Test 3.1. : Test for all services displayed for seekers

Objective	To all the services from database for seeker.
Action	➢ Logged in as a seeker. ➢ Service is clicked in nav bar to navigate to services page.
Expected Result	All the services in the database should be displayed.
Actual Result	All the services were displayed.
Conclusion	The test is successful.

Table 5: Test table for service display to seekers

Proofs:

1) Logging in as a seeker:

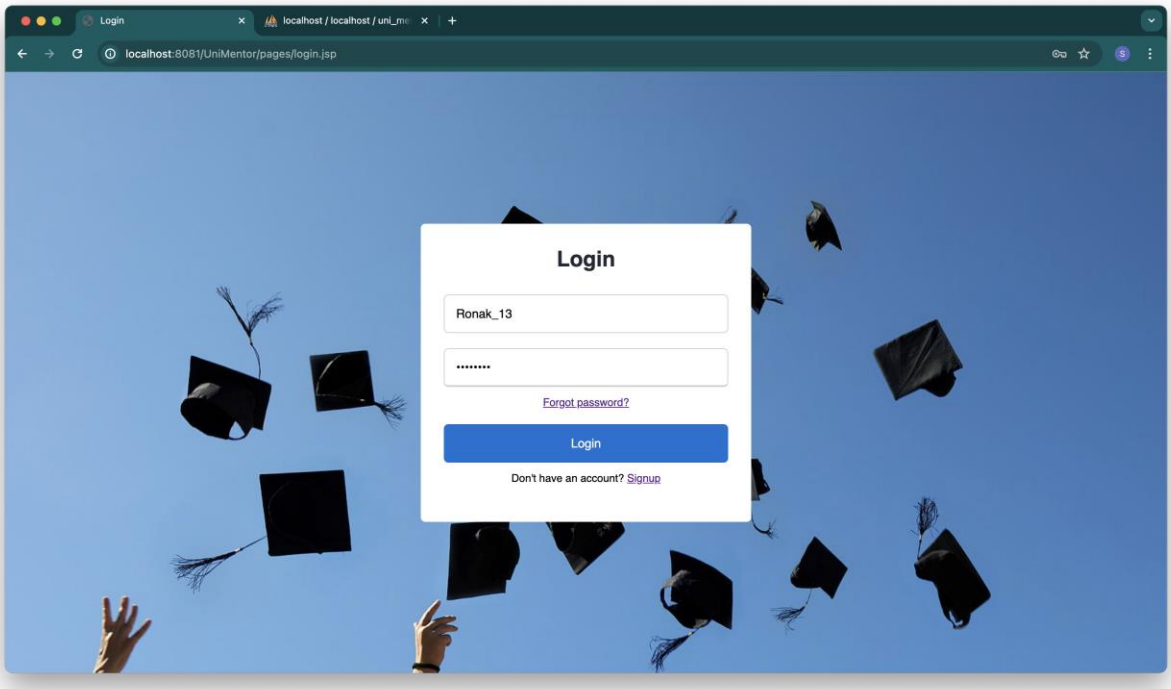


Figure 125: Screenshot of entering seeker login details

2) Clicking service button nav bar to navigate to services page:

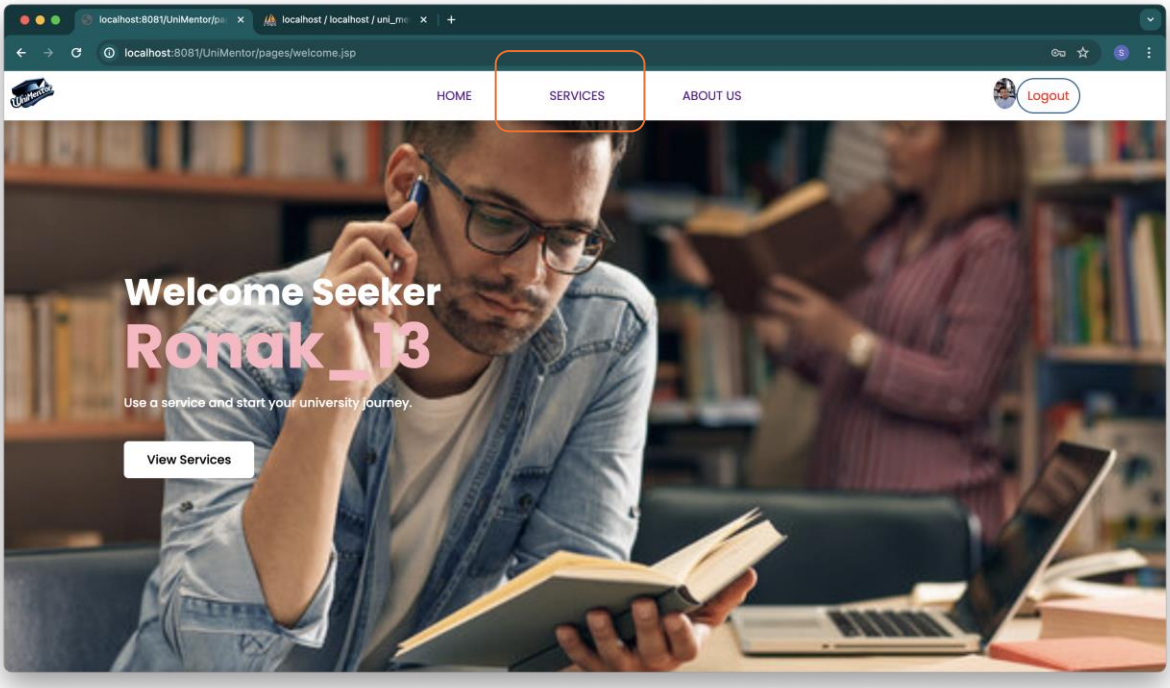


Figure 126: Screenshot of clicking service button

3) All services present in database

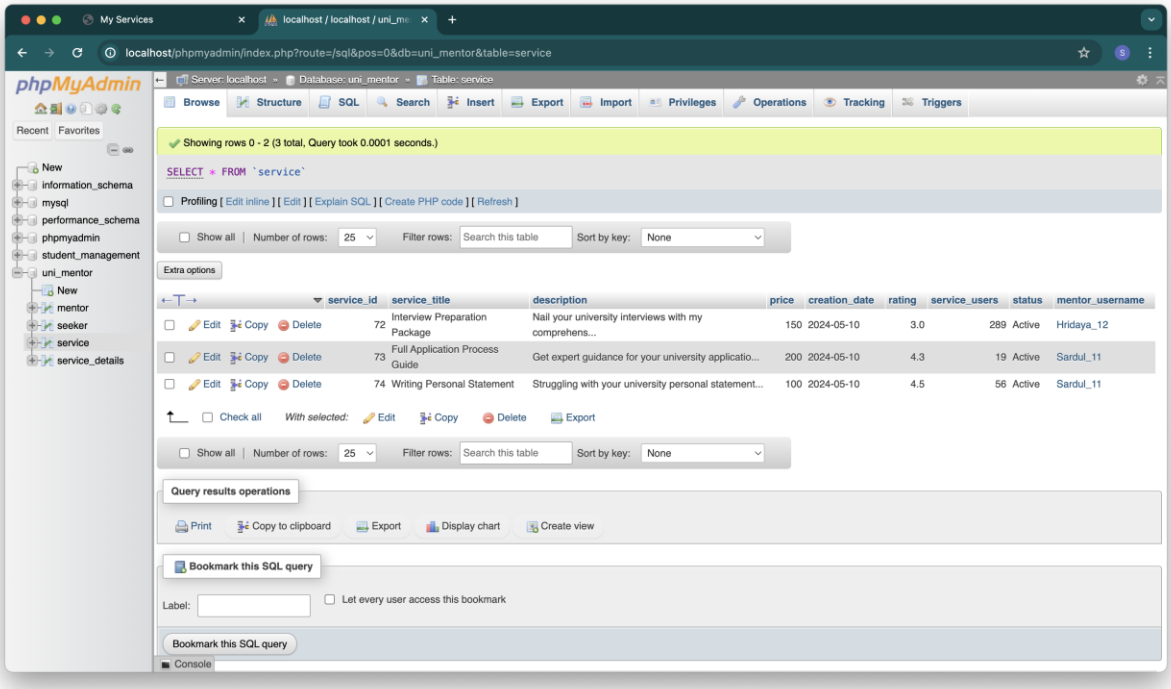


Figure 127: Screenshot of all services in database

4) All the services displayed:

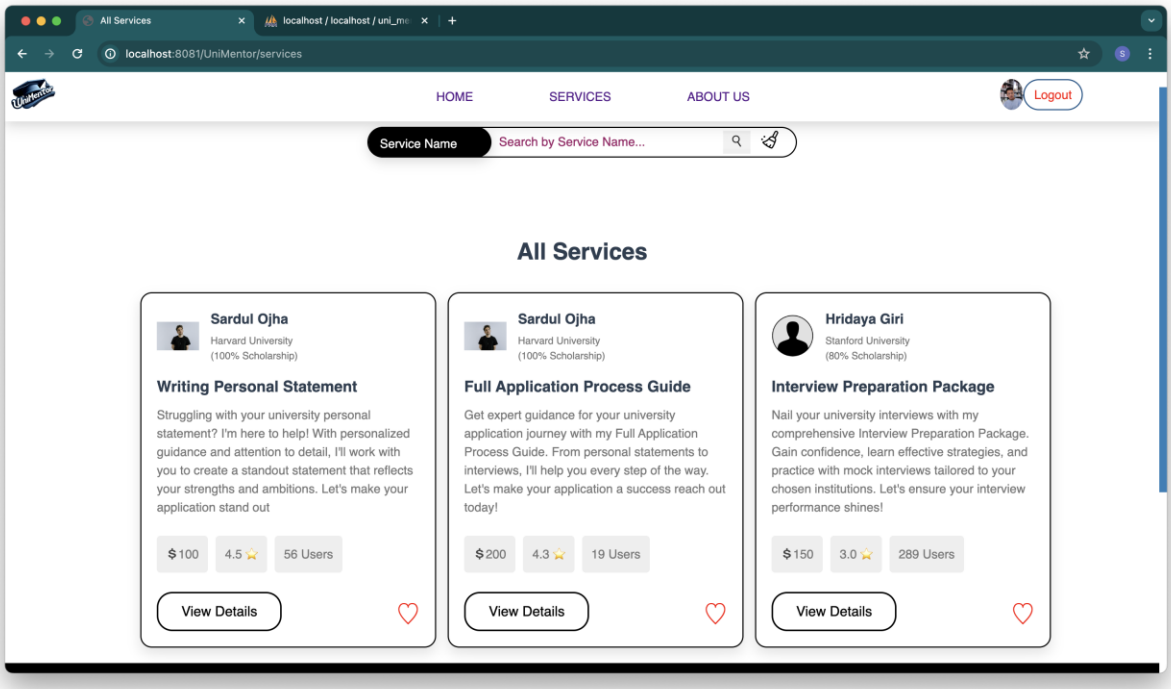


Figure 128: Screenshot of all service displayed in service page

Test 3.2. : Test for own services displayed for mentors

Objective	To display only current mentor's services from database.
Action	➢ Logged in as a mentor. ➢ My service is clicked in nav bar.
Expected Result	Only the logged in mentor's services should be displayed with the option to add, update, and delete.
Actual Result	The services were displayed.
Conclusion	The test is successful.

Table 6: Test table for service display to mentors

Proofs:

1) Logging in as a mentor:

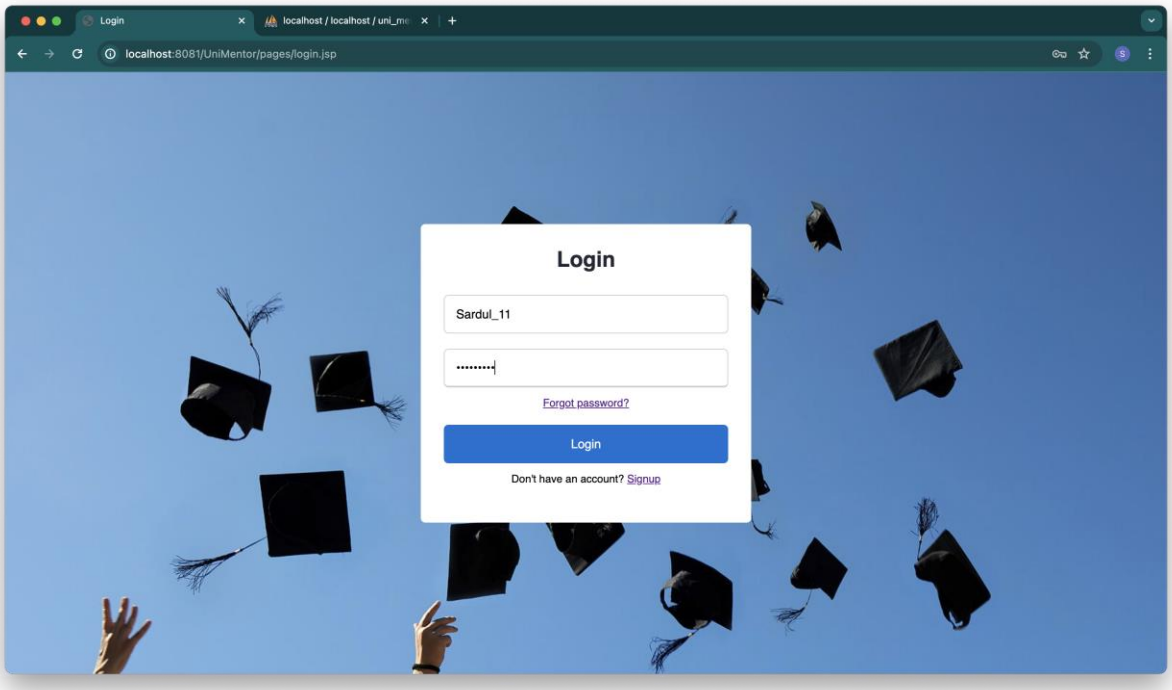


Figure 129: Screenshot of entering login details as mentor

2) Clicking my service button nav bar to navigate to my services page:

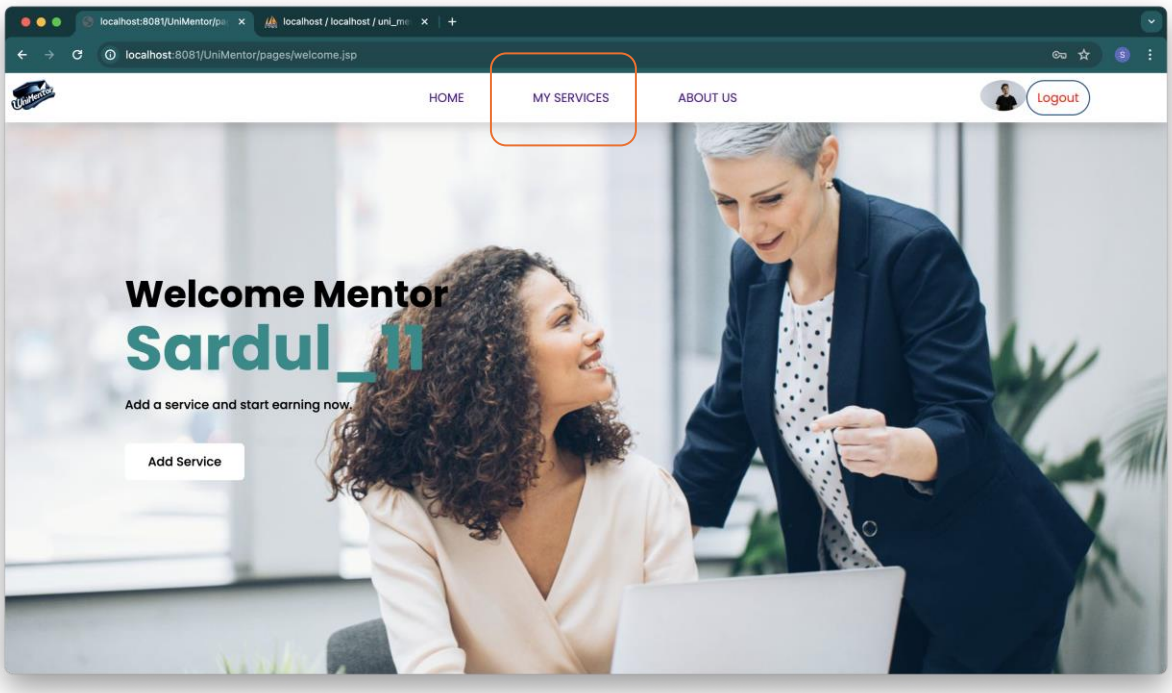


Figure 130: Screenshot of clicking my service button in nav

3) All the logged in mentor's services displayed:

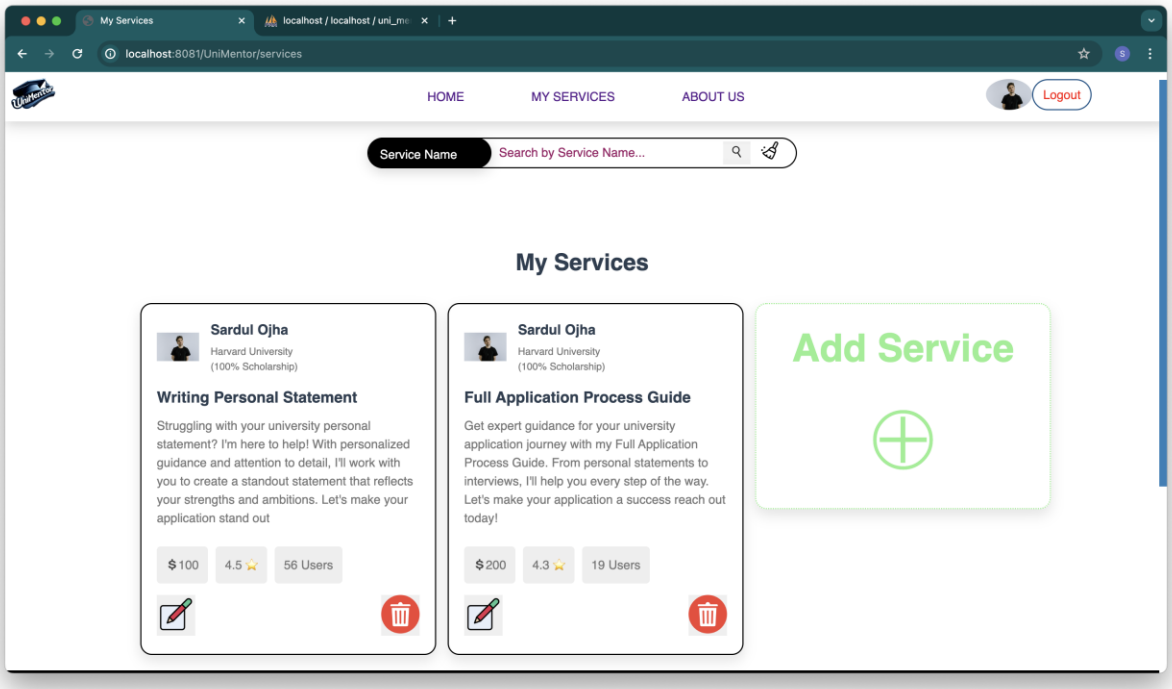


Figure 131: Screenshot of mento's own service displayed

5.4. Test 4: Test for Add

Test 4.1. : Test for new service being added by mentor

Objective	To add a new service.
Action	➢ Add service button is clicked in my services. ➢ Details of service to be added are entered. ➢ Add button is clicked.
Expected Result	The added service should be displayed in my services.
Actual Result	The added service was displayed.
Conclusion	The test is successful.

Table 7: Test table for new service added

Proofs:

1) Clicking add service button in my services:

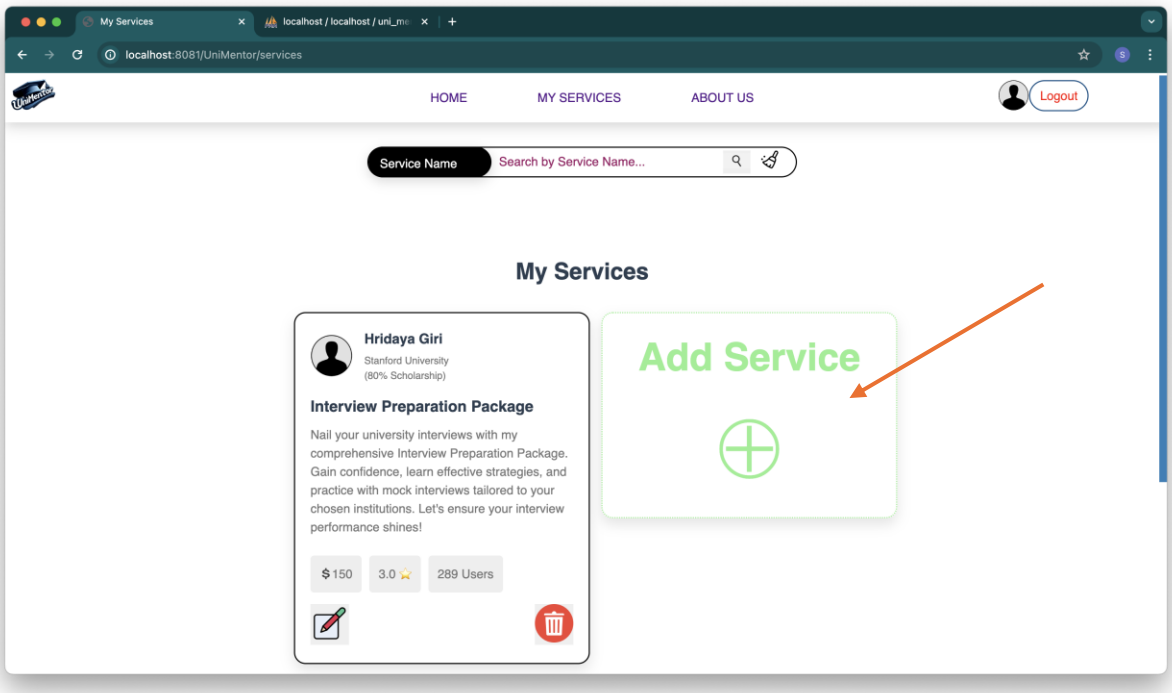


Figure 132: Screenshot of clicking add service button

2) Entering service details:

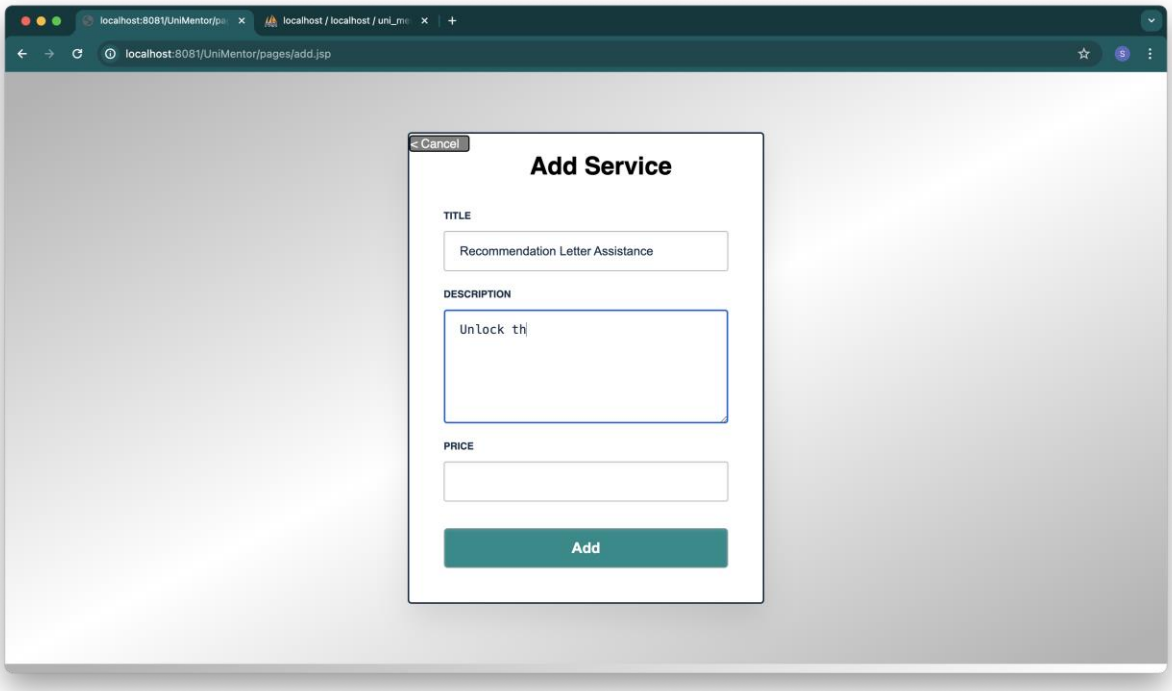


Figure 133: Screenshot of entering service details

3) Add button is clicked:

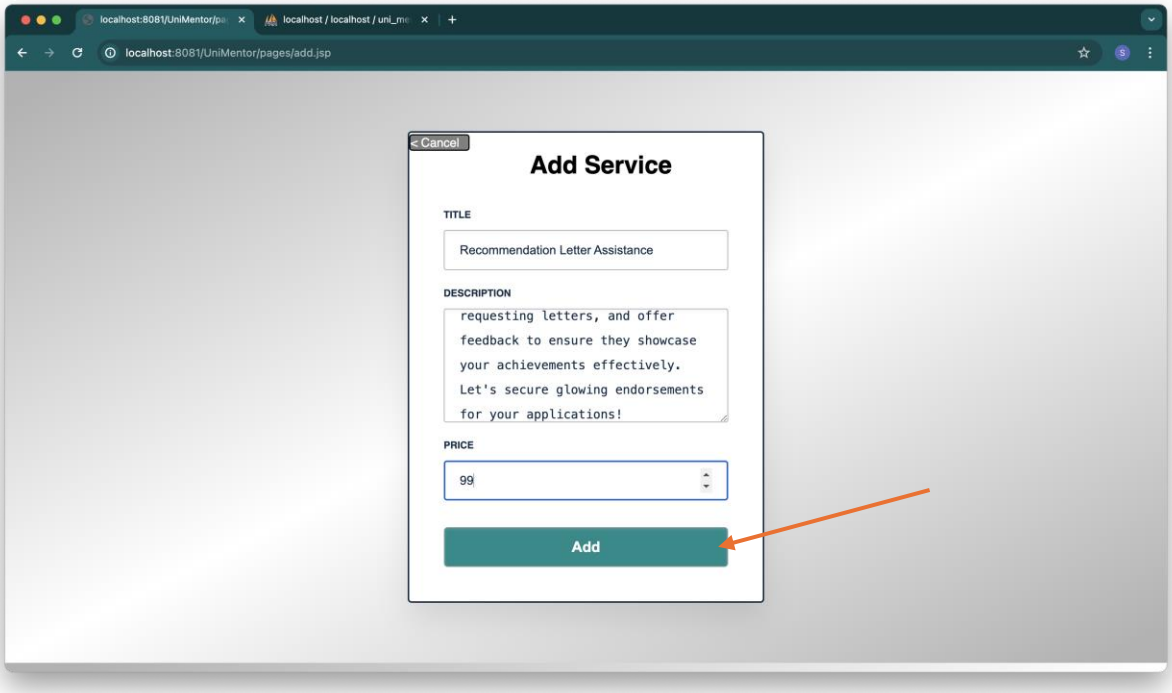


Figure 134: Screenshot of clicking add button

4) Added service displayed:

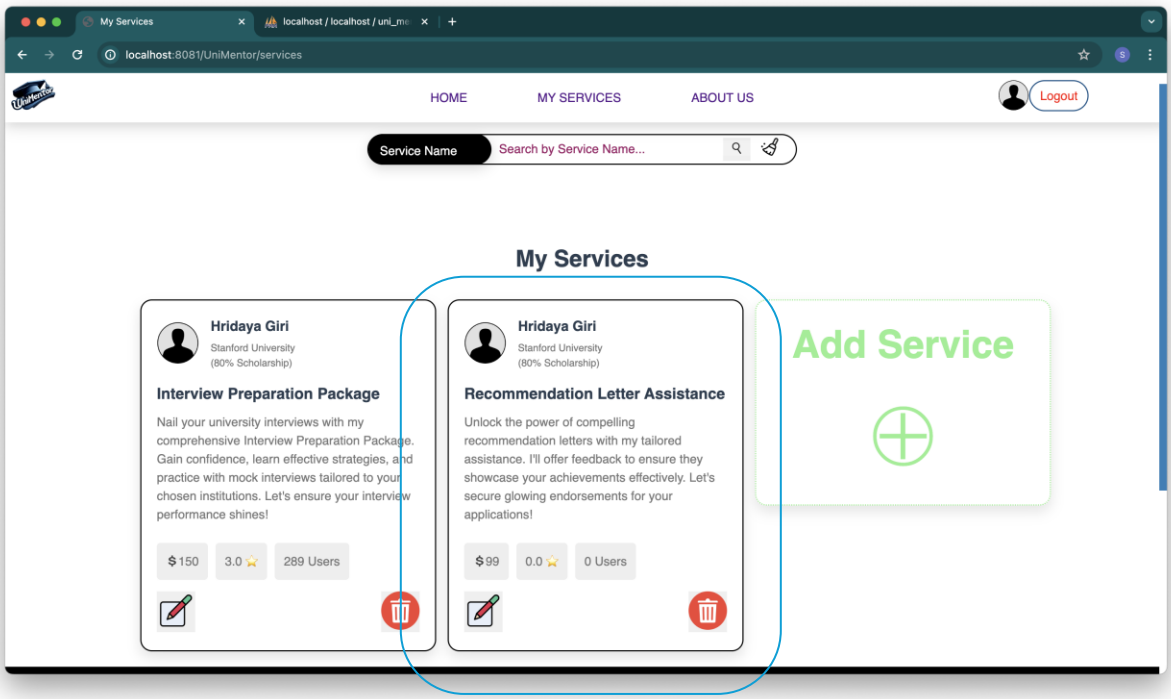


Figure 135: Screenshot of new service added

5) Added service displayed in database:

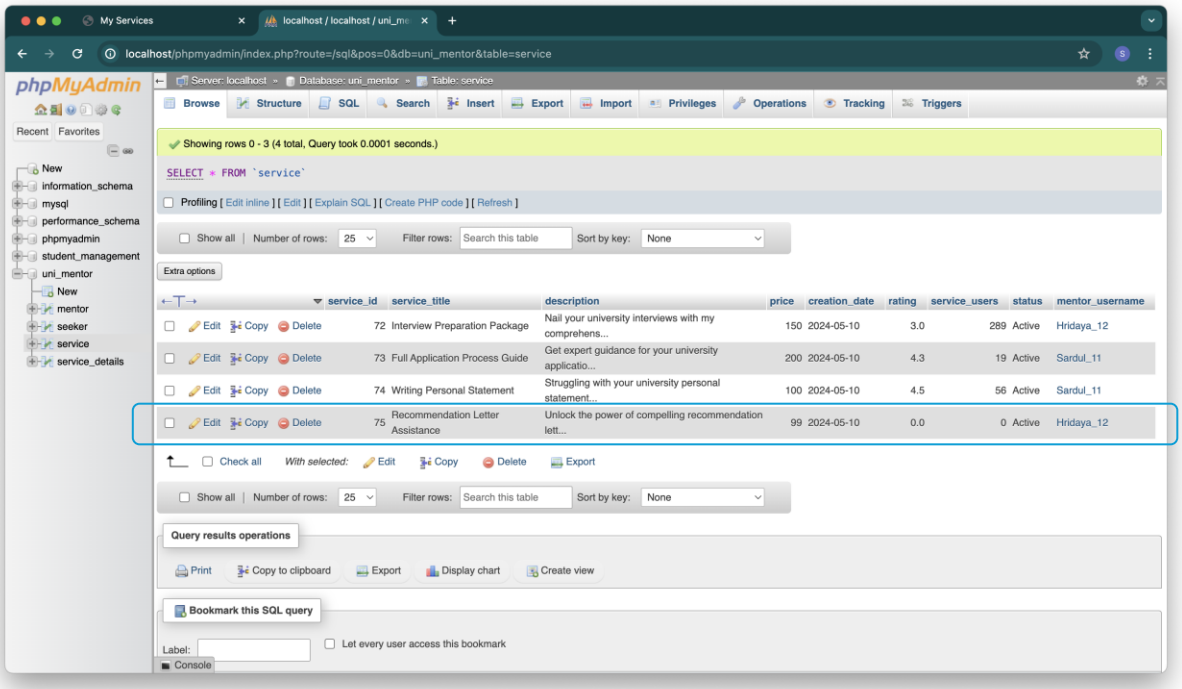


Figure 136: Screenshot of added service in database

Test 4.2. : Test for new added service displayed for seeker

Objective	To check the added service being displayed for seeker.
Action	➢ Logged in as a seeker. ➢ View Services button clicked to navigate to all services.
Expected Result	The added service in test 4.1. should be displayed for seeker.
Actual Result	The added service was displayed.
Conclusion	The test is successful.

Table 8: Test table for added service displayed

Proofs:

1) Logging in as a seeker:

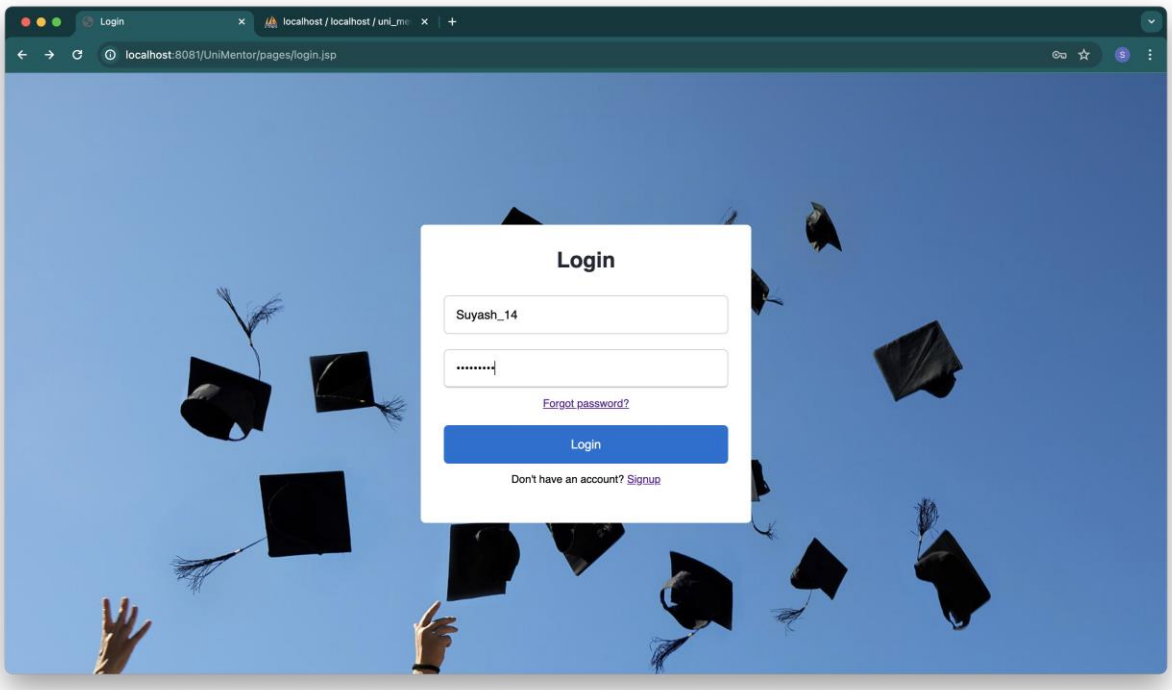


Figure 137: Screenshot of logging in as seeker

2) Clicking view services button to navigate to all services:

Figure 138: Screenshot of clicking view services button

3) The added service displayed:

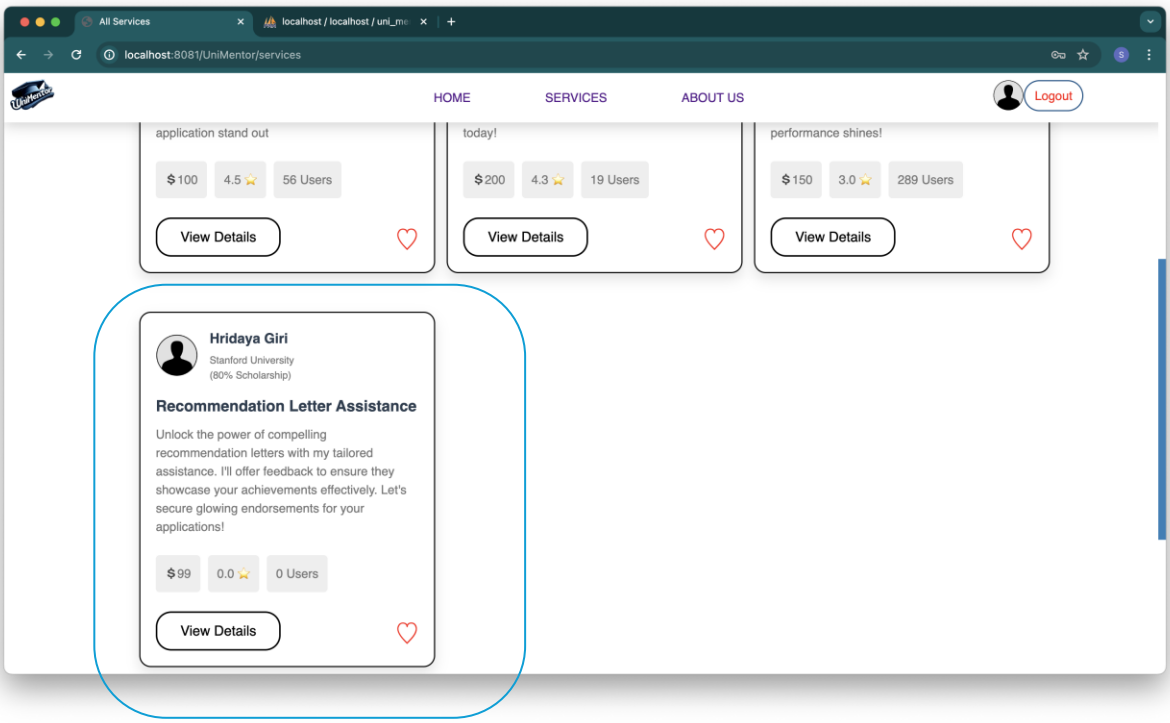


Figure 139: Screenshot of added service displayed

5.5. Test 5: Test for Update

Test 5.1. : Test for selected service being updated for mentor

Objective	To update the selected service.
Action	➢ Update symbol button is clicked for a service in my services. ➢ Details of the selected service is updated. ➢ Update button is clicked.
Expected Result	The service should be updated as entered details.
Actual Result	The service was updated.
Conclusion	The test is successful.

Table 9: Test table for selected service update

Proofs:

1) Clicking update symbol button for a service in my services:

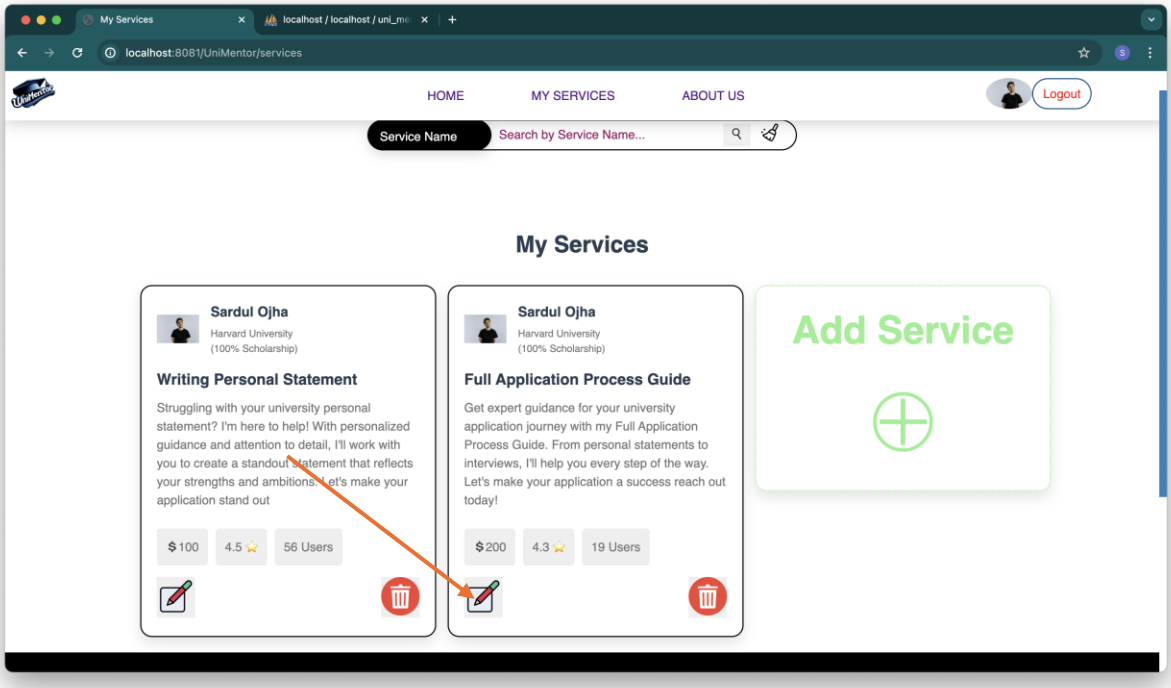


Figure 140: Screenshot of clicking updat button

2) Updating details of the selected service:

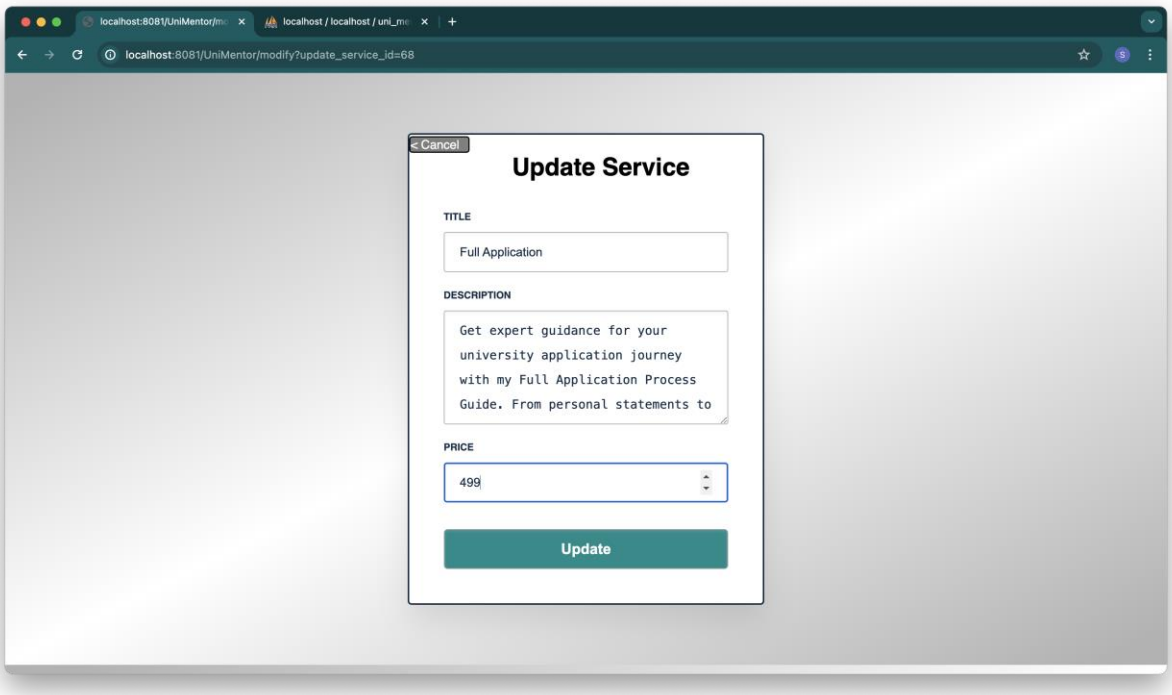


Figure 141: Screenshot of details updated

3) Clicking update button:

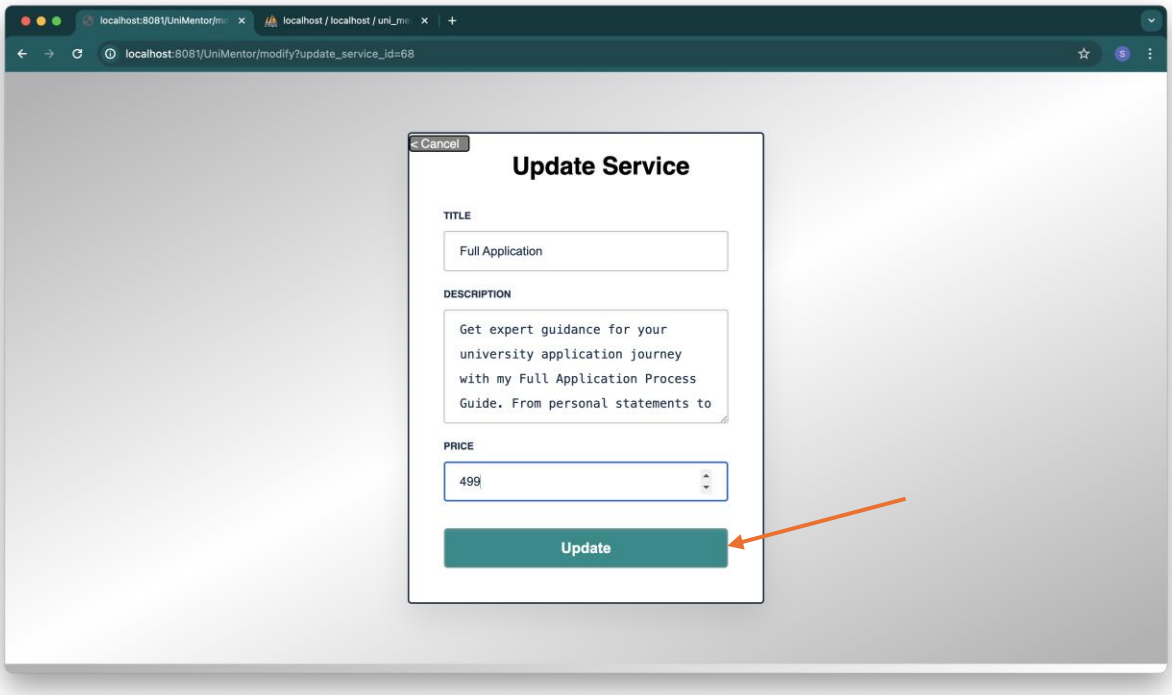


Figure 142: Screenshot of update button clicked

4) Change in service displayed:

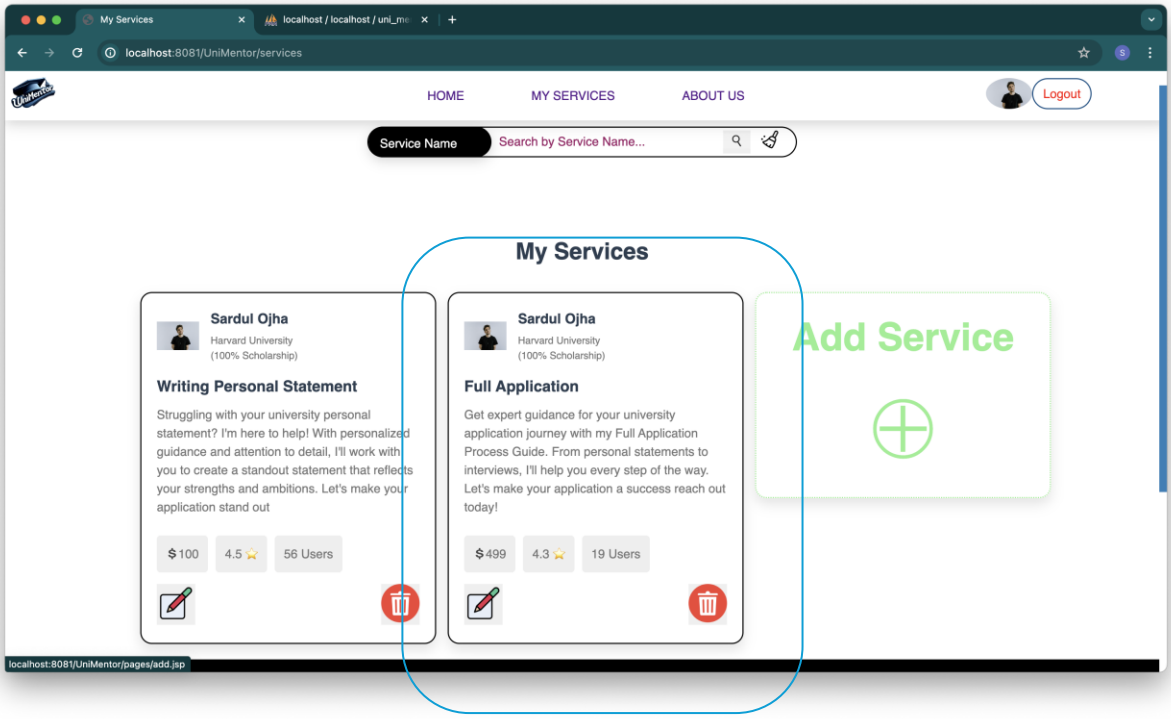


Figure 143: Screenshot of change in my service

5) Change in service displayed in database:

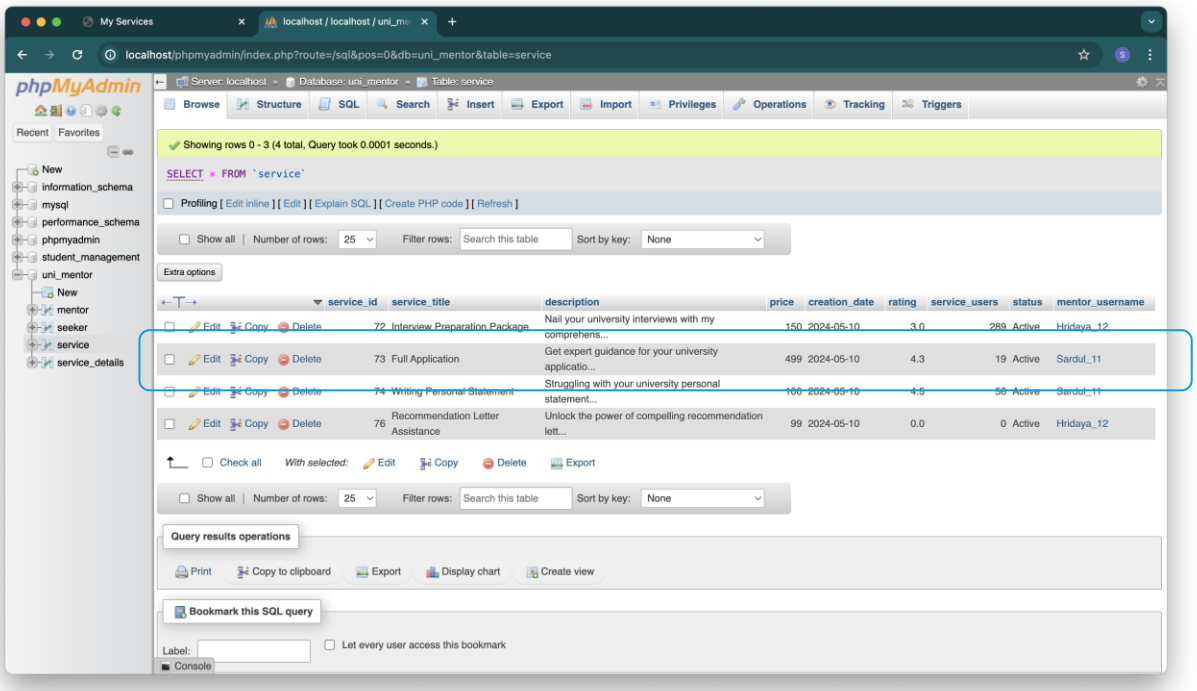


Figure 144: Screenshot of change in database

Test 5.2. : Test for updated service displayed for seeker

Objective	To check the updated service being displayed for seeker.
Action	➢ Logged in as a seeker. ➢ View Services button clicked to navigate to all services.
Expected Result	The updated service in test 5.1. should be displayed with updated details.
Actual Result	The updated service was displayed.
Conclusion	The test is successful.

Table 10: Test table for updated service display

Proofs:

1) Logging in as a seeker:

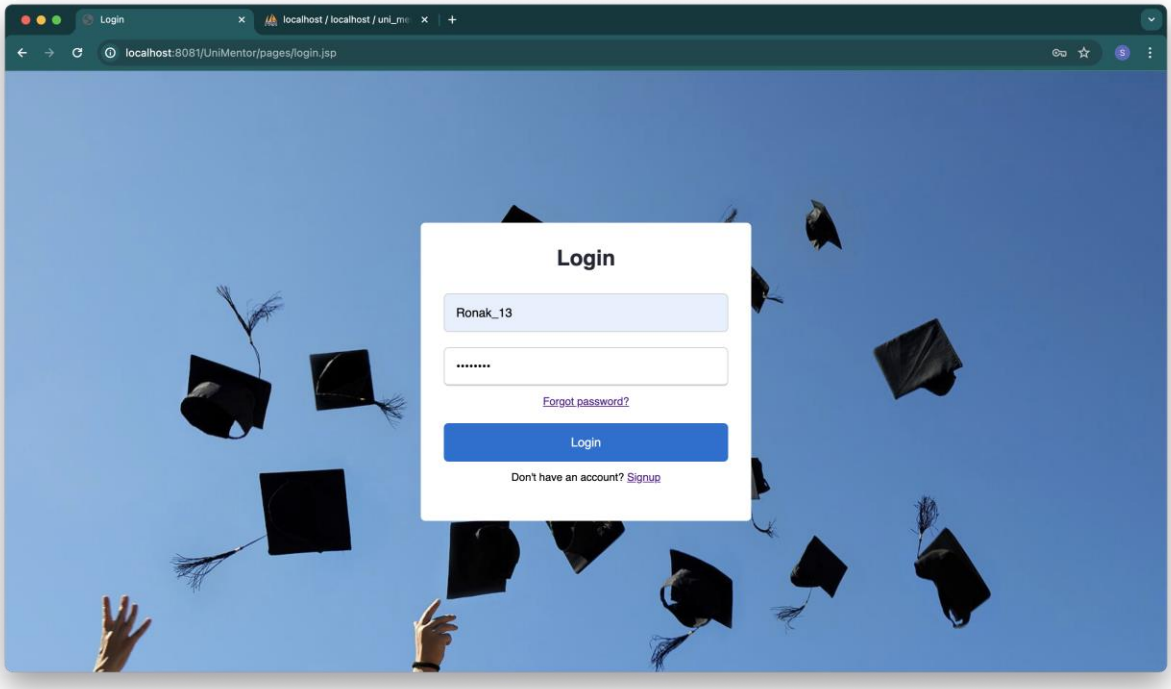


Figure 145: Screenshot of loging in as a seeker

2) Clicking view services button to navigate to all services:

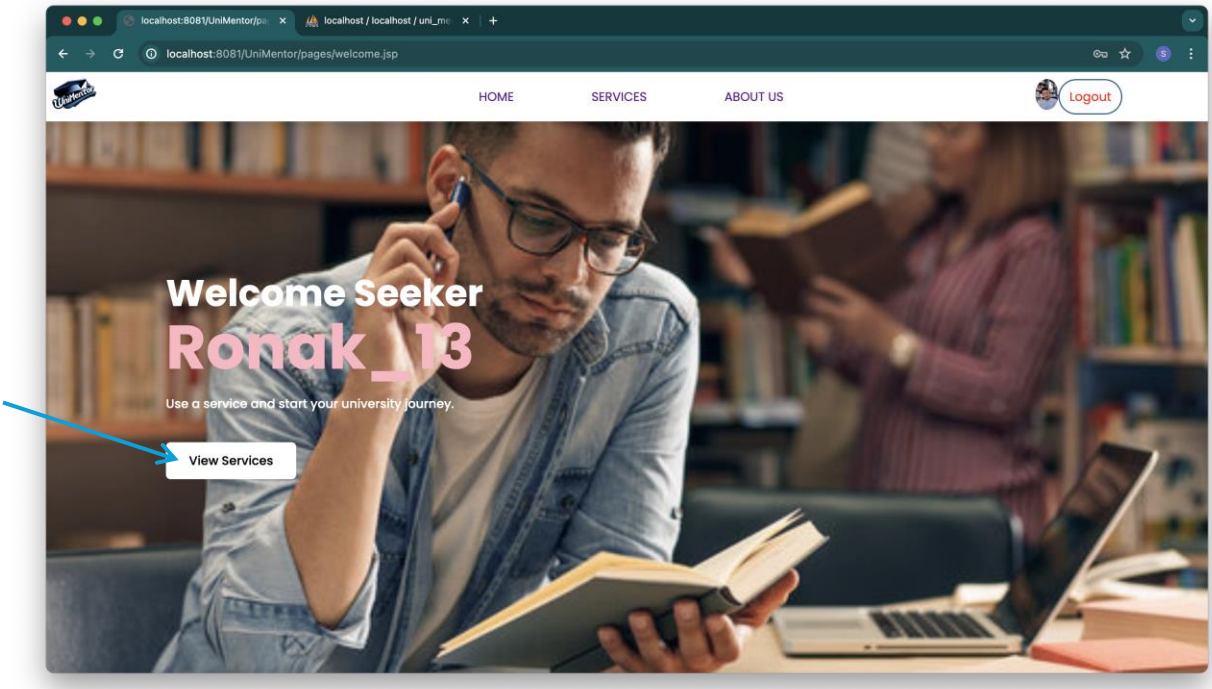


Figure 146: Screenshot of clicking view services

3) The updated service displayed:

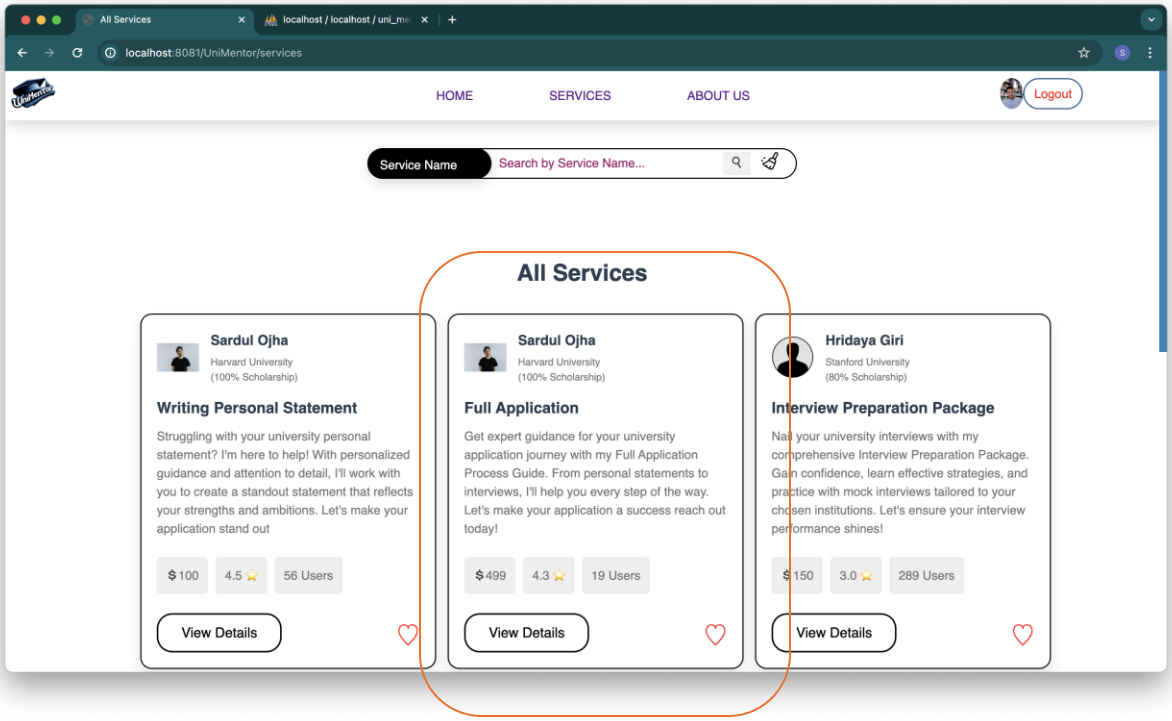


Figure 147: Screenshot of updated service displayed

5.6. Test 6: Test for Delete

Test 6.1. : Test for selected service being deleted for mentor

Objective	To delete the selected service.
Action	➢ Delete button is clicked for a service in my services. ➢ Yes button is clicked for confirmation.
Expected Result	The service should be deleted and should not be displayed.
Actual Result	The deleted service was not displayed.
Conclusion	The test is successful.

Table 11: Test table for selected service delete

Proofs:

1) Clicking delete button for a service in my services:

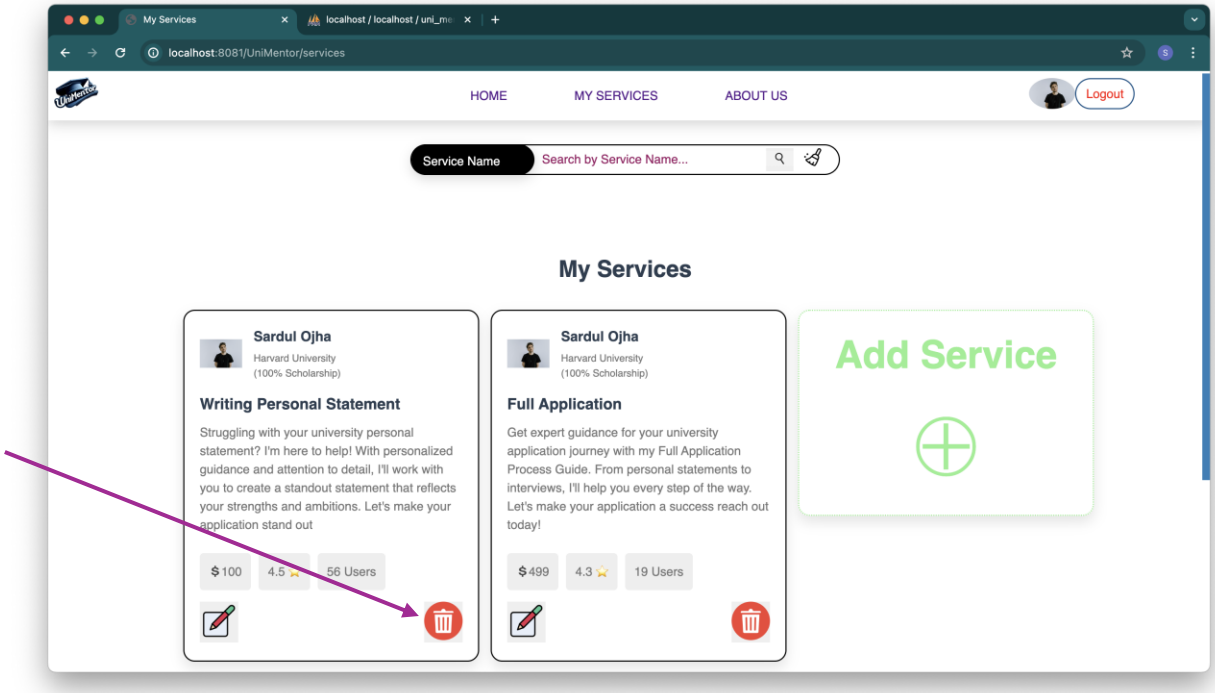


Figure 148: Screenshot of delete button clicked

2) Clicking yes button for confirmation:

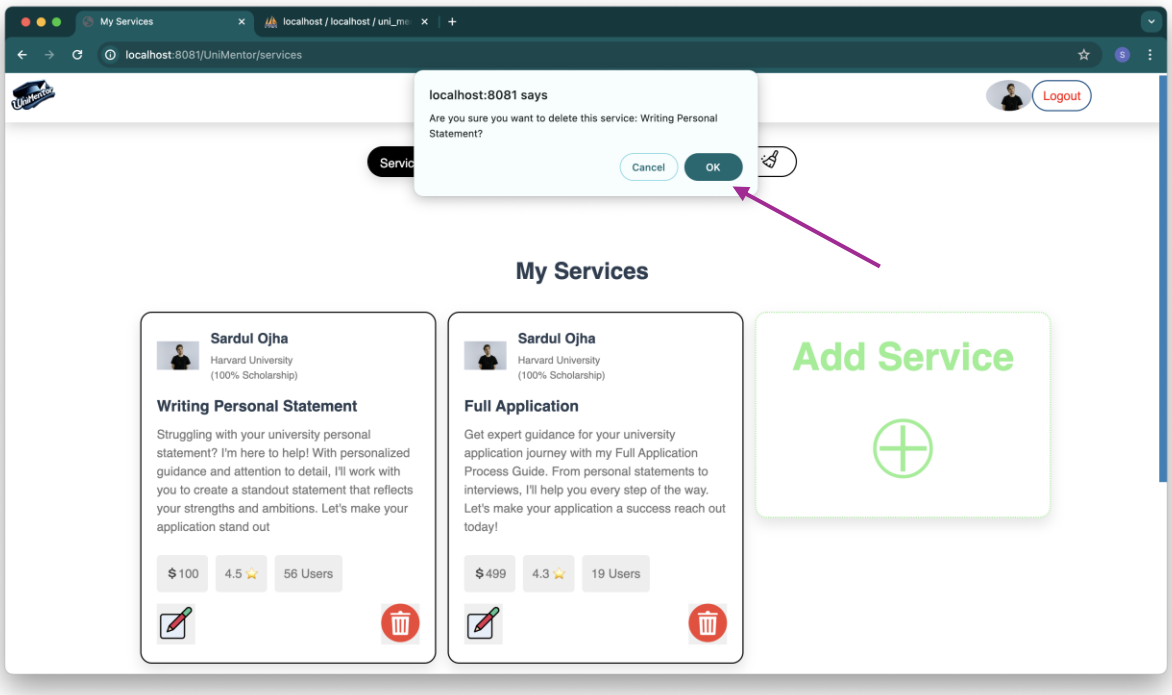


Figure 149: Screenshot of ok button clicked

3) The deleted service not displayed:

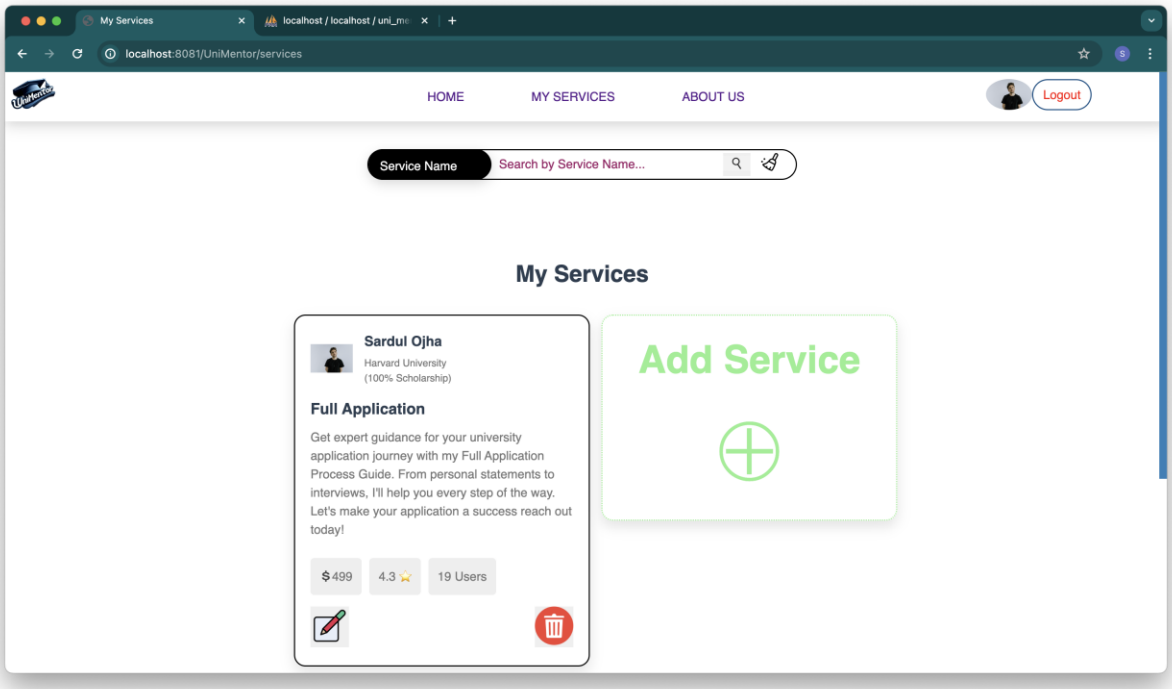


Figure 150: Screenshot of deleted service not displayed

4) The deleted service removed from database:

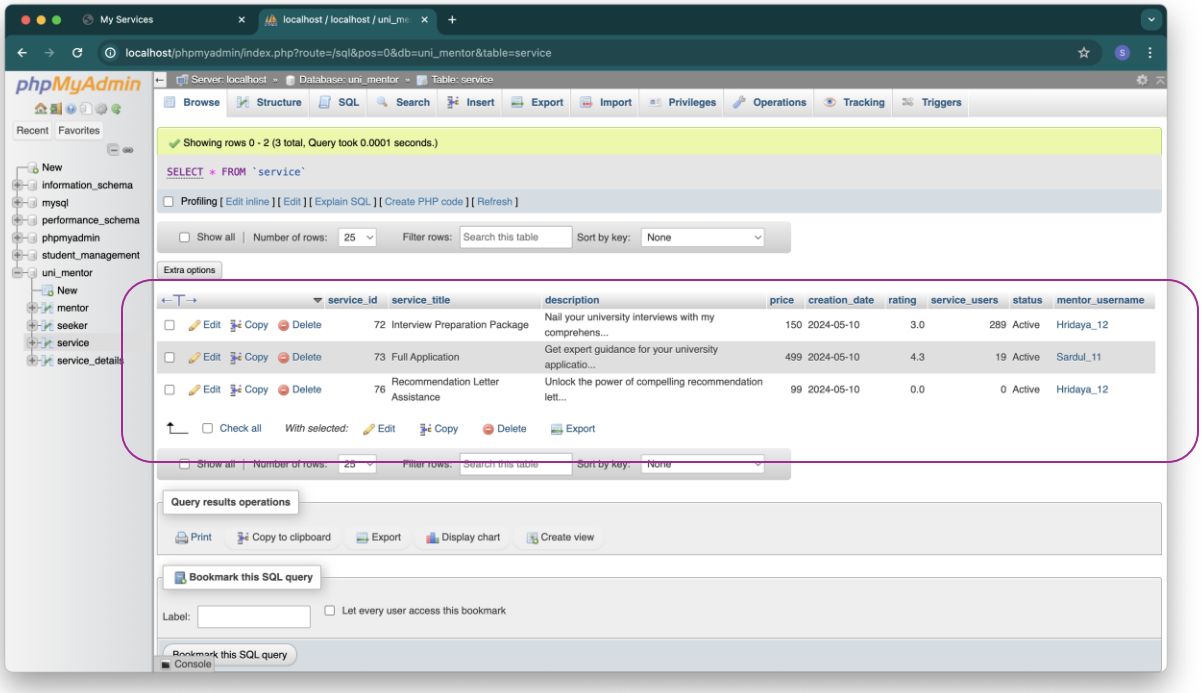


Figure 151: Screenshot of deleted service removed from database

Test 6.2. : Test for deleted service not displayed for seeker

Objective	To check the deleted service not being displayed for seeker.
Action	➢ Logged in as a seeker. ➢ All Services button clicked to navigate to all services.
Expected Result	The deleted service in test 6.1. should not be displayed.
Actual Result	The deleted service was not displayed.
Conclusion	The test is successful.

Table 12: Test table for deleted service not displayed for seeker

Proofs:

1) Logging in as a seeker:

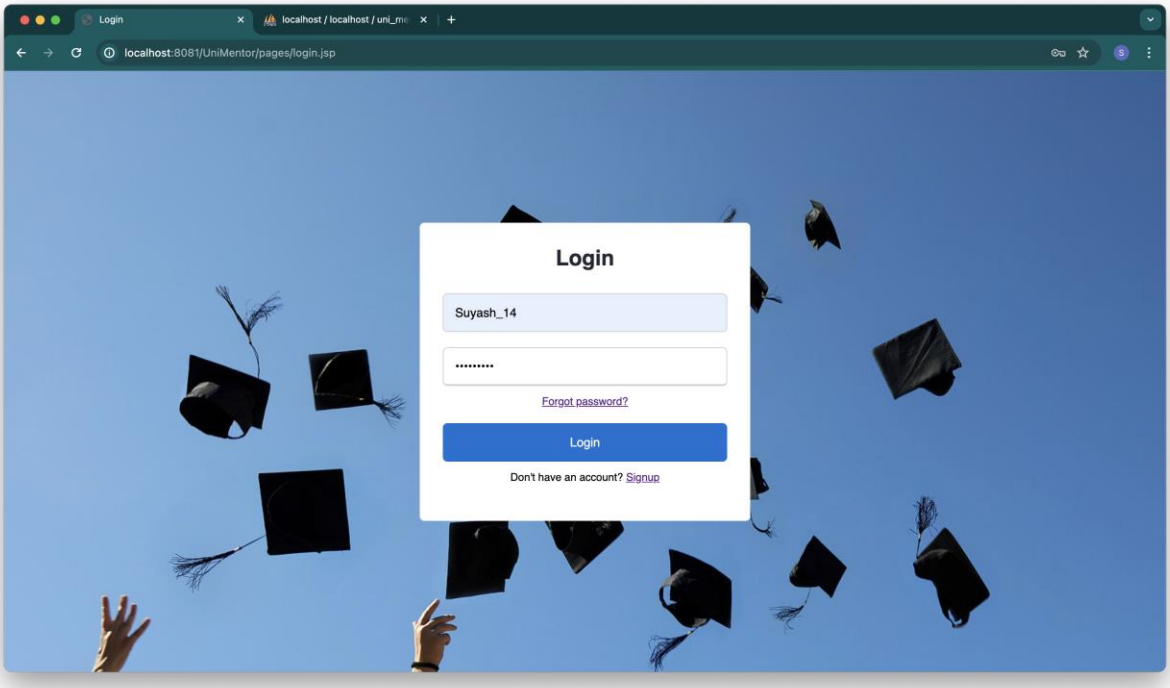


Figure 152: Screenshot of logging in as seeker

2) Clicking view services button to navigate to all services:

3) The deleted service not displayed:

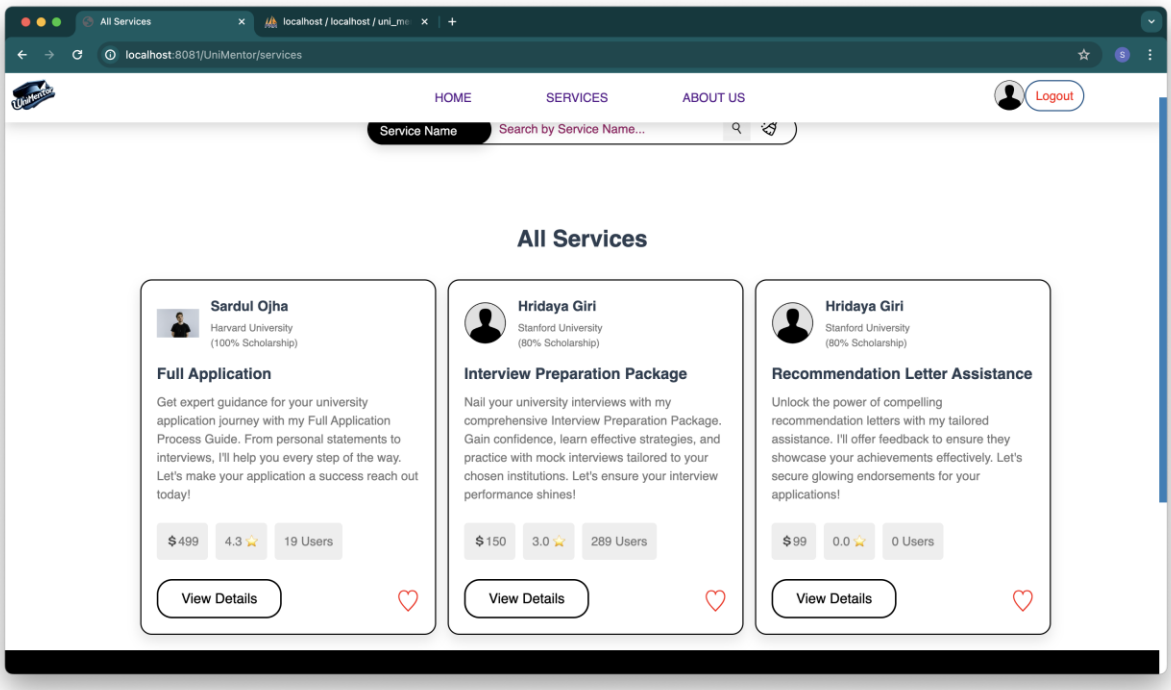


Figure 153: Screenshot of deleted service not displayed for seeker

5.7. Test 7: Test for Profile (C.R.U.D)

Test 7.1. : Test for new profile being displayed (Create and Read)

Objective	To check the information being displayed in profile after logging in.
Action	➢ Logged in as user (mentor or seeker). ➢ Profile button is clicked on the navbar.
Expected Result	All the details of the logged in user should be displayed.
Actual Result	All the details was displayed.
Conclusion	The test is successful.

Table 13: Test table for profile display

Proofs:

1) Logging in as user:

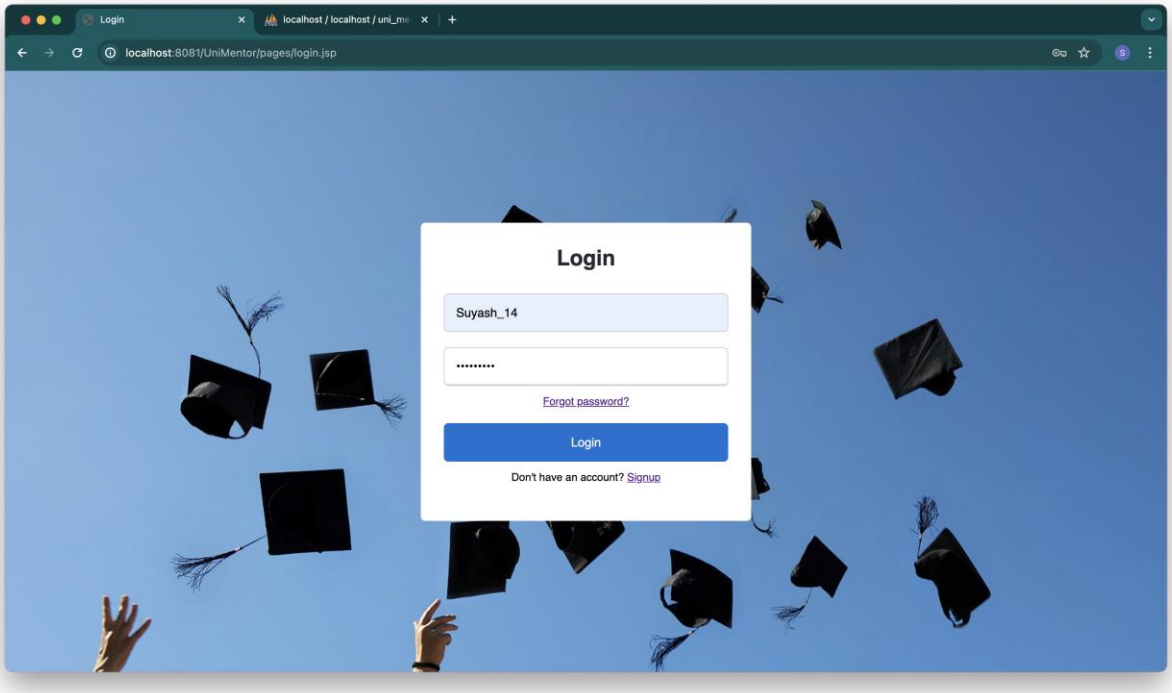


Figure 154: Screenshot of logging in as a user

2) Clicking profile button on the navbar:

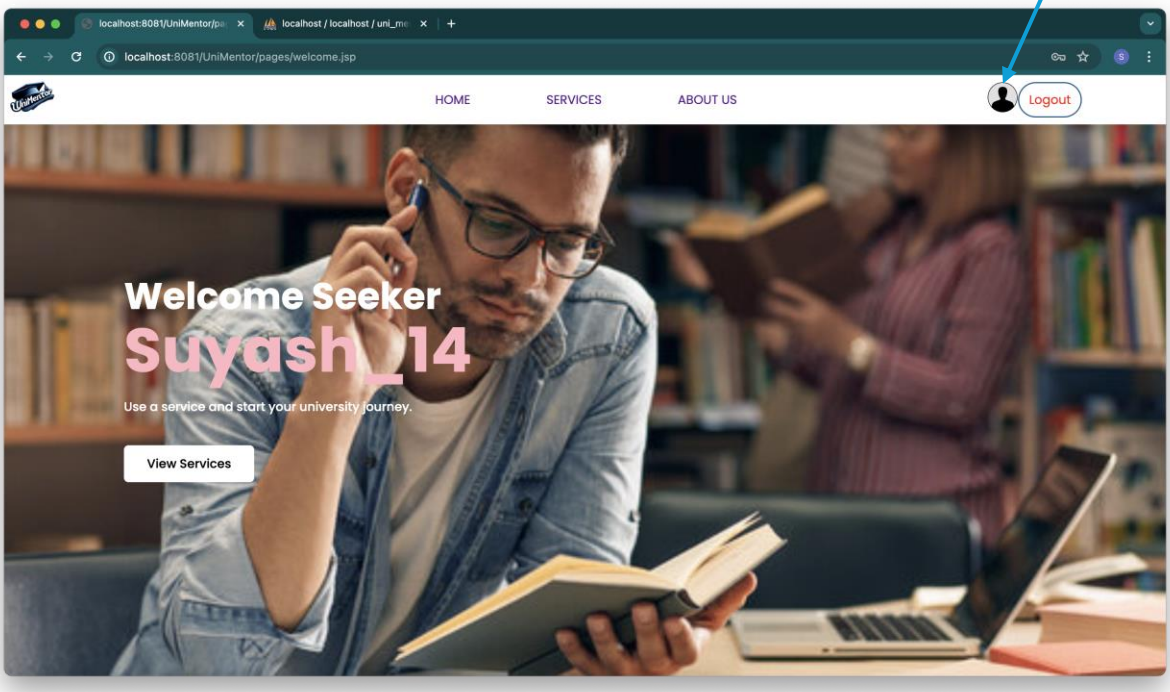


Figure 155: Screenshot of clicking profile button

3) Profile information displayed:

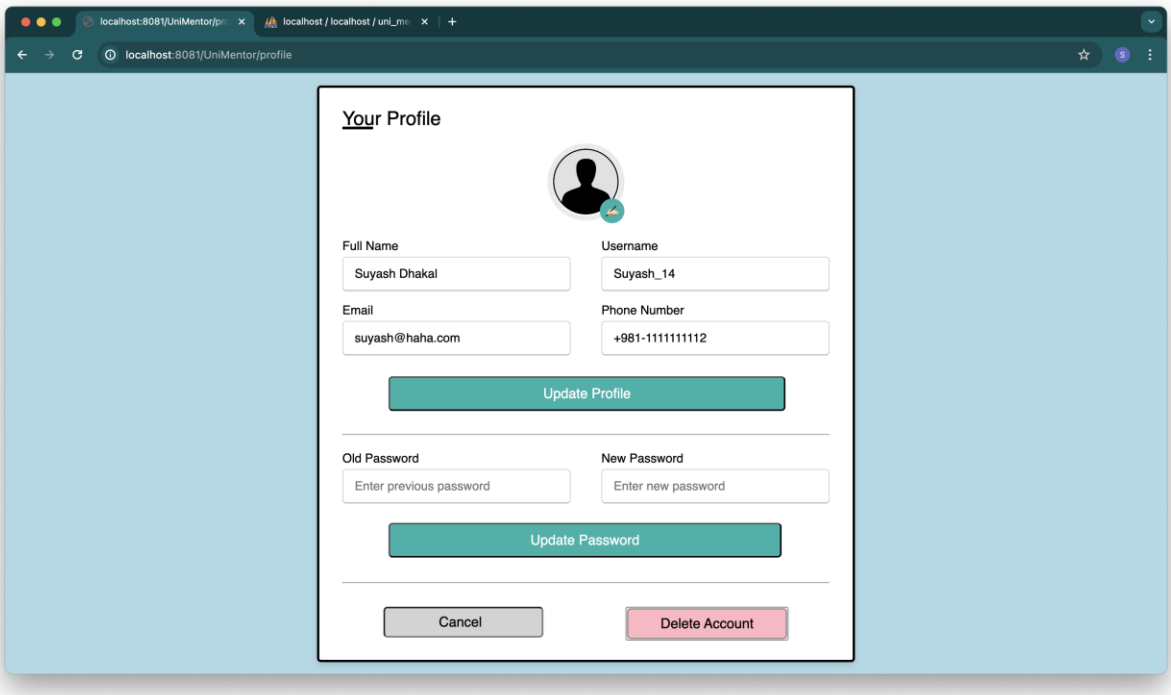


Figure 156: Screenshot of profile information displayed

4) Profile information in database:

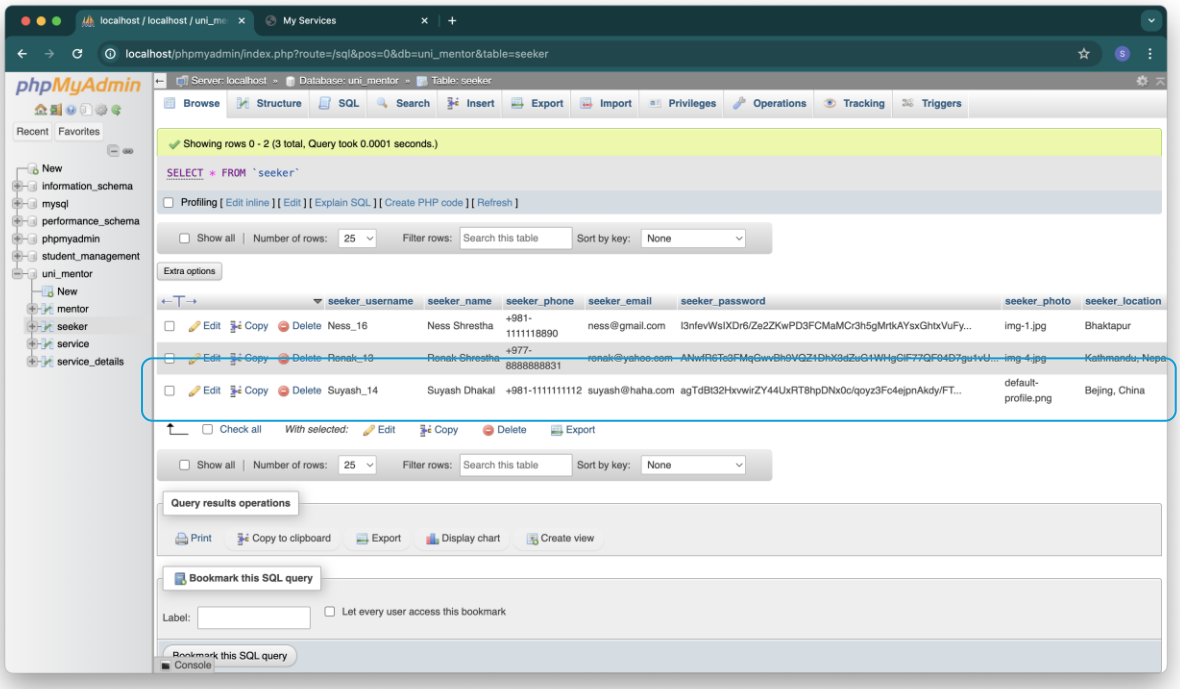


Figure 157: Screenshot of profile information in database

Test 7.2. : Test for profile being updated (Update)

Objective	To update the profile information.
Action	➢ Profile page is opened. ➢ Personal details are updated. ➢ Update Profile button is clicked. ➢ Profile page is again opened to check results.
Expected Result	➢ The profile page should be updated according to the updated information.
Actual Result	The profile page was updated.
Conclusion	The test is successful.

Table 14: Test table for profile update

Proofs:

1) Clicking profile button on the navbar:

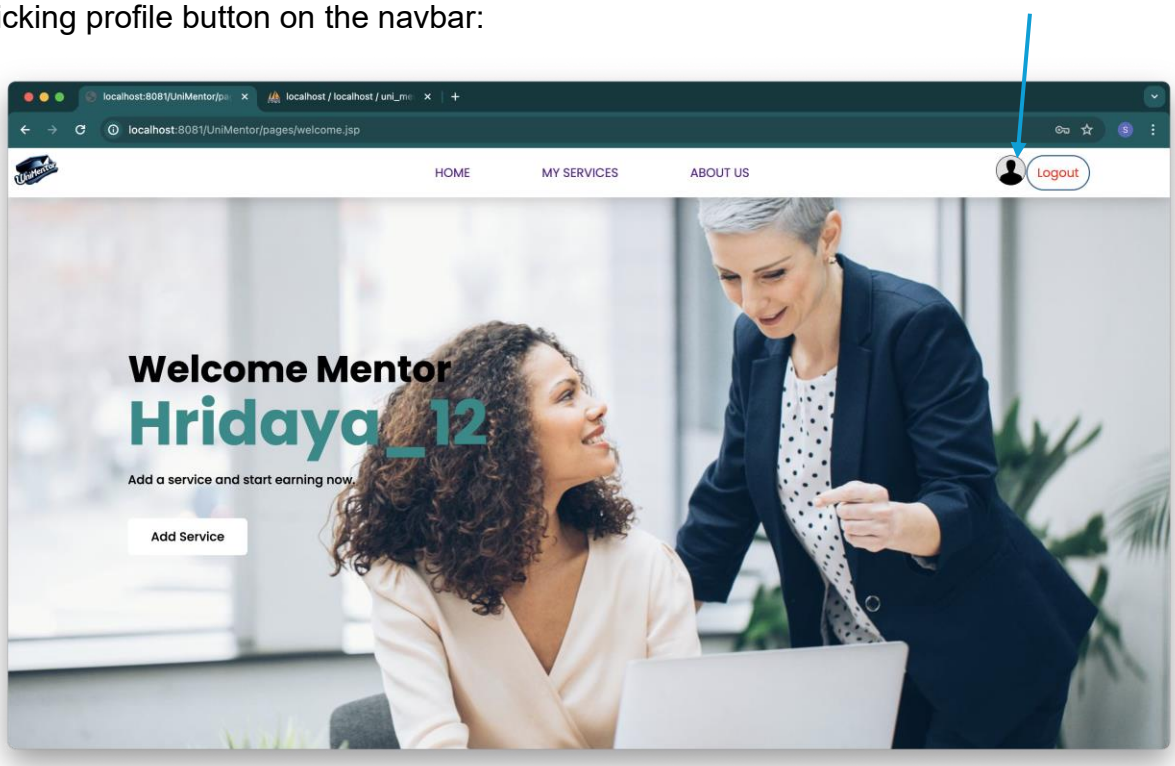


Figure 158: Screenshot of clicking profile button on navbar

2) Profile information displayed:

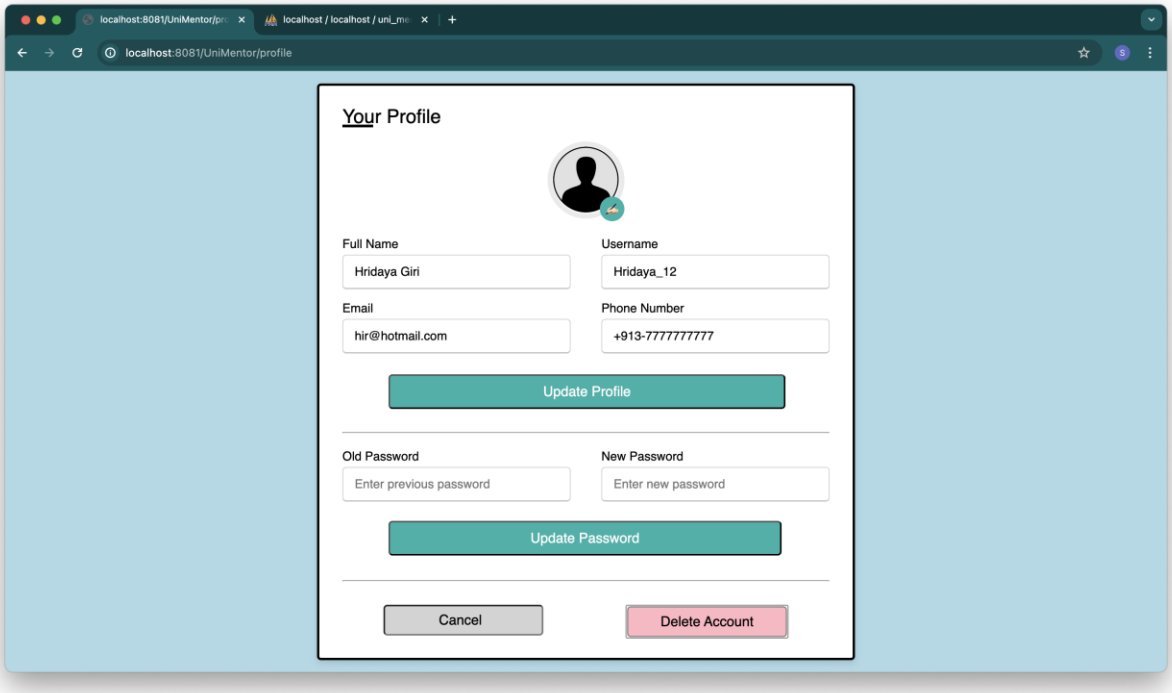


Figure 159: Screenshot of profile information displayed

3) Updating profile information:

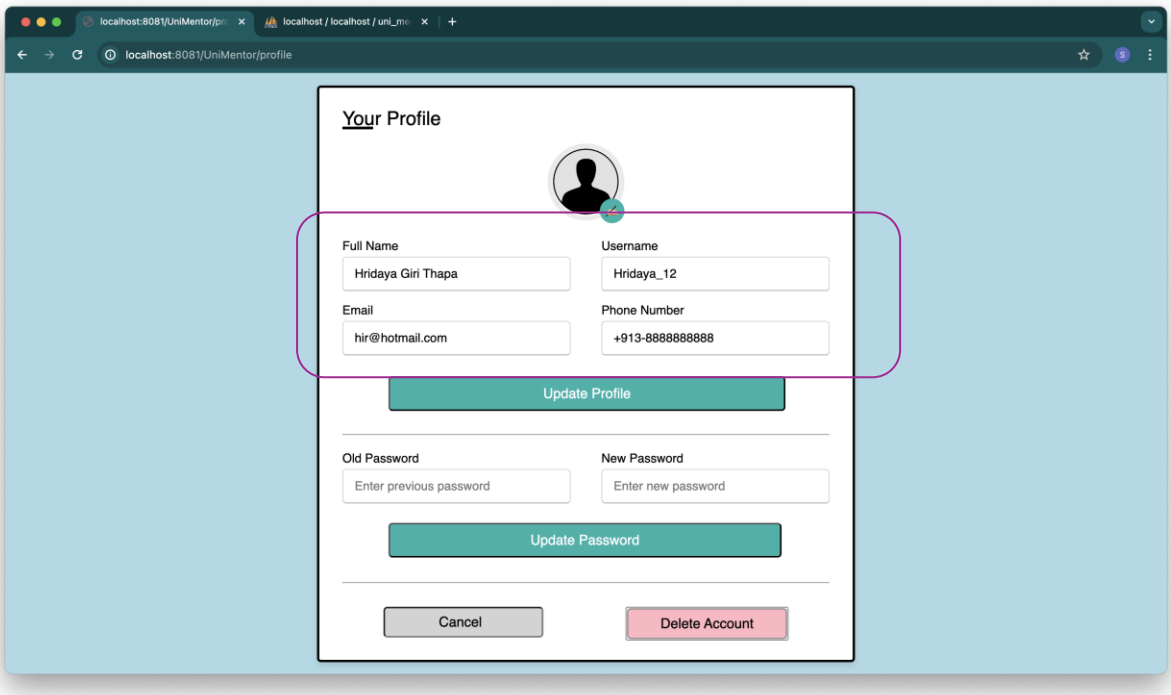


Figure 160: Screenshot of profile information updated

4) Clicking update profile button:

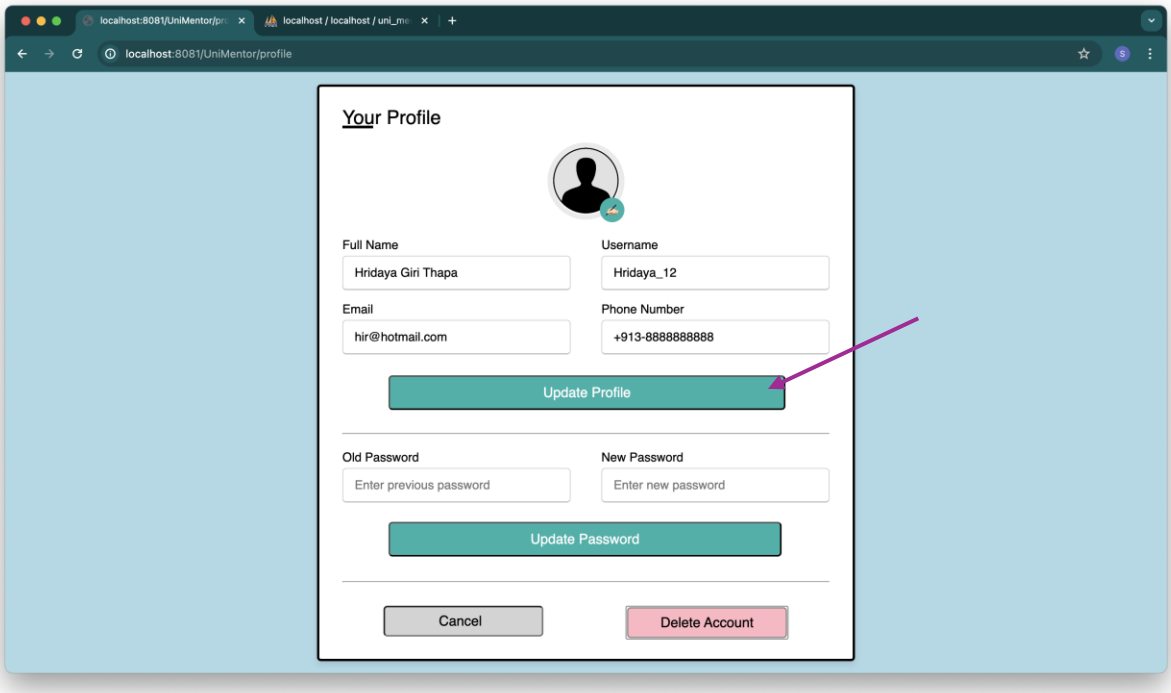


Figure 161: Screenshot of update profile button clicked

5) Again, clicking profile button on the navbar:

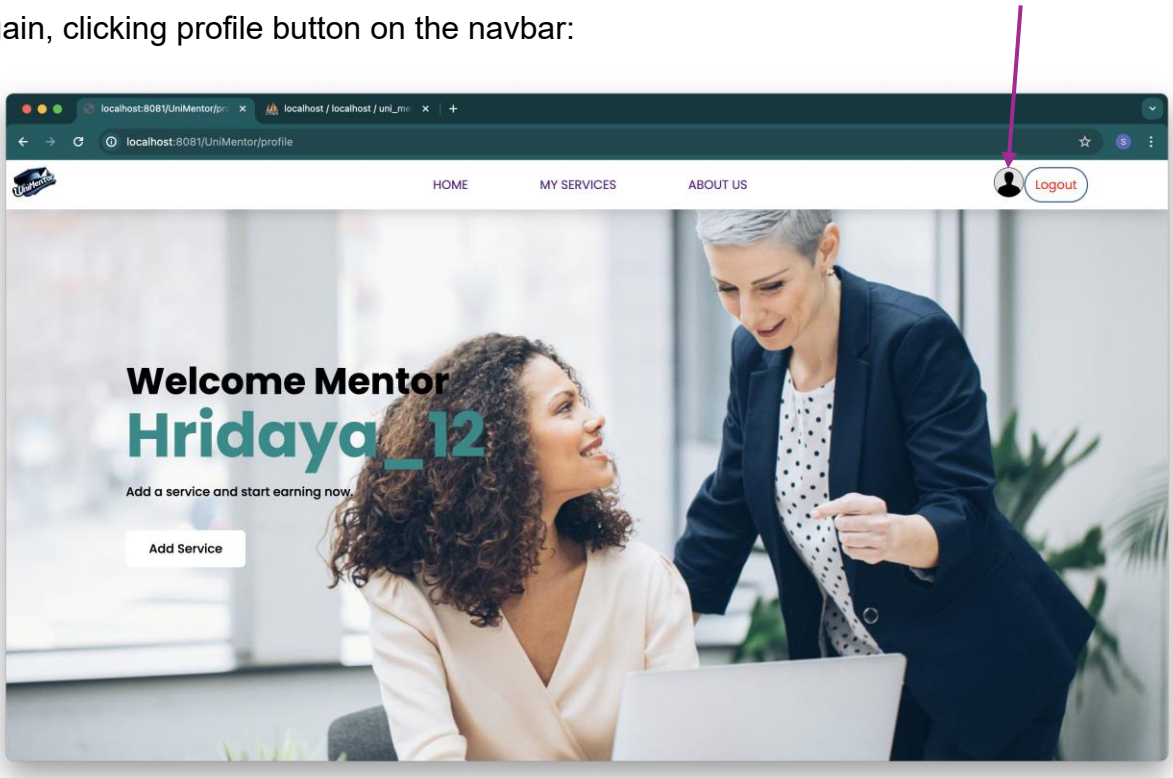


Figure 162: Screenshot of again clicking on profile button

6) Updated profile information:

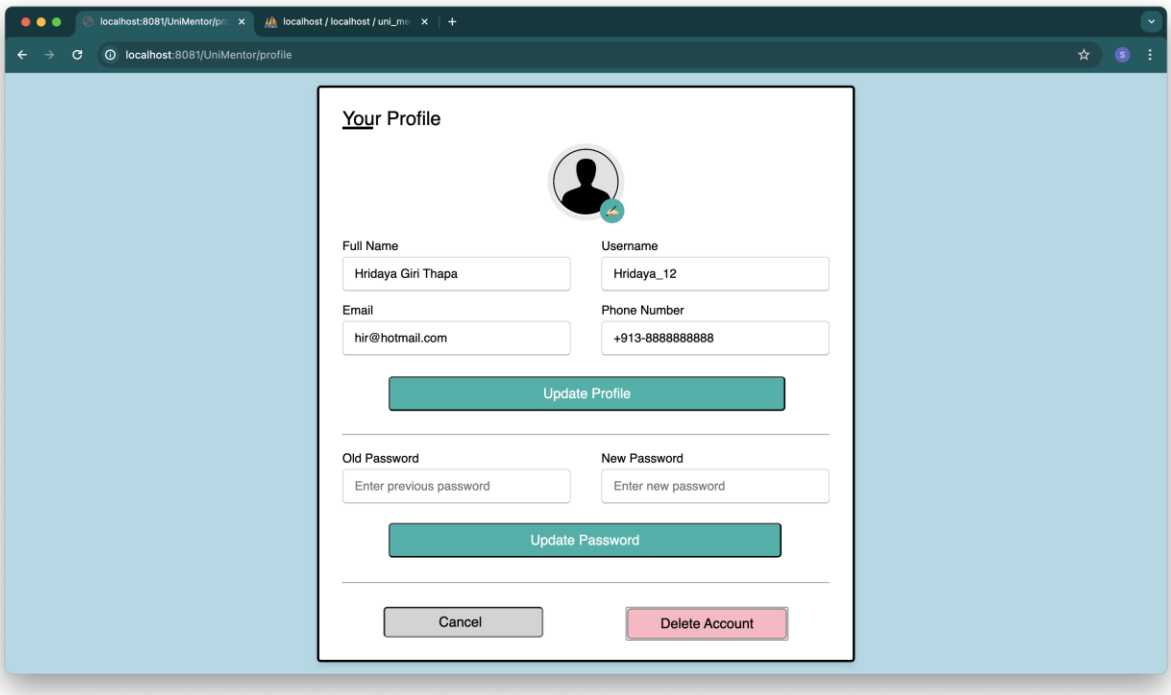


Figure 163: Screenshot of updated information displayed

7) Updated profile information in database:

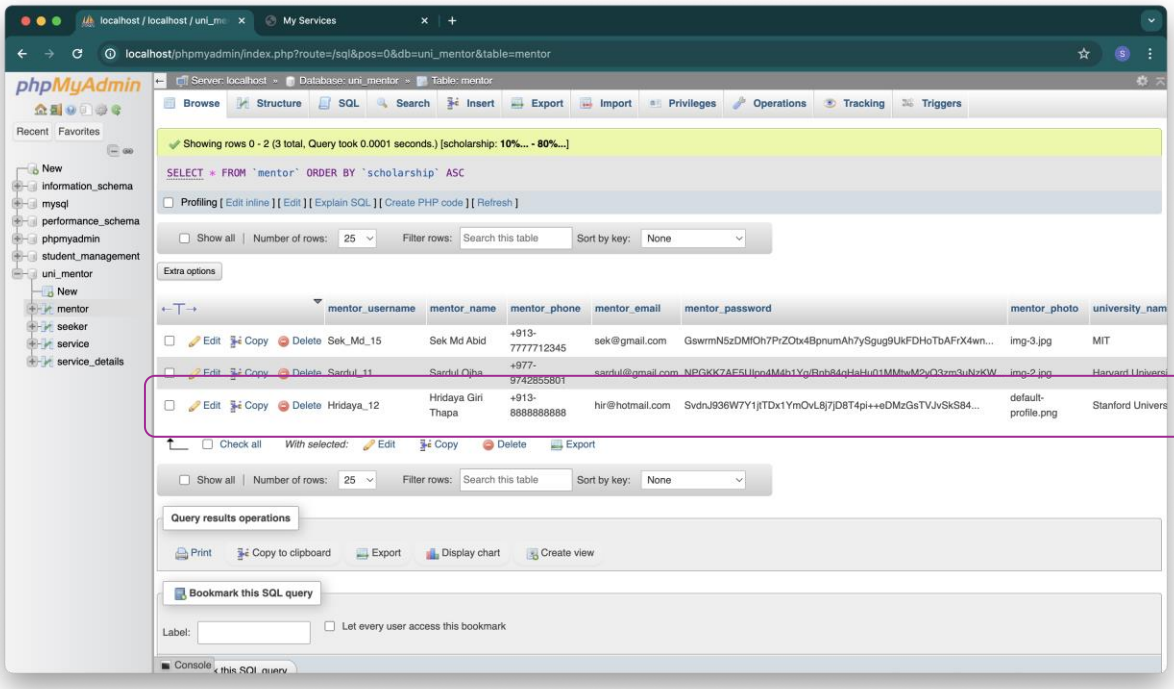


Figure 164: Screenshot of information updated in database

Test 7.3. : Test for profile being deleted

Objective	To delete the account(profile).
Action	➢ Logging in as a user (mentor or seeker). ➢ Profile page is opened. ➢ Delete profile button is clicked. ➢ Yes button is clicked for confirmation. ➢ Log in information is entered to check the account.
Expected Result	The account (profile) should be deleted.
Actual Result	The account was deleted.
Conclusion	The test is successful.

Table 15: Test table for profile delete

Proofs:

1) Clicking profile button on the navbar:

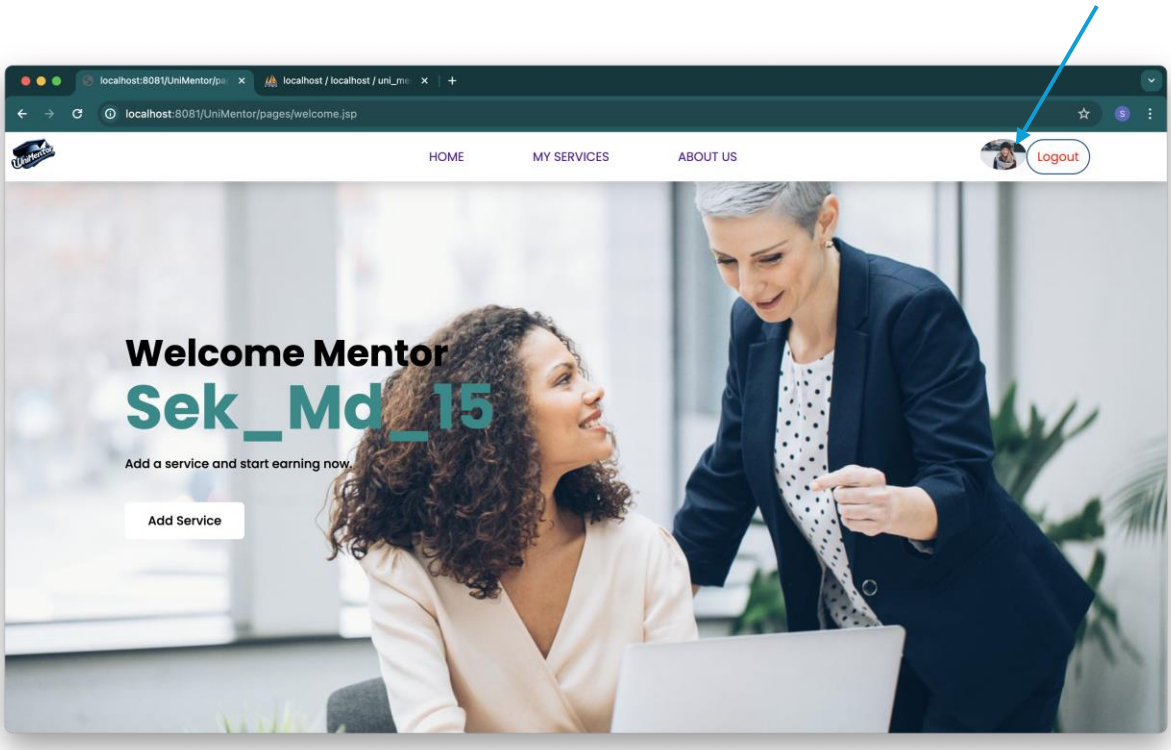


Figure 165: Screenshot of clicking profile buttons

2) Profile information displayed:

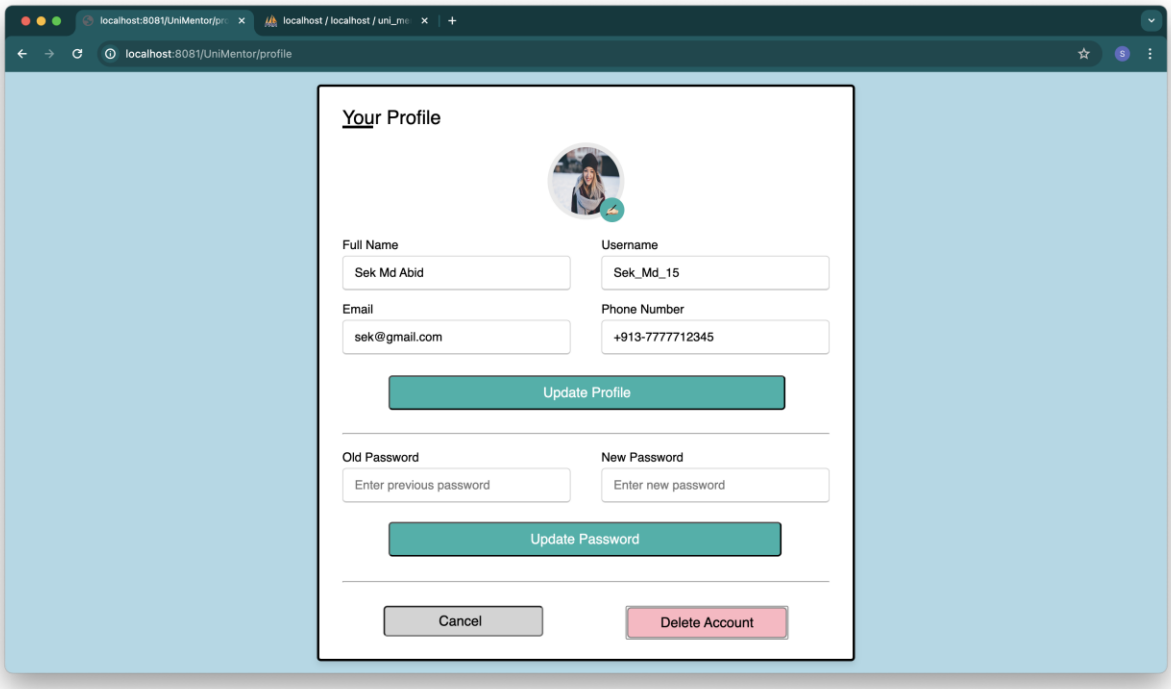


Figure 166: Screenshot of profile information displayed

3) Clicking delete profile button:

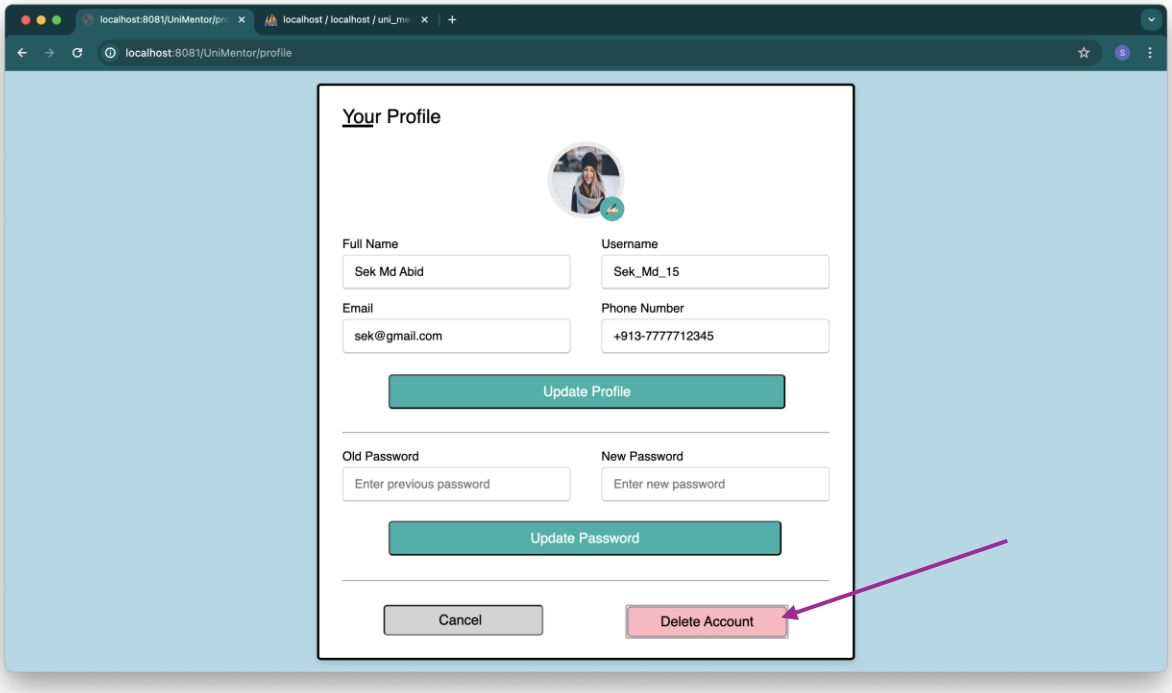


Figure 167: Screenshot of clicking delete button

4) Clicking yes for confirmation:

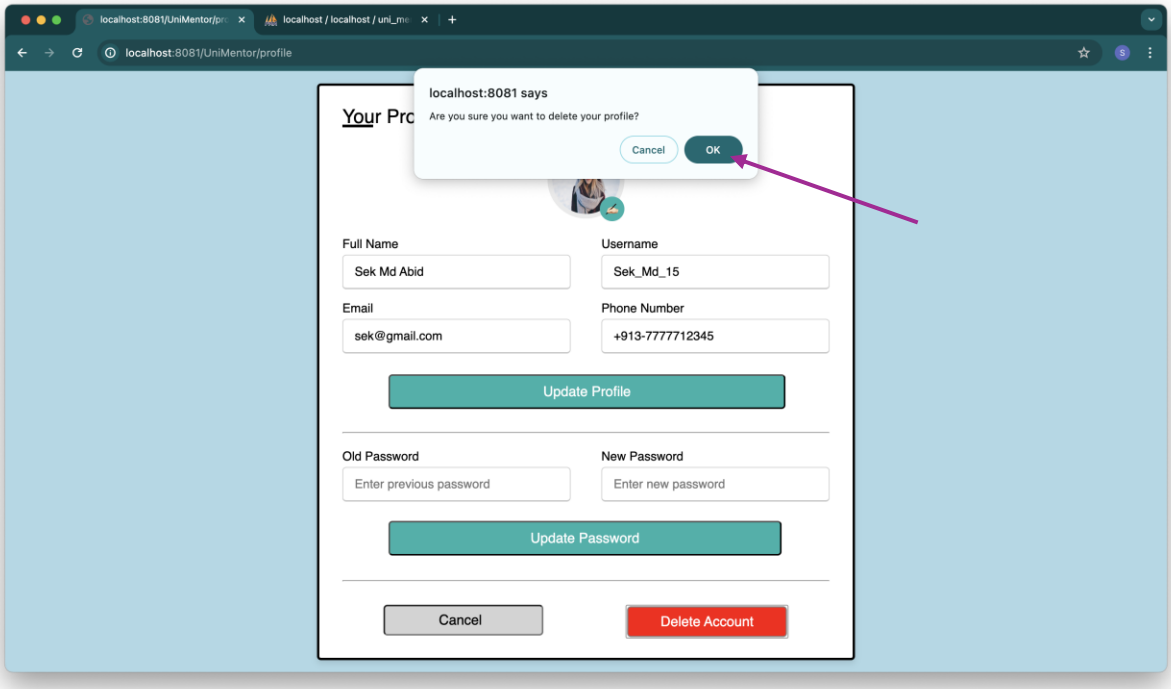


Figure 168: Screenshot of clicking yes for confirmation

5) Redirected to index page (logged out):

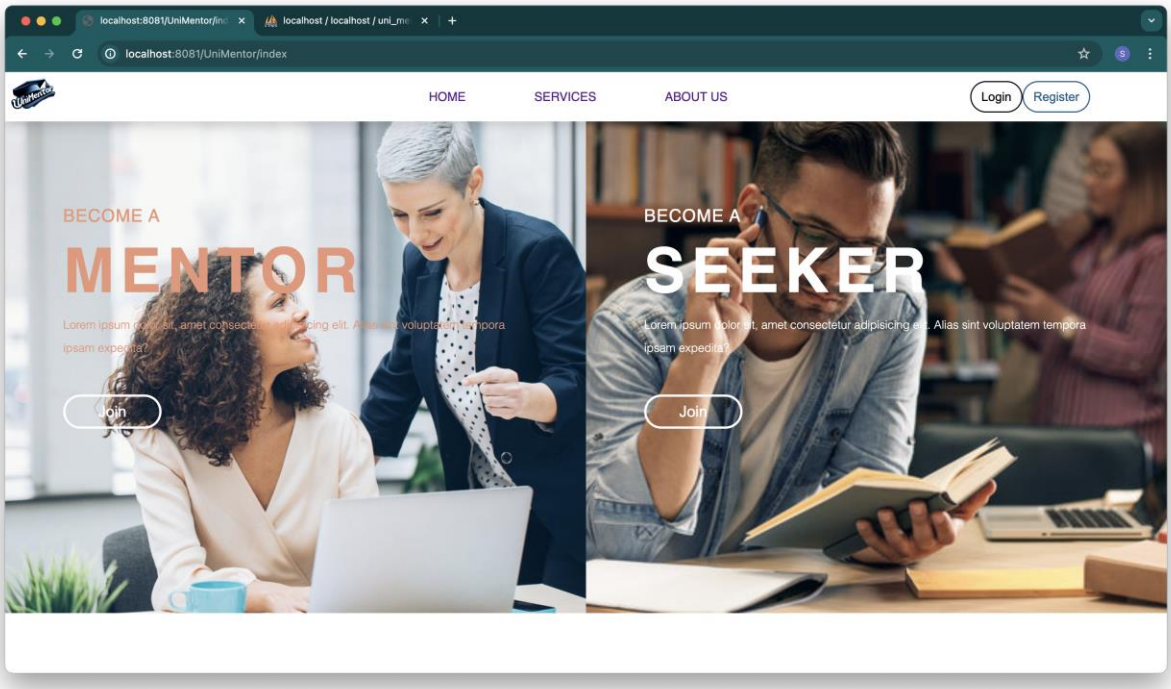


Figure 169: Screenshot of redirection to index page logged out

6) No account in database:

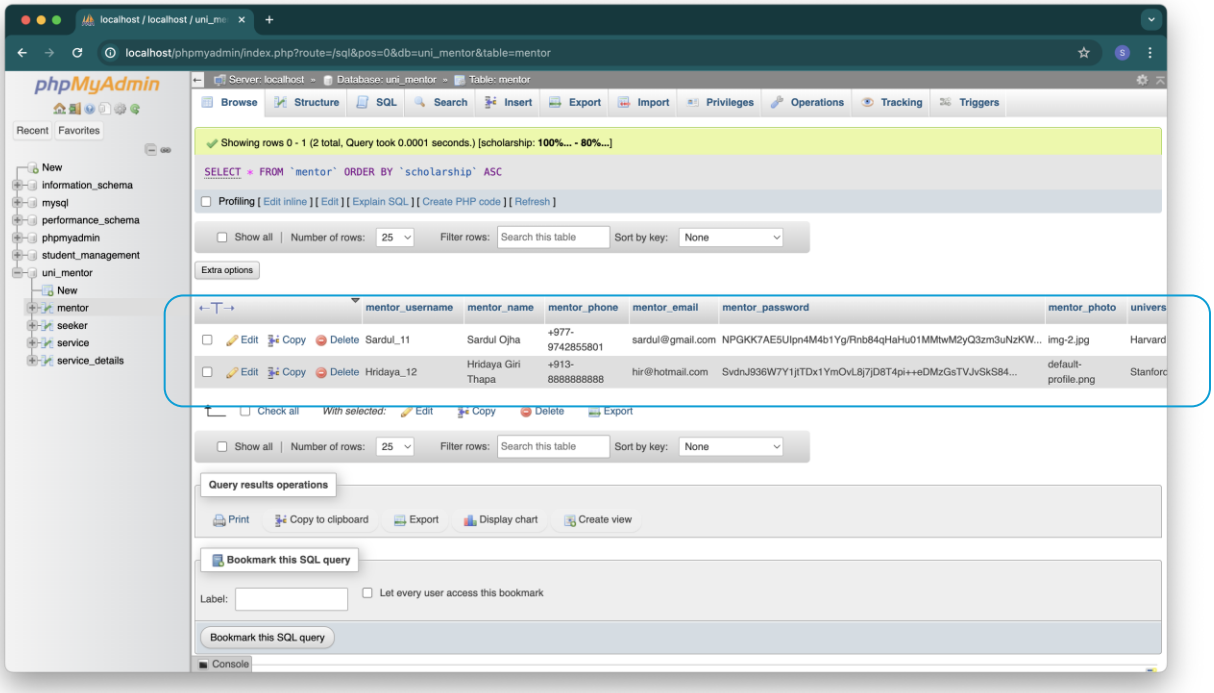


Figure 170: Screenshot of account removed from database

7) Entering log in information to check:

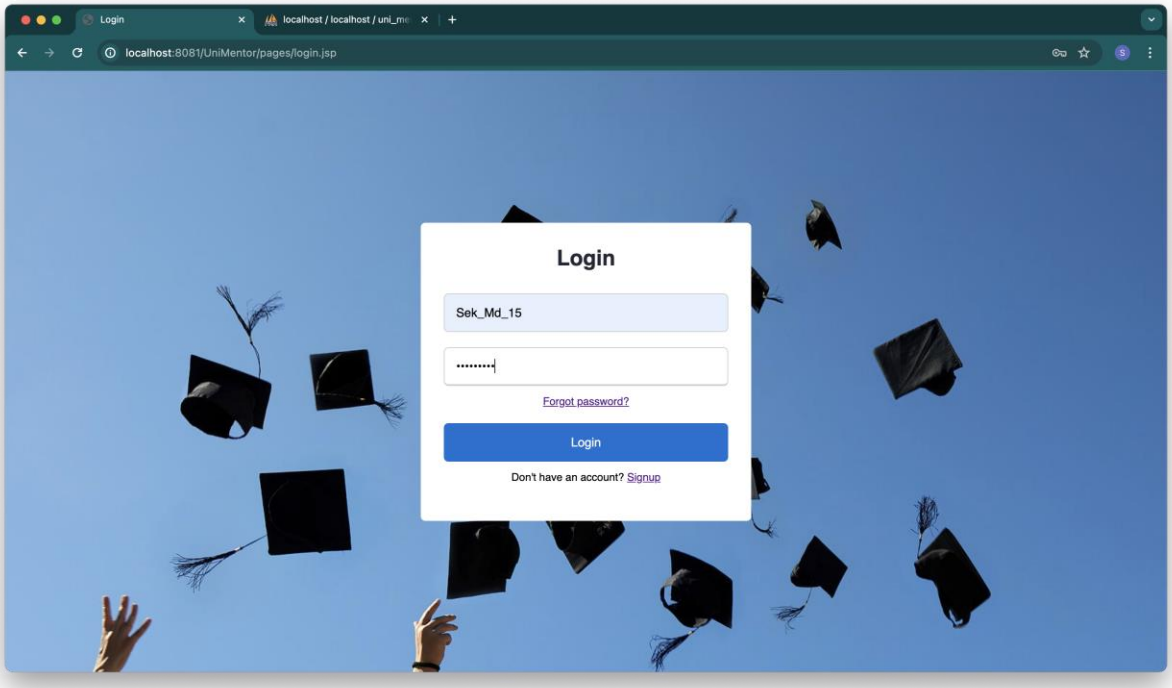


Figure 171: Screenshot of entering login information of deleted account

8) No account error message displayed:

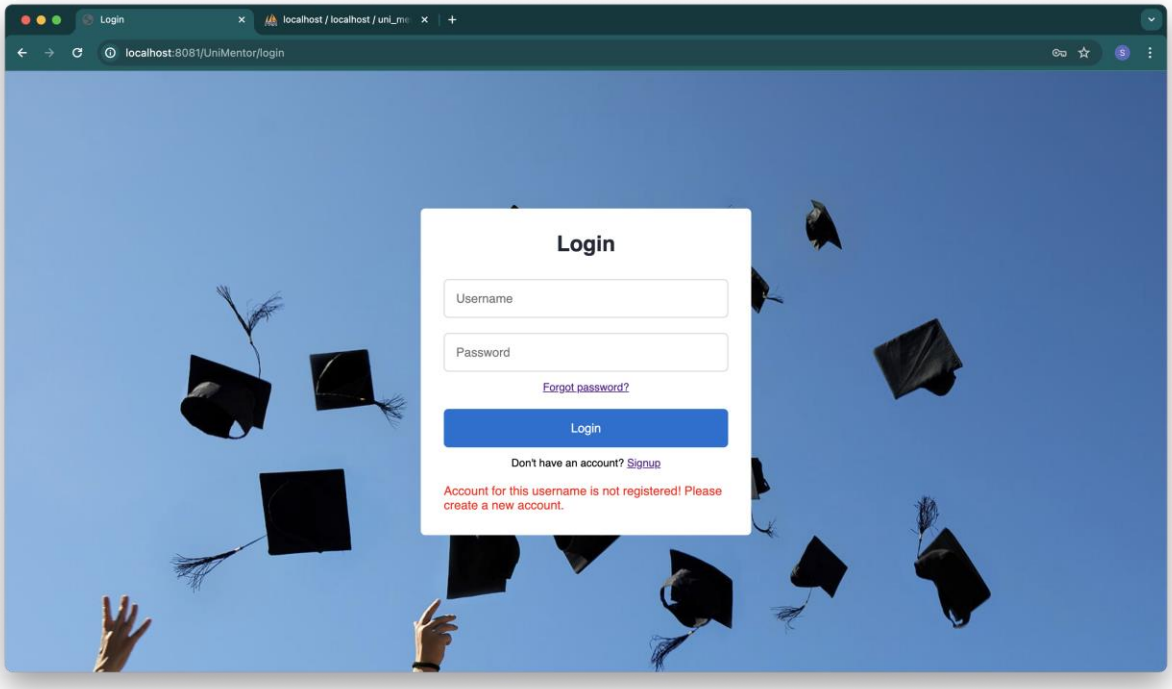


Figure 172: Screenshot of error message displayed

5.8. Test 8: Test for Password Reset

Test 8.1. : Test for input validation for password reset

Objective	To display error message when invalid details are entered for password reset.
Action	➢ Profile page is clicked. ➢ Incorrect input is entered in password reset fields. ➢ Update password button is clicked.
Expected Result	Error message should be displayed indicating the error.
Actual Result	Error message was displayed.
Conclusion	The test is successful.

Table 16: Test table for validation for password reset

Proofs:

1) Clicking profile button on the navbar:

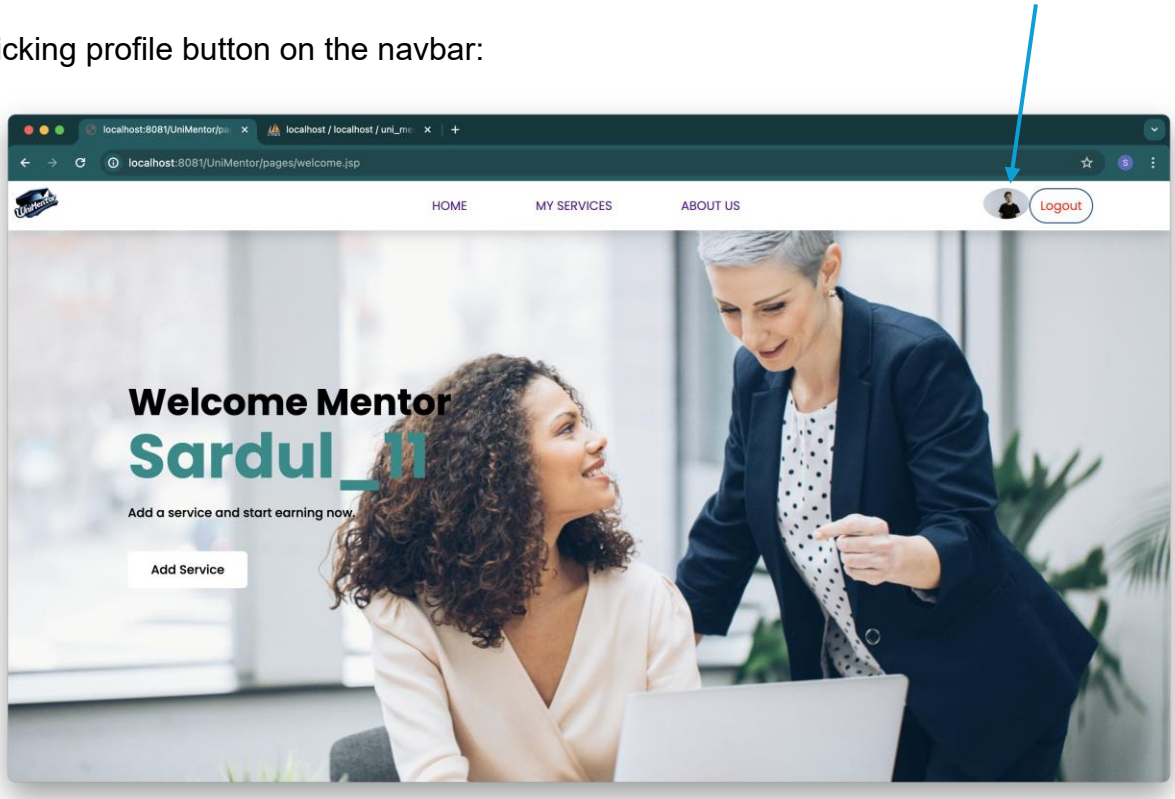


Figure 173: Screenshot of clicking profile button

2) Profile information displayed:

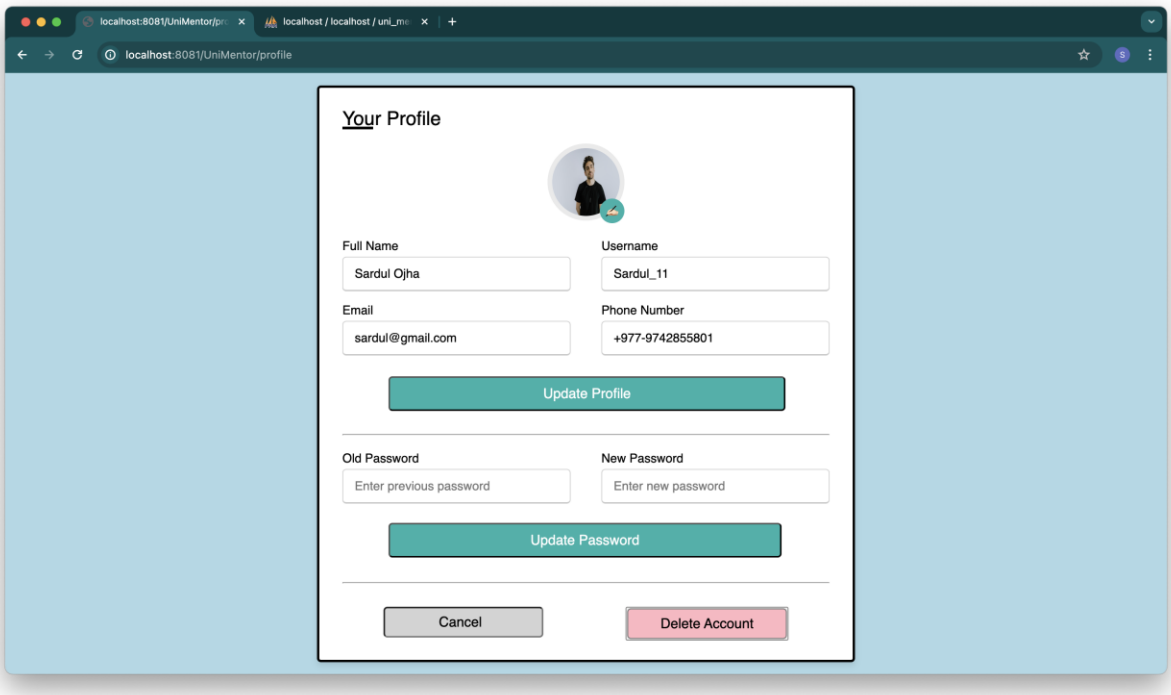


Figure 174: Screenshot of profile displayed

3) Entering invalid input in update password fields:

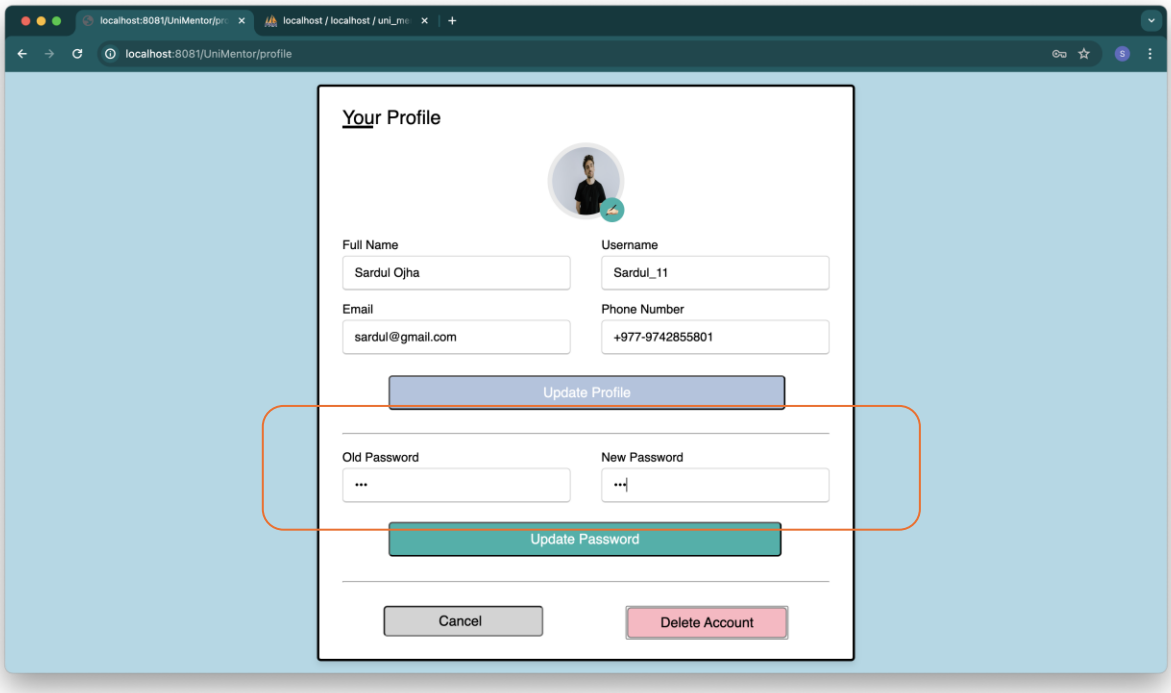


Figure 175: Screenshot of entering invalid in password reset

4) Clicking update password button:

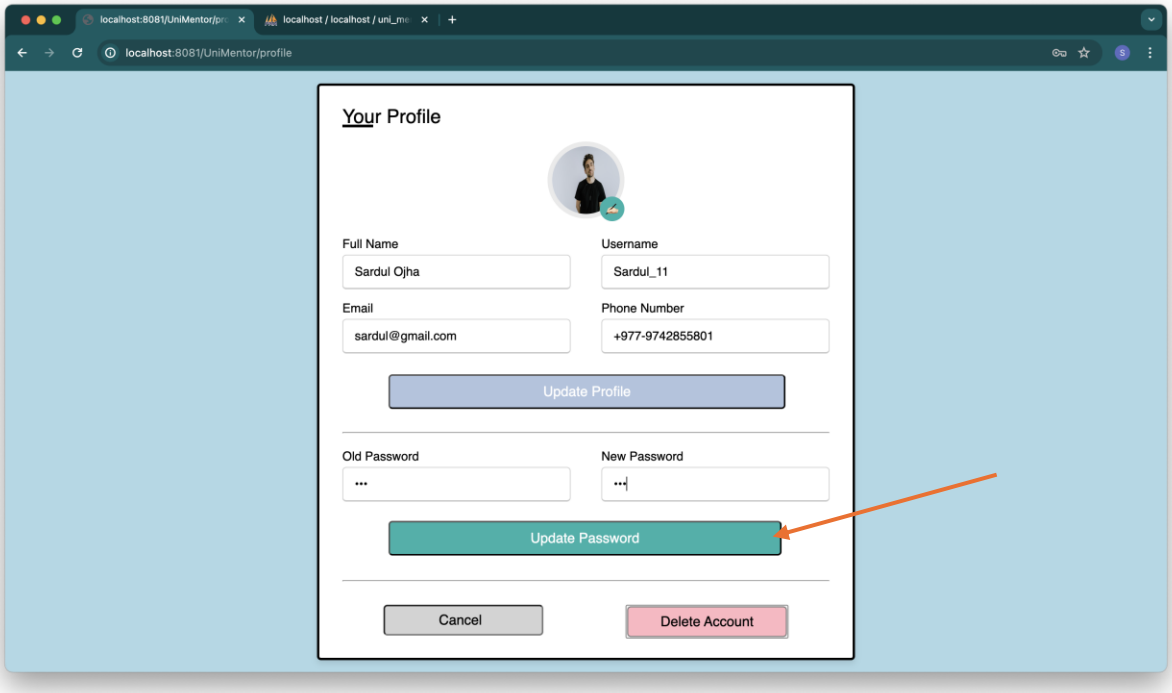
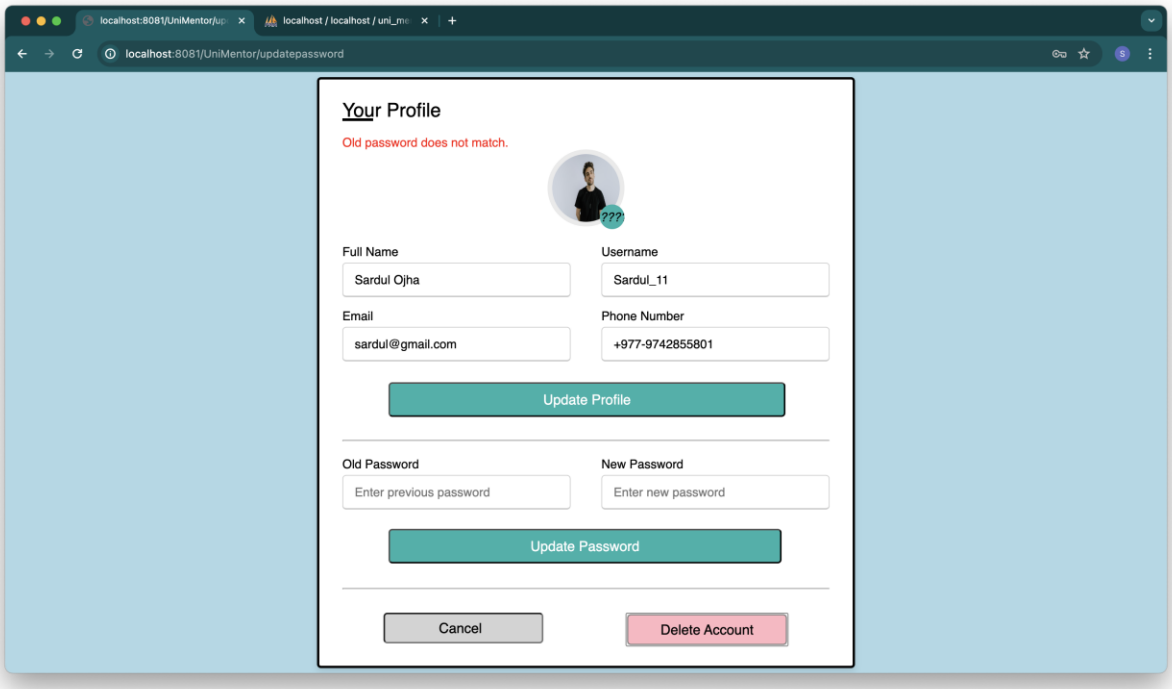


Figure 176: Screenshot of update password button clicked

5) Error message displayed:



Test 8.2. : Test for successful password reset

Objective	To update password after correct input.
Action	➢ Profile page is clicked. ➢ Valid input is entered in password reset fields. ➢ Update password button is clicked. ➢ Logout button is clicked. ➢ Old password is entered to check. ➢ New password is again entered to check.
Expected Result	The password should be updated. Entering old password should display error message. Correct password should redirect to welcome page.
Actual Result	The password was updated successfully.
Conclusion	The test is successful.

Table 17: Test table for successful password reset

Proofs:

1) Clicking profile button on the navbar:

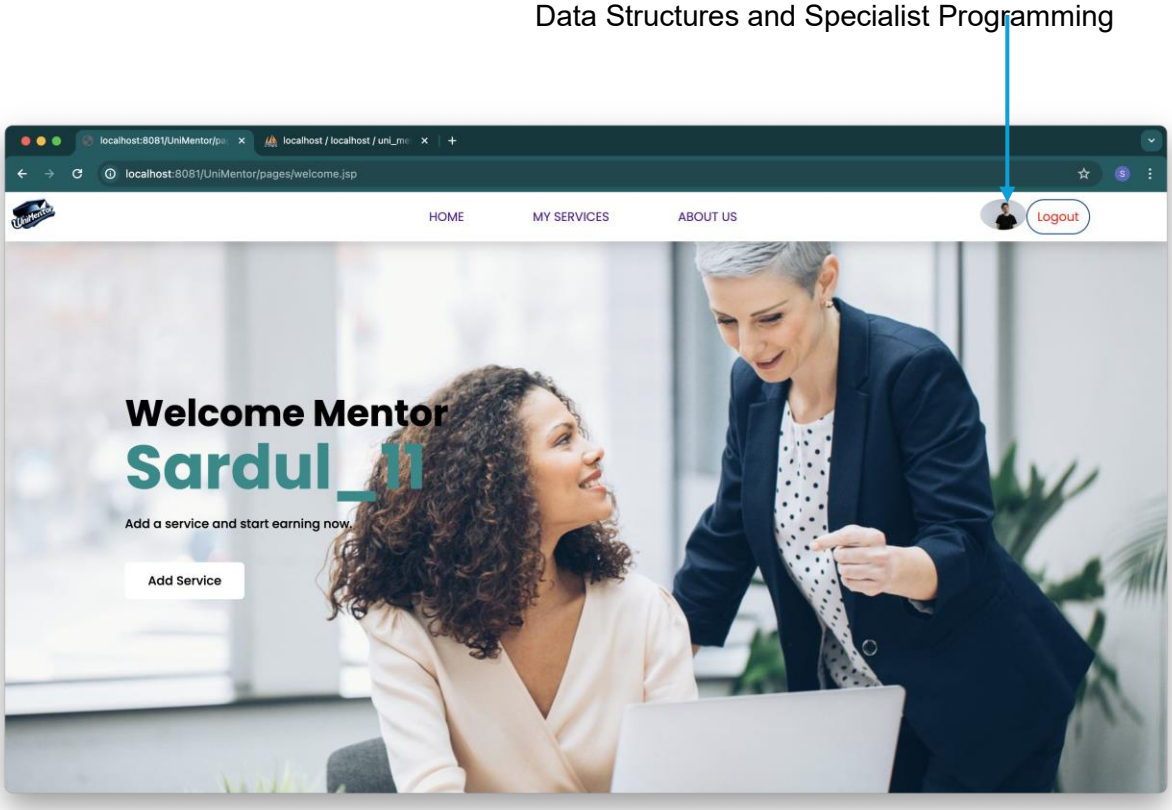


Figure 177: Screenshot of clicking profile button

2) Profile information displayed:

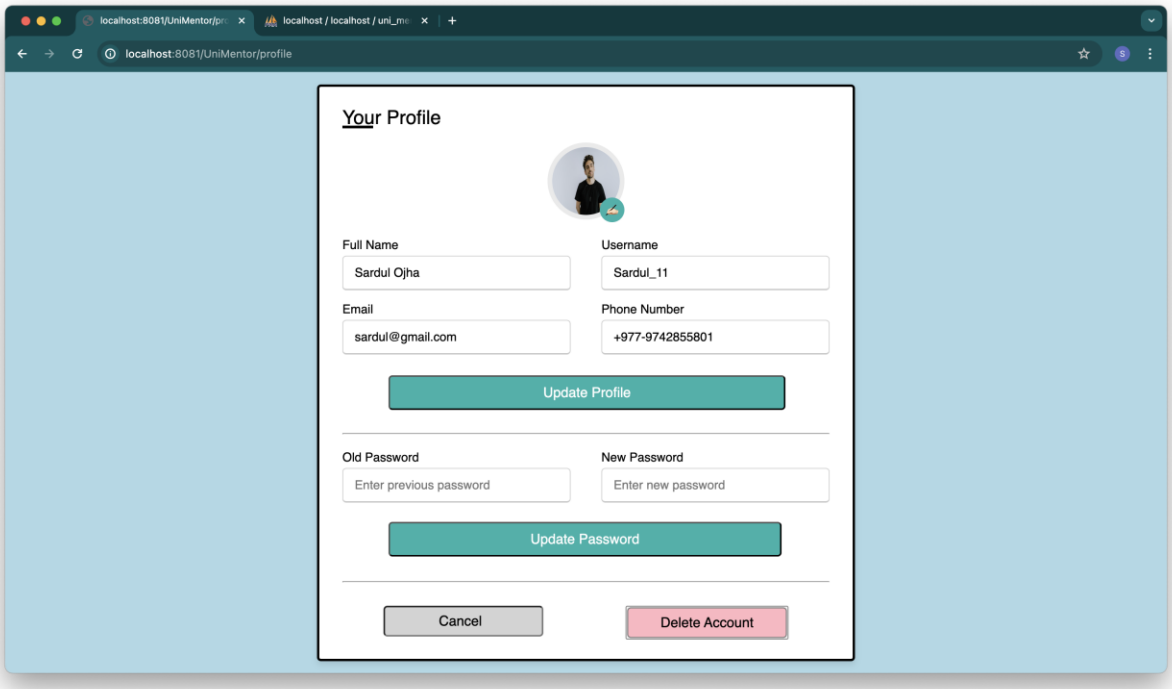


Figure 178: Screenshot of profile information displayed

3) Entering correct input in update password fields:

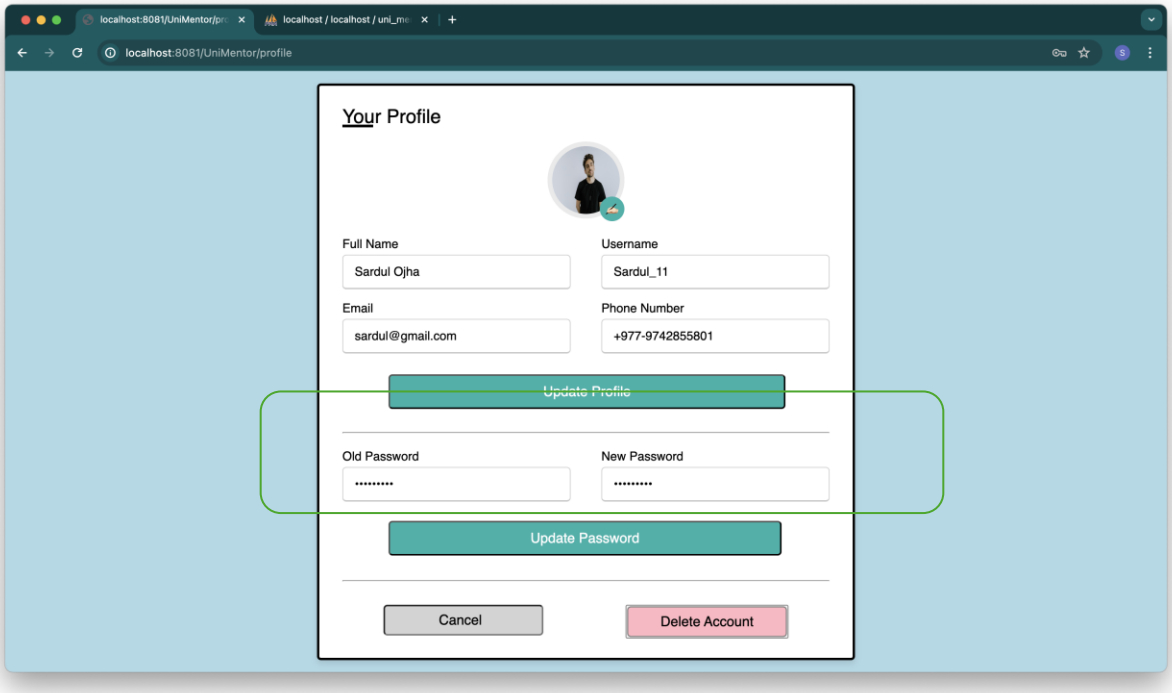


Figure 179: Screenshot of entering correct information in password fields

4) Clicking update password button:

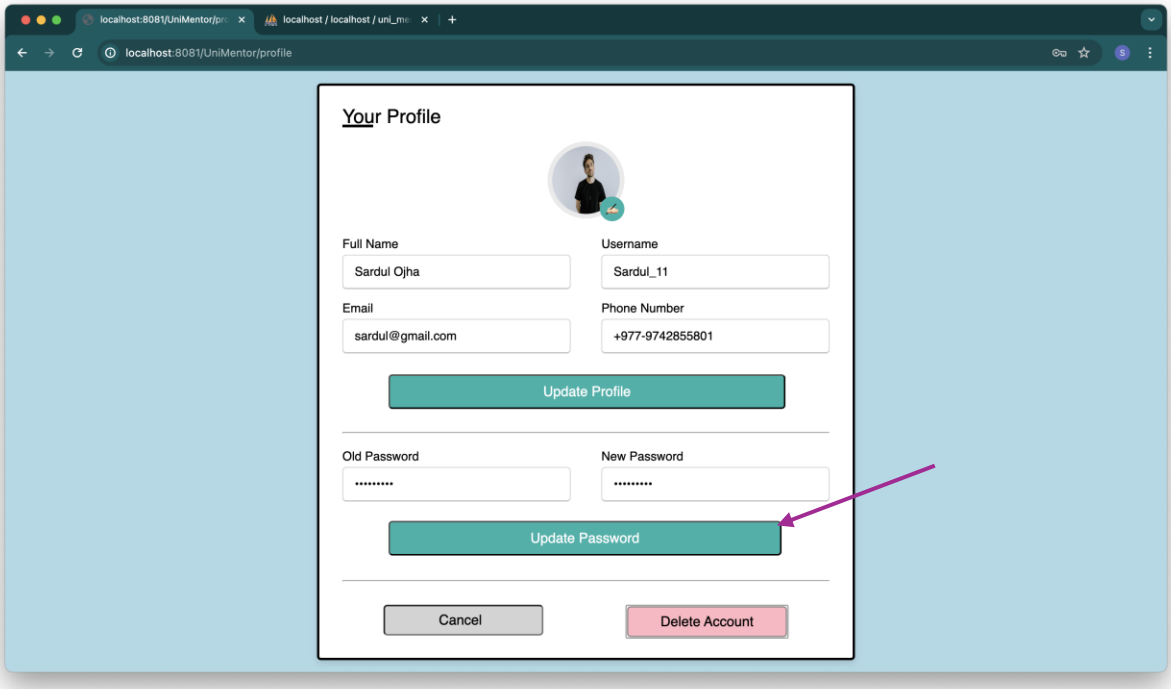


Figure 180: Screenshot of clicking update password button

5) Redirected to Welcome page:

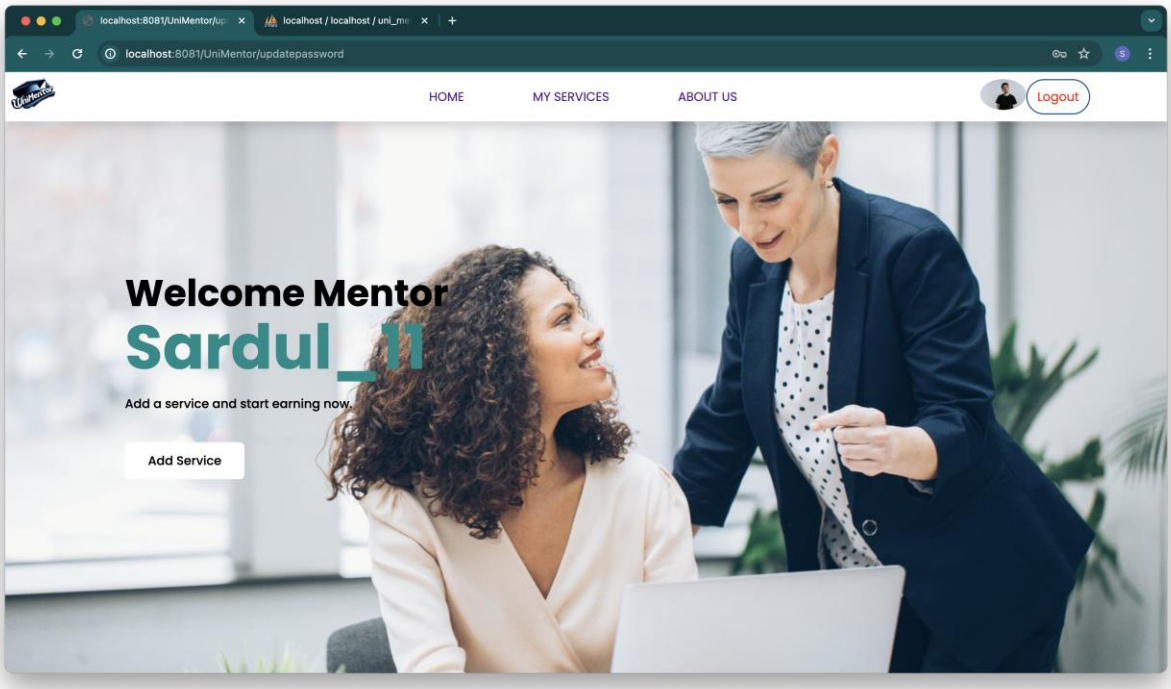


Figure 181: Screenshot of redirection to welcome page

6) Logging out for checking:

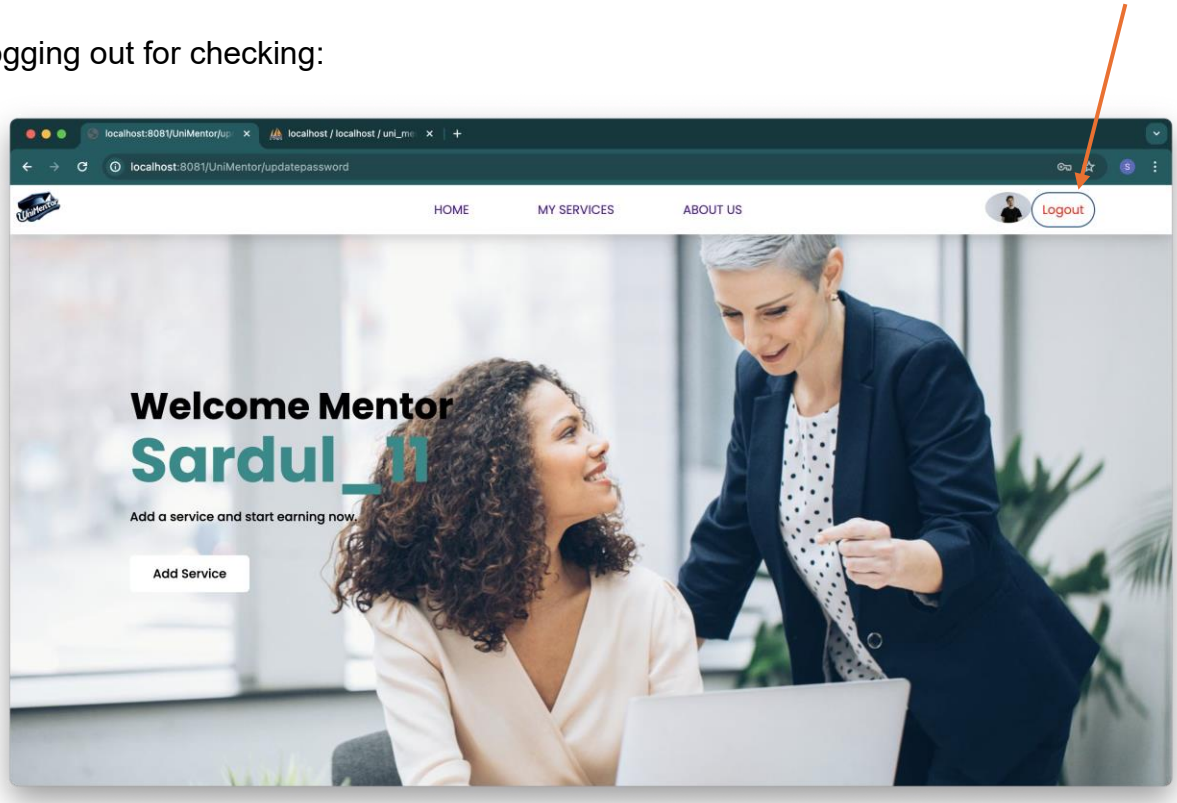


Figure 182: Screenshot of clicking logout button

7) Entering old password in login page:

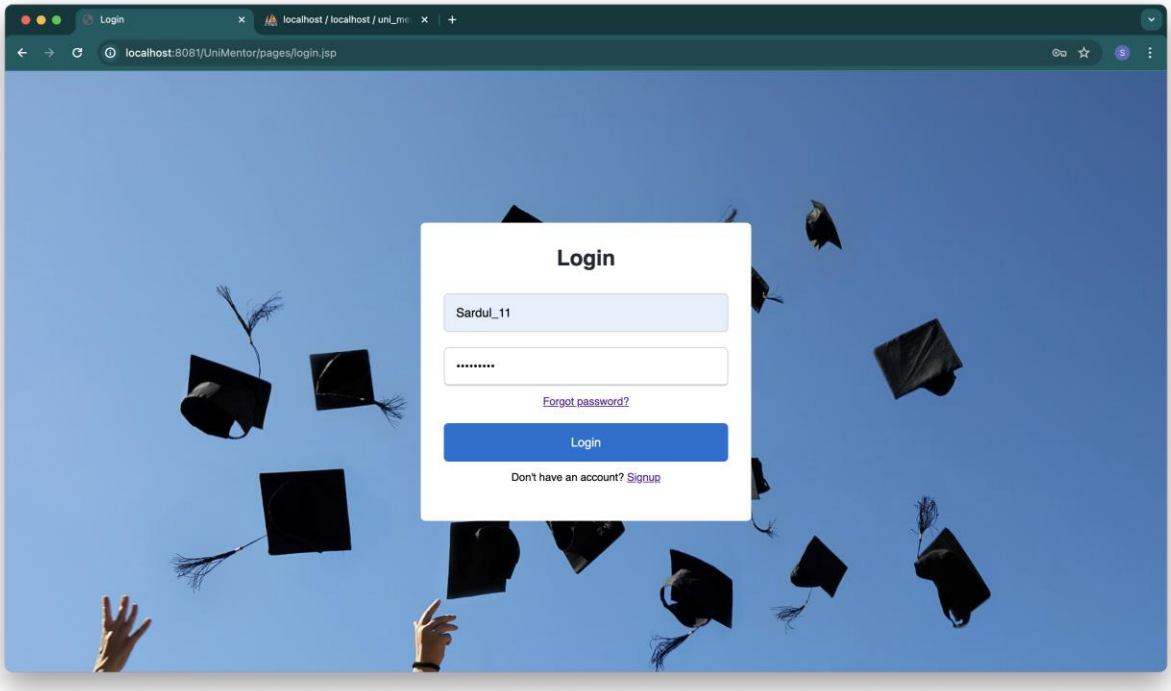


Figure 183: Screenshot of entering old password

8) Error message displayed:

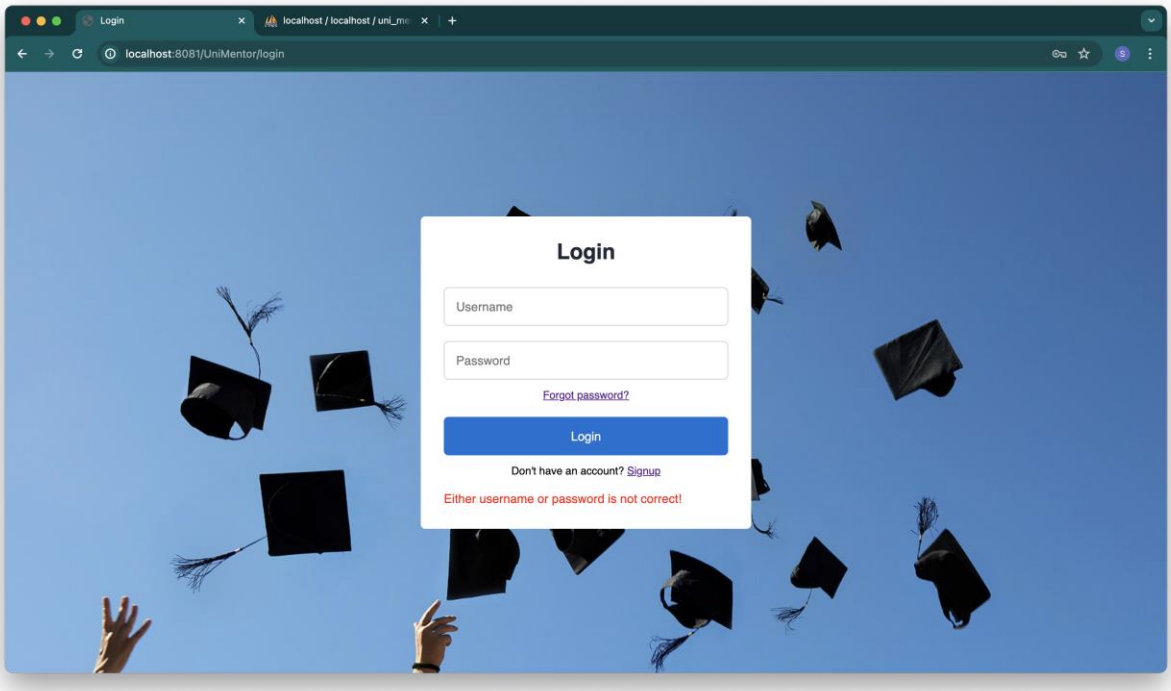


Figure 184: Screenshot of error message displayed

9) Entering correct password in login page:

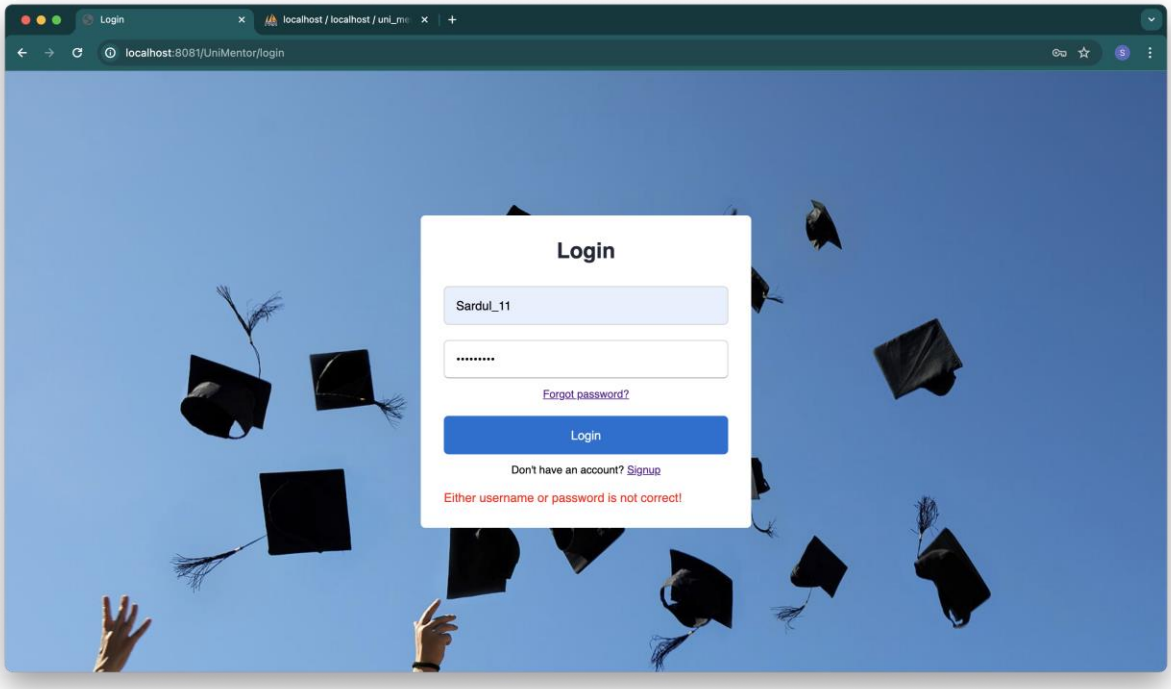


Figure 185: Screenshot of entering correct password

10) Welcome page displayed (Login success):

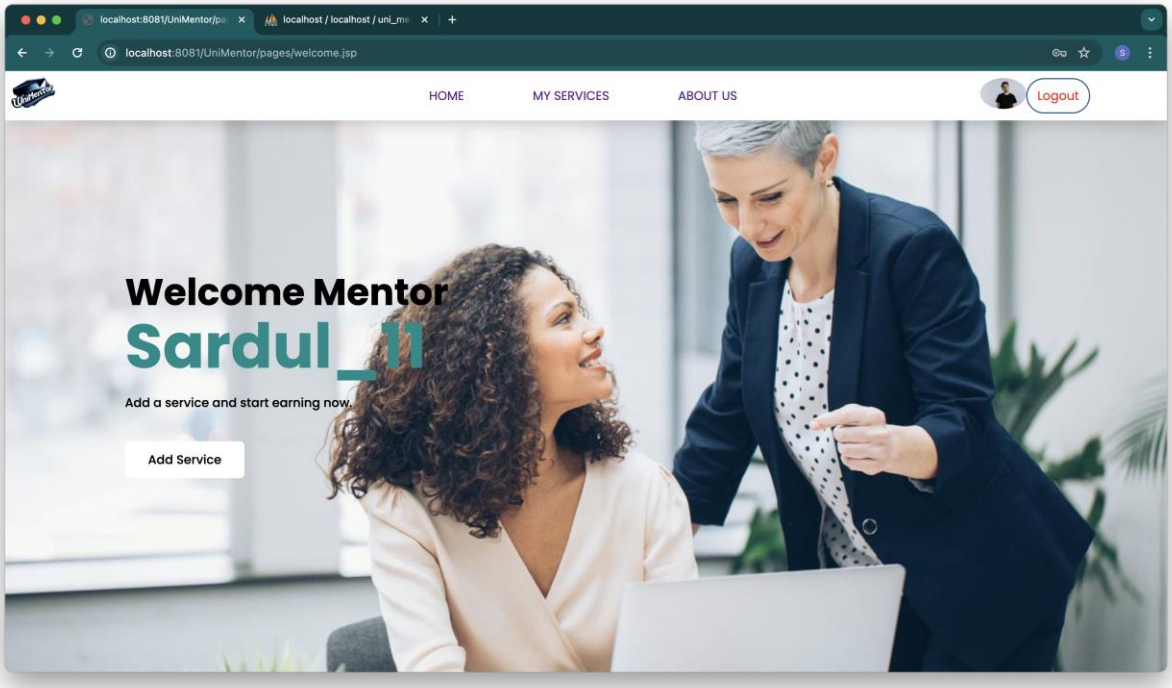


Figure 186: Screenshot of login success

5.9. Test 9: Test for Search

Test 9.1. : Test for search

Objective	To display searched services.
Action	➢ Search value is entered in textbox in service page. ➢ Search button is clicked.
Expected Result	All the services with search value should be displayed.
Actual Result	The searched services were displayed.
Conclusion	The test is successful.

Table 18: Test table for search

Proofs:

1) Entering search value in searchbox:

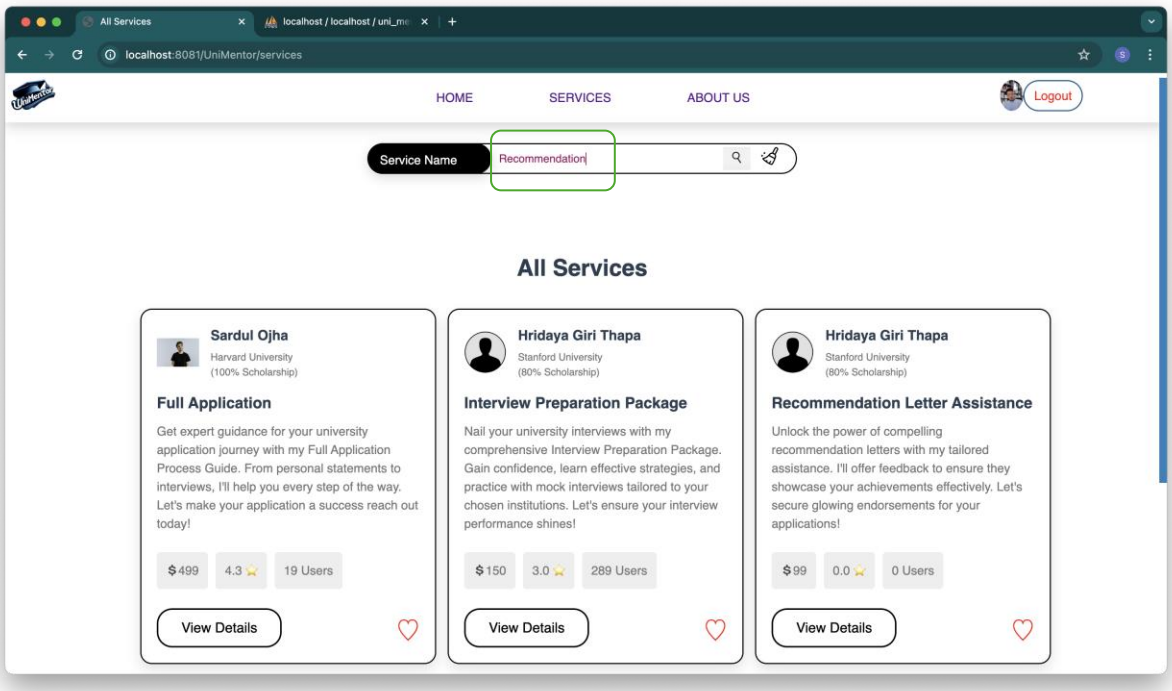


Figure 187: Screenshot of entering search value

2) Search button clicked:

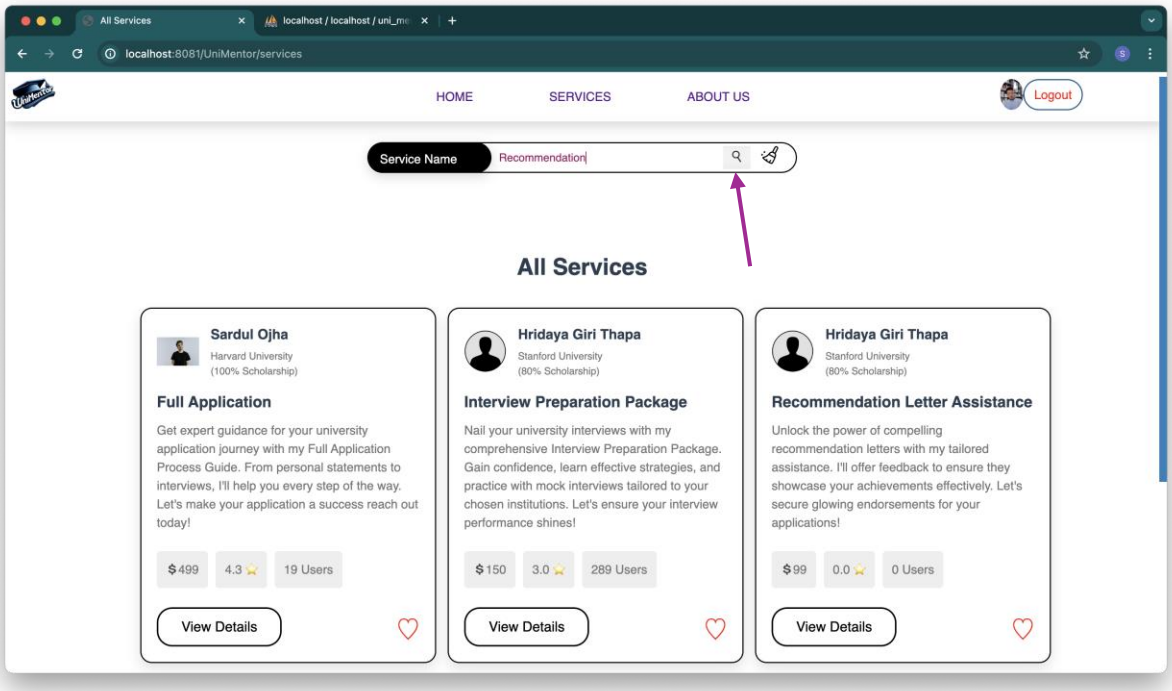


Figure 188: Screenshot of search button clicked

3) Search results displayed:

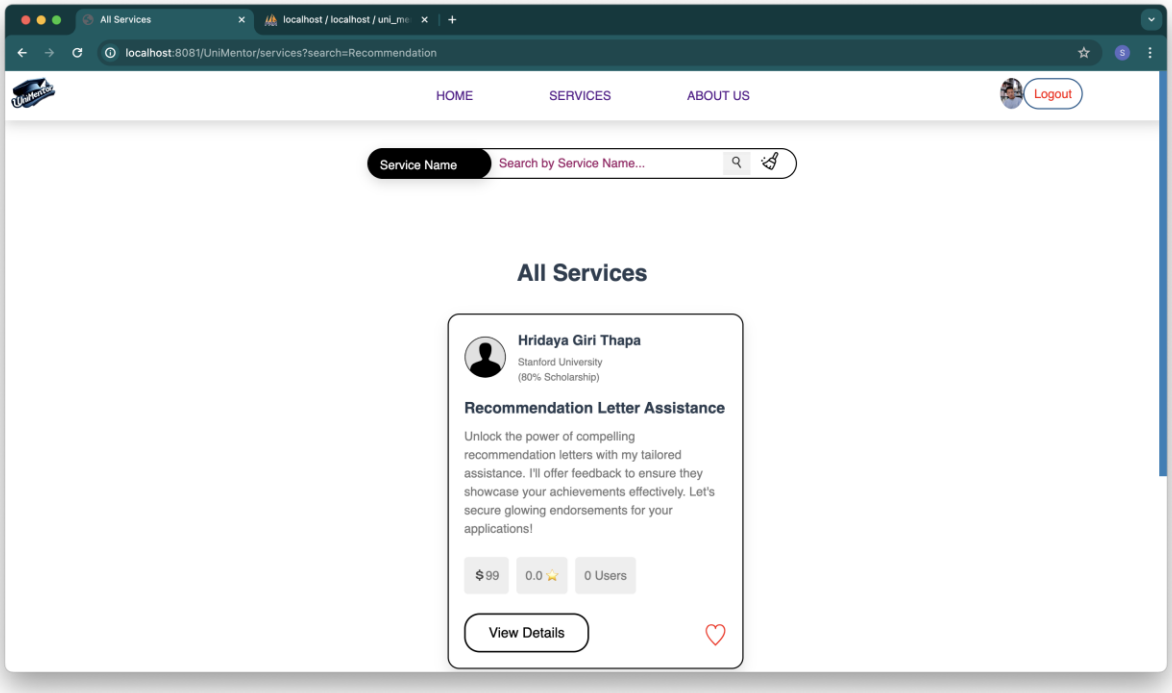


Figure 189: Screenshot of search results displayed

Test 9.2. : Test for added service being searched

Objective	To display new added service when searched.
Action	➢ Add button is clicked to add a service. ➢ A new service is added. ➢ Added service name is entered in textbox in service page. ➢ Search button is clicked.
Expected Result	The new added service should be displayed.
Actual Result	The new service was displayed.
Conclusion	The test is successful.

Table 19: : Test table for added service search

Proofs:

1) Clicking add button in my service page:

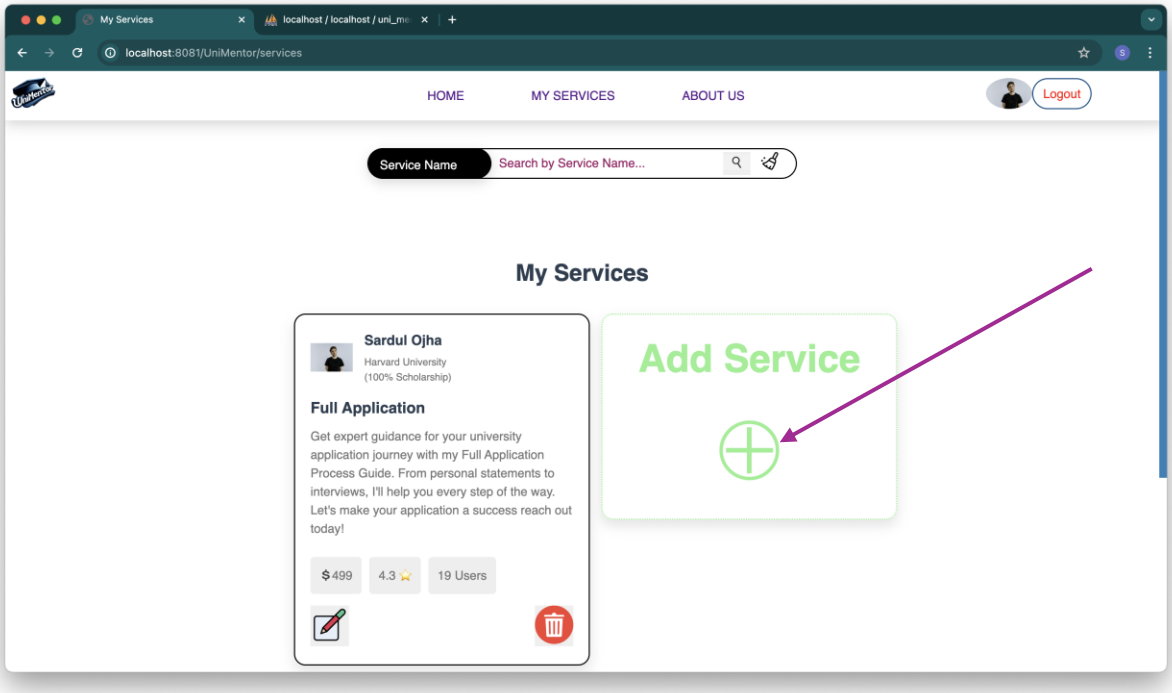


Figure 190: Screenshot of clicking add button

2) Adding new service:

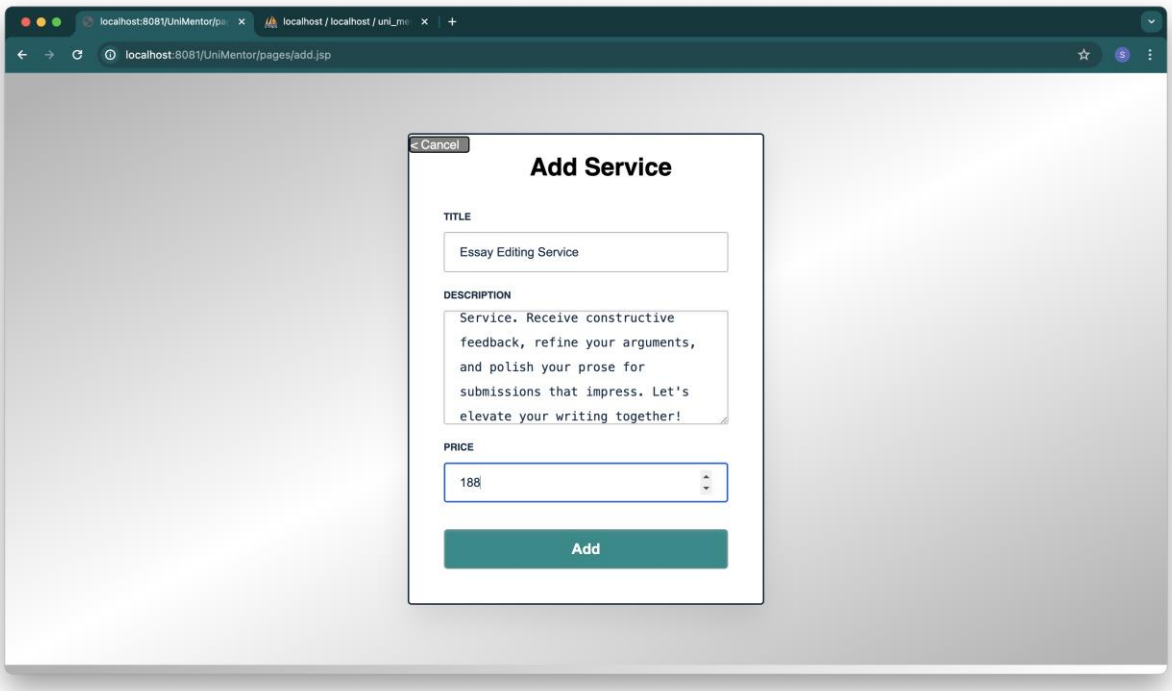


Figure 191: Screenshot of addind new service

3) Entering added service name in searchbox:

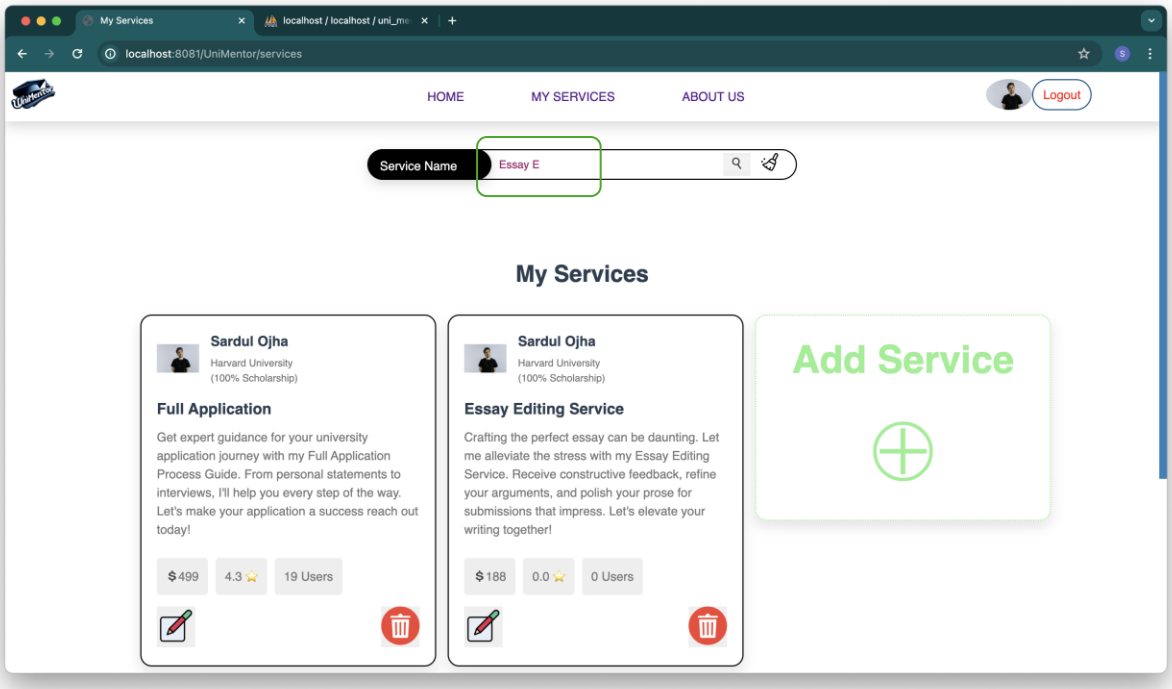


Figure 192: Screenshot of entering added service name

4) Search button clicked:

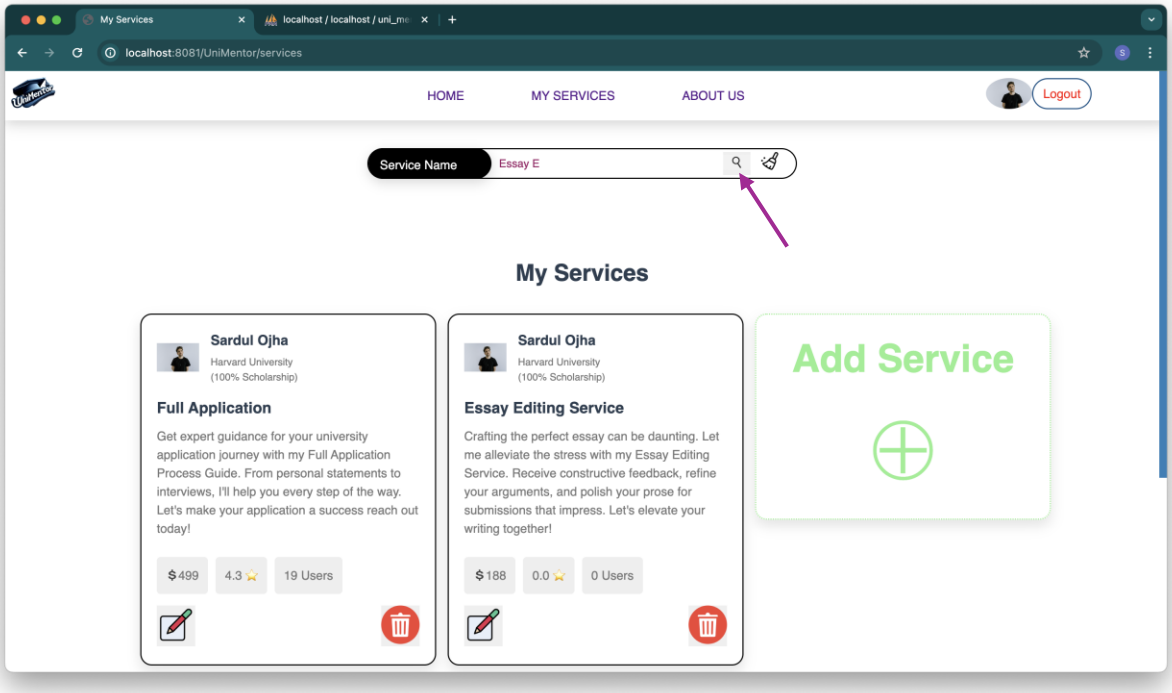


Figure 193: Screenshot of search button clicked

5) Added service displayed:

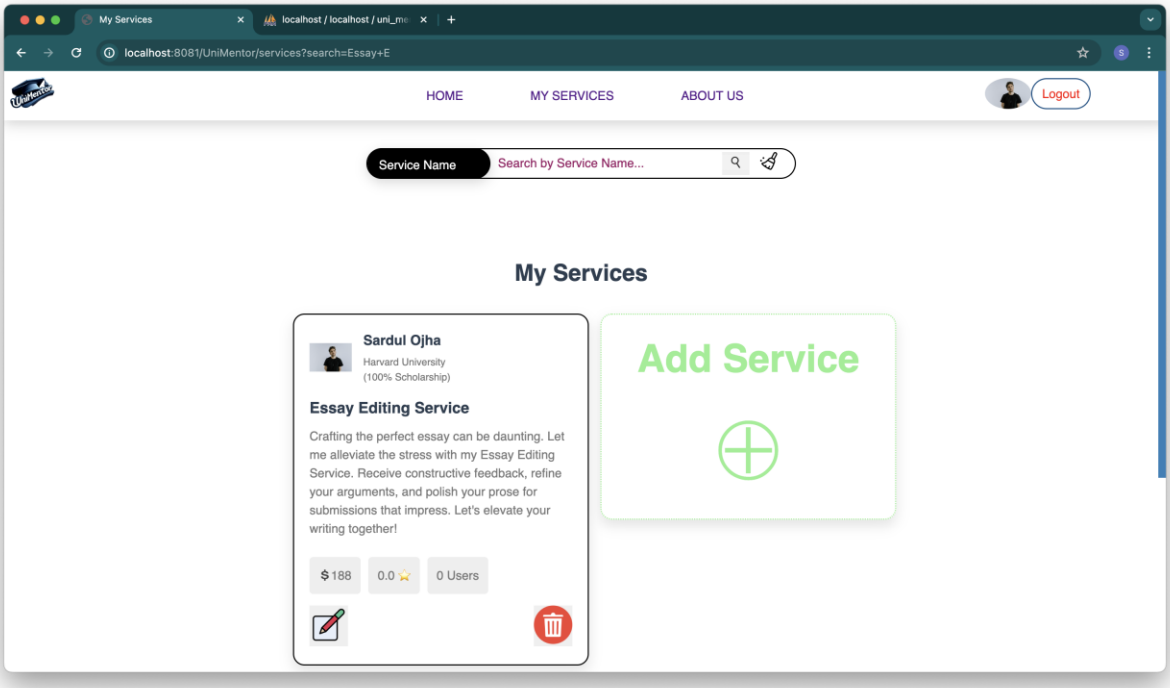


Figure 194: Screenshot of added service displayed

Test 9.3. : Test for deleted items not being searched

Objective	To not display the deleted service.
Action	➢ Delete button is clicked to delete the selected service. ➢ Yes button is clicked to confirm delete. ➢ The deleted service name is entered in textbox in service page. ➢ Search button is clicked.
Expected Result	The deleted service should not be displayed.
Actual Result	The deleted service was not displayed.
Conclusion	The test is successful.

Table 20: Test table for deleted service search

Proofs:

1) Clicking delete button in for the selected service:

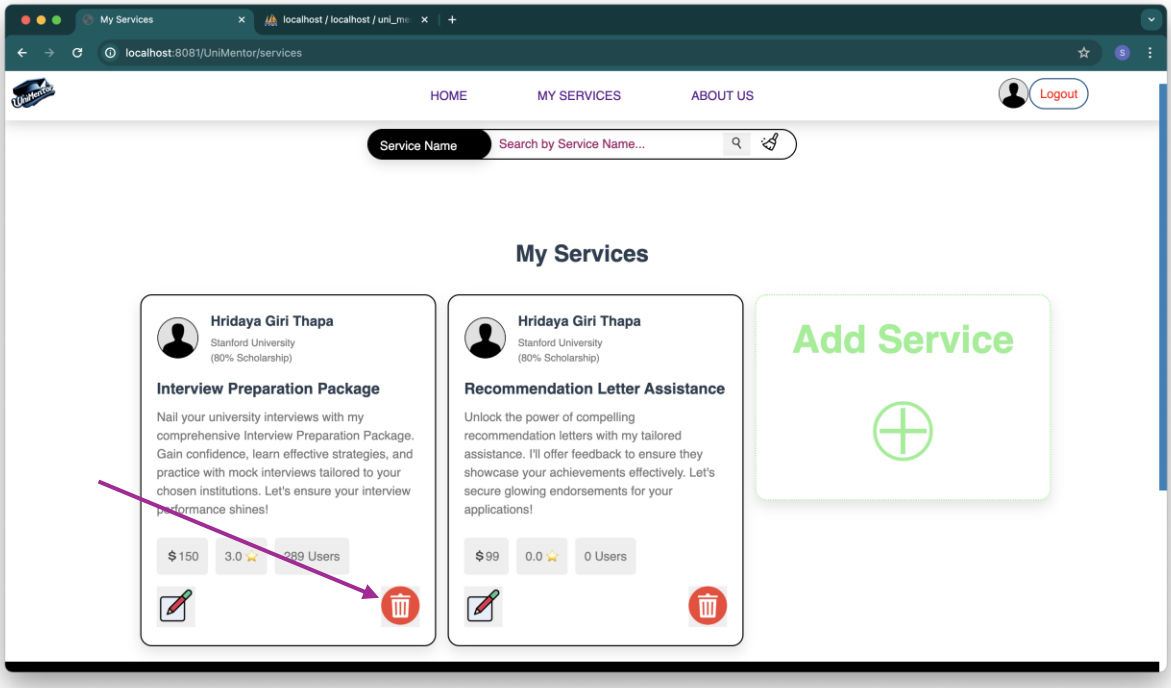


Figure 195: Screenshot of clicking delete button

2) Clicking yes to confirm delete:

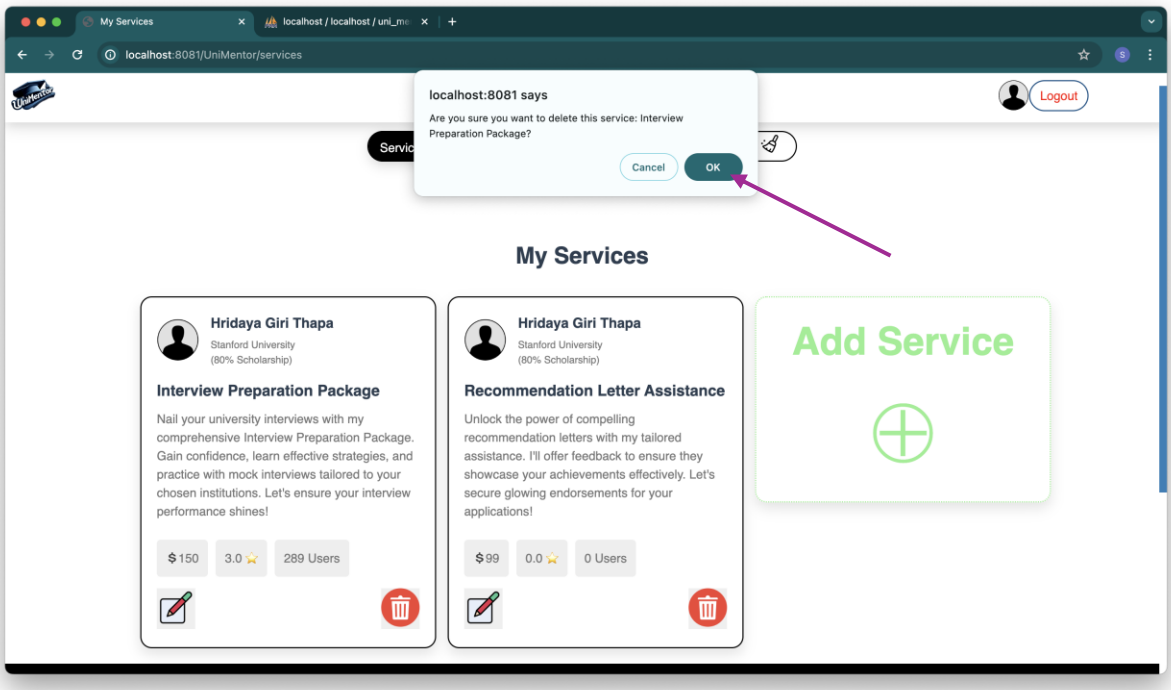


Figure 196: Screenshot of clicking ok button

3) Entering deleted service name in searchbox:

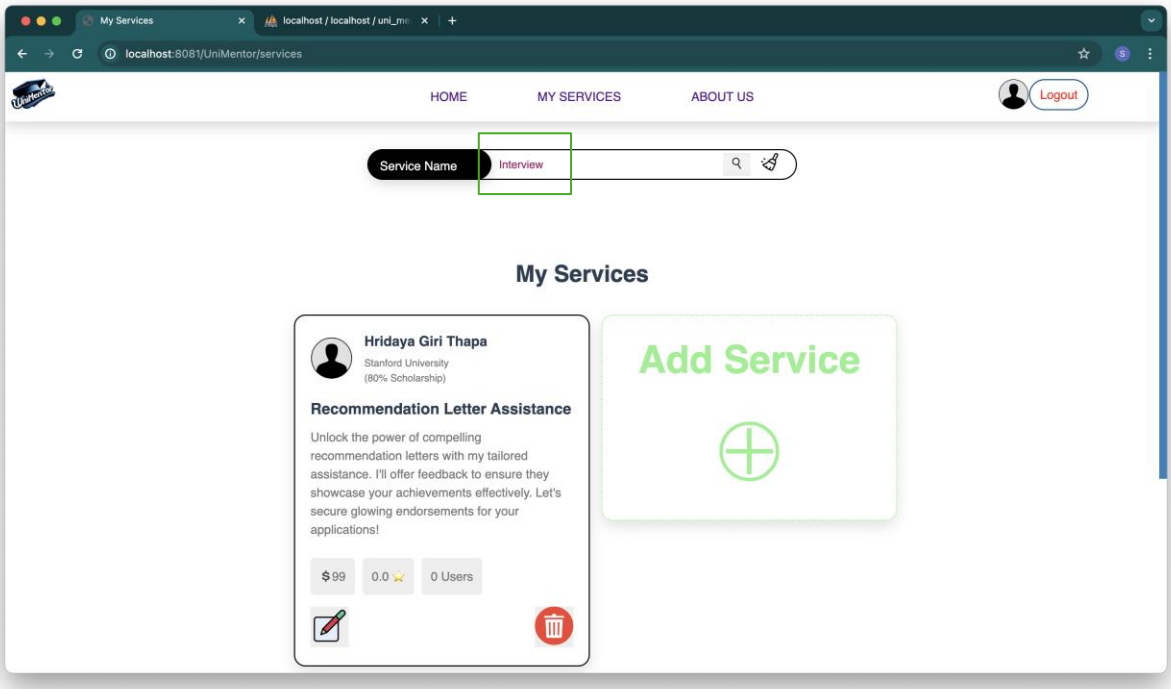


Figure 197: Screenshot of entering deleted service title

4) Search button clicked:

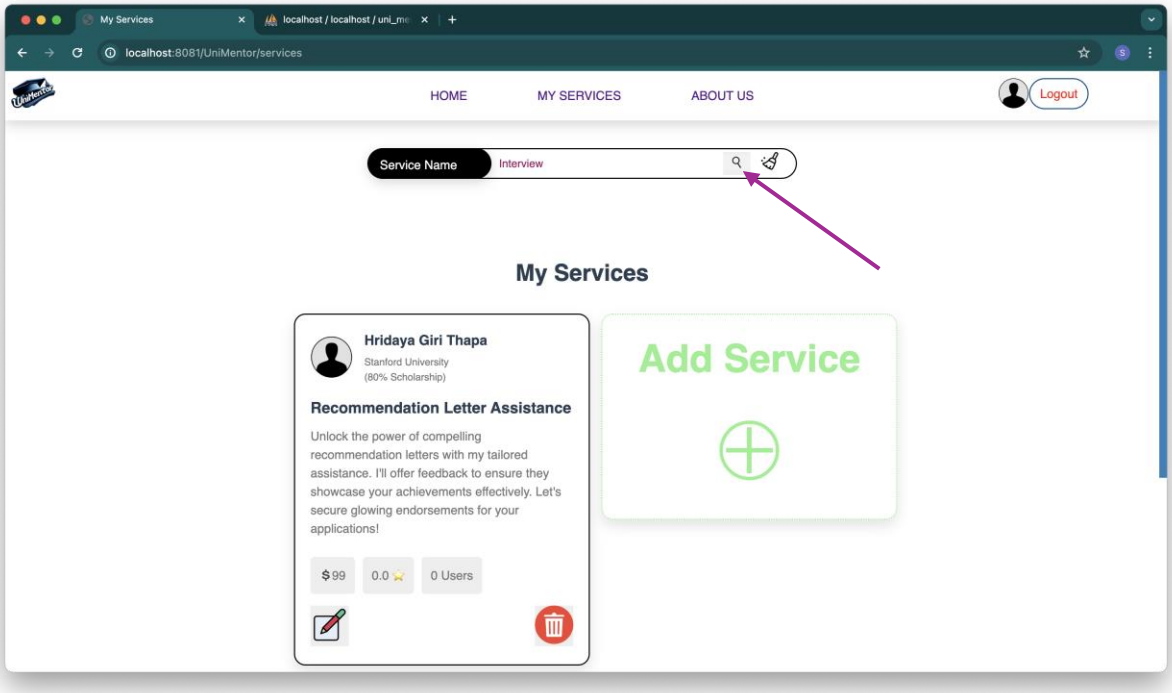


Figure 198: Screenshot of search button clicked

5) Deleted service not displayed:

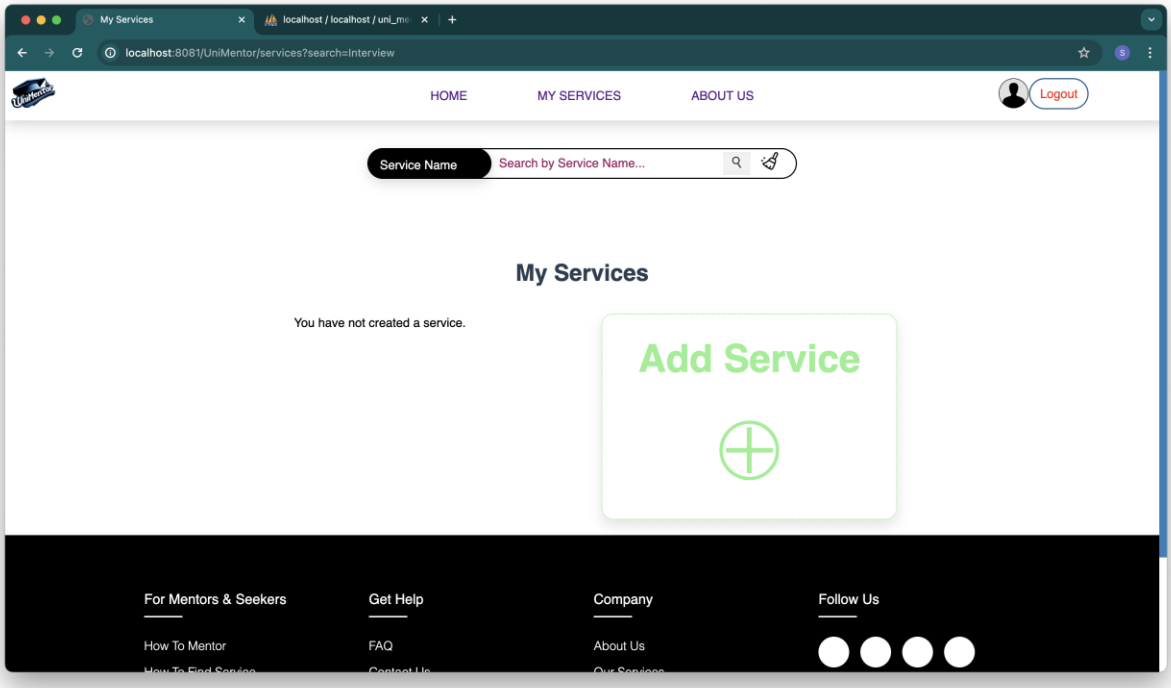


Figure 199: Screenshot of no service found

Test 9.4. : Test for updated item being searched

Objective	To display the updated service when searched.
Action	➢ Update button is clicked to update the selected service. ➢ The service title is updated. ➢ Old title is entered in the textbox in service page. ➢ Updated service title is entered in textbox in service page. ➢ Search button is clicked.
Expected Result	The updated service should be displayed whereas the old service title should display no services.

Actual Result	The old service was not displayed, and the new title was displayed.
Conclusion	The test is successful.

Table 21: Test table for updated service search

Proofs:

1) Clicking update button for the selected service:

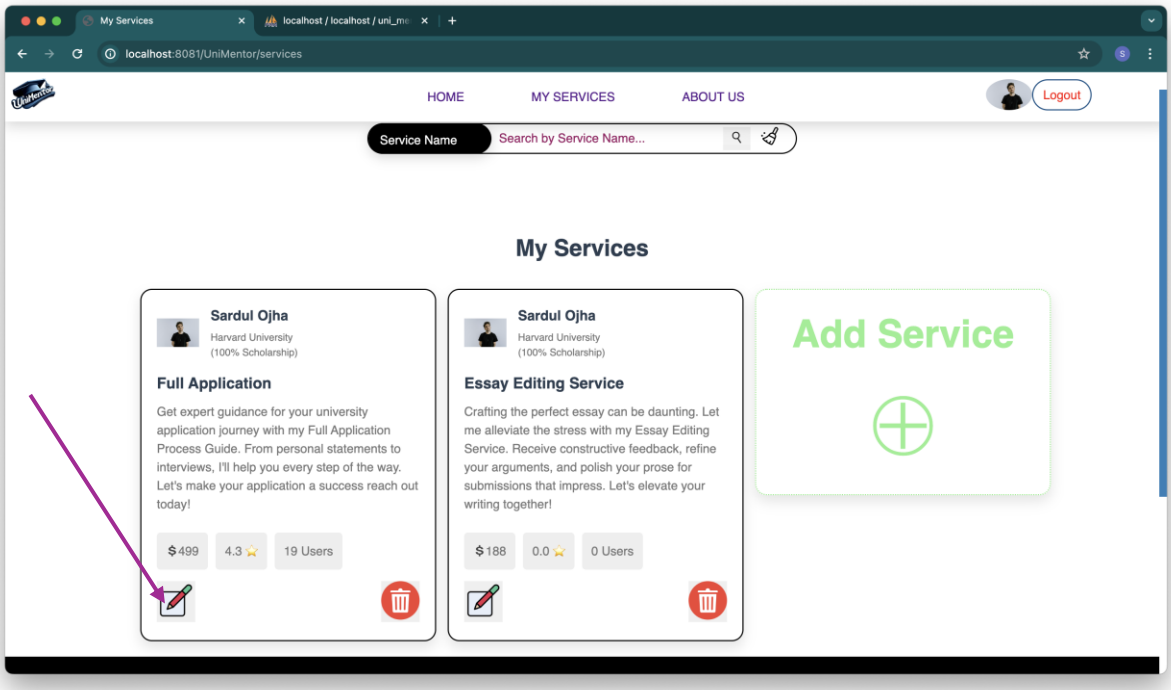


Figure 200: Screenshot of clicking update button

2) Updating title of the service:

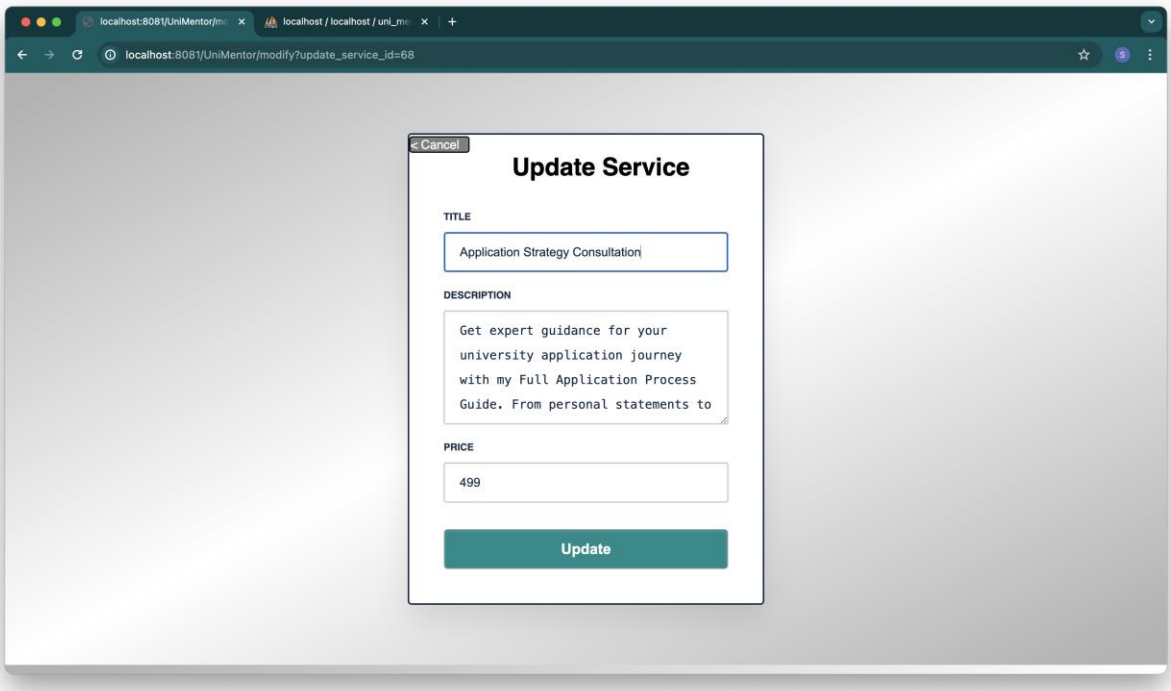


Figure 201: Screenshot of updating title

3) Entering old service title in searchbox and search button clicked:

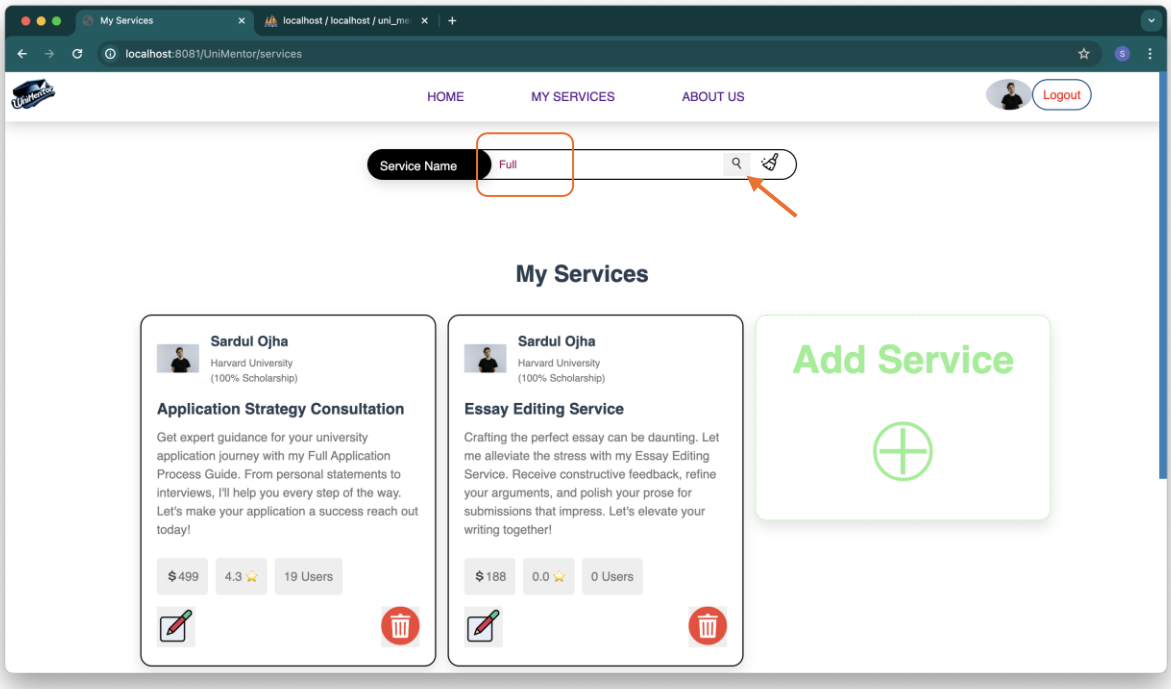


Figure 202: Screenshot of entering old title in searchbox

4) Service not displayed:

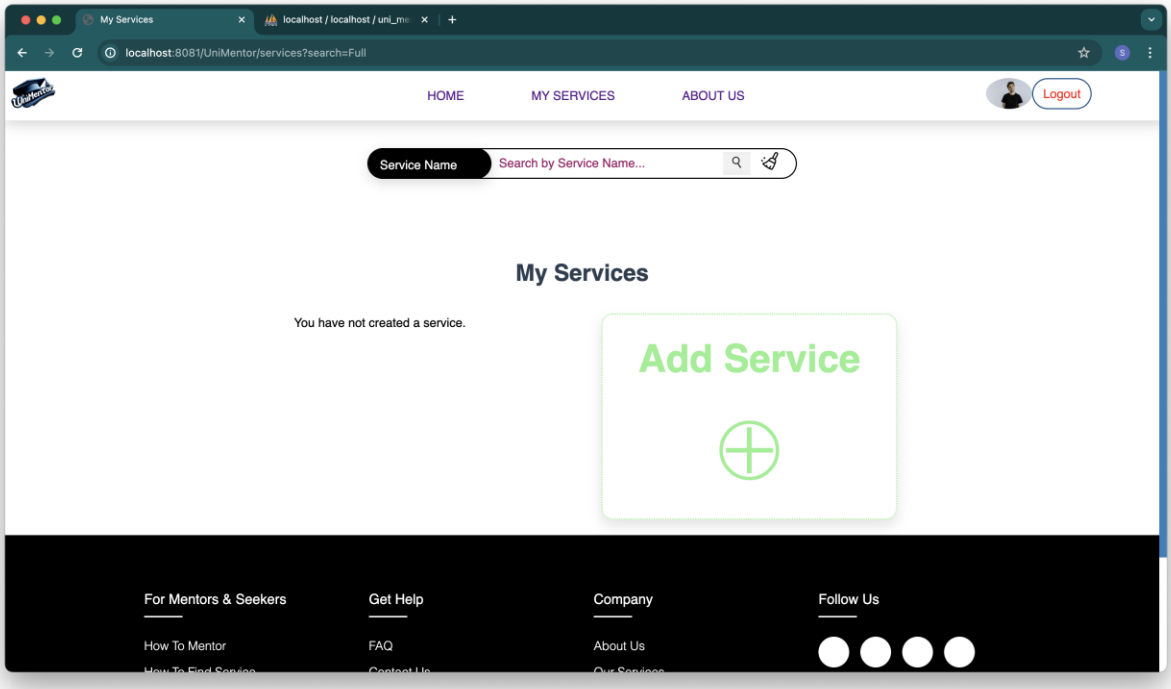


Figure 203: Screenshot of old service title not displayed

5) Entering updated service name in searchbox and search button clicked:

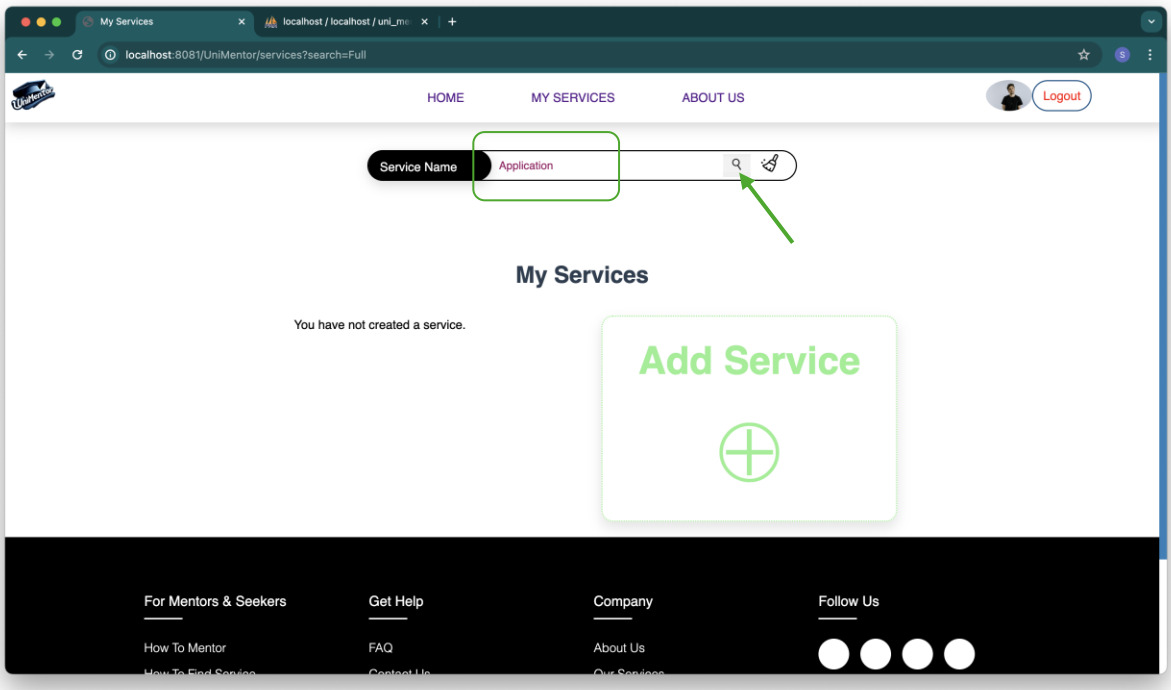


Figure 204: Screenshot of entering updated title

6) Service displayed:

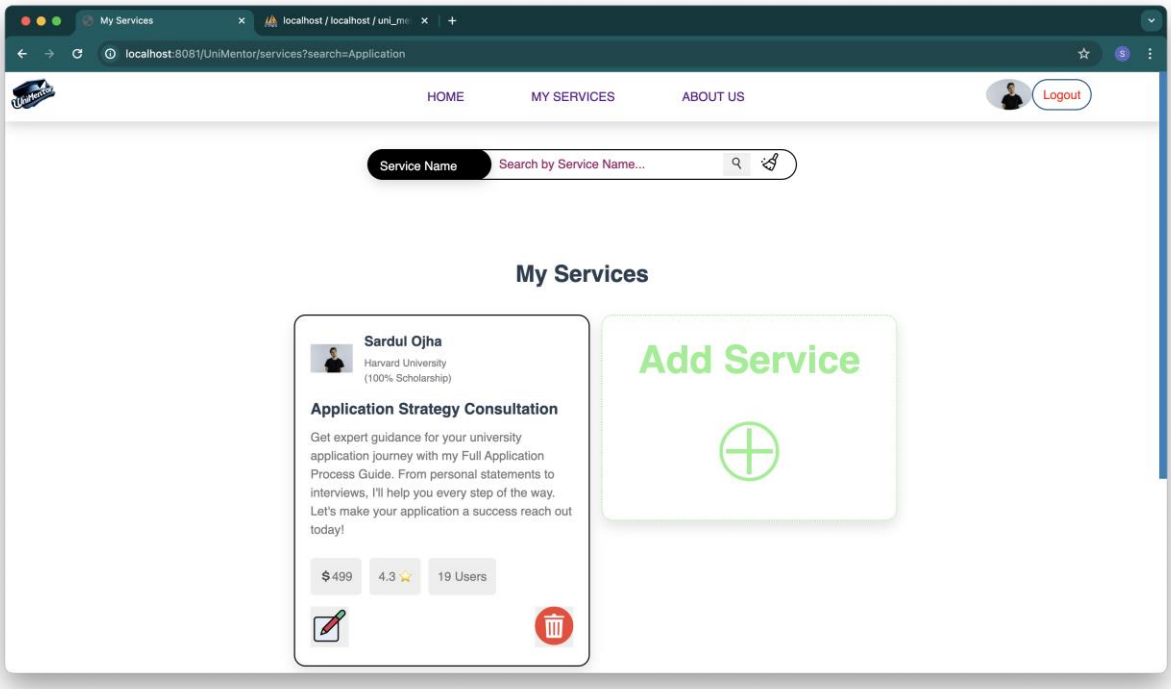


Figure 205: Screenshot of updated service displayed

5.10. Test 10: Test for navigation (Authentication Filter)

Test 10.1. : Test for access of logged out users

Objective	To navigate logged out users to login page when trying to access pages like services, profile, welcome.
Action	When logged out, ➢ Service is clicked in nav bar to access service page. ➢ Profile page URL is given in address bar. ➢ Welcome page URL is given in address bar.
Expected Result	Each action should navigate user to login page.
Actual Result	The protected pages were not accessed, and user was navigated to login page.
Conclusion	The test is successful.

Table 22: Test table for page access to logged out users

Proofs:

1) Clicking service in nav bar to access service page:

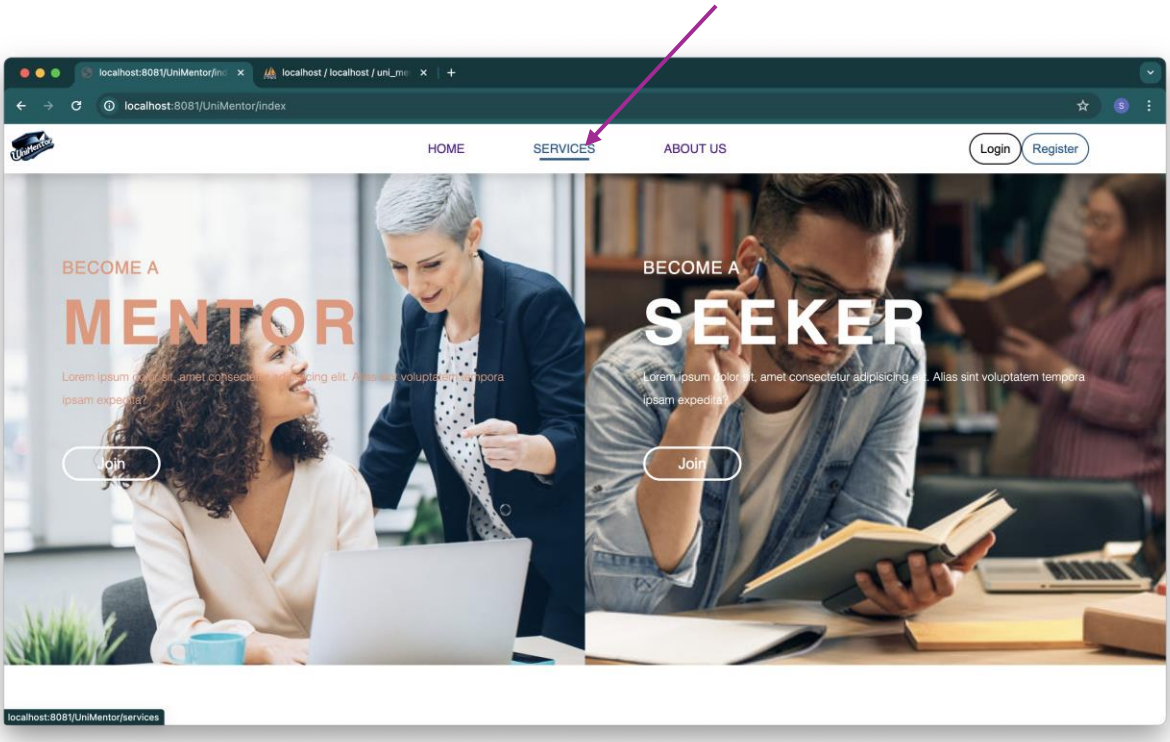


Figure 206: Screenshot of clicking services in nav bar

2) Login page displayed:

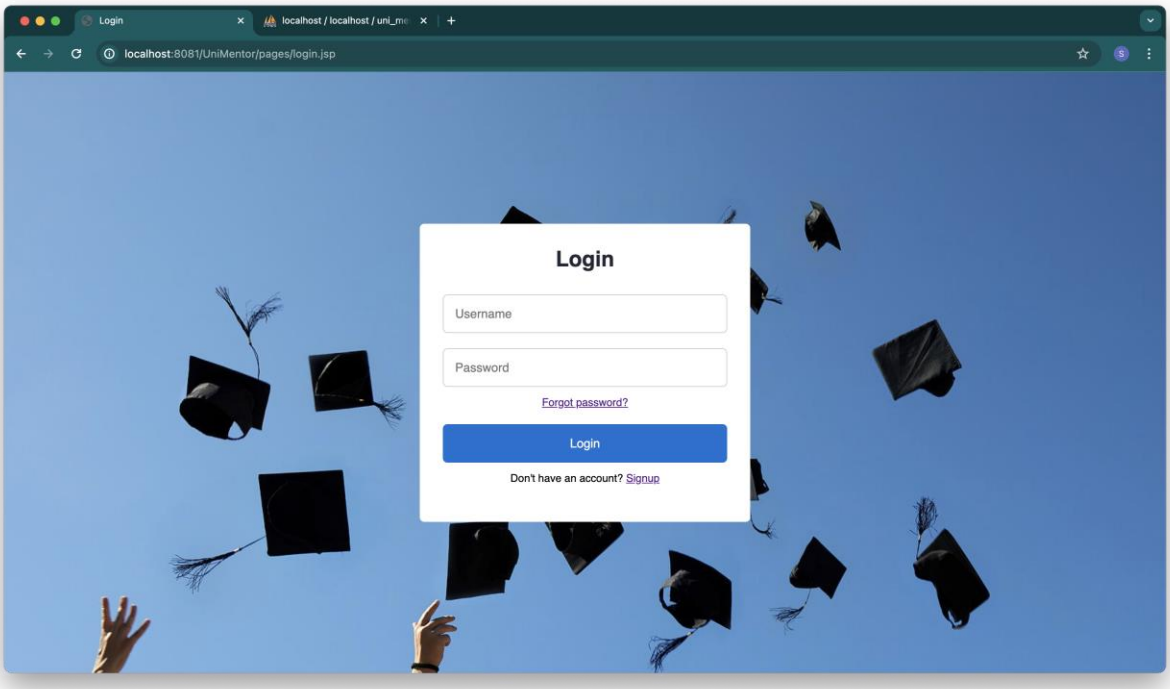


Figure 207: Screenshot of login page displayed

3) Giving profile page URL in address bar:

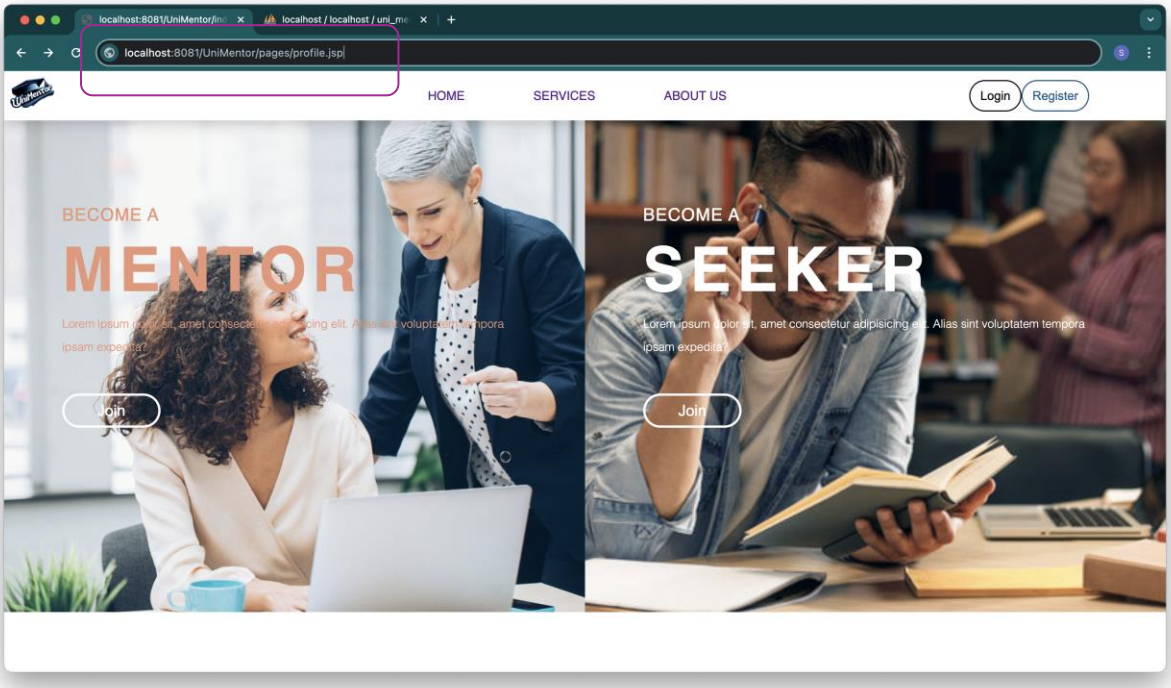


Figure 208: Screenshot of giving profile page url

4) Login page displayed:

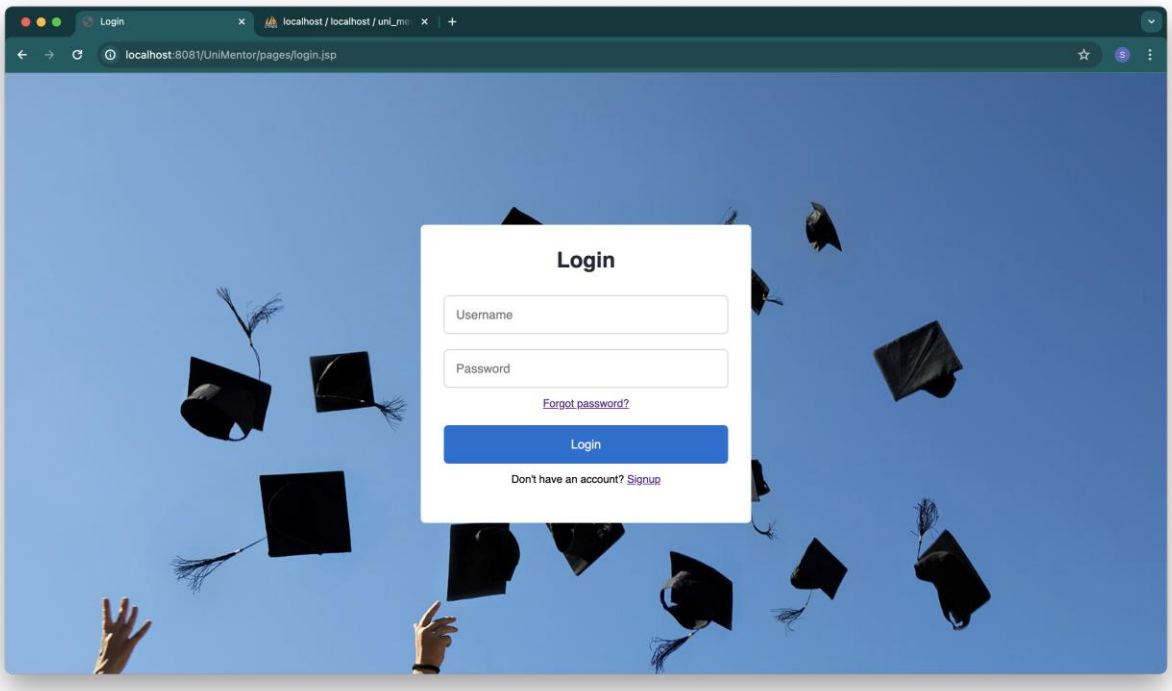


Figure 209: Screenshot of login page displayed

5) Giving welcome page URL in address bar:

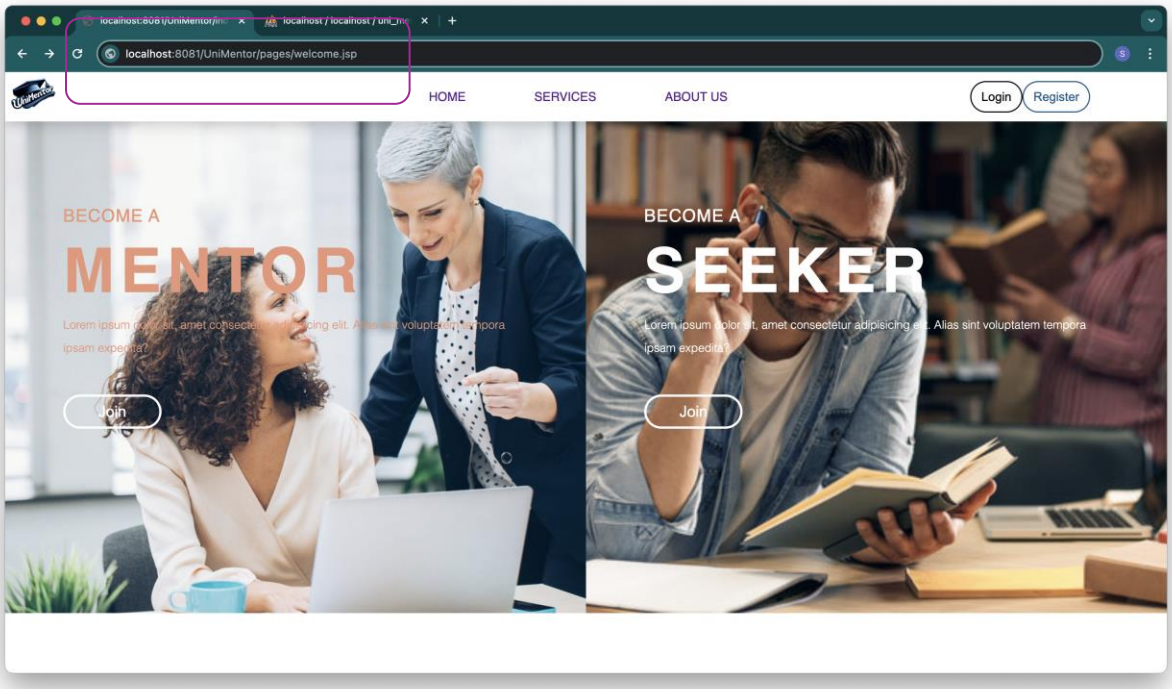


Figure 210: Screenshot of giving welcome page url

6) Login page displayed:

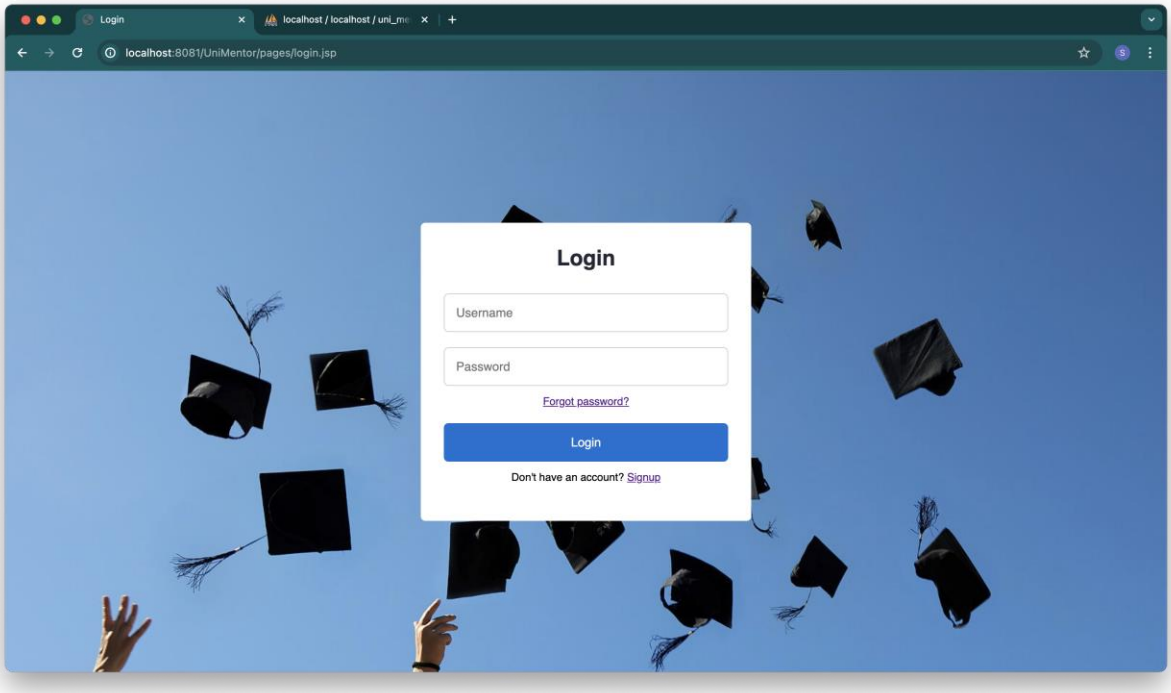


Figure 211: Screenshot of login page displayed

Test 10.2. : Test for access for logged in users

Objective	To navigate logged in users to welcome page when trying to access pages like login and register.
Action	When logged in, ➢ Login page URL is given in address bar. ➢ Register page URL is given in address bar.
Expected Result	Each action should navigate user to welcome page.
Actual Result	The protected pages were not accessed, and user was navigated to welcome page.
Conclusion	The test is successful.

Table 23: Test table for page access to logged in users

Proofs:

1) Logging in as user (mentor or seeker):

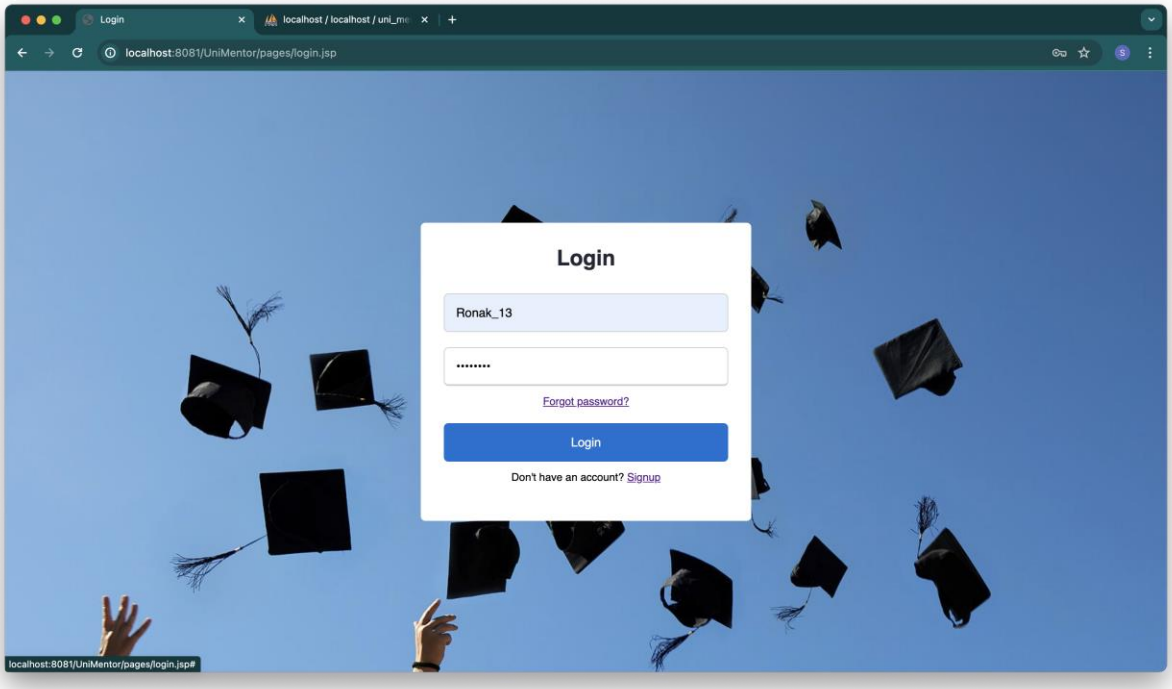


Figure 212: Screenshot of logging in as user

2) Welcome page displayed:

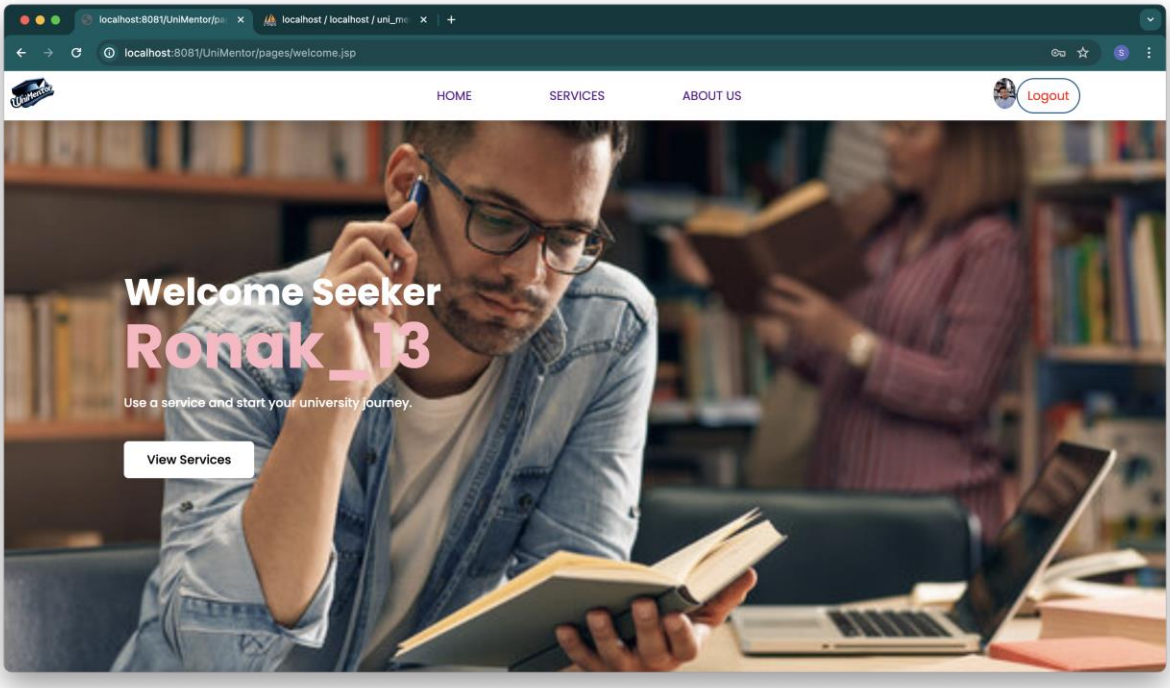


Figure 213: Screenshot of welcome page displayed

3) Giving login page URL in address bar:

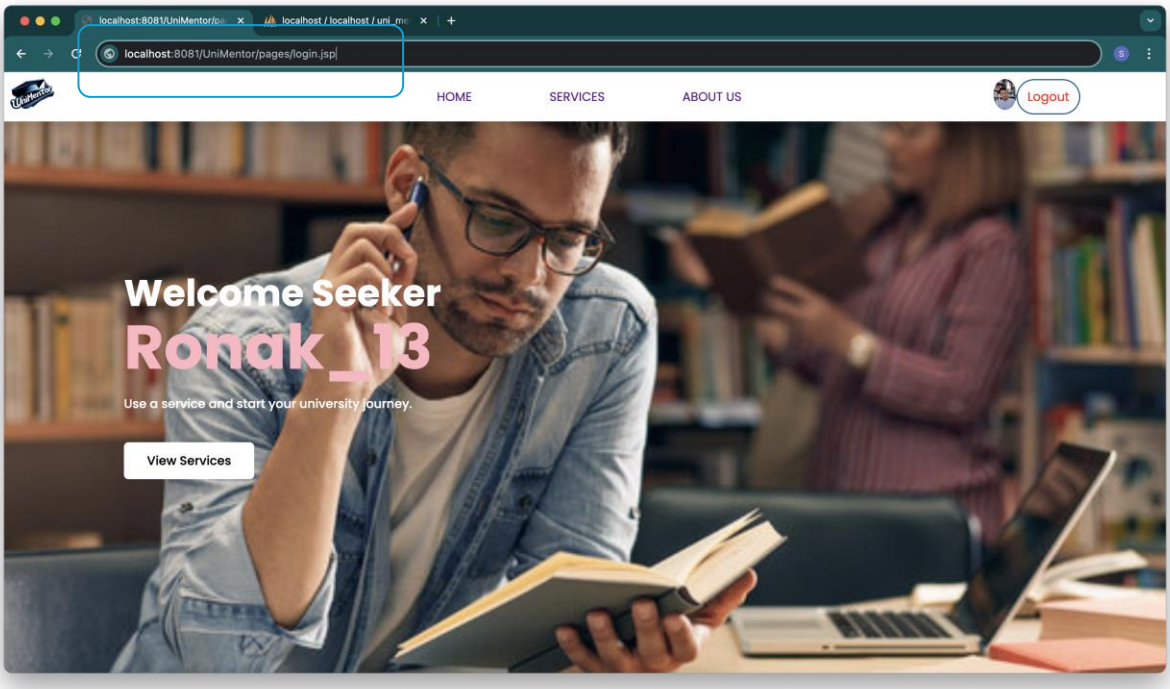


Figure 214: Screenshot of giving login page url

4) Welcome page displayed:

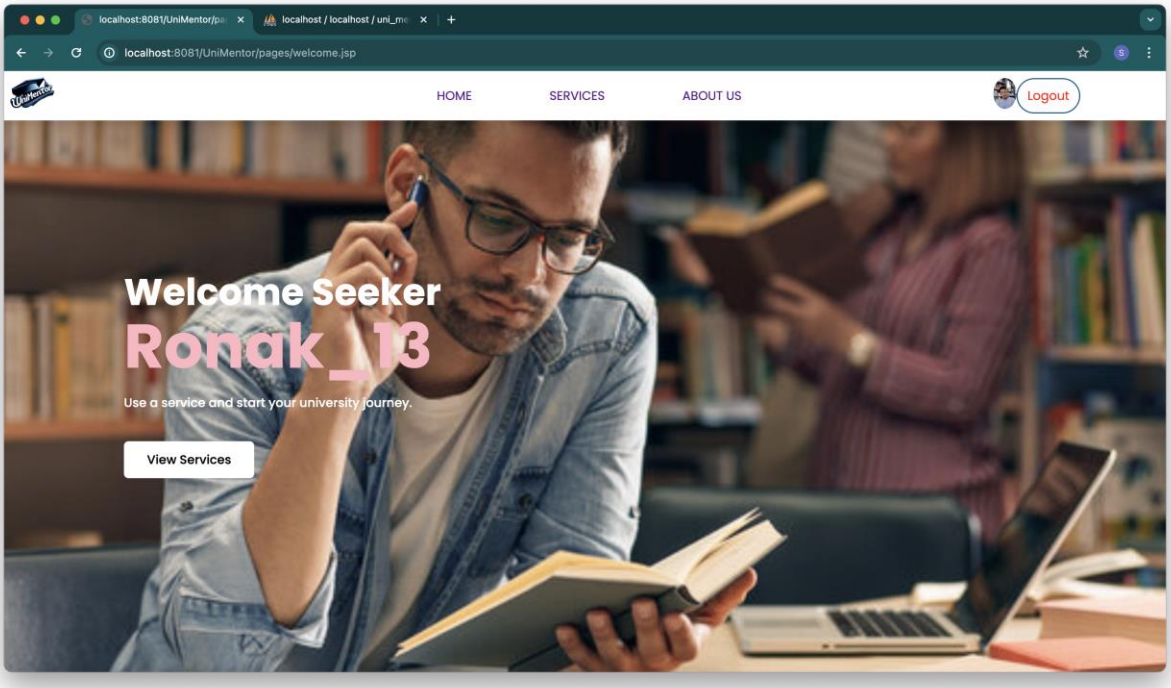


Figure 215: Screenshot of welcome page displayed

5) Giving register mentor page URL in address bar:

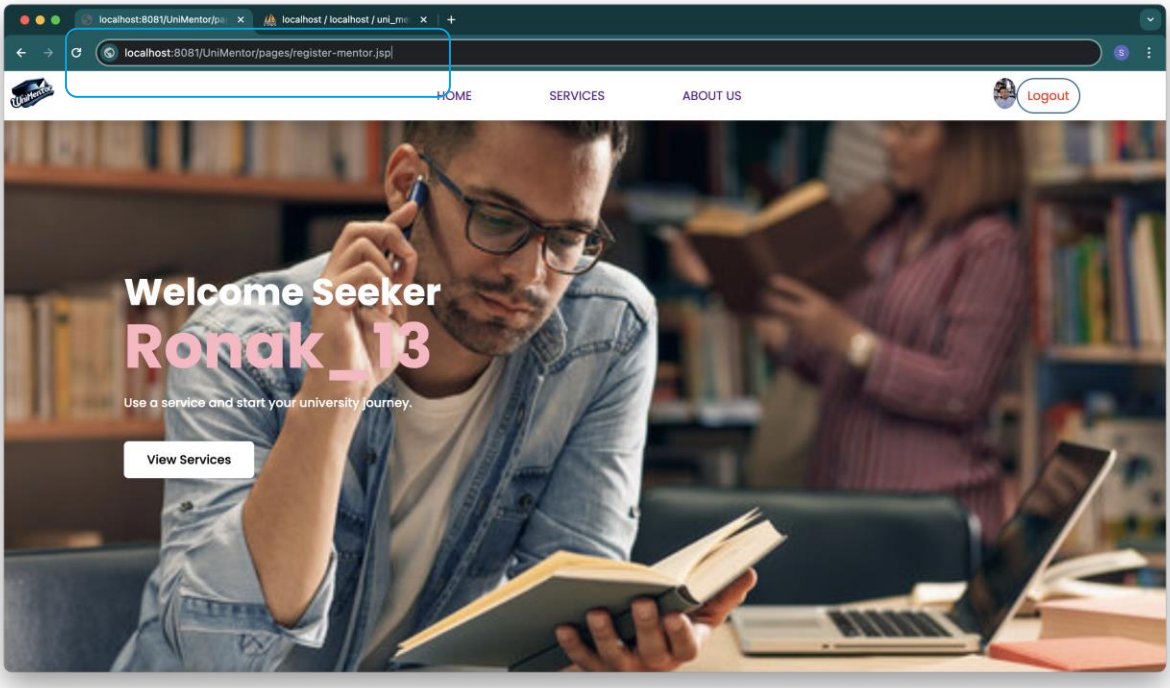


Figure 216: Screenshot of giving register mentor page url

6) Welcome page displayed:

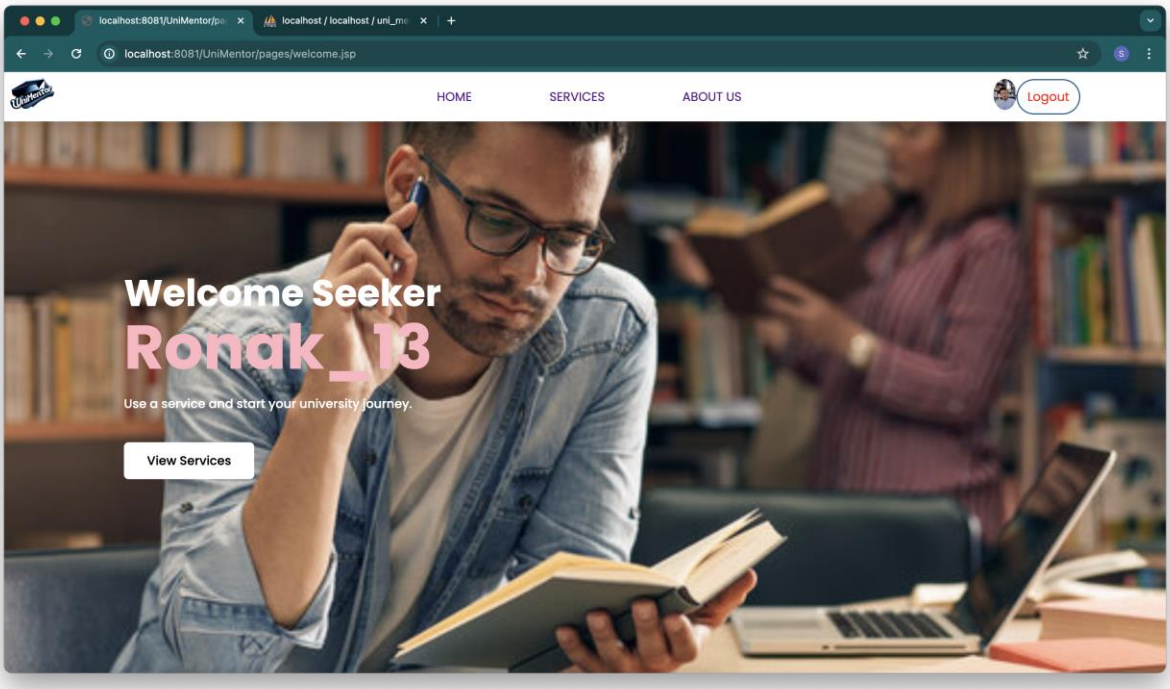


Figure 217: Screenshot of welcome page displayed

7) Giving register seeker page URL in address bar:

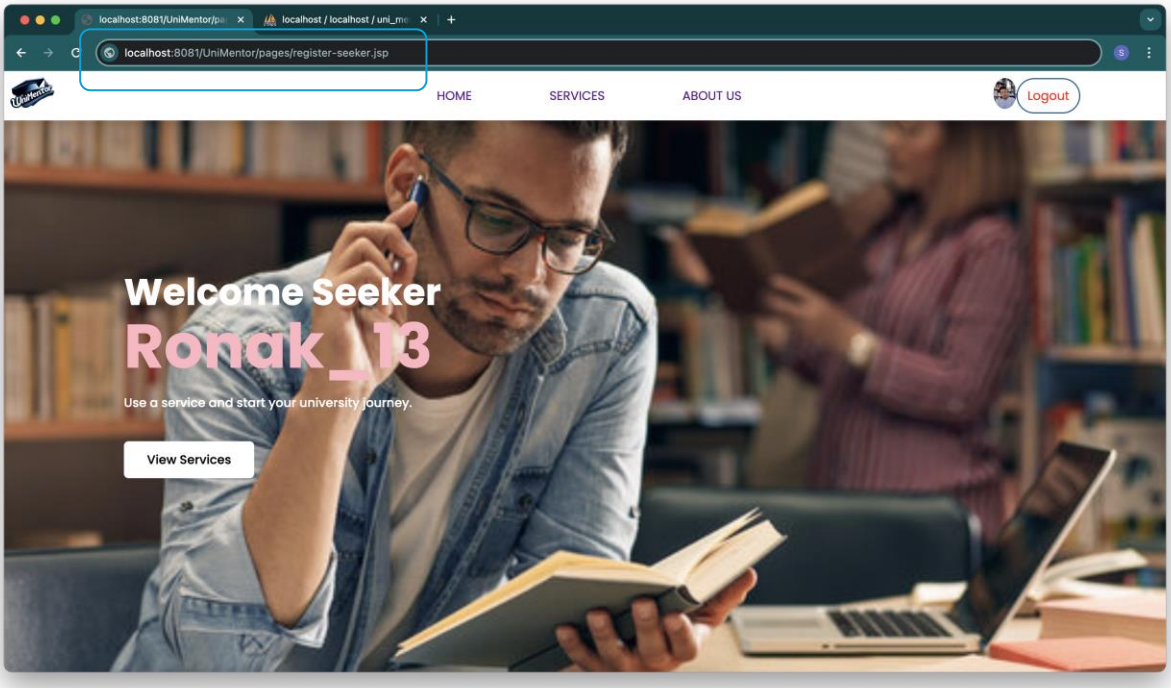


Figure 218: Screenshot of giving register seeker page url

8) Welcome page displayed:

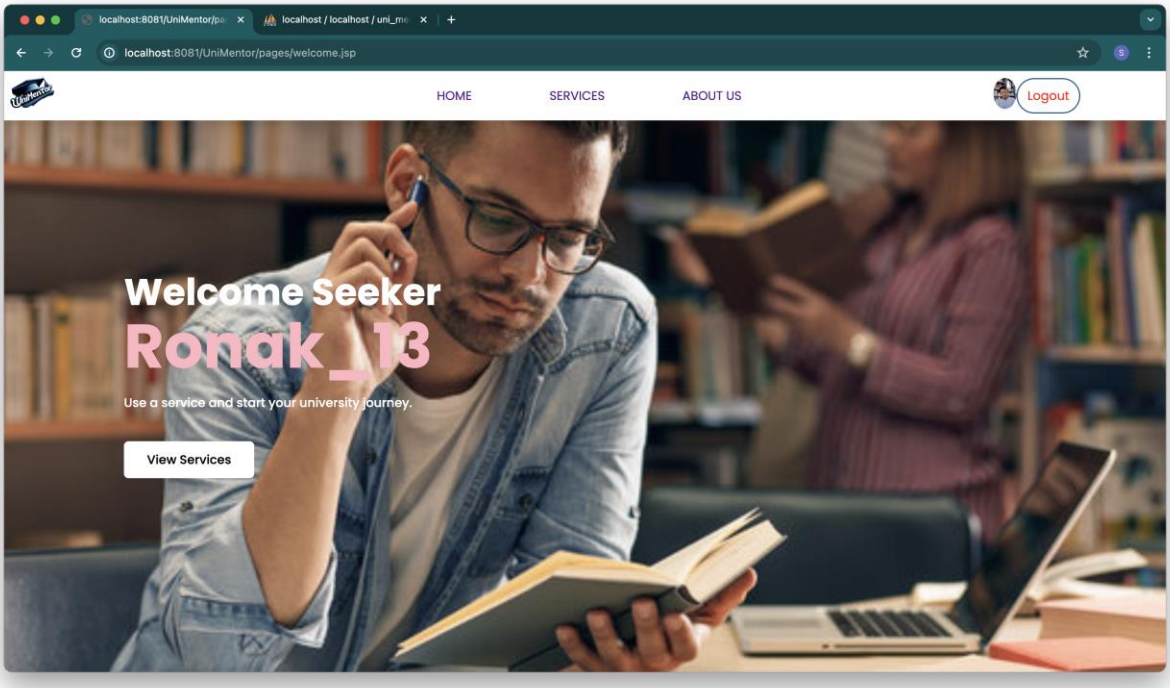


Figure 219: Screenshot of welcome page displayed

6. Tools and libraries used

3.1. Software Platform Selection

1) Eclipse

Eclipse is mainly known as an IDE for Java, also regarded as a Java development environment. However, it is far more than just a Java IDE due to its various features. It is a tools framework, an open-source enabler, a community, and an ecosystem (Eclipse Foundation AISBL, n.d.).

Figure 220: Logo of eclipse ide

Reason for selection:

- Used as a platform for system development.
- To integrate with Apache Tomcat. It helps to easily deploy, manage, and test servlets and JSP pages directly from the Eclipse IDE.
- For features like auto-completion, error checking and debugging the code.

1.1 Apache Tomcat

Apache Tomcat is a Java servlet container that is freely available and open-source. Its fundamental role is providing a runtime environment for Java web applications and websites. It has numerous other advantages as well. It is incredibly lightweight and fast (LogicMonitor Inc, 2024).

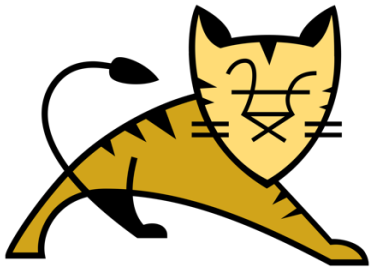


Figure 221: Logo of tomcat server

Reason for selection:

- To locally host and run servlets and JSP pages during development.
- To simulate the behavior of a production environment locally, enabling efficient debugging and validation of web applications.

2) XAMPP

XAMPP is widely recognized for PHP development environments. It's completely free and comes with Apache, MariaDB, PHP, and Perl in one package. It is designed for user-friendly installation and utilization (Apache Friends, 2023).

Figure 222: Logo of XAMPP

Reason for selection:

- The apache server of XAMPP hosts the website locally.
- The MySQL database provided by XAMPP will be used to store and manage data in the database.

3) Balsamiq

Balsamiq wireframes is a software designed to help user create digital sketch of applications and websites interface before any coding. This tool is used to design wireframes to serve communication and help user clarify his idea or obtain a raw sketch of the product that is to be made (balsamiq, 2023).

Figure 223: Logo of balsamiq

Reason for selection:

- To design the wireframes of the pages of the website.

4) MS Word

Microsoft released MS Word, a program for making documents, on October 25, 1983. It helps create professional stuff like letters and reports. With its many features, we can easily edit and format files and documents (BYJU'S, 2021).

Figure 224: Logo of MS Word

Reason for selection:

- To write the proposal and report of the program. It offers features like auto correction, fonts, report design, pdf conversion, and many more.

5) Draw.io

Draw.io is a widely used software for crafting charts and diagrams, offering a variety of shapes and decorative elements to add a unique look to our diagrams. The easy-to-use drag-and-drop functionality simplifies the process of creating graphs and charts, and the user interface is user-friendly. (Hope, Computer, 2020).

Figure 225: Logo of draw.io

Reason for selection:

- To draw and design entity relationship diagram (ERD) of the database after normalization.

3.2. Programming PS

1) Java

Java is a robust, object-oriented programming language with a class-based structure, designed for various applications. By compiling programs into bytecode, developers can write code once and run it on any platform that supports Java. Java was the most popular language in 2019. (Wikimedia Foundation, Inc, 2023).

Figure 226: Logo of Java

Reason for selection:

- All the classes like controller, filter, servlets, models and utils will be made using Java.
- All the methods and functions of these classes are will be written in Java Programming Language.
- All the Java Server Pages(JSP) will also include java code along with html.

2) HTML, CSS, and JS

HTML, CSS, and JavaScript build on one another. They can form a simple website to a website with advanced interactive features. HTML sets up the basic structure of a website, CSS makes it look good, and JavaScript adds functionality to make it interactive (The University of Texas at Austin, 2021).

Figure 227: HTML, CSS AND JS LOGO

Reason for selection:

- HTML will be used to define the structure of the web pages.
- CSS will be used for visually appealing design and responsiveness.
- JS will be used for features like animation and other functions.

3) MySQL

MySQL most popular relational database management system. It is developed, distributed, and supported by Oracle Corporation. It is a database management system, open source, has fast and reliable server, and, works in client/server or embedded systems (Oracle, 2024).

Figure 228: Logo of MySQL

Reason for selection:

- To store and manage structured data for the website.

- It provides SQL (Structured Query Language) as its querying language, which allows to perform different operations.
- It provides mechanisms for enforcing data integrity constraints such as primary keys, foreign keys and so on.
- It will be suitable for handling large volume of data.

3.3. Framework and libraries

1) Java Servlets & Java Server Pages (JSPs)

They are Java-based programs that operate on a Java application server, enhancing the functionalities of a web server. Servlets are essentially Java classes crafted to handle HTTP requests within a web application. JSPs serve as an extension of HTML, allowing for the integration of Java code snippets directly into HTML pages. These Java segments generate dynamic content (IBM, 2023).

Figure 229: Figure of servlets and JSP

Reason for selection:

- Servlets are used to handle server-side logic like http request, database interaction, page navigation and making dynamic responses.
- JSP is used to create dynamic web pages by integrating java code in HTML.
- JSPs are also the user interface of the website.

2) Java Database Connectivity (JDBC) Driver

It provides a standard way to access data using the Java programming language. With JDBC, applications can interact with various databases and operate on any platform equipped with a Java Virtual Machine. It allows application to send SQL statements to different data sources (Progress Software Corporation, 2024).

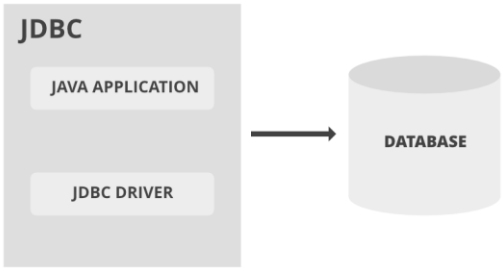


Figure 230: Diagram of JDBC

Reason for selection:

- JDBC driver is used to establish connection between Java web application and the MySQL database.
- It allows statement execution which allows to perform CRUD (Create, Read, Update, Delete) operations as needed.

7. Development Process

7.1. Creating a new dynamic web project

At the very first, our dynamic web project is created form the Eclipse IDE. It will contain all the jsp, css, java files where our system will be built.

7.1.1 Project name with location, Apache Tomcat v8.5 and Dynamic module version 3.1

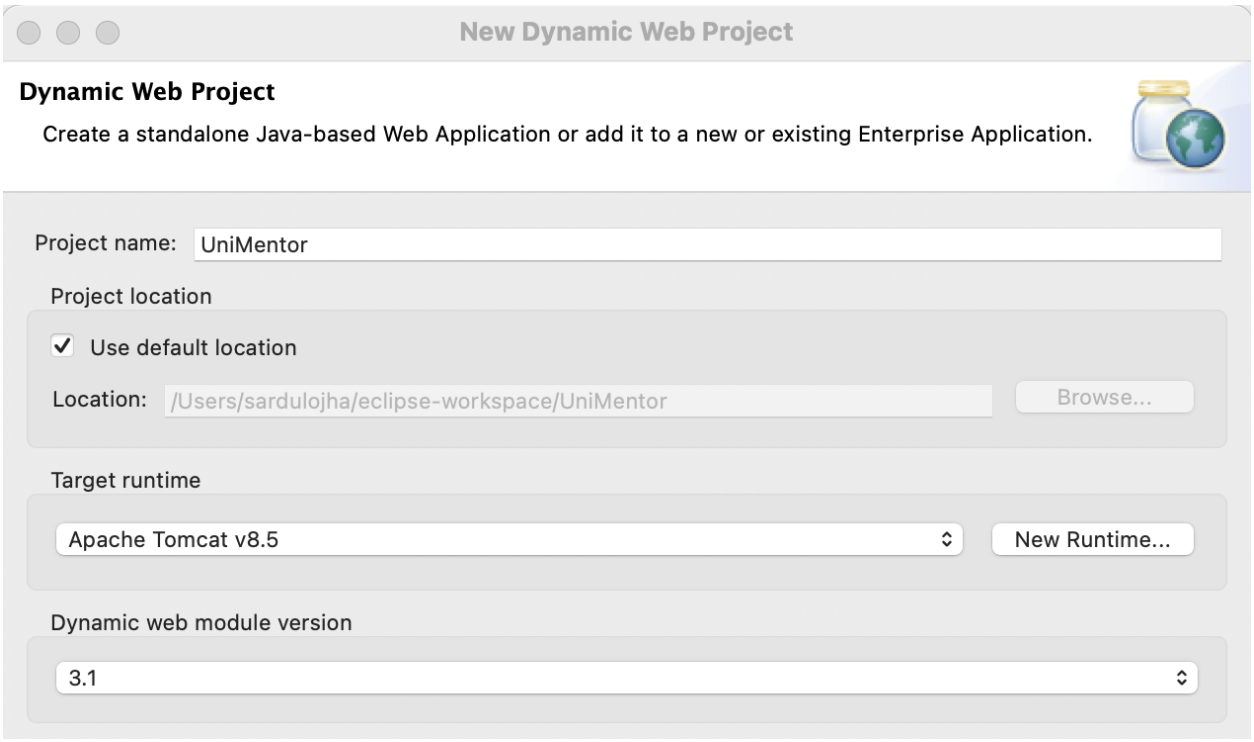


Figure 231: Screenshot of giving project name and selecting server

7.1.2. Selecting Generate web.xml deployment descriptor

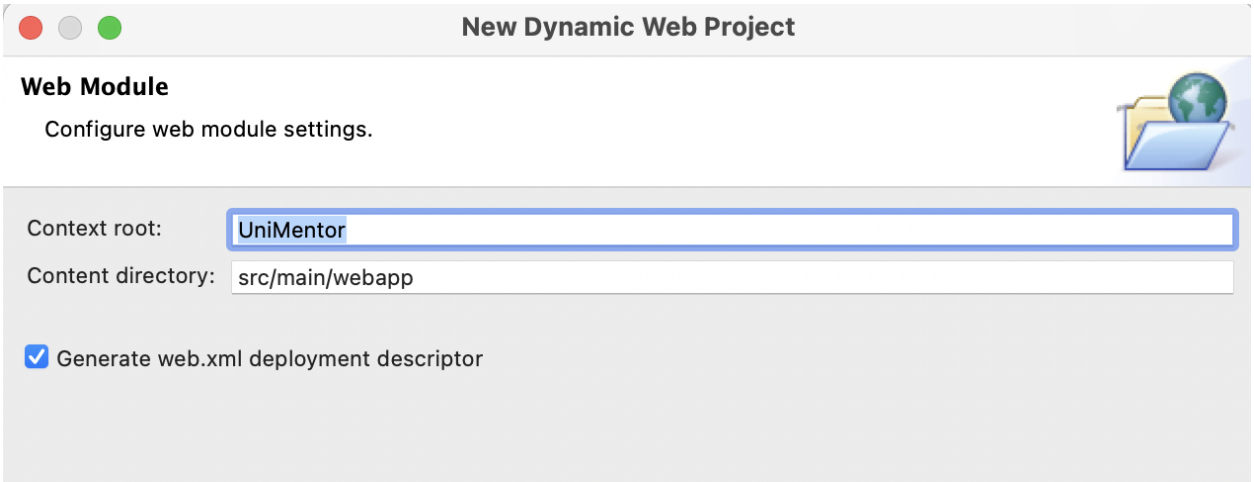


Figure 232: Screenshot of generating webxml description

7.1.3. Creating MVC pattern Packages and Folders

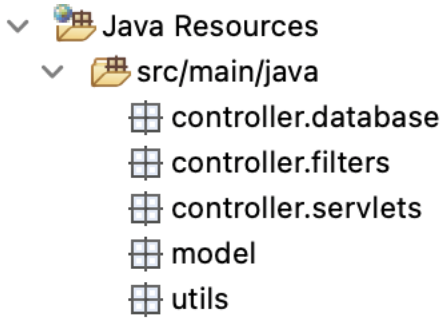


Figure 233: Screenshot of creating packages

7.1.4. Creating Folders inside webapp folder

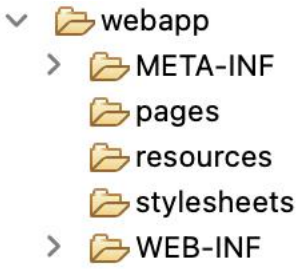


Figure 234: Screenshot of creating folders

7.1.5. Adding MySQL Connector jar file in deployment assembly

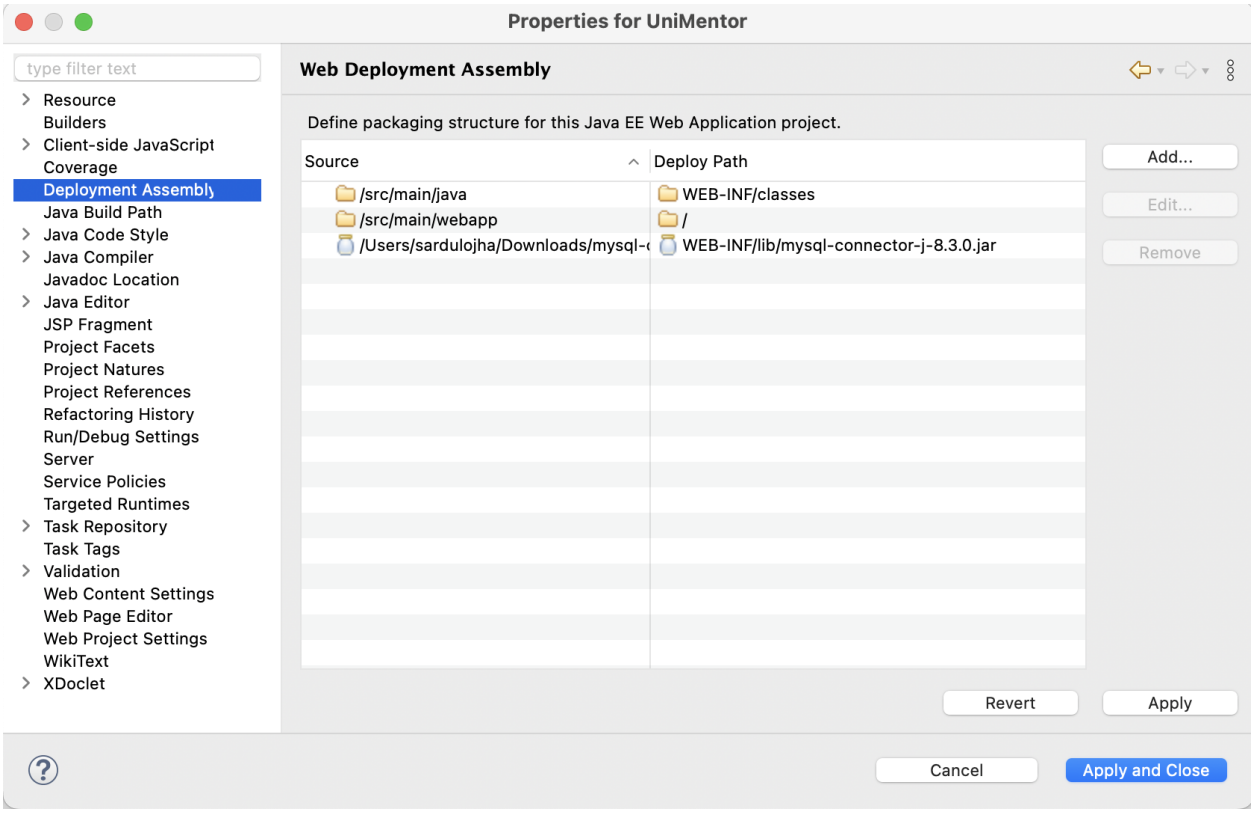


Figure 235: Screenshot of adding mysql jar in deployment assembly

7.1.6. Adding MySQL Connector jar file in java build path

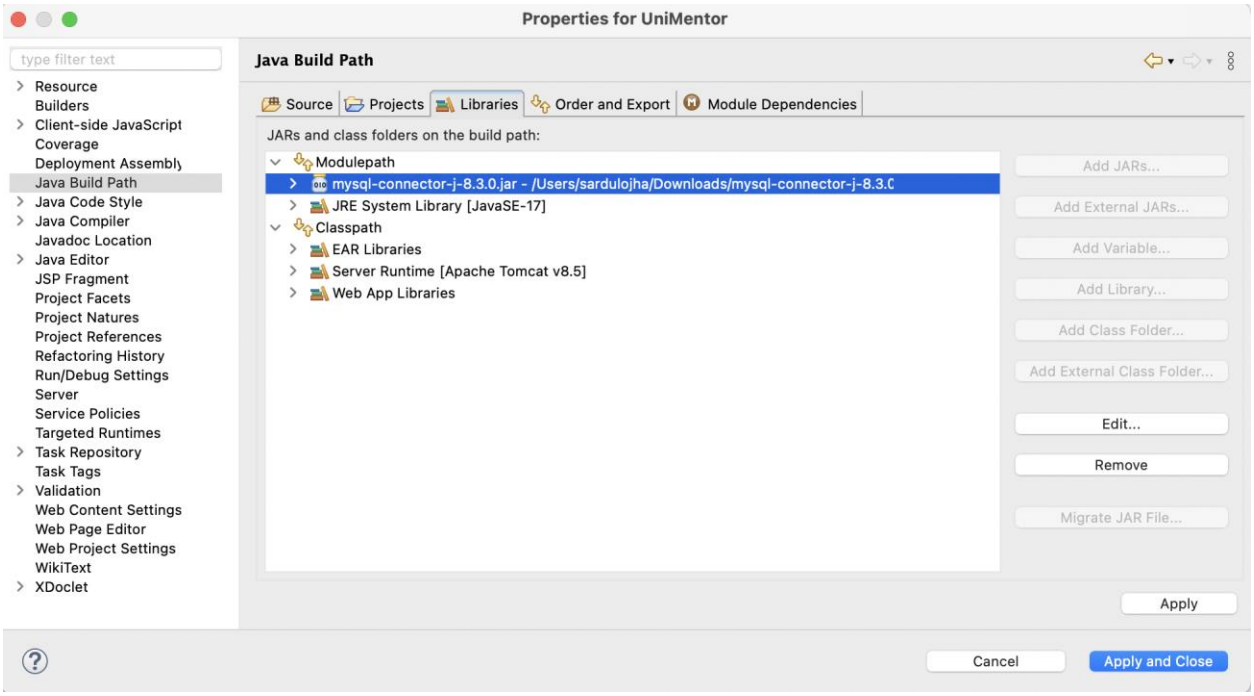


Figure 236: Screenshot of adding mysql jar in java build path

7.1.7. Creating DbController Class

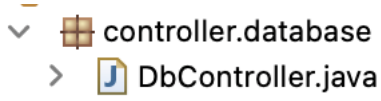


Figure 237: Screenshot of creating DbController class

7.1.8. Creating AuthenticationFilter Class

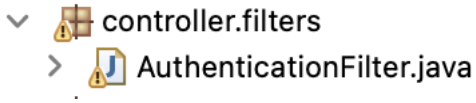


Figure 238: Screenshot of creating authentication filter class

7.1.9. Creating Servlet Classes

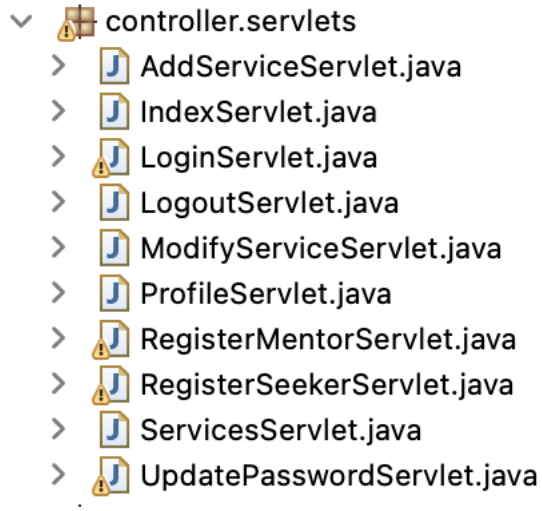


Figure 239: Screenshot of creating servlet classes

7.1.10. Creating Model Class

Figure 240: Screenshot of creating model class

7.1.11. Creating Util Class

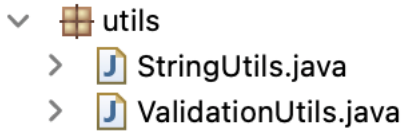


Figure 241: Screenshot of creating util classes

7.1.12. Creating JSPs

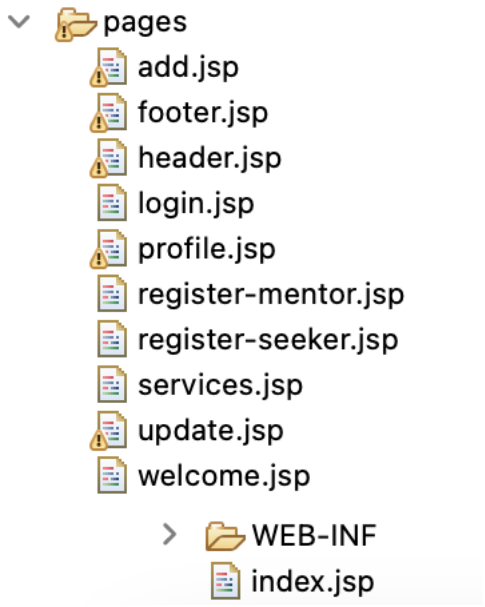


Figure 242: Screenshot of creating jsp

7.1.13. Creating Stylesheets (CSS)

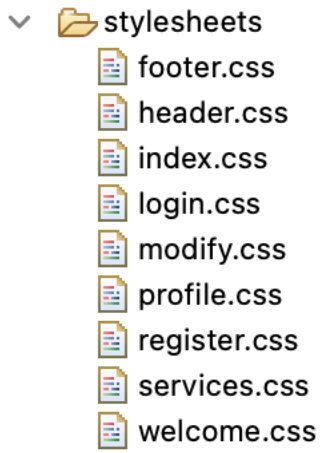


Figure 243: Screenshot of creating css files

7.2. Designing Wireframes

The second step was designing wireframes. I used balsamiq software to design the wireframe of the entire system. It was very important for planning out how the “UniMentor” would look and work. One by one I designed wireframes for all the 9 pages.

Designing wireframe in balsamiq:

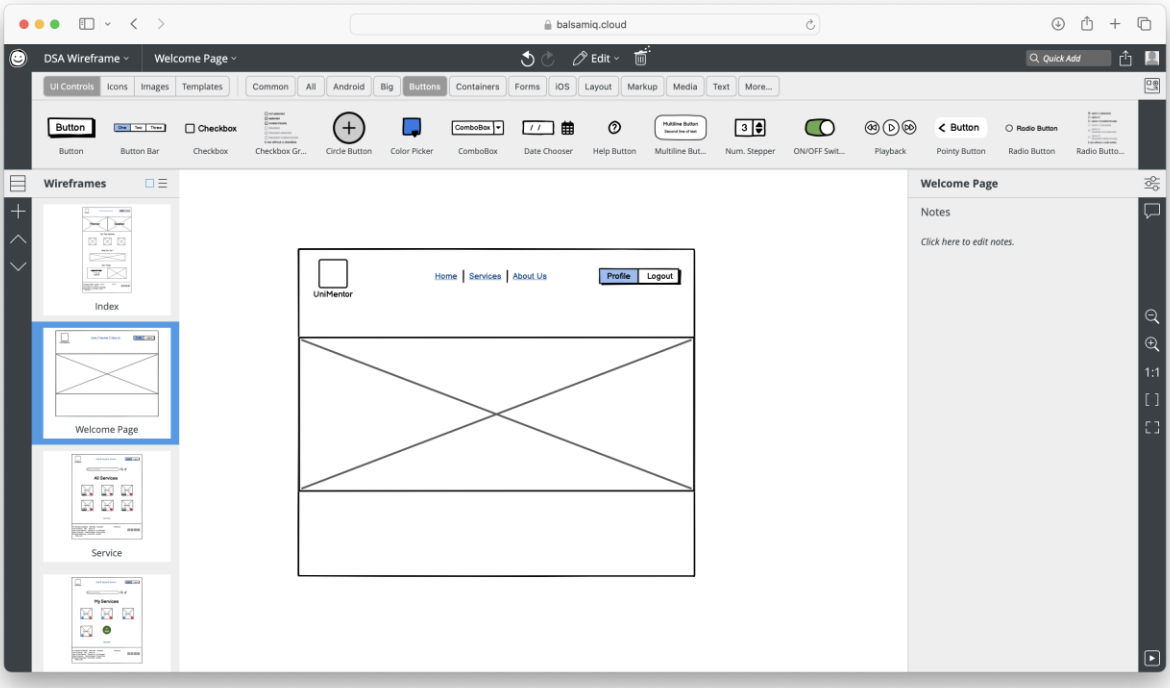


Figure 244: Screenshot of designing wireframes

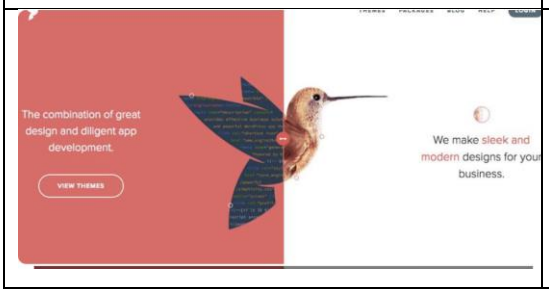
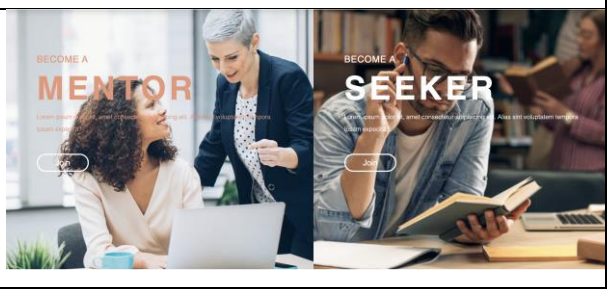
7.3. Website design (Frontend)

Once the wireframes were done, I jumped into building the actual web pages using HTML, CSS, and JavaScript. Each page, like the Home Page, Profile Pag e andService Page, and, got special attention to make sure they looked good and were easy to use. For the Home Page, I made sure you could see a list of mentors. The Profile Page let users check and update their info, with colors and styles making it look nice, and some fancy coding making sure everything works smoothly. The Service Page made it easy to check service, with colors and sorting making it less confusing, and some clever coding making it all interactive. All along the way, I made sure everything was easy to understand and use for everyone, no matter what device they're using.

7.3.1. Home page

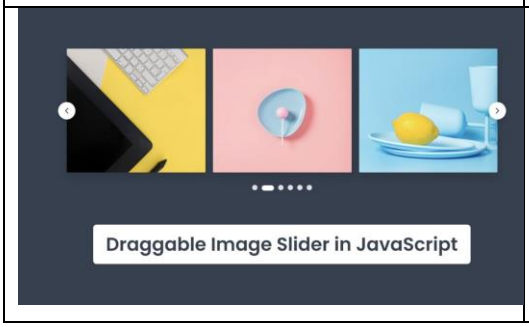
1) **Split Screen**

- Design Reference: https://www.pinterest.com/pin/examples-of-beautiful-splitscreen-layoutsdesign-inspiration--66850375701714906/
- Code Reference: https://github.com/codicts/Split-Landing-Page/blob/master/index.html

Reference Design	Actual Design
	

2) Most Popular

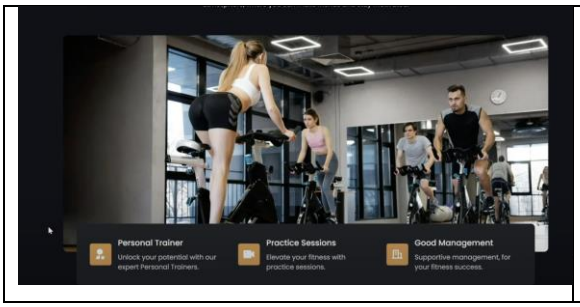
- Design Reference: https://www.codingnepalweb.com/draggable-image-slider-html-css-javascript/
- Code Reference: https://www.codingnepalweb.com/draggable-card-slider-html-css-javascript/

Reference Design	Actual Design
	

3) Why Join Us

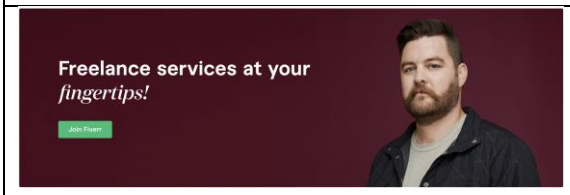
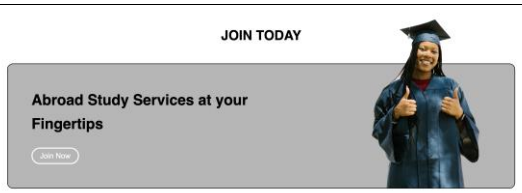
- Design Reference: https://www.youtube.com/watch?v=_rWKTxvTUzQ
- Code Reference: https://www.youtube.com/watch?v=_rWKTxvTUzQ

Reference Design	Actual Design



4) Join

- Design Reference: https://www.fiverr.com
- Code Reference: https://www.youtube.com/watch?v=rzP0BpDpXY4&t=67s

Reference Design	Actual Design
	

7.3.2. Service page

1) Search Bar

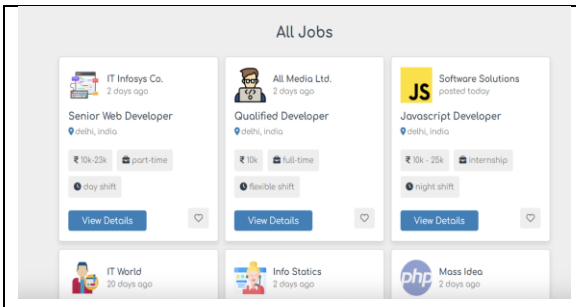
- Design Reference: https://stackoverflow.com/questions/62975335/place-the-dropdown-list-inside-the-search-bar-using-html
- Code Reference: https://www.patreon.com/posts/78939892?pr=true

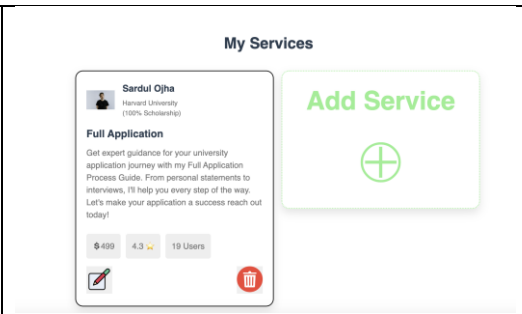
Reference Design	Actual Design
	

2) Service List

- Design Reference: https://github.com/umeshkillua/Jobs_Portal/blob/main/screenshots/all%20jobs.png
- Code Reference: https://github.com/umesh-killua/Jobs_Portal/blob/main/screenshots/all%20jobs.png

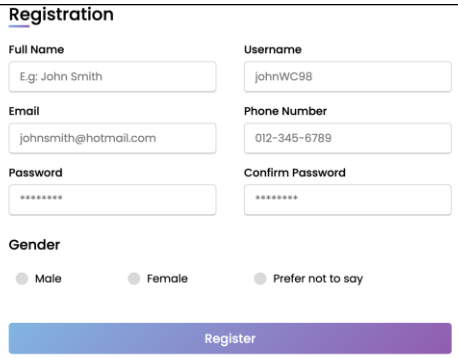
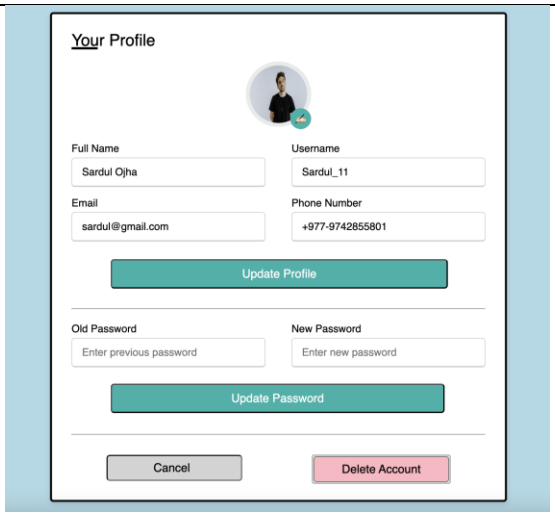
Reference Design	Actual Design





7.3.3. Profile page

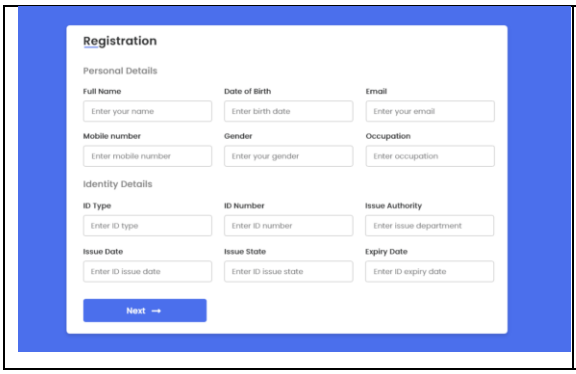
- Design Reference: https://codepen.io/doantthuylinh98/pen/OJOBKwe
- Code Reference: https://codepen.io/doantthuylinh98/pen/OJOBKwe

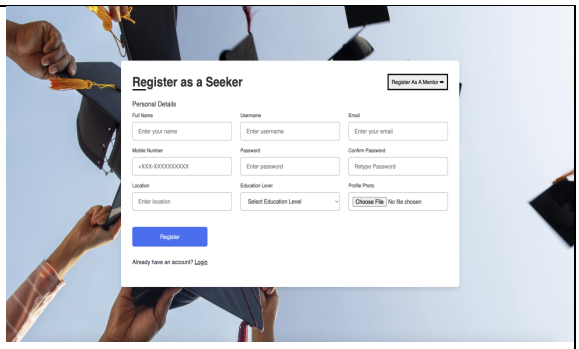
Reference Design	Actual Design
	

7.3.4. Register page

- Design Reference: https://www.codingnepalweb.com/registration-form-html-css-javascript/
- Code Reference: https://www.codingnepalweb.com/registration-form-html-css-javascript/

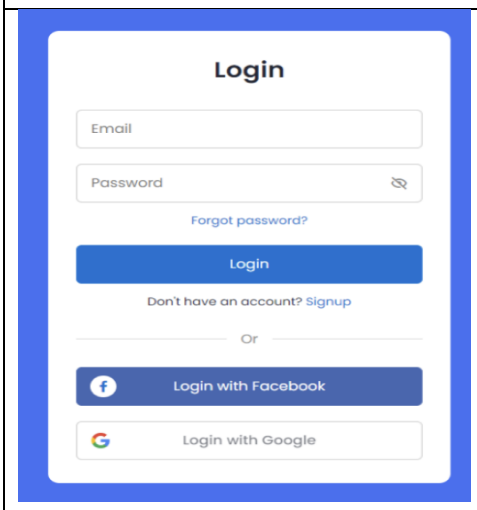
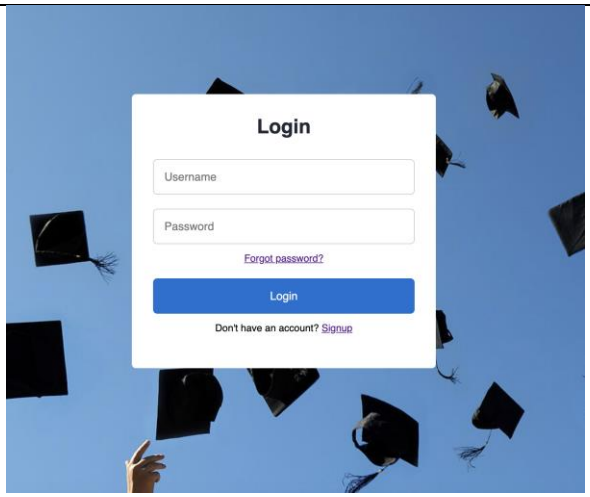
Reference Design	Actual Design





7.3.5. Login page

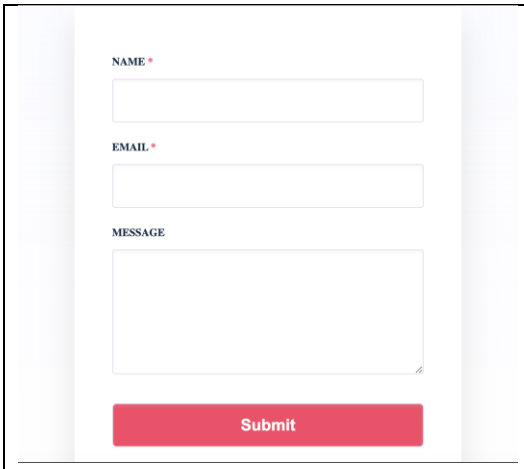
- Design Reference: https://www.codingnepalweb.com/login-signup-form-html-css-javascript/
- Code Reference: https://www.codingnepalweb.com/login-signup-form-html-css-javascript/

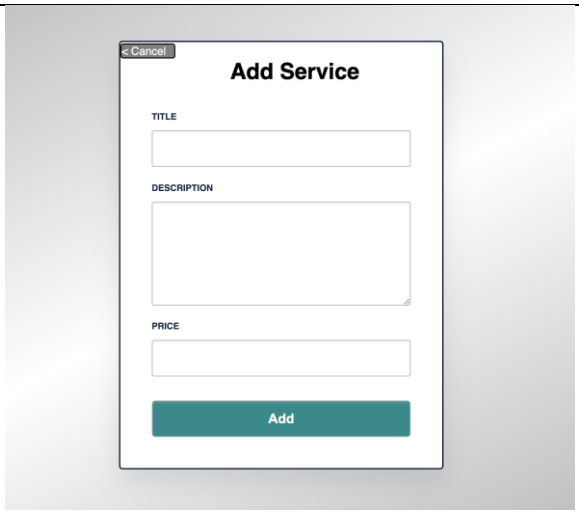
Reference Design	Actual Design
	

7.3.6. Add/Update page

- Design Reference: https://codepen.io/peterfaretra/pen/oNjRzje
- Code Reference: https://codepen.io/peterfaretra/pen/oNjRzje

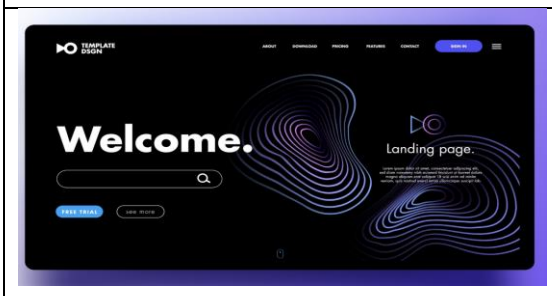
Reference Design	Actual Design





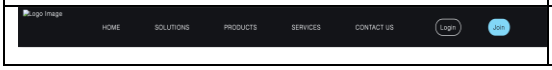
7.3.7. Welcome page

- Design Reference: https://www.searchenginejournal.com/best-landing-pages/494196/

Reference Design	Actual Design
	

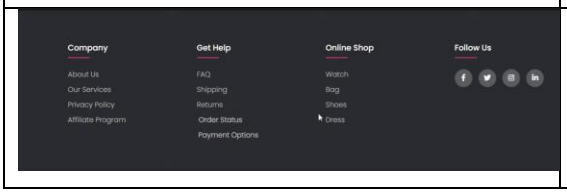
7.3.8. Header

- Design Reference: https://codepen.io/hitensharma/pen/dybryGE
- Code Reference: https://codepen.io/hitensharma/pen/dybryGE

Reference Design	Actual Design
	

7.3.9. Footer

- Design Reference: https://www.youtube.com/watch?app=desktop&v=YOb67OKw62s
- Code Reference: https://www.youtube.com/watch?app=desktop&v=YOb67OKw62s

Reference Design	Actual Design
	

7.4. Backend design

For the backend, I outlined the structure and functionality of the server-side components that power the “UniMentor” web application. Leveraging Java EE technologies such as Servlets and Java Database Connectivity (JDBC), I established a robust backend architecture capable of handling user authentication, data retrieval, and database operations. The database design, depicted through an Entity-Relationship (ER) diagram, efficiently organized mentor,seeeker and service information ensuring data integrity and accessibility. Security measures, including user authentication and input validation, were implemented to safeguard sensitive data and prevent unauthorized access. Session management techniques were employed to track user sessions securely across multiple interactions with the application. Additionally, the backend functionality encompassed CRUD operations for managing mentor’s service. Scalability and performance considerations were addressed through optimized database queries and infrastructure planning, ensuring the backend could accommodate future growth and increased user demand. Similarly, CRUD for profile including image were also done.

Figure 245: Screenshot of backend development

7.5. Report

I summed up our entire project in one place. I started with the wireframes we made using Balsamiq, which helped us plan how each page would look. Then, I explained the Java classes we used to make the backend work, showing what each part of our code does. We also talked about the database tables we set up to store student info and attendance records, and I included a picture to show how they're connected. After that, I listed the different tests we did to make sure everything works as it should. We also talked about the tools we used throughout the project and why they were important. Lastly, I looked at what went well, what were the challenges and errors, and what we could improve on in the future. This report gives a clear picture of our project journey and how we built the “UniMentor” step by step.

8. Critical Analysis

8.1. Challenges

There were many challenges that I had to overcome during my journey of building this program. Two of the most difficult challenges to overcome, for me, are listed below:

8.1.1. Challenge 1: Displaying information from two different tables (i.e. service and mentor tables) in the service page

The first challenging part of this for me was to display mentor's information in his/her created service. When I consulted my teacher about this, he told me to use join query to retrive information from the database. He also advised me to create a separate mentor-service model (new model) to handle the data retrived and display in the service page. But I did not want to create separate model for this small task.

Upon deep thinking, research and evaluation, I realized about a data structure that can hold key value pairs i.e. HashMap. I revised our previous lecture slides about hashmap and also watched a short youtube video (click for link) about HashMaps. After a good knowledge and understanding about this topic, I implemented them in the code as shown below:

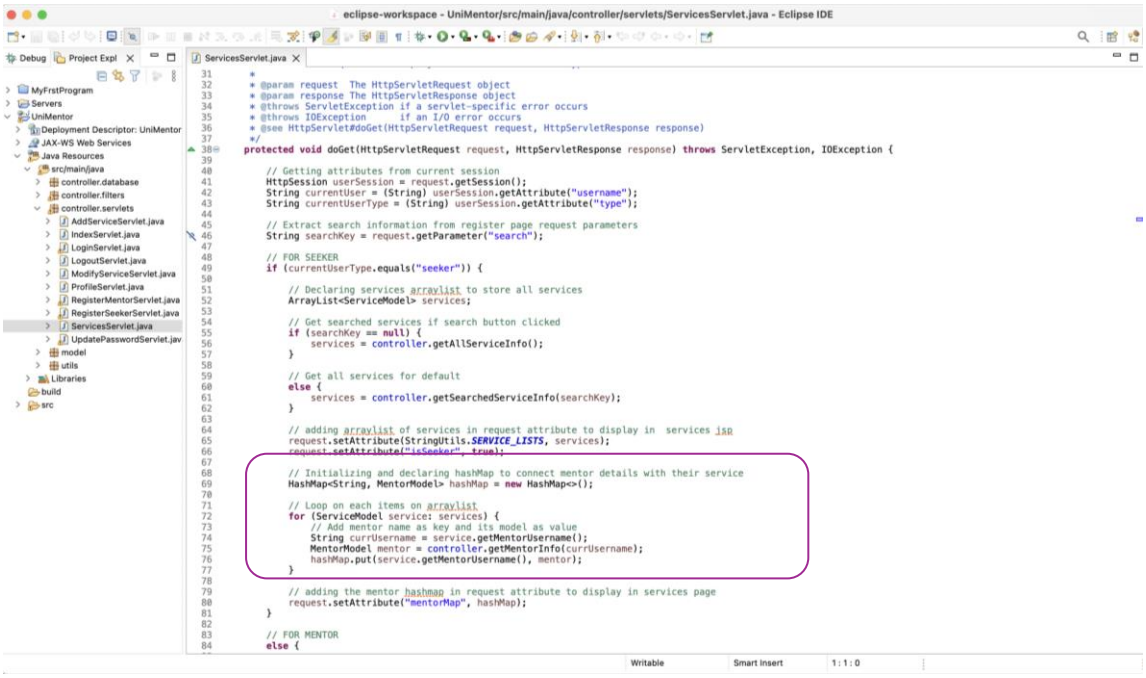


Figure 246: Screenshot of implementing hashmap

Now the main challenge was to display the hashmap information in the service page(jsp). As you can see in the screenshot above the created hashmap was set as request attribute to send to the jsp. I did not know how to display the hashmap key and values so I googled for solution. I landed on stackoverflow(most popular developers community) and got this :

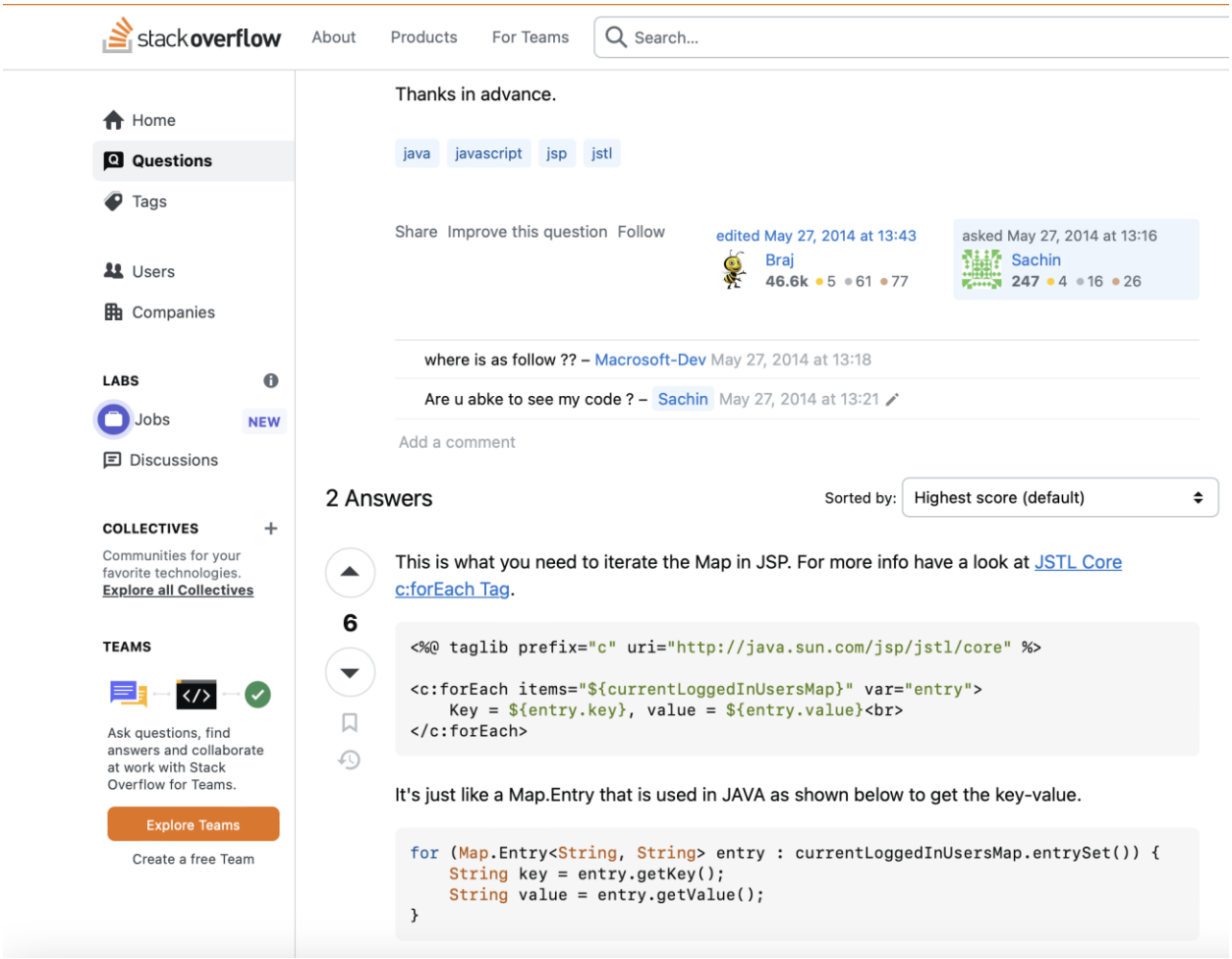


Figure 247: Screenshot of getting solution from stack overflow

Upon using this expression language “${hashMapObject.key}” and “${hasmMapObject.value}” I was able to retrive information and display in the services page. The usage is shown below :

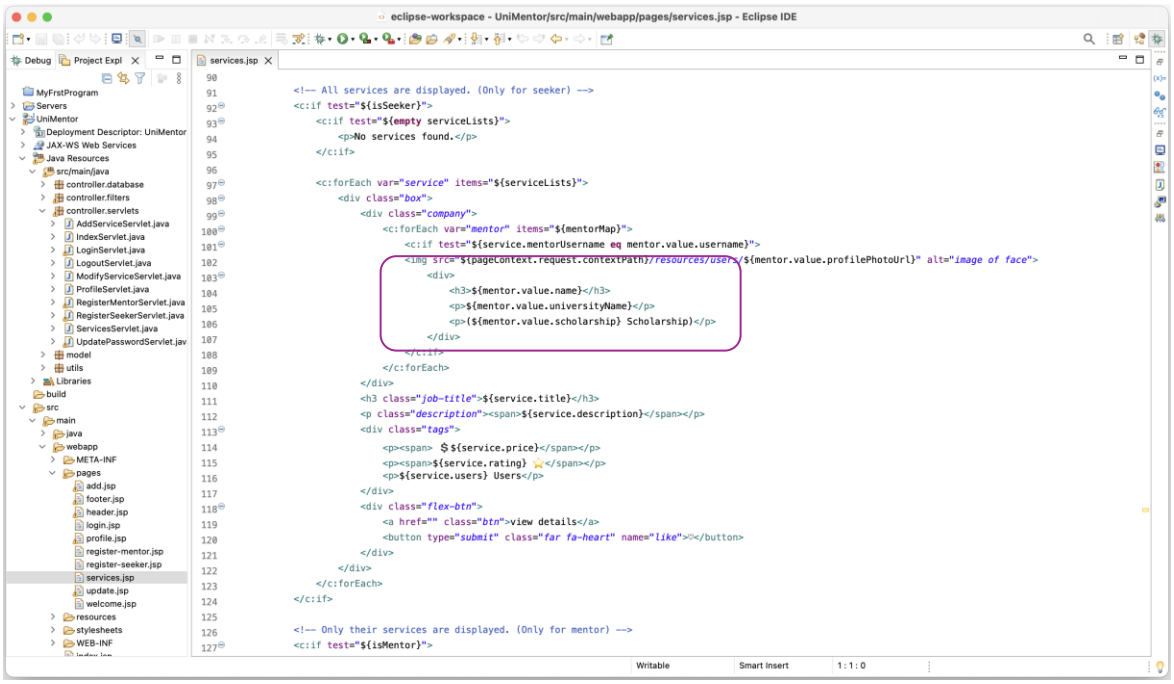


Figure 248: Screenshot of getting hashmap values in jsp

After this,the mentors and service details both were displayed in the service page. Hence, I tackled the challenge.

8.1.2. Challenge 2: Updating/Deleting related table elements from the database

Another challenge I faced was when updating/deleting the parent or child table rows from the database. Here, service and mentor table are related as primary key of mentor table is foreign key in service table. So, when I wanted to delete or mentor, it would throw an error as it was a in the parent table.

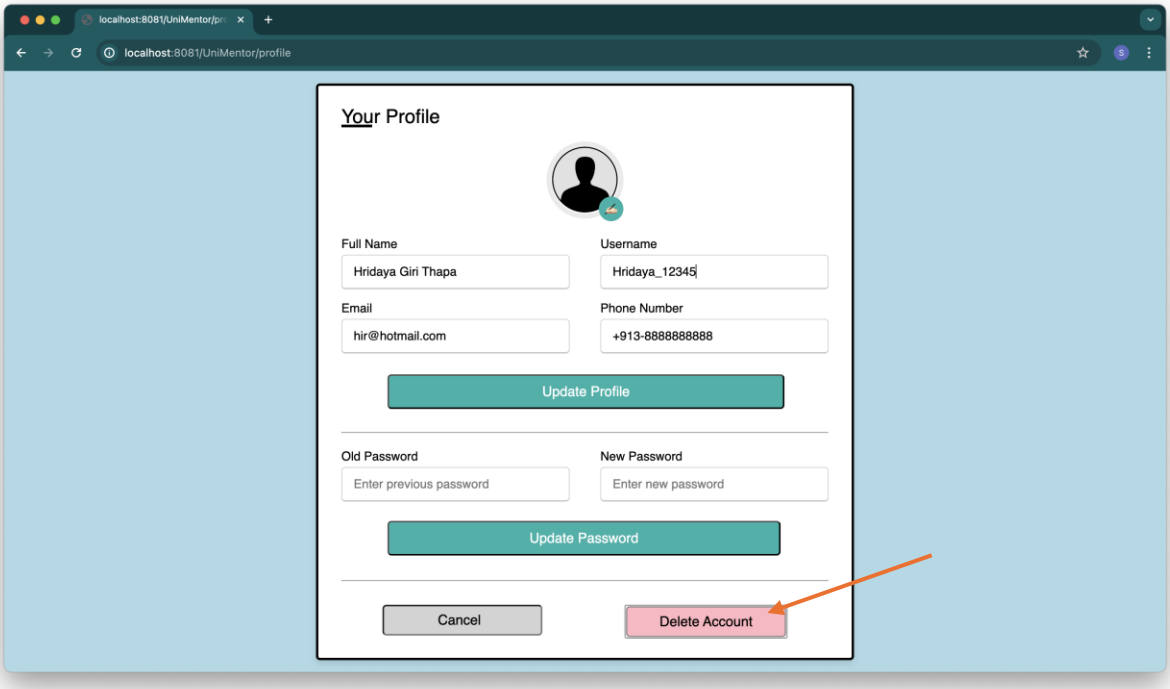


Figure 249: Screenshot of when delete button clicked

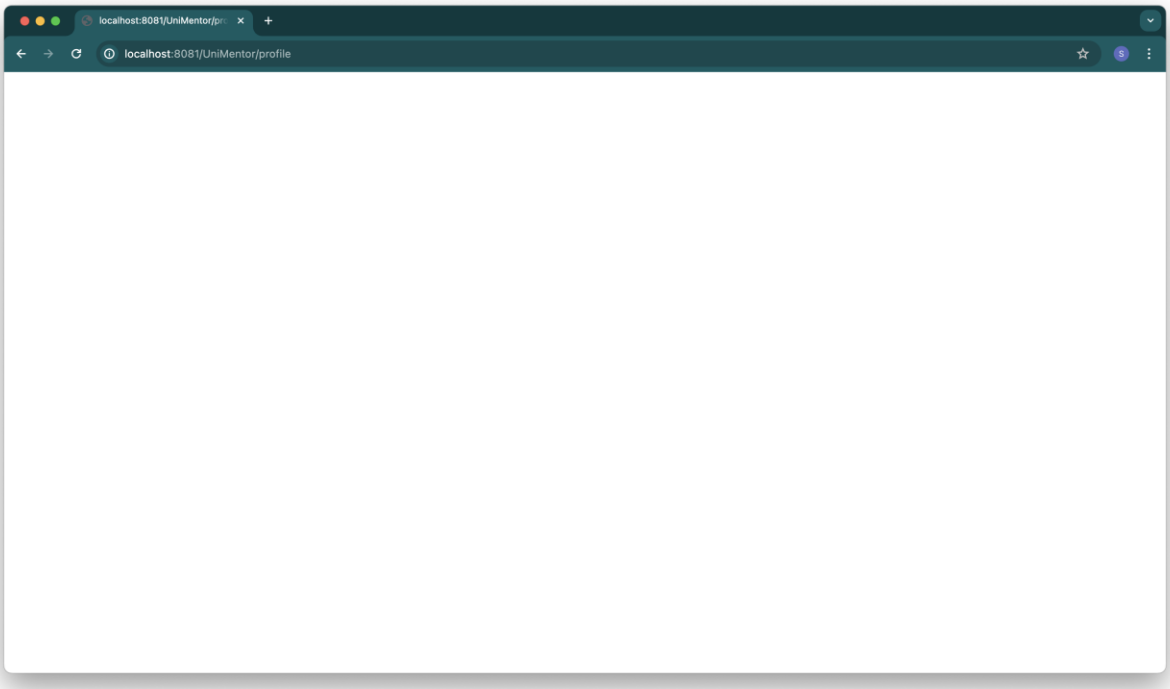


Figure 250: Screenshot of blank page displayed

The error was displayed as :

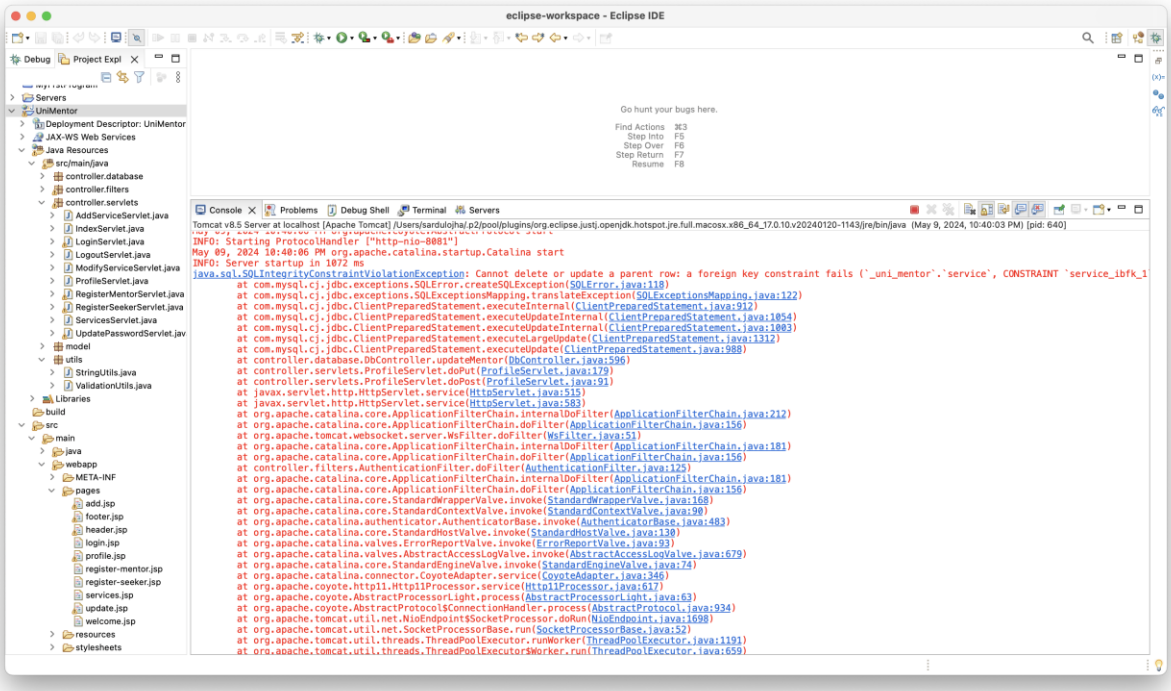


Figure 251: Screenshot of displayed error

When I tried updating the username/ deleting the user manually it would not let me do it.

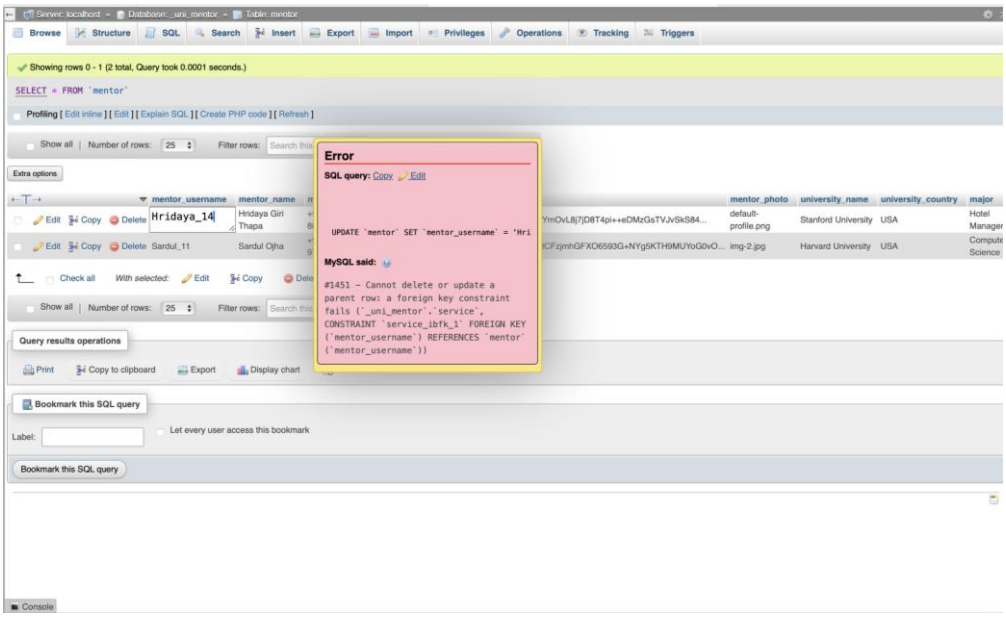


Figure 252: Screenshot of updating/deleting manally from database

Upon lots of research on internet, I came across this youtube video (click for link) which made me understand about “On Delete Cascade and Restrict”. I came to know that “on delete cascade” deletes or updates all the child relations whereas “on delete restrict”

restricts the deletion or update if there is a child relation. So, I changed the key relation to cascade in the palce where I established the primary and foreign key relations.

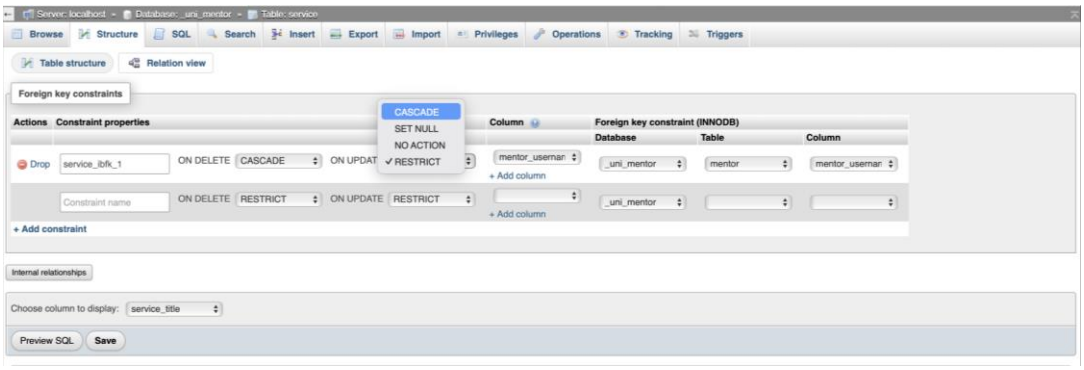


Figure 253: Screenshot of changing key type to cascade

Finally, the username was successfully updated and I was able to overcome this challenge.

8.2. Problems Faced

8.2.1. Problem Faced 1 : Tomcat Failed to start

Descirption : When I was working on my project, all of a sudden my project did not start. The reason was the tomcat server encountered a problem and failed to start. When I clicked on details to find out more about the problem, it read “Server Tomcat v8.5 Server at localhost failed to start”.

Screenshots of Problem:

1. Tomcat failed to start

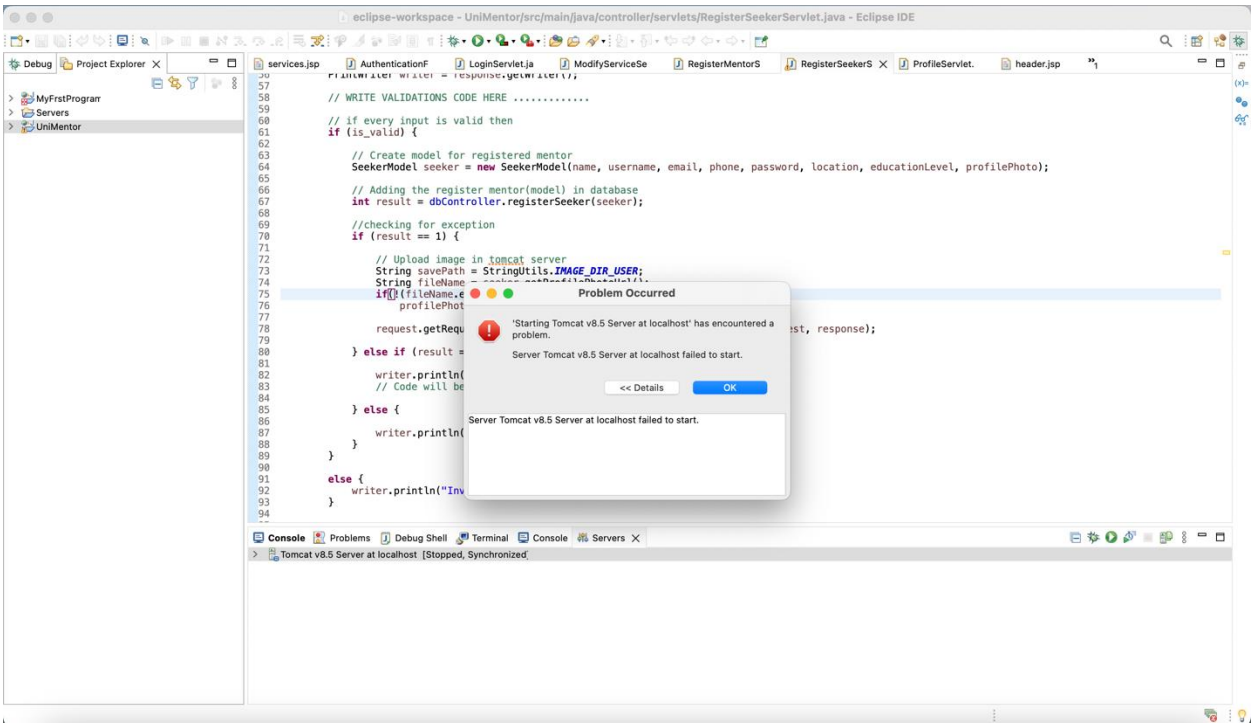


Figure 254: Screenshot of tomcat failed to start

Solution: I tried different methods to solve this problem. First I tried cleaning and restarting the server. But it did not work. I also checked for the same URL mapping of the servlets but it was't the case. I asked a friend for help and he suggested me to delete my previous programs. So, I deleted rest of the programs as they were of no use. Finally when I started the program, the tomcat started working and the problem I faced was solved.

Screenshots of attempt and solution:

1. Cleaning tomcat server

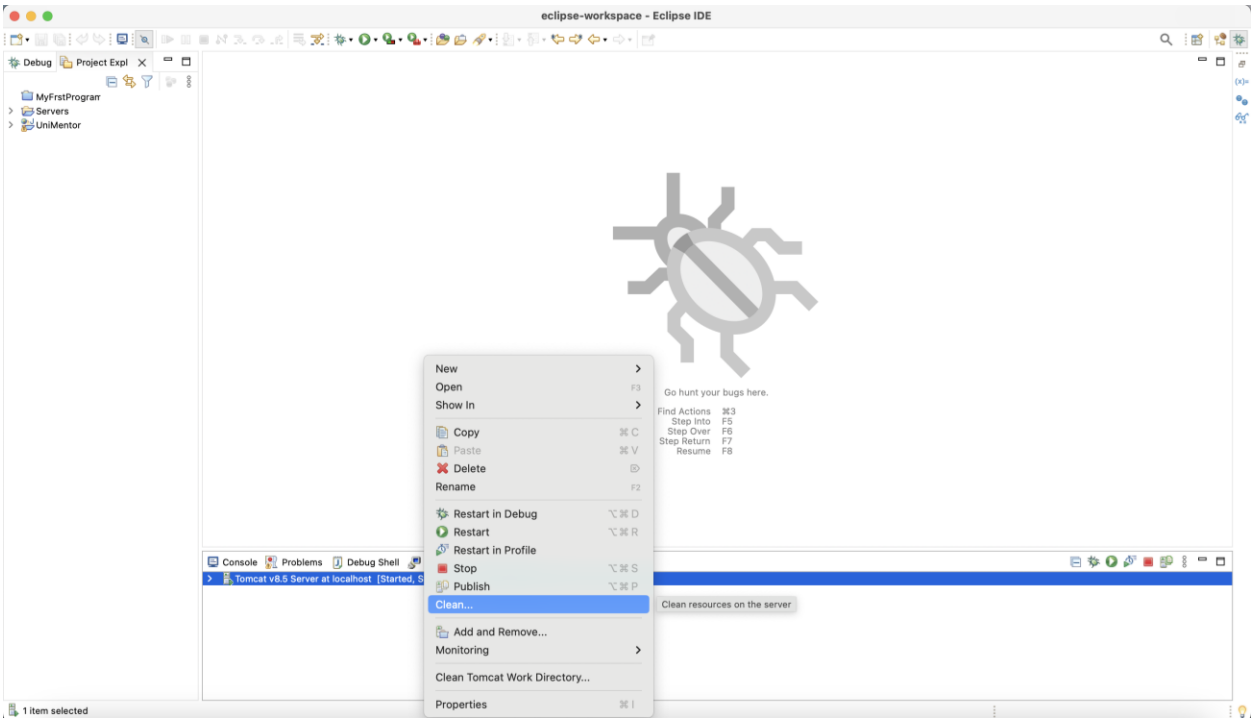


Figure 255: Screenshot of cleaning tomcat

2. Restarting tomcat server

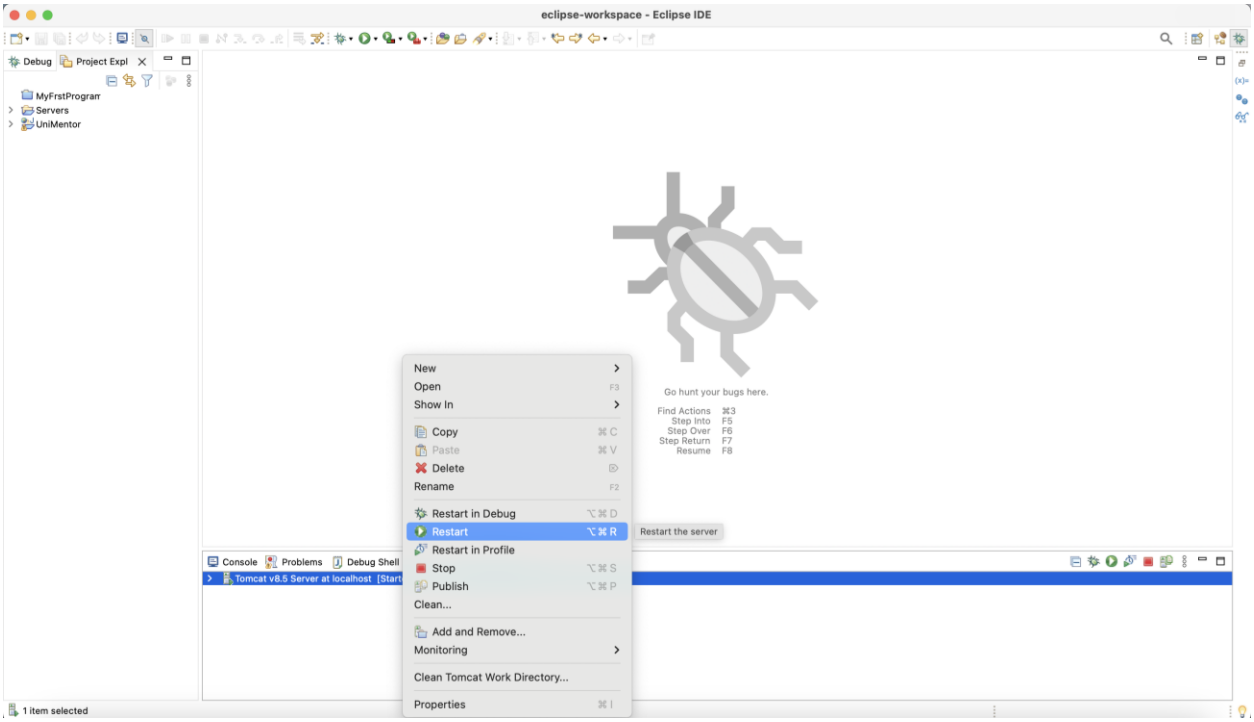


Figure 256: Screenshot of restarting tomcat

3. Deleting other projects (MyFirstProgram)

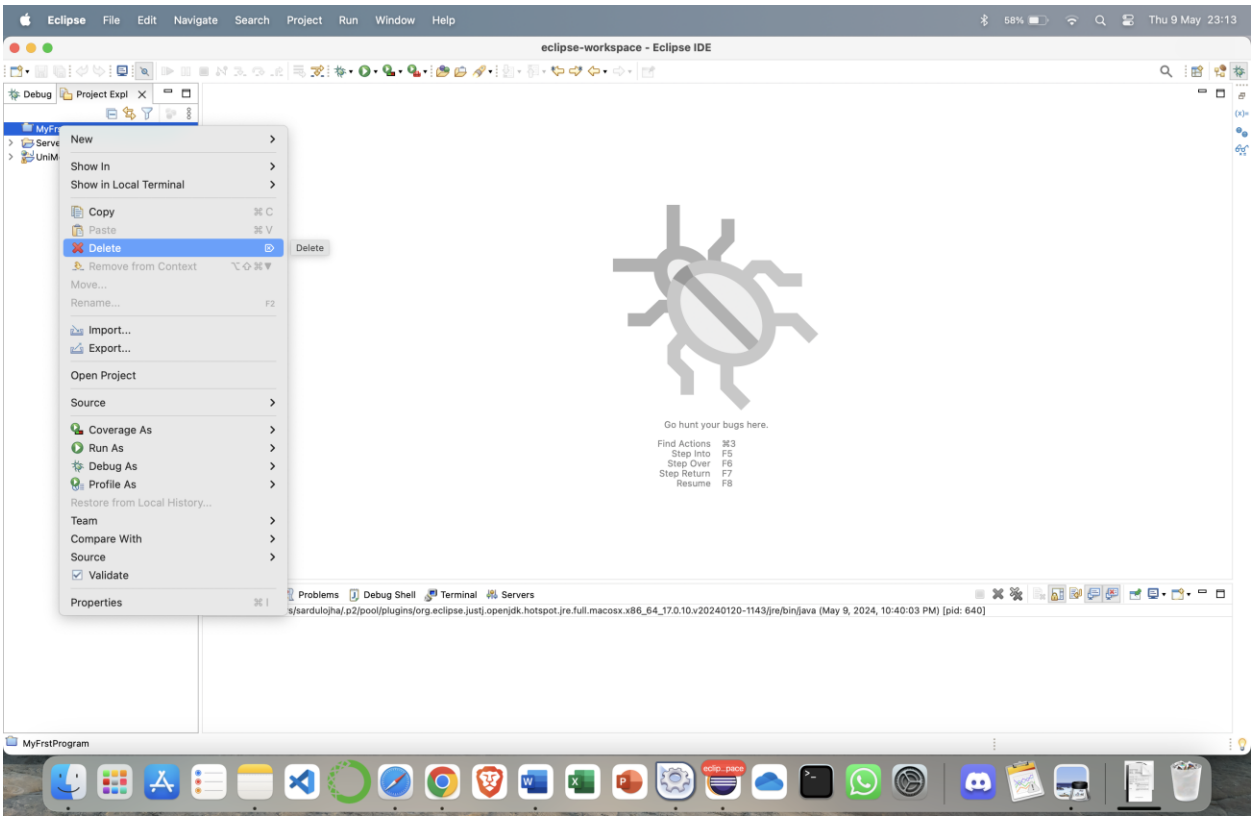


Figure 257: Screenshot of deleting other projects

4. Running the program

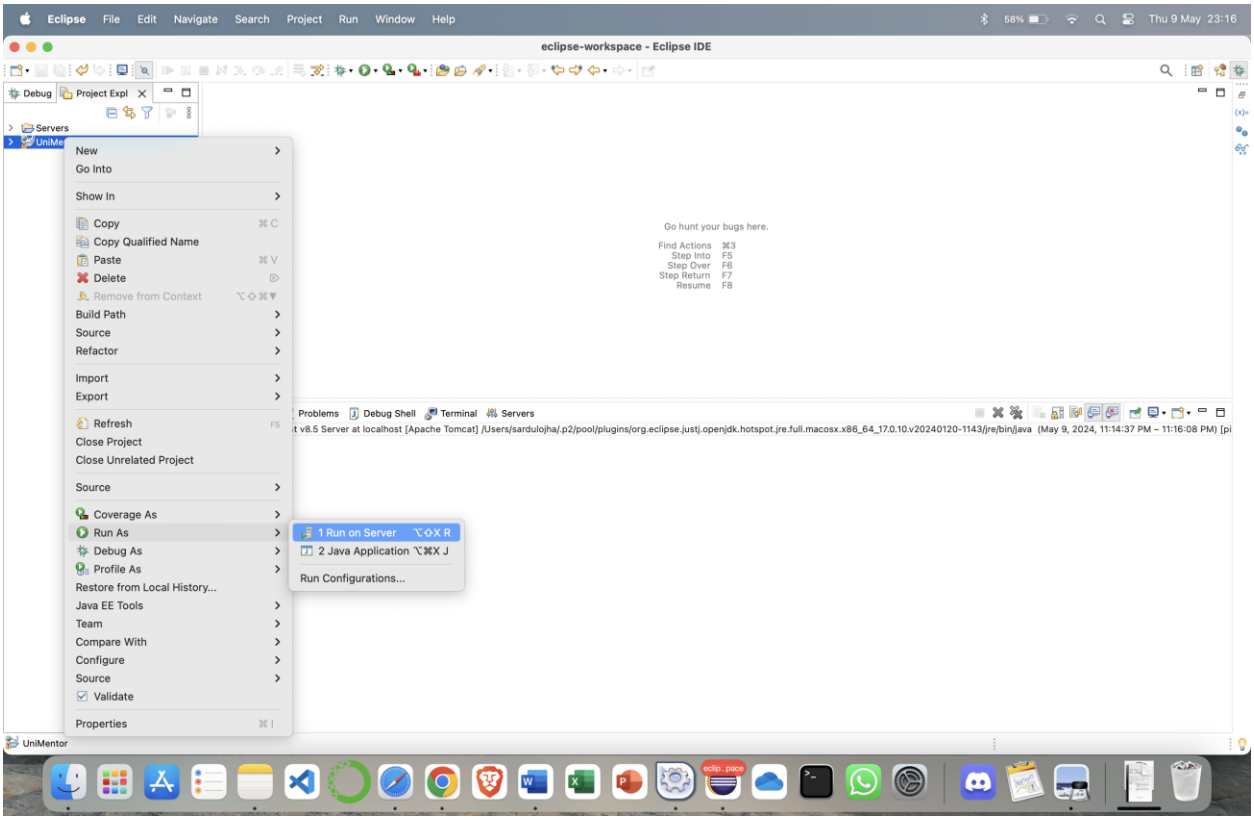


Figure 258: Screenshot of running the program

5. Tomcat started and program is running (problem solved)

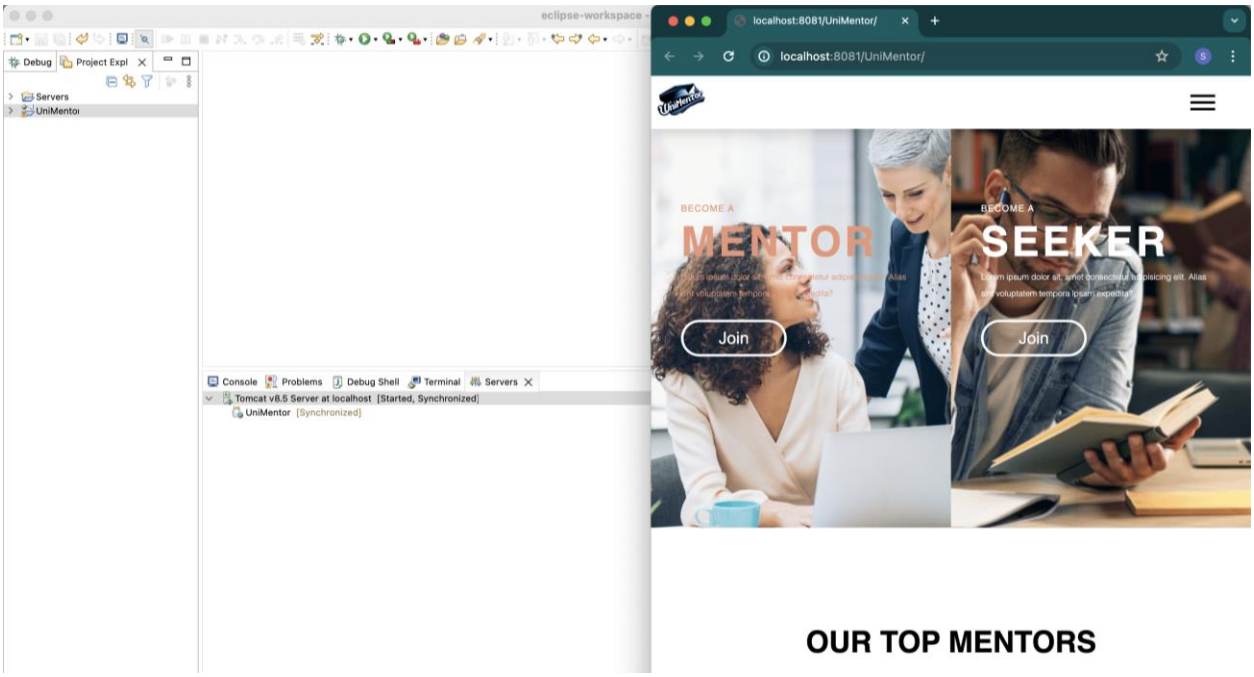


Figure 259: Screenshot of tomcat started and program running

8.2.2. Problem Faced 2 : Redirection from a servlet to another dyanmic web page

Description: The profile page of my website is dynamic. When I click on update password button on my profile page, it redirects to UpdatePasswordServlet for validation and password update. When all password details are valid, the password update is successful and the servlet redirects to welcome page which is static. But in case of invalid password details for password update, the servlet should redirect to profile servlet (as profile page is dynamic). I tried using request dispatcher and send redirect but there was a problem.

Screenshots of Problem:

1. Code to redirect to profile servlet from update password servlet

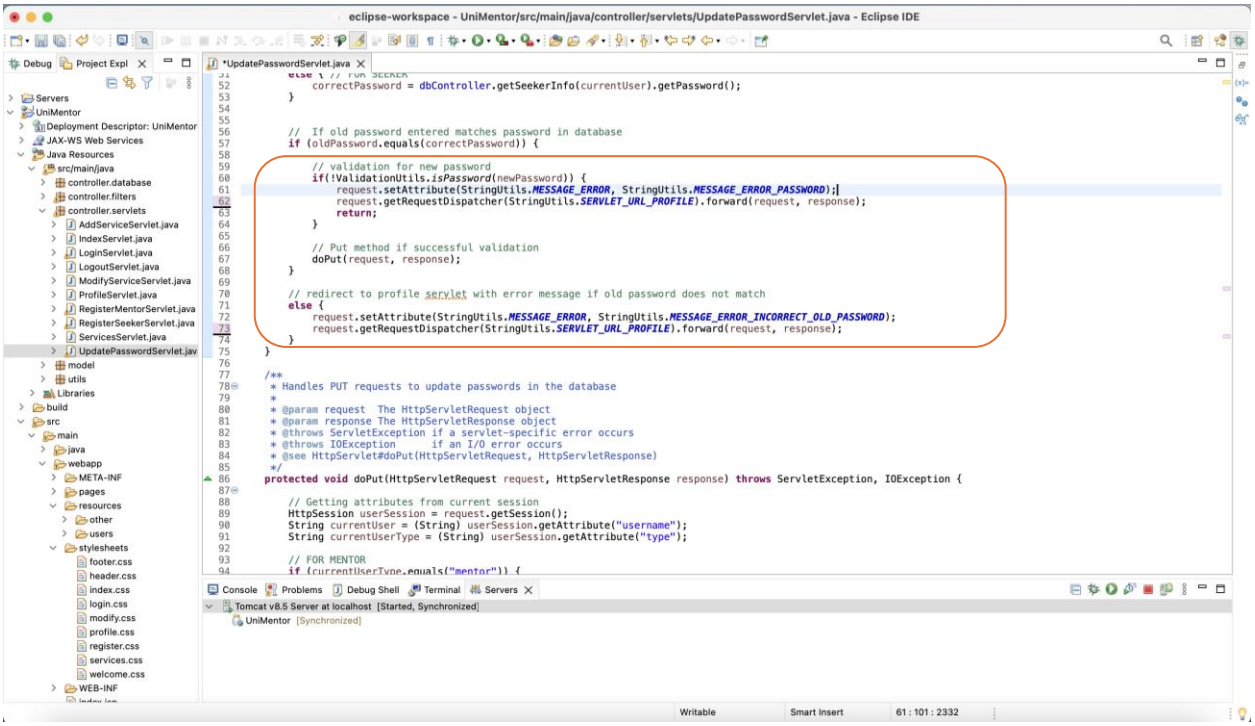


Figure 260: Screenshot of redirection code

2. Entering invalid input in reset password fields

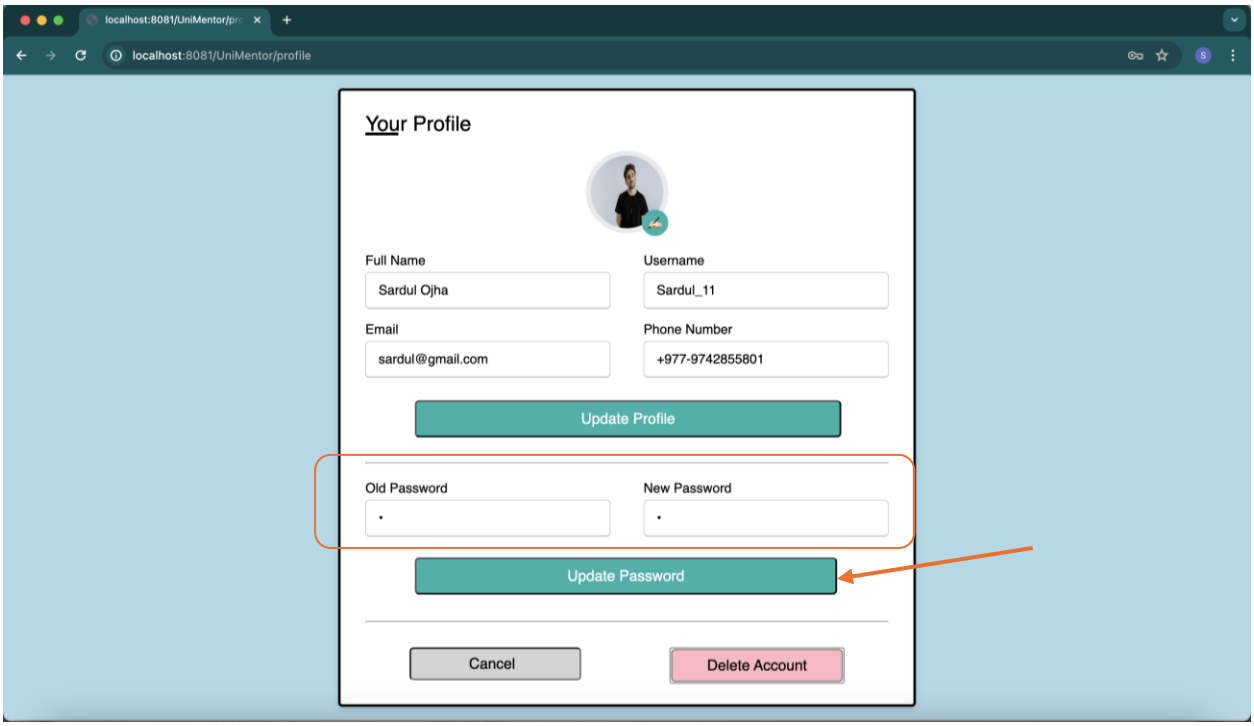


Figure 261: Screenshot of entering invalid in reset password

3. Blank page in case of exception in update password

Figure 262: Screenshot of blank page shown (error)

Solution: When I consulted my teacher and adressed this problem, he advised me to use include method to handle content from UpdatePasswordServlet to ProfileServlet. He also advised me to set the attribute “isUpdate” to 1 and handle that accordingly in the ProfileServlet. Upon changing the code, error message was displayed and program was run accordingly.

Screenshots of attempt and solution:

1. Changed code in update password servlet (include instead of forward)

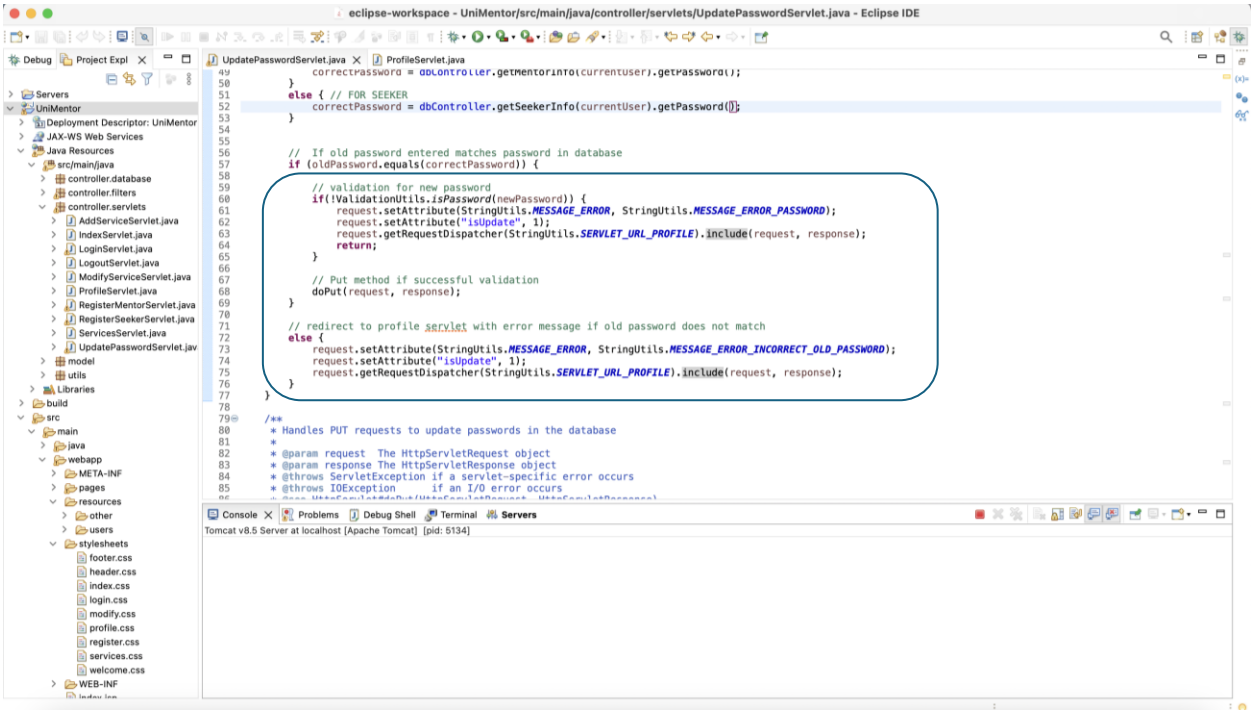


Figure 263: Screenshot of changed code

2. Changed code in profile servlet (handiling isUpdate)

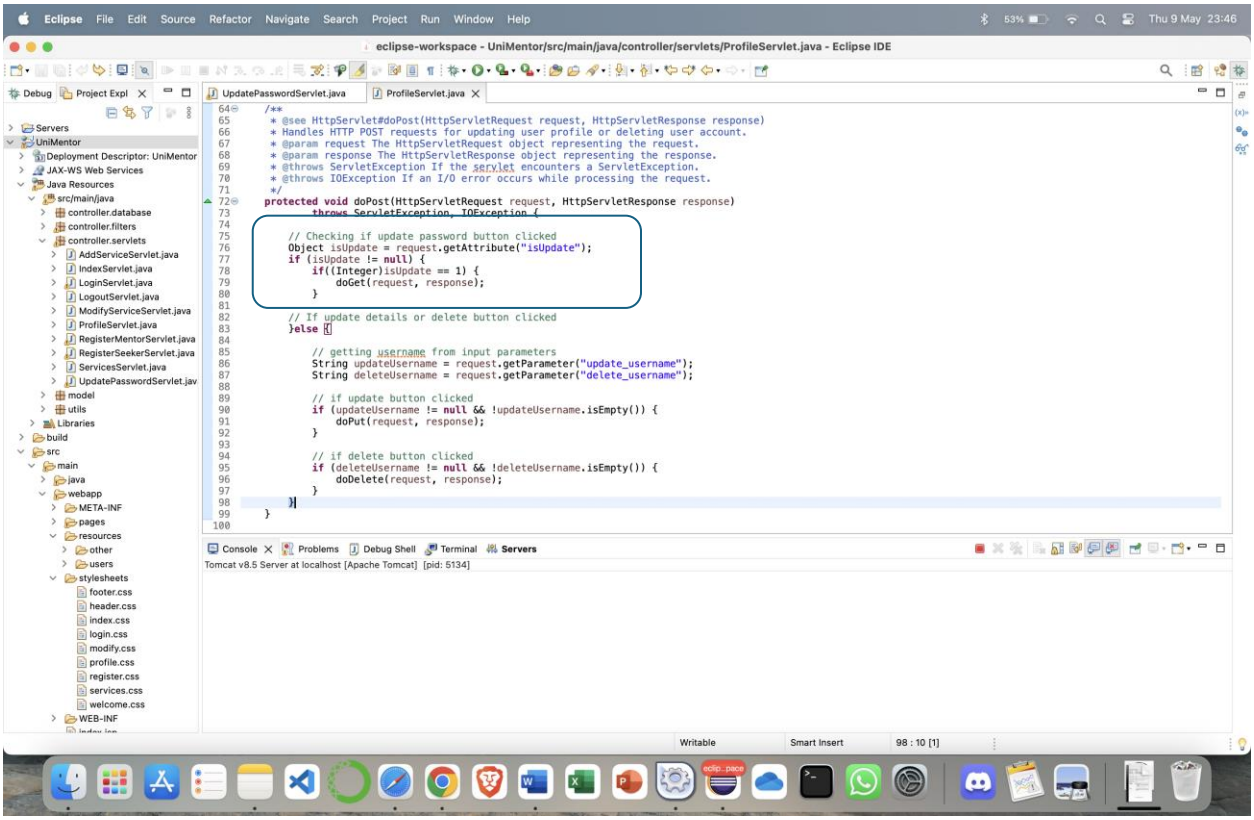


Figure 264: Screenshot of changed code in profile servlet

3. Again entering invalid input in update password

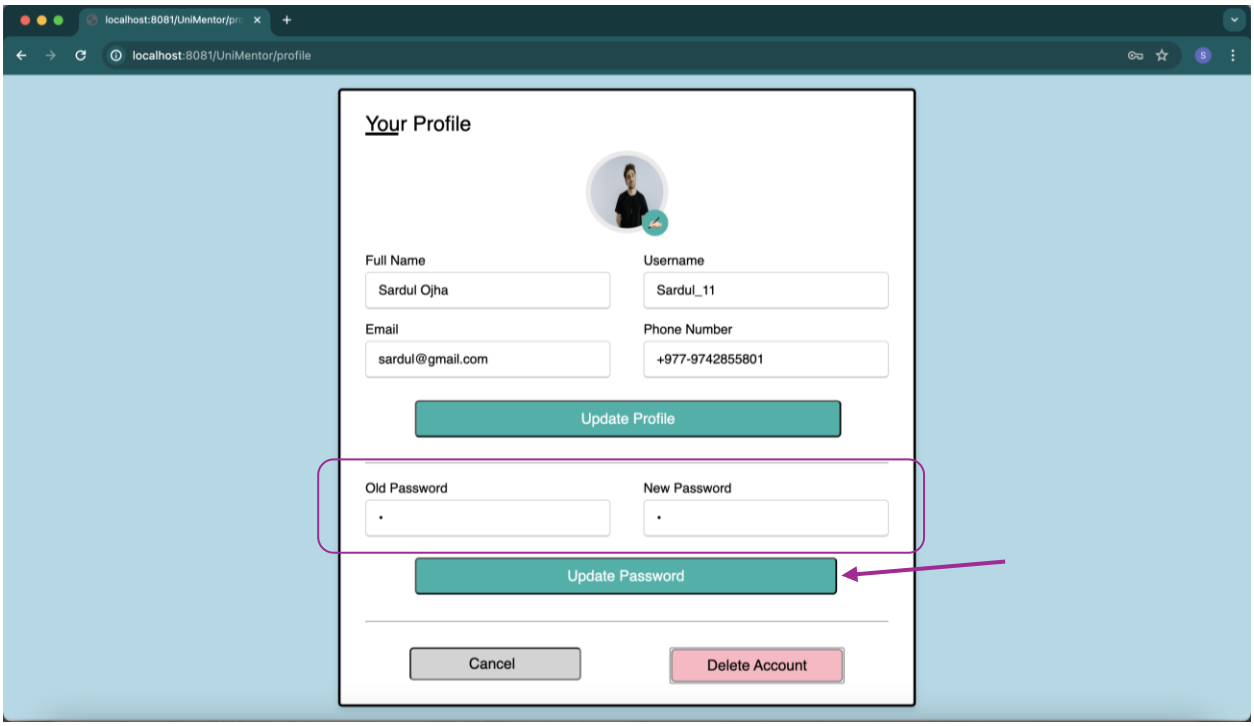


Figure 265: Screenshot of entering invalid input again in reset password

4. Error message displayed in profile page (problem solved)

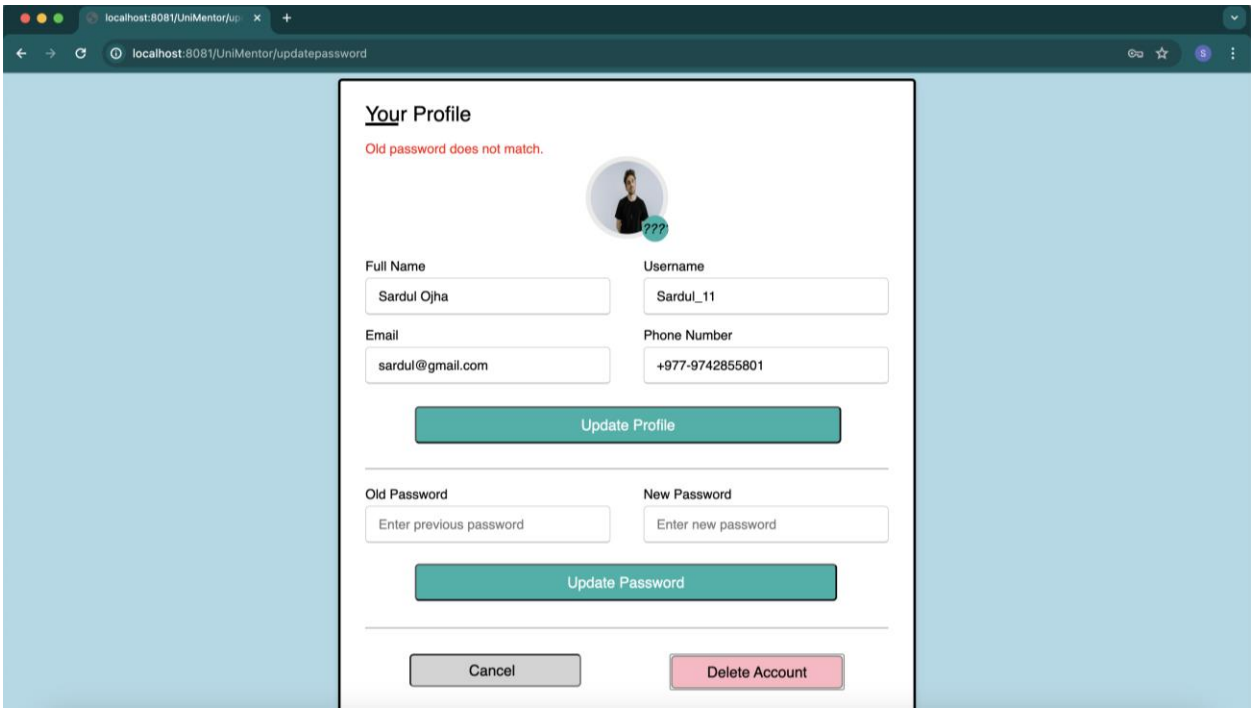


Figure 266: Screenshot of error message displayed (code working)

8.2.3. Problem Faced 3 : Error when trying to add images

Description: After completing registration process, I wanted to move on to next step i.e. adding images for registration. I did everything that was taught in week 9 for image handling. But after that when I tried registering, the following problem was faced.

Screenshots of Problem:

1. Entering valid details to register seeker

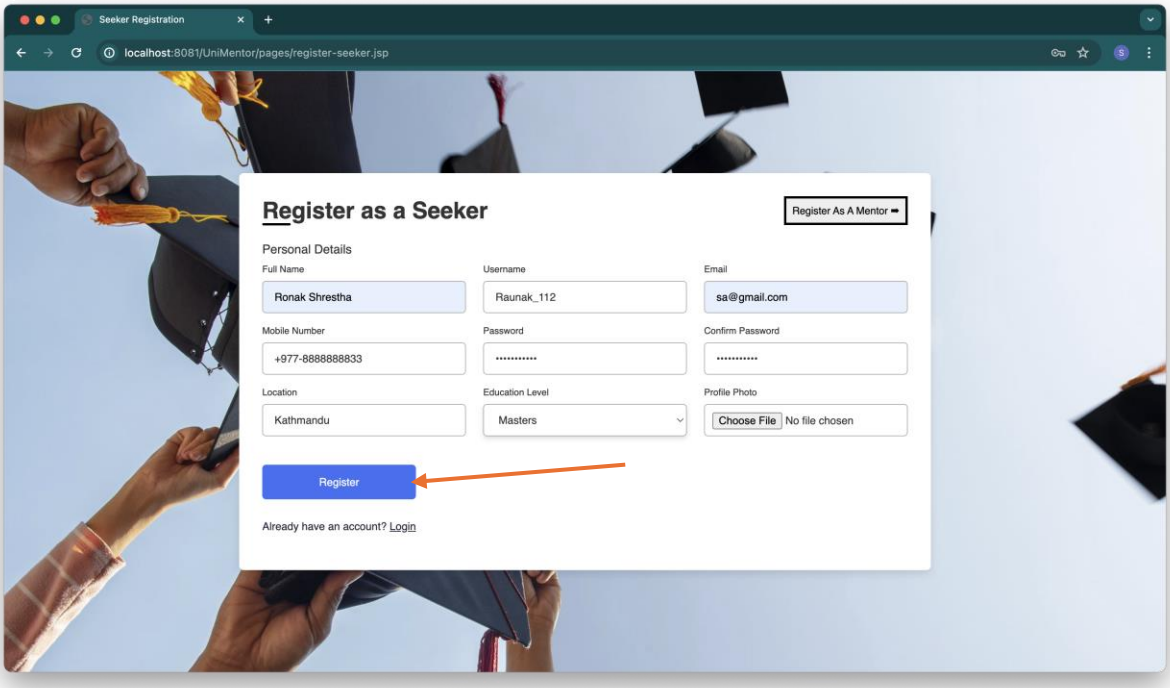


Figure 267: Screenshot of entering valid registration details

2. Error page displayed (NullPointerException)

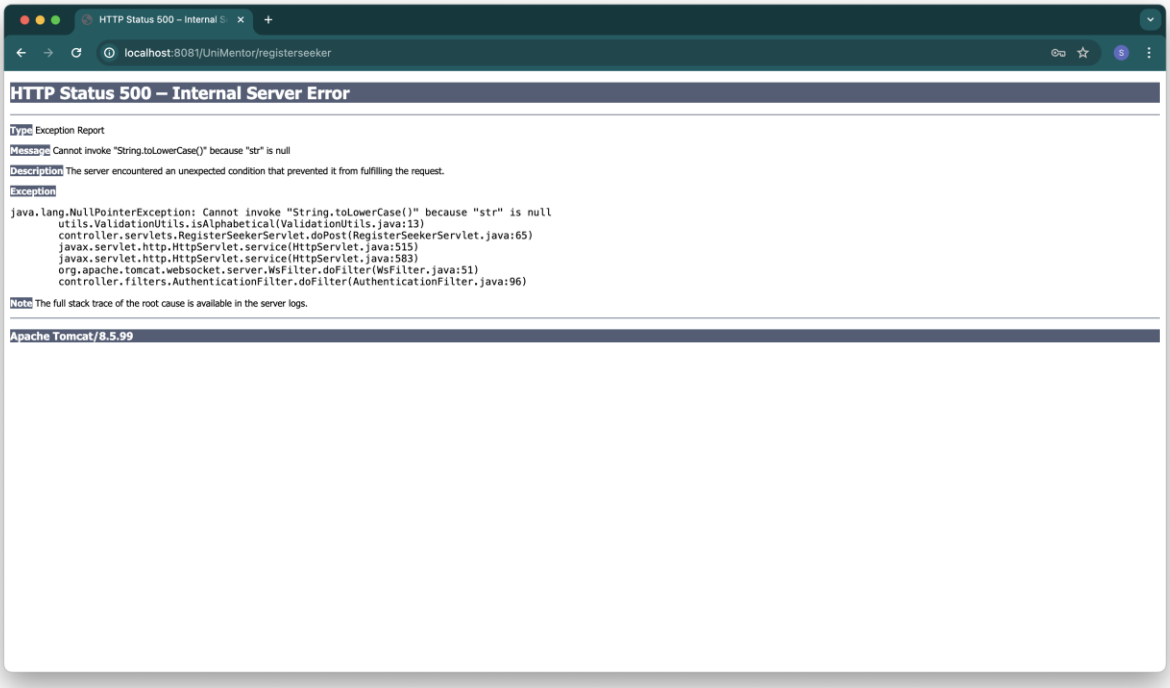


Figure 268: Screenshot of error page

Solution: On reading the error message, there was a problem in my RegisterSeekerServlet. It was also indicating null pointer exception. To tackle this problem, I ran a debugger in my register seeker servlet. On inspecting variables from my debugger it was found that all the extracted text from the input parameters from the jsp were null. So, I again started googling this problem. I ran into stack overflow(link here) again to find out some annotation was missing in my servlet. I checked our teacher's code on github (github link) again to find out that "@MultiPartConfig" was missing from my servlet code. On adding the code, inserted values in the textfield were returned and registration was successful with image.

Screenshots of attempt and solution:

1. Adding breakpoints for debugging

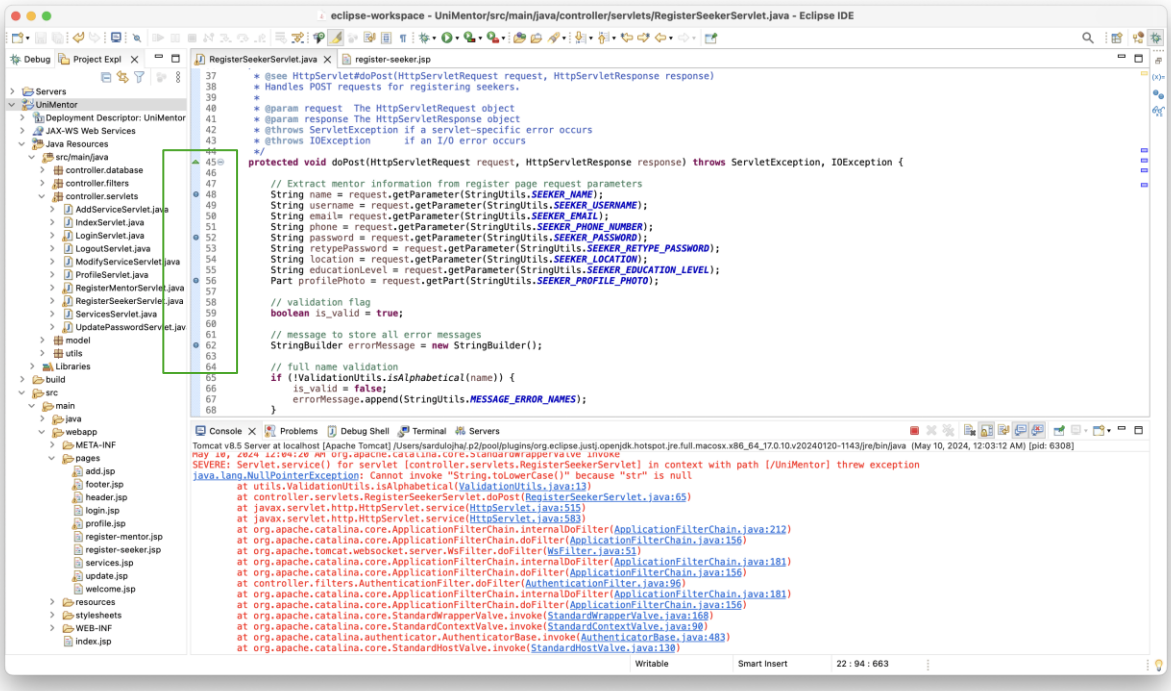


Figure 269: Screenshot of adding breakpoints for debugging

2. Debugging on server

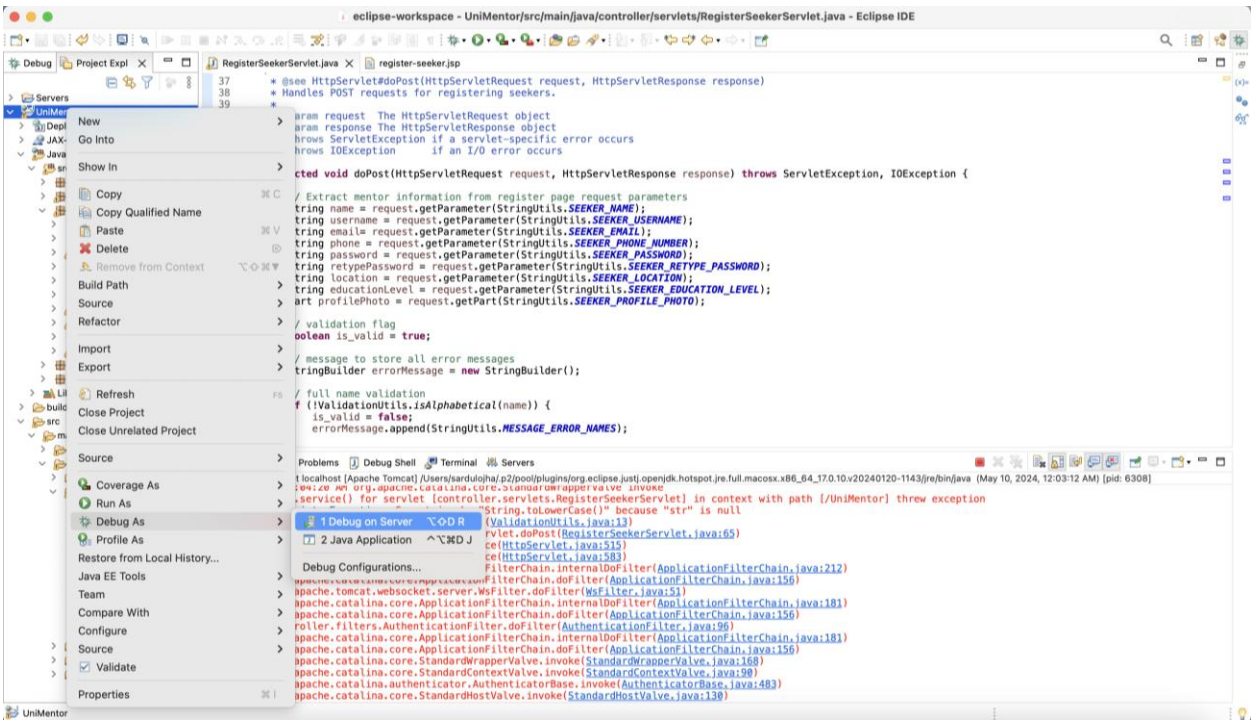


Figure 270: Screenshot of running debugger

3. Registering again to check

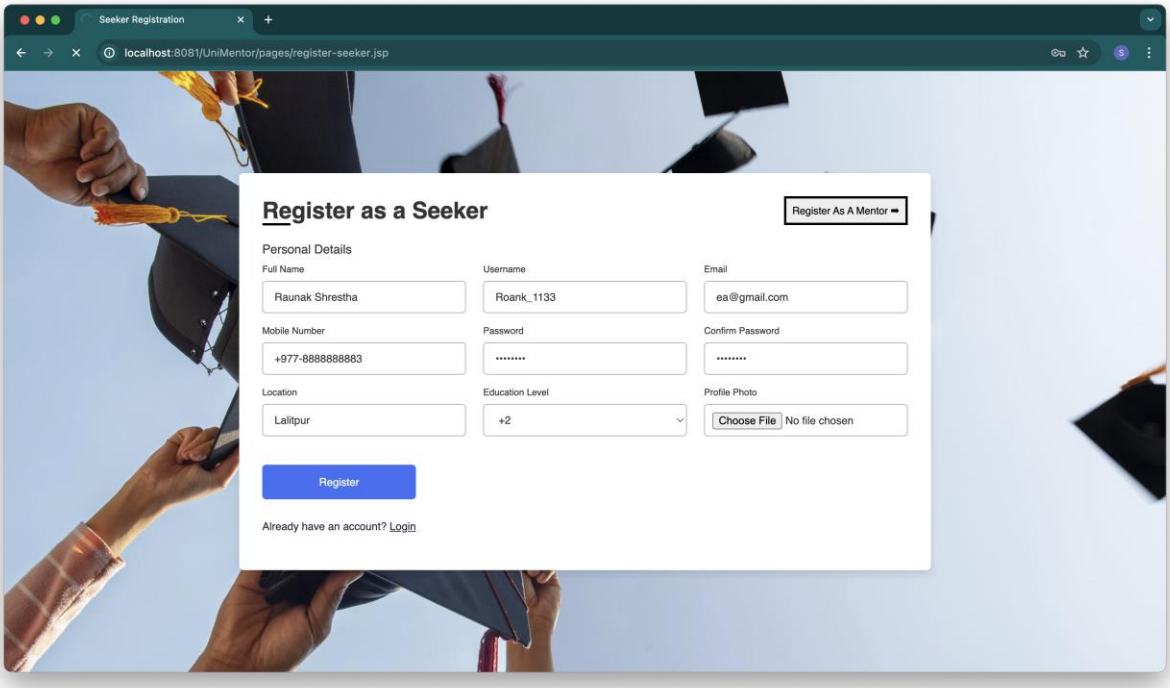


Figure 271: Screenshot of registering again

4. Program stopped on breakpoint

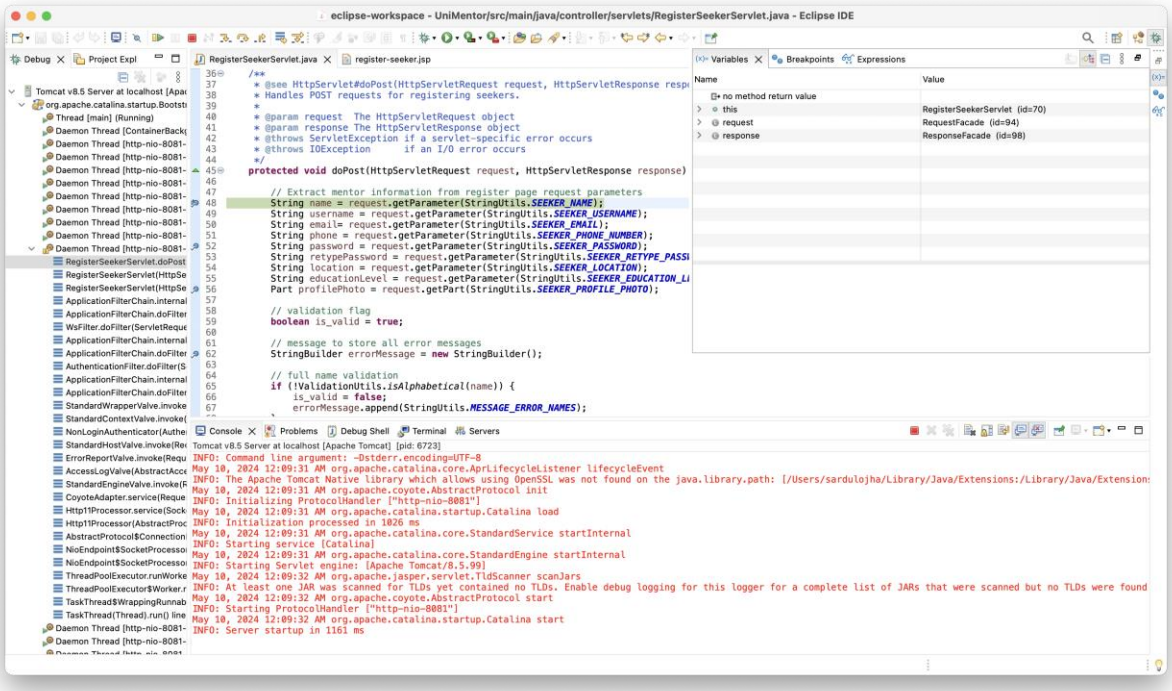


Figure 272: Screenshot of program stopped at breakpoint

5. All input parameters displaying null values

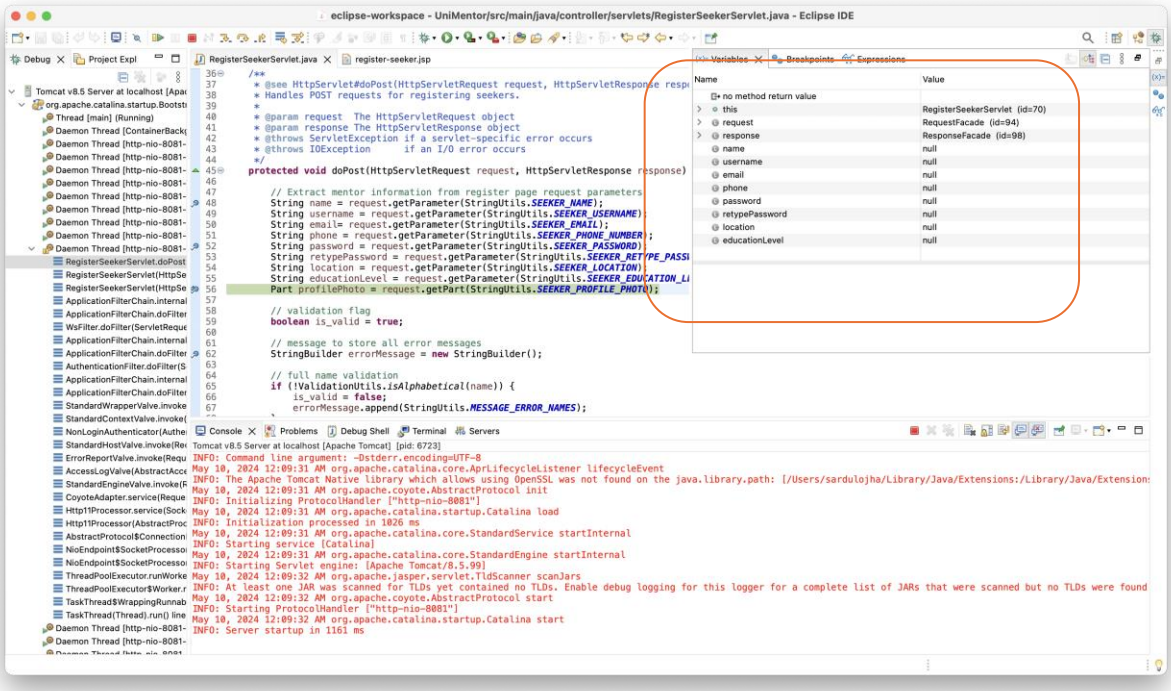


Figure 273: Screenshot of null values returned

6. Serching for solution in stack overflow

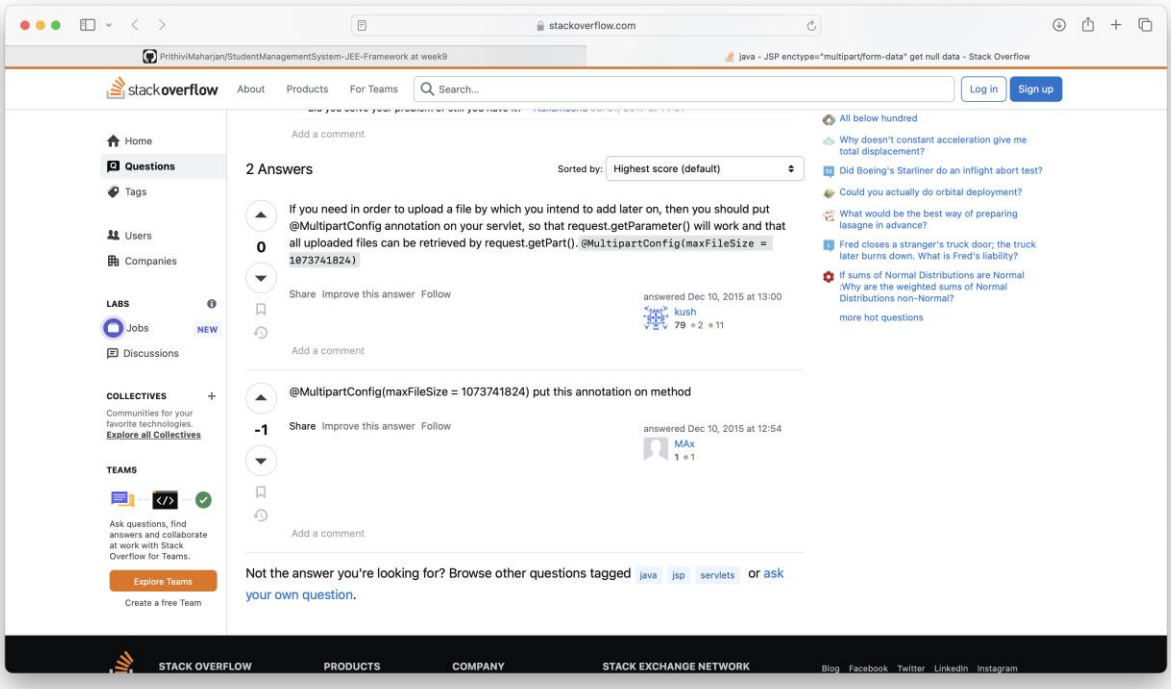


Figure 274: Screenshot of hint in stack overflow

7. Missing multipartconfig code on github

```
21      * This Servlet class handles student registration requests. It extracts student
22      * information from the registration form submission, performs basic data
23      * validation (to be implemented), and attempts to register the student in the
24      * database using a `DBController`. The user is redirected to the login page
25      * upon successful registration.
26      *
27      * @author Prithivi Maharjan (prithivi.maharjan18@gmail.com)
28      */
29     @WebServlet(asyncSupported = true, urlPatterns = { StringUtils.SERVLET_URL_REGISTER })
30     @MultipartConfig(fileSizeThreshold = 1024 * 1024 * 2, // 2MB
31     maxFileSize = 1024 * 1024 * 10, // 10MB
32     maxRequestSize = 1024 * 1024 * 50)
33     public class RegisterStudentServlet extends HttpServlet {
34
35             private static final long serialVersionUID = 1L;
36             private final DBController dbController;
37
38             public RegisterStudentServlet() {
39                     this.dbController = new DBController();
40             }
41
42             /**
43              * Handles HTTP POST requests for student registration.
44              *
45              * @param request  The HttpServletRequest object containing registration form
46              *                 data.
47              * @param response The HttpServletResponse object for sending responses.
48              * @throws ServletException if a servlet-specific error occurs.
49              * @throws IOException      if an I/O error occurs.
50              */
51             @Override
52             protected void doPost(HttpServletRequest request, HttpServletResponse response)
53                             throws ServletException, IOException {
```

Figure 275: Screenshot of corrected/missing code in github

8. Adding the missing code in register servlet

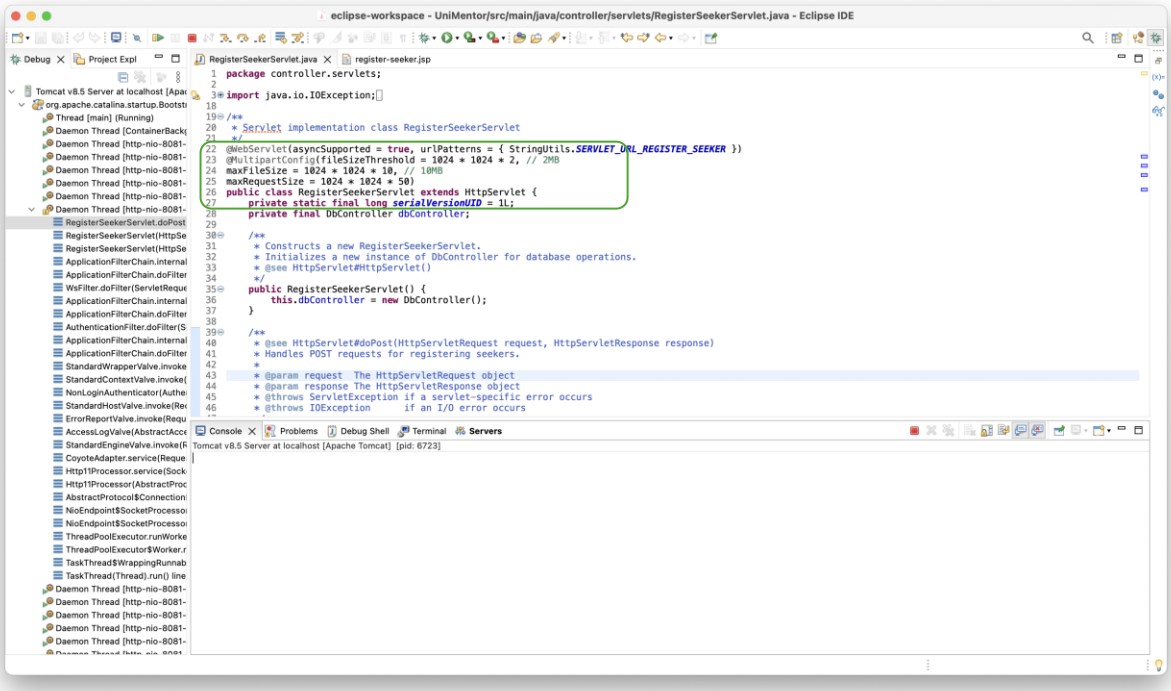


Figure 276: Screenshot of missing code added in servlet

9. Entering register details again for checking

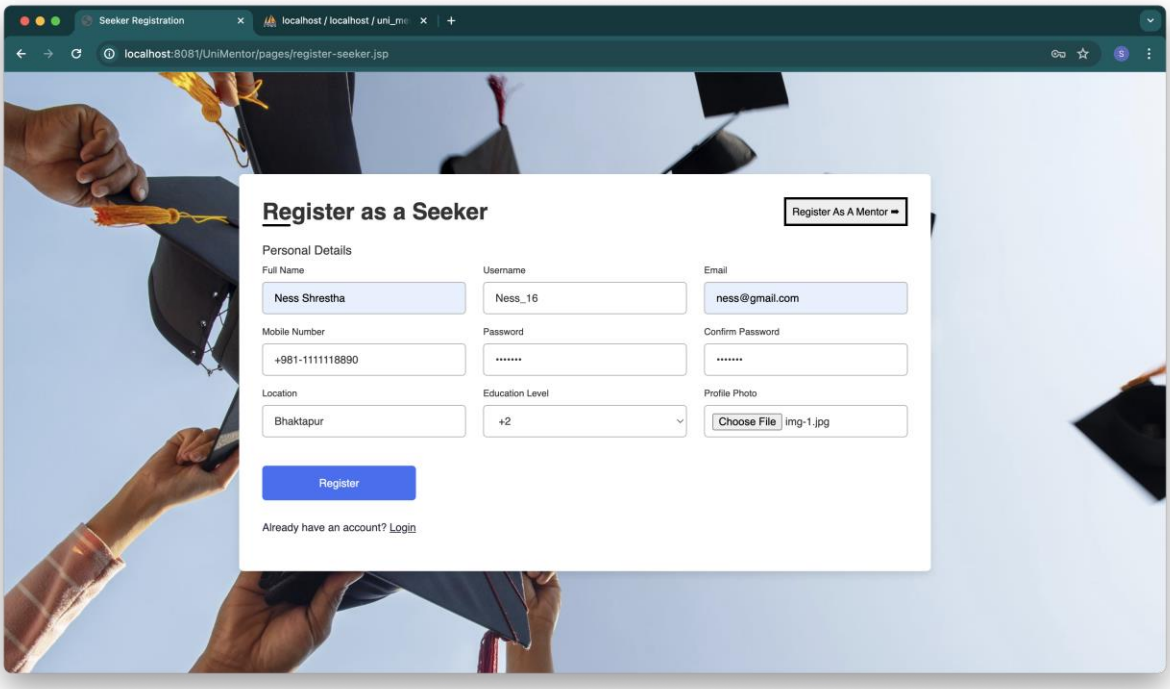


Figure 277: Screenshot of registering again

10. Register successful (Problem solved)

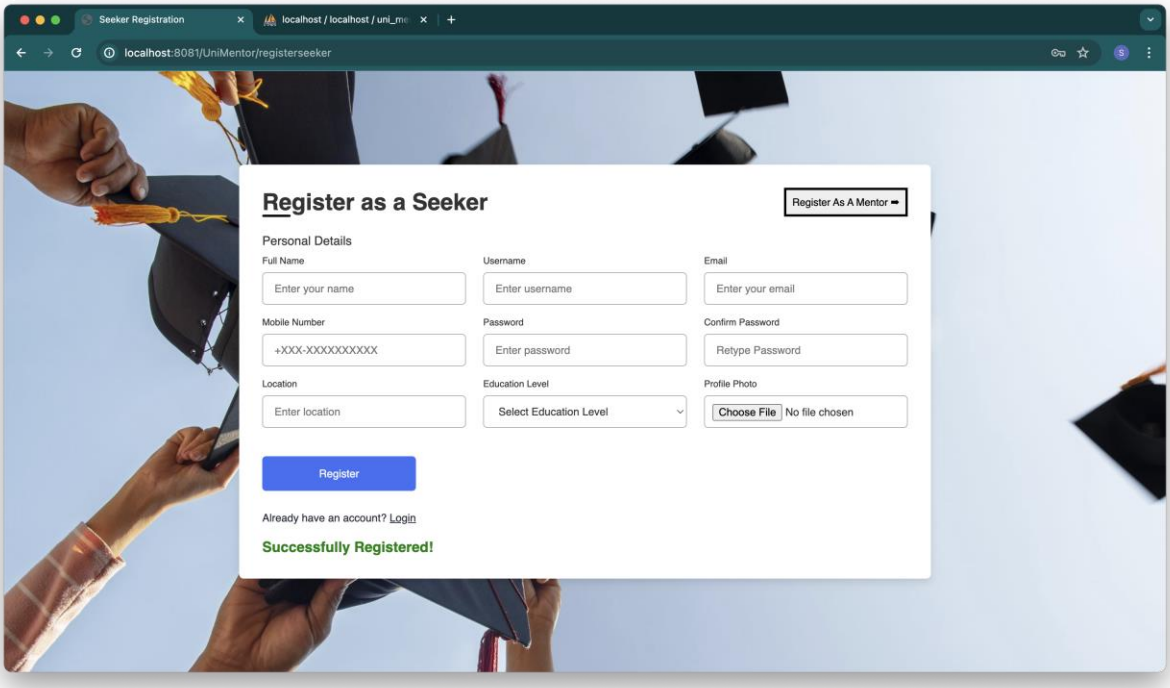


Figure 278: Screenshot of register success (problem solved)

8.3. Reflection

The development of "UniMentor" was a valuable learning experience. It provided insights into various aspects of web application development, including frontend and backend technologies, database management, and user interface design. Throughout the project, I gained a deeper understanding of Java EE server-side technology and its application in building dynamic web applications. One of the most significant lessons learned from this project was the importance of effective time management and prioritization. Managing all the work and a short deadline required too much effort, hard work, and sleepless nights to ensure the timely completion of coursework. Additionally, it also prepared me for the upcoming final year project (FYP), which is expected to be of much higher difficulty. Looking ahead, this project has given me practical skills, critical thinking abilities, and newfound confidence in my ability to tackle complex challenges. Reflecting on the strengths and weaknesses of "UniMentor", I am eager to apply the lessons learned to future projects and further refine my skills. Overall, the experience gained from developing this system has been invaluable in my journey.

9. Conclusion

A thorough evaluation of the project has been conducted in this report, and all the findings have been found to be satisfactory. All the tests that were carried out were successful, and all the project's objectives outlined in the coursework were met, with all the errors and bugs found being fixed.

This coursework has been a valuable learning experience, helping me gain knowledge, skills, and experience. I became much more familiar with Java EE and other tools such as Eclipse, Draw.io, MS Word, and many more. This real-world scenario problem also deepened my understanding of how a dynamic web application is made. Additionally, this project enhanced my research and report writing skills. All these skills and knowledge will be useful in my future endeavors.

Many challenges were encountered and solved during my coursework journey. I had to seek help from my teachers and friends to solve the problems faced. Similarly, I also faced difficulties during the report, such as formatting it correctly, crashing of MS Word and Eclipse IDE. I had to rely on Google for solutions and learned the importance of making backups after completing a major portion of the program and report.

Finally, this project has been a challenging but rewarding experience. I am proud that I was able to complete this project, and I would like to thank everyone, especially all me teachers, who helped me make this project a success. It was a great learning experience, and I am grateful to have been a part of it.

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