



**BILKENT UNIVERSITY**

**Computer Engineering Department**

## **CS 353 DATABASE SYSTEMS FALL 2017**

### **CASESWITCHERS**

*Collaborative Hypertext Dictionary*

## **PROJECT FINAL REPORT**

### **Section 1 - Group 2**

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Available online : <https://djcedrics.github.io/CaseSwitchers>

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# 1. PROJECT DESCRIPTION

CaseSwitchers is a collaborative hypertext dictionary where people can find contents or definitions of computer science and informatics related topics. Unlike traditional dictionaries where users cannot write, edit or comment, users have a control on this web-based dictionary. They can write posts, rate and comment on them. People can find entries about almost every computer programming topics and concepts that are written by the registered users who are authors of the dictionary.

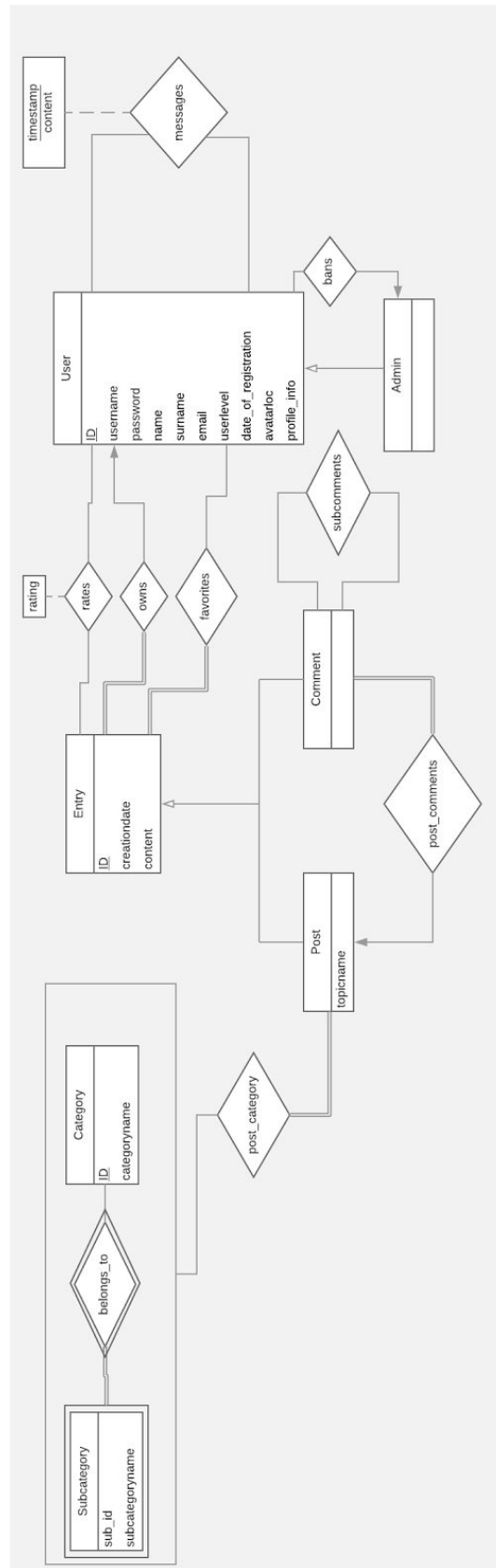
A post that is committed under a topic is called “entry” and entries are the basic elements of the CaseSwitchers.

An entry example for the topic named Computer Science:

*“A scientific discipline where mathematics, logic, creativity, eye disorders and sleep deprivation meet.”*

In general, CaseSwitchers can be considered as a user based dictionary that serves as a source for information and it grows with its users since users create the content. Users can be from anywhere around the world and they can share their knowledge with anyone. The more they post entries, the more CaseSwitchers grows. This makes CaseSwitchers an up-to-date dynamic information platform.

## 2. FINAL E/R MODEL



### **3. RELATION SCHEMAS**

#### **3.1. User**

##### **Relational Model:**

User (ID, username, password, name, surname, email, userlevel, date\_of\_registration, avatarloc, profile\_info)

#### **3.2. Category**

##### **Relational Model:**

Category (ID, categoryname)

#### **3.3. Entry**

##### **Relational Model:**

Entry (ID, creationdate, content)

#### **3.4. Post**

##### **Relational Model:**

Post (ID, topicname)

FOREIGN KEY : ID REFERENCES Entry ( ID )

#### **3.5. Admin**

##### **Relational Model:**

Admin (ID)

FOREIGN KEY: ID REFERENCES User ( ID )

#### **3.6. Comment**

##### **Relational Model:**

Comment (ID)

FOREIGN KEY: ID REFERENCES Entry ( ID )

### **3.7. BannedUsers**

**Relational Model:**

BannedUsers (banned\_id, admin\_id)

FOREIGN KEY: banned\_id REFERENCES User(ID)

### **3.8. Subcategory**

**Relational Model:**

Subcategory (sub\_id, c\_id, subcategoryname)

FOREIGN KEY: c\_id REFERENCES Category (ID)

### **3.9. SubComments**

**Relational Model:**

SubComments (comment\_id, subcomment\_id)

FOREIGN KEY: comment\_id REFERENCES Comment (ID)

FOREIGN KEY: subcomment\_id REFERENCES Comment (ID)

### **3.10. Messages**

**Relational Model:**

Messages (sender\_id, receiver\_id, timestamp, content)

FOREIGN KEY: sender\_id REFERENCES User (ID)

FOREIGN KEY: receiver\_id REFERENCES User(ID)

### **3.11. Rates**

#### **Relational Model:**

Rates(e\_id, u\_id, rating)

FOREIGN KEY: e\_id REFERENCES Entry (ID)

FOREIGN KEY: u\_id REFERENCES User(ID)

### **3.12. Favorites**

#### **Relational Model:**

Favorites(e\_id, u\_id)

FOREIGN KEY: e\_id REFERENCES Entry (ID)

### **3.13. Owns**

#### **Relational Model:**

Owns(e\_id, u\_id)

FOREIGN KEY: e\_id REFERENCES Entry (ID)

FOREIGN KEY: u\_id REFERENCES User (ID)

### **3.14. PostCategory**

#### **Relational Model:**

PostCategory(p\_id, c\_id, s\_id)

FOREIGN KEY: p\_id REFERENCES Post (ID)

FOREIGN KEY: c\_id REFERENCES Category(ID)

FOREIGN KEY: s\_id REFERENCES Subcategory(ID)

### 3.15. PostComment

#### Relational Model:

PostComments(c\_id,p\_id,)

FOREIGN KEY: c\_id REFERENCES Comment(ID)

FOREIGN KEY: p\_id REFERENCES Post(ID)

## 4. IMPLEMENTATION DETAILS

We implemented our database system by using MySQL. We used MySQL Workbench in order to simplify the design of the database part. For handling the server operations, we preferred to use XAMPP.

For the back-end part of our system, we used PHP 7 to allow the communication between database layer and front-end layer. We communicated with the database by executing proper queries in MySQL, and reported the outputs to front-end, by manipulating HTML elements. Moreover, we used PHP also for input validation. Providing an input is not in correct format, it is handled by PHP before sending a query to the database and proper error message is shown in an alert bar at the top of the pages.

For the front-end, we mainly relied on a front-end framework called Bootstrap. Bootstrap mainly consists of a package of HTML, CSS, Javascript files. When required, we did some modifications on the CSS files of bootstrap to align the views. Also, by correctly using its grid-system, we managed to make the front-end part responsive. Additionally, we used Javascript to handle some of the dynamic front-end operations.

#### Problems we faced

- **PHP Compatibility Issues**

PHP has compatibility issues between its versions. The functions that are supported in the old versions might not be supported by the new version. We used PHP 7 since we thought it would satisfy our needs. We consulted to PHP documentations and tutorials to learn the details of functions that we would like to



use. We wanted to test these functions in our system, however, we faced with issues like *function not found* and these issues caused some troubles during the implementation phase until we realised that PHP 7 did not support PHP 4 functions. For instance, functions starting with *mysql* prefix are not supported in PHP 7 and we were required to use the corresponding ones starting with *mysqli* prefix. We had to spent some extra time to figure out that issue.

- **Problem at image upload**

We provide the functionality of uploading a profile image in the system so that users can freely choose a profile picture from their environment and upload it to the system. While file is at the moving stage, we faced with a PHP issue saying *Permission denied*. After some Google searches, we realized that the local path that we have the server running on do not have *Write* permission on the directory that it is trying to write to. By modifying the operating system's read/write options for the image upload folder, we solved this issue.


## 5. ADVANCED DATABASE COMPONENTS

### 5.1. Secondary Indices

For Messages, we have Messages (sender\_id, receiver\_id, timestamp, content) table.

**CREATE INDEX** content\_index **USING BTREE ON** Messages(content);

After running the above statement, our newly created index is provided:

		content_index	BTREE	Hayır	Hayır	content	0	A	Hayır
---	---	---------------	-------	-------	-------	---------	---	---	-------

For user, we have User (userID, username, password, name, surname, email, userlevel, date\_of\_registration, avatarloc, profile\_info) table.

**CREATE INDEX** name\_index **USING BTREE ON** User(username);

After running the above statement, our newly created index is provided:

		name_index	BTREE	Hayır	Hayır	username	0	A	Hayır
---	---	------------	-------	-------	-------	----------	---	---	-------

### 5.2. Advanced Features

- **Trigger**

*Trigger for updating the user level according user's ratings:*

**CREATE TRIGGER** user\_level\_update

**AFTER INSERT ON** Rates

**FOR EACH ROW**

**UPDATE** User u **INNER JOIN** (SELECT o.u\_id, SUM(entryrating) as userrating

```

FROM Owns o, (SELECT e_id, SUM(rating) as entryrating
FROM Rates GROUP BY e_id) t WHERE
o.e_id = t.e_id GROUP BY o.u_id
ORDER BY userrating DESC) t2 ON u.userID = t2.u_id
SET userlevel = CASE
    WHEN userrating <=10 THEN 'Freshman'
    WHEN userrating > 10 AND userrating <=100 THEN 'Sophomore'
    WHEN userrating > 100 AND userrating <=500 THEN 'Junior'
    WHEN userrating > 500 AND userrating <=1000 THEN 'Senior'
    WHEN userrating > 1000 AND userrating <=2000 THEN 'Post-Senior'
    WHEN userrating > 2000 AND userrating <=3000 THEN 'Code Enthusiast'
    WHEN userrating > 3000 AND userrating <=5000 THEN 'Code Expert'
    WHEN userrating > 5000 AND userrating <=10000 THEN 'Code Meister'
    WHEN userrating > 10000 AND userrating <=50000 THEN 'The Don of Codes'
    WHEN userrating > 50000 THEN 'Code God' END

```

*When a subcategory is deleted, the posts under it will be assigned to NULL category.*

```

CREATE TRIGGER before_subcategory_delete
BEFORE DELETE ON Subcategory
FOR EACH ROW
BEGIN
    UPDATE SubCategory SET c_id = NULL WHERE sub_id= (SELECT *
FROM OLD.sub_id ) END

```

- **Stored Procedures**

*Get the Rating of a User by ID:*

```

USE mydb;
DROP PROCEDURE IF EXISTS getRatingByUserID;
delimiter //
CREATE DEFINER=`root`@`localhost` PROCEDURE `getRatingByUserID` (param INT)
BEGIN
SET @s = 'WITH userentries
    AS (SELECT e_id, u_id FROM Entry, Owns, WHERE (Owns.e_id = Entry.ID AND
    u_id = @user_id))
    SELECT u_id, sum(rating) FROM Rates, userentries WHERE (Rates.e_id =
    userentries.e_id AND u_id = @user_id)';
SELECT @s;
PREPARE stmt FROM @s;
EXECUTE stmt;
END delimiter ;

```

- **View**

*User Messages View:*

```

CREATE VIEW user_messages as
SELECT*from Messages

```

In the inbox.php file, our PHP code is like this:

```

$query = "SELECT * FROM user_messages WHERE (receiver_id = '$login_id' OR
sender_id = '$login_id') ;

```

User Ratings View:

```
CREATE VIEW user_rate as
    SELECT e_id, sum(rating) as entryrating
    FROM Rates
```

In the users.php file, our PHP code is like this:

```
$query3 = "SELECT user_rate WHERE e_id = '$entryid'";
```

### 5.3. Reports

*Report for displaying top 5 most populated category:*

```
SELECT COUNT(*), c.categoryname FROM Category c, Postcategory pc
WHERE pc.c_id = c.ID
GROUP BY c.categoryname
ORDER BY COUNT(*) DESC
LIMIT 5;
```

**Output:**           Computer Science : 6  
                  Machine Learning : 5  
                  Robot Sophia : 4  
                  Apple :3  
                  Malwares on Phones : 2

*Report for displaying the most rated user:*

```
SELECT username
FROM User user1, (SELECT o.u_id, SUM(entryrating) as userrating
                  FROM Owns o, (SELECT e_id, SUM(rating) as entryrating
                                FROM Rates
                                GROUP BY e_id) t
                  WHERE o.e_id = t.e_id
                  GROUP BY o.u_id) t2
WHERE user1.userID = t2.u_id AND t2.userrating = (SELECT MAX(userrating) FROM
(SELECT o.u_id, SUM(entryrating) as userrating
  FROM Owns o, (SELECT e_id, SUM(rating) as entryrating
                FROM Rates GROUP BY e_id) t
  WHERE o.e_id = t.e_id
  GROUP BY o.u_id) t2, User U)
```

**Output:** Arif

## 6. USER MANUAL

- Home Page

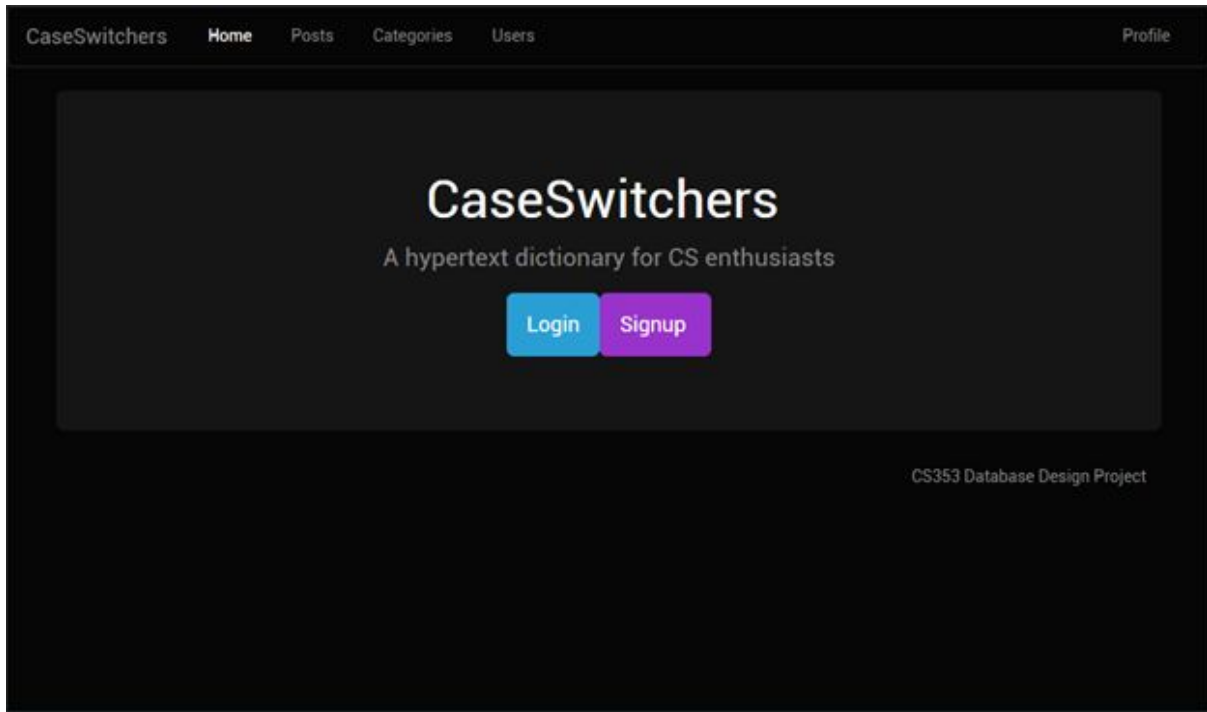
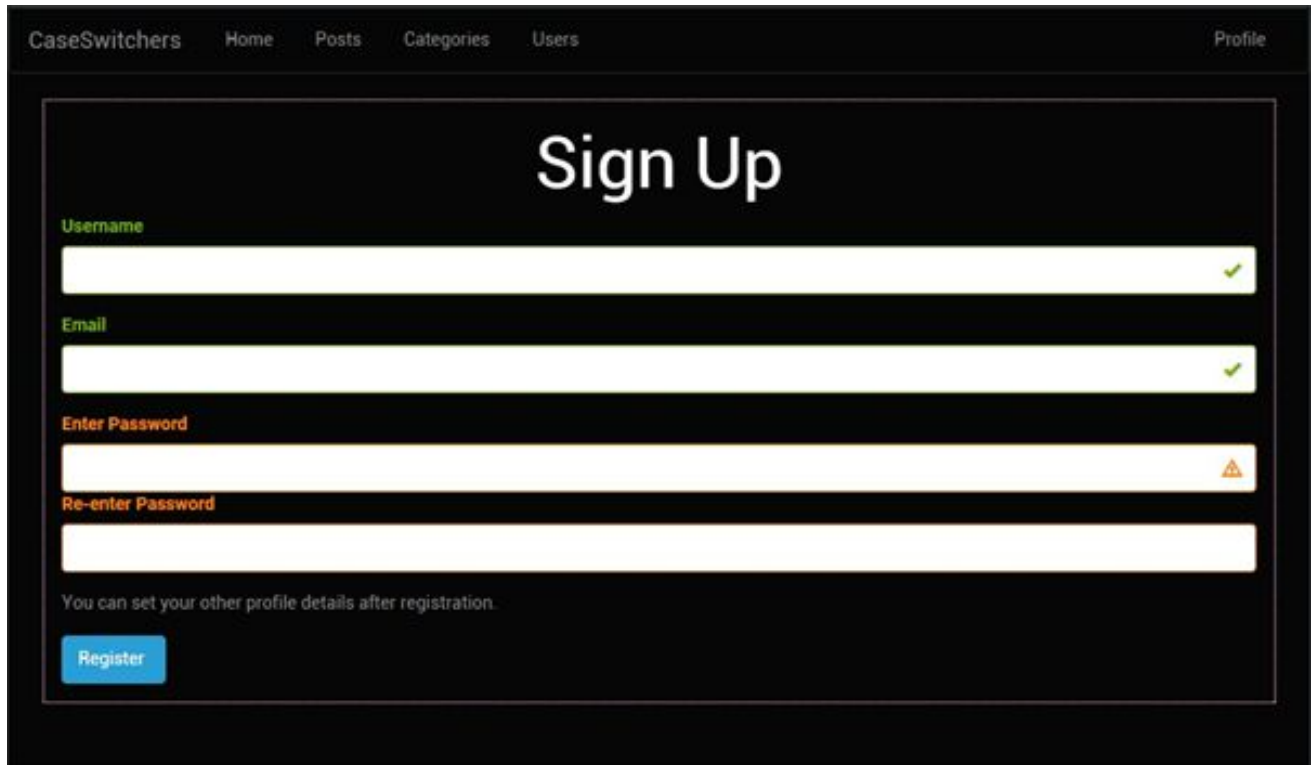


Figure 1: Home Page of CaseSwitchers

This is the home page of CaseSwitchers. You are required to have an account to see the contents. Therefore, if you have a current account, you can login to our system by clicking on the “Login” button. However, if you don’t have an account yet, you can easily sign up by clicking on the “Signup” button.

- **SignUp Screen**

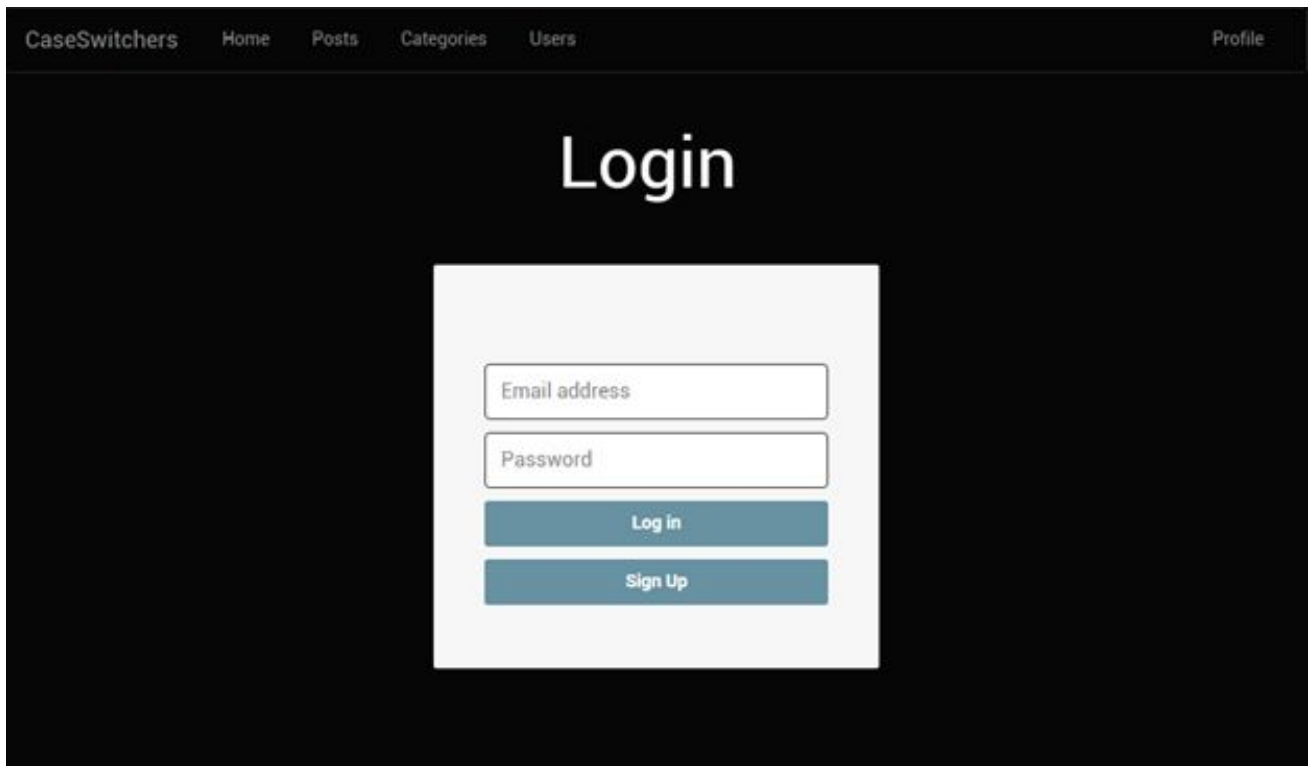


The screenshot shows a web application interface with a dark blue header. The header contains navigation links: 'CaseSwitchers', 'Home', 'Posts', 'Categories', 'Users', and 'Profile'. The main content area is white and features a large 'Sign Up' title. Below the title are four input fields: 'Username', 'Email', 'Enter Password', and 'Re-enter Password'. The 'Username' and 'Email' fields have green checkmarks at the end, indicating they are valid. The 'Enter Password' field has a red warning icon at the end. Below the input fields is a blue 'Register' button. At the bottom of the form, there is a note: 'You can set your other profile details after registration.'

Figure 2: Sign Up Screen

In order to sign up, you are required to create a username which will be the name seen on your posts and comments. Additionally, you ought to enter your current e-mail address. After providing this information, you should enter a password and confirm the password by re-entering it. As it is stated on the below of the screen, you will be able to set your profile information again after you signed up. After you logged in, you will be redirected to home page. If you are an admin, you will be redirected to Admin Panel.

- **Login Screen**



The screenshot shows the login page of a website. At the top, there is a dark navigation bar with the following links: CaseSwitchers, Home, Posts, Categories, Users, and Profile. The main content area has a dark background. In the center, the word "Login" is displayed in a large, white, sans-serif font. Below the title, there is a white rectangular box containing the login form. The form consists of two input fields: "Email address" and "Password", both with light gray borders. Below these fields are two blue buttons with white text: "Log in" and "Sign Up".

Figure 3: Login page

Figure 3 shows the login page of the website. If you are a registered user, you can login to your account by entering your e-mail address and your password. Otherwise, you should click on the “Sign Up” button.

- **Display User List**

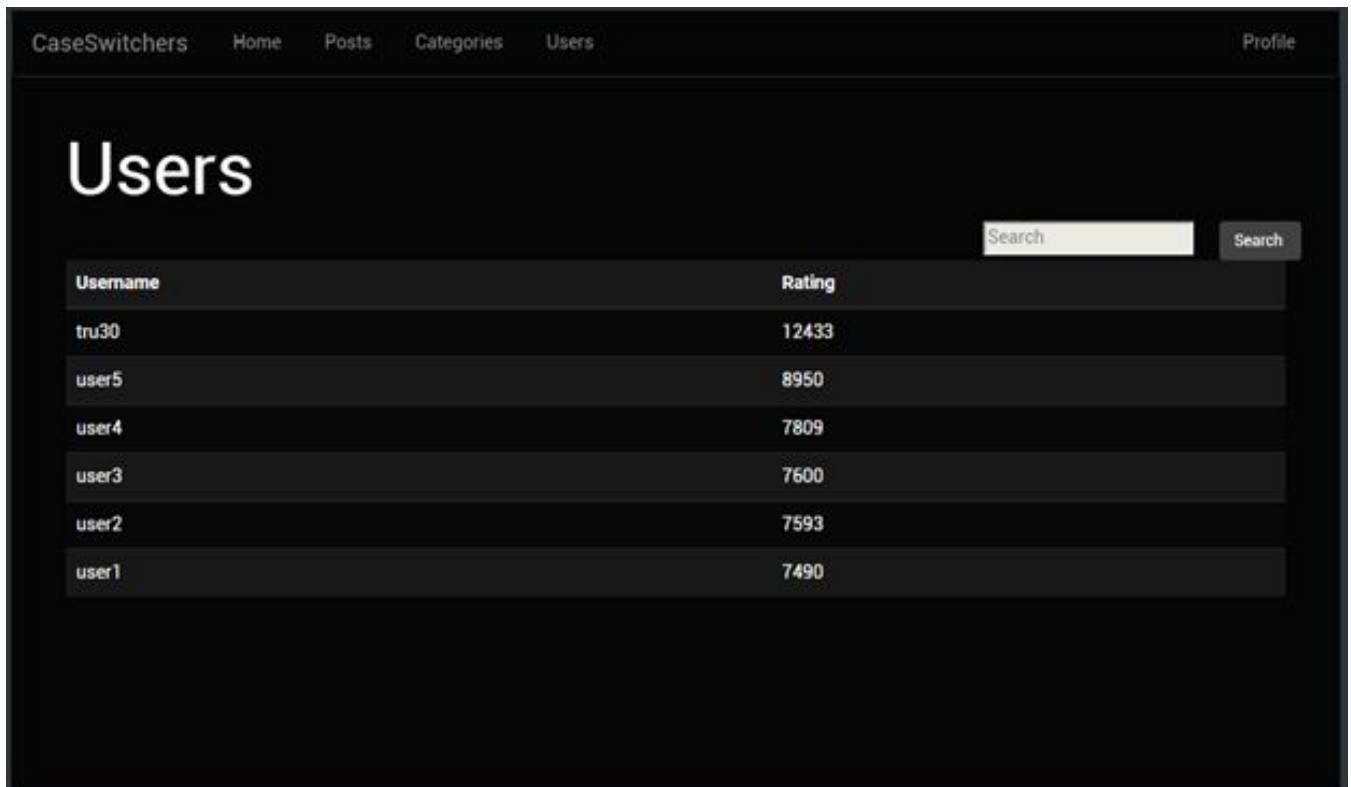


Figure 4: Users List Screen

You can display users with their username and their ratings. In order to do that, you should click on “Users” tab at the top of the page.

- **Search for a Specific User**

After clicking “Users” tab, you can also search for a specific user by entering their names on the search bar.

- Display Profile

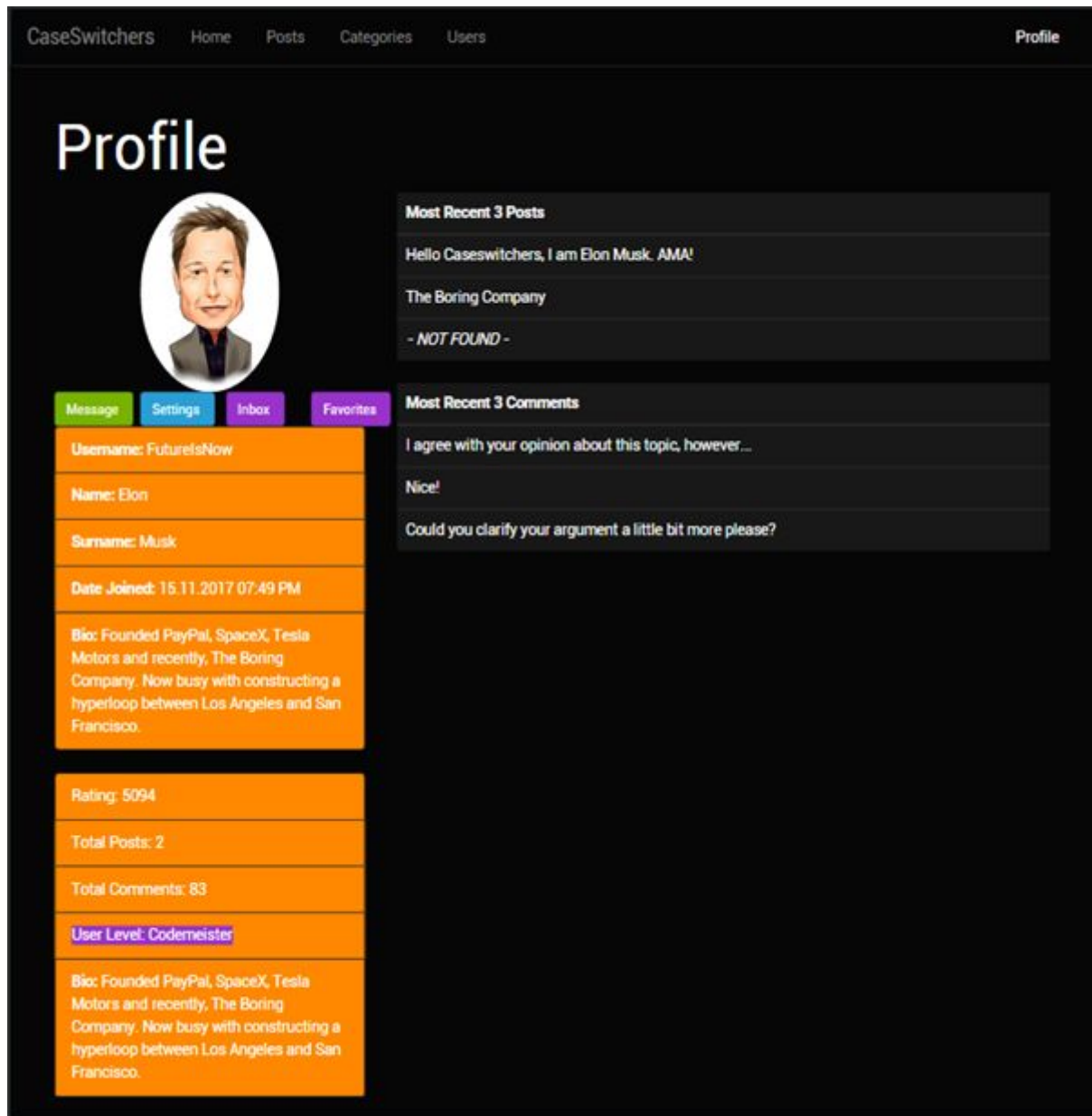


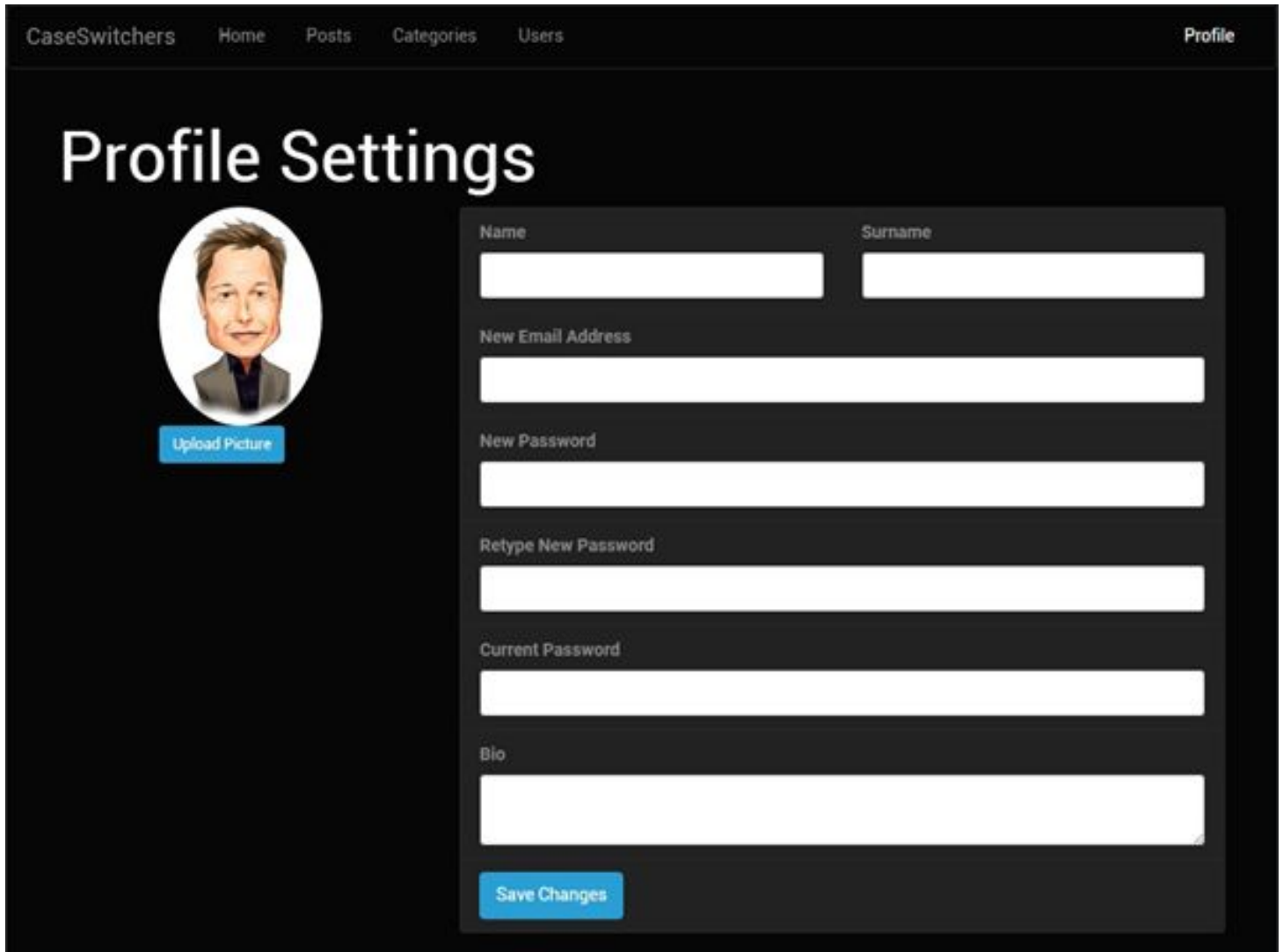
Figure 5: Profile Information Screen

You are able to display your own profile by clicking on Profile tab or any other user's profile by clicking on their usernames. User profile screen displays user information as well as the most recent 3 posts and the most recent 3 comments from the user. By displaying users' profile, you can have detailed information about them such as their real names, the date that they joined on CaseSwitchers and their biography.



From your profile, you can view your messages, modify settings and view your favorite posts by clicking on buttons which are on the below of your profile picture.

- **Update Profile Information**

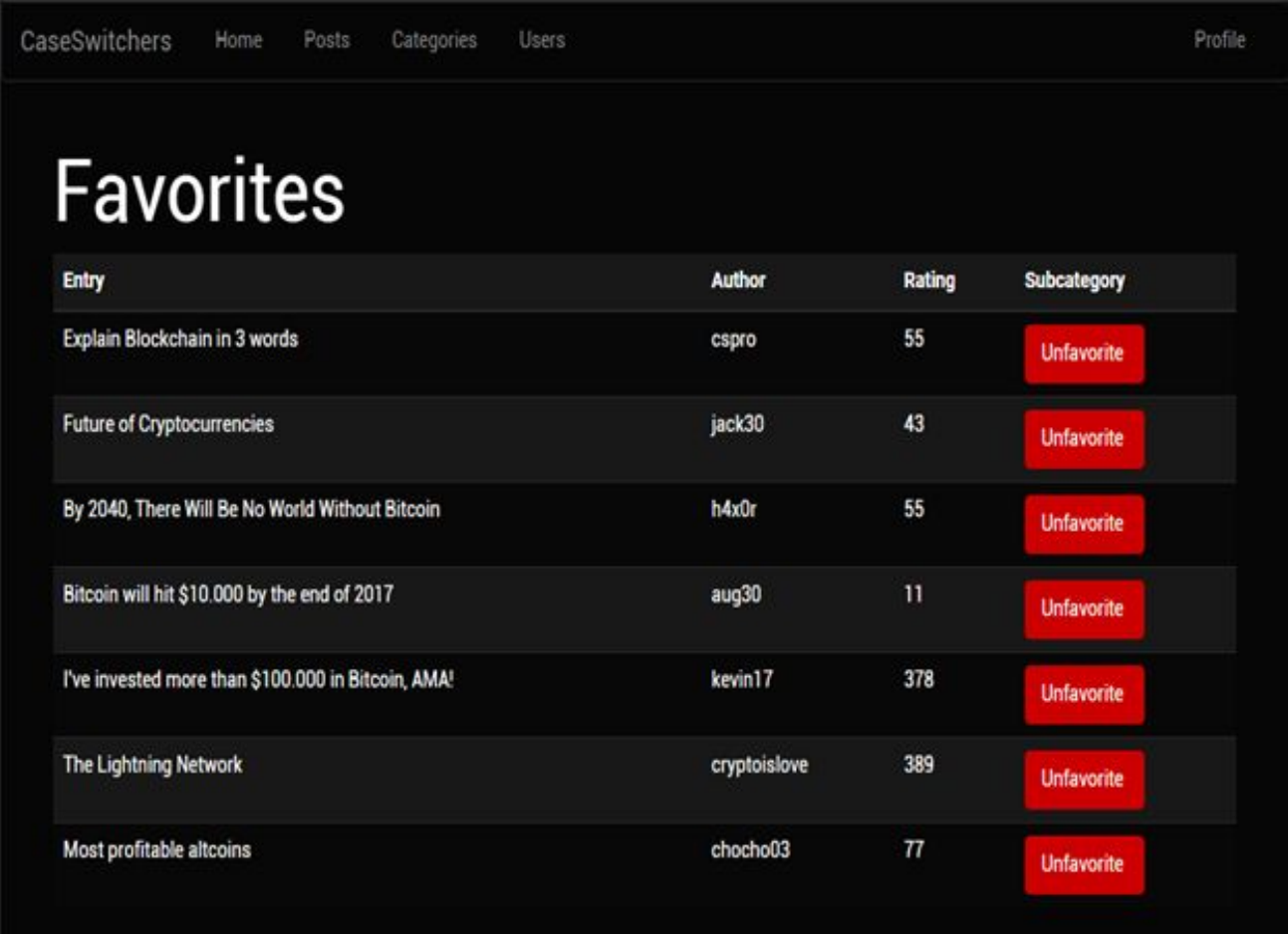


The screenshot shows the 'Profile Settings' interface. The top navigation bar includes 'CaseSwitchers', 'Home', 'Posts', 'Categories', 'Users', and 'Profile'. The main heading is 'Profile Settings'. On the left, there is a circular profile picture of a man with a blue 'Upload Picture' button below it. On the right, there is a form with several input fields: 'Name' and 'Surname' (two separate fields), 'New Email Address', 'New Password', 'Retype New Password', 'Current Password', and 'Bio'. A blue 'Save Changes' button is at the bottom of the form.

Figure 6: Update Profile Information Screen

You are able to set and update your personal information in profile settings screen. You can enter your name and surname, write your bio and change your passwords through this screen. In order to save the changes, you need to enter your current password correctly; otherwise the changes will not be saved.

- **Display Your Favorite Posts**



CaseSwitchers	Home	Posts	Categories	Users	Profile
Favorites					
Entry	Author	Rating	Subcategory		
Explain Blockchain in 3 words	cspiro	55	Unfavorite		
Future of Cryptocurrencies	jack30	43	Unfavorite		
By 2040, There Will Be No World Without Bitcoin	h4x0r	55	Unfavorite		
Bitcoin will hit \$10.000 by the end of 2017	aug30	11	Unfavorite		
I've invested more than \$100.000 in Bitcoin, AMA!	kevin17	378	Unfavorite		
The Lightning Network	cryptoislove	389	Unfavorite		
Most profitable altcoins	chocho03	77	Unfavorite		

Figure 7: Favorites Screen

You are able to view your favorite posts in list form. In order to do that, you should click on the “Favorites” button on your profile. You can see your favorite posts, their authors as well as their ratings. If you decide to remove one of the posts from your Favorites, you should just click on the “Unfavorite” button which is at the end of the line.

- **Send/Search Messages**

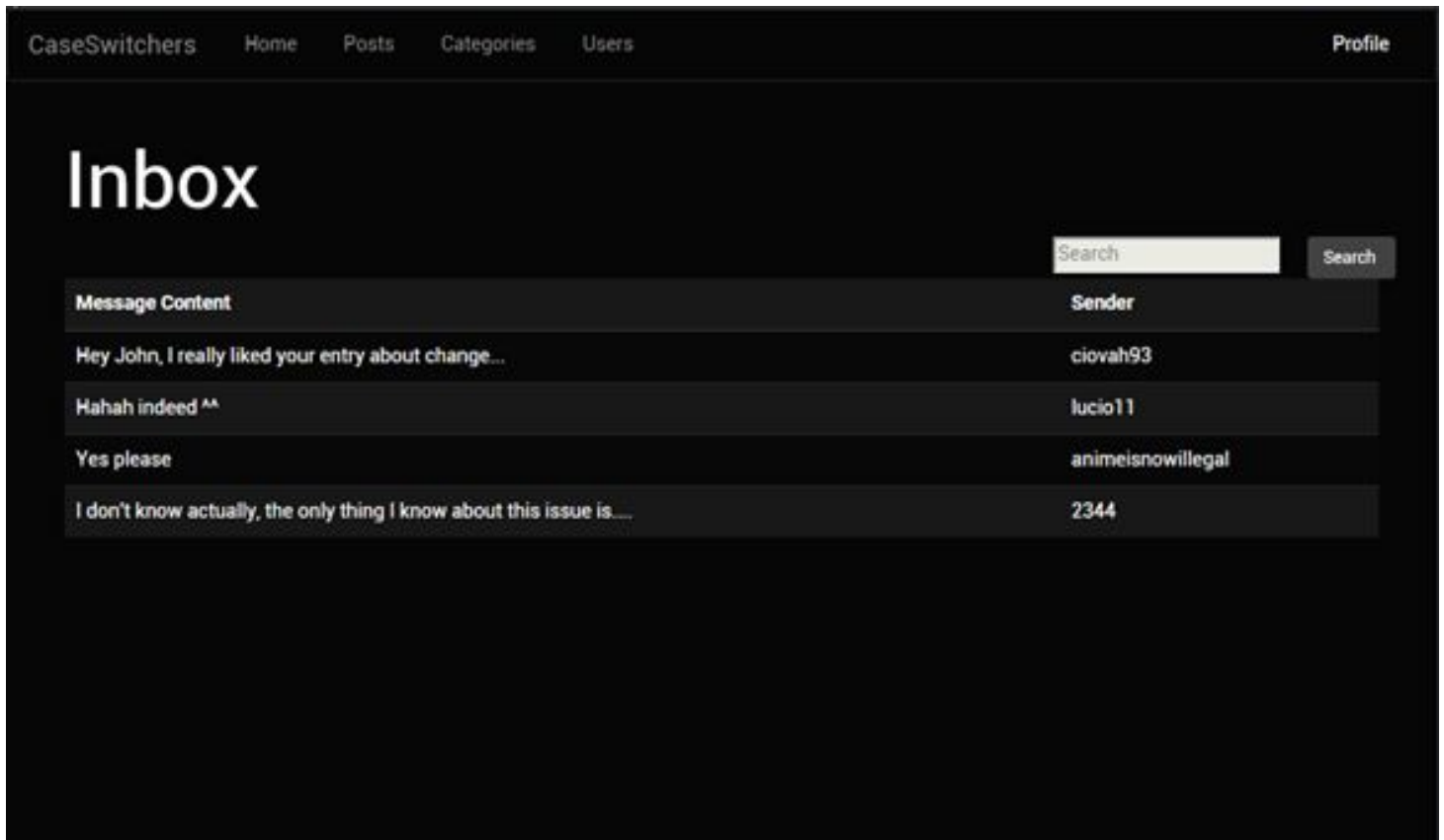
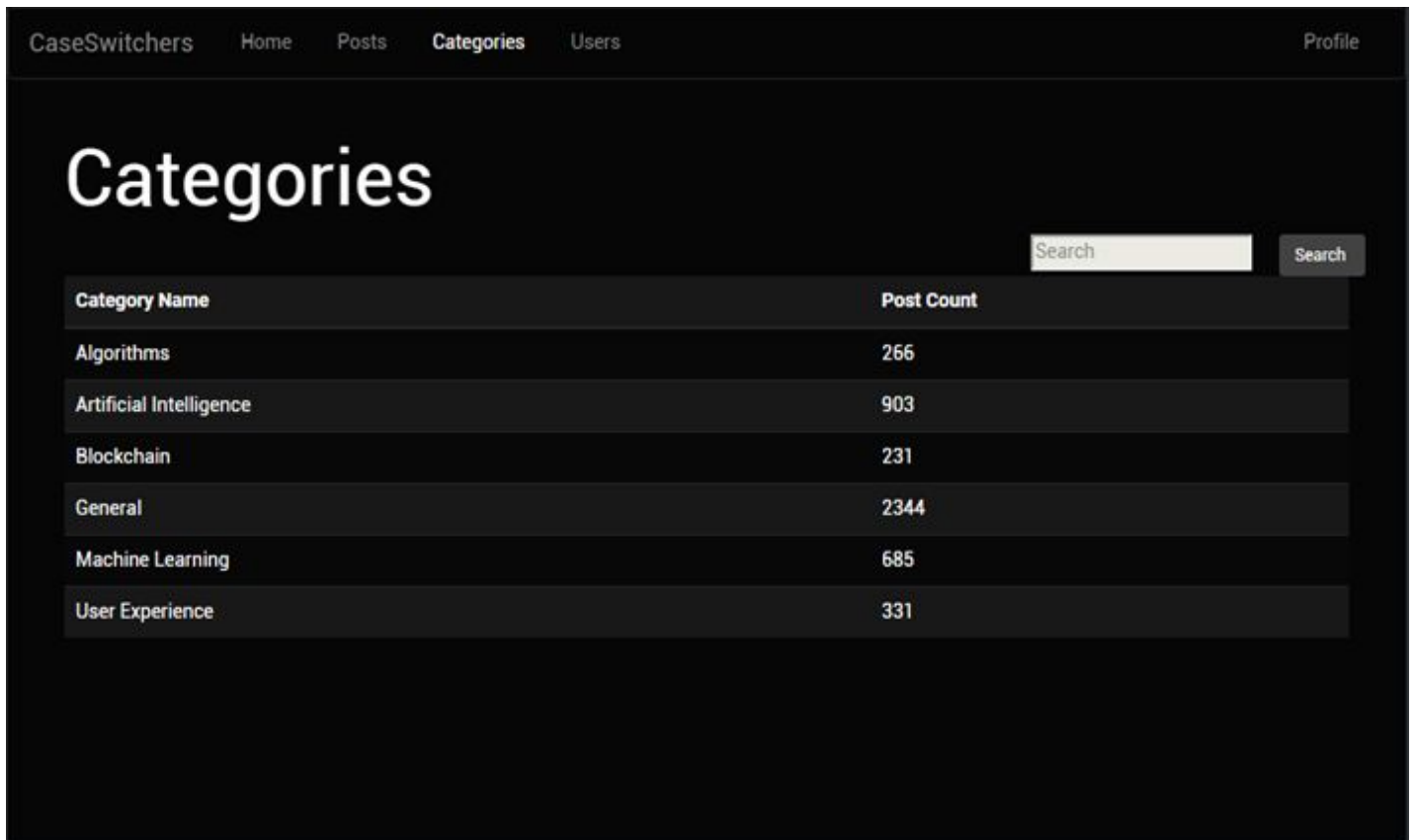


Figure 8: Message Screen

In order to view your Inbox, you ought to click on the “Inbox” button on your profile. In your inbox, you can find your direct messages and their senders. You can send direct messages to any user who has an account on CaseSwitchers. Similarly, you can get direct messages from other users.

Additionally, you are able to search for the messages from a specific user by typing the sender’s username to the search bar.

- **Display Category List**



Category Name	Post Count
Algorithms	266
Artificial Intelligence	903
Blockchain	231
General	2344
Machine Learning	685
User Experience	331

Figure 9: Category List Screen

If you want, you can display the category list that contains names and post counts of all categories on CaseSwitchers. In order to do that, you should click on the “Categories” tab at the top of the page. After having the list, you can click on the name of the category in which you are interested in and you can see the category specific screen.

- **Search for a Specific Category**

After clicking on the “Categories” tab, you can also search for a specific category by entering the name of the category on the search bar.

- Display a Specific Category

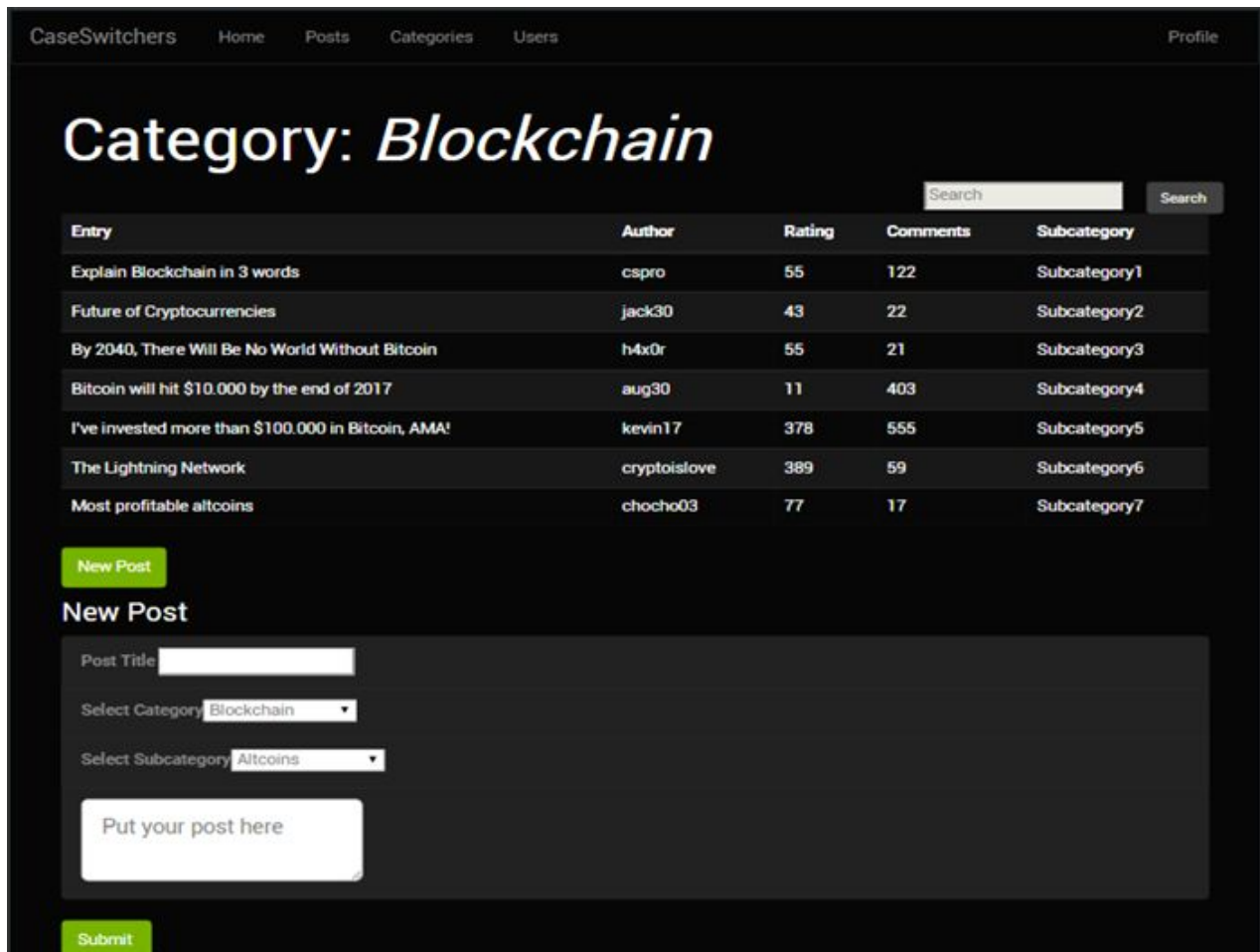


Figure 10: Category Specific Screen

When you enter the system, you can display posts which are under a specific category. In the category specific screen, you can see which authors posted on this category, their ratings and comment numbers as well as subcategory name which are related to their posts. You can contribute to that category by submitting new posts.

- **Create a new Post**

CaseSwitchers Home **Posts** Categories Users Profile

## New Post

Post Title

Select Category Blockchain ▼

Select Subcategory Altcoins ▼

Put your post here

Submit

Figure 11: New Post Screen

To submit a new post; you should enter a post title, select category for the post, optionally select a subcategory from the selected category for the post and write the content of your post. After entering required information, you can create your new post by clicking on “Submit” button.

- **Make Comments/Subcomments on Posts**

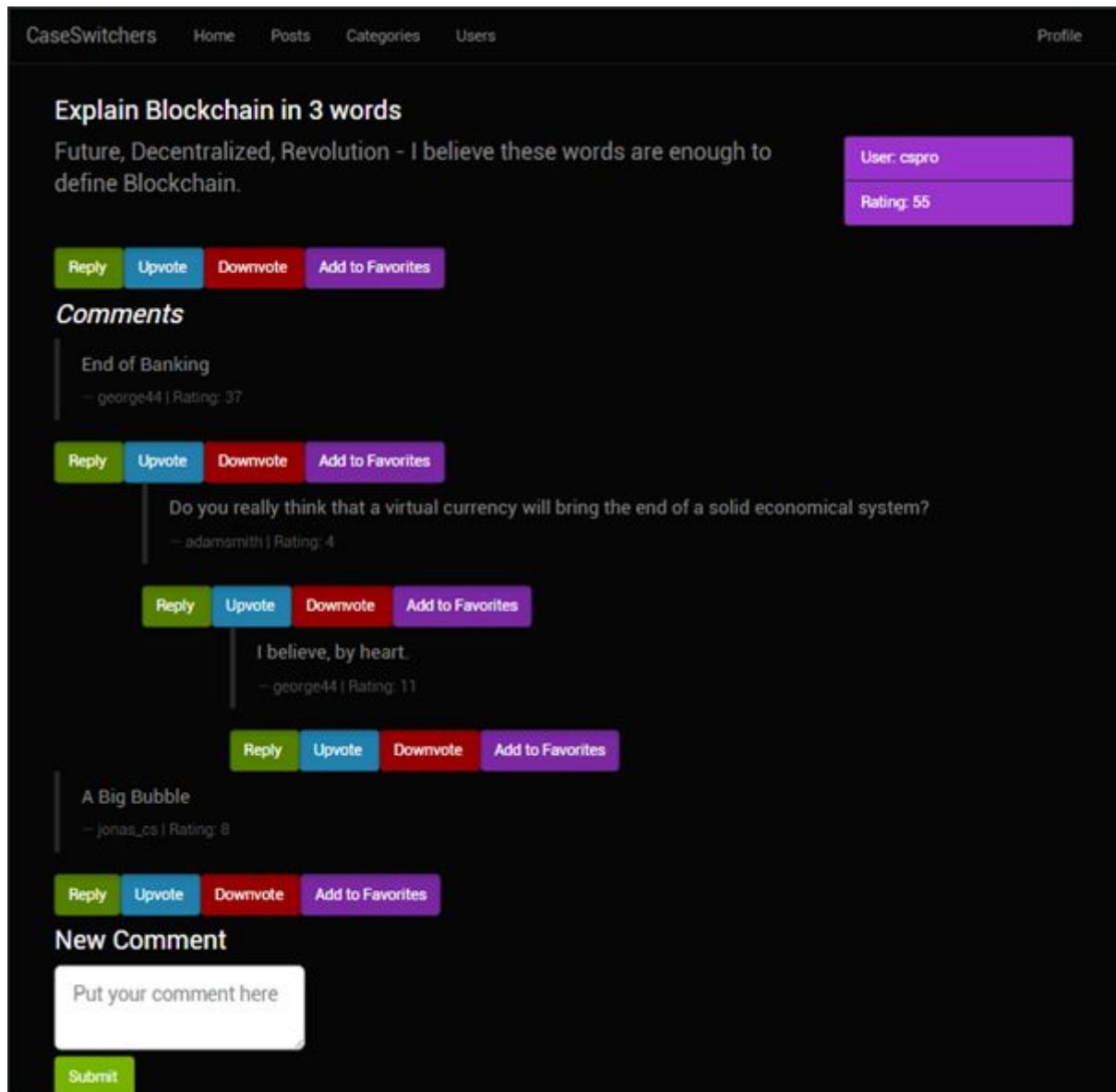


Figure 12: Post Specific Screen

You are able to make comment on any posts that was written by other users. You should simply write content for the comment and submit it by clicking on “Submit” button. Moreover, you can also make a subcomment on a comment. In order to do this, you are required to write content for the subcomment and submit it by clicking on “Submit” button.

- **Rate an Entry**

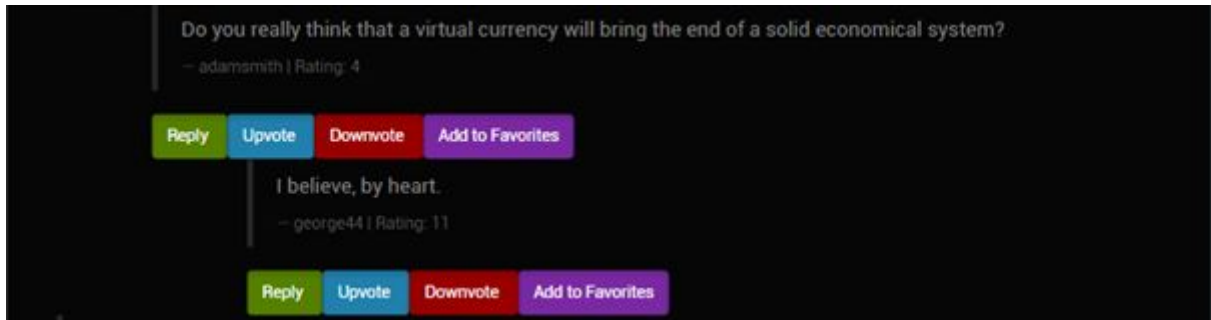


Figure 13: Rating an Entry Screen

You are able to rate entries. You can rate comments or posts by upvoting or downvoting them. If you like an entry, you can click on “Upvote” or if you don’t like an entry you can show it by clicking on “Downvote” button.

- **Add an Entry to Favorites**

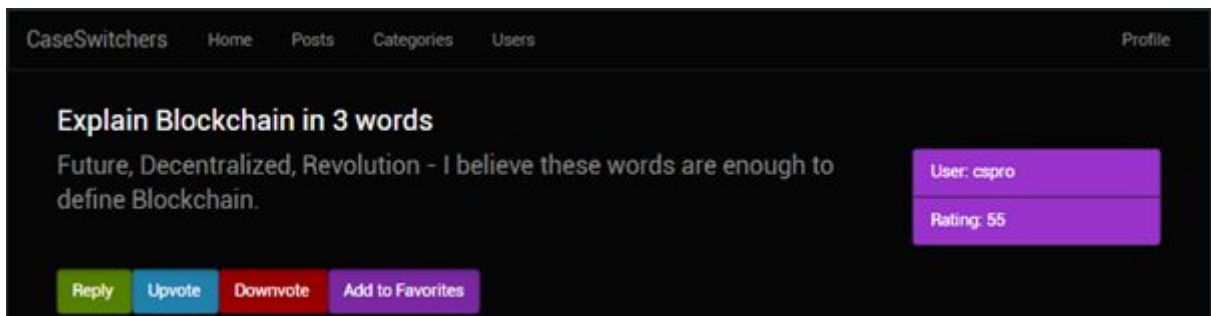


Figure 14: Adding an Entry to Favorites Screen

CaseSwitchers provides you a practical feature. You can add an entry to your Favorites by clicking on “Add to Favorites” button. In this way, you can easily have an access to your favorite entries.



- **Display Most Recent Posts**

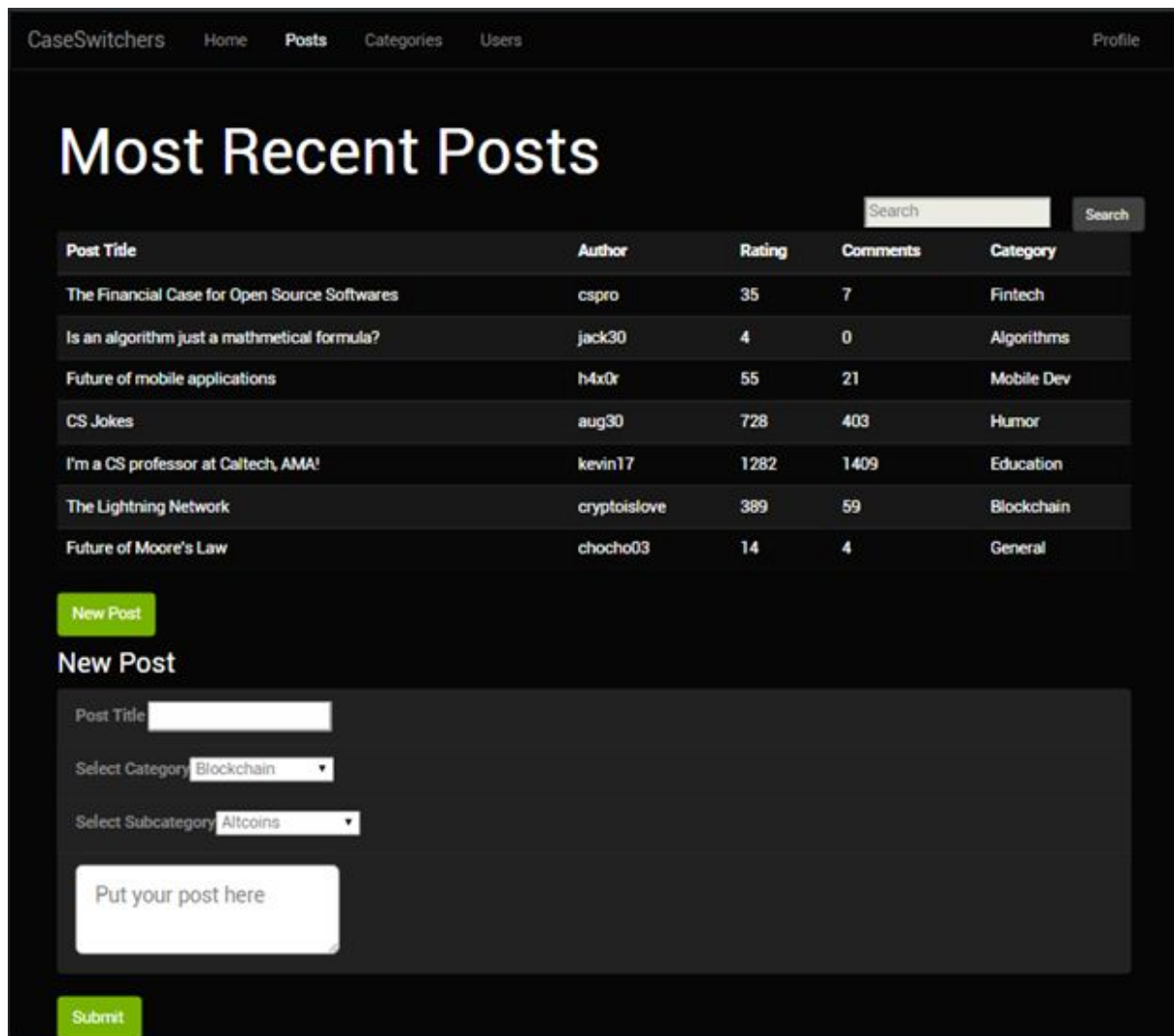


Figure 15: Most Recent Post Screen

You can display most recent posts by clicking on the “Posts” button at the top of the page. In this way, you can have a list of most recent posts on the system with their authors, their ratings, their comment numbers and in which category they belong to.

- **Send message to users**

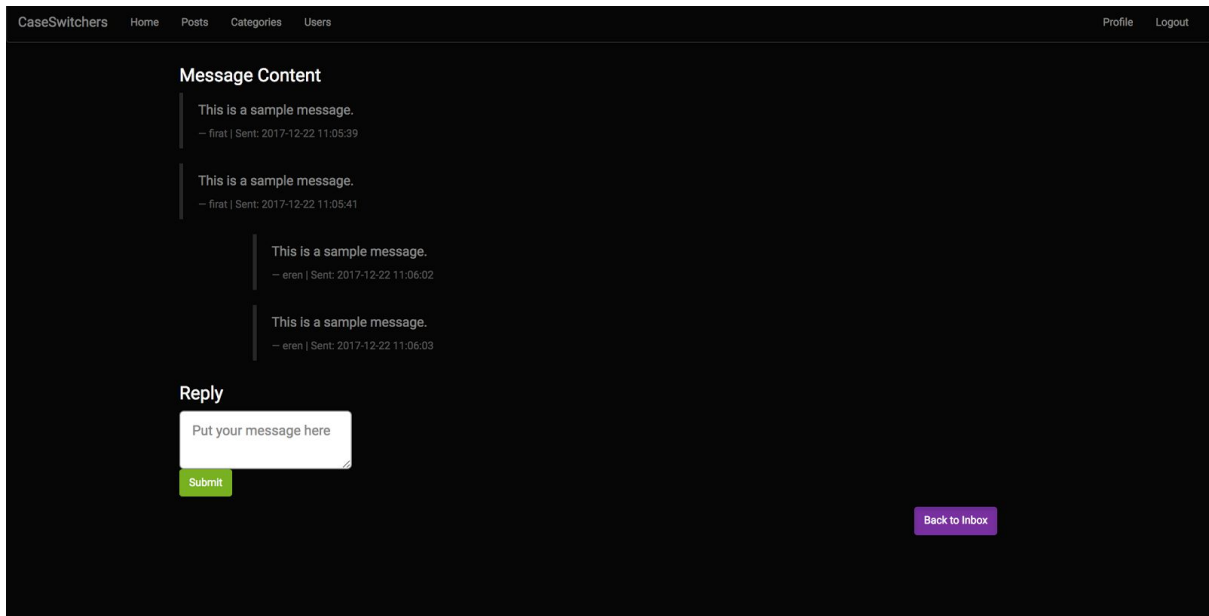


Figure 16: Send Message Screen

You can simply send messages to users by clicking on the message button which is located in profile page. You can also read the incoming messages by clicking on Inbox button in your own profile page.

- **Make modifications in the system via admin panel**

The screenshot displays the 'Admin Panel' interface. At the top, there is a navigation bar with links: 'CaseSwitchers', 'Home', 'Posts', 'Categories', 'Users', and 'Profile'. The main content area is titled 'Admin Panel' and features a sidebar on the left with statistics: 'Total Posts: 12000', 'Total Comments: 40000', 'Total Categories: 10', 'Total SubCategories: 50', and 'Total Users: 10000'. The main area contains several form sections for managing the system:

- Edit Post:** Includes a 'Post ID' input field, a 'Select Category' dropdown, a 'Select Subcategory' dropdown, and a text area for editing the post content, followed by a 'Submit' button.
- Delete Post:** Includes a 'Post ID' input field and a 'Submit' button.
- Edit Comment:** Includes a 'Comment ID' input field, a text area for editing the comment, and a 'Submit' button.
- Delete Comment:** Includes a 'Comment ID' input field and a 'Submit' button.
- Ban User:** Includes a 'User ID' input field and a 'Submit' button.
- Unban User:** Includes a 'User ID' input field and a 'Submit' button.
- Create Category:** Includes a 'Category Name' input field and a 'Submit' button.
- Delete Category:** Includes a 'Category ID' input field and a 'Submit' button.
- Create Subcategory:** Includes a 'Select Category' dropdown, a 'Subcategory Name' input field, and a 'Submit' button.
- Change Subcategory Parent:** Includes a 'Select Category' dropdown, a 'Subcategory ID' input field, and a 'Submit' button.
- Update User Bio:** Includes a 'User ID' input field, 'Name' and 'Surname' input fields, a text area for updating the bio, and a 'Submit' button.

Figure 17: Admin Panel Screen

If you were granted admin privileges, you can access to admin panel to make modifications in the system. Admins can edit and delete posts and comments; ban and unban users; create, delete categories and subcategories; change a subcategory's parent category and update a user's bio, if they think a user has inappropriate content. Furthermore, admins can display reports and statistics, such as displaying the most rated user, top 5 most populated categories.