İstanbul Bilgi Üniversitesi

Java Programming Tutorial

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Table of Contents

Java Programming Tutorial ____ ***4***

Homepage ____ **5**

Compiler page ____ **5**

Quiz page ____ **5**

Admin login & editing sections pages ____ **6**

Admin page for editing quizzes ____ **7**

The user's manual ____ **7**

Homepage: ____ 7

Compiler page: ____ 10

Quiz page: ____ 11

Admin page for editing sections: ____ 18

Quiz Editing Page for Admins: ____ 23

Total time: ____ 25

Table of Figures

Figure 1. Database ER Diagram ____ *4*

Figure 2. Homepage ____ *8*

Figure 3. Navigation Bar ____ *8*

Figure 4. Subjects Panel ____ *9*

Figure 5. Subject Example ____ *9*

Figure 6. Subject Panel ____ *10*

Figure 7. Compiler Page Interactive Elements ____ *11*

Figure 8. Welcome page ____ *11*

Figure 9. First question ____ *12*

Figure 10. Answer choice is selected ____ *12*

Figure 11. Another choice is selected ____ *13*

Figure 12. Correct answer is shown after clicking on "Confirm" button – Selected answer is the correct answer ____ *13*

Figure 13. Correct answer is shown after clicking on "Confirm" button – Selected answer is the incorrect answer *14*

Figure 14. Next question after clicking on "Submit" button ____ *14*

Figure 15. When time is up before any response from the user ____ *15*

Figure 16. When time is up before the user clicks on "Confirm" button but chooses an option ____ *15*

Figure 17. When the user refreshes the page or takes the quiz again ____ *16*

Figure 18. Last page of the quiz ____ *16*

Figure 19. Background picture of the quiz pages (SELF MADE by Buket Yeşiloğlu on Canva) ____ *17*

Figure 20. Screenshot of a quiz with meaningful information ____ *17*

Figure 21. Home page and the highlighted "Admin" button. ____ *18*

Figure 22. Admin Log in page ____ *18*

Figure 23. Admin Log in page with "Log in" button highlighted. ____ *19*

Figure 24. Admin page for editing or adding sections. ____ *19*

Figure 25. Editing section menu ____ *20*

Figure 26. Adding section menu ____ *20*

Figure 27. Update Subject & Content ____ *21*

Figure 28. Result appearing on homepage. ____ 21
Figure 29. New section appearing in "Edit Sections" drop-down menu. ____ 22
Figure 30. New subject appearing in home page. ____ 22
Figure 31. New section showing in home page. ____ 23
Figure 32. Edit Quizzes Button Appearance ____ 23
Figure 33. Update Screen for Editing ____ 24
Figure 34. Add Quizzes Button Appearance ____ 25

Java Programming Tutorial

This project's aim is to create an educational friendly website that is easy to use and comfortable to the eyes of the user while he or she is trying to learn a new programming language. It is a project that consists of home page and tutorial pages, quizzing page which contains the quizzes to be asked to the user, admin pages which are only accessible by the authorized logged in admin, and a compiler page for users to execute their java code. While designing the user interface for the website, a collaborative website "Figma" was used by the team members to share and create their self-made UI design concepts on the following link https://www.figma.com/file/jMg2jI4oI3NxkCG5QXlRe7/ENGR-372--Java-Programming-Tutorial?node-id=0%3A1&t=mwomOsrvGKGs4wi0-1.

In this project, we used the database design shown in Figure 1. The "Section" table will store information of the subjects and their contents. The "Logs" table will hold logs of the user's input code, its output, and the executed time. The "Quizzes" table will store data of each quiz's question, answers, and the correct answer. The "Admin" table is used for storing the name, surname, username, and password of the admin user.

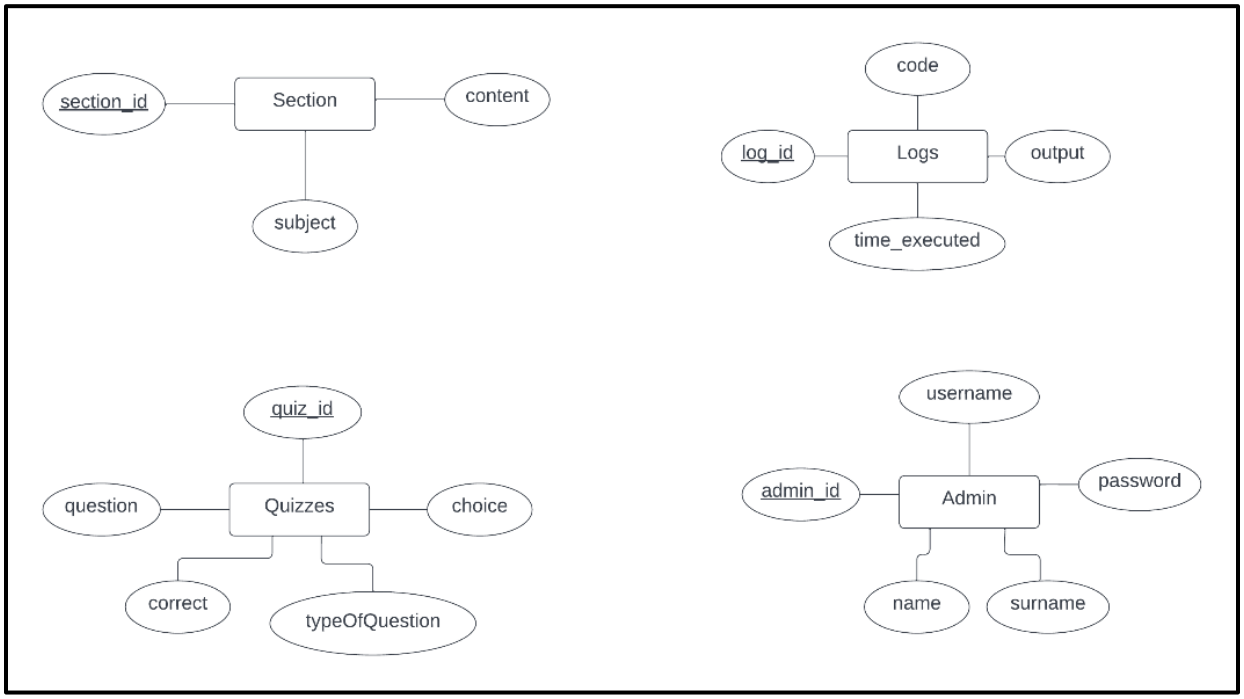

Figure 1. Database ER Diagram

Homepage

In the homepage, users can go to any subject that the site offers, or they can go to different pages the site has like quizzes and compiler. HTML and CSS are used for creating buttons and the User Interface. JavaScript is used for the subjects div's display status. PHP is used to make the database connection and to get the subject information like subject's name and the content from the database. PHP is also used to create dynamic tables on both the homepage and the "Subjects" div.

Compiler page

It is one of the last pages that the user will reach. The interface of the page is created with HTML and CSS. A post request is sent to the API with JavaScript and the output of the API is printed on the screen, output text area. In addition, the log of the codes written and executed outputs by user, is stored in the database using PHP.

Quiz page

In the Java Programming Tutorial web site, quiz pages were designed for the user to test their coding knowledge and skills. For every different topic, there is a different quiz about that topic. All the quiz questions and choices are determined by the admin. The admin can add, edit, or remove the questions with the help of the MySQL database connection.

Every quiz starts with an introductory page. This first page gives information to the user about the quiz for a better experience, then directs the user to the first question. For each quiz, there are 10 multiple choice questions. Every question has 3 wrong choices and 1 correct answer with a limited time of 1 minute. If time is up, the user can't answer the question nor see the correct answer, they will be directed to the next question. The user can leave a question empty and move to the next one. Additionally, if the user refreshes the question page or retake the test, the locations of the choices will be different. The choices are randomized each time.

When the user chooses an option, the selected option becomes highlighted. Moreover, if the user wants to see the correct or incorrect answer, the user should click on "Confirm" button. After clicking on this button, the text color of the correct answer will turn to green while the selected wrong choice text color becomes red. Hence, the user can see the correct answer easily. Later, by simply clicking on "Submit" button, user can move to the next question.

Lastly, there is another page at the end of the quiz that acknowledges the user about the quiz is done. On this page, the user can either take the quiz again or go to the home page by clicking on the “Try Again” or “Home Page” buttons, respectively.

1. Background picture of the quiz pages were designed by using Canva.
2. Design of the quiz pages were done by simply using HTML.
3. Design of the quiz pages were enriched by using CSS.
4. Connections of the MySQL database and PHP files were made.
5. All HTML and CSS codes were transferred and arranged for the PHP file format.
6. Choices of the questions were randomized.
7. New functions were added to show the correct answer by using different text colors after clicking on “Confirm” button when the choices were randomized.
8. Timer was added and given a function to go to the next page when it is done.
9. The introductory page and the ending page were added by simply transferring the HTML code into PHP.

Admin login & editing sections pages

HTML, CSS, JavaScript and PHP were used for creating admin page for editing and add sections. The database connection is stored in “dbconnection.php”. The “login.php” handles authenticating the admin user. “add.php” handles adding new sections through post requests. “edit.php” handles updating subjects and contents using post requests. “remove.php” handles removing sections, subjects, or contents using post requests.

For the admin page for editing the sections, the admin must log in with the correct credentials. A connection with the database is made and based on the username and password of the admin, the row from the table “admin” is selected. If the user is available on the “admin” table, then using session storage, the “name” and “role” values are set to the name of the admin and “admin” respectively.

The admin is directed to the admin page for editing sections and is authorized based on if “role” value in session storage is set to “admin”. With the help of the session storage, the name of the admin is displayed on the top left corner of the page as “Hello, [Admin’s name]”. In the admin for editing sections, the user has the privilege to update or remove subjects and contents in sections. Each section consists of subject and content and admin can remove each section. The “Edit

Sections" drop-down menu will fetch all the subject and content data from the "section" table and display them to user. For every section, subject and content, there is a "remove" button which links to "remove.php" with the "id" of the section and "value" parameters in the URL. The "value" parameter may be "section", "subject" or "content" and the action in "remove.php" will remove the specified information based on the "id" and "value" given. For every subject and content there is an "Update" button which uses a form to send a post request with a link directing to "edit.php" and has the parameters "id" and "value", however, the edited data will be passed on by the post method. The "Add Sections" part will give a drop-down menu for the user to write new subject and content then click "Add" button. "Add" button will send a post request containing the new subject and new content to the "add.php" which handles adding a new section.

Admin page for editing quizzes

This is the page in the project where admins can add, remove, and update quizzes. The interface of the page is created with HTML and CSS. One of the buttons has JavaScript function and database management part is done with the PHP codes.

The user's manual

Homepage:

1. Users will be greeted with the homepage when they enter the website. On the homepage, a short description of Java and a Subject table can be found. The Subject table that is on the homepage has all the subjects the site offers. Users can click on any subjects to go to its page.

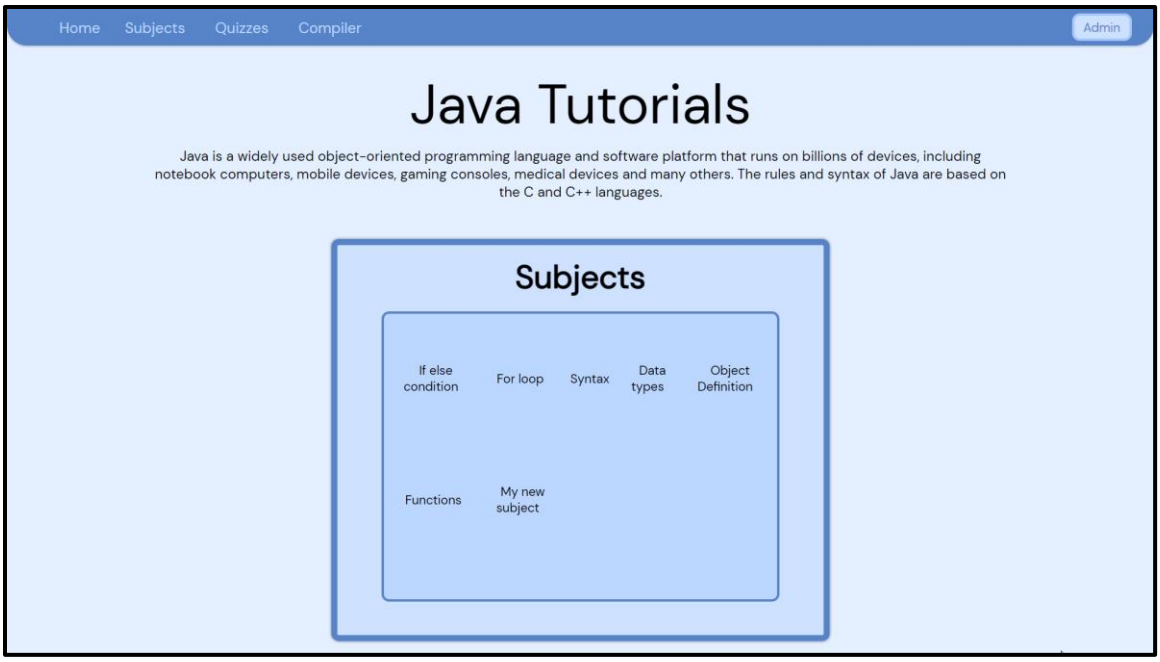

Figure 2. Homepage

2. The Top Navigation Bar includes buttons for:

- Home: Directs the user to the homepage.
- Subjects: Opens the subjects panel.
- Quizzes: Directs the user to the quizzes page.
- Compiler: Directs the user to the compiler page.
- Admin: Directs the admin to the admin login page.

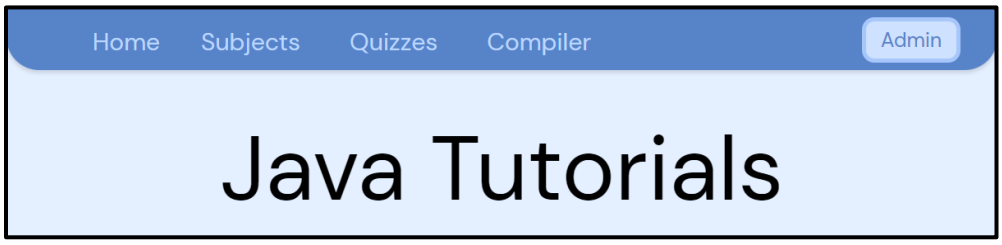

Figure 3. Navigation Bar

3. The Subjects will also appear on the “Subjects” Panel in the top navigation bar.

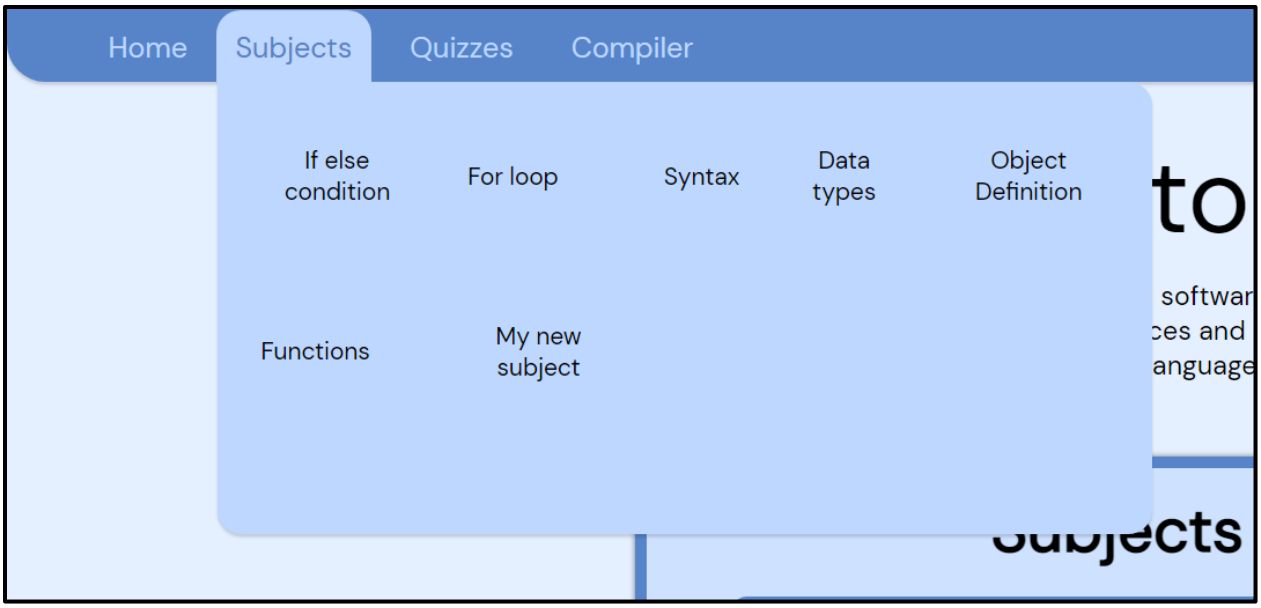

Figure 4. Subjects Panel

4. On the subject pages of the website, users can see the subject title and it's content here according to which subject was clicked/choosen.

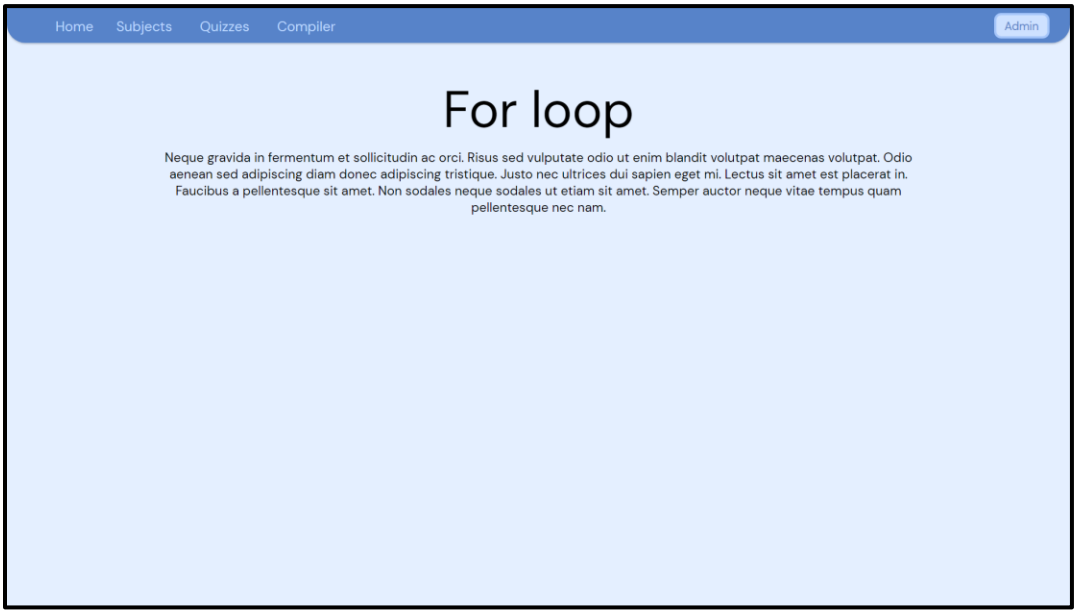

Figure 5. Subject Example

5. Users can directly switch to another subject using the "Subjects" Panel in the top navigation bar without going to the homepage again.

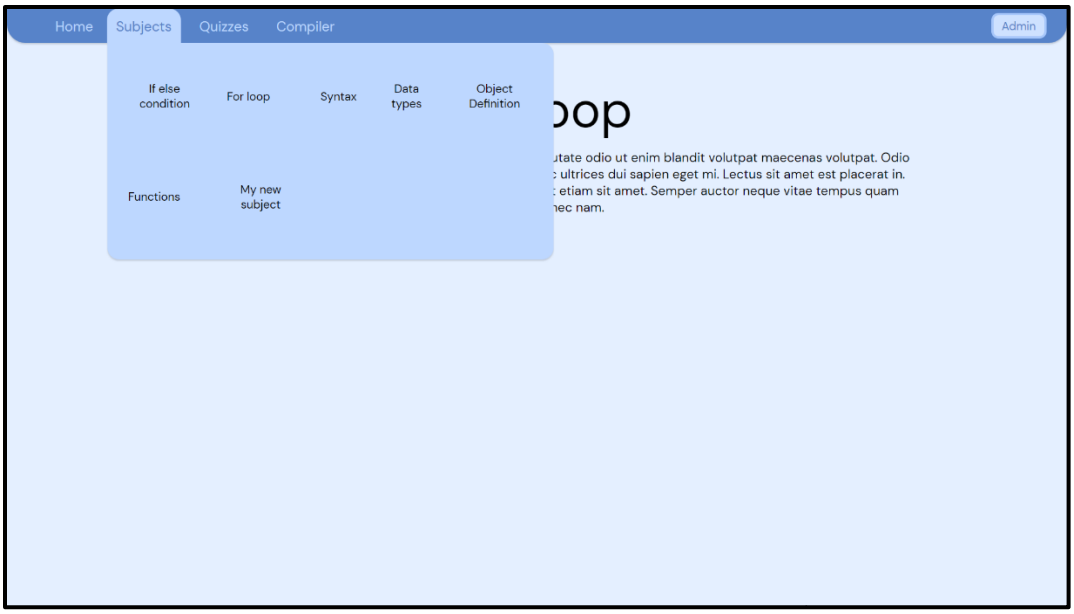

Figure 6. Subject Panel

Compiler page:

1. The user should write the code he wants to compile into this textarea. The font size is 20px.
2. The output of the compiled code will be written in this textarea. The font size is default.
3. This button should be used to compile the codes written in the 1st textarea. Compile operation is an asynchronous operation, so after pressing the button, the response should be waited. When you hover over the button, the color of the button changes to red, and when it is pressed, it turns blue.
4. The size of the first textarea can be changed by holding down the Placeholder in the picture with the mouse.
5. The second textarea size can be changed by holding down the Placeholder in the picture with the mouse.

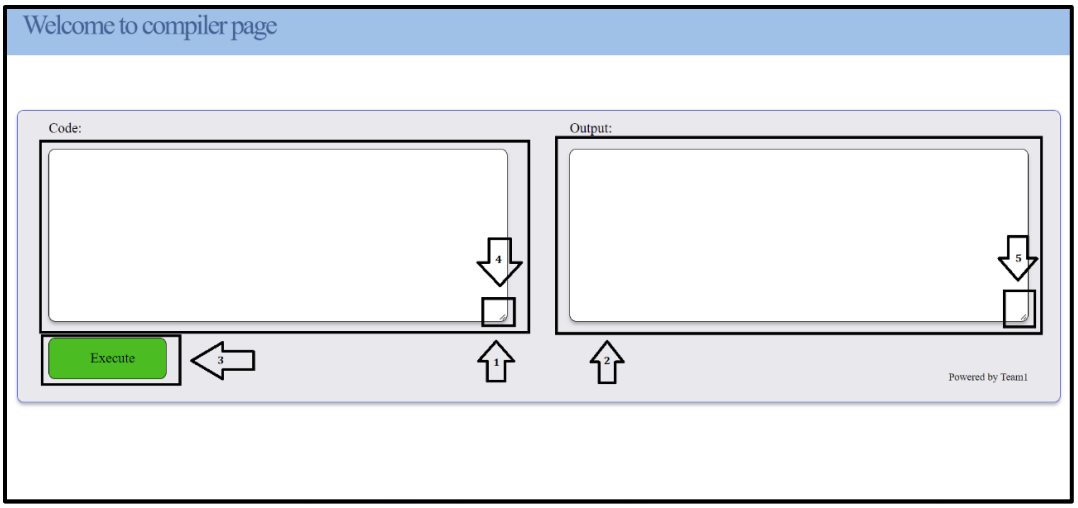

Figure 7. Compiler Page Interactive Elements

Quiz page:

When the users click on the "Quizzes" page from the home page, firstly they will see the introductory page as shown in Figure 8.

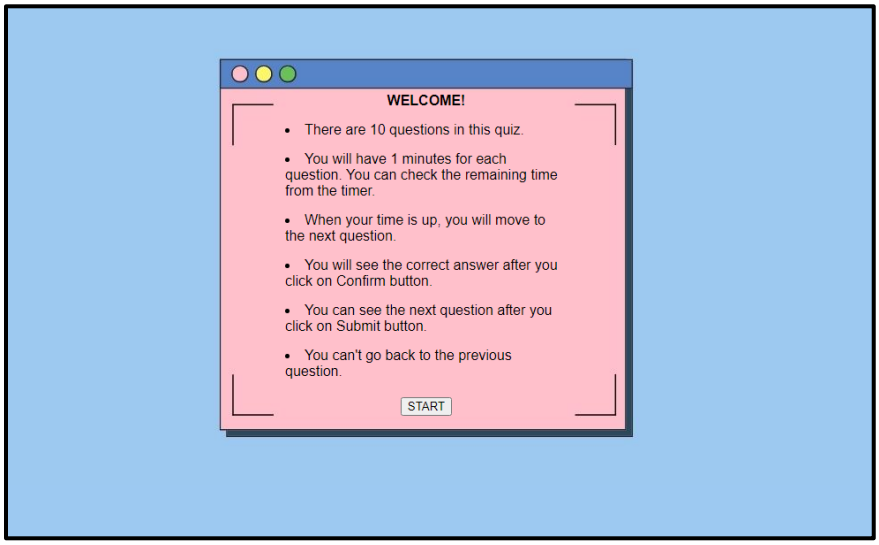

Figure 8. Welcome page

When the users click on the "START" button at the bottom of the Welcome Page, they will be directed to the first question.

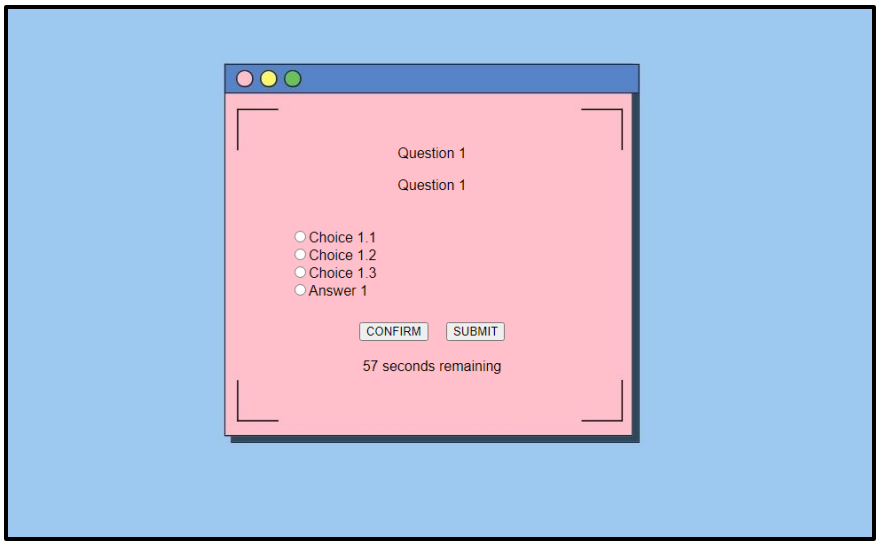

Figure 9. First question

If the user selects a choice, the background color of the selected choice's text will be changed as can be seen in Figure 10 and 11.

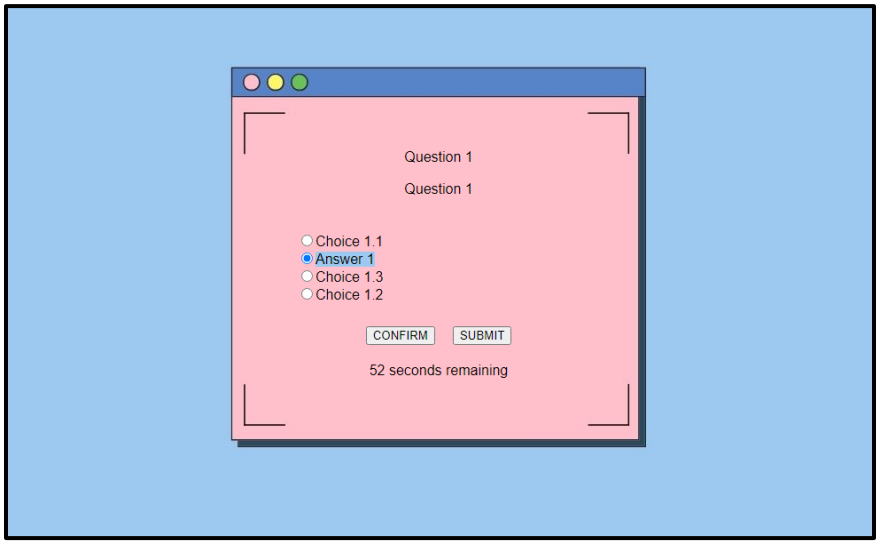

Figure 10. Answer choice is selected

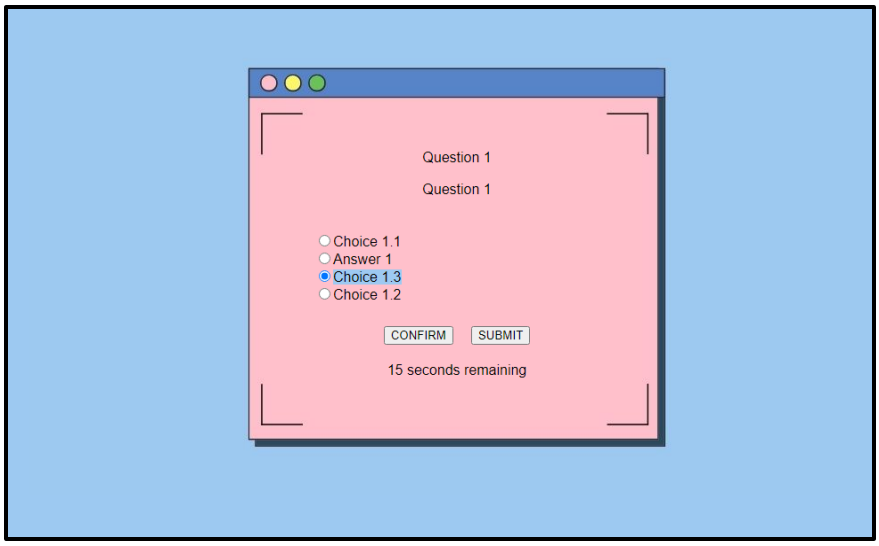

Figure 11. Another choice is selected

The user can't see the correct and incorrect answer until clicking on the "CONFIRM" button. When they click on this button, if the answer is correct, the text color of the selected choice will be green as Figure 12. If the answer is not correct, text color of the selected choice will be red while the correct answer's text color turns to green simultaneously as shown in Figure 13.

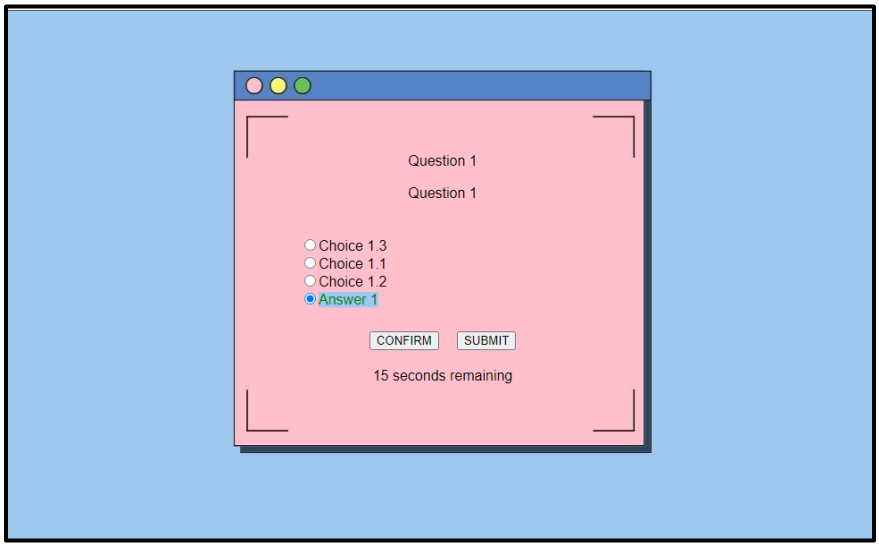

Figure 12. Correct answer is shown after clicking on "Confirm" button – Selected answer is the correct answer

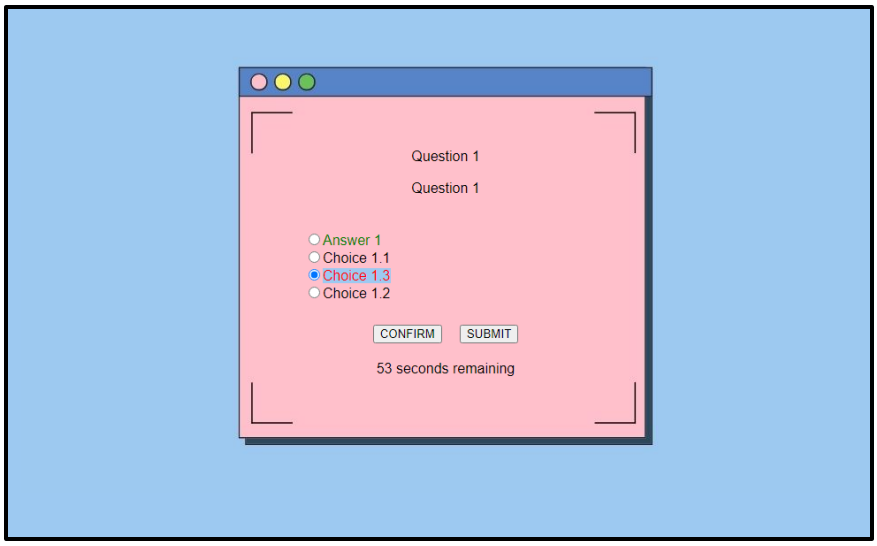

Figure 13. Correct answer is shown after clicking on "Confirm" button – Selected answer is the incorrect answer

After confirming the answer, if the user clicks on the “SUBMIT” button, the user will be directed to the next question as shown in Figure 14. The working principle is exactly the same for each question. The user can select an option, confirm the answer, see the remaining time, and go to the next question by submitting the answer.

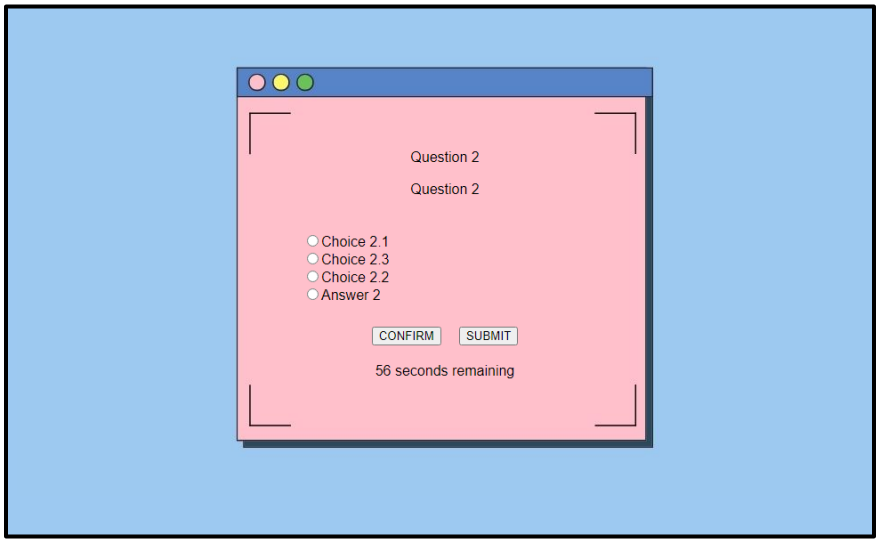

Figure 14. Next question after clicking on "Submit" button

On the other hand, if the user fails to click on “Submit” button before the time is up, the user will receive an alert about the time as shown in Figure 15 and 16. When time is up, the user can’t choose an option, can’t confirm, or submit the answer. The user should click on “Okay” button in

the alert box to be able to continue. When the user clicks on “Okay”, the user will be directed to the next question.

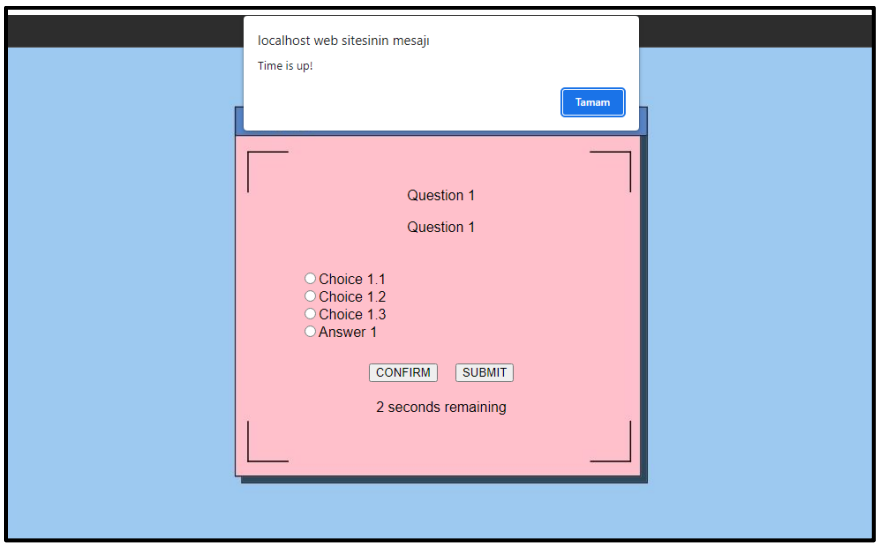

Figure 15. When time is up before any response from the user

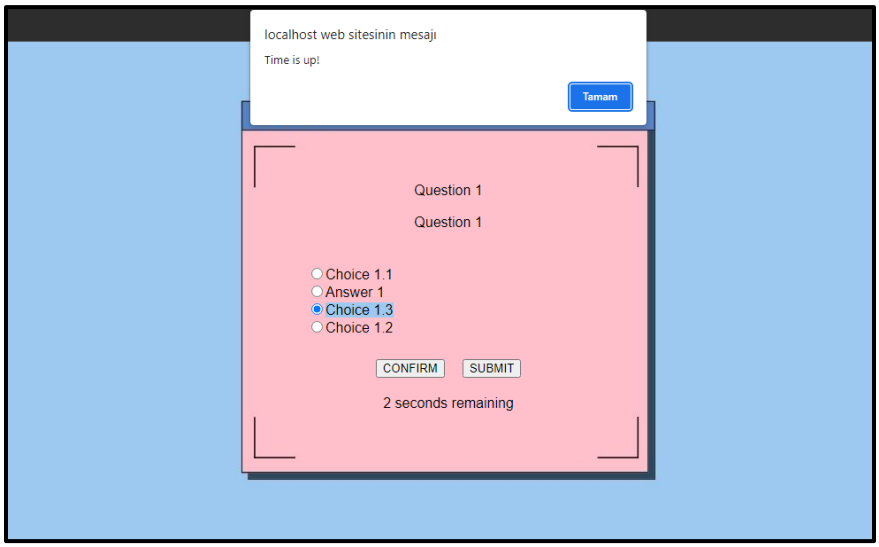

Figure 16. When time is up before the user clicks on "Confirm" button but chooses an option

Additionally, if the user refreshes or takes the quiz again the order of the choices will be different as seen in Figure 17.

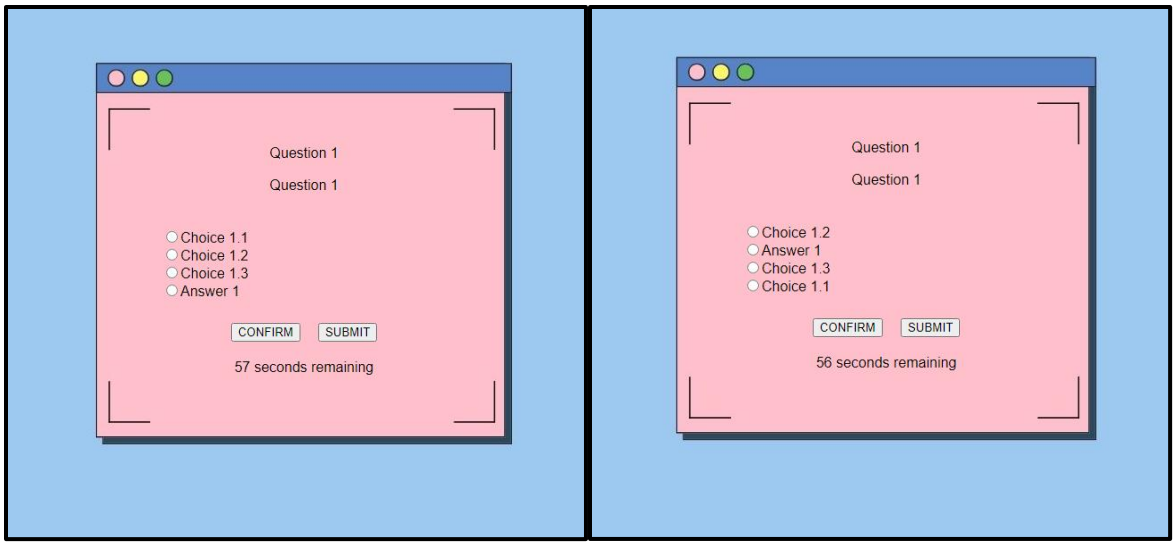

Figure 17. When the user refreshes the page or takes the quiz again

At the end, when the quiz is done, the user will be directed to another page. This ending page acknowledges the user about the quiz is done. Also, there are two different buttons that can direct the user to take the test again or to go to the home page, respectively. This ending page can be seen in Figure 18.

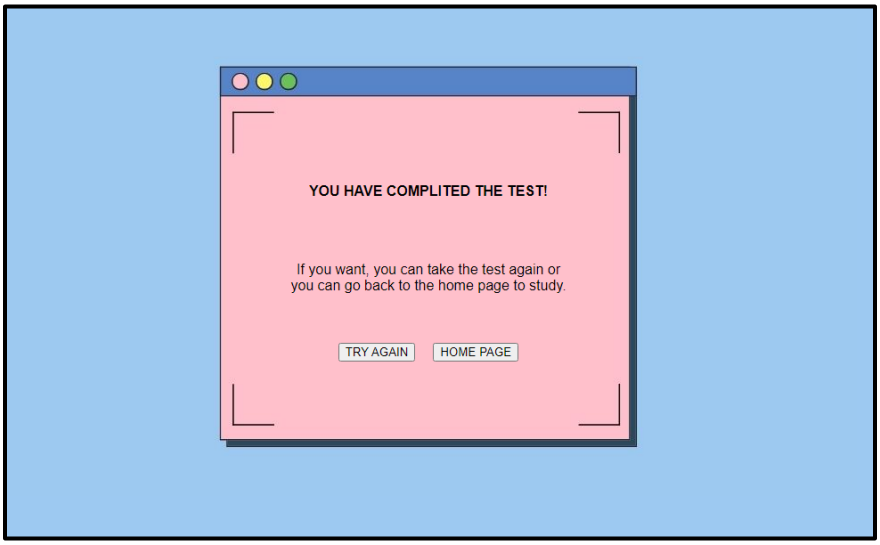

Figure 18. Last page of the quiz

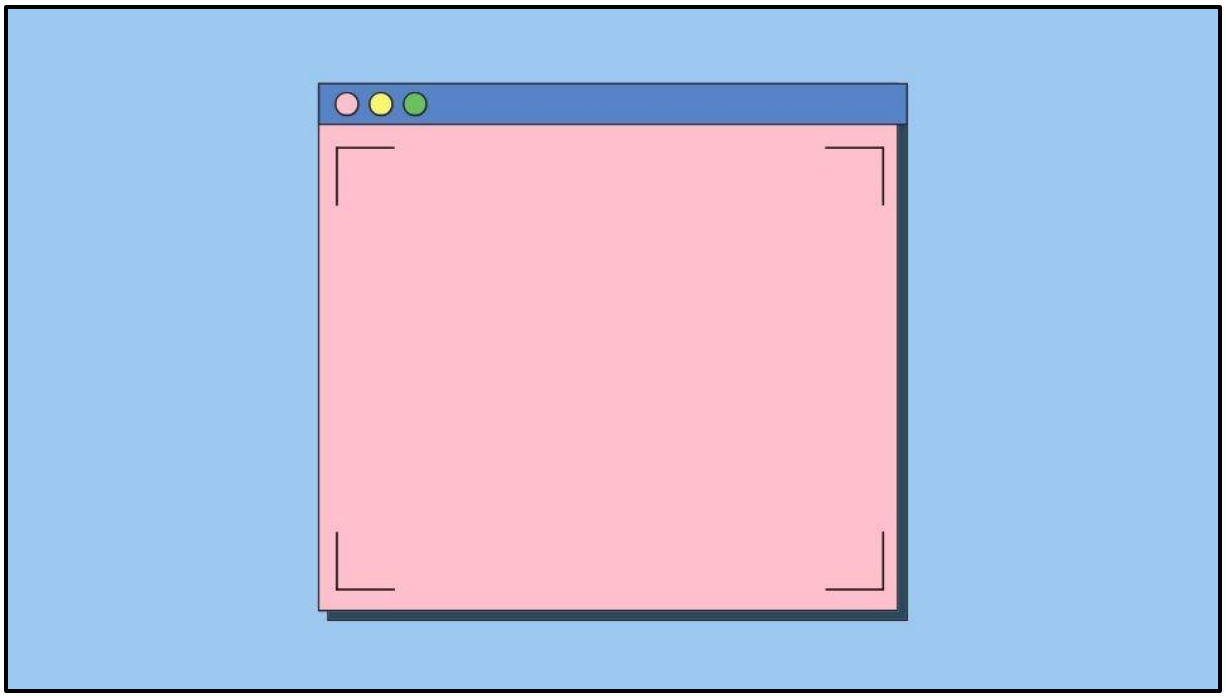

Figure 19. Background picture of the quiz pages (SELF MADE by Buket Yeşiloğlu on Canva)

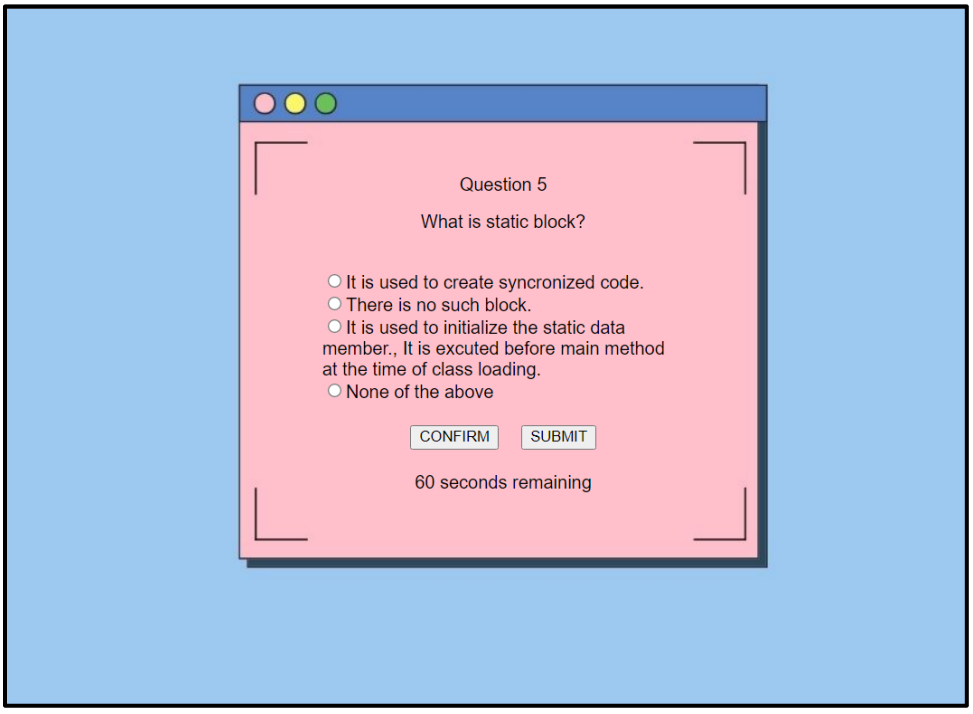

Figure 20. Screenshot of a quiz with meaningful information

Admin page for editing sections:

The privileged user can click on the "Admin" button from the homepage to be taken to the admin log in page. As shown in Figure 21, the admin button is on the top-right of the home page which leads to the admin log in page.

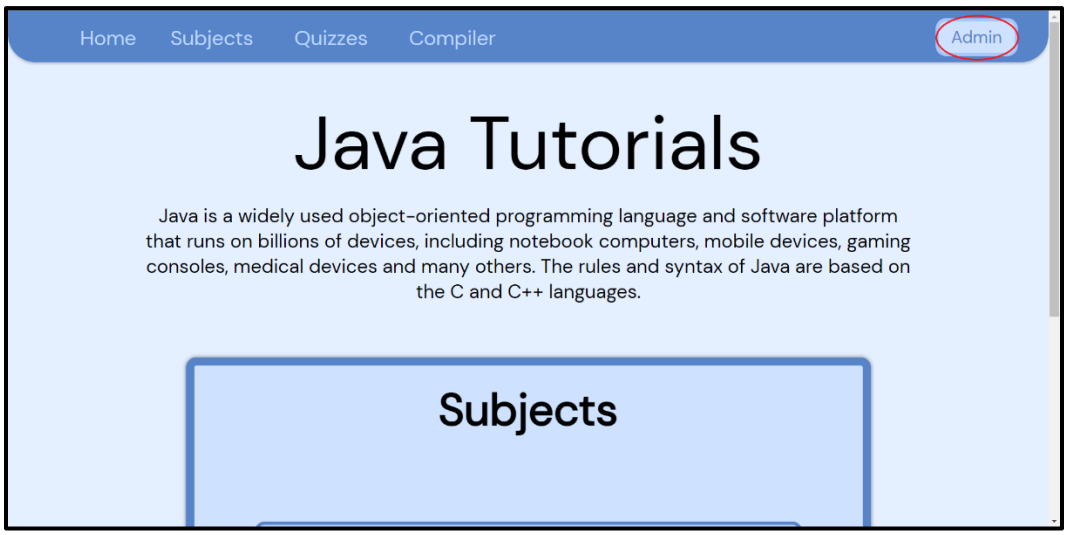

Figure 21. Home page and the highlighted "Admin" button.

After user clicks on "Admin" button, the following log in page will be shown as shown in Figure 22.

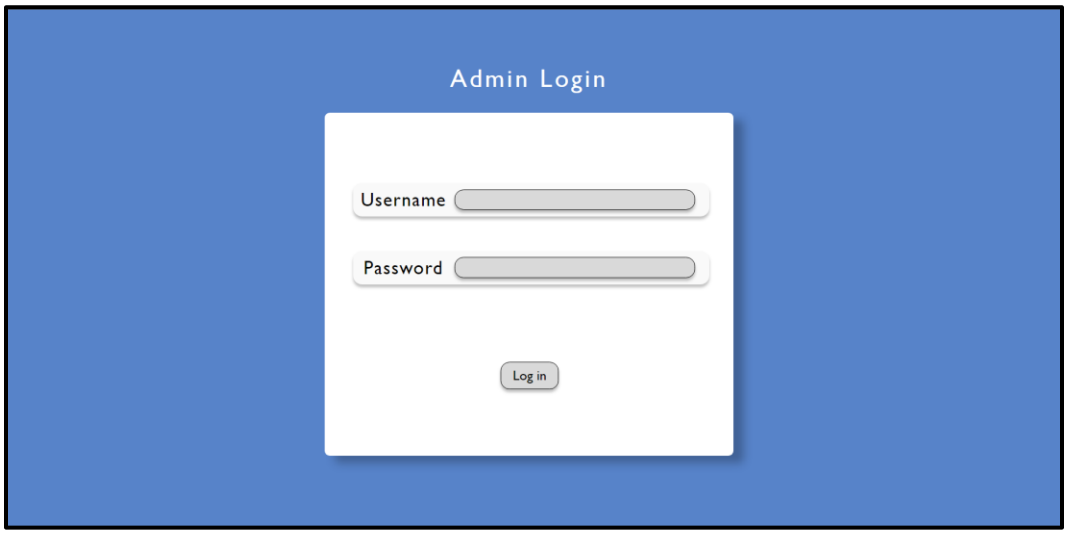

Figure 22. Admin Log in page

The privileged admin must enter the correct credentials and press the “log in” button as shown in Figure 23.

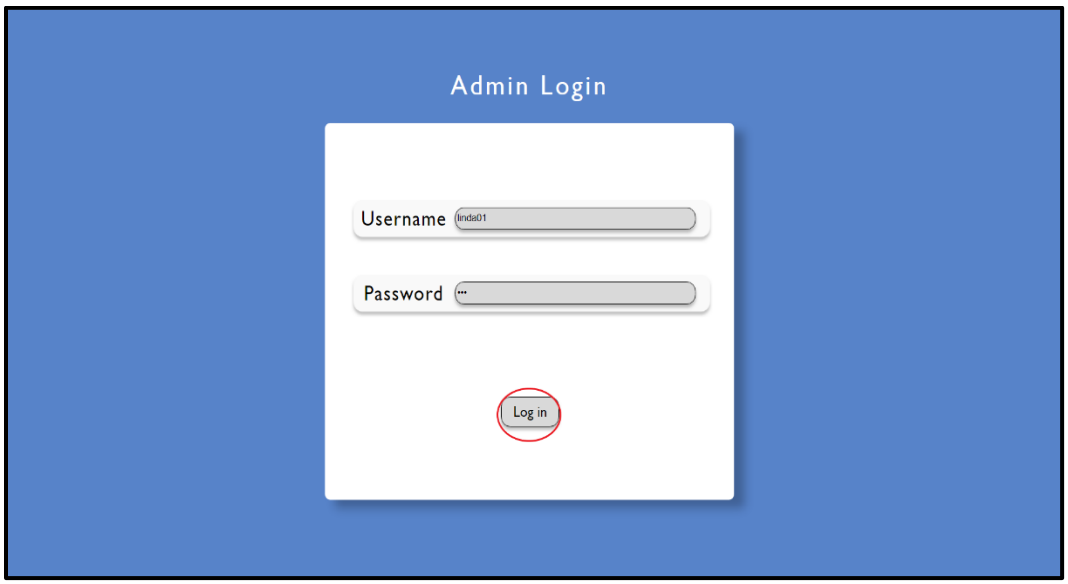

Figure 23. Admin Log in page with “Log in” button highlighted.

The admin will be taken to the admin page for editing sections which contain subjects and contents that are shown on the homepage. The admin is privileged to remove or add a section, update or remove subjects, and update or remove contents. Figure 24 illustrates the admin page that the admin will be greeted with.

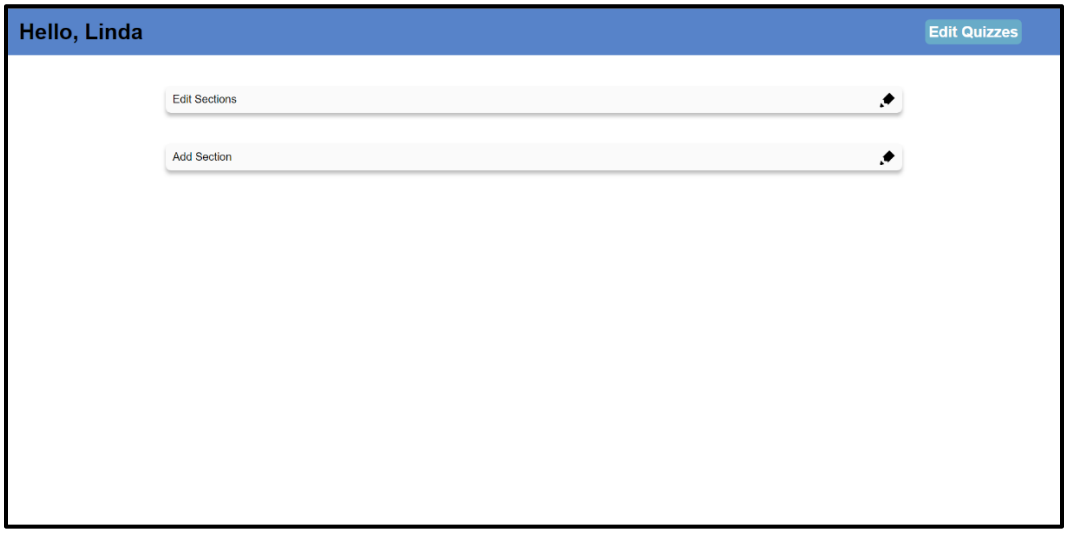

Figure 24. Admin page for editing or adding sections.

The admin will click on the pencil icon in “Edit Section” and a dropdown menu will appear to show the subjects and contents to the admin. The menu is organized into sections which contain their subject and content as shown in Figure 25. Figure 25 shows the drop-down menu containing sections’ information after admin clicks the highlighted pencil icon.

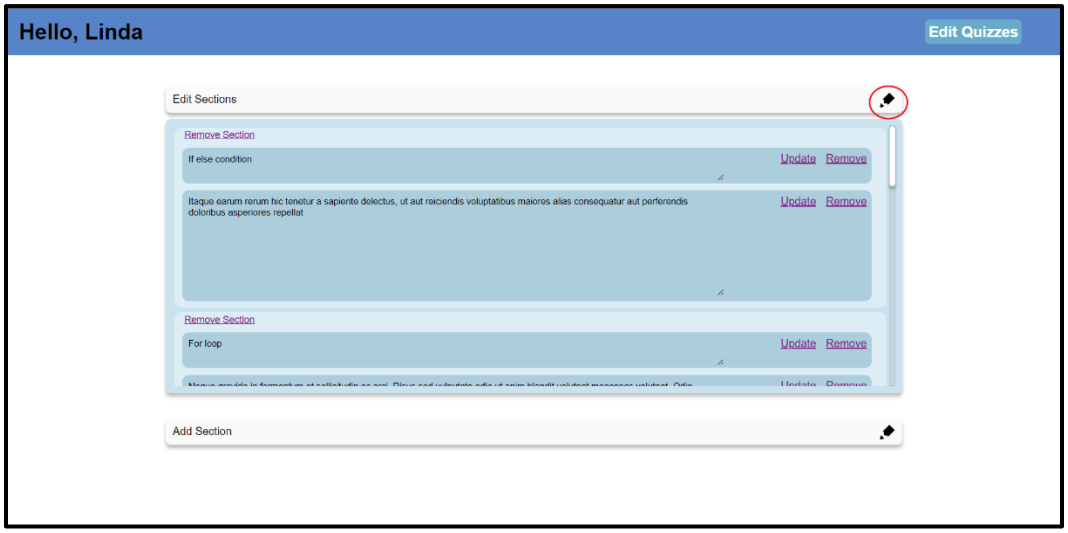

Figure 25. Editing section menu

The admin can add a new section by clicking the pencil icon near “Add Section” as shown in the Figure 26. Figure 26 shows the drop-down menu that appears when user clicks the pencil icon near “Add Section”, user is allowed to write the new subject and its content then adding them by clicking the “**Add**” button.

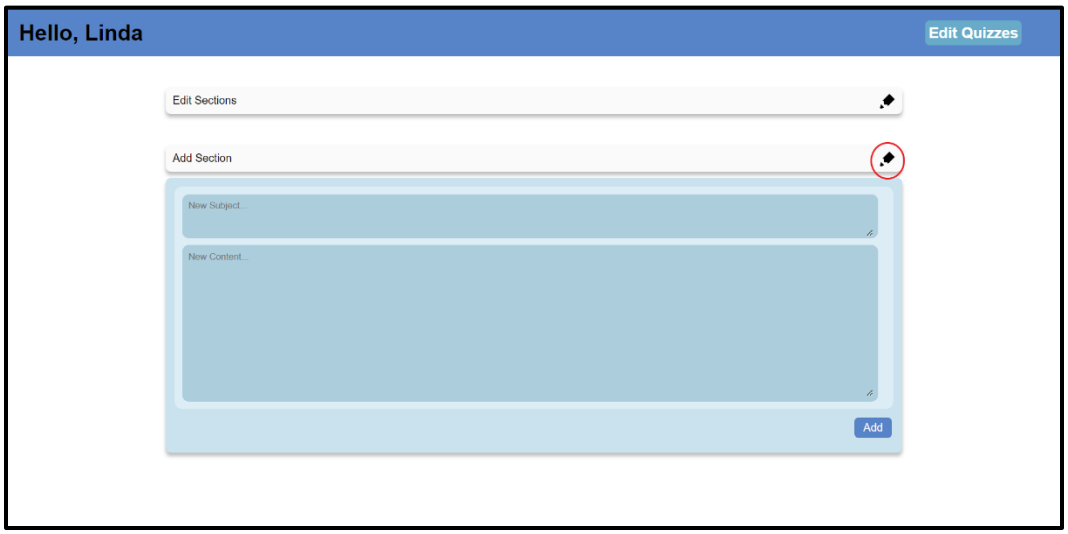

Figure 26. Adding section menu

The admin can update the subject or content by writing into the text box and clicking “Update” button as shown in Figure 27.

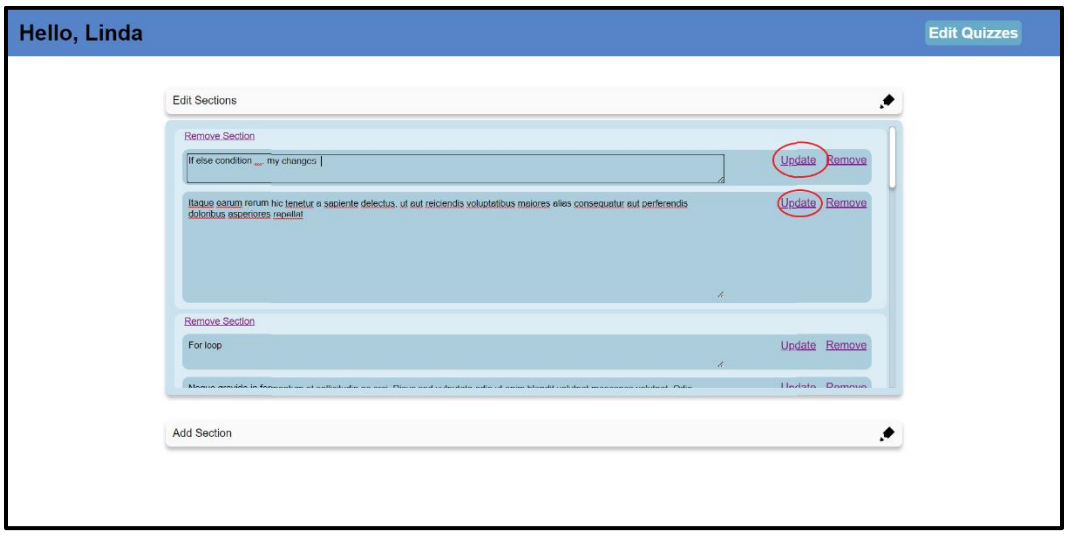

Figure 27. Update Subject & Content

After user clicks “Update” for editing subject, the updated subject will appear on homepage. Figure 28 shows the result shown to user after admin edits a subject.

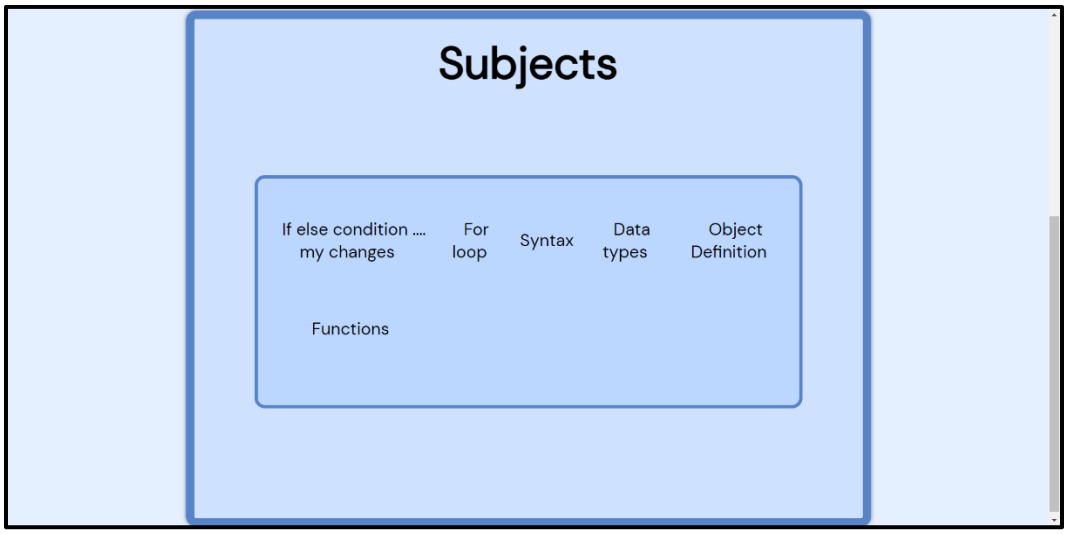

Figure 28. Result appearing on homepage.

For adding a new section, the user will click the pencil icon near “Add Section” as shown in Figure 26, then the user enters the new subject and content. The new section appears on the home page

as shown in Figure 29 and it will be listed in the “Edit Section” drop-down menu along with the existing sections as shown in Figure 29.

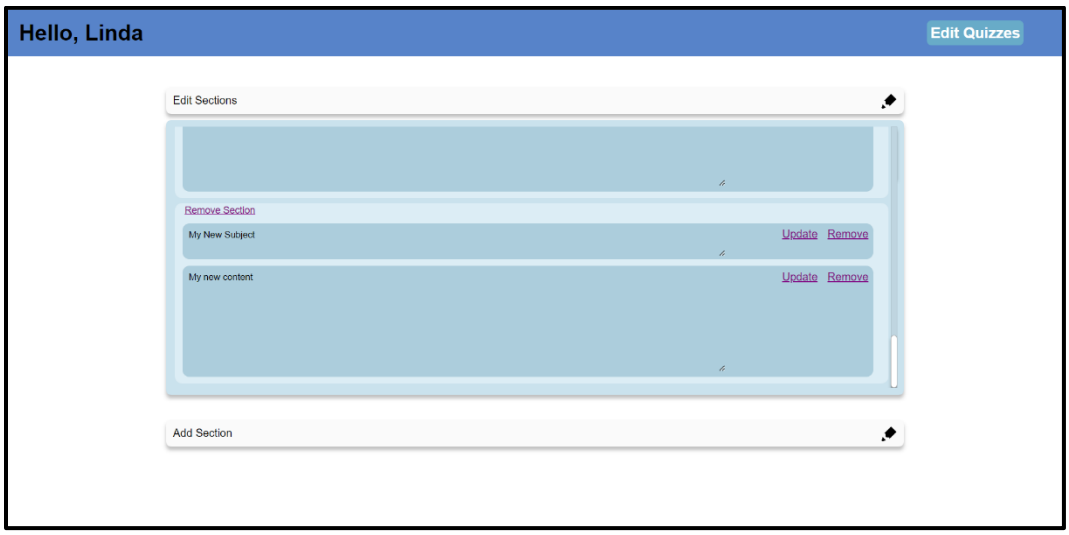

Figure 29. New section appearing in “Edit Sections” drop-down menu.

The changes made on subjects will be shown on the homepage as shown in Figure 30 and 31.

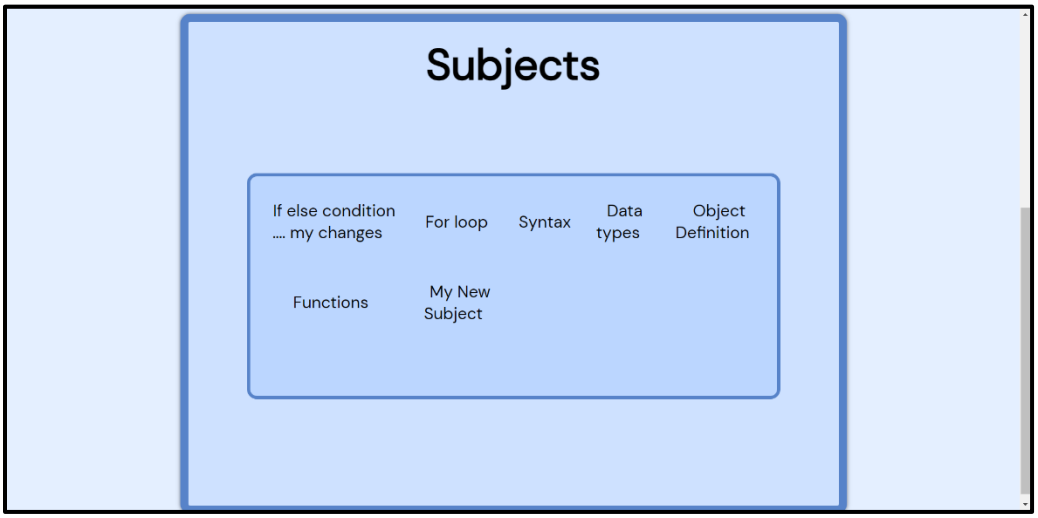

Figure 30. New subject appearing in home page.

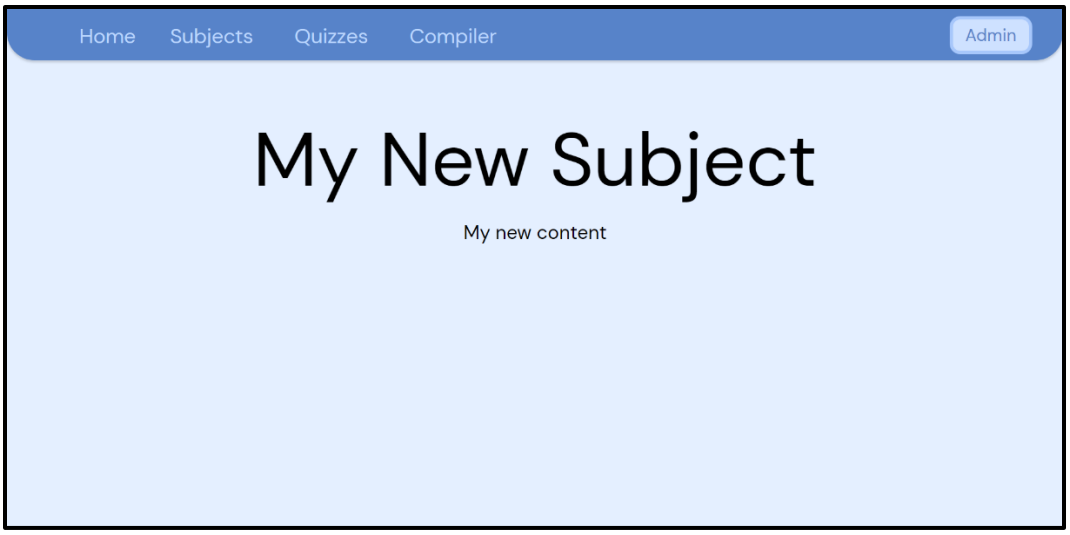

Figure 31. New section showing in home page.

Quiz Editing Page for Admins:

1. The admin will see a page with 3 buttons. When the edit quizzes button is pressed, the quiz table in the database will appear like in Figure 32.

2. There are two mini buttons for operations named “Delete” and “Update”. When you click the admin delete button, the question, correct answer, and options in that line will be deleted.

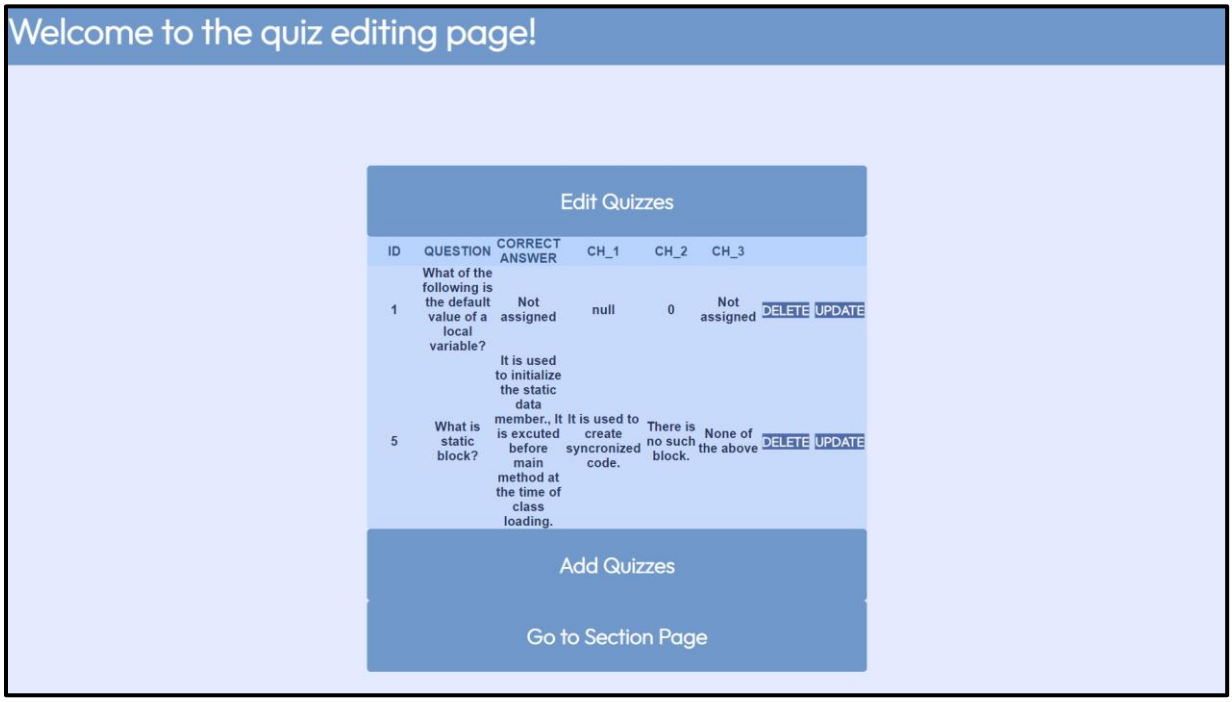

Figure 32. Edit Quizzes Button Appearance

3. When the "Update" mini button is clicked, a screen like Figure 33 appears. The data is updated according to what is written in the input places. If the admin refuses to update, admin can return to the previous page by clicking "Back to Quiz Editing Page".

Figure 33. Update Screen for Editing

4. When the Add Quizzes button is clicked, 5 input places appear below like Figure 34. When the Add button is clicked, the written data is added to the database.

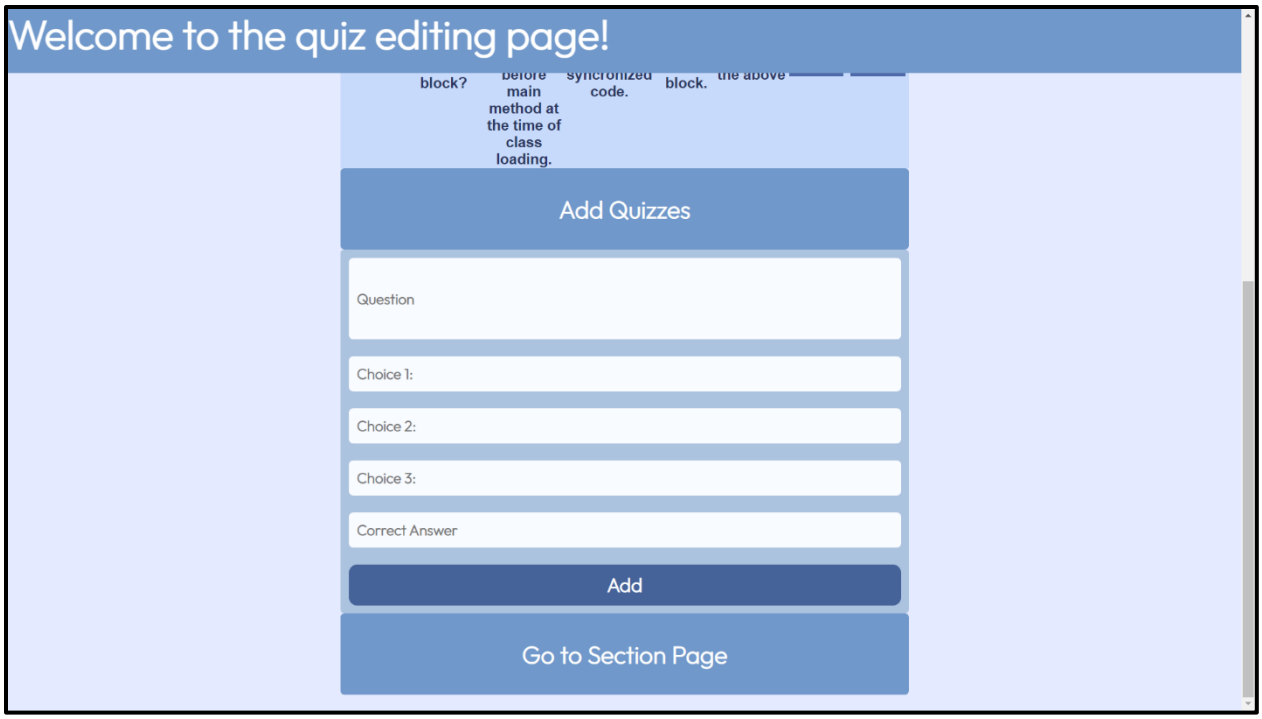

Figure 34. Add Quizzes Button Appearance

5. Admin can access the other admin page by clicking the go to section page button.

Total time:

The total time spent on the overall project was 16 days and 4 hours.