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1. Introduction

Rise of learning portals has foregrounded the need for effective peer support mechanisms in higher learning. This paper presents the "Internet of Chicken Database", an internet student inquiry forum system to facilitate peer academic support.

Inspired by websites such as Facebook, the system allows the sharing of information, describing issues, and collaboration in addressing school life or academic issues.

The major objectives of this project are:

- Give students the facility to add, modify, and remove posts.
- Give a list of questions and posts.
- Giving the facility to show a screenshot or picture for a post.
- Giving the facility to employ the existing list to create a post for a subject name and student name.
- Giving a list of subject names to add, modify, and remove.
- Each post has a comments section.

2. Development of Systems

The "Internet of Chicken Database" was developed with an effectively planned and iterative design methodology, emphasizing usability, functionality, and secure handling of data. The next section presents the system's design decisions, navigation hierarchy, data interrelationships, and technologies employed.

2.1 Page Design and Navigation Hierarchy

The system contains the following pages:

Post List Page: Display a feed of all student posts. Each post contains:

- Post Title
- Subject Name
- Posting Date
- Related Image
- Name of Author (linked to user profile if necessary)
- A comments space where users can insert and view replies
- Edit/Delete buttons for posts.

Add a New Post Page: Allow students to leave a new message. Students select names and subjects from drop-down lists, insert an optional photo, and type in the topic title and message.

Manage Subjects Page: Allows administrators to insert, edit, or delete subject titles. This keeps messages ordered and relevant to appropriate academic topics.

Manage Students Page: Administrators can insert, edit, or delete student names and email addresses. This assigns users to their message.
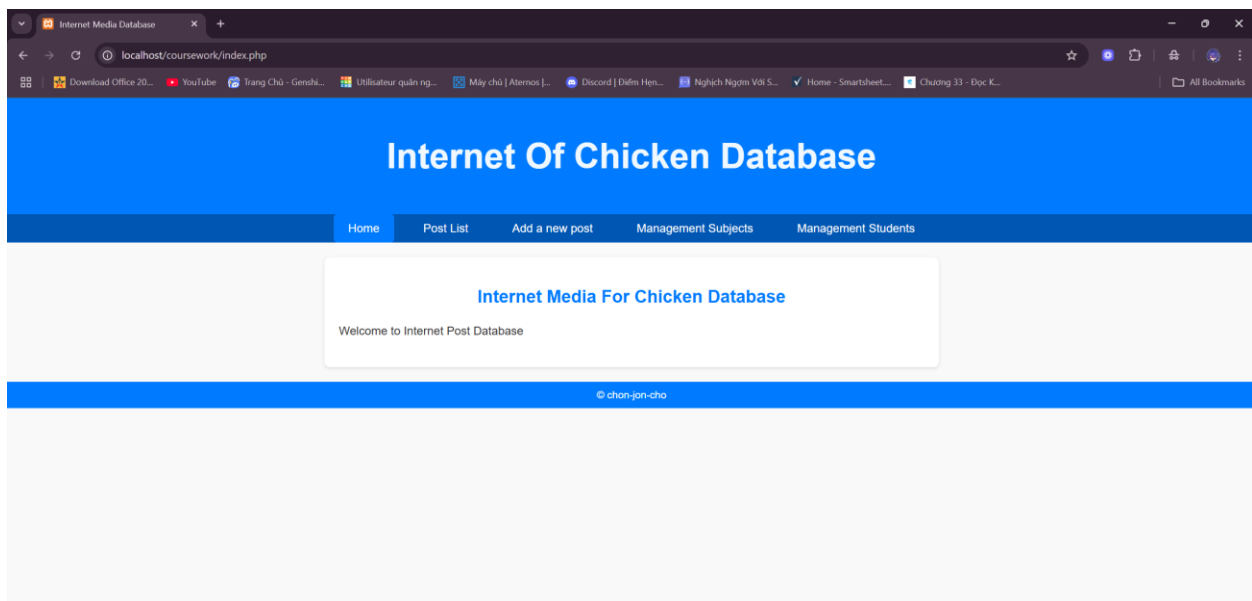

Fig.1 The layout of website

Navigation Structure:

There is always at the top of each page a top horizontal navigation bar having links to:

- Home
- Post List
- Add a New Post
- Management Subjects
- Management Students

The layout makes the system simple to use, simply accessible to all features, and visually consistent throughout the system.

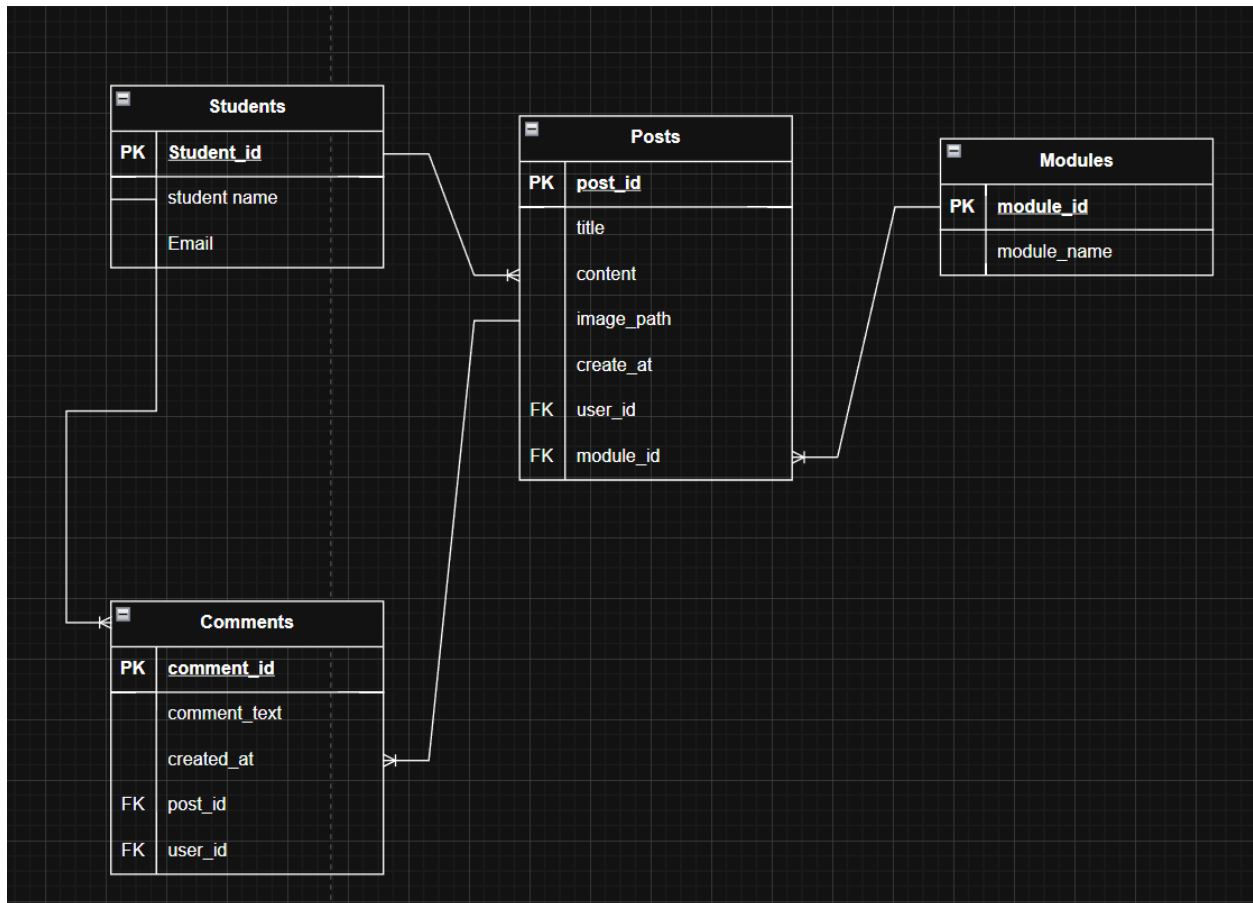## 2.2 Database Design (Entity-Relationship Model)

Fig.2 The ERD of the website

The database is for a student site where students post their entries. The students table stores information on each student, such as his/her name and email address. A student might have several posts, thus there is a one-to-many relationship between Students and Posts. The Posts table stores data such as the title of the post, content, path to image, creation date, and back pointers to the creator student and to the module which it belongs. Posts also point to the Modules table, and a post has one and only one associated module, signifying another one-to-many relationship (one module, many posts). Additionally, students can leave comments on posts, which are managed by the Comments table. Each comment is referenced both to the post it belongs to and the student who posted it, forming two independent many-to-one relationships. Overall, the schema supports a system in which students can upload posts to some modules and interact with other students' posts through comments. Minor changes for readability could be to rename "create_at" to "created_at" and consistently use "student_id" instead of "user_id" across the database.

2.3 Technologies Used

2.3.1 Front-end Technologies:

Technology	Description
HTML5	Utilizes semantic elements (<section>, <article>, <nav>) to enhance accessibility and SEO (Duckett, 2011).
CSS3	Provides layout, spacing, typography, and responsive styling across various devices.
JavaScript	Implements client-side form validation to ensure data correctness before submission.

Fig.3 Front-end Technologies

2.3.2 Back-end Technologies:

Technology	Description
PHP with PDO	Handles server-side logic and secure database interaction using prepared statements to prevent SQL injection (OWASP Foundation, 2024).
MySQL	Acts as a robust, scalable relational database solution managing users, subjects, posts, and comments (Ellis, 2022).

Fig.4 Back-end Technologies

The image depicts the technologies employed to build a web application centered around students, which allows them to upload and manage their posts. Section 2.3 Technologies Used is divided into two sub-sections: Front-end Technologies and Back-end Technologies. The part of section Front-end Technologies about Table 1 (Fig.3) describes HTML5 as a semantic structure for "content" with elements like <section>, <article> and <nav>; it further states that such structures improve accessibility and SEO, as Duckett (2011) claims. CSS3 controls the layout, spacing, and typographic attributes of the page while ensuring compatibility across devices. The validation of the forms by spearing both ends(JavaScript) only help in client-side validation before opening these pieces of evidence with the server. The Back-end Technologies table (Fig.4) PHP with PDO- Manages Server-Side Logic and secures Database Interactions through prepared statements, which reduces the chances of SQL injection attacks

(OWASP Foundation, 2024). As for the database system yet capable and reliable in managing student data, post data, and comments, to name a few, it is MySQL, a database as cited by Ellis (2022). They harmoniously work to create a platform where students can conveniently create, view, and interact with posts regarding various academic modules.

3. Legal, Social, and Ethical Issues

During the development of the "Internet of Chicken Database" system, it was important to consider various legal, social, and ethical issues to ensure that the system was legal and suitable for a diverse large audience. In this process, the project focused on the improvement of web accessibility, the responsible and thoughtful handling of personal data, and the adherence the European data protection legislation UK GDPR which stands for United Kingdom General Data Protection Regulation after Brexit has occurred throughout the system.

3.1 Web Accessibility

Accessibility is a basic human right. It means that individuals with disabilities equally could consume web content. At the development of the "Internet of Chicken Database" system, local web-developing standards of the Web Content Accessibility Guidelines (WCAG) 2.1 were applied (W3C, 2018).

That includes:

1. Text Alternatives: To access visual information through a screen reader, descriptive text has been added to all graphics within the application.
2. Semantic HTML: Native elements like headings (<h1>, <h2>), form labels, and navigation landmarks, are used throughout the application which leads to an improved experience with the usage of assistive technologies.
3. Keyboard accessibility: Users can access every single part of the experiments only with a keyboard, which supports, or enables users with certain neurological impairments which might affect motors or other functions.
4. Color contrast: Better readability for the visually impaired, who often require as high as a minimum color contrast of 4.5:1 to read text clearly against a background color.

Adhering to the principles, everyone, regardless of disabilities, can access the platform. Failing to be accessible does not only mean to discriminate against people with disabilities, and thus, breaching the Equality Act 2010 of the United Kingdom

3.2 Personal Data Storage

The system records personal data predominately usernames and email addresses. According to the UK GDPR personal data should be processed fairly, lawfully and in a transparent manner (ICO, 2023). To be compliant we undertook several steps:

- Data Minimization: We collect only the necessary information to do the basic functions of the system, and we do it according to the principle of data minimization.

- Data Security: We use PDO prepared statements and by using proper input sanitation we protect against SQL Injection attacks.

- No Unnecessary Collection: The "Contact Admin" form only sends the message directly to the administrator's email and doesn't store the content of the message in the database. This way we reduce the possibility of data breach.

In addition, students are made aware of the purpose for which we collect their data, ensuring that we are transparent with them in line with the UK GDPR.

3.3 Consequence of Brexit on GDPR Compliance Guidance

Post Brexit, the UK formally adopted its version of GDPR, referred to as UK GDPR, alongside the Data Protection Act of 2018. The only significant modification is local enforcement by the Information Commissioner's Office (ICO) as opposed to the EU GDPR's centralized governance (ICO, 2024).

Institutions of higher education in the UK are not obligated to designate a representative based in the EU, because the system services local clientele.

The "Security of the System" and "Data Protection Principles" as well as the consent of users, data retention, and access ("Right to be Forgotten") are active components, and system enforcement can guarantee compliance."

Hence, irrespective of the political developments, the method for managing personal data in the project remains appropriate and in accordance with contemporary rules and requirements following Brexit.

3.4 Ethical Considerations

Ethical responsibility goes beyond legal compliance. The project aimed to foster a respectable digital community by:

- Promoting Fair Use: Allowing students to post, comment, and engage equally on social media without discrimination.
- Transparency: It means to reveal the purpose of the data collection and avoid secretive or misleading data practices.
- Avoiding Plagiarism: unique code was written where necessary and any external code snippets or templates were properly identified in line with academic guidelines.
- Respect for User Privacy: Messages sent via the contact form are handled confidentially, and no sensitive data (such as passwords) is stored without encryption.

Failure to address these ethical considerations could undermine trust in the platform and violate both user expectations and institutional guidelines.

4. Overview of the System with Annotated Screenshots

An overview of the "Internet of Chicken Database" system is given in this section, along with screenshots that have been annotated. The screenshots show that the system satisfies the functional requirements listed in the project brief, including features for peer collaboration, post creation, and management.

4.1 Main Page (View of the Post List)

All the posts that have been submitted are listed on the Home Page. Every post includes:

- Title: "TEST 86"
- Name of Subject ("User Interface Design")
- Date of Posting ("Mon 28 Apr 2025")
- A screenshot or related image that demonstrates the post's content
- "Hoa-Anh" is the author's linked name.
- Buttons for editing and deleting posts

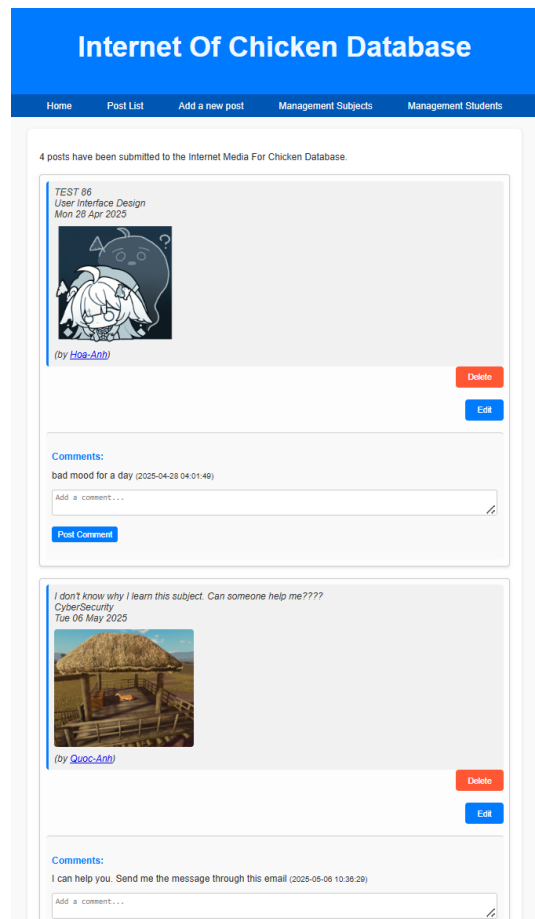Fig. The navigation bar to show the place where user stay in

Fig. The post layout

Users can add and view responses in the Comments Section that appears beneath each post. A timestamp and the text of each comment are shown. This promotes peer-

to-peer support and communication, which is consistent with the system's intended collaborative design.

4.2 Add New Post Page

The "Add New Post" screenshot can be added, making the post more interesting for students.

- The "Add New Post" page displays a form where the user:
- Inputs the Post Title and Post Content.
- Selects their Name from the dropdown list populated from the student database.
- Selects the Subject Name from the dropdown list populated from the Module database.
- Uploads an optional Image/Screenshot file to accompany their post.
- Submits the post to be stored in the database and displayed on the Home Page.
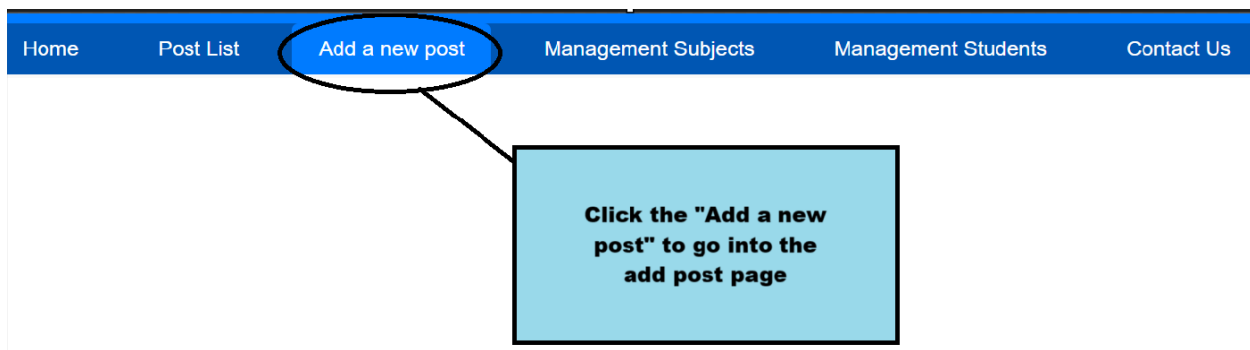
Fig. Click the "Add a new post" on navigation bar to enter the new page

Fig. Add new post page
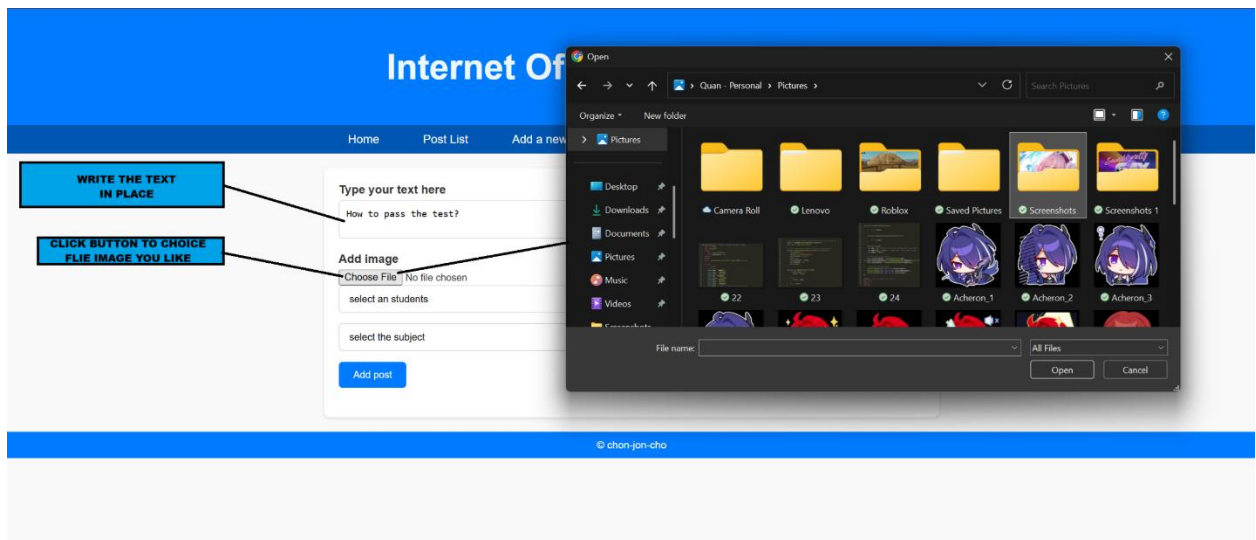
Fig. Enter the text and choice the picture to add the new post
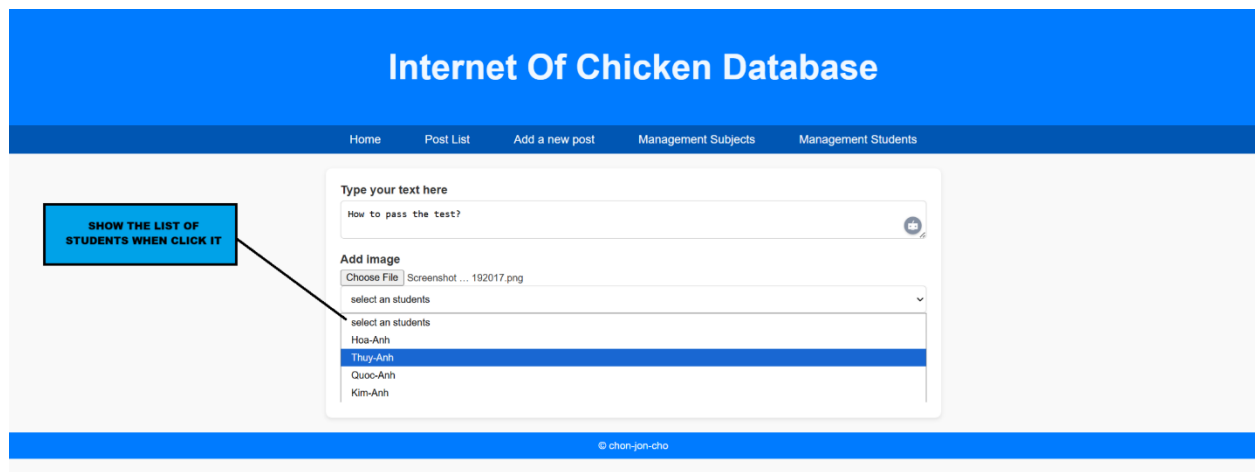
Fig. Select the student to be the owner of that post

Fig. Choice the subject for that student

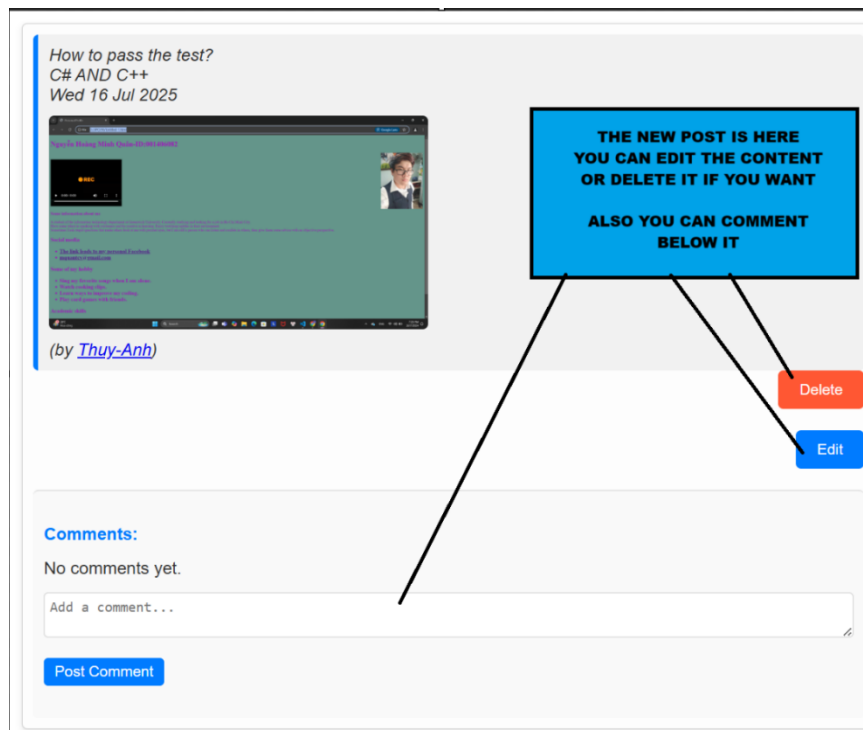Fig. Click the button when you do all done of these things above

Fig. The new post had been added to the list post, the number of post list will be change depending on it
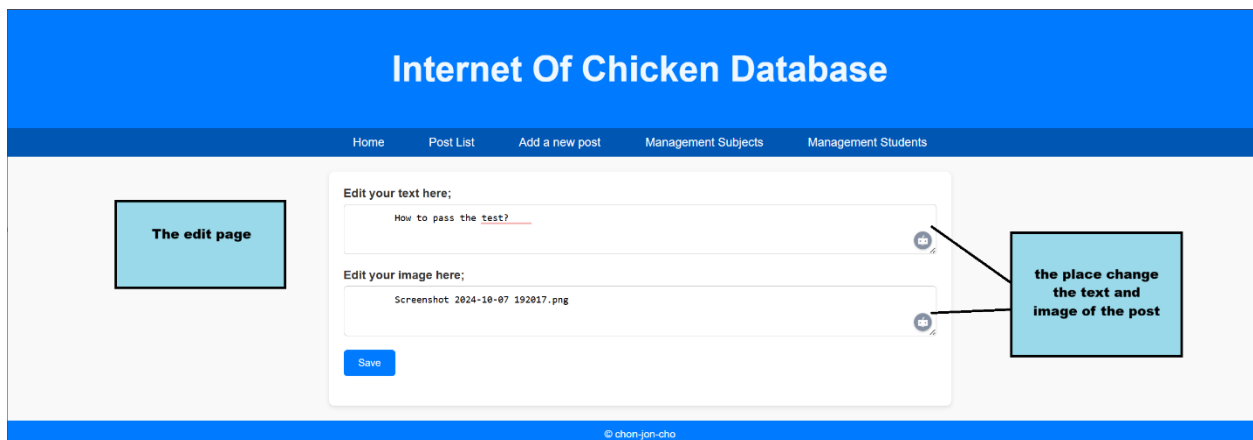

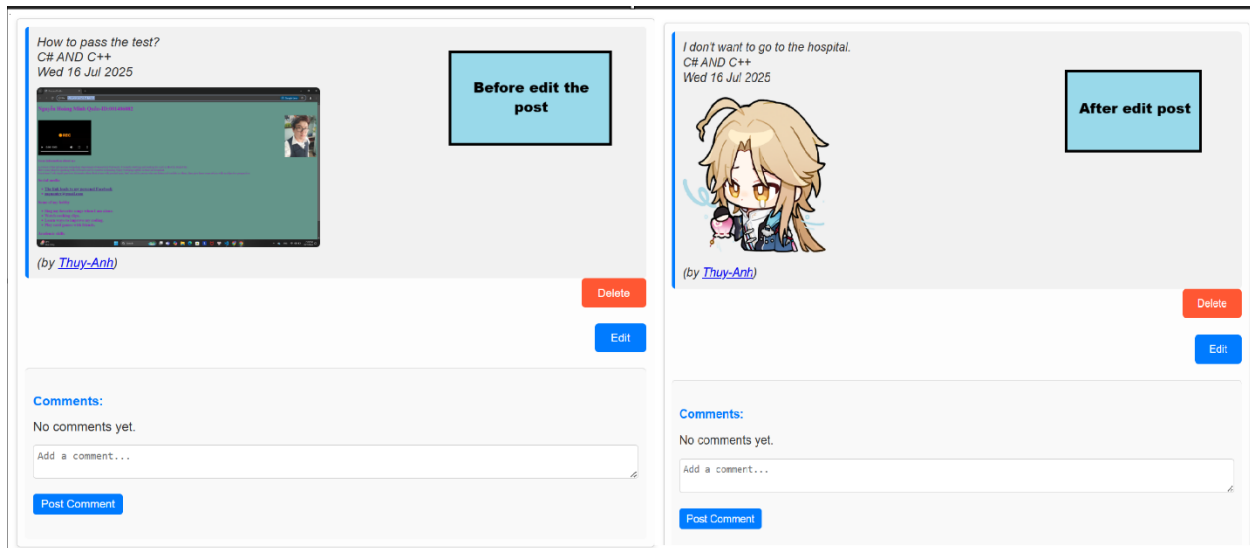Fig. The edit page layout after clicking the button

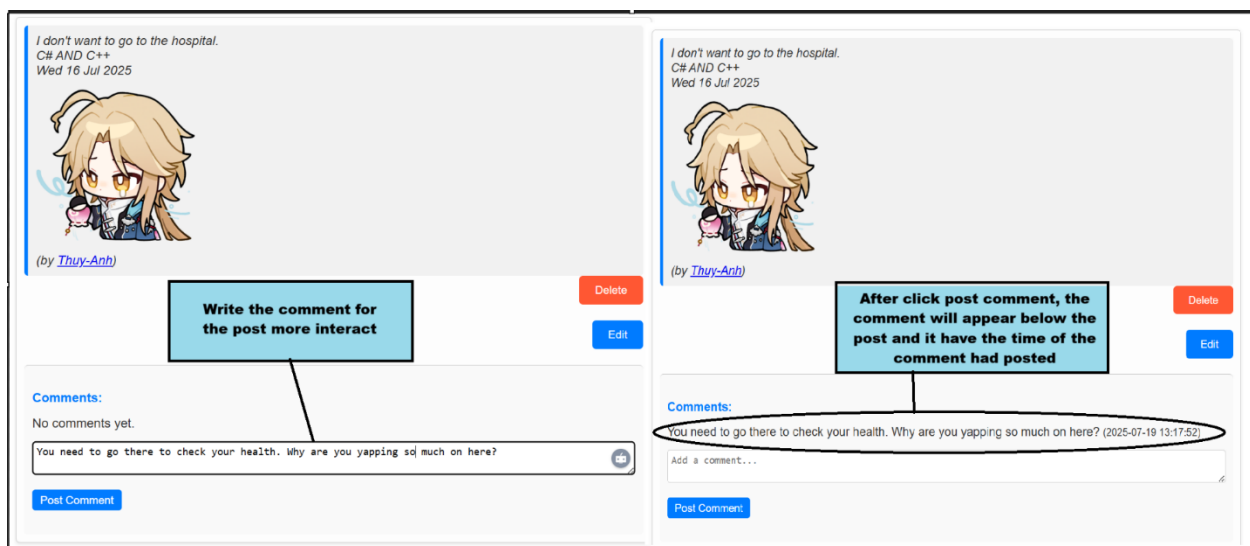Fig. The before and after edit the post

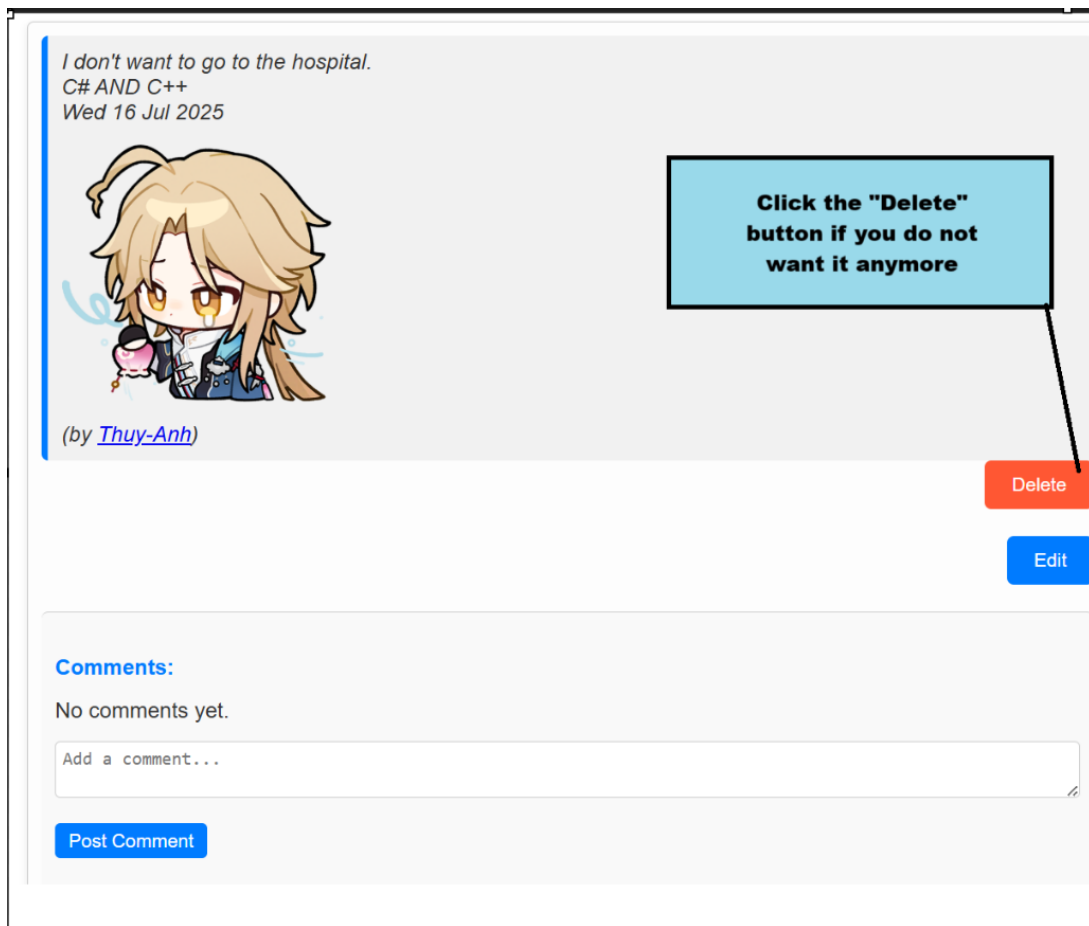Fig.14 The comment box and the real-time of post comment

Fig. The delete button function

Fig. Before and after click delete button, the number of post list will change depending on it

Form validation keeps all fields required from being left blank or filled in incorrectly before submitting.

4.3 Subject Management Page

The "Subject Management" page allows administrators to:

- **Insert new subjects**
- **Delete subject records**

- **Edit subject records**

This facility keeps the subject list up to date so that students can correctly categorize their posts.
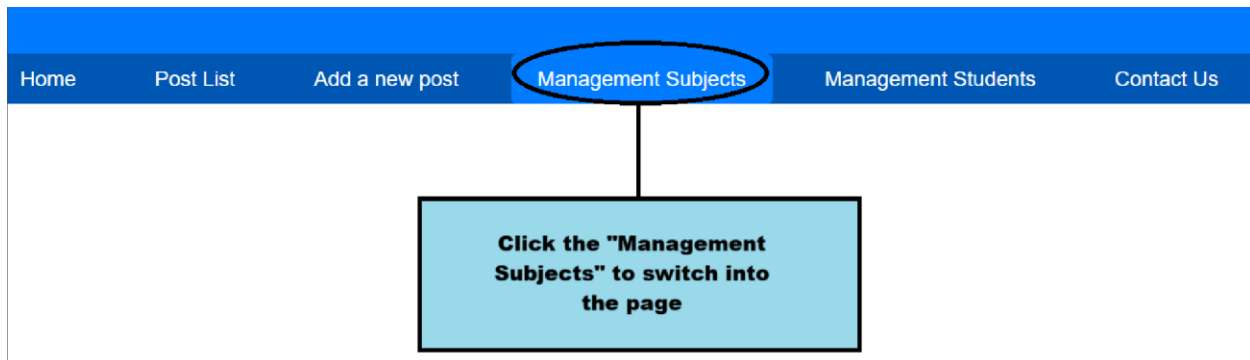

Fig. Click the "Management Subjects" on navigation bar to enter the page
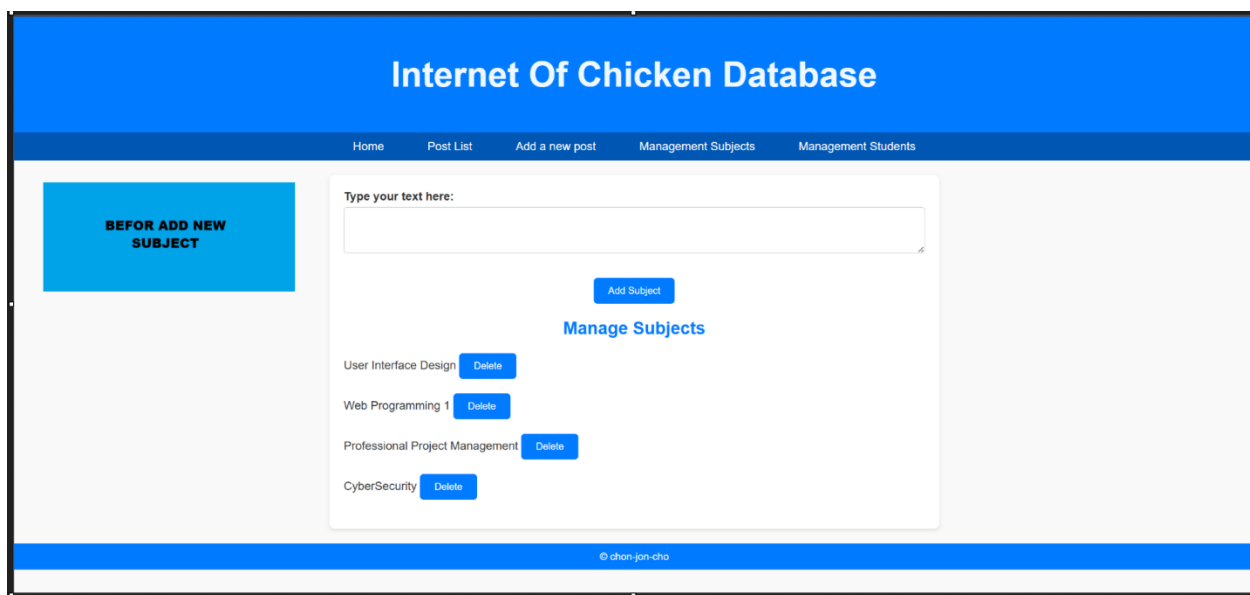

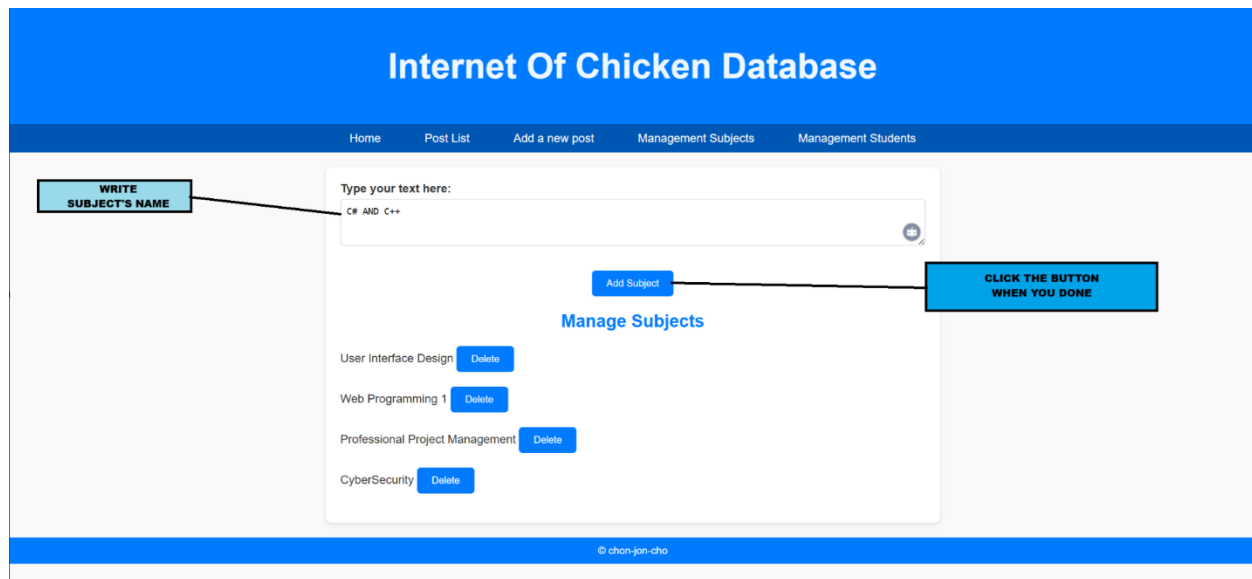Fig. The original subject list

Fig. Insert the name of new subject that you want to add
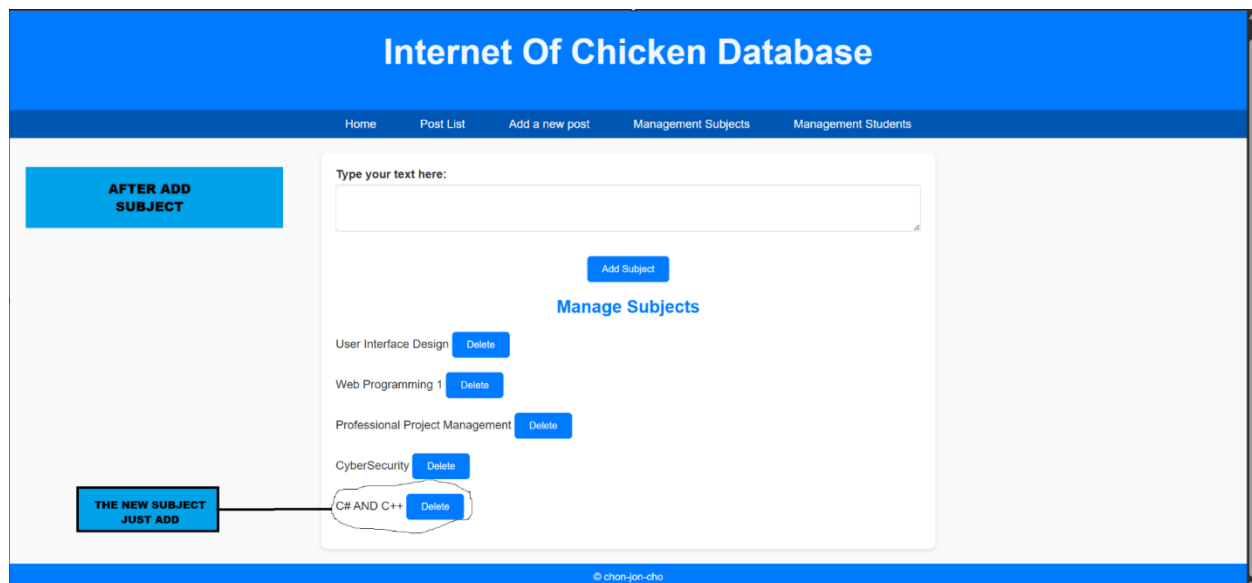

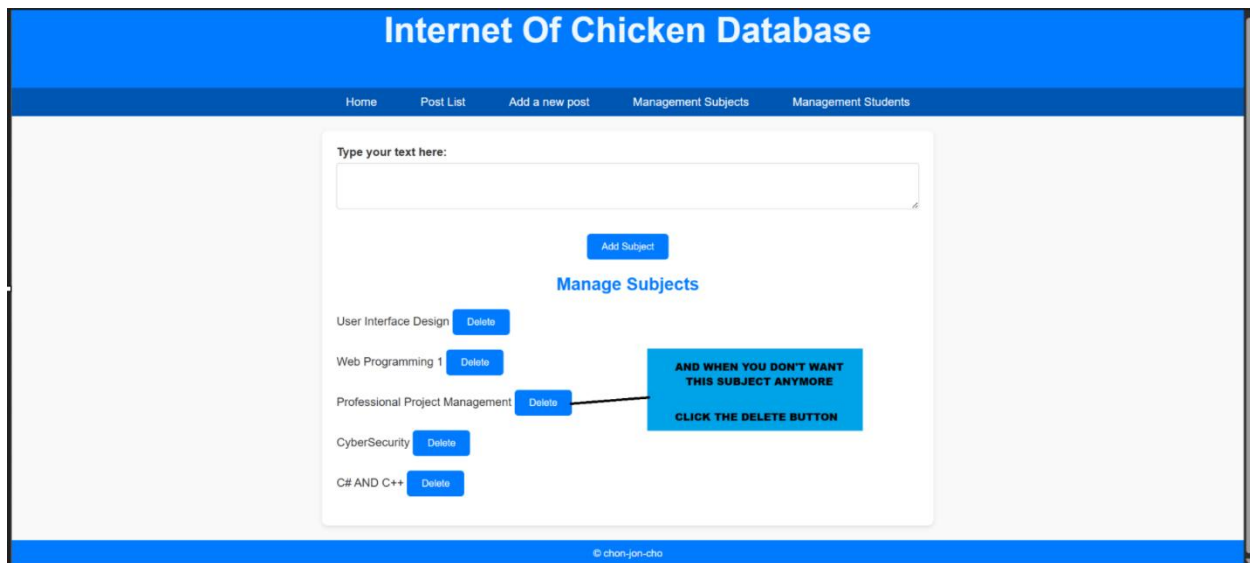Fig. After clicking the "add subject", the new subject had been added to the   list

Fig. Delete button will remove the subject you do not want to present in list
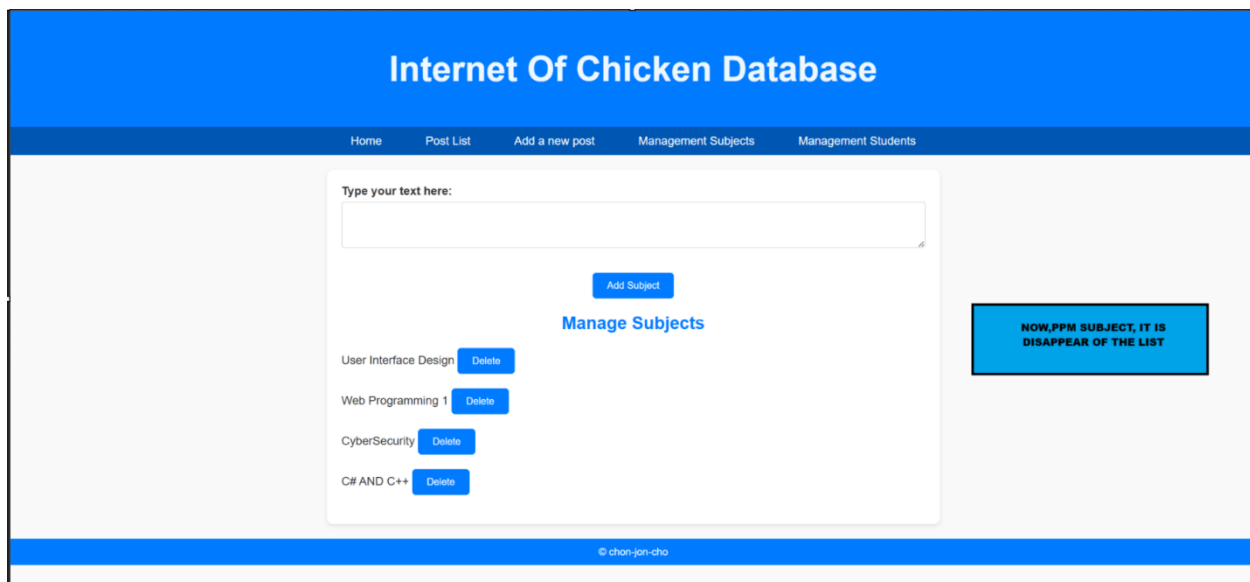
Fig. After click "Delete" button, the chosen subject had been removed out of list

Home	Post List	Add a new post	Management Subjects	Management Students	Contact Us

Type your text here:

Add Subject

Manage Subjects

User Interface Design — Delete — Edit — **click here to edit name**

Web Programming 1 — Delete — Edit

CyberSecurity — Delete — Edit

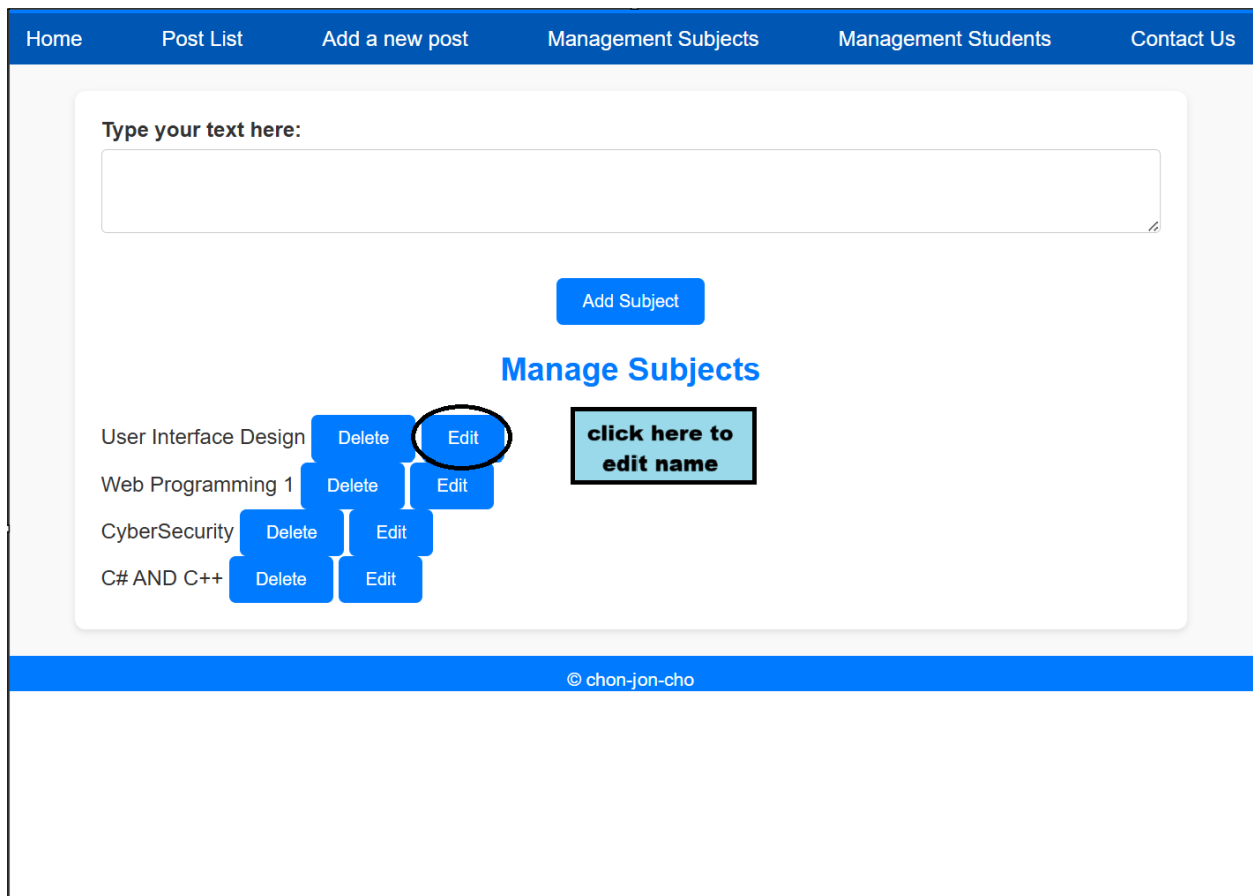C# AND C++ — Delete — Edit

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Fig. click the edit button to change the name of the subject

Fig. Textbox and cancel button

Fig. The save button after entering the new name

Fig. After changing the name of subject

4.4 Management Students Page

The "Manage Students" page provides administrative control over user accounts. Administrators can:

- **Insert new student records (name and email address)**

- **Delete student records**

- **Edit student records**

Proper management of users ensures that posts are allied to valid student accounts, in support of the relational database scheme of the system.
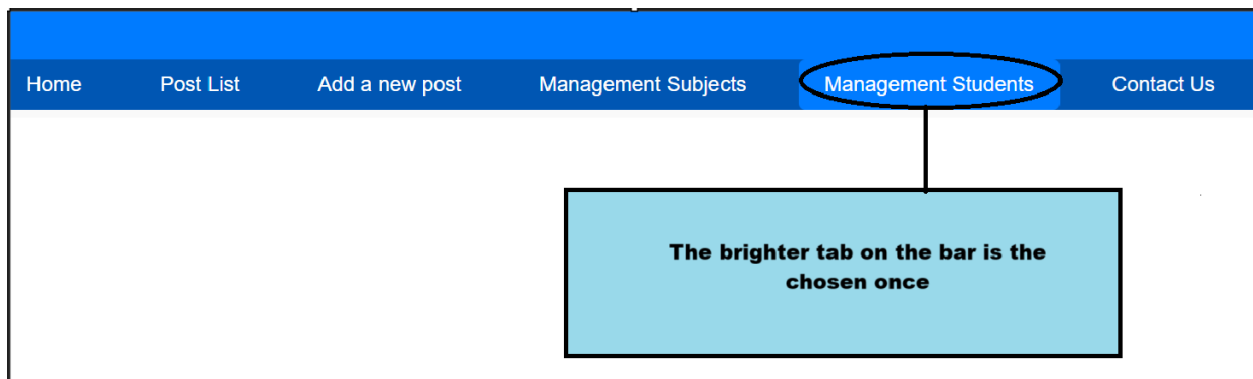
Fig. Click tab on the bar to switch to the page where management students

Fig. The management student page
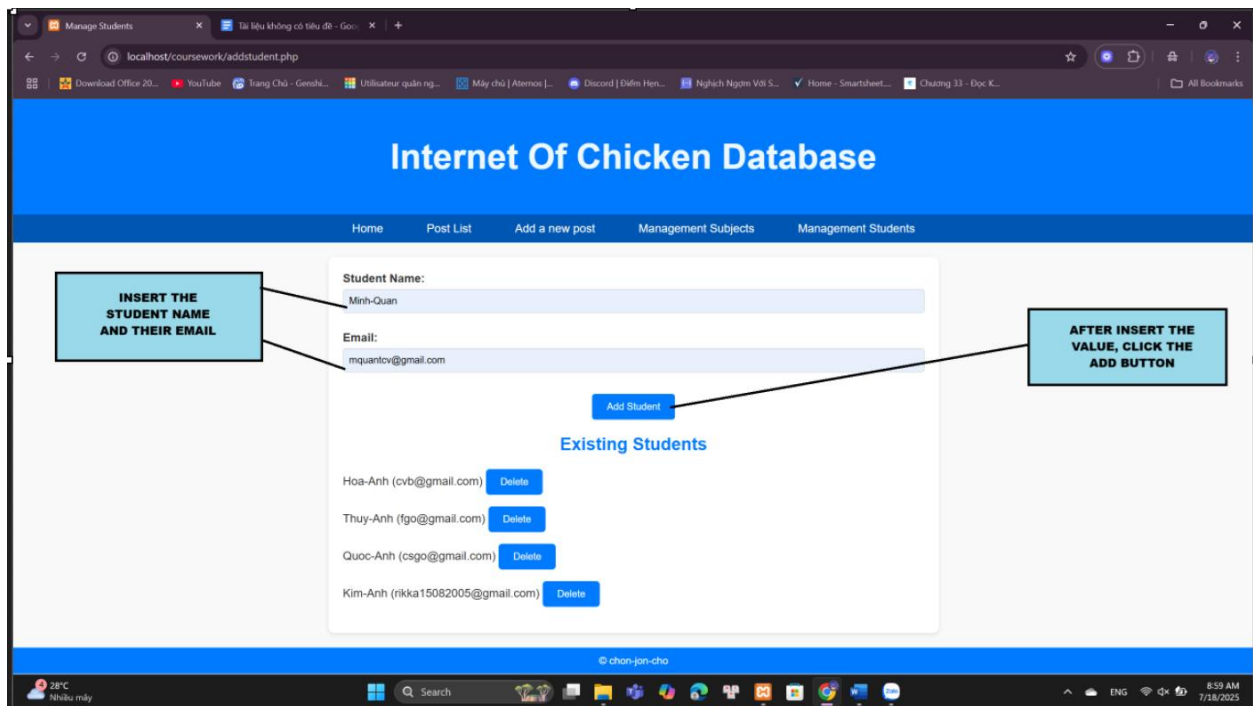
Fig. Tutorial of steps to add new students
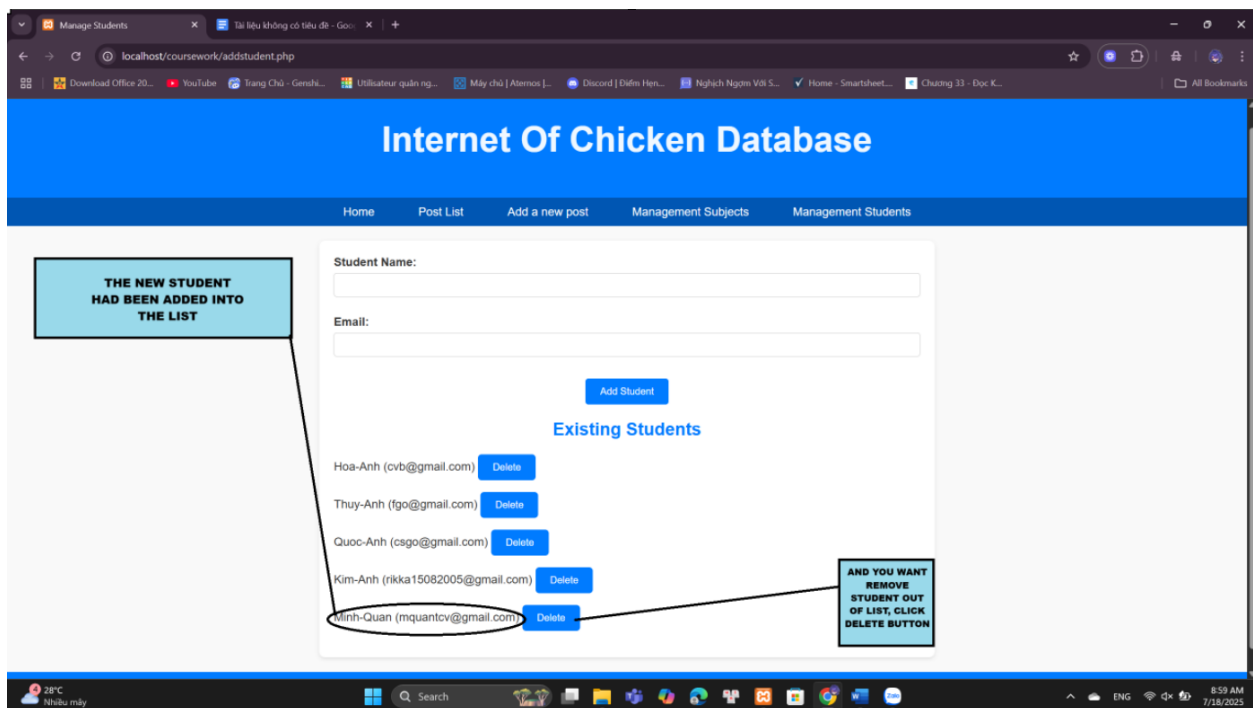
Fig. After adding new students, it will appear at bottom of list. When you do not want that student in the list, click the "delete" button
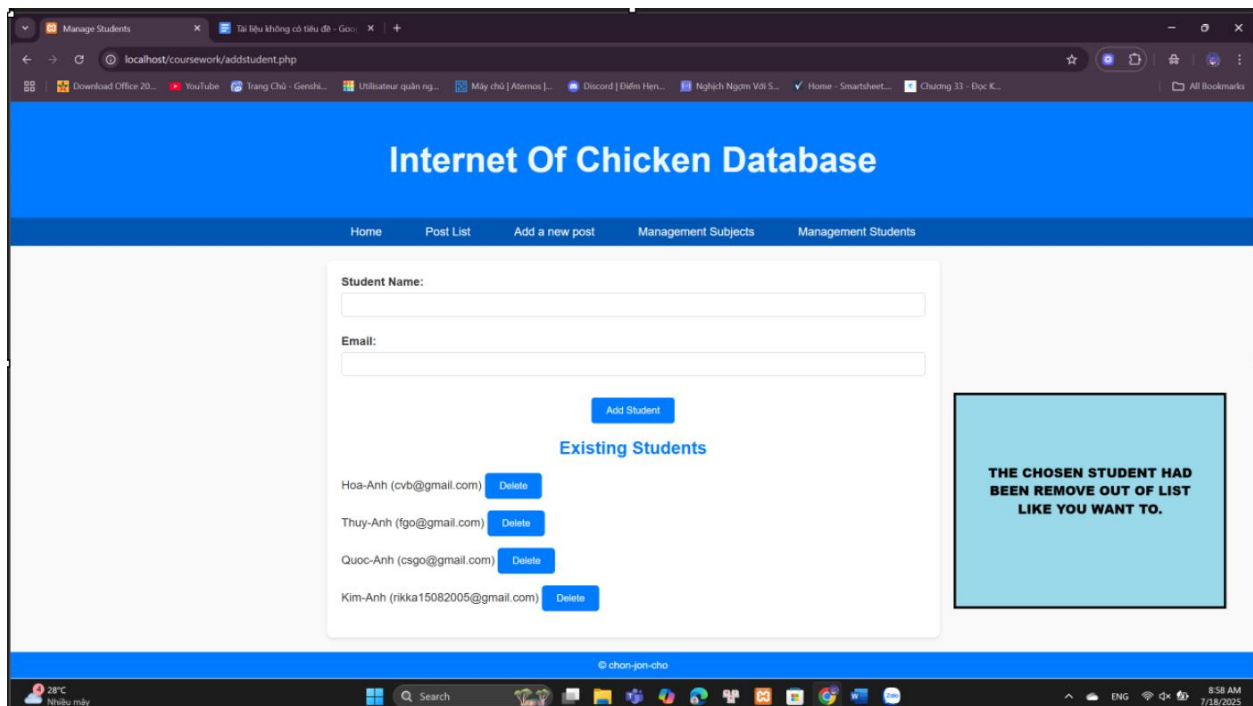
Fig. The chosen student has disappeared out of list

Fig. The edit button

Fig. Textbox and cancel button

Fig. The save button after entering the new name
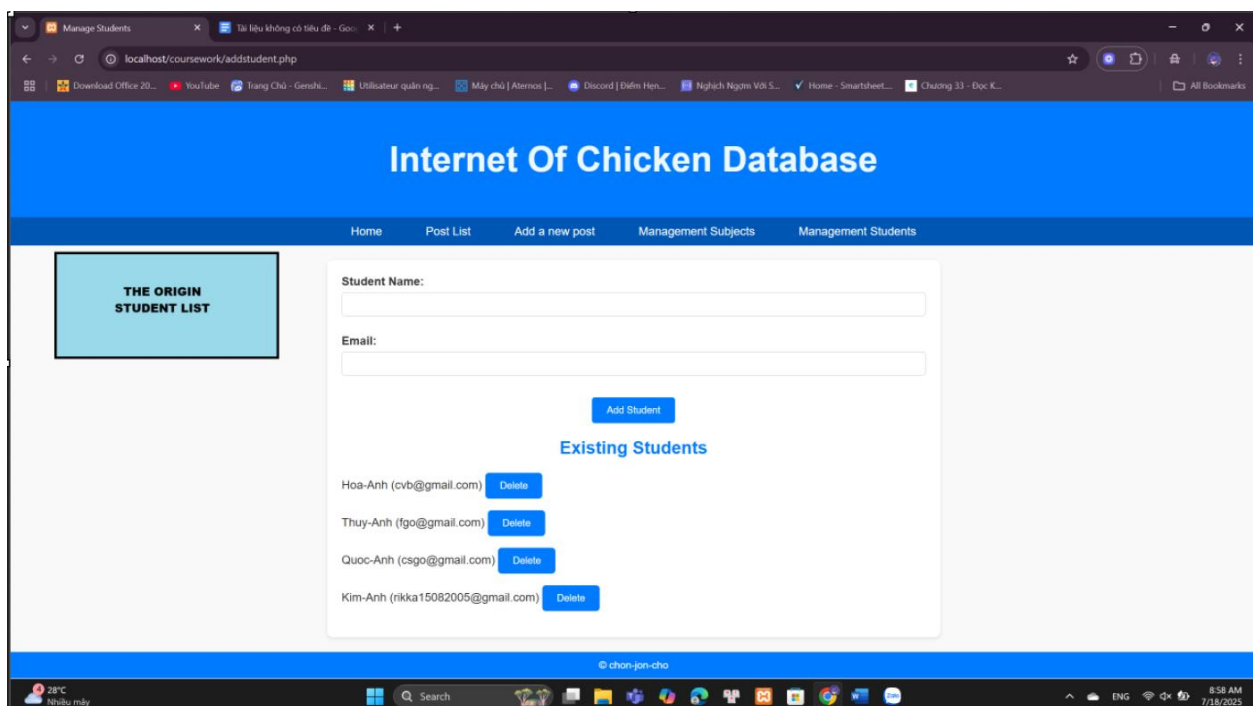

Fig. After changing the name of student and gmail

4.5 Contact Us Page

The "Contact Us" page allows users to provide feedback or ask questions directly to the administrator. The form consists of three mandatory fields: Name, Email, and Message. HTML5 validation is utilised for proper format of the input.

The form data is processed when submitted by using PHP's mail() function and sent to the admin's email without storing the message in the database. This is in accordance with data minimisation under UK GDPR (ICO, 2024).

The design consists of usable HTML elements with meaningful labels, with the use of keyboard navigation and conformance to WCAG 2.1 guidelines (W3C, 2018). This feature increases user assistance and inclusivity of the platform.

When user want to send
message to the admin
They will click this tab to get
into the place, where can
contact with admin

Fig. introduces for the contact page

Internet Of Chicken Database

Home   Post List   Add a new post   Management Subjects   Management Students   Contact Us

Page have 3 textbox
for user can write
their problem or find
some help

Your Name:
Quoc-Anh

Your Email:
csgo@gmail.com

Message:
YOU NEED TO UPDATE THE SYSTEM MORE IN THE FUTUTRE

Send Message

Contact Messages

- Nguyen Hoang Minh Quan (mquantcv@gmail.com): test 1
  2025-07-30 07:55:34

The history box to
show message
sended

© chon-jon-cho

Fig. introduces the page layout

Internet Of Chicken Database

Home   Post List   Add a new post   Management Subjects   Management Students   Contact Us

Your Name:

Your Email:

Message:

Send Message

Thank you for contacting us

Contact Messages

After click the
send button
The notify will
appear

and the new message
had been added to the
history box

- Quoc-Anh (csgo@gmail.com): YOU NEED TO UPDATE THE SYSTEM MORE IN THE FUTUTRE
  2025-07-30 09:30:13
- Nguyen Hoang Minh Quan (mquantcv@gmail.com): test 1
  2025-07-30 07:55:34

© chon-jon-cho
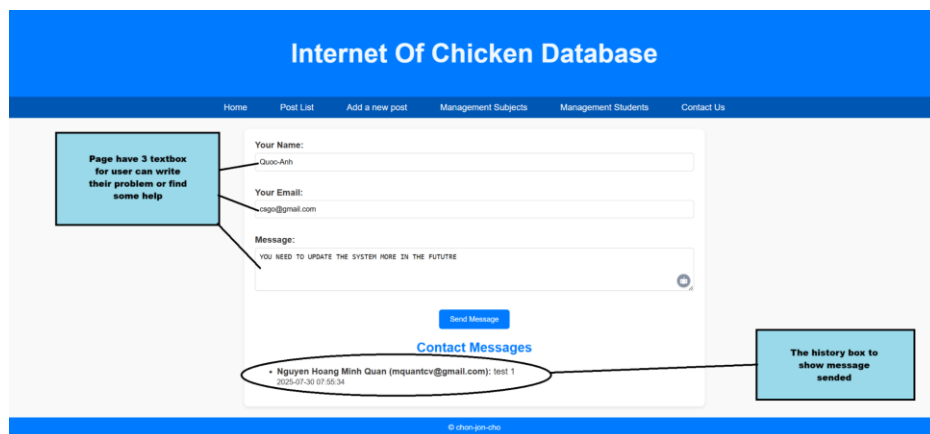
Fig. after send message, it have been save in history box

5. Evidence of Structured Testing

Testing is a critical phase of system development aimed at verifying functionality, identifying errors, and ensuring reliable user experience. The "Internet of Chicken Database" was tested through a formalized structured testing approach. The following table summarizes test cases, expected results, actual outcomes, and the final verdict.

5.1 Structured Test Plan

Test Case ID	Feature Tested	Test Description	Expected Result	Actual Result	Pass/Fail	Testing Day
1	Post Creation	Submit a valid post with title, content, subject, and image	Post appears in Post List with correct data and image	Success	Pass	14–16/3/2025
2	Post Creation	Submit a post without selecting a subject	System prompts error (validation failure)	Validation error shown	Pass	15/3/2025
3	Post Editing	Edit an existing post's content	Post updates successfully in the database	Success	Pass	17/3/2025
4	Post Deletion	Delete an existing post	Post is removed from Post List and database	Success	Pass	16–20/3/2025
5	Image Upload	Upload a valid image with post	Image displays correctly with the post	Success	Pass	22–27/3/2025
6	Comment Submission	Add a comment under a post	Comment appears with timestamp under correct post	Success	Pass	1–7/4/2025

7	Manage Subjects	Add a new subject	New subject appears in dropdown when creating a post	Success	Pass	9–10/4/2025
8	Manage Subjects	Delete an existing subject	Subject removed from management page and dropdown	Success	Pass	9–10/4/2025
9	Manage Students	Add a new student	New student appears in dropdown when creating a post	Success	Pass	9–10/4/2025
10	Manage Students	Delete a student	Student removed from management list and dropdown	Success	Pass	9–10/4/2025
11	Accessibility	Navigate entire website using only keyboard (Tab key)	All links, buttons, and forms are reachable and usable	Success	Pass	12–20/4/2025

Test case table is an overview of the most critical testing activity to be done on the student web application, where the students can create, manage, and interact with academic posts. Every row in a table includes a feature, test scenario, and expected and actual results.

Key features tested included post creation (with and without choosing a subject), editing, deleting, and uploading photos—checking posts were added successfully, updated, deleted, and appeared with images. Comment functionality was also tested to confirm comments appeared below the respective posts with date/timestamp.

Admin functions such as managing students and subjects were checked and proved that adding or deleting entries properly updated dropdowns and lists. The system was tested for accessibility using keyboard alone (Tab key) to ensure mouse-free usability.

All the tests passed successfully, proving that the system functions as designed in terms of core functionality, data processing, and accessibility.

5.2 Testing Notes

- Manual testing was carried out on a local XAMPP server and student web hosting space.
- Validation was tested both on the client-side (HTML5 form validation) and server-side (PHP).
- Special attention was paid to security, including SQL injection resistance.
- Accessibility tests were conducted manually using the keyboard only.
- Cross-browser compatibility was briefly tested on Google Chrome and Microsoft Edge.
- No significant bugs were identified during testing. A few minor improvements to the form validation error messages were made after initial results.

6. Conclusion and Suggestions for the Future

Through a straightforward and effective web platform, the "Internet of Chicken Database" system effectively accomplishes its main goals of promoting peer academic support, facilitating student connection, and organizing course-related posts. Users may quickly publish posts, manage subjects, and comment on peers' inputs thanks to the system's secure CRUD (publish, Read, Update, Delete) structure, which promotes a collaborative learning environment.

Data security, legal compliance (particularly the UK GDPR), and accessibility standards were carefully considered throughout the development process. MySQL's implementation of the system's relational database design guarantees scalability and integrity, while PHP PDO programming improves security by guarding against SQL injection attacks. The inclusion of a useful "Contact Us" page improves user-system administrator contact even more.

Suggestions for the Future

- The following improvements may be made if more time and resources were available:

- User Authentication System: Putting in place a login process that lets students create personal accounts and restricts post modification and deletion to users who have been verified.
- Password Protection: Using password hashing to enable safe user credential storage.
- Users can now immediately respond to individual comments (nested comments) thanks to the improved comment system.
- Upvote/downvote functionality has been added to the post voting feature to highlight the most helpful posts.
- Admin Dashboard: Creating a thorough administrative panel to keep an eye on all activity, manage users, and more effectively moderate posts and comments.
- Accessibility Upgrades: To significantly improve compatibility with assistive technology, include ARIA roles and labels.
- Using a CSS framework such as Bootstrap, responsive frontend enhancements improve mobile responsiveness for a better experience on all devices.

The "Internet of Chicken Database" could develop into a strong academic assistance platform with these further capabilities, providing a more comprehensive and safe setting for student participation.

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