Database Table and Columns

Database name: Questionbank

Table #1: User

The table in *Figure 1* is responsible for saving user data, controlling flow of data in login and registration.

Column	Type	Nullable	Default Value	Description
UserID	int(11)	NO	*None*	(Extra: AUTO_INCREMENT) Increment automatically
UserEmail	varchar(100)	NO	*None*	-
Username	varchar(15)	NO	*None*	-
FirstName	varchar(50)	NO	*None*	-
LastName	varchar(50)	NO	*None*	-
Password	varchar(30)	NO	*None*	-

Figure 1: User table in the database.

Table #2: Question

The table in *Figure 2* is responsible for saving all data related to the questions in the question bank.

Column	Type	Nullable	Default Value	Description
QuestionID	int(11)	NO	*None*	(Extra: AUTO_INCREMENT) Increment automatically
QuestionName	varchar(100)	NO	*None*	Title of question based on its contents
QuestionSection	varchar(1)	NO	*None*	-
QuestionSrc	varchar(200)	NO	*None*	Image source of question to print out
MarkschemeSrc	varchar(200)	NO	*None*	Image source of mark scheme (solution of question)
time	int(11)	NO	*None*	Integer value of time taken to complete question (calculated from number of marks a question is worth where 1 mark = 1 question)

Figure 2: Question table in database.

Table #3: unit

The table in Figure 3 is responsible for saving static data related to all units of questions.

Column	Type	Nullable	Default Value	Description
UnitID	int(11)	NO	None	(Extra: AUTO_INCREMENT) Increment automatically
UnitName	varchar(50)	NO	None	Title of unit (topic) based on the IB guide.

Figure 3: Unit table in database

Table #3: question_unit

The table in *Figure 3* is the joint table of a many-to-many relationship between the *question* and *unit* tables. Responsible for connecting each question with its respective units.

Column	Type	Nullable	Default Value	Description
QuestionID	int(11)	No	None	Same QuestionID from *question* table
UnitID	int(11)	No	None	Same UnitID from *unit* table.

Figure 4: question_unit table from database, joint table between question and unit tables

Database relationships:

Figure 5 provides a detailed entity relationship diagram for the final application. For the *question* and *unit* tables, the *QuestionID* and *UnitID* are the primary keys that uniquely identify the table respectively. They are also both indexed to be foreign keys in the *question_unit* joint table, where the *question* and *unit* tables both have a 1-to-many relationship with the joint table. Which is accurate considering that each question may have many units, and many units may have many questions. On the other hand, the *user* table has the *UserID* as the primary key.
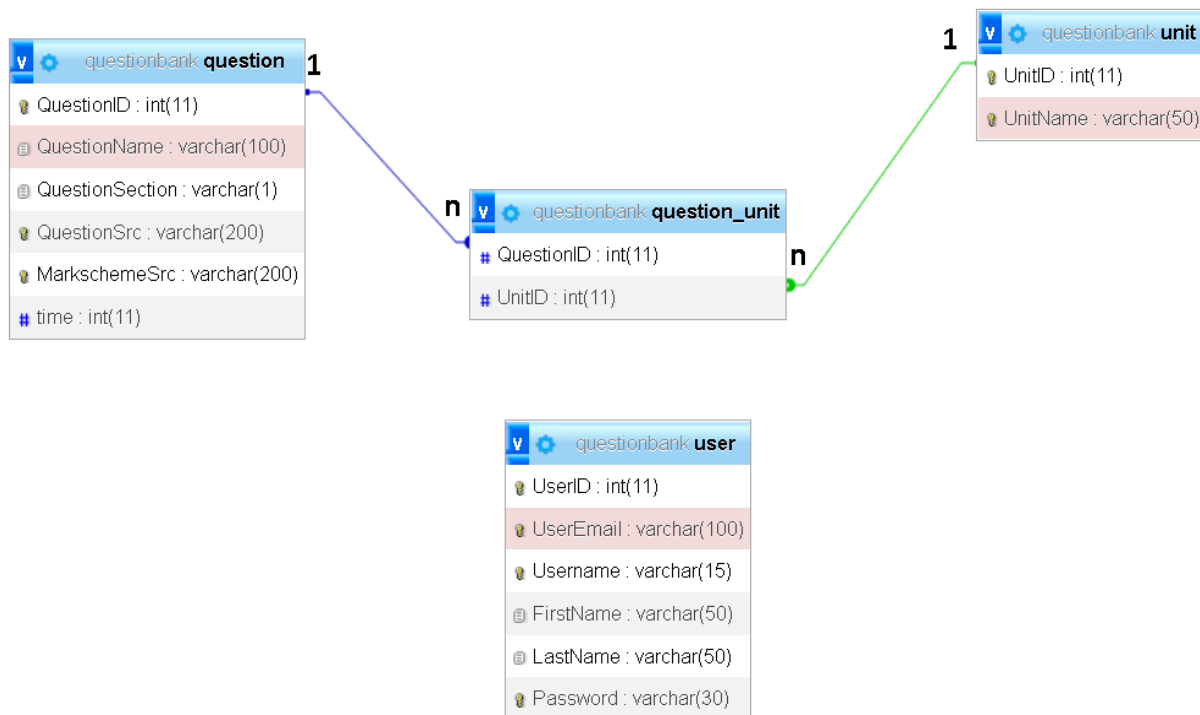
Figure 5: Database Detailed Entity relationship diagram

Furthermore, This layout ensures that the database is: First, 1NF, meaning each cell contains singular atomic values and every column in the table is uniquely named. Secondly, 2NF, as Non-key attributes depend fully on every part of the primary key. And finally, 3NF, since no *non-key* attributes depend on any other *non-key attributes.*
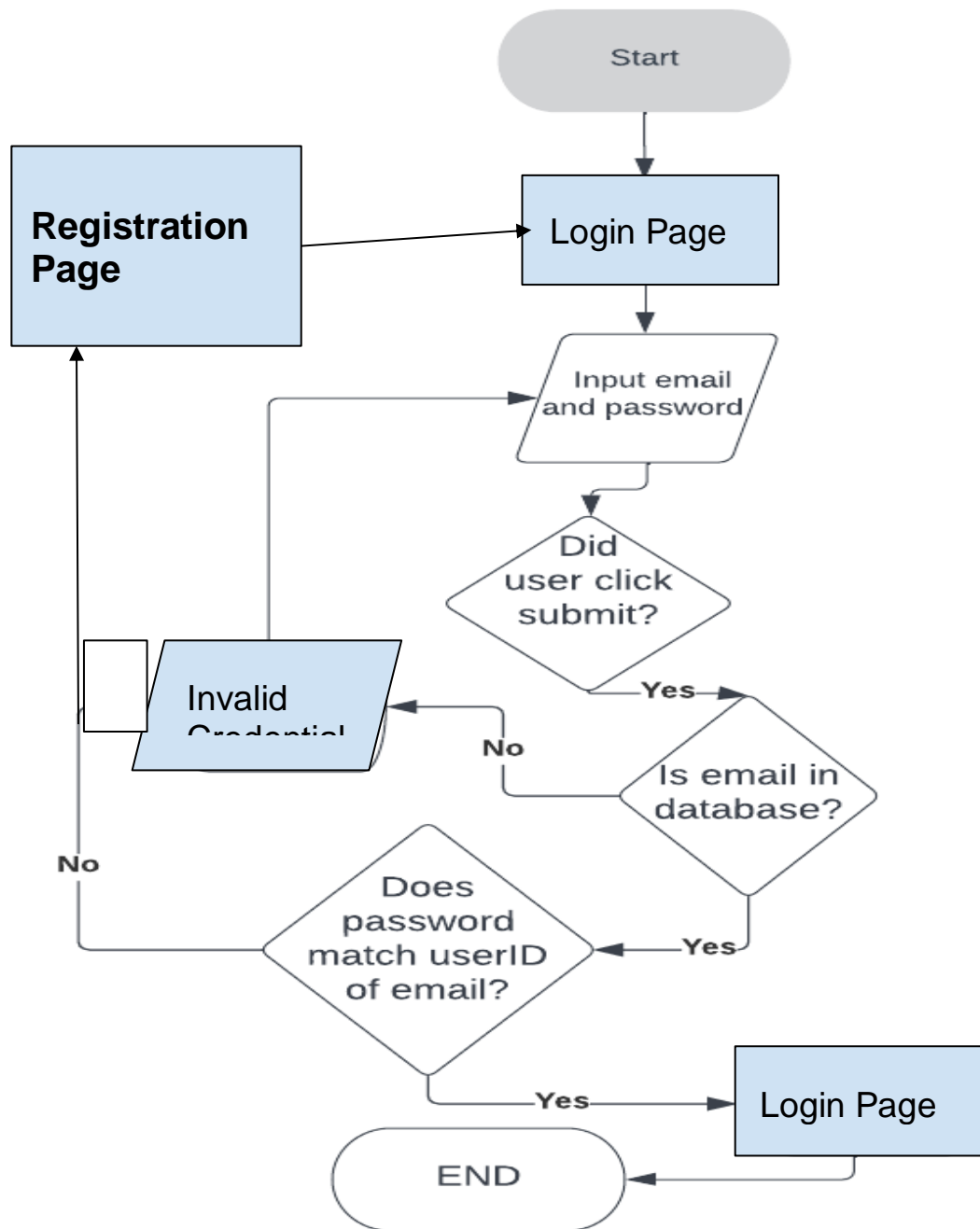
Process Flowcharts:

Figure 6: Login page process flowchart, illustrates the process the login page will follow. Those whose email/username is not found in the database will be referred to the registration page. If the user logs in a $_SESSION will be established
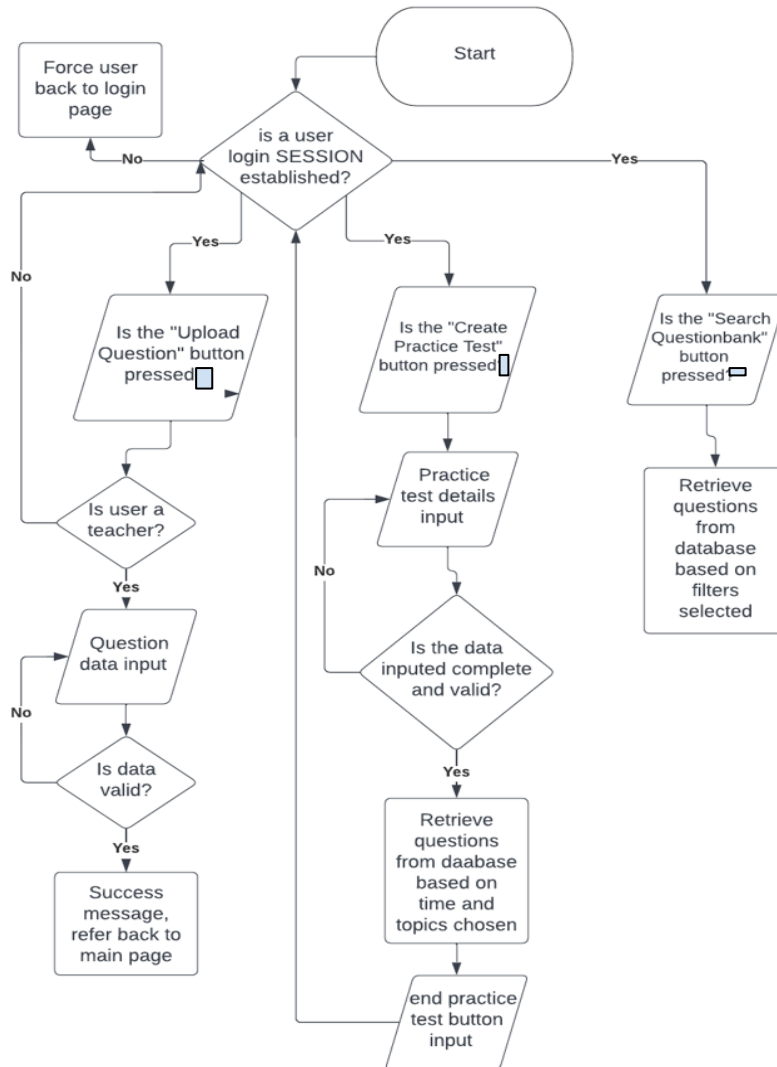
Figure 7: illustrating the entire process of the main page and its links according to the success criteria and GUI design
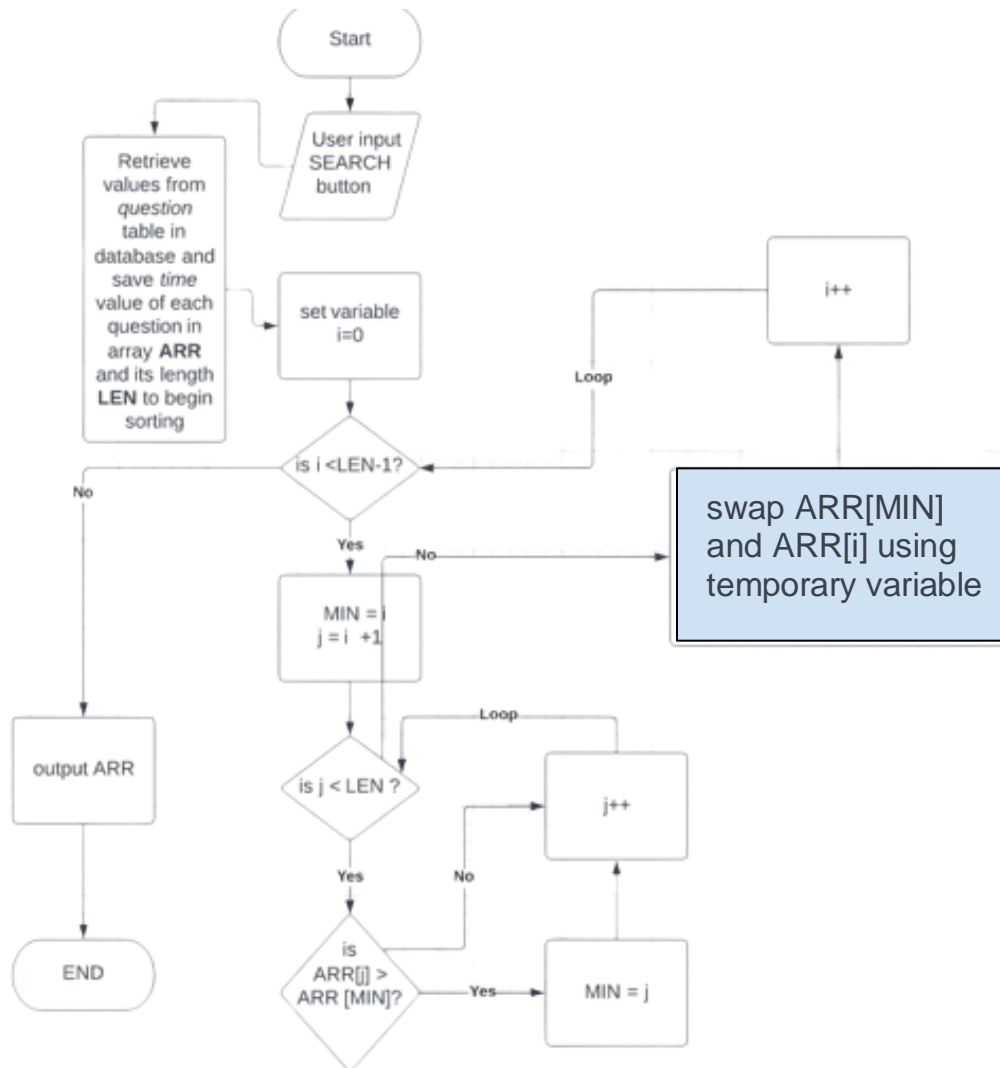
Figure 8: Selection sort used on questions in the question bank after filtering, ensuring that all questions are properly sorted either from least to greatest time, or greatest to least, based on user selection. Helping the user find specific questions
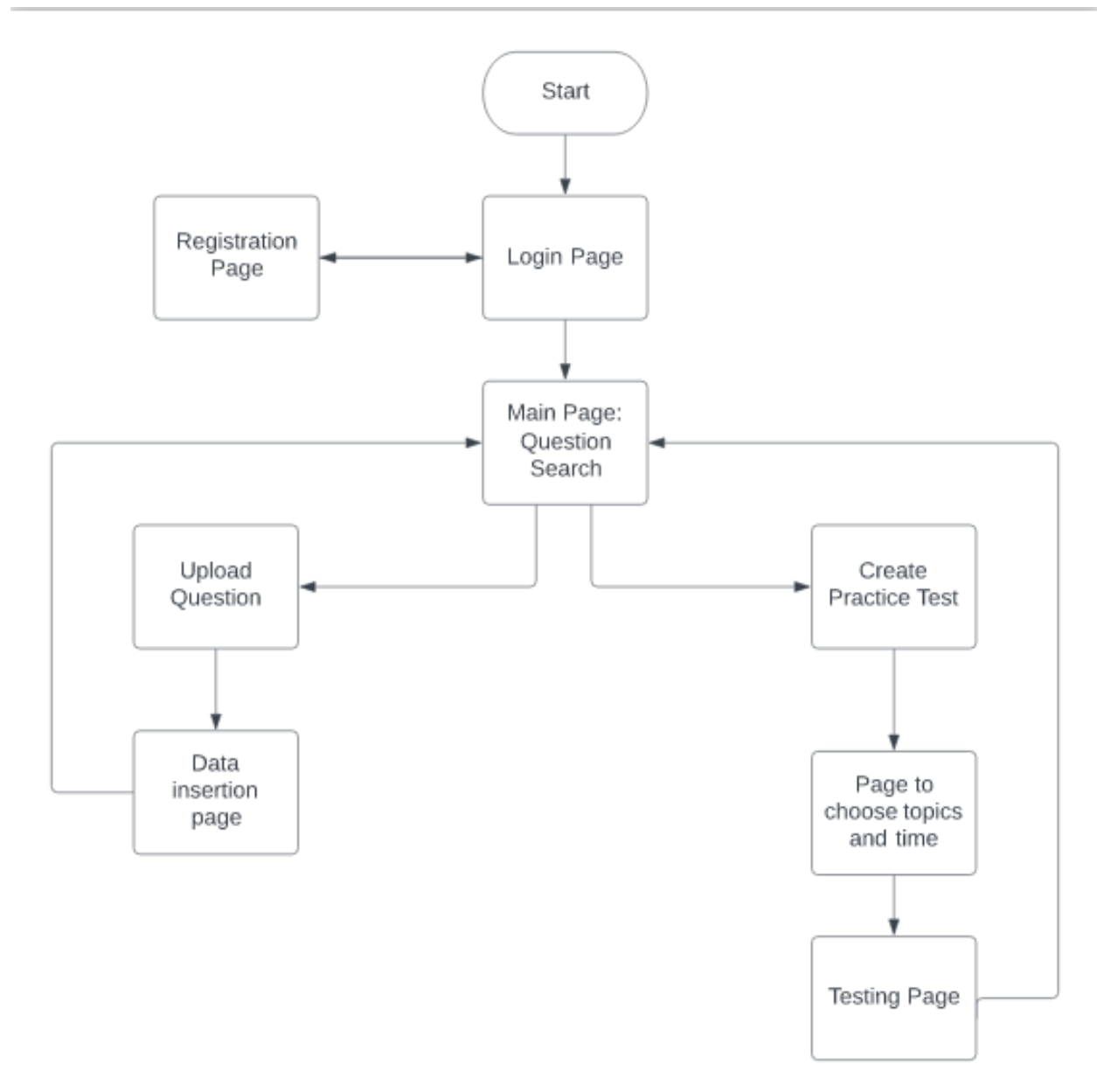
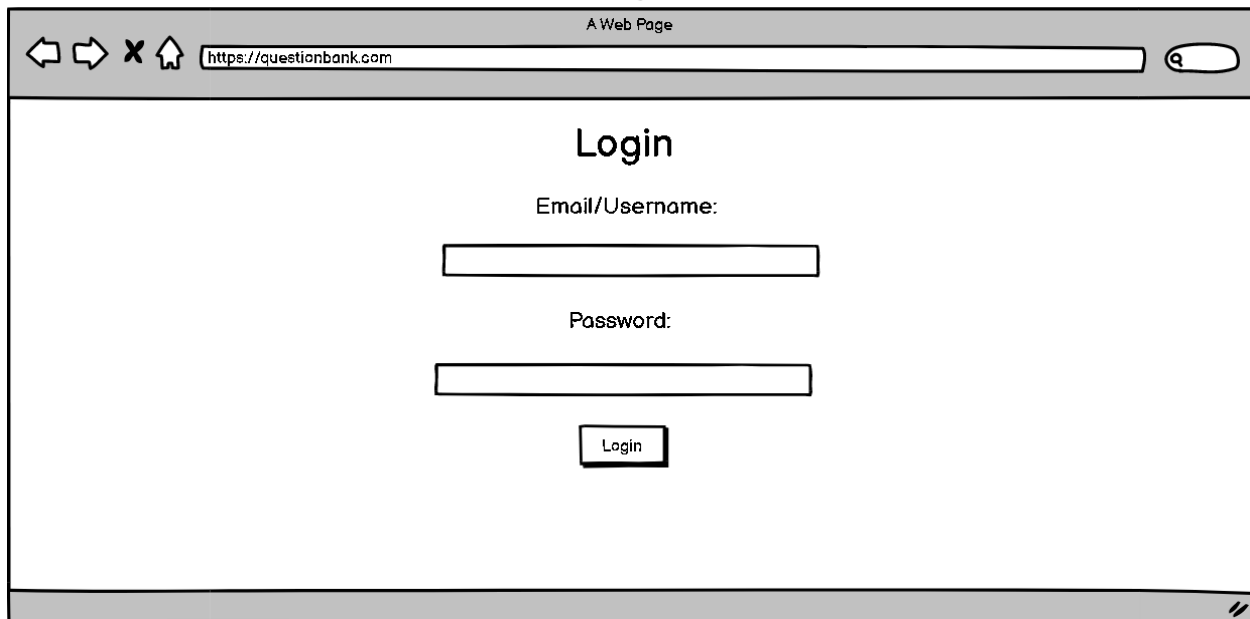**Graphical User Interface and Linking:**

Figure 9: Flowchart illustrating navigation paths between each page in the web application.

The following are prototype GUI designs for the 6 main pages of the questionbank web application. The explanation outlines the functionality and purpose of the page.

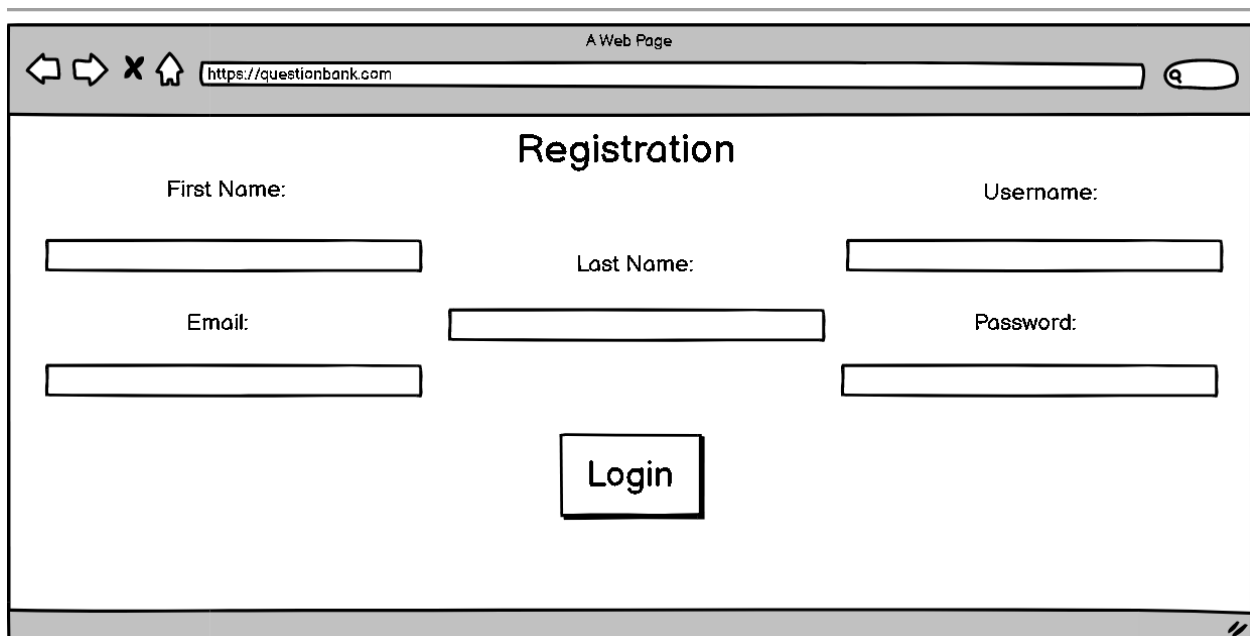*Figure 10: Login page design, utilized as a safety precaution that prompts the user to input a valid email address and password to proceed to the main page.*

Figure 11: Registration page design, users must input valid data in order to register, meaning the email must be real. Data will then be stored in the database.
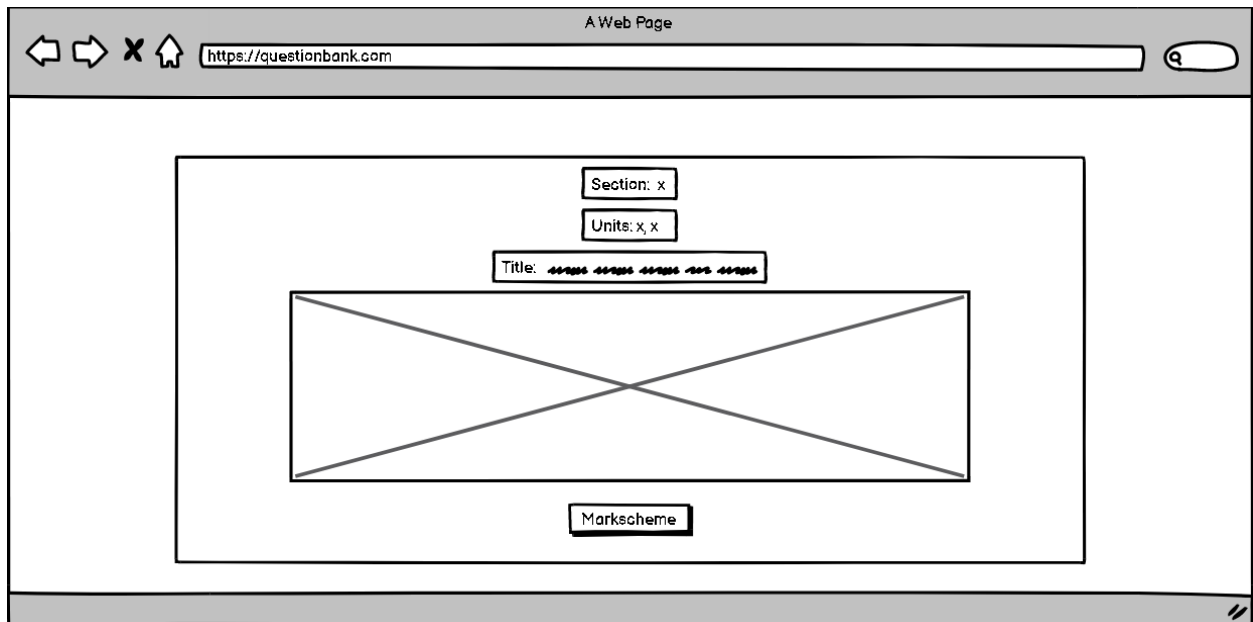
Figure 12: Layout for each question retrieved from the database. Containing question section, units, title, image (diagram with large cross), and markscheme. This layout will be used for questions retrieved by the question search and practice test.
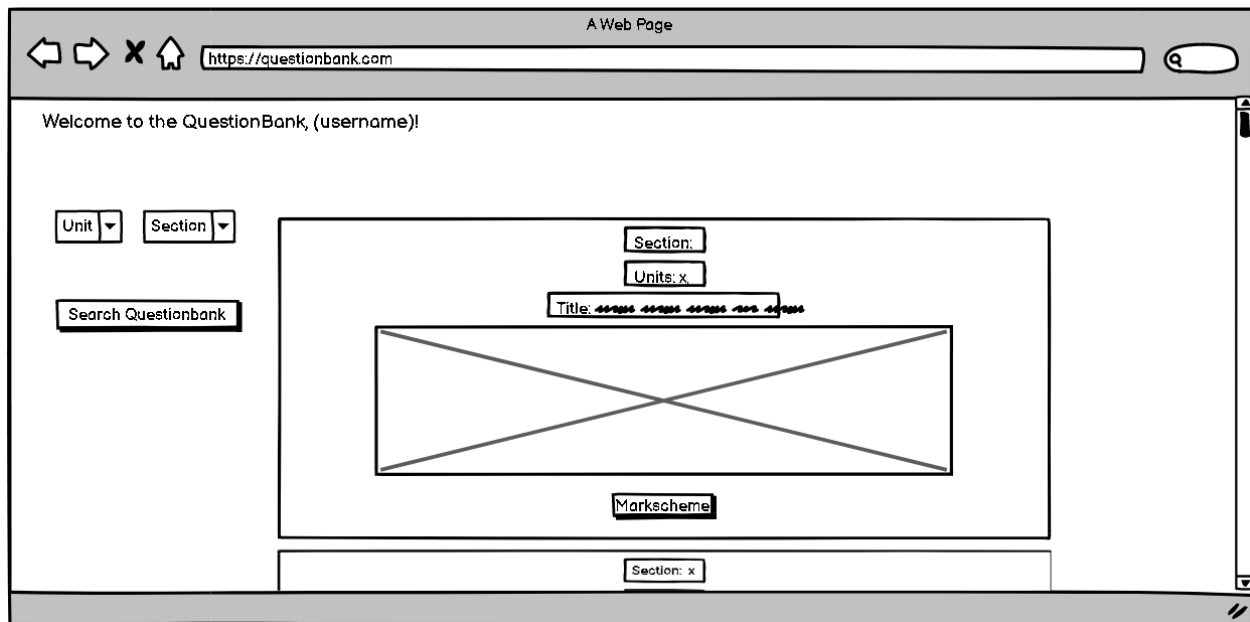
Figure 13: Layout for the main page, containing a welcoming message, filtering options, along with the questions retrieved from the database.
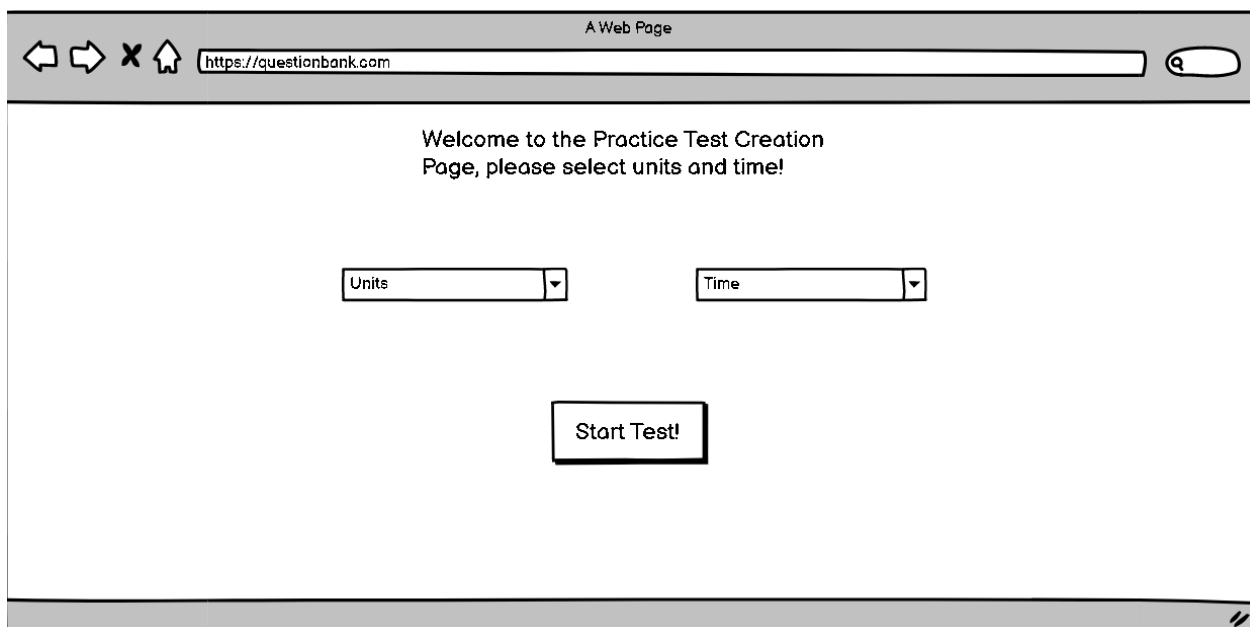

Figure 14: Layout for the practice test creation test, containing a welcoming message and tip, along with multiple selection option inputs allowing the user to specify units and a time given for a practice test.

Figure 15: Layout for the practice test tab after creating a practice test in the practice test creation page. The user is allocated a specific amount of questions based on the time they specified, and they have the option to end the test early.

Figure 16: Layout for data entry page for teachers to upload questions to the database, users must fill out all fields with valid data, filling out the question section, units, title, image, and markscheme.

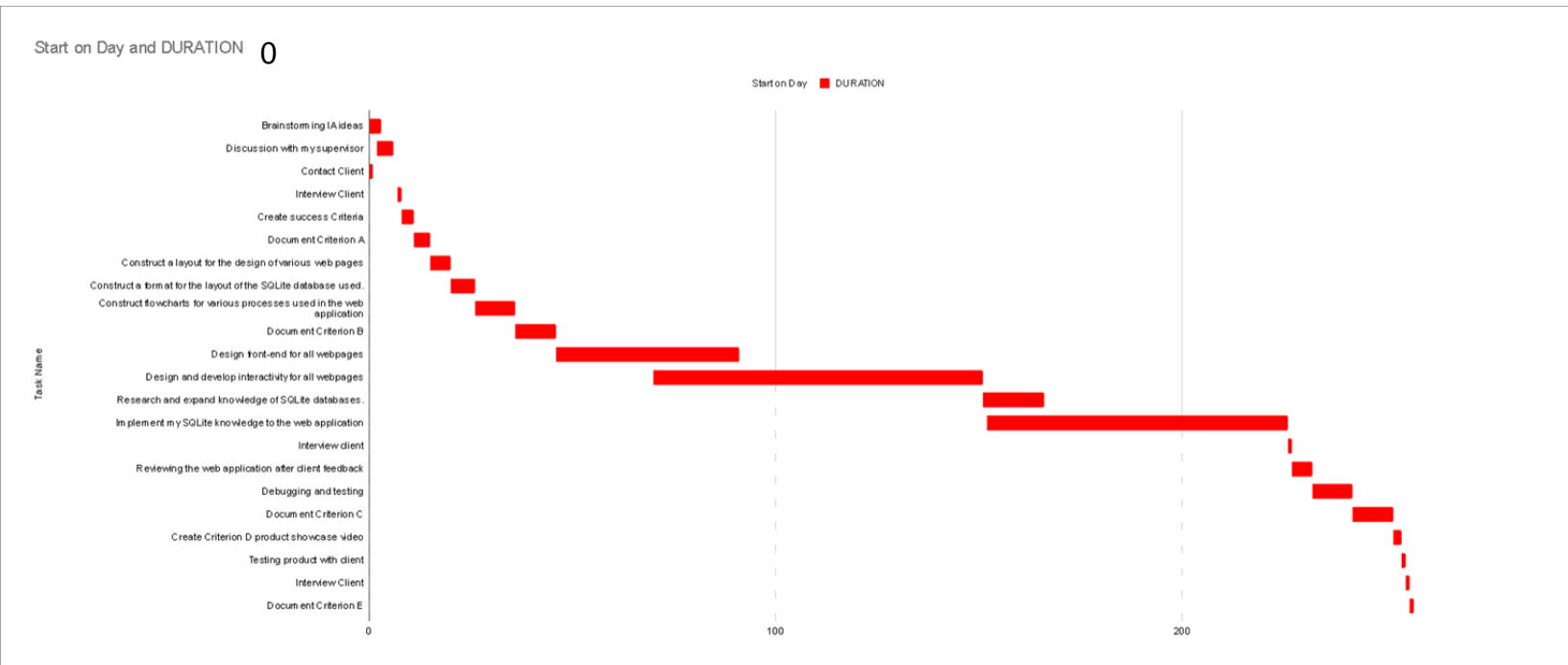**Gantt Chart (showing breakdown of tasks):**

Figure 17: Gantt Chart demonstrating the complete process including number of days as to when tasks will be done. As seen, all tasks are properly sequenced with some of the tasks being completed concurrently.

- **Test Plan**

The following table will address all success criteria mentioned in Criterion A, based on the client's needs. It includes a test method for every success criteria and the ways in which it will be evaluated.

Tested Action	Test Method	Success Criteria
Login System	**In the log in page:** -Test not inputting an email/username or password. Users should be prompted to enter required fields. -Test inputting incorrect password with existing email/username, users should be prompted to try entering a different password. -Test inputting a non-existing email/username, users should be referred to the registration page. **In the registration page:** -Test not inputting one of the fields, Users should be prompted to enter required fields. -Test inputting an invalid field, such as the email field, user should be prompted to input valid data. -Test inputting email/username already in the database, user	1

	should be prompted to enter a different email/username.	
GUI features	-Log into a student and a teacher account. A welcome message, search filters, search buttons, logout option, and link to create practice tests should be clear.	2
Filtering	- Search the application without filtering. The questions retrieved should be all that is in the database. - Search the application with a unit filter of topic 3.1, questions retrieved should be of all sections, but only topic 3.1 questions. - Search the application with no unit filter, but with a section filter of Section A, questions retrieved should be of all units, but only Section A.	3
Selected filters	- Search the application without filtering. There should be text showing that the selected filters are set to ALL questions. - Search the application with a unit filter of topic 3.1, There should be text showing that the selected unit filter is set to topic 3.1. - Search the application with no unit filter, but with a section filter of Section A, there should be text showing that the selected unit filter is set to topic 3.1.	4

Question format	-Search questions with any filter and make sure that each question has the appropriate section, unit, title, question image, and that the mark scheme is hidden until the user clicks on it.	5,6
Practice Tests	- Create a practice test without specifying a time or units, the user should be prompted to choose time and units without creating a practice test. - Create a practice test selecting units 1.1 and 2.1 and 30 minutes, the total questions retrieved for the practice test must be between 25-35 marks, and questions must only be 1.1 and 2.1 topics.	7,8