

Quiz Manager Design Plan

Summary

The Quiz Manager web application stores and manages quizzes, questions and answers in a database and shows them to the user through a web-based User Interface (UI). Users will need to be logged in on an authorised account to view the data.

When first accessing the website, users are taken to the *Login Page*, which contains input fields for *username* and *password*. Entering valid credentials logs the user in and redirects them to the *Home Page*.

The *Home Page* shows the user a list of all the quizzes that are stored in the database along with each quizzes description. Users can click on any quiz title and be taken to the *Quiz Page* page for the selected quiz.

The *Quiz Page* shows the user a list of questions in a quiz. Similarly to the *Home Page*, the user can click on a question and be taken to the *Question Page* for the selected question, which will show the user a list of answers to a question. Users with *restricted* permission do not have access to the *Question Page* so questions on the *Quiz Page* are not clickable for them.

Users with *edit* permission are additionally allowed to add, edit and delete items. These controls will appear on the *Home Page*, *Quiz Page* and *Question Page* as buttons for editing, deleting and adding new content. These buttons will not be visible to users with *view* or *restricted* permission.

The UI has a simple, clean and consistent layout which is easy to read and navigate. The navigation bar at the top of each page has shortcuts to log out and go to the *Home Page*.

Requirements

The Project Outline contained the business requirements and goals of the client. These were used to elicit requirements and produce the specification, which specified the functionality of the application as well as security, design, error handling and other best practices desirable for a modern web application. Requirements were also assigned a priority of *High*, *Medium* or *Low* to help with project management, and a category (*Design*, *Data*, *Deployment* etc.), which helped with grouping related requirements. The full specification is shown in Appendix A - Specification.

Design

The User Interface was designed to meet all the relevant requirements and provide the user with a clear, responsive interface to access the data stored in the database. Particular focus was given to the different functionalities granted to users depending on their permission, and how the website design should change depending on these features.

User Stories

User Stories were created to identify the pages necessary for the website by analysing a user's journey through the UI. One of the main functions of the website was to view quizzes, questions, and answers. These steps were captured in the first User Story (Figure 1, below). The User Story identified the need for 4 essential pages; *Login Page*, *Home Page*, *Quiz Page* and *Question Page*.

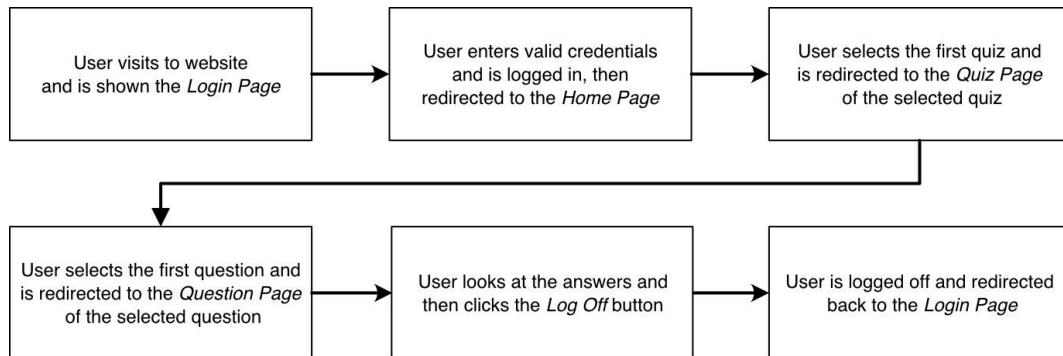


Figure 1: User Story for logging in, viewing data, then logging off

Another User Story was created to outline the process of creating a new quiz, question and answer for users with *edit* permissions (Figure 2, below). This User Story identified the need for 3 *Create Pages*, where users can input values for new items (quizzes, questions and answers) and then save it, with the values being persisted in the database.

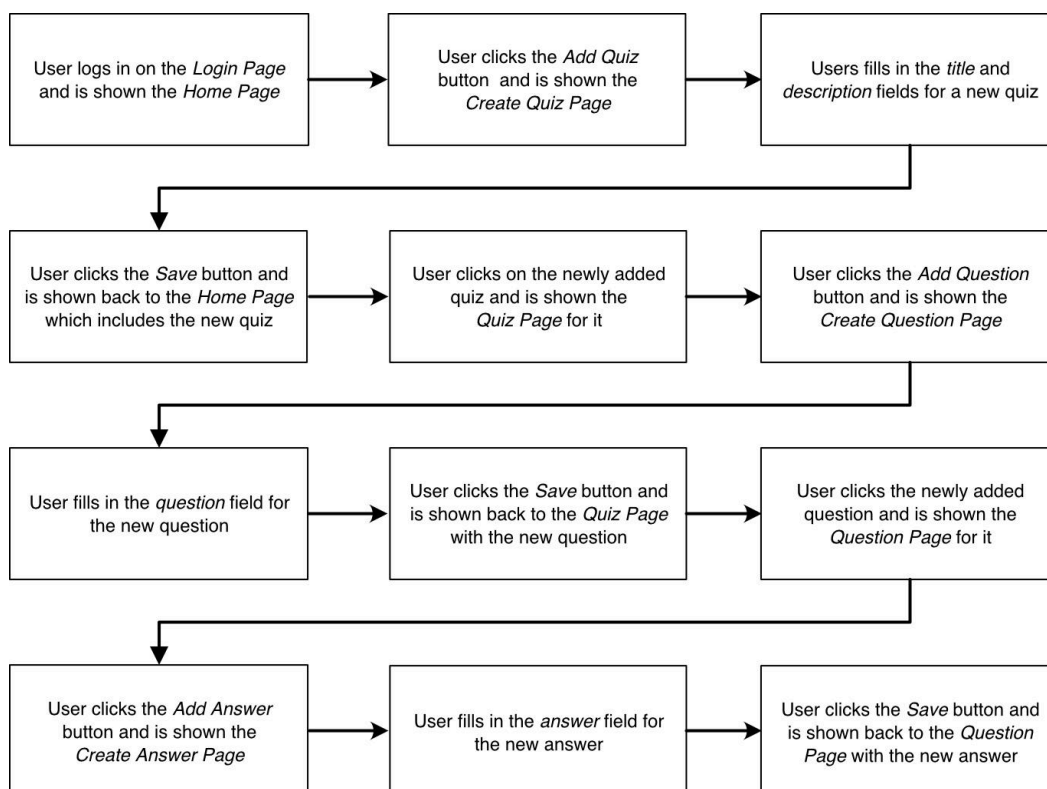


Figure 2: User Story for creating new items

Using User Stories and the specification, 7 necessary pages for the website were identified:

- **Login Page** - inputs for user login credentials
- **Home Page** - shows the quizzes
- **Quiz Page** - shows the questions for a particular quiz
- **Question Page** - shows the answers for a particular question
- **Create Quiz Page** - inputs for new / changing quiz data
- **Create Question Page** - inputs for new / changing question data
- **Create Answer Page** - inputs for new / changing answer data

Wireframes

The pages identified from the user stories were then designed and drafted using wireframe diagrams. This outlined the layout of the page and any interactive buttons, forms, and links. The requirements were used in the design of the wireframes to make sure the UI met all the necessary requirements. Figure 3 shows the UI design of the Home Page.

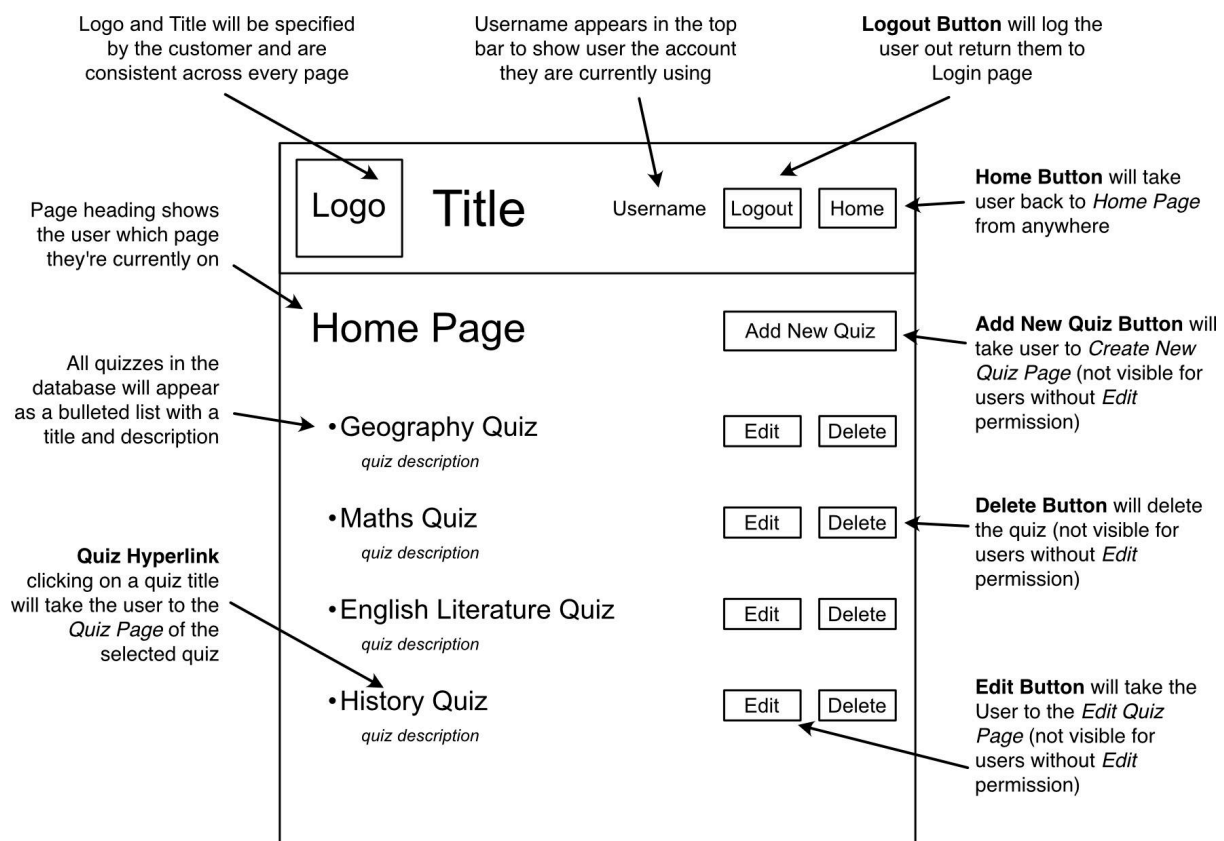


Figure 3: Home Page wireframe

At the top of the page, there is a navigation bar which features a customer supplied title and logo. The colour scheme of the navigation bar can also be customised by the customer, which gives the website a bespoke and personal design. To the right of the navigation bar is the username of the currently logged in user, a Home button and a Logout button. These buttons allow the user to perform actions quickly from any page they're on. The page heading shows the user the current page they are on.

The Quizzes are laid out in a vertical list, which can be scrolled down if the number of quizzes is too big to fit on the page. The quiz description appears in smaller text just below the title, which gives users a bit more information on each quiz at just a glance. The Add New Quiz, Edit and Delete buttons are used to implement the modifying capabilities of users with *edit* permissions. To users with lower permissions, they will not appear at all.

Wireframes for all the other pages were also created and are shown in Appendix B.

Data Model

The Data model was designed to organise all the stored data in an efficient way. The data model splits data into tables, where each table represents a logical component of the application. To design the data model, first the required application data was defined. The 2 data objects for the application were:

- **Quizzes** - which are made up of description multiple questions and multiple answers
- **Users** – which have username, password, and permission attributes.

Because each user only had a fixed amount of data associated with it (username, password and permission) it was organised into a single table. Quizzes, on the other hand, were a more complex data object. Quizzes had a dynamic number of questions, which in turn had a dynamic number of answers. The data was therefore split into 3 tables for storing quizzes, questions and answers.

The quizzes table contained a quiz id, a title and a description. The questions table contained a question id, the questions text, and a reference to the quiz id that the question was from. Similarly, the answers table had an answer text and a reference to the question id it was associated with. The final data model is shown in Figure 4.

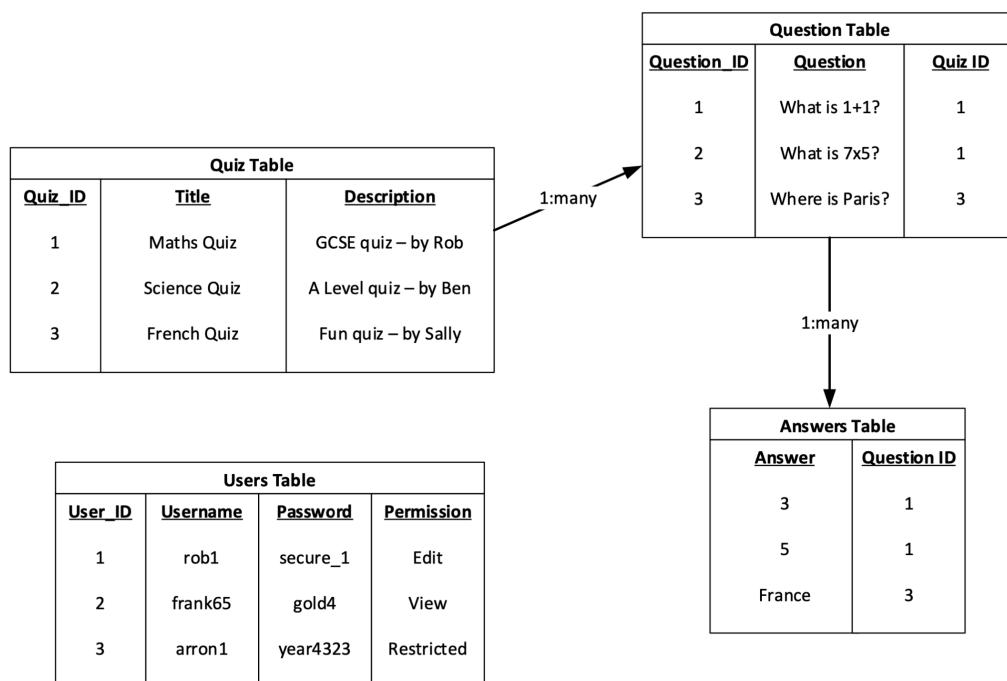


Figure 4: Data model

Appendix A - Specification

Requirement	Category	Priority
The Home Page must show the user all the quizzes stored	Core	High
The Quiz Page must show the user all the questions for a specific quiz	Core	High
The Question Page must show the user all the answers for a specific question	Core	High
Questions must be associated with a single quiz	Core	High
Questions should have between 3-5 answers	Core	Medium
Answers must be associated with a single question	Core	High
Question must be indexed with numbers	Core	High
Question can be added, edited or deleted	Core	Medium
Quizzes can be added, edited or deleted	Core	Medium
Answers can be added, edited or deleted	Core	Medium
Answers must be indexed with uppercase letters	Core	High
When an question or answer is added or deleted, the indexing should automatically update	Core	Medium
The UI should have easily changeable colour scheme, font and styles	Design	Medium
The UI should have easily changeable title and logo	Design	Medium
The UI must support desktop screen sizes	Design	High
The UI should support mobile screen sizes	Design	Medium
The UI must be easy to read and use	Design	High
The UI should indicate to the user if they are logged in or not	Design	Medium
If all the items on a page cannot fit the screen, the UI must let the user scroll to see more	Design	High
Data must be stored in a persistent database	Data	High
The data must include user information	Data	High
The data must include quiz information	Data	High
The data must include question information	Data	High
The data must include answer information	Data	High
When a quiz is deleted, all the questions and answers for that quiz should also be deleted	Data	Medium
When a question is deleted, all the answers for that question should also be deleted	Data	Medium
The application must allow users to log in and log out	Users	High
If a user is logged out, they cannot access the Home Page, Quiz Page or Question Page	Users	High
If a user is logged out, any pages they access will redirect them to the Login Page	Navigation	Medium
Only preconfigured users can log in	Users	Medium
When a user is logged in, the website shall maintain user session state	Users	Medium
Every user must have a permission of either edit, view or restricted	Users	Medium
Users with restricted, view or edit permission can view the quizzes and questions	Users	Medium
Users with view or edit permission can view answers	Users	Medium
Users with edit permission can add, edit and delete quizzes, questions, and answers	Users	Medium
Users cannot perform any operations above their permission level	Users	Medium
Users can log out from any page	Navigation	Medium
Users can go to the home page from any page	Navigation	Medium
When a user clicks on a quiz name on the Home Page, they will be taken to the Quiz Page for the selected quiz	Navigation	High
When a user (with correct permission) clicks on a question on the Quiz Page, they will be taken the Question Page for the selected question	Navigation	High

The application must be unit tested	Testing	High
The unit testing should have maximum code coverage	Testing	Medium
The application must be manually tested	Testing	High
If a user tries to access a page they are not authorised for, they'll receive a 403 HTTP Error	Error Handling	Medium
If a user tries to access a page which doesn't exist, they'll receive a 404 HTTP Error	Error Handling	Medium
If the application fails, users should be given a 500 HTTP Error	Error Handling	Medium
The application must not crash for any users inputs	Error Handling	High
Error pages must match the layout and design of the website	Design	Low
The application shall be protected from SQL injection	Security	Medium
Passwords will be hashed when stored	Security	Medium
The application should be easy to deploy	Deployment	Medium
The application should have sufficient documentation	Deployment	Medium
The application should be publicly available	Deployment	Medium

Appendix B - Wireframe

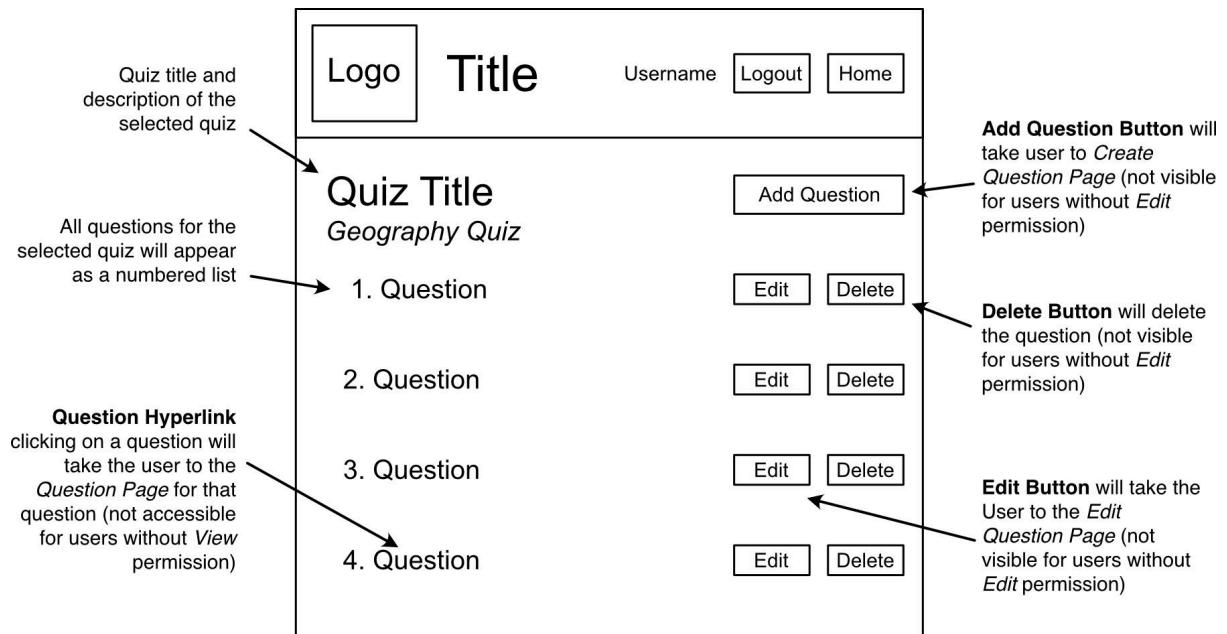


Figure 5: Quiz Page wireframe

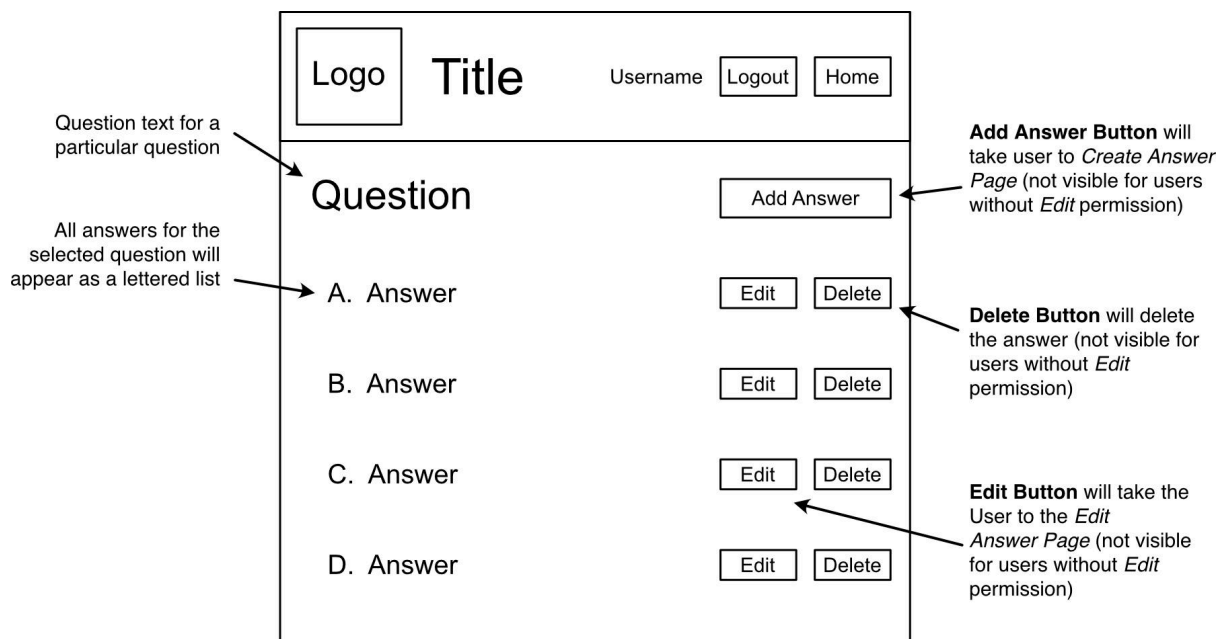


Figure 6: Question Page wireframe

Logo Title

Login

Username

Password

Login

Username input for users to input username

Password input for users to input password (password is masked for security)

Login Button will process the users credentials and only log them in if they're valid

Figure 7: Login Page wireframe

Logo Title Username Logout Home

Add New Quiz

Title

Description

Save

Title text input for users to input quiz title (when editing, this field will be initially filled with the original title value and allow the user to modify it before saving)

Description text input for users to input quiz description (when editing, this field will be initially filled with the original description value and allow the user to modify it before saving)

Save Button will save the inputted data to the database

Figure 8: Add New Quiz Page wireframe