



# **GAMIFIED TOOL FOR TEACHING GDPR FUNCTIONAL SPECIFICATION**

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## 1. Context Diagram

Figure 1.0 shows the context diagram for this gamified tool for teaching GDPR.

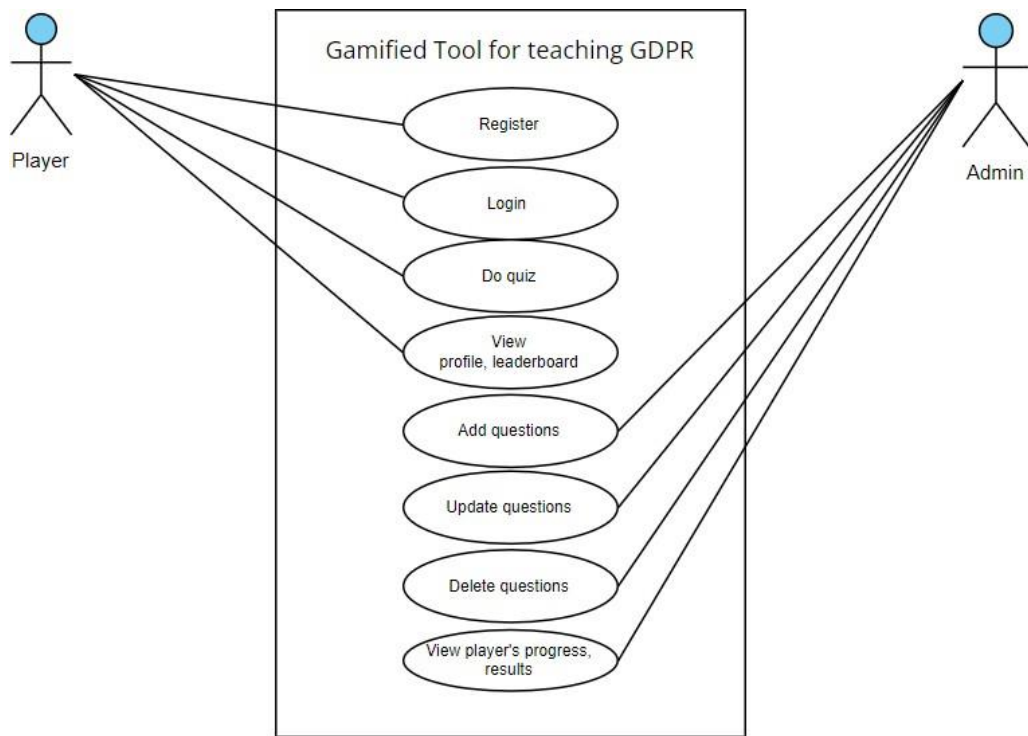


Figure 1.0: The context diagram for this gamified tool for teaching GDPR

## 2. Use Cases

<b>Name: Register</b>	
<b>Actors</b>	Players
<b>Description</b>	New players register themselves by creating a new account in gamified tool for teaching GDPR
<b>Preconditions</b>	Players have a valid email
<b>Main success scenario</b>	<ol style="list-style-type: none"> <li>1. Player navigates to the Sign Up page</li> <li>2. Player enters a valid email, password, and confirmation password</li> <li>3. Player clicks on the "Sign Up" button</li> <li>4. If the email is available and valid, the password is in the correct length, the player account is created</li> </ol>
<b>Post Conditions</b>	<ol style="list-style-type: none"> <li>1. The email and password of the player will be stored into the database.</li> <li>2. A new player account is created.</li> </ol>
<b>Alternative</b>	<p>Email already exists</p> <ol style="list-style-type: none"> <li>1. Web site outputs "Email already exists"</li> <li>2. Player will be prompted to re-enter the email and password</li> </ol> <p>Email is in wrong format</p> <ol style="list-style-type: none"> <li>1. Web site output "Invalid email"</li> <li>2. Player will be prompted to re-enter the email and password</li> </ol> <p>Password is in wrong format</p> <ol style="list-style-type: none"> <li>1. Web site output "Invalid password. Password should be at least eight characters in length and should include at least one upper case letter, one number, and one special character."</li> <li>2. Player will be prompted to re-enter the email and password</li> </ol>

<b>Name: Login</b>	
<b>Actors</b>	Players
<b>Description</b>	Existing player logs into gamified tool for teaching GDPR
<b>Preconditions</b>	Player has already created an account for the web sites.
<b>Main success scenario</b>	<ol style="list-style-type: none"> <li>1. Player navigates to the login page</li> <li>2. Player enters the email, password</li> <li>3. Player clicks on the "Login" button</li> <li>4. If the email and password is valid and correct, the player is then logged in into his/ her account</li> </ol>
<b>Post Conditions</b>	<ol style="list-style-type: none"> <li>1. Player is logged in into his/ her account</li> <li>2. Player is greeted by the main menu and his/ her email is displayed</li> </ol>
<b>Alternative</b>	Invalid email or password is entered <ol style="list-style-type: none"> <li>1. Web site outputs "Invalid email or password."</li> <li>2. Player will be prompted to re-enter the email and password</li> </ol>

<b>Name: Do quiz</b>	
<b>Actors</b>	Players
<b>Description</b>	Player takes the quiz
<b>Preconditions</b>	Player has already logged in to the gamified tool for teaching GDPR
<b>Main success scenario</b>	<ol style="list-style-type: none"> <li>1. Player navigates to the quiz page from the navigation bar</li> </ol>
<b>Post Conditions</b>	<ol style="list-style-type: none"> <li>1. The quiz page is shown.</li> </ol>
<b>Alternative</b>	Player navigates to the quiz without logging in <ol style="list-style-type: none"> <li>1. Web site outputs "Please log in to continue"</li> <li>2. Player will be redirect to the log in page</li> </ol>

<b>Name: View Profile</b>	
<b>Actors</b>	Players
<b>Description</b>	Player views their own profile
<b>Preconditions</b>	Player has already logged in to the gamified tool for teaching GDPR
<b>Main success scenario</b>	<ol style="list-style-type: none"> <li>1. Player clicked on their own email shown on the page</li> <li>2. Player is being navigated to the player profile page</li> </ol>
<b>Post Conditions</b>	<ol style="list-style-type: none"> <li>1. The page with the details of player such as points and badge are shown</li> </ol>
<b>Alternative</b>	Player tries to navigate to the player profile page without logging in <ol style="list-style-type: none"> <li>1. Web site outputs "Please log in to continue"</li> <li>2. Player will be redirect to the log in page</li> </ol>

<b>Name: View leader board</b>	
<b>Actors</b>	Players
<b>Description</b>	Player views leader board
<b>Preconditions</b>	Player has already logged in to the gamified tool for teaching GDPR
<b>Main success scenario</b>	<ol style="list-style-type: none"> <li>1. Player is being navigated to the leader board page from the navigation bar</li> </ol>
<b>Post Conditions</b>	<ol style="list-style-type: none"> <li>1. The page with the leader board is shown</li> </ol>
<b>Alternative</b>	<ol style="list-style-type: none"> <li>1. Player tries to navigate to the leader board page without logging in</li> <li>2. Web site outputs "Please log in to continue"</li> </ol> <p>Player will be redirect to the log in page</p>

<b>Name: Add questions</b>	
<b>Actors</b>	Admin
<b>Description</b>	Admin add question
<b>Preconditions</b>	Admin account is logged in
<b>Main success scenario</b>	<ol style="list-style-type: none"> <li>1. Admin clicks on "Questions" in the navigation bar</li> <li>2. Admin clicks on "Add question" in the Questions page</li> <li>3. Details of questions are typed in or selected</li> <li>4. Admin clicks on the "Add" button</li> </ol>
<b>Post Conditions</b>	<ol style="list-style-type: none"> <li>1. Question is added</li> </ol>
<b>Alternative</b>	<p>A non-admin credentials are used to log in</p> <ol style="list-style-type: none"> <li>1. Player will be redirect to player page</li> </ol> <p>Invalid email or password is entered</p> <ol style="list-style-type: none"> <li>1. Web site outputs "Invalid email or password."</li> <li>2. Admin will be prompted to re-enter the email and password</li> </ol>

<b>Name: Update questions</b>	
<b>Actors</b>	Admin
<b>Description</b>	Admin update question
<b>Preconditions</b>	Admin account is logged in
<b>Main success scenario</b>	<ol style="list-style-type: none"> <li>1. Admin clicks on "Questions" in the navigation bar</li> <li>2. Admin clicks on the edit icon in the Questions page</li> <li>3. Details of questions that wanted to be changed are typed in or selected</li> <li>4. Admin clicks on the "Edit" button</li> </ol>
<b>Post Conditions</b>	<ol style="list-style-type: none"> <li>1. Details of question is/ are changed.</li> </ol>
<b>Alternative</b>	<p>A non-admin credentials are used to log in</p> <ol style="list-style-type: none"> <li>1. Player will be redirect to player page</li> </ol> <p>Invalid email or password is entered</p> <ol style="list-style-type: none"> <li>1. Web site outputs "Invalid email or password."</li> <li>2. Admin will be prompted to re-enter the email and password</li> </ol>

<b>Name: Delete questions</b>	
<b>Actors</b>	Admin
<b>Description</b>	Admin delete question
<b>Preconditions</b>	Admin account is logged in
<b>Main success scenario</b>	<ol style="list-style-type: none"> <li>1. Admin clicks on “Questions” in the navigation bar</li> <li>2. Admin clicks on the delete icon in the Questions page</li> <li>3. Admin confirm to delete the question</li> </ol>
<b>Post Conditions</b>	<ol style="list-style-type: none"> <li>1. Question is deleted.</li> </ol>
<b>Alternative</b>	<p>A non-admin credentials are used to log in</p> <ol style="list-style-type: none"> <li>1. Player will be redirect to player page</li> </ol> <p>Invalid email or password is entered</p> <ol style="list-style-type: none"> <li>1. Web site outputs “Invalid email or password.”</li> <li>3. Admin will be prompted to re-enter the email and password</li> </ol>

<b>Name: View player’s progress</b>	
<b>Actors</b>	Admin
<b>Description</b>	Admin view player’s progress from the player’s detail page
<b>Preconditions</b>	Admin account is logged in
<b>Main success scenario</b>	<ol style="list-style-type: none"> <li>1. Admin clicks on Players in the navigation bar</li> <li>2. Admin specifically clicks on a player to view his or her details in the game such as points, leaderboard position, streak, last login time, latest login time, badge, ranking for every question category, levels.</li> </ol>
<b>Post Conditions</b>	<ol style="list-style-type: none"> <li>1. The player’s detail page with his or her details in the game such as points, leaderboard position, streak, last login time, latest login time, badge, ranking for every question category, levels are shown</li> </ol>
<b>Alternative</b>	<p>A non-admin credentials are used to log in</p> <ol style="list-style-type: none"> <li>1. Player will be redirect to player page</li> </ol> <p>Invalid email or password is entered</p> <ol style="list-style-type: none"> <li>1. Web site outputs “Invalid email or password.”</li> <li>2. Admin will be prompted to re-enter the email and password</li> </ol>

### 3. User Description

#### Players

Players are one of the users that interact with the gamified tool for teaching GDPR. They can register, login, do quiz, view profile and dashboard in the gamified tool for teaching GDPR.

#### Example User: Student

For example, John is a college student studying Cybersecurity. One of the subjects he took is Cyber Legislation. In the subject of Cyber Legislation, GDPR is one of the topics taught. John hopes to refresh his memory about the fundamental knowledge of GDPR before the exam. However, he finds it hard to understand GDPR by just revising the lecture notes. He does the quiz from the gamified tool that teaches GDPR and finds it easier to understand and memorize the knowledge of GDPR. Therefore, John is one of the players that interact with the gamified tool for teaching GDPR.

#### Example User: Web Developer

Jane is a web developer who works in an online boutique store. Jane wants to develop a website for the boutique store. She was planning to provide a more personal, convenient shopping experience to the customers that visit the online boutique store. She knows she can do that by making the website remember the contents of the customer's shopping cart and suggest the items according to the customer's preference. This can all be done by including HTTP cookies on the website she built. However, cookies are recognized as personal information in the European Union (EU). (Bateman, 2022) If Jane collects any information using HTTP cookies without consent from the customers, she is violating the GDPR. Jane then realized that she needs to have some fundamental knowledge of GDPR before building the website. She does the quiz from the gamified tool that teaches GDPR and finds it easier to understand the knowledge of GDPR. Therefore, Jane is one of the players that interact with the gamified tool for teaching GDPR.

#### Admins

Admins are other users that interact with the gamified tool for teaching GDPR. They can add, update and delete questions in the gamified tool for teaching GDPR. Other than that, the admins can also view the players' progress and result by visiting the player profile from the admin side.

Since the admin can change the questions and answers in the gamified tool, they need to have access granted by the developer.

#### Example: Lecturer

For example, Michelle is a lecturer who teaches Cyber Legislation in a college. She wants to make her lecture that involves GDPR to be more interesting and attract the attention of students. She found this gamified tool for teaching GDPR and request to be the admin of this gamified tool teaching GDPR from the developer. She got access and therefore is an admin for this gamified tool for teaching GDPR.



## 4. GUI Design

### Player Interface

Figure 2.0 below shows the flow chart in the gamified tool for teaching GDPR from the player side.

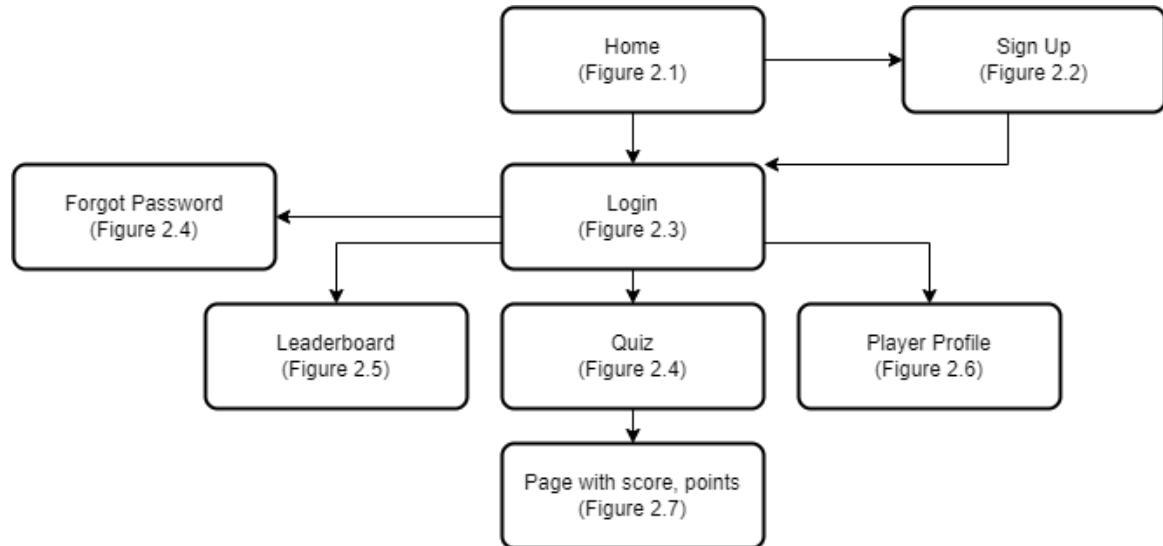


Figure 2.0: The flow chart in the gamified tool for teaching GDPR from the player side

As shown in the flow chart above, the player will first land on the home page for the gamified tool for teaching GDPR. Figure 2.1 shows the mock-up of the home page for the gamified tool for teaching GDPR.

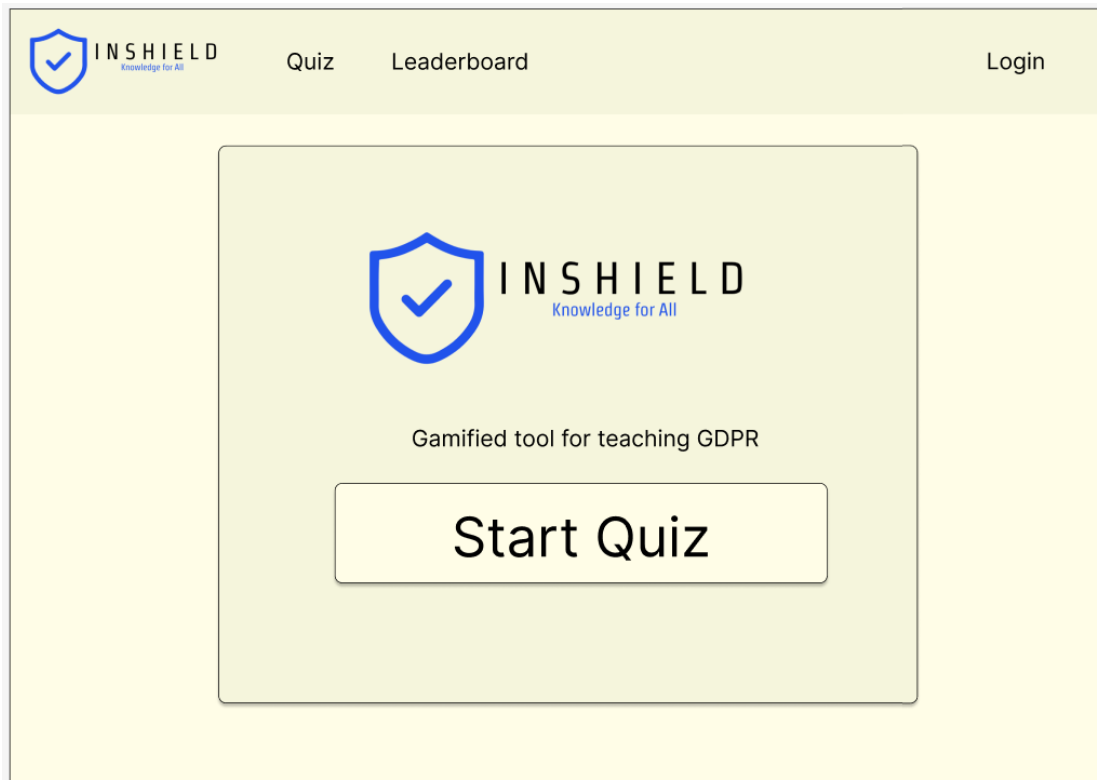


Figure 2.1: The mock-up of the home page for the gamified tool for teaching GDPR

On the home page, the player can navigate to the sign-up page to register themselves. The player will be redirected to the login page after registering. The player can also choose to log in from the home page if they already have a user account registered in the gamified tool for teaching GDPR. Figure 2.2 shows the mock-up of the sign-up page.

The image shows a web page mock-up for a sign-up process. At the top left is the INSHIELD logo, which consists of a blue shield with a white checkmark inside, followed by the text 'INSHIELD' and 'Knowledge for All' in a smaller font. To the right of the logo are two navigation links: 'Quiz' and 'Leaderboard'. Further to the right, in the top right corner, is a 'Login' link. The main body of the page has a light yellow background and is centered with the heading 'Sign Up'. Below the heading are four rounded rectangular input fields stacked vertically. The first three are white with a thin border and contain the placeholder text 'Email', 'Password', and 'Confirm Password' respectively. The fourth field is a solid light green color and contains the text 'Sign Up'. Below this field is a 'Login' link.

Figure 2.2: The mock-up of the sign-up page

If the player forgot the password for his or her account, he or she can choose the forgot password option on the login page too. Figure 2.3 shows the mock-up of login page and Figure 2.4 shows the mock-up of forgot password page.

INSHIELD  
Knowledge for All

Quiz    Leaderboard    Login

# Login

Email

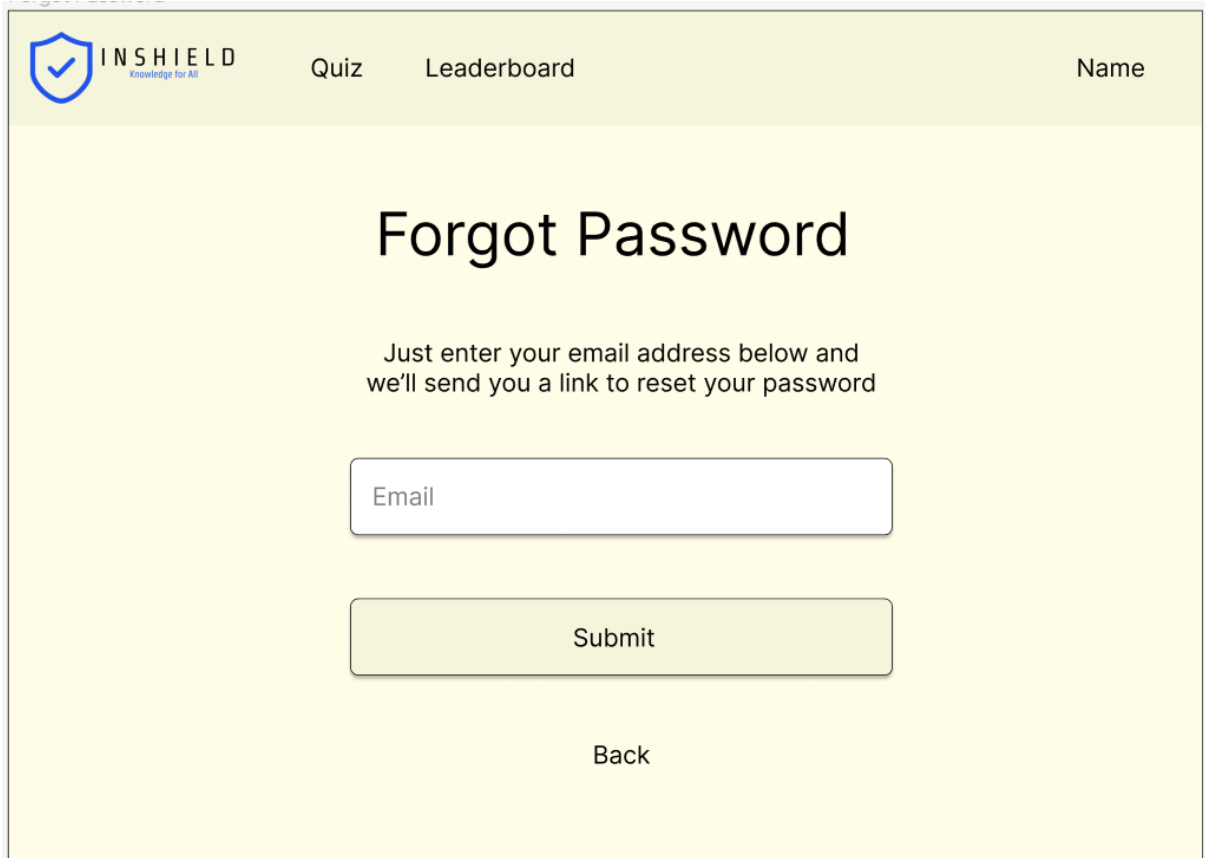
Password

Login

[Forgot Password?](#)

[Create an account](#)

*Figure 2.3: The mock-up of login page*



*Figure 2.4: The mock-up of forgot password page*

After logging in using a valid email and password from a player, the player can choose to be redirected to the page to do the quiz, view the player profile, or view the leaderboard. Figure 2.4 shows the mock-up of quiz page. Meanwhile, Figure 2.5 shows the mock-up of leaderboard and figure 2.6 shows the mock-up of player profile.

INSHIELD  
Knowledge for All

Quiz    Leaderboard    peter@gmail.com

## Quiz

Q1: Test Ques?

Test Answer 1

Test Answer 1

Test Answer 1

Test Answer 1

Next

Figure 2.4: The mock-up of quiz page

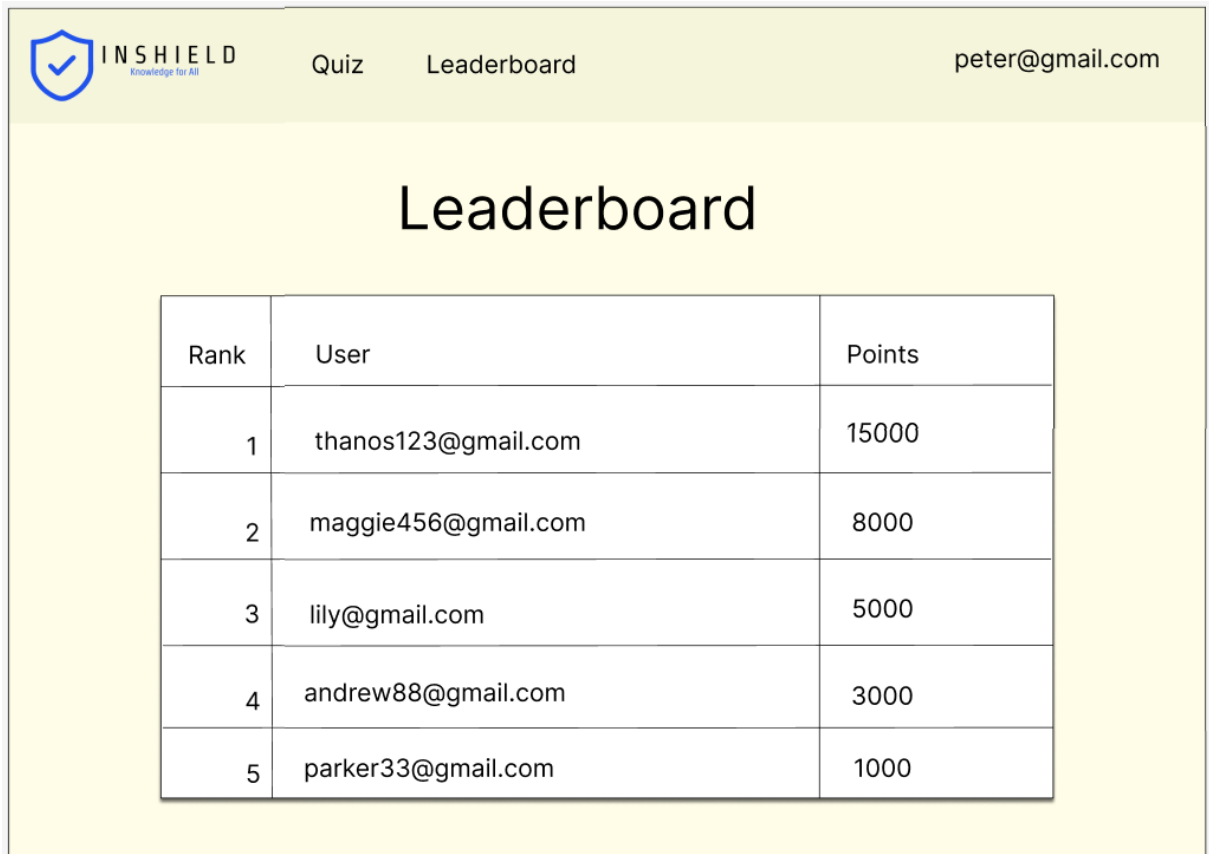


Figure 2.5: The mock-up of leaderboard

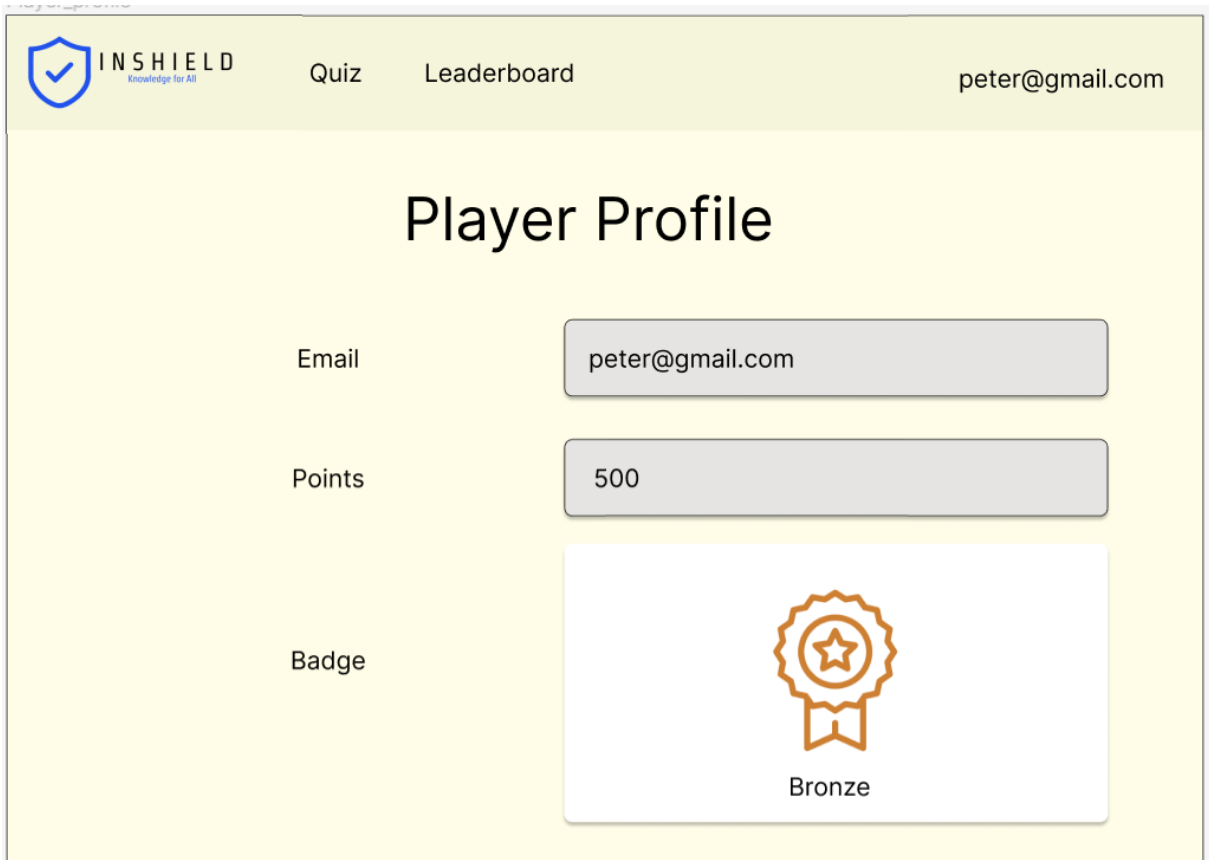
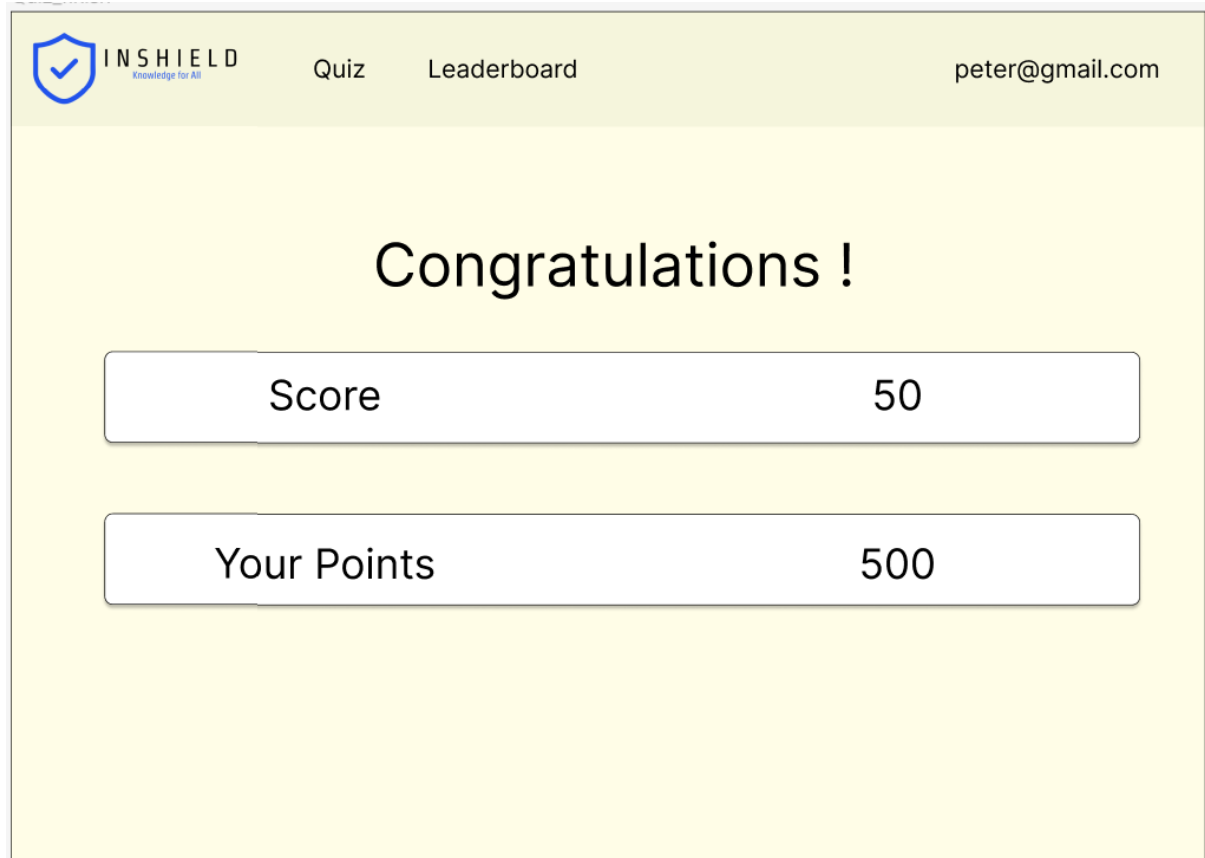


Figure 2.6: The mock-up of player profile

After completing the quiz, the player will be redirected to the page with the score obtained in the quiz and the overall points gathered over time. Figure 2.7 shows the mock-up of page with score and points.



*Figure 2.7: The mock-up of page with score and points*

## Administration Interface

Figure 3.0 below shows the flow chart in the gamified tool for teaching GDPR from the admin side.

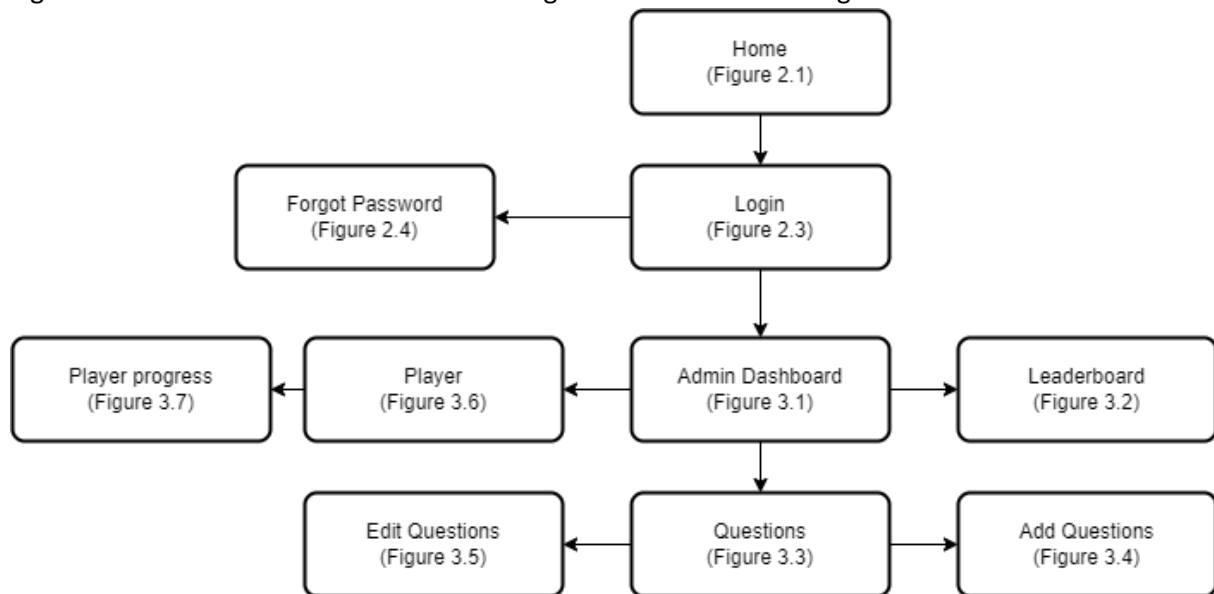


Figure 3.0: The flow chart in the gamified tool for teaching GDPR from the admin side

As shown in the flow chart above, the admin will first land on the home page for the gamified tool for teaching GDPR. The admin can navigate to the login page on the home page the same as what a player can do on the home page for the gamified tool for teaching GDPR.

After logging in using an admin email and password, the admin will be redirected to the admin dashboard. Figure 3.1 shows the mock-up of the admin dashboard.

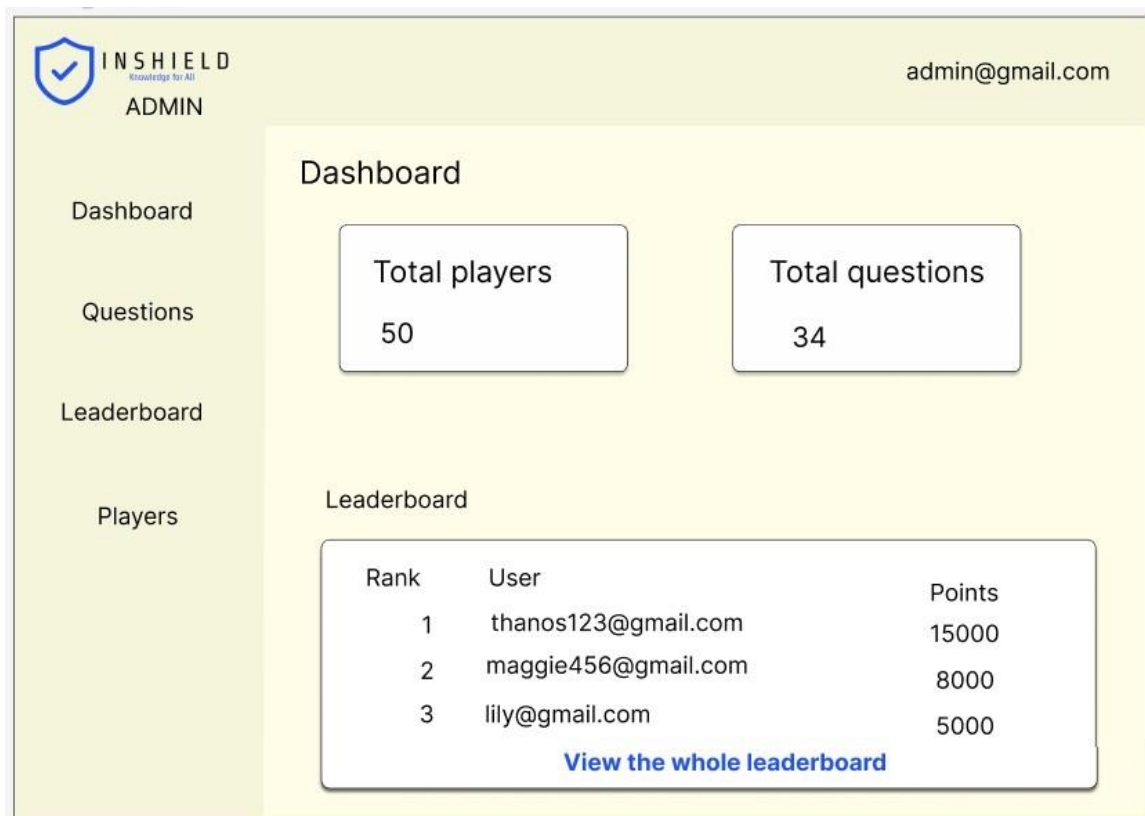


Figure 3.1: The mock-up of the admin dashboard



From the Admin Dashboard, the admin can navigate to the question page or the leaderboard page. Figure 3.2 shows the mock-up of leaderboard page.

The mock-up shows the INSHIELD ADMIN interface. The top right corner displays the email address 'admin@gmail.com'. The sidebar on the left contains the following navigation items: Dashboard, Questions, Leaderboard, and Players. The main content area is titled 'Leaderboard' and features a 'Back' button. A table lists the top 5 users with their ranks, email addresses, and point scores.

Rank	User	Points
1	thanos123@gmail.com	15000
2	maggie456@gmail.com	8000
3	lily@gmail.com	5000
4	andrew88@gmail.com	3000
5	parker33@gmail.com	1000

Figure 3.2: The mock-up of leaderboard page

From the question page, the admin can delete the question, navigate to the add question page, or edit question page. The admin can delete the question on the question page by clicking on the delete icon beside the question that needs to be deleted. Figure 3.3 below shows the mock-up of the question page.

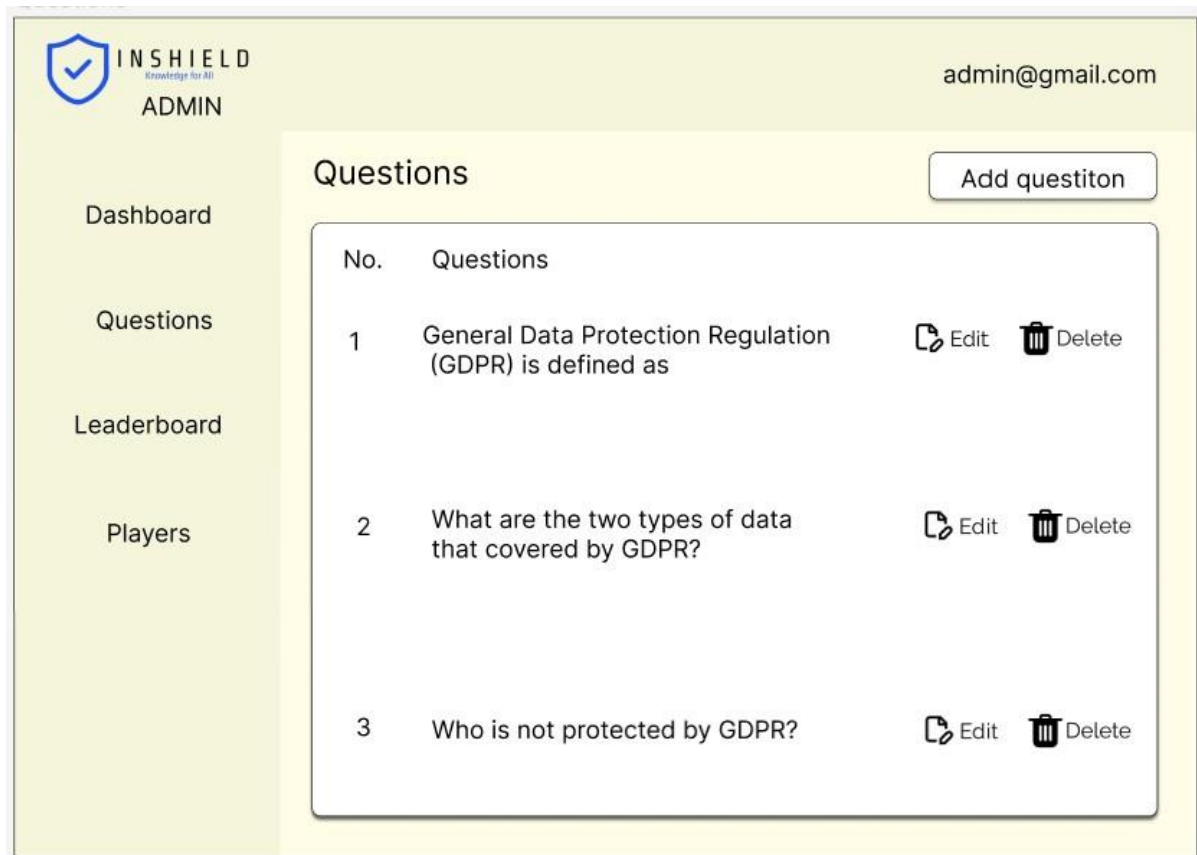


Figure 3.3: The mock-up of the question page

Figure 3.4 shows the mock-up of add question page.

The image shows a web application interface for an administrator. At the top left is the logo for 'INSHIELD Knowledge for All' with the word 'ADMIN' below it. At the top right, the email address 'admin@gmail.com' is displayed. On the left side, there is a vertical navigation menu with four items: 'Dashboard', 'Questions', 'Leaderboard', and 'Players'. The 'Questions' item is highlighted. The main content area is titled 'Add Questions' and contains a 'Back' button in the top right corner. Below the title is a large white box containing four input fields: 'Question', 'Choose Category' (with a dropdown arrow), 'Option 1', and 'Option 2'. At the bottom right of the main content area is an 'Add' button.

Figure 3.4: The mock-up of add question page

Figure 3.5 below shows the mock-up of the edit question page.

The image shows a web interface for editing a question. On the left is a sidebar with the INSHIELD logo (a shield with a checkmark) and the text 'INSHIELD Knowledge for All ADMIN'. Below the logo are menu items: 'Dashboard', 'Questions', 'Leaderboard', and 'Players'. The top right corner shows the email 'admin@gmail.com'. The main content area is titled 'Edit Questions' and contains a 'Back' button. A central form box contains the following fields: 'ID:' with the value '1'; 'Question:' with the text 'General Data Protection Regulation (GDPR) is defined as'; 'Category:' with the text 'What is GDPR?'; and 'Option 1:' with the text 'An act to revise the law relating to the main non-fatal offences against the person and to provide for connected matters'. An 'Edit' button is located at the bottom right of the form area.

Figure 3.5: The mock-up of the edit question page

Other than add, update and delete questions, the admin is also able to view the progress and results of each player. The admin can do that by clicking the player's name in the player page from the admin side. Figure 3.6 below shows the mock-up of the player page from admin side.

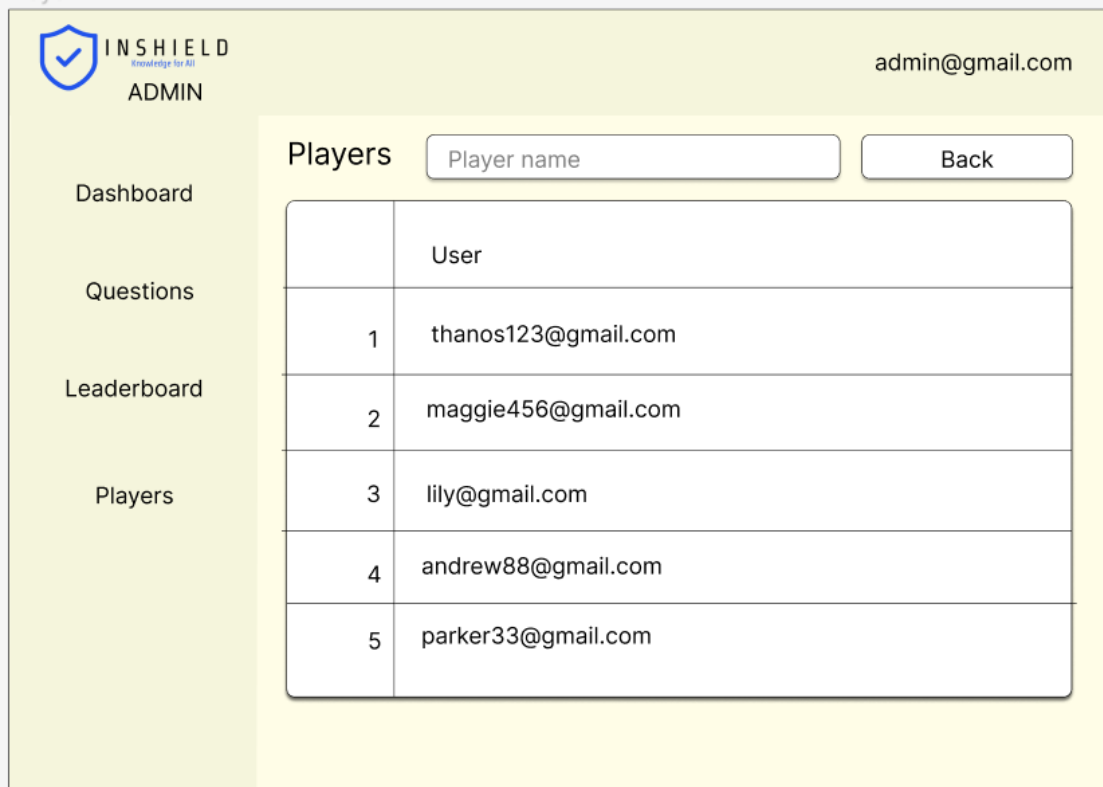


Figure 3.6: The mock-up of the player page from admin side

Figure 3.7 below shows the mock-up that shows the progress and results of the players after clicking on the player's name in the player page from admin side.

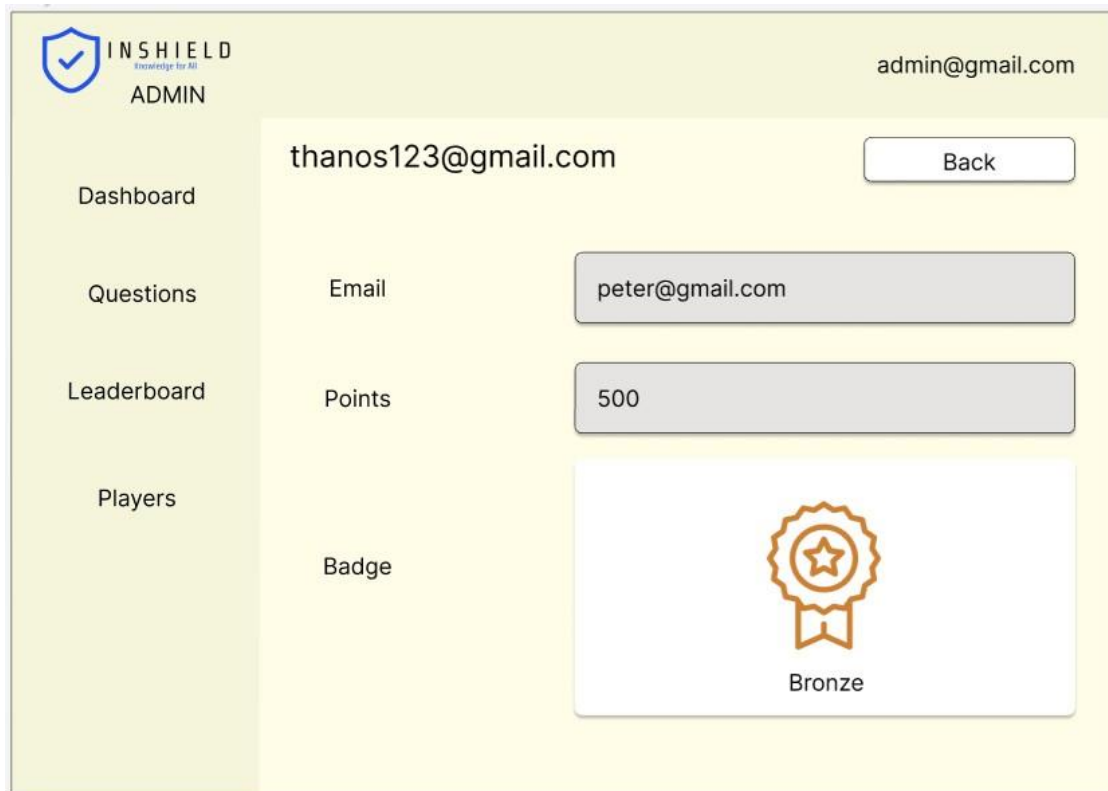


Figure 3.7: The mock-up that shows the progress and results of the players

## 5. Technologies

Figure 4.0 shows the technology stack that is going to be used to develop this project.

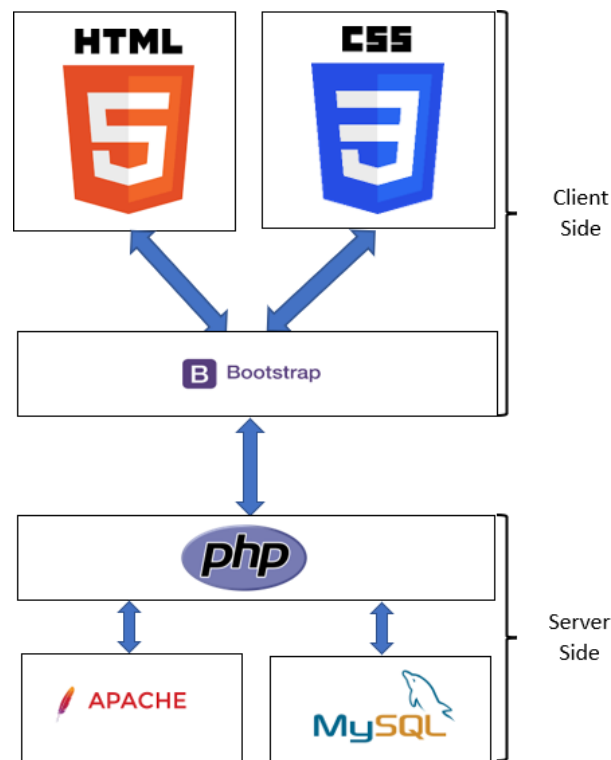


Figure 4.0: The technology stack that is going to be used to develop this project

### Language: HTML, CSS, Bootstrap, PHP

The programming language used to build this gamified tool for teaching GDPR are HTML, CSS, Bootstrap and PHP. HTML, CSS and Bootstrap will be the programming language that I used to build the interface of the gamified tool for teaching GDPR and they are run on the client side. HTML will be the programming language that I used to make the structure of the website and its content. CSS and Bootstrap are going to be the programming language that I used to make the style of the website. Meanwhile, PHP will be the programming language that I used to build the functionality of this project and PHP is run on the server side of the gamified tool for teaching GDPR. The functionality includes all the back-end function that operates within the gamified tool for teaching GDPR.

### Tools: Visual Studio Code, XAMPP

Since HTML, CSS, Bootstrap and PHP are going to be the programming languages that are used to build the gamified tool for teaching GDPR, Visual Studio Code and XAMPP will be the tools that are chosen for this project. Visual Studio Code is a simplified code editor that supports development operations such as debugging, task execution and version control. (Code, 2022) Visual Studio Code will be the tool that is used to write all the code for this project. Meanwhile, XAMPP will be the tool used for running PHP in this project. The reason that XAMPP is chosen is that Apache is provided in XAMPP. Apache XAMPP is defined as an open-source program for using a web server to run PHP or PERL Web applications locally. (Quadri, 2021)

## Database: MySQL

MySQL is the database that will be used to build this gamified tool for teaching GDPR. MySQL is the database that comes with XAMPP. Apache server and MySQL need to be started from the XAMPP control panel. Figure 4.1 below shows the buttons to click to start Apache Server and MySQL service from the XAMPP control panel.

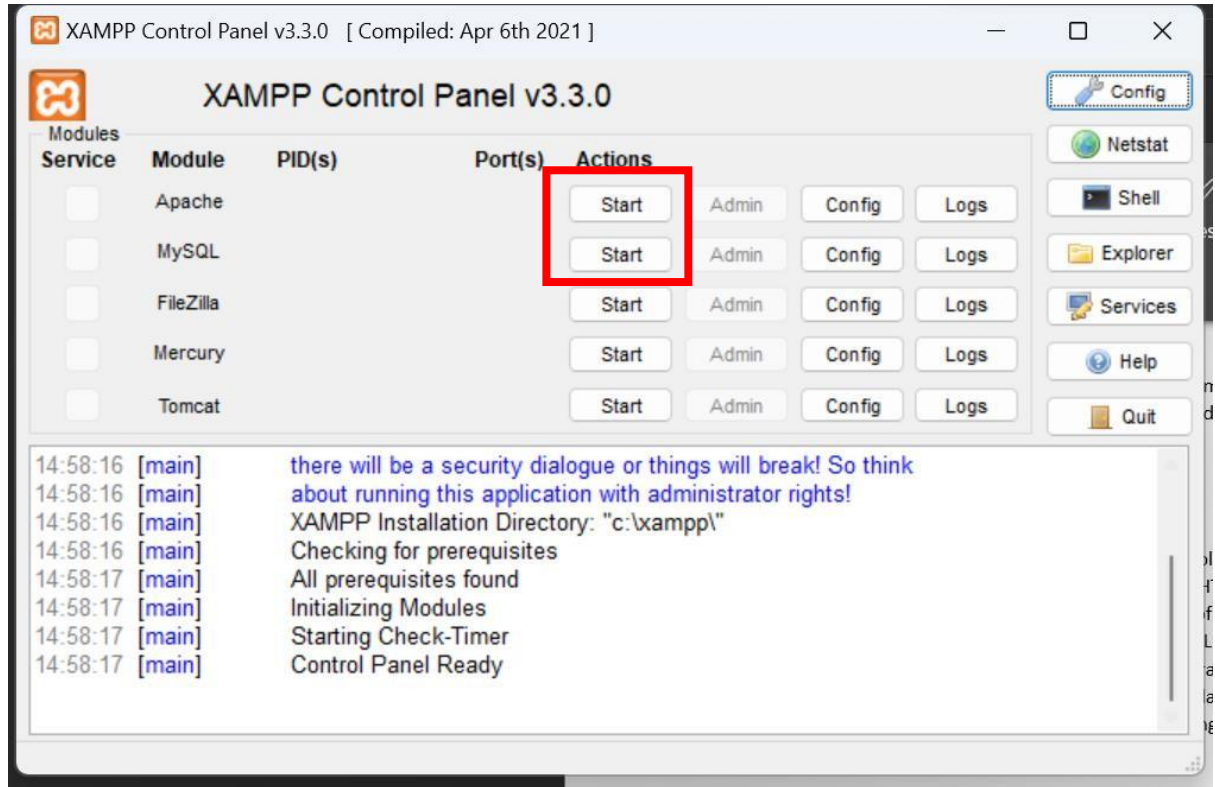


Figure 4.1: Buttons to click to start Apache Server and MySQL service from the XAMPP control panel

## Platform: Web site

The platform that will be used to build this gamified tool for teaching GDPR is a website. This is because, the language chosen to build this project are HTML, CSS, Bootstrap and PHP. HTML is defined as a code that is used to organize the content of a web page. (MDN, 2022) CSS is an HTML document's styling language. The way how HTML components will be presented fully depends on CSS. (w3schools, 2022) Meanwhile, Bootstrap is a front-end development framework for the creation of responsive websites. (Zola, 2022) Because most of the languages picked to build this project are more suitable for building the web, therefore the website is chosen as the platform to build this project.



## 6. Metrics

This gamified tool for teaching GDPR will be deemed successful if:

- 1) The user can browse the gamified tool for teaching GDPR using all different types of browsers such as Google Chrome Version 108.0 or above, Microsoft Edge Version 107.0 or above or Mozilla Firefox Version 107.0 or above.
- 2) The player can register an account and log in successfully.
- 3) The score and points are calculated correctly after the player finishes doing the quiz.
- 4) High scores are displayed in the leaderboards accordingly.
- 5) Badges are displayed for the players if applicable.
- 6) Admins can view players' results and progress from the admin side.

## 7. FURPS+

FURPS is defined as a technique used to validate the prioritised requirements after understanding the needs and necessities of the client. FURPS is an acronym that stands for Functionality, Usability, Reliability, Performance, and Supportability. (COEPD, 2014)

### Functionality

Functionality represents the description of the main features of the solution developed and in this instance is the gamified tool for teaching GDPR. The main features of this gamified tool for teaching GDPR are listed below:

1. Stores the login credentials entered by the players.
2. Enables the players to do the quiz.
3. Enable the players to view their profile that contains the points they accumulate and badge, leaderboard.
4. Enable the players to upload a profile picture if they wanted to.
5. Enable the players to collect titles after playing every level. They must keep on playing every 5 days to keep the title for that level.
6. Enable the players to share their current score to social media if they want to.
7. Determine the topic in GDPR that all players are weak in and output more questions about those topics according to the weakness of every player.
8. Admins can view players' results and progress from the admin side.
9. The web application is hosted remotely.

### Usability

Usability in FURPS+ refers to the experience of users and accessibility when using the user interface. The gamified tool for teaching GDPR should be able to run on all different types of browsers such as Google Chrome Version 108.0 or above, Microsoft Edge Version 107.0 or above or Mozilla Firefox Version 107.0 or above.

### Reliability

Reliability is defined as the accuracy and dependability of the solution developed and, in this instance, the gamified tool for teaching GDPR. There is no issue with the reliability of this gamified tool for teaching GDPR.

### Performance

Performance in FURPS+ refers to the system response time of the solution developed. After turning on Apache and MySQL service using XAMPP Control Panel, the gamified tool for teaching GDPR should be able to start running in 2 seconds using any browser such as Google Chrome Version 108.0 or above, Microsoft Edge Version 107.0 or above or Mozilla Firefox Version 107.0 or above

### Supportability

Supportability is determined by the testability and maintainability of the solution developed. There is no issue with the supportability of this gamified tool for teaching GDPR as it should be able to run on all browsers such as Google Chrome Version 108.0 or above, Microsoft Edge Version 107.0 or above or Mozilla Firefox Version 107.0 or above

+

The "+" in FURPS+ is about the security aspect of the solution developed. In this gamified tool for teaching GDPR, all the information stored in the database about the players except password will

be encrypted using the OpenSSL encrypt function. OpenSSL module is added by default to PHP. (tutorialspoint,2022) Meanwhile, the password of the player will be hashed using SHA3-256. SHA3 is the most recent addition to the SHA family (Store, 2022) and is highly secure (Nakov, 2021).

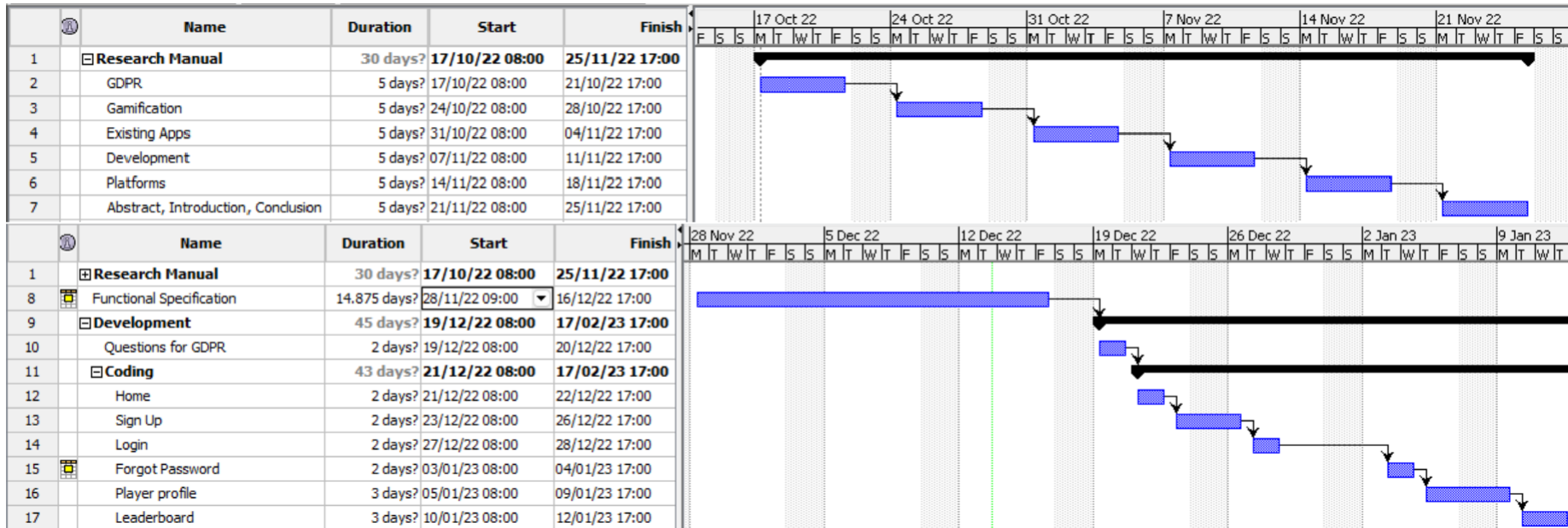
Another security feature that will be implemented in this gamified tool for teaching GDPR is the verifying of email after the player first signing up. The email will be sent using PHP mailer. PHP mailer is defined as the code library in PHP. The code library is integrated to send email securely and effectively from a web server. (Khan, 2021)

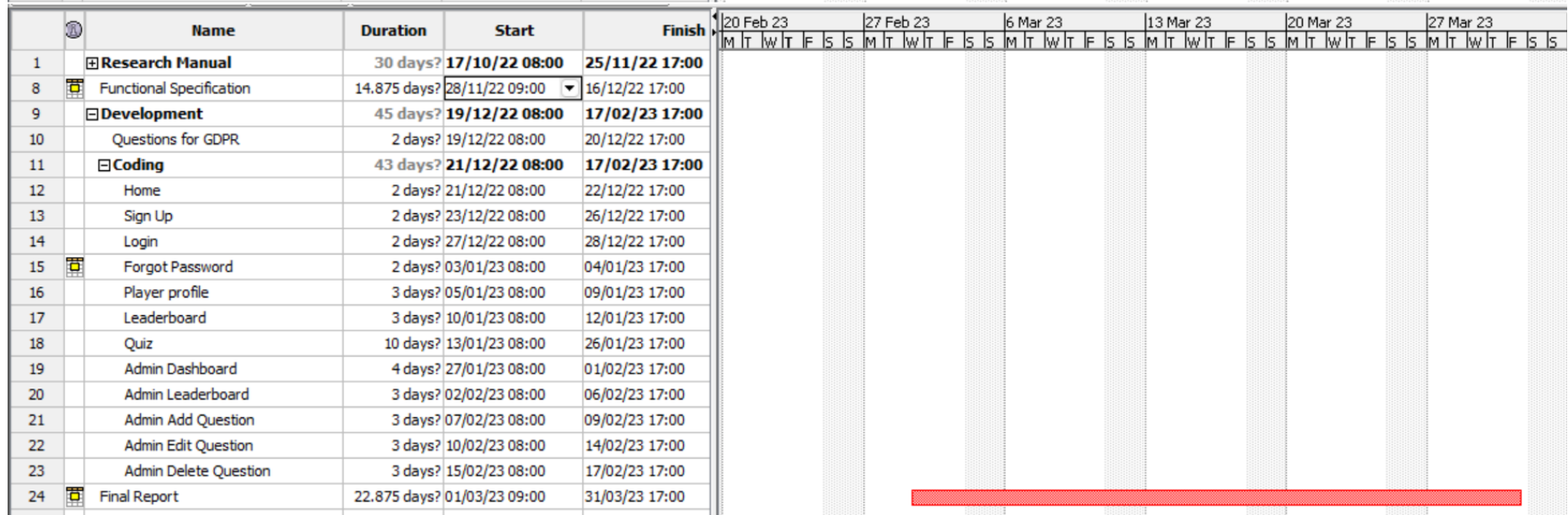
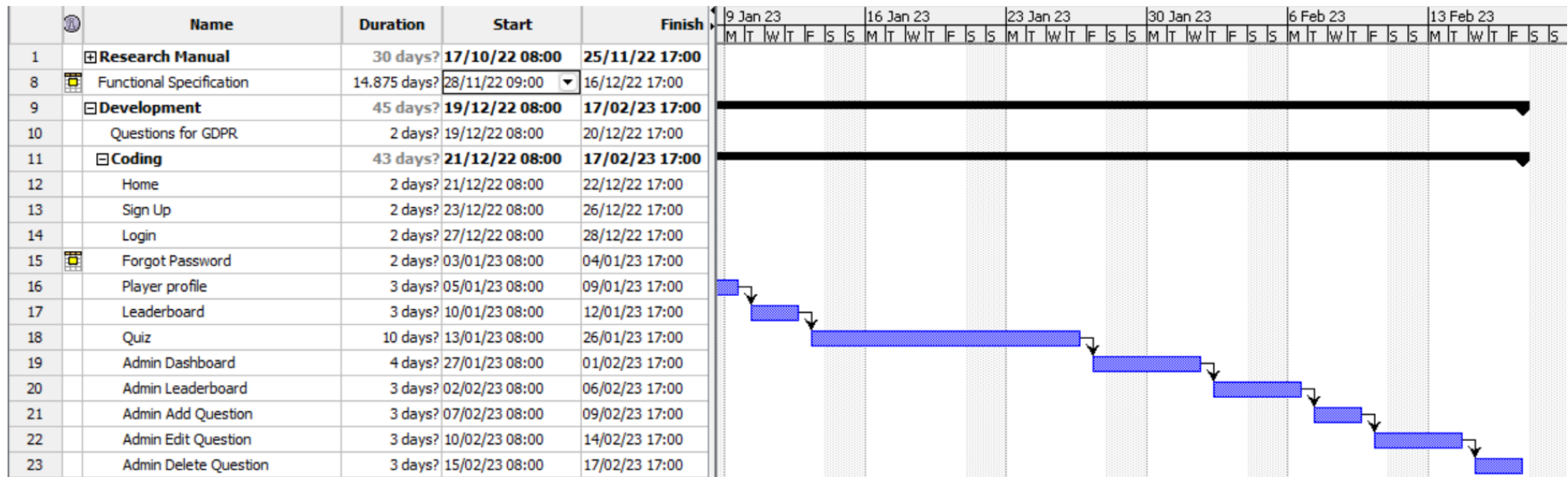
Next, all the input field that allow the users to enter input will be validated. This is to prevent SQL injection from users. Besides, the player or the admin are allowed to enable Google Two Factor Authentication if they wish to. This is to make sure that only the authorized people who own the email account is allowed to login into the account if the feature is enabled.

Other than that, there is a log out after 10 minutes of inactivity for the pages that require users to sign in. This means that if the user does not active in the web page that require the users to sign in for more than 10 minutes, they will be log out automatically when they tried to use the page again.

## 8. Project Plan

Figure 4.0 below shows the project plan of this project.





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