Introduction

To address the challenges of decreasing lecture attendance at UNSW, a new approach has been proposed to gamify educational interactions through an interactive quiz platform named Toohak. This platform is inspired by the functionality and engagement of Kahoot and aims to boost student participation by making learning activities both fun and competitive. This document outlines the process of developing Toohak, from understanding user needs to conceptualising and validating proposed solutions.

Elicitation

To identify unmet needs in current quiz platforms, interviews were conducted with potential Toohak users. The goal was to gather insights into their experiences with existing tools and to understand what features could enhance their interaction with Toohak.

Interview Questions:

1. **What features do you look for in a quiz tool like Toohak?**
   ↳ To understand the essential functionalities of the quiz platform
2. **What challenges do you face with existing quiz tools like Kahoot? Can you describe them?**
   ↳ To identify common pains and limitations that Toohak can address
3. **How important is having analytics, like the performance of a student on a specific quiz?**
   ↳ To gauge the significance of data trends in the user experience
4. **What improvements or additional features do you have that could improve the experience, more engaging?**
   ↳ To collect specific suggestions for enhancements that could make Toohak more attractive and useful to users

User 1 - Liem Phan limefan190@gmail.com

1. Prefers questions to have pictures and videos for further context in the question. Especially because the quizzes he wants to create would be based on the image. He also likes tools that support multiple-choice questions and fill in the blanks.
2. Finds it difficult and annoying with exporting quiz results manually to a secondary platform, would like a direct integration for it.
3. “Extremely important” This would help him identify weakness for individuals and also understand what could be wrong with the questions themselves, if everyone answers differently then it suggests the question was not specific enough.
4. Adaptive feature he would like is to adjust the difficulty of questions based on the user’s previous answers.

User 2 - Dhruva Bhattacharya dhruva.bhattacharya8@gmail.com

1. He's analytical so he wants to see the data features of progress of each quiz, this way he can see patterns and trends over a period of time. This would especially be helpful if using a quiz tool had a discussion board/ forum after the quiz so people can discuss it.
2. Doesn't have the customisation he wants, wants to be able to change background themes and add custom time limits.
3. "Critical" Seeing how often each question is skipped can help understand if that question was right to ask, also making each quiz more fun and less monotonous if everyone is skipping the same thing.
4. Would like a feature to automatically suggest questions from a database based on topics input so if he input "animals" then questions with the word animals would pop up first, so he can go through certain questions first and be able to manipulate the order.

User 3 - Armaan Sharma armaansharma1219@gmail.com

1. He wants things to be easy, so ease of access and simplicity is the most important to him, it should be easy to use on every device (unlike kahoot because tapping on screen is faster than moving cursor so would like keyboards to replace input of cursor).
2. Dislikes the mobile optimisation, some quizzes work well on PC but are glitchy on mobile devices.
3. "Extremely" Important. Knowing trends can help him understand the pacing of the quiz and to determine if it's fair enough for everyone and if everyone had enough time to answer it.
4. Would like to be able to view a leaderboard of everyone and their scores, so that the quiz creator can have detailed analytics of the quiz and not just the top 3.

Analysis & Specification

Based on the people that have been interviewed, we have created user stories that attempt to describe a solution that satisfies some of the elicited requirements.

User Story 1

As a quiz creator, I want the ability to include multimedia elements like pictures and videos in my quiz questions, so that I can provide better context and engage users more effectively.

Acceptance Criteria

- Users must be able to upload and embed images and videos directly within the quiz questions.
- The embedded multimedia elements should be compatible with and display correctly across all device types (desktop, tablet, mobile).
- The platform should support common multimedia formats (e.g., JPG, PNG for images; MP4, AVI for videos).

- The quiz interface should include user-friendly tools for resizing and positioning multimedia within questions.

User Story 2

As a quiz creator, I want the ability to preview and test quizzes before publishing, so that I can ensure the quiz runs smoothly and as intended without errors or issues.

Acceptance Criteria

- A preview mode button must be available once the quiz is complete, allowing creators to view and interact with the quiz as a participant would before it is published.
- During preview, all functionalities (like multimedia content, timer settings, question transitions) should operate exactly as they would in the live version.
- The platform should allow the creator to make edits directly from the preview mode.
- The preview should include tools for simulating different user environments (e.g., different device screens, network speeds).

User Story 3

As a quiz participant using different devices, I want quizzes that are optimised for both desktop and mobile platforms, so that I can have a seamless and fair experience regardless of the device I use.

Acceptance Criteria

- The quiz layout must adjust automatically to fit the screen size and resolution of the device it is viewed on.
- Input methods should be optimised for the device (e.g., touch inputs for mobiles, keyboard inputs for desktops).
- Load times should be minimised and consistent across different devices, with no significant performance degradation on older devices.

User Story 4

As a quiz creator interested in quiz effectiveness, I want detailed analytics on how participants perform on quizzes, including data on which questions are frequently skipped or misunderstood, so that I can improve the quizzes for better clarity and engagement.

Acceptance Criteria

- The system must track and provide analytics on individual participant performance, question skip rates, and common incorrect answers.
- Analytics should include visual representations (charts, graphs) for quick assessment and deeper insights.

- The platform should allow quiz creators to download detailed reports that can be further analysed offline.
- Analytics should be real-time, providing feedback shortly after a quiz session ends, enabling timely adjustments for upcoming sessions.

User Story 5

As a quiz creator, I want the quiz platform to automatically suggest questions from a database based on topics I input, so that I can organise relevant quizzes.

Acceptance Criteria

- When creating or editing a quiz, the user can enter specific topics (e.g. “animals”) into a search field
- The system searches the question database and displays the questions related to the input topic at the top of the search results
- The user can preview each suggested question before deciding to include it in the quiz.
- The user can manipulate the order of questions within the quiz after selecting them from the suggestions
- The system supports multiple topics as the input and can handle complex searches (e.g., combining multiple topics)

User Story 6

As a quiz administrator, I want the quiz platform to display player results onto a leaderboard to boost engagement and encourage competitiveness within the players.

Acceptance Criteria

- Whenever a quiz session is active, it should have an associated leaderboard
- The leaderboard should display the scores of all the players in descending order after each question
- The admin can get the position of a specific player on the leaderboard
- The admin can add and remove players from the leaderboard
- If a player is removed from the leaderboard, they can be restored with their previous score
- You can update the display name of a given player

Use Case 1 - Compatibility, customisation and analytics

1. The quiz creator initialises a new quiz setup, inputs quiz details like title and description.
2. The system records the details and creates a new quiz framework.
3. The creator adds multimedia elements (images, videos) to questions using an integrated media manager, which supports resizing and positioning.

4. The system checks for media compatibility across device types (desktop, tablet, mobile) and confirms proper display.
5. The creator enters "Preview Mode" to test the quiz, simulating the participant experience across different environments.
6. The system ensures all functionalities work as intended, mirroring live quiz conditions.
7. The system updates in real-time, allowing for immediate re-testing.
8. The creator publishes the quiz, setting it live for participants. The system makes the quiz available and notifies potential participants as configured.
9. The creator monitors participant engagement and reviews analytics on performance, including question skip rates and common errors.
10. The system provides real-time analytics via a dashboard, supporting downloads of detailed reports for offline analysis.

Use Case 2 - Leaderboard

1. When a quiz session is created, the administrator opts to activate the leaderboard feature.
2. The system initialises a leaderboard tied to the quiz session and prepares it to track scores.
3. As participants join the quiz session, they are automatically added to the leaderboard.
4. The system assigns initial scores of zero and lists all participants on the leaderboard.
5. After each quiz question is answered by the participants, scores are calculated based on the answers.
6. The system updates the leaderboard instantly, displaying scores in descending order.
7. During the quiz, the administrator views specific player rankings or adjusts the leaderboard by adding or removing players.
8. The system allows for real-time modifications to the leaderboard and displays changes immediately to all participants.
9. At the end of the quiz, final scores are displayed.
10. The leaderboard shows the final standings and allows for a detailed review by the administrator and participants.
11. The administrator closes the quiz session and requests the archiving of the leaderboard and scores.
12. The system archives all data, including each player’s scores and leaderboard changes throughout the session, for future analysis and record-keeping.

Validation

Feedback from the initial interviewees confirmed that the proposed solutions aligned well with their needs, though they also suggested additional refinements such as better support for high-resolution media and more customization options.

User 1 - Liem

“I’m really impressed with how the use cases address my needs. I like use case 1 because it acknowledges the quizzes I create, which rely heavily on visual content to engage users. The direct

integration for exporting quiz results will save me a lot of time and hassle. This would definitely enhance my ability to create and manage quizzes more effectively.”

User 2 - Dhruva

“I'm happy to see the focus on analytics, which is essential for understanding quiz effectiveness. The suggestion tool for creating quizzes based on topics is a step in the right direction, but I hope it's sophisticated enough to filter out irrelevant questions that might not fit the exact context of my quizzes. The custom theme options are a welcome feature; however, adding more customization in terms of font sizes and colour schemes would make it even better. I also hope that the implementation of these features won't slow down the overall performance of the platform.”

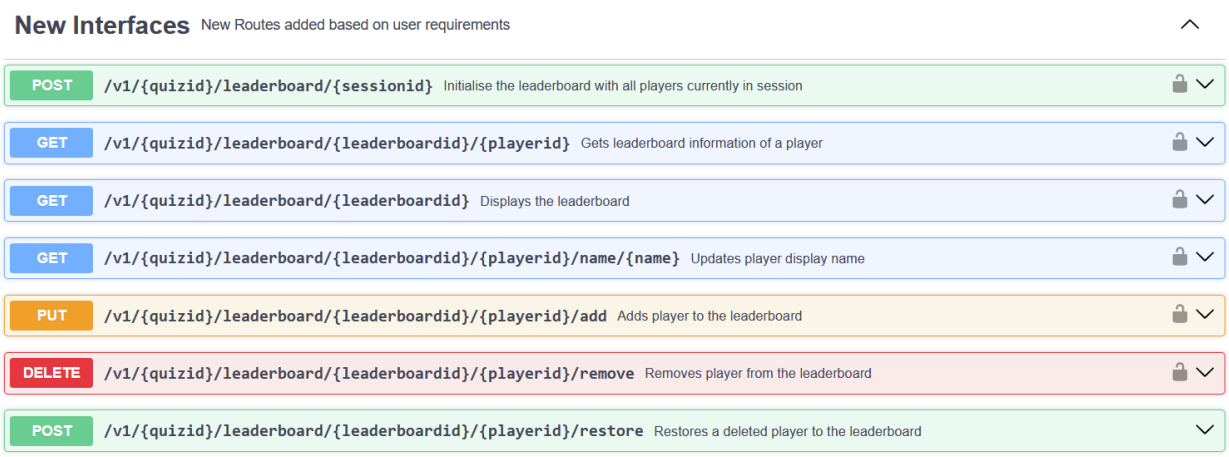
User 3 - Armaan

“It's great to see improvements in device optimization, as accessing quizzes easily on both desktop and mobile is crucial for my students. The ability to preview the quiz on multiple devices is valuable, yet I'm concerned about the ease of use—particularly, how changes can be tracked in real-time during the preview. While the streamlined quiz creation process sounds promising, I'd like to ensure that the platform remains stable and responsive, especially under heavy use when multiple participants are accessing a quiz simultaneously.”

Interface Design

Capabilities necessary to support the use cases were specified as HTTP endpoints, aligning with the requirements for future integration with a frontend developed by other student teams.

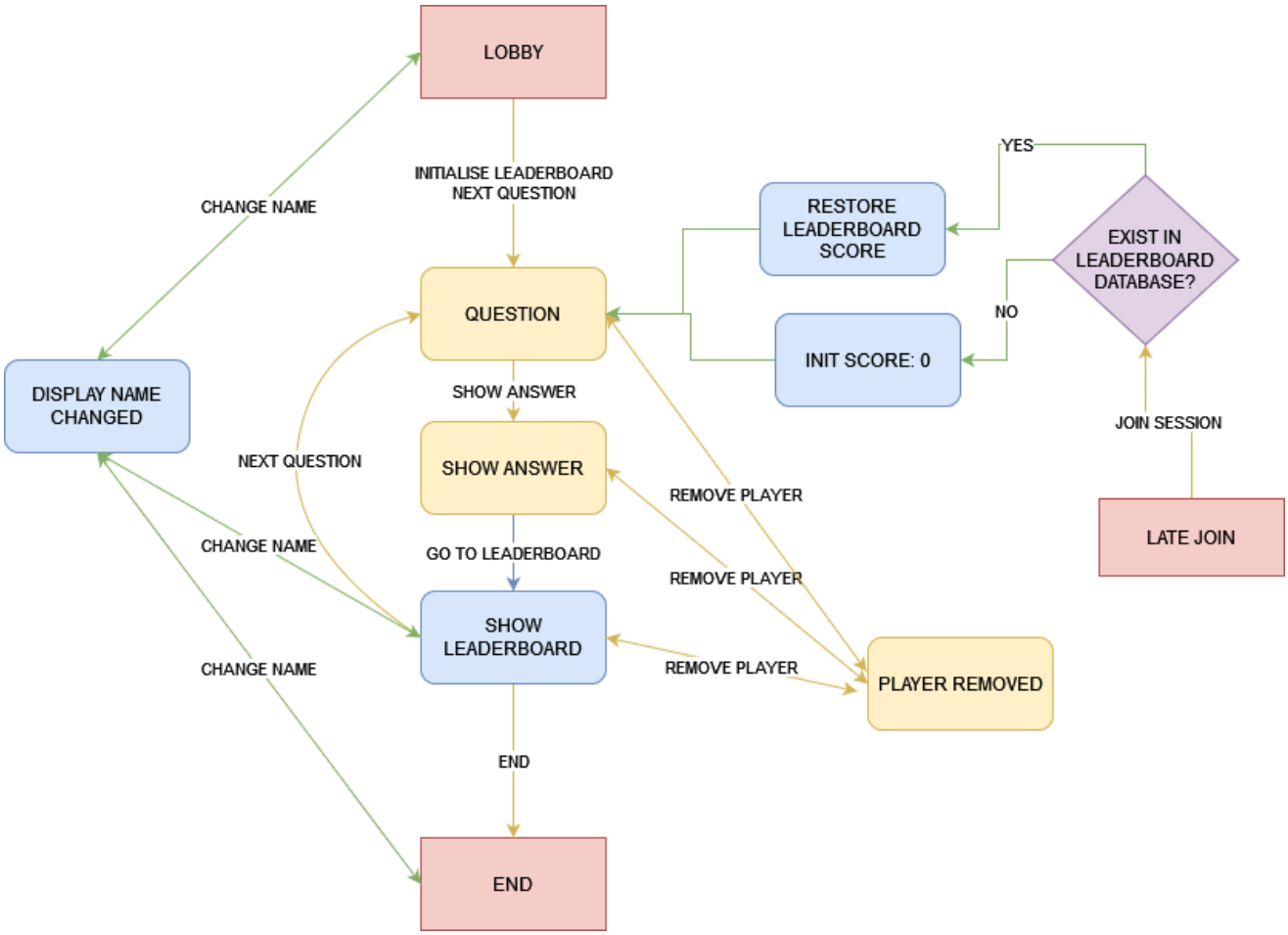
For the new interface, we will be implementing a leaderboard interface to satisfy User Story 6. The leaderboard will enable the session admin to be able to track the performance of each player by assigning each of them a score value and a position value. Then, whenever the leaderboard is displayed, the players will be ordered in decreasing score order, and their display name (which is initially set to their player name) will be displayed. A player can also be added to and removed from a leaderboard, and removed users can be restored with their previous score.



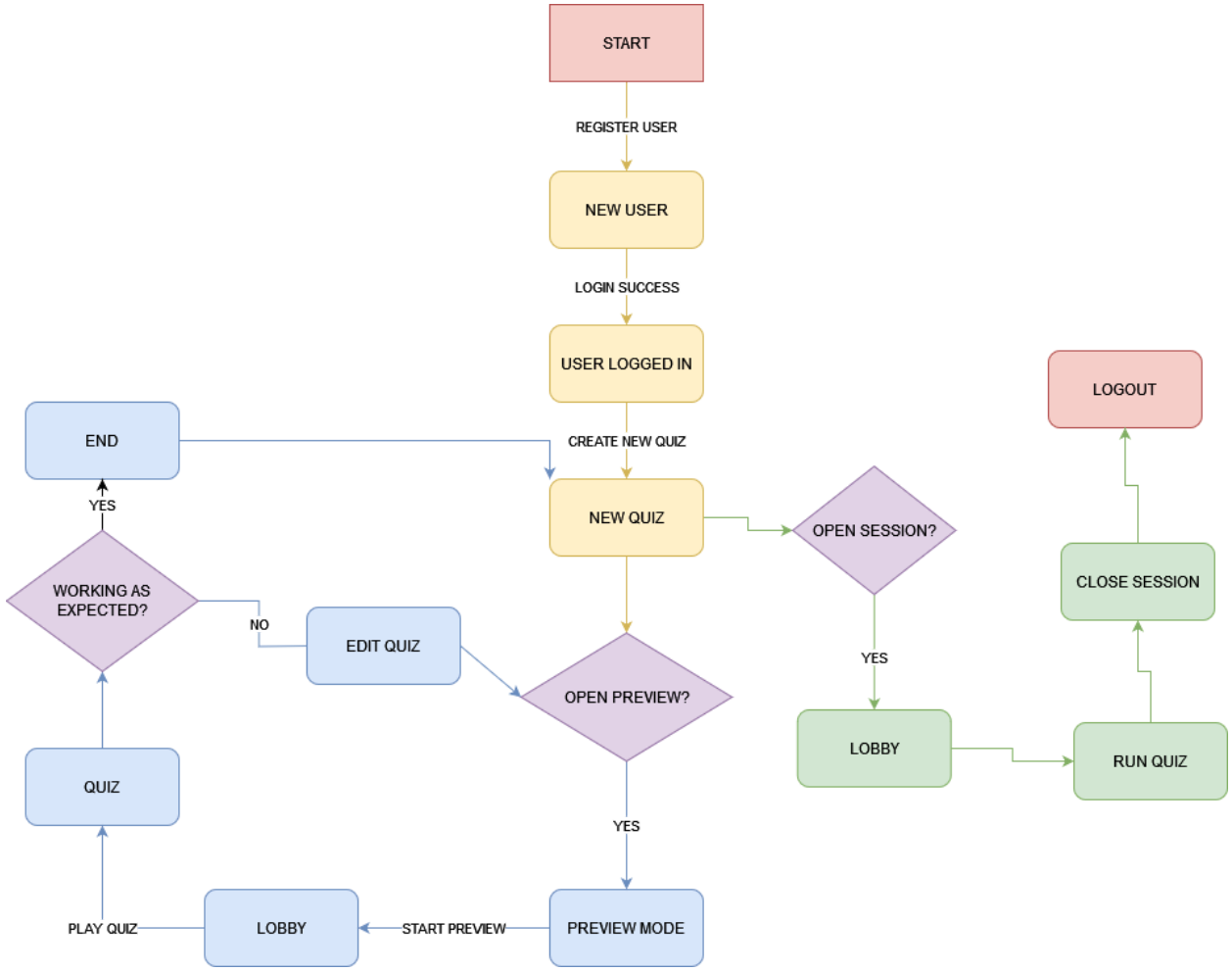
Conceptual Modelling

State Diagram For Leaderboard

State diagrams were created to visually represent the behaviour of the application in various scenarios, particularly focusing on the new leaderboard feature and the quiz preview process. These diagrams aid developers in understanding how the application transitions between different states in response to user actions.


LOBBY
INITIALISE LEADERBOARD
NEXT QUESTION
CHANGE NAME
DISPLAY NAME CHANGED
QUESTION
SHOW ANSWER
NEXT QUESTION
CHANGE NAME
GO TO LEADERBOARD
SHOW LEADERBOARD
CHANGE NAME
END
END
RESTORE LEADERBOARD SCORE
INIT SCORE: 0
YES
NO
EXIST IN LEADERBOARD DATABASE?
JOIN SESSION
LATE JOIN
REMOVE PLAYER
REMOVE PLAYER
REMOVE PLAYER
PLAYER REMOVED

State Diagram For Previews



Conclusion:

This use case demonstrates how the leaderboard functionality within Toohak can be effectively managed to enhance user engagement by maintaining a dynamic, interactive environment that promotes competition and participation. The ability for the administrator to manage the leaderboard flexibly, including real-time updates and player management, ensures that the quiz remains fair and engaging for all participants.