# Capstone Project Documenation.

**QUIZ THE GLOBE APP**

## Section: Introduction & Purpose

**What is the problem or the opportunity that the project is investigating?**

The project is investigating the challenge of learning and memorizing world capitals in a way that is engaging and interactive. Many students and general users find it hard to retain geographic knowledge when using traditional methods like textbooks or static flashcards. There's a growing opportunity to solve this problem using modern web technologies and gamification to enhance learning.

**Why is this problem valuable to address?**

Geographic knowledge—especially knowing countries and their capitals—is essential in schools, trivia competitions, travel planning, and global communication. By providing a fun and educational tool, we help learners improve memory retention and confidence in a key subject area. This is especially valuable in an age where digital learning tools are increasingly preferred over traditional materials.

**What is the current state (e.g. unsatisfied users, lost revenue)?**

Currently, users either rely on dull memorization techniques or use generic quiz apps that often lack customization, visuals, or progress tracking. Many learners abandon these tools quickly due to lack of engagement. Teachers also struggle to find free or customizable geography tools that can supplement classroom learning effectively.

**What is the desired state?**

The desired outcome is a web-based quiz app that is visually appealing, interactive, and adaptable. Users should be able to:

- Choose different quiz types (e.g., multiple-choice, true/false, images questions)

- Get instant feedback and see correct answers

- Track their progress over time
  This would lead to improved learning outcomes and user satisfaction, especially among students and trivia fans.

**Has this problem been addressed by other projects? What were the outcomes?**

Yes, similar ideas have been implemented on websites like Quizlet, Kahoot!, and Sporcle. However, these platforms often have limitations such as:

- Needing paid subscriptions for full access

- Lacking specific focus on capital-city learning

- Offering limited visuals or gamification features
  As a result, while they have seen success in general learning, they do not fully address the need for a focused, engaging world capitals quiz experience My app aims to combine the best of these solutions and improve the overall learning experience.

## What is the industry/domain?

**Quiz The Globe** is part of the **Education Technology (EdTech)** industry, focusing on geography education and knowledge enhancement. The application serves as an interactive quiz platform designed to engage users in learning about world countries, capitals, flags, populations, and currencies through various quiz formats such as multiple choice, true/false, and fill-in-the-blank.

By combining gamification elements like scoring, streaks, timers, and instant feedback, the app promotes active learning and retention. This approach fits within the broader domain of e-learning tools and digital education resources aimed at making learning more accessible, fun, and effective for users worldwide

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## What is the current state of this industry?

The EdTech industry has grown rapidly, especially post-pandemic, with a huge shift toward digital learning platforms. Key challenges in this space include:

- **High competition** from startups offering quiz-based apps (e.g., Duolingo, Kahoot!, Quizlet)

- **User engagement**: Many apps struggle to retain learners due to poor design or lack of motivation

- **Content overload**: Some tools offer too much generic content, making it hard for users to focus on a single learning goal (e.g., world capitals)

Despite these challenges, there is still a **demand for niche, well-designed tools** that focus on specific topics like geography or world knowledge, especially for schools, travelers, and competitive exam learners.

## What is the overall industry value-chain?

The EdTech value chain typically includes:

1. **Content Development**

   - Creation of educational material (questions, media, maps)

2. **Technology Platform**

   - Web/mobile app development, hosting, and user management

3. **User Interface/User Experience (UI/UX)**

   - Making the app accessible, intuitive, and fun

4. **Distribution & Marketing**

   - Sharing through app stores, websites, or schools

5. **User Engagement & Analytics**

   - Tracking progress, scores, and usage to improve the app

My app focuses mainly on **content**, **technology**, and **UI/UX**, which are the core drivers of value in early-stage learning apps.

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## What are the key concepts in the industry?

- **Gamification**: Using game elements like points, levels, and feedback to improve learning motivation

- **Active Recall**: Forcing the learner to retrieve information (like remembering capitals), proven to boost memory

- **Spaced Repetition**: Repeating questions over time to improve retention

- **User-Centered Design**: Making apps that are fun, easy to use, and accessible to all ages

- **Microlearning**: Delivering small chunks of learning in quick, interactive formats

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## Is the project relevant to other industries?

Yes, this project can have cross-industry relevance:

- **Travel & Tourism**: Educating travelers about global destinations and capitals

- **Language Learning**: Expanding the quiz to teach capital names in multiple languages

- **Corporate Training**: Using gamified apps for cultural training in multinational companies

- **Entertainment / Trivia Apps**: Integrating with general knowledge games and platforms

# Stakeholders

## Who are the stakeholders?

The stakeholders of the **Quiz Capital World App** include:

1. **Students (Primary School to University)**

   - Age range: 10–25 years

   - Use the app to study geography or prepare for exams.

2. **Teachers and Educators**

   - Geography or Social Studies teachers using the app to reinforce classroom lessons or assign homework/quizzes.

3. **Self-Learners & Trivia Enthusiasts**

   - Adults or hobbyists who enjoy testing their world knowledge in a fun way.

4. **Parents**

    ○ Especially younger students, interested in tools that support their child's learning.

5. **School Administrators / Educational Institutions**

    ○ May consider integrating the app into digital classrooms or recommending it to students.

6. **App Developer / Project Owner (myself)**

    ○ Manages and maintains the app, monitors feedback, and ensures it meets educational goal

## Why do they care about this software?

- **Students** want a more engaging, game-based way to learn about countries and capitals, rather than reading from a textbook.

- **Teachers** look for free or low-cost digital tools that can support active learning, homework, or classroom activities.

- **Self-learners** and **quiz lovers** enjoy challenging themselves and improving their knowledge in fun formats.

- **Parents** value accessible, safe, and educational apps that make learning enjoyable for their children.

- **School administrators** are interested in scalable, digital resources that support student achievement.

- **You (the developer)** care about building a useful, well-designed educational product and possibly showcasing it in a portfolio.
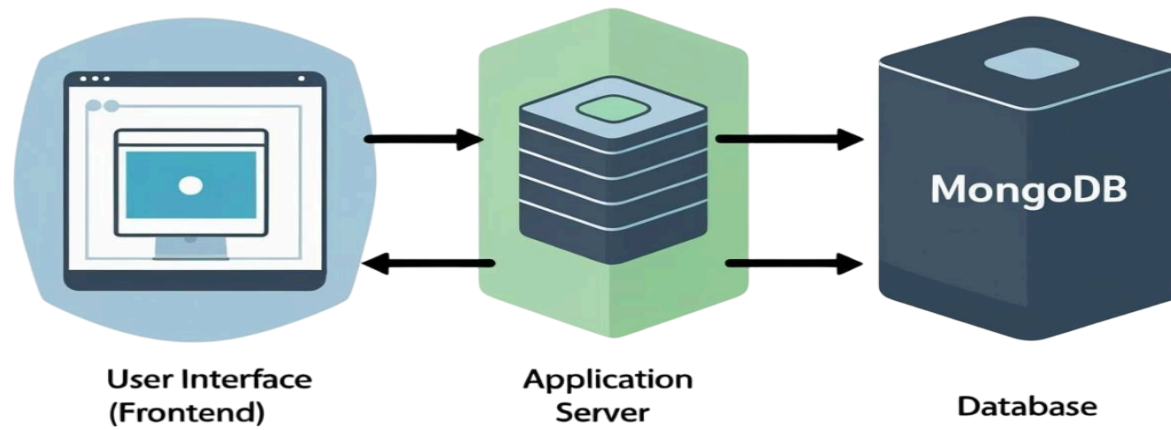
## What are the stakeholders' expectations?

| Stakeholder | Expectations |
|---|---|
| Student | A fun, easy-to-use quiz app with instant feedback and visible progress |
| Teacher | Reliable quiz modes, question variety, and the ability to recommend or assign it. |
| Self- learner | A challenging experience, perhaps with levels, scoreboards, or daily goals |
| Parents | Age-appropriate content, no ads/pop-ups, and progress monitoring features |

| | |
|---|---|
| School Admins | Free or affordable access, educational value, data privacy, and scalability |
| Developer (myself) | Clean code, responsive design, and positive feedback and usability met |

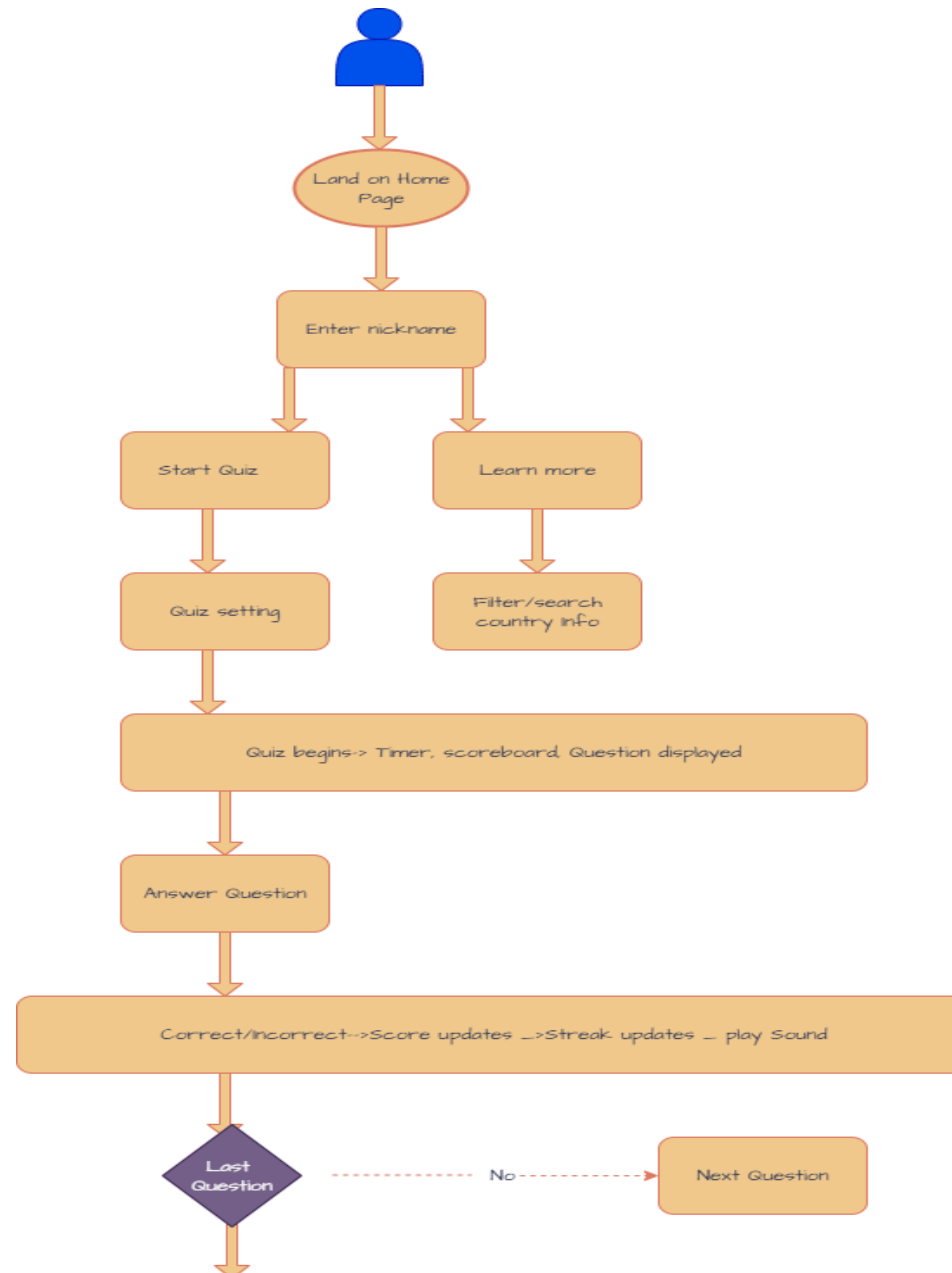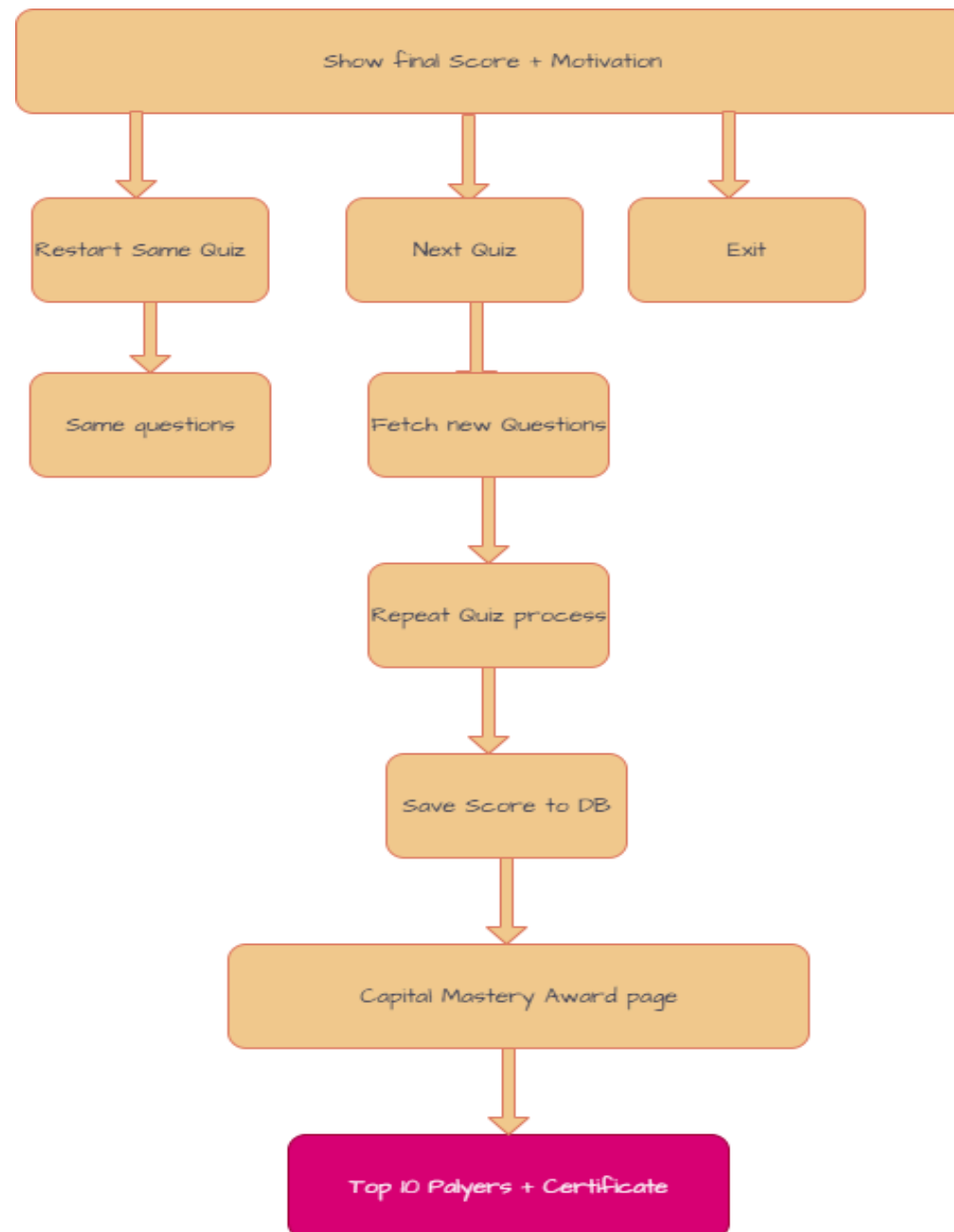# Product Description

## Architecture Diagram



User Interface (Frontend)   →   Application Server   →   Database (MongoDB)

**USERS**

_id: Object(PK)

nickname: String

**QUESTIONS**

_id ObjectIld [pk]
question: string
options: string []
correctAnswer: String

**QUIZ RESULTS**

_id ObjectId [pk]
name: string
answer: object []
score: int

**COUNTRIES (OPTIONAL)**

_id ObjectId [pk]
name: string
capital: string
region: string
population: int
currency: string
alpha2code: string
media: Object
media.flag: string (URL)

# User Stories

| # | User Story Title | User Story Description | Priority | Additional Notes |
|---|---|---|---|---|
| 1 | Start Quiz | As a student, I want to start a quiz with one click so that I can immediately begin testing my knowledge of world capitals | High | The call to Action button should stand out clearly so users can click on it immediately |
| 2 | View Quiz Questions | As a user, I want to see one question at a time with answer options so I can focus and answer easily. | High | Support multi choice questions, true/false, and fill-in-the-blank |
| 3 | Get Immediate Feedback | As a student, I want to know right away if my answer is correct or not so I can learn from my mistakes | High | Display different sounds when I answer right or wrong. |
| 4 | See Score at End | As a user, I want to see my score after completing the quiz so I can track my performance | High | Display final score and correct answers. |

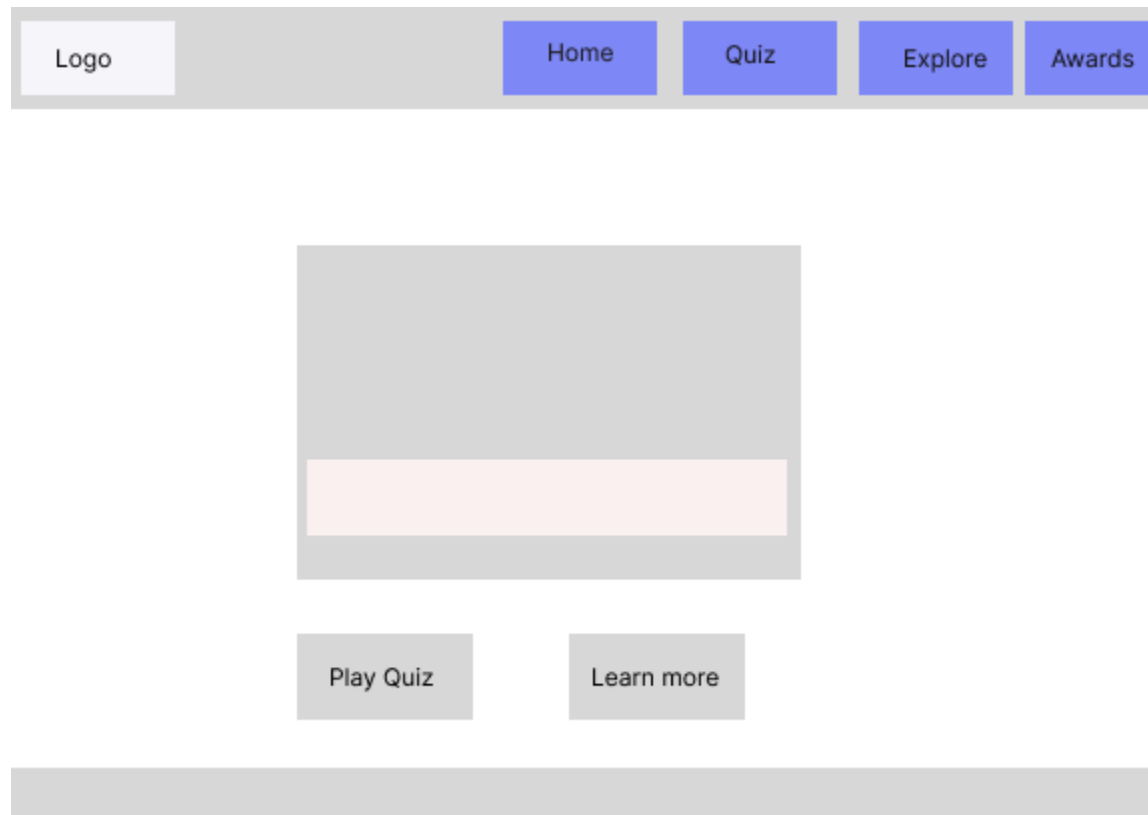| 5 | Display Countries List | As a user, I want to view a list of countries with flags, names, capitals, population, region, and currency so I can learn about different countries clearly. | High | Responsive grid, clickable cards with hover effects |
|---|---|---|---|---|
| 6 | Search Countries by Name | As a user, I want to search countries by name using autocomplete with flag icons so I can quickly find a specific country. | High | Supports free text, flag icons in dropdown |
| 7 | Filter Countries by Region | As a user, I want to filter countries by region to browse countries in a specific geographic area. | Medium | Dropdown with "All" option |
| 8 | Sort Countries by Name or Population | As a user, I want to sort countries alphabetically or by population size to explore countries in my preferred order. | Medium | Sort options: None, Name (A–Z), Population (descending) |
| 9 | View Country Details in Modal | As a user, I want to click a country card to see detailed info in a modal dialog so I can learn more without leaving the page. | High | Modal shows flag emoji, capital, region, population, currency |

# User Flow:



```
                          [User]
                            |
                            v
                    ( Land on Home
                          Page )
                            |
                            v
                    [ Enter nickname ]
                       /          \
                      v            v
              [ Start Quiz ]   [ Learn more ]
                    |               |
                    v               v
            [ Quiz setting ]   [ Filter/search
                    |            country info ]
                    v
    [ Quiz begins-> Timer, scoreboard, Question displayed ]
                    |
                    v
            [ Answer Question ]
                    |
                    v
    [ Correct/Incorrect-->Score updates _->Streak updates _ play Sound ]
                    |
                    v
              < Last        > ------No------> [ Next Question ]
                Question
                    |
                    v
```

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                    ┌─────────────────────────────────────────┐
                    │       Show final Score + Motivation       │
                    └───────────┬──────────┬──────────┬─────────┘
                                │          │          │
                    ┌───────────▼──┐  ┌────▼─────┐  ┌─▼────────┐
                    │ Restart Same │  │ Next Quiz │  │   Exit   │
                    │     Quiz     │  │           │  │          │
                    └───────┬──────┘  └─────┬─────┘  └──────────┘
                            │               │
                    ┌───────▼──────┐  ┌──────▼──────────┐
                    │    Same      │  │ Fetch new       │
                    │  questions   │  │ Questions       │
                    └──────────────┘  └──────┬──────────┘
                                             │
                                      ┌──────▼──────────┐
                                      │ Repeat Quiz     │
                                      │ process         │
                                      └──────┬──────────┘
                                             │
                                      ┌──────▼──────────┐
                                      │ Save Score to DB│
                                      └──────┬──────────┘
                                             │
                                   ┌─────────▼────────────┐
                                   │ Capital Mastery Award │
                                   │        page           │
                                   └─────────┬────────────┘
                                             │
                                   ┌─────────▼────────────┐
                                   │ Top 10 Palyers +      │
                                   │    Certificate        │
                                   └──────────────────────┘
```

# Flow Diagrams:

https://www.figma.com/design/wl8g2jmfNZt1dJQ4S3pbC0/QUIZTHEGLOBE--CAPSTONE-PROJECT?node-id=0-1&p=f&t=QkNEuabltcbdtLol-0

| Logo | | Home | Quiz | Explore | Awards |

Play Quiz     Learn more

Home

Quiz

Explore

Awards

QUIZ THE GLOBE

WELCOME.....!!

SET YOUR CHALLENGE LEVEL

Select Question types

Select Difficulty levels

# EXPLORE COUNTRIES

Search Countries

Sort By

Filter by Region

NEW ZEALAND

FRANCE

ANGOLA

BRAZIL

MEXICO

INDIA

VIETNAM

PHILIPPINES

## TOP 10 PLAYER

| | CERTIFICATE |
| --- | --- |
| | CERTIFICATE |
| | CERTIFICATE |
| | CERTIFICATE |
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| | CERTIFICATE |
| | CERTIFICATE |

# Open Questions/Out of Scope

- **Encryption / HTTPS**:

  Securing data transmission using HTTPS and encryption is handled externally by the hosting environment or backend infrastructure. This is out of scope for the frontend application.

- **User Authentication:**

  Features such as user registration, login, and authentication are not included in this project. The app currently supports anonymous or nickname-based usage only.

- **Multi language support:**

  The application supports English only. Localization and internationalization features are not included.

- **Optimization for mobile -** mobile app version of the application.

# Non-functional Requirements

| | |
|---|---|
| **Performance** | The application should load quiz data and country data within 3 seconds on standard broadband connections. |
| **Scalability** | The application should support multiple concurrent users without affecting the responsiveness of the quiz. |

**Availability**      The application is expected to be available 24/7 on
                      supported desktop browsers during testing and
                      presentation.

**Maintainability**   The code is modular and uses React components, allowing
                      for easier updates and improvements in the future.

**Usability**         The interface is designed to be visually engaging and easy
                      to navigate for users with basic technical skills.

• **The app hasn't been deployed yet and is run locally.**

# Project Planning

| Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | Sunday |
|---|---|---|---|---|---|---|
|  | 1/7<br><br>Start planning + start documentation | 2/7<br><br>Lo-Fi Design + Logical model of database | 3/7<br><br>Finish documentation<br><br> + Lo-Fi design -<br><br>DONE | 4/7<br><br>Start building front-end<br><br>Adding in components + pages | 5/7<br><br>Homepage front-end<br><br>Done | 6/7<br><br>Start backend - create models and controllers ensure all CRUD |

| 7/7<br><br>Back-end controllers<br><br><br>Back-end models - Routes<br><br>DONE | 8/7<br><br>Quiz page<br><br>Explore page for front end<br><br>DONE | 9/7<br><br>Capital Mastery Award page for front end<br><br>DONE | 10/7<br><br>Finish main build of back end Done<br><br>Mongo DB connected<br><br>CRUD check-DONE | 11/7<br><br>Integrate all code in main branch and fix any bugs | 12/7 Tidy up and fix bugs | 13/7 tidy up the code<br><br>Done<br><br>Comment Code<br><br>DONE |
|---|---|---|---|---|---|---|
| 14/7<br><br>Making the presentation file<br><br>Done | 15/7<br><br>Finish Documentation<br>DONE | 16/7<br><br>Prepare for the presentation | 17/7 | 18/7 | 19/7<br><br>Presentation day | |

# Testing Strategy

**Testing steps:**

- Followed Figma design
- Thunder Client was used to test CRUD operations in database
- Every component was tested and any errors were troubleshooted and resolved
- Tested all aspects of application as a user to ensure no unexpected errors
- Code was tidied and commented to ensure each step is accounted for

# Implementation

- ☐ The application should be deployed to AWS EC2 free tier through Docker and the server database Should be deployed to Amazon Web Services Relational Database Service

# End-to-end solution

- The application is fully functional and has met the requirements.
- This application provides a complete end-to-end solution for an interactive quiz platform focused on world geography. It integrates a responsive and animated React front end with a Node.js/Express backend and MongoDB database to offer a seamless experience from user login to score tracking and rewards.

- Users can explore real-time country data via REST Countries API, configure personalized quizzes, receive instant feedback with sound and scoring, and earn digital awards. The backend securely handles score submissions and leaderboard data using RESTful APIs. Fallback support ensures resilience during network or API failures, and celebration features like certificates and confetti enhance engagement.
- The project architecture demonstrates a fully integrated solution including UI/UX, data flow, persistence, learning mode, game logic, and reward systems — from entry to celebration.

# References:

**Code: https://github.com/hangnznguyen/CAPSTONEPROJECT.git**

## Resources:

- **Visual Studio Code**
- **dotenv**
- **Draw.io**

**Front end**

- **React**
- **React Router DOM**
- **Material UI / Icons**

**API**

- **NodeJS**
- **Express**

- **Mongo Db**

**External APIs AND Data Sources**
**https://restcountries.com/**