QUIZ GAME

A PROJECT REPORT

Submitted by

B.R.VIMAL AANANTH (2303811714821058)

in partial fulfillment of requirements for the award of the course

CGB1122 – DATA STRUCTURES

in

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

K. RAMAKRISHNAN COLLEGE OF TECHNOLOGY

(An Autonomous Institution, affiliated to Anna University Chennai and Approved by AICTE, New Delhi)

SAMAYAPURAM – 621 112

May, 2024

K. RAMAKRISHNAN COLLEGE OF TECHNOLOGY

(AUTONOMOUS)

SAMAYAPURAM – 621 112

BONAFIDE CERTIFICATE

Certified that this project report titled **"QUIZ GAME"** is the bonafide work of **B.R.VIMAL AANANTH (2303811714821058),** who carried out the project work under my supervision. Certified further, that to the best of my knowledge the work reported here in does not form part of any other project report or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

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Samayapuram–621112.	Samayapuram–621112.

Submitted for the viva-voce examination held on ...18-06-2024...

DECLARATION

I declare that the project report on **“QUIZ GAME”** is the result of original work done by us and best of our knowledge, similar work has not been submitted to **“ANNA UNIVERSITY CHENNAI”** for the requirement of Degree of **BACHELOR OF ENGINEERING**. This project report is submitted on the partial fulfillment of the requirement of the award of the course **CGB1122 - DATA STRUCTURES.**

B.R.Vimal Aanth

Signature

B.R.VIMAL AANANTH

STUDENT NAME

Place: Samayapuram

Date: 11-06-2024

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It is with great pride that I express our gratitude and indebtedness to our institution, "**K. Ramakrishnan College of Technology (Autonomous)**", for providing us with the opportunity to do this project.

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VISION OF THE INSTITUTION

To emerge as a leader among the top institutions in the field of technical education.

MISSION OF THE INSTITUTION

Produce smart technocrats with empirical knowledge who can surmount the global challenges.

Create a diverse, fully-engaged, learner-centric campus environment to provide quality education to the students.

Maintain mutually beneficial partnerships with our alumni, industry, and Professional associations.

VISION OF DEPARTMENT

To become a renowned hub for AIML technologies to producing highly talented globally recognizabletechnocrats to meet industrial needs and societal expectation.

MISSION OF DEPARTMENT

Mission 1: To impart advanced education in AI and Machine Learning, built upon a foundation in Computer Science and Engineering.

Mission 2: To foster Experiential learning equips students with engineering skills to tackle real-worldproblems.

Mission 3: To promote collaborative innovation in AI, machine learning, and related research and development with industries.

Mission 4: To provide an enjoyable environment for pursuing excellence while upholding strong personal and professional values and ethics.

PROGRAM EDUCATIONAL OBJECTIVES

Graduates will be able to:

1. PEO1: Excel in technical abilities to build intelligent systems in the fields of AI & ML in order to find new opportunities

2. PEO2: Embrace new technology to solve real-world problems, whether alone or as a team, while prioritizing ethics and societal benefits.

3. PEO3: Accept lifelong learning to expand future opportunities in research and product development.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO 1: Domain Knowledge

To analyze, design and develop computing solutions by applying foundational concepts of Computer Science and Engineering.

PSO 2: Quality Software

To apply software engineering principles and practices for developing quality software for scientific and business applications.

PSO 3: Innovation Ideas

To adapt to emerging Information and Communication Technologies (ICT) to innovate ideas and solutions to existing/novel problems

PROGRAM OUTCOMES (POs)

Engineering students will be able to:

Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

ABSTRACT

This paper presents the development and implementation of a basic quiz game using the C programming language. The program is designed to test users' knowledge across various subjects through multiple-choice questions, aiming to create an engaging educational tool that enhances knowledge retention and demonstrates practical C programming skills. A `Question` struct is defined to encapsulate the question text, possible answers, and the correct answer, facilitating modularity and easy extension of the question set. The quiz comprises five questions on diverse topics, each with four answer options. Users are prompted to respond within a 60-second time limit, implemented using the `time.h` library, adding a real-time challenge to the game. The timer function employs a delay mechanism to simulate a countdown, while user answers are captured and processed case-insensitively using a conversion function. The program tracks the user's score, providing immediate feedback upon quiz completion. This quiz game serves as an educational tool, reinforcing users' knowledge in various domains and showcasing key programming concepts such as data structuring, real-time operations, and input validation in C. Future enhancements could include a larger, dynamically loaded question set, advanced timing mechanisms, a graphical user interface (GUI), randomization of question order, and detailed feedback for incorrect answers. This project highlights the versatility of C programming in creating interactive applications, offering both a fun educational experience and a foundational example for aspiring programmers to build upon.

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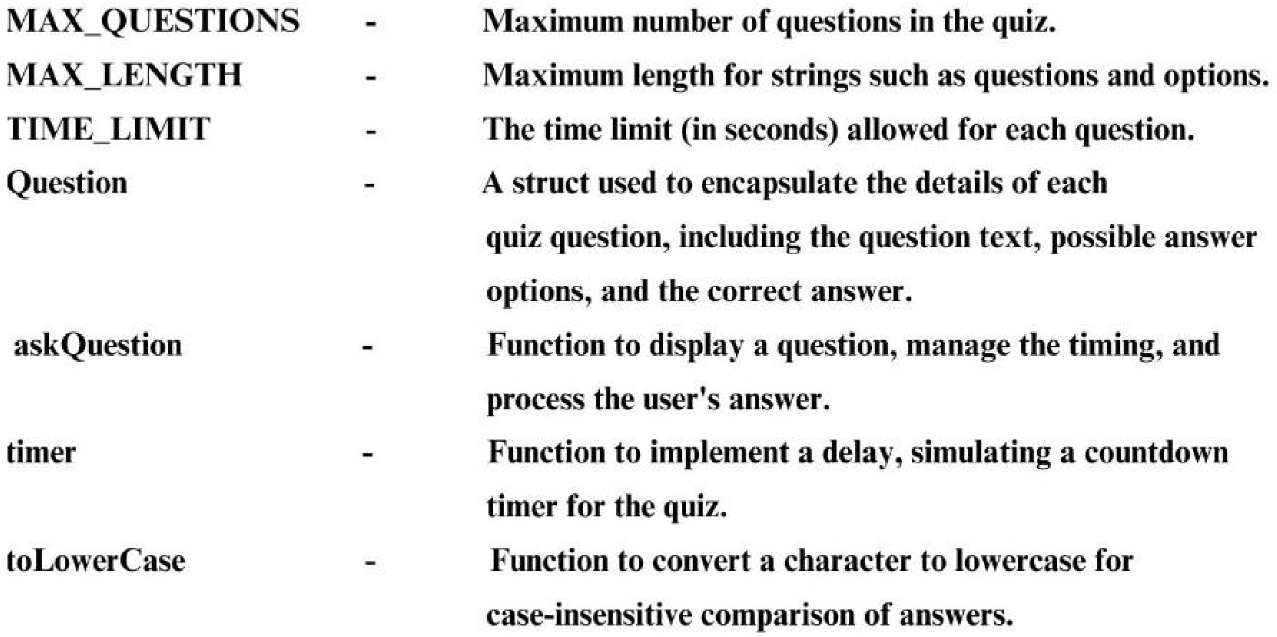
ABBREVIATIONS



MAX_QUESTIONS - **Maximum number of questions in the quiz.**

MAX_LENGTH - **Maximum length for strings such as questions and options.**

TIME_LIMIT - **The time limit (in seconds) allowed for each question.**

Question - **A struct used to encapsulate the details of each quiz question, including the question text, possible answer options, and the correct answer.**

askQuestion - **Function to display a question, manage the timing, and process the user's answer.**

timer - **Function to implement a delay, simulating a countdown timer for the quiz.**

toLowerCase - **Function to convert a character to lowercase for case-insensitive comparison of answers.**

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION TO PROJECT

In today's digital era, this project focuses on developing a quiz game application in C to engage users and enhance knowledge retention. Using a Question struct, the game organizes questions, answer options, and correct answers efficiently. With pre-defined questions and a 60-second time limit per question, users are challenged in a dynamic environment. User answers are processed case-insensitively, and immediate feedback is provided, showcasing practical use of C programming concepts. Future enhancements may include expanding the question set, improving timing mechanisms, and implementing a graphical user interface for enhanced user experience.

1.2 PURPOSE AND IMPORTANCE OF THE PROJECT

The purpose and importance of this project lie in its endeavor to create an interactive and educational quiz game application tailored to the needs of users in today's digital era. Through the development of this quiz game, the project aims to achieve several key objectives. Firstly, it seeks to engage users in dynamic learning experiences by presenting a variety of multiple-choice questions spanning diverse topics. By actively participating in the quiz game, users can enhance their knowledge retention and deepen their understanding of various subjects. Additionally, by implementing the quiz game in C, the project provides an opportunity for users to develop and refine their programming skills. Working with fundamental data structures, timing functions, and user input handling fosters a stronger grasp of core programming concepts. Furthermore, the project aims to create a quiz game application that is accessible to a wide range of users, irrespective of their background or level of expertise.

The simplicity and intuitiveness of the interface ensure that the quiz game can be enjoyed by individuals seeking to expand their knowledge in a fun and interactive manner. Moreover, the versatility and adaptability of the quiz game application make suitable for integration into various platforms and environments, serving as a valuable tool for both formal and informal learning settings. Finally, by fostering innovation and creativity in the development of educational software, the project encourages exploration of new avenues for improvement and expansion. Future enhancements, such as adding new question sets, refining user feedback mechanisms, and implementing advanced features, can further enhance the utility and appeal of the quiz game application. Overall, this project contributes to the broader goal of promoting knowledge sharing and lifelong learning in today's digital age.

1.3 OBJECTIVES

Engagement and Learning Enhancement

Programming Skill Development

Accessibility and User-Friendliness

Versatility and Adaptability

Innovation and Continuous Improvement

Knowledge Sharing

Skill Development

Lifelong Learning

Educational Software

User Engagement

1.4 PROJECT SUMMARIZATION

The "Quiz Game Application" is a C-based project aimed at providing an interactive platform for users to engage in educational quizzes. Using structured programming techniques, it offers a seamless experience for users to enhance their knowledge and skills through challenging multiple-choice questions. The application features a user-friendly interface, facilitating easy navigation and interaction with the quiz content. It leverages versatile data structures and algorithms to manage quiz questions and user responses efficiently. Some benefits of this project include:

Engagement and Learning: The quiz game fosters active participation and knowledge retention through engaging quiz sessions on diverse topics.

Skill Development: By implementing the quiz game in C, users have the opportunity to strengthen their programming skills, particularly in data structuring and algorithmic problem-solving.

Accessibility and User-Friendliness: The intuitive interface ensures accessibility for users of all levels, promoting an inclusive learning environment.

Versatility and Adaptability: The quiz game can be easily customized and expanded to accommodate various quiz formats and difficulty levels, catering to diverse user preferences.

Innovation and Continuous Improvement: Regular updates and enhancements to the quiz game ensure a dynamic and evolving learning experience, promoting continuous improvement in educational software development.

By encapsulating these features, the Quiz Game Application demonstrates the practical application of programming concepts in creating engaging and educational software solutions, ultimately contributing to knowledge sharing and lifelong learning.

CHAPTER 2
PROJECT METHODOLOGY

2.1 PROJECT METHODOLOGY OVERVIEW

The "Project Methodology Overview" provides a concise introduction to the approach and methodology adopted for the development of the quiz game application. It outlines the key phases, processes, and strategies employed throughout the project lifecycle, offering stakeholders a high-level understanding of the project's structure and objectives.

2.2 REQUIREMENTS ANALYSIS

The requirements analysis phase involves identifying and documenting the core functionalities, content, user interface, timing, scoring, performance, compatibility, security, and privacy requirements for the quiz game application. This phase ensures a clear understanding of project objectives and constraints, guiding the subsequent development and deployment processes effectively.

2.3 SYSTEM DESIGN

The system design phase focuses on creating a robust and efficient architecture for the quiz game application. Key components of this phase include:

2.3.1 High-Level Architecture:

Define the overall structure and components of the quiz game application. This includes identifying modules for question management, user interface, timer functionality, scoring mechanism, and data persistence. Establish the relationships and interactions between these modules to ensure seamless operation.

2.3.2 Detailed Architecture Diagram:

Develop a detailed architecture diagram depicting the components, interfaces, and data flows within the quiz game application. This diagram provides a visual representation of how the various modules interact and communicate with each other. It helps ensure clarity and alignment among team members regarding the system's design and functionality.

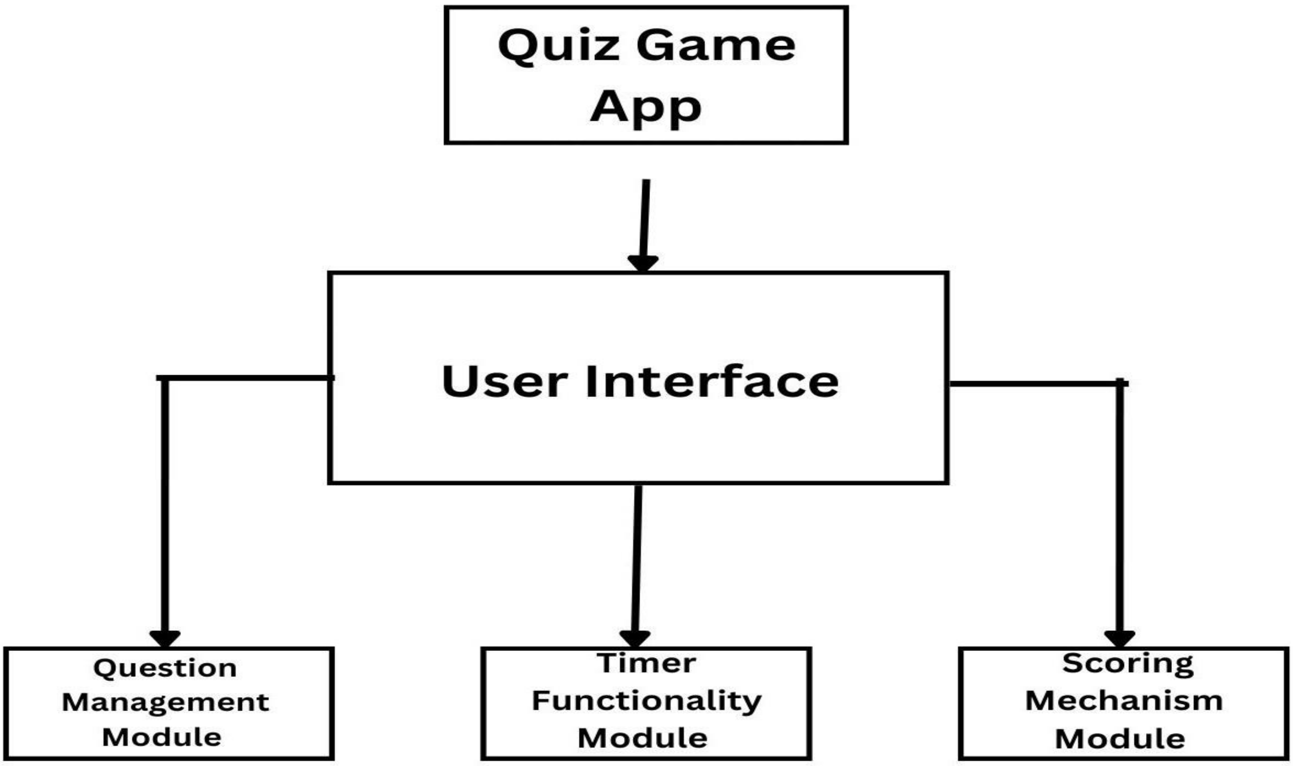


Fig 2.1 : Architecture Diagram For Quiz Game

2.4 IMPLEMENTATION AND MODULE DEVELOPMENT

During this phase, the focus is on translating the system design into code. Key steps include developing and integrating modules such as question management, user interface, timer functionality, scoring mechanism, and data persistence. Iterative development, version control, documentation, and quality assurance processes ensure efficient and reliable implementation.

2.5 TESTING AND DEPLOYMENT

This phase involves rigorous testing to ensure the functionality, performance, and security of the quiz game application. Activities include unit testing, integration testing, user acceptance testing, performance testing, compatibility testing, and security testing. Deployment planning and execution are carried out to release the application to production or the target environment, followed by post-deployment testing and user training and support.

2.6 MAINTENANCE, SUPPORT, AND CONTINUOUS IMPROVEMENT

This phase involves addressing bugs promptly, providing technical support to users, monitoring performance, analyzing user feedback for feature updates, ensuring security with regular updates, updating documentation, and embracing continuous improvement to enhance usability and functionality.

CHAPTER 3

DATA STRUCTURE PREFERANCE

3.1 EXPLANATION OF WHY AN ARRAY OF STRUCTURES WAS CHOSEN

An ARRAY OF STRUCTURES was chosen for this project due to its simplicity and efficiency in organizing and managing data. By grouping related data fields into a single structure, it allows for easy access and manipulation of information, which is essential for handling quiz questions, options, and other relevant data. Additionally, using an array allows for sequential access to elements, making it suitable for iterating through questions and options during the quiz game. This approach simplifies code implementation, reduces complexity, and improves readability, facilitating faster development and maintenance of the quiz game application**.**

3.2 COMPARISON WITH OTHER DATA STRUCTURES

For the quiz game application, the choice of data structure revolves around efficiency, simplicity, and suitability for the specific requirements. While arrays offer constant-time access and simplicity, they lack flexibility in dynamic resizing. Linked lists provide dynamic memory allocation but can be slower for access. Trees offer efficient operations but introduce complexity. Ultimately, the array of structures was chosen for its balance of simplicity and efficiency, aligning well with the fixed-size and straightforward nature of the quiz questions.

3.3 ADVANTAGES AND DISADVANTAGES OF USING AN ARRAY OF STRUCTURES

Advantages:

1. **Simplicity**: Arrays of structures offer a straightforward implementation, making it easy to store and access quiz questions in a systematic manner.
2. **Efficiency**: With constant-time access to elements by index, arrays provide efficient random access, suitable for quickly retrieving quiz questions during gameplay.

3. **Compact Memory Usage**: Arrays allocate contiguous memory blocks, resulting in efficient memory usage and cache locality, which can improve performance.

Disadvantages:

1. **Fixed Size**: Arrays have a fixed size, making it challenging to dynamically add or remove quiz questions during runtime without resizing or reallocation.
2. **Inflexibility**: Once initialized, the size of the array cannot be changed dynamically, potentially limiting flexibility in accommodating changes in the number of quiz questions or options.
3. **Memory Overhead**: Arrays may allocate more memory than needed if the size is predefined to accommodate the maximum possible number of quiz questions, leading to inefficient memory usage.

CHAPTER -4

DATA STRUCTURE METHODOLOGY

4.1 ARRAYS OF STRUCTURES

Arrays of structures provide a structured and efficient way to organize related data, such as quiz questions in the quiz game application. Each element in the array represents a single quiz question, with attributes defining the question text, options, and correct answer. This approach offers efficient access to elements by index, simplifies memory allocation, and ensures uniformity in data organization. By leveraging arrays of structures, the application can effectively manage quiz questions, facilitating seamless gameplay and user interaction.

4.1.1 Data Structure Selection:

Explanation of why an array of structures was chosen as the preferred data structure for storing quiz questions and options.

4.1.2 Structure Definition:

Definition of the structure(s) used to represent quiz questions and options. Explanation of the attributes or fields included in the structure(s), such as question text, options, and correct answer.

4.1.3 Array Initialization:

Process of initializing the array of structures, including allocating memory and populating the array with quiz questions and options. Discussion of any initialization routines or procedures implemented to ensure the proper setup of the array.

4.1.4 Accessing Elements:

Methods for accessing elements within the array of structures, such as by index or through iterative traversal. Explanation of how quiz questions and options are retrieved from the array for presentation to the user during gameplay.

4.1.5 Modifying Elements:

Techniques for modifying elements within the array of structures, such as updating quiz questions or changing option values. Discussion of the procedures or functions implemented to facilitate modifications to the array while maintaining data integrity.

4.2 NODE STRUCTURE IMPLEMENTATION

The node structure implementation involves defining the structure of individual nodes used in the array. Each node contains fields representing different components of the quiz questions, such as the question itself, options, and correct answer. Implementation includes defining the structure of the node, initializing nodes with appropriate data values, defining access operations to retrieve information from nodes, and implementing modification operations to update node contents. Error handling mechanisms are also implemented to handle cases where nodes cannot be initialized or modified successfully, ensuring robustness and reliability in the node

4.3 INITIALIZATION, ACCESS, AND MODIFICATION OPERATIONS

These operations involve initializing, accessing, and modifying the nodes within the array of structures used to store quiz questions.

1. **Initialization:**

   Initialize the array of structures by populating each node with the relevant data for quiz questions. This may involve reading quiz questions from external sources like files or databases and initializing the nodes accordingly. Ensure proper memory allocation and error handling during initialization to handle cases where data cannot be loaded successfully.

2. **Access Operations**:

   Implement functions to access information stored within individual nodes, such as the question text, options, or correct answer.

Provide interfaces for other parts of the program to access and retrieve data from nodes as needed during gameplay. Ensure efficient access mechanisms to retrieve data quickly and accurately from the array of structures.

3. **Modification Operations**:

   Implement functions to modify the contents of nodes, allowing for dynamic updates to quiz questions during runtime if necessary. Enable functionality to update question text, modify options, or change the correct answer within individual nodes. Implement error handling to handle cases where modifications cannot be applied successfully due to invalid data or memory allocation issues.

By implementing these initialization, access, and modification operations, the quiz game application can effectively manage and manipulate quiz questions stored within the array of structures, facilitating seamless gameplay and interaction with users.

CHAPTER-5

MODULES

5.1 QUESTION MANAGEMENT MODULE

The Question Management Module handles storing, retrieving, and managing quiz questions. It stores questions in an array of structures, ensuring efficient memory allocation. Functions are implemented for retrieving questions and options, allowing both random and sequential access during gameplay. The module also populates the array with questions from hardcoded data or external sources, with error handling for unsuccessful loads. Modification functions enable updates to question text, options, and correct answers, with validation checks to ensure proper formatting and validity. This module ensures effective management of quiz questions for a seamless user experience.

5.2 USER INTERFACE MODULE

The User Interface (UI) Module ensures effective user interaction with the quiz game. It includes clear display of questions and options, user input handling, a countdown timer, immediate feedback on answers, score and progress tracking, user navigation controls, and an end-of-quiz performance summary. This module enhances the user experience by providing a seamless and engaging interface for the quiz game.

5.3 TIMER FUNCTIONALITY MODULE

The Timer Functionality Module manages the timing for each quiz question, ensuring responses within a set time limit.

Key Components:

1. **Initialization**: Set and initialize the time limit (e.g., 60 seconds) for each question.
2. **Countdown Mechanism**: Implement a countdown timer that updates in real-time.

3. **Timeout Handling**: Define actions when the time limit is reached, such as moving to the next question and notifying the user.
4. **Integration**: Sync the timer with question display and response handling, resetting for each new question.
5. **User Feedback**: Provide visual or auditory cues as the time limit approaches.
6. **Error Handling**: Manage potential errors or interruptions to maintain accurate timing.

This module enforces time constraints, enhancing the challenge and ensuring a consistent pace in the quiz.

5.4 SCORING MECHANISM MODULE

The Scoring Mechanism Module manages the calculation, tracking, and display of player scores throughout the quiz game. It initializes the score, calculates it based on correct or incorrect answers, and updates it in real-time on the user interface. At the end of the quiz, it provides the final score along with feedback on the player's performance. Optionally, it can store scores for future reference and allows for score reset when needed. Error handling ensures the reliability of the scoring mechanism. Overall, this module enhances user engagement by providing feedback on performance throughout the game.

5.5 DATA PERSISTENCE MODULE

The data persistence module manages the storage and retrieval of quiz data, ensuring that quiz questions, user responses, and scores are saved and accessible between sessions. It implements file handling techniques, serialization, and error handling to store data in external files and retrieve it when needed. This module ensures data integrity and provides a seamless user experience by preserving user progress and maintaining reliable access to quiz data across multiple sessions.

5.6 FEEDBACK AND RESULT MODULE

The Feedback and Result module generates feedback after each question, calculates the final score, and presents comprehensive results at the end of the quiz. It offers immediate feedback on user responses, calculates the score based on correct answers, and displays a summary of performance. Users can interact with the interface to review answers and retake quizzes. Optionally, it logs data for analysis and offers customization options. This module enriches user engagement and learning experience by providing valuable insights into quiz performance.

CHAPTER 6

CONCLUSION & FUTURE SCOPE

6.1 CONCLUSION

In conclusion, the development of the quiz game application represents a significant step towards providing users with an engaging and educational platform to test their knowledge across various subjects. Through the implementation of key modules such as question management, user interface, timer functionality, scoring mechanism, and feedback/result presentation, the application has successfully offered a comprehensive and interactive quiz experience. The integration of these modules has resulted in a user-friendly interface where users can access a diverse range of questions, answer them within a set time limit, receive immediate feedback, and view their final scores and performance summary. This approach not only encourages active participation but also fosters continuous learning and knowledge retention among users. Looking ahead, there are several promising avenues for future improvement and expansion. Firstly, the question database could be further enriched and diversified to encompass a broader spectrum of topics and difficulty levels, catering to the varied interests and preferences of users. Additionally, the integration of advanced features such as multimedia content, randomized question selection, and adaptive learning algorithms could enhance user engagement and provide a more personalized learning experience. Moreover, exploring opportunities for mobile compatibility would extend the reach of the application, allowing users to access quizzes conveniently on their smartphones or tablets. Social integration features could also be incorporated to facilitate user interaction, encourage friendly competition, and foster a sense of community among users. Furthermore, leveraging data analytics tools to gather insights from user interactions, quiz performance metrics, and feedback data could provide valuable information for refining the application, optimizing user experiences, and tracking learning progress over time.

Accessibility enhancements, including compliance with accessibility standards and support for multiple languages, would ensure that the quiz game application is inclusive and accessible to users of all abilities and backgrounds. In essence, by prioritizing these areas of improvement and future expansion, the quiz game application has the potential to evolve into a versatile, user-centric, and impactful educational tool that empowers users to learn, grow, and succeed in the digital age.

6.2 FUTURE SCOPE

The quiz game application has laid a solid foundation for future enhancements and expansions to further enrich the user experience and educational value. Here are some promising avenues for future development:

1. **Enhanced Question Database**: Continuously expand and diversify the question database to cover a broader range of topics, including niche subjects and specialized knowledge areas. This will ensure that the application remains relevant and engaging for users with diverse interests and expertise levels.

2. **Advanced Features Integration**: Explore the integration of advanced features such as multimedia content, interactive simulations, gamified learning elements, and real-time leaderboards to enhance user engagement and interactivity. These features can make the learning experience more immersive, dynamic, and enjoyable for users.

3. **Personalized Learning Paths**: Implement algorithms to analyze user performance, preferences, and learning objectives to provide personalized learning recommendations and adaptive quiz experiences. By tailoring quizzes to individual user needs, the application can optimize learning outcomes and foster a deeper understanding of the subject matter.

4. **Collaborative Learning Opportunities**: Introduce features that enable collaborative learning experiences,

such as multiplayer quizzes, group challenges, and peer-to-peer knowledge sharing. By facilitating collaboration and social interaction among users, the application can create a supportive learning community and foster teamwork and communication skills.

5. **Integration with Learning Management Systems (LMS)**: Explore integration with existing educational platforms and learning management systems to extend the reach of the application and streamline access for students and educators. Compatibility with LMS platforms will enable seamless integration into educational workflows and curriculum planning.

6. **Data Analytics and Insights**: Implement robust data analytics tools to gather insights into user behavior, quiz performance, content effectiveness, and engagement metrics. By analyzing this data, the application can identify trends, patterns, and areas for improvement, allowing for data-driven decision-making and continuous optimization.

7. **Augmented Reality (AR) and Virtual Reality (VR)**: Explore the integration of AR and VR technologies to create immersive and interactive quiz experiences. By leveraging these technologies, the application can provide realistic simulations, virtual tours, and hands-on learning opportunities, enhancing user engagement and retention.

8. **Global Expansion and Localization**: Expand the reach of the application by offering support for multiple languages and cultural adaptations. By localizing content and adapting to regional preferences and norms, the application can appeal to a broader global audience and promote inclusivity and accessibility.

In summary, the future scope of the quiz game application is vast and exciting, with opportunities to innovate, iterate, and evolve in response to user feedback, technological advancements, and changing educational trends.

By embracing these opportunities and staying abreast of emerging technologies and pedagogical approaches, the application can continue to empower learners, educators, and knowledge seekers worldwide.

APPENDICES

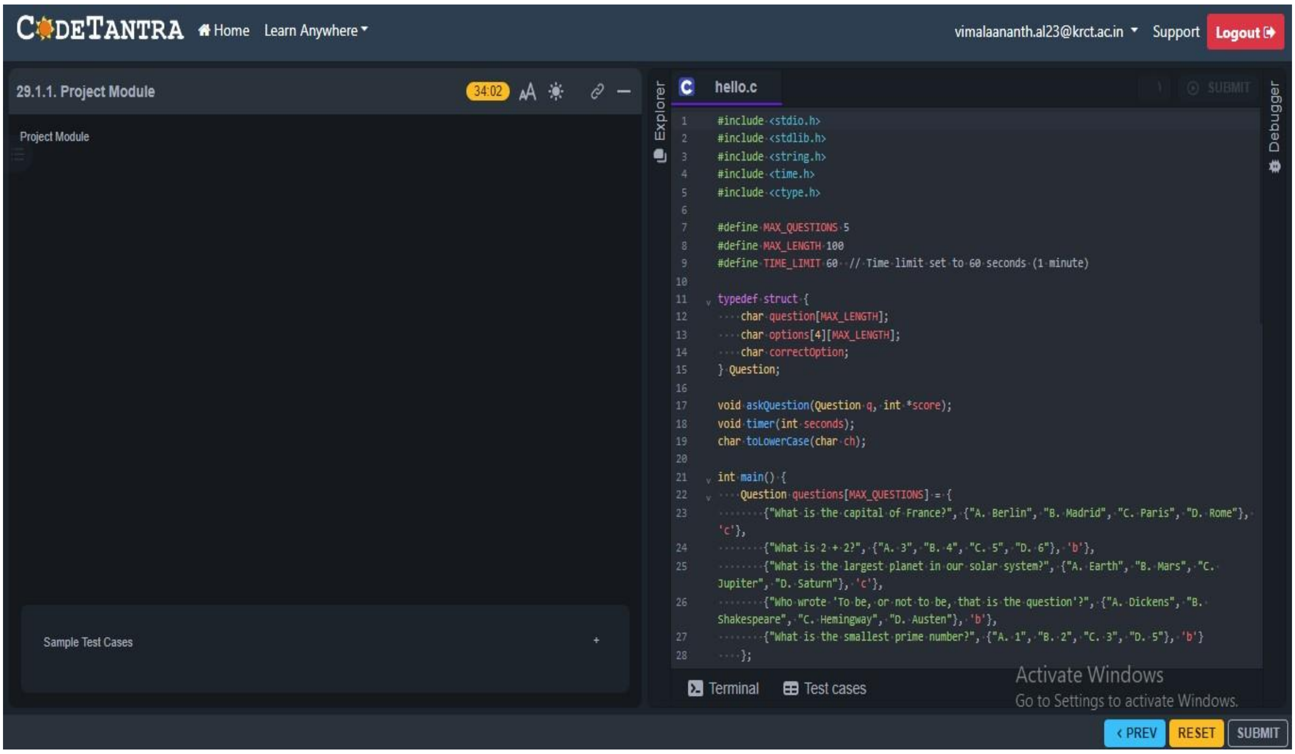
APPENDIX A-SOURCE CODE

```
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <time.h>
#include <ctype.h>

#define MAX_QUESTIONS 5
#define MAX_LENGTH 100
#define TIME_LIMIT 60  // Time limit set to 60 seconds (1 minute)

typedef struct {
    char question[MAX_LENGTH];
    char options[4][MAX_LENGTH];
    char correctOption;
} Question;

void askQuestion(Question q, int *score);
void timer(int seconds);
char toLowerCase(char ch);

int main() {
    Question questions[MAX_QUESTIONS] = {
        {"What is the capital of France?", {"A. Berlin", "B. Madrid", "C. Paris", "D. 
Rome"}, 'c'},
        {"What is 2 + 2?", {"A. 3", "B. 4", "C. 5", "D. 6"}, 'b'},
        {"What is the largest planet in our solar system?", {"A. Earth", "B. Mars", 
"C. Jupiter", "D. Saturn"}, 'c'},
        {"Who wrote 'To be, or not to be, that is the question'?", {"A. Dickens", "B. Shakespeare", "C. Hemingway", "D. Austen"}, 'b'},
        {"What is the smallest prime number?", {"A. 1", "B. 2", "C. 3", "D. 5"}, 'b'}
    };

    int score = 0;
    for(int i = 0; i < MAX_QUESTIONS; i++) {
        askQuestion(questions[i], &score);
    }

    printf("Quiz finished! Your final score is %d/%d.\n", score, MAX_QUESTIONS);
    return 0;
}

void askQuestion(Question q, int *score) {
    char userAnswer;
    time_t start, end;

    printf("%s\n", q.question);
    for(int i = 0; i < 4; i++) {
        printf("%s\n", q.options[i]);
    }
    printf("You have %d seconds to answer: ", TIME_LIMIT);

    time(&start);
    timer(TIME_LIMIT);

    if(scanf(" %c", &userAnswer) == 1) {
        time(&end);
        double elapsed = difftime(end, start);

        if(elapsed > TIME_LIMIT) {
            printf("Time's up! Moving to the next question.\n");
        } else if(toLowerCase(userAnswer) == q.correctOption) {
            printf("Correct!\n");
            (*score)++;
        } else {
            printf("Incorrect! The correct answer was '%c'.\n", q.correctOption);
        }
    }
}

void timer(int seconds) {
    int milliseconds = 1000 * seconds;
    clock_t start_time = clock();
    while(clock() < start_time + milliseconds);
}

char toLowerCase(char ch) {
    if (ch >= 'A' && ch <= 'Z') {
        return ch + ('a' - 'A');
    }
    return ch;
}
```

APPENDIX B - SCREENSHOTS

RESULT AND DISCUSSION

OUTPUT IN CODETANTRA



```c
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    char question[MAX_LENGTH];
    char options[4][MAX_LENGTH];
    char correctOption;
} Question;

void askQuestion(Question q, int *score);
void timer(int seconds);
char toLowerCase(char ch);

int main() {
    Question questions[MAX_QUESTIONS] = {
        {"What is the capital of France?", {"A. Berlin", "B. Madrid", "C. Paris", "D. Rome"}, 'c'},
        {"What is 2 + 2?", {"A. 3", "B. 4", "C. 5", "D. 6"}, 'b'},
        {"What is the largest planet in our solar system?", {"A. Earth", "B. Mars", "C. Jupiter", "D. Saturn"}, 'c'},
        {"Who wrote 'To be, or not to be, that is the question'?", {"A. Dickens", "B. Shakespeare", "C. Hemingway", "D. Austen"}, 'b'},
        {"What is the smallest prime number?", {"A. 1", "B. 2", "C. 3", "D. 5"}, 'b'}
    };
```
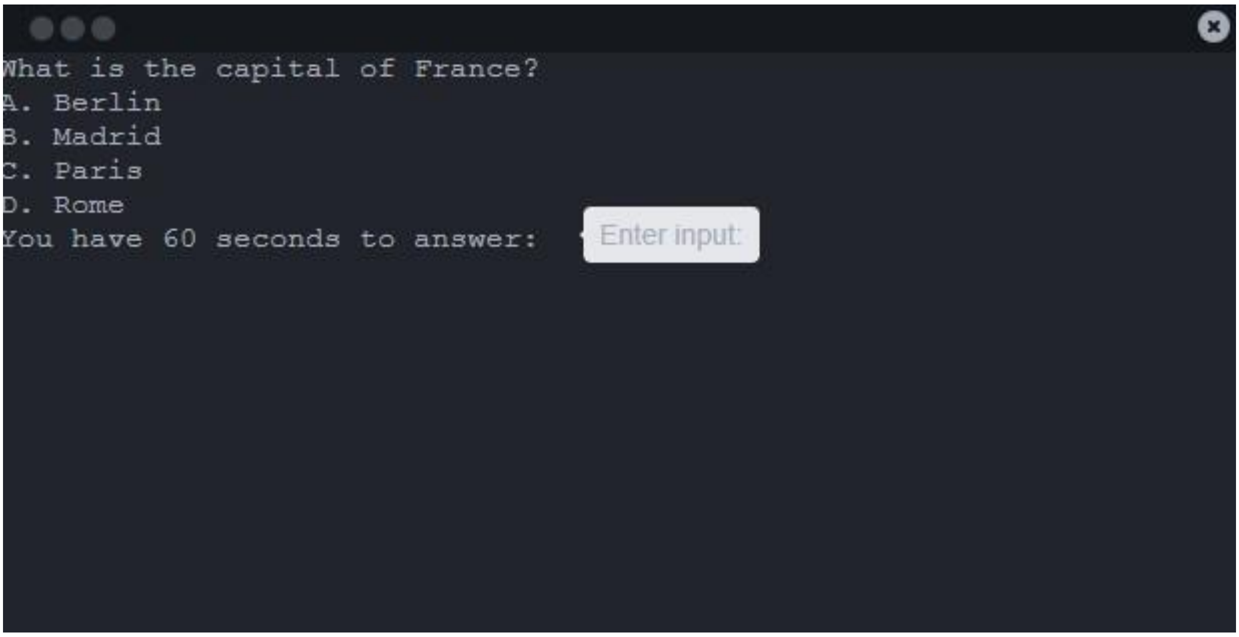
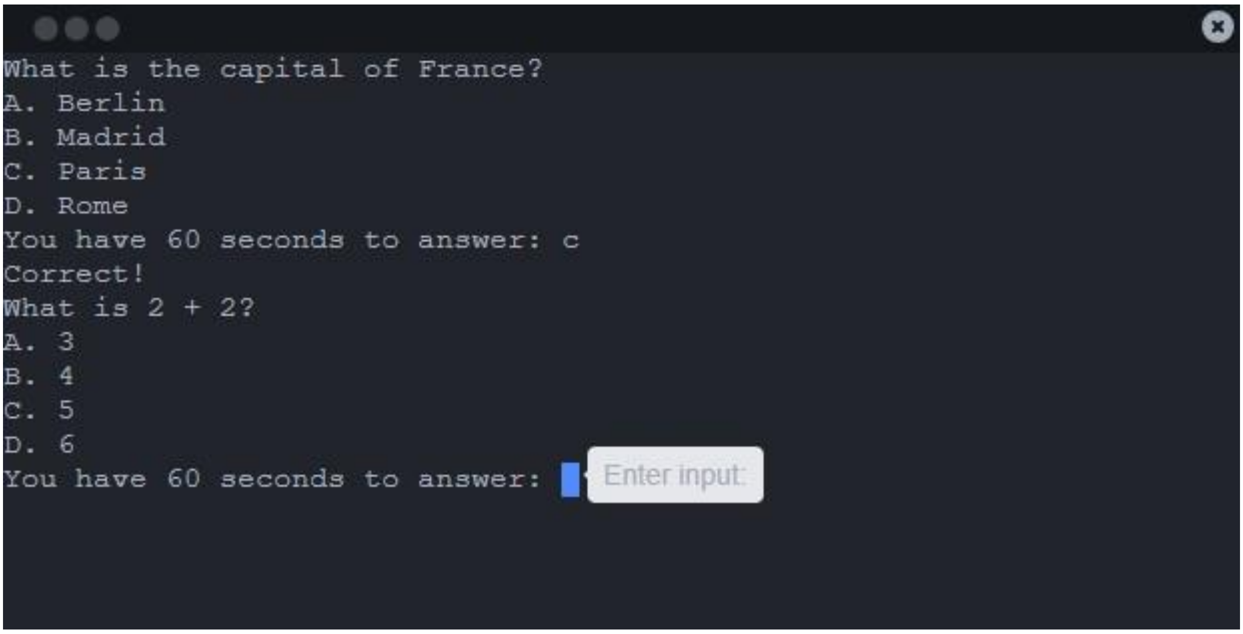

OUTPUT 1



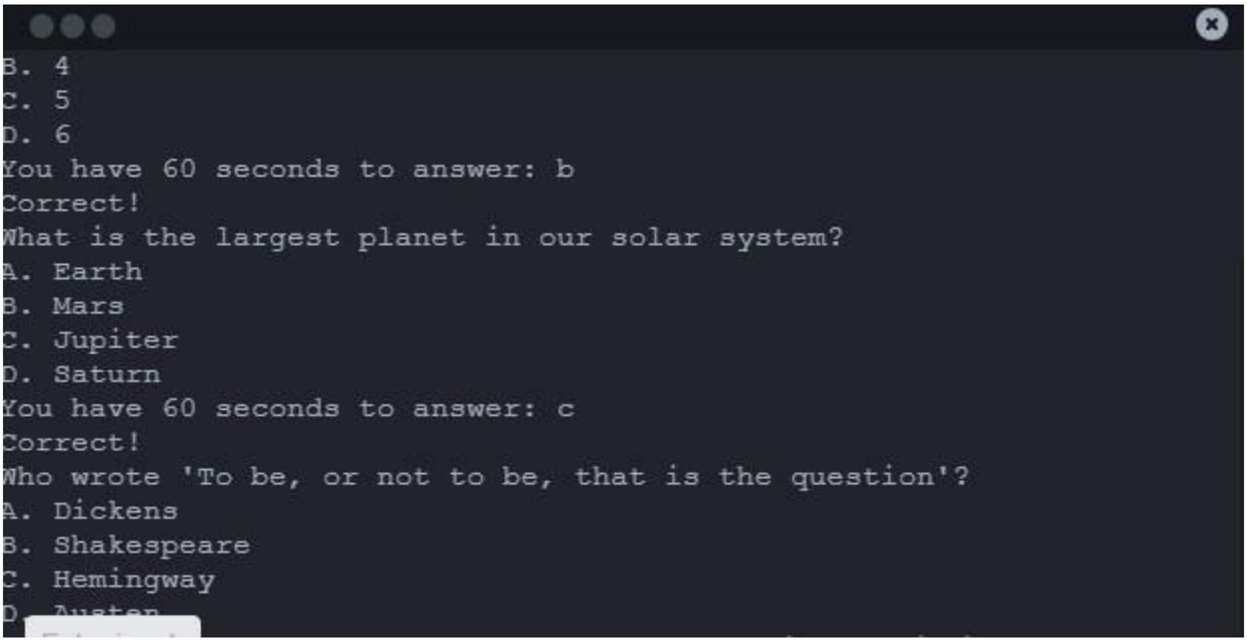
```
What is the capital of France?
A. Berlin
B. Madrid
C. Paris
D. Rome
You have 60 seconds to answer:
```

OUTPUT 2



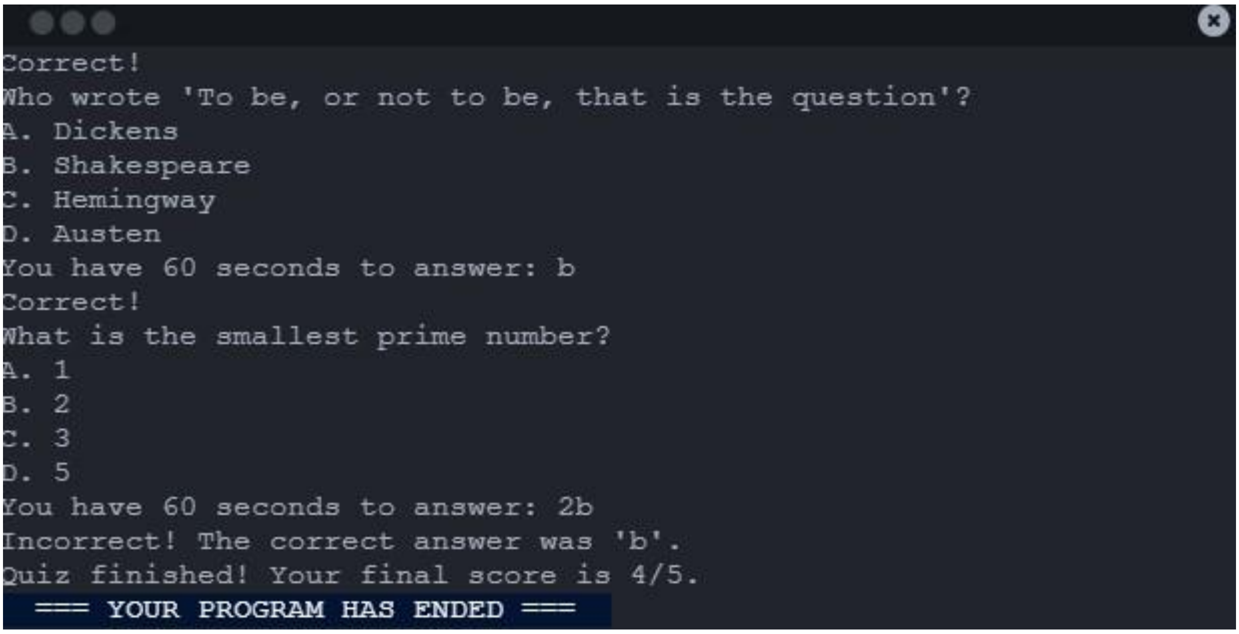
```
What is the capital of France?
A. Berlin
B. Madrid
C. Paris
D. Rome
You have 60 seconds to answer: c
Correct!
What is 2 + 2?
A. 3
B. 4
C. 5
D. 6
You have 60 seconds to answer:
```

OUTPUT 3



```
B. 4
C. 5
D. 6
You have 60 seconds to answer: b
Correct!
What is the largest planet in our solar system?
A. Earth
B. Mars
C. Jupiter
D. Saturn
You have 60 seconds to answer: c
Correct!
Who wrote 'To be, or not to be, that is the question'?
A. Dickens
B. Shakespeare
C. Hemingway
D. Austen
```

OUTPUT 4



```
Correct!
Who wrote 'To be, or not to be, that is the question'?
A. Dickens
B. Shakespeare
C. Hemingway
D. Austen
You have 60 seconds to answer: b
Correct!
What is the smallest prime number?
A. 1
B. 2
C. 3
D. 5
You have 60 seconds to answer: 2b
Incorrect! The correct answer was 'b'.
Quiz finished! Your final score is 4/5.
 === YOUR PROGRAM HAS ENDED ===
```