Dr BR Ambedkar National Institute of Technology
Jalandhar-144011, Punjab, India.

July-Dec, 2021

Department of Computer Science & Engineering
Object Oriented Programming Lab
(CSCP-223)

PROJECT
COMPUTER ASSISTANT INSTRUCTION TOOL

Submitted to:
Dr. Nonita Sharma
(Assistant Professor)
Department of
Computer Science
& Engineering

Submitted By:
Gunika (20103061)
Jaskeerat Singh (20103072)
Manavjeet Singh (20103086)

INTRODUCTION

Computer-assisted instruction (CAI) Computer Aided Instruction (CAI) is a narrower term and most often refers to drill-and-Long Challenge, tutorial, or simulation activities.

It is an instructional strategy whereby the computer is used to provide learning objectives, learning resources, record keeping, progress tracking, and assessment of learner performance. Computer based tools and applications are used to assist the teacher or school administrator in the management of the learner and instructional process.

Typical CAI provides

1. Text or multimedia content
2. Multiple-choice questions
3. Problems
4. Immediate feedback
5. Notes on incorrect responses
6. Summarizes students' performance
7. Exercises for Long Challenge
8. Worksheets and tests.

We have named out computer assistant instruction tool as MATHEZ which creates exciting possibilities for improving the educational experience of all the students in the field of mathematics.

It includes modules with varied difficulty levels and various modes of practicing mathematical problems. It monitors performance level over a period and uses methods to reduce student fatigue.

CONCEPTS OF OOPS USED IN MATHEZ

1. CLASSES AND OBJECTS:
   A class provides the blueprints for objects, so basically an object is created from a class. We declare objects of a class with exactly the same sort of declaration that we declare variables of basic types.

2. INHERITANCE:
   A class can be derived from more than one class, which means it can inherit data and functions from multiple base classes. In C++, the class which inherits the members of another class is called derived class and the class whose members are inherited is called base class.

3. FUNCTIONS AND SPECIAL FUNCTIONS (like rand()):
   By creating functions in C++, you can call it many times. So we don't need to write the same code again and again. It provides modularity and code reusability.

4. FUNCTION OVERLOADING:
   Function Overloading is defined as the process of having two or more function with the same name, but different in parameters is known as function overloading in C++.The advantage of Function overloading is that it increases the readability of the program because you don't need to use different names for the same action.

5. THREADS:
   A multithreaded program contains two or more parts that can run concurrently. Each part of such a program is called a thread, and each thread defines a separate path of execution.

6. STATIC MEMBERS AND MEMBER FUNCTIONS:
   A field which is declared as static is called static field. Unlike instance field which gets memory each time whenever you create object, there is only one copy of static field created in the memory. It is shared to all the objects. It is used to refer the common property of all objects

7. THIS POINTER:
   In C++ programming, this is a keyword that refers to the current instance of the class. There can be 3 main usage of this keyword in C++. It can be used to pass current object as a parameter to another method. It can be used to refer current class instance variable. It can be used to declare indexers.

8. CONSTRUCTOR (Default, Copy and Parameterized)

In C++, constructor is a special method which is invoked automatically at the time of object creation. It is used to initialize the data members of new object generally. The constructor in C++ has the same name as class or structure.

9. CONSTRUCTOR OVERLOADING:

When we overload a constructor more than a purpose it is called constructor overloading. The declaration is the same as the class name but as they are constructors, there is no return type. The criterion to overload a constructor is to differ the number of arguments or the type of arguments.

10. DYNAMIC INITIALIZATION OF OBJECTS:

C++ supports dynamic allocation and deallocation of objects using the new and delete operators. These operators allocate memory for objects from a pool called the free store. The new operator calls the special function operator new , and the delete operator calls the special function operator delete .

11. TEMPLATES:

A C++ template is a powerful feature added to C++. It allows you to define the generic classes and generic functions and thus provides support for generic programming. Generic programming is a technique where generic types are used as parameters in algorithms so that they can work for a variety of data types.

12. MANAGING OUTPUT WITH MANUPILATORS:

Manipulators are operators used in C++ for formatting output. The data is manipulated by the programmer's choice of display. In this C++ tutorial, you will learn what a manipulator is, endl manipulator, setw manipulator, setfill manipulator and setprecision manipulator are all explained along with syntax and examples.

13. FRIEND FUNCTION:

If a function is defined as a friend function in C++, then the protected and private data of a class can be accessed using the function. By using the keyword friend compiler knows the given function is a friend function.

14. FILE MANAGEMENT:

In C++ programming we are using the iostream standard library, it provides cin and cout methods for reading from input and writing to output respectively. To read and write from a file we are using the standard C++ library called fstream.

15. DESTRUCTOR:

A destructor is defined like constructor. It must have same name as class. But it is prefixed with a tilde sign (~).It can be defined only once in a class. Like constructors, it is invoked automatically.

FEATURES OF MATHEZ

1. 3 Types of Modes- Time bound, Quiz type, long challenge:

    - This application introduces 3 modes – time bound, quiz and long Challenge.
    - Quiz mode: The user has to answer a question within a stipulated time else it shall be passes on to the next participant.
    - Long Challenge mode: This mode allows user to Long Challenge as many questions without any time restriction.
    - Time Bound: The user has given amount of time and can Long Challenge as many questions as he/she can.

2. Scoring Criteria:

    - Quiz mode: +3 marks are awarded for right answer within stipulated time. There is no negative marking for wrong answer. For a passed question +1 mark shall be awarded for right answer, within stipulated time.
    - Long Challenge Mode: +5 marks are awarded for right answer in first attempt. For further attempts, maximum marks for that question shall be reduced by one each time. However minimum score will remain zero.
    - Time bound: +5 marks are awarded for right answer in first attempt. For further attempts, maximum marks for that question shall be reduced by one each time. However minimum score will remain zero.

3. Difficulty Levels:

    - The program exposes the user to various difficulty levels (Easy, Medium, Hard, and Insane). The user can enter difficulty level and the program displays combination of only single digit numbers in case of difficulty level 1, two-digit number for difficulty level 2 and so on.

4. Time Management Using Thread:

- The program allows the user to Long Challenge time management skills, especially in the time bound mode, which limits the overall time to answer the questions.
- The quiz mode also tests the time management capacity as time for each question is fixed. The user will lose the capacity to answer once the question is passed.

5. Variable Number of Participants:

- For quiz mode there can be variable number of participants which the user is allowed to enter as per his choice.
- For the rest two modes, number of participants is limited to one.

6. Interactive Problem Solving:

- For each module, storylines have been added in every mode to make the mathematical problems more interactive and engaging.
- It adds creativity to the problems and makes it overall more appealing.

7. Reduces Student Fatigue:

- This program reduces student fatigue by wearing the computer's response in order to hold student's attention. A random generation function selects appropriate response for correct/incorrect answer.
- This change is incorporated to encourage the user in case his answer is wrong and congratulate if the answer is correct.

8. UI Interactive:

- The User Interface is made interactive to inculcate the interest of the user towards mathematical problems.
- Transitions have been added to text in the main menu to make the interface synergistic.

9. Increases Competitiveness:

- The quiz mode increases the competitiveness of the program and reduces the monotonicity of mathematical problems.
- This mode of the program allows the user to be rapid and right at the same time.

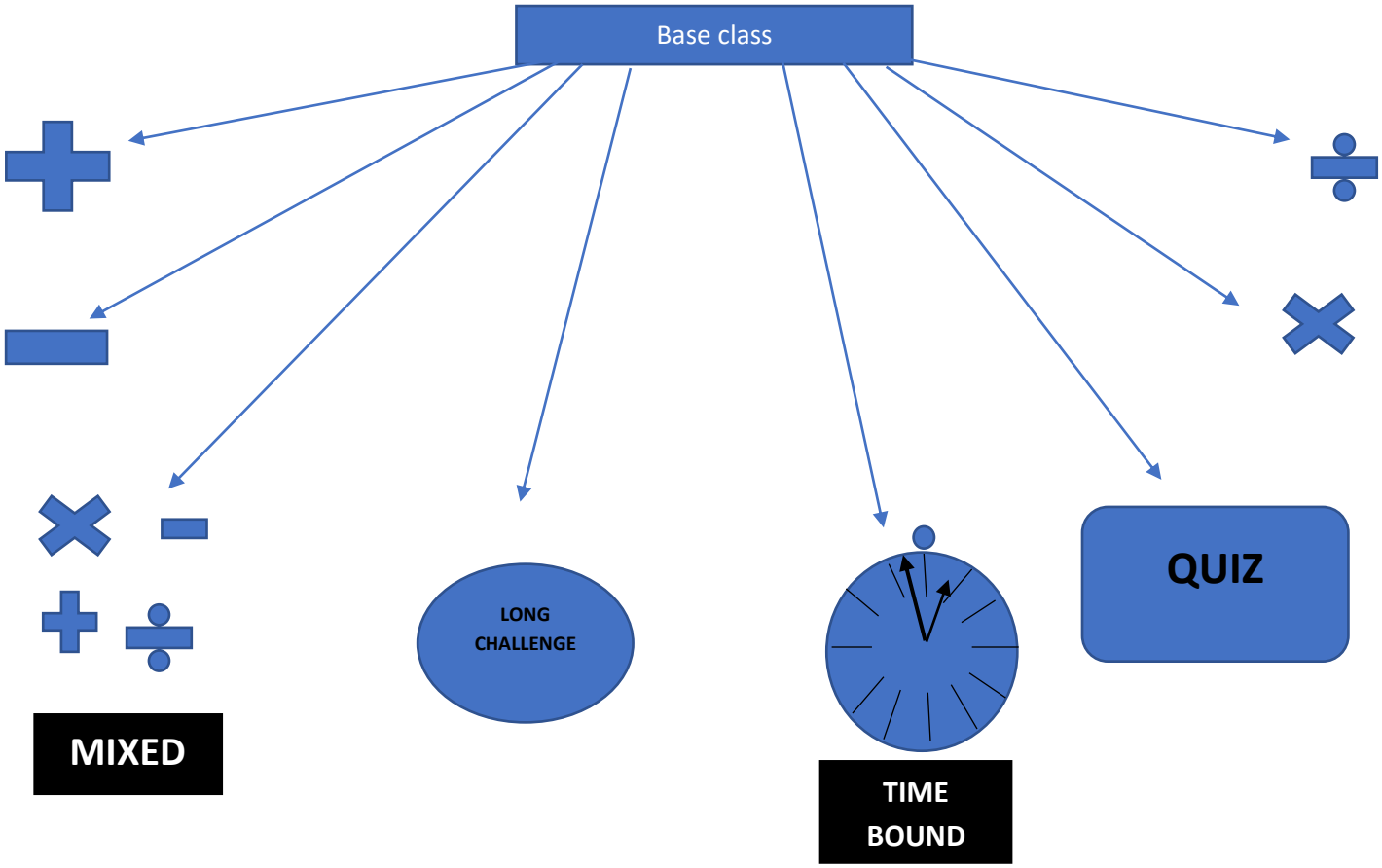
10. List of Top Performers:

- In all the three modes the names of top three performers are announced at the end of the contest.

11. Performance Report for Analysis:

- This program monitors the performance of the user for a period of time.
- Program counts the number of correct/incorrect responses and calculates the percentage accordingly.
- After a certain percentage student can jump to the next level.

CLASS DIAGRAM



CODE FOR THE PROJECT:

https://github.com/Manavdandiwal/OOPs-Project