PING PONG GAME
OOP PROJECT PROPOSAL

GROUP MEMBERS – BCS 2H

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OVERVIEW

Background

Addresses the need for practical implementation of OOP in a real-time interactive environment, allowing users to visualize object behavior and interaction through a classic two-player game.

- **This project focuses on interactive game development using Object-Oriented Programming (OOP) principles. The game is a simple Ping Pong (Pong) simulation that utilizes the raylib graphics library and C++ for implementation.**

Problem Statement

An engaging C++ Ping Pong game that showcases core OOP principles through real-time player and AI paddle interactions using the raylib graphics library.

- **The goal is to design an interactive application that demonstrates the implementation of OOP principles like classes, encapsulation, inheritance, polymorphism, and abstraction. The game will simulate real-time paddle and ball interactions with basic AI for the CPU paddle.**

Objectives

To create a functional and educational game application that reinforces the practical understanding of OOP principles in C++, while incorporating user interaction, simple AI behavior, and graphical rendering using the raylib library.

- **To design and implement a Ping Pong game.**
- **To demonstrate core OOP concepts through game mechanics.**
- **To provide a hands-on application of simple AI behavior and real-time user input handling.**

SCOPE OF THE PROJECT

This project focuses on the development of a 2D Ping Pong game using C++ and the raylib library to demonstrate Object-Oriented Programming concepts. It covers basic game mechanics including paddle and ball movement, collision detection, scoring, and simple AI for the opponent paddle.

The scope is limited to a single-player mode against a CPU and local gameplay on desktop environments. The project is designed for educational purposes, highlighting the practical application of OOP in game development.

Inclusions:

*The features, functionalities, and components that are **included** in the project. It's a way to outline what your project offers or what has been implemented.*

- **Movable player paddle using keyboard**
- **AI-controlled opponent paddle**
- **Real-time 2D graphics using the raylib library**
- **Ball physics and collision detection**
- **Sound effects**
- **Scoring system**
- **Classes (Ball, Paddle, CPU Paddle)**
- **Inheritance and virtual functions**
- **Encapsulation of object properties**

Exclusions:

*The features, functionalities, and components that are ex**cluded** in the project. It's a way to outline what your project doesn't offer or what has not been implemented.*

- **Mobile or web version of the game**
- **Advanced game physics or power-ups**
- **Filling to store player information**
- **Multiplayer over network**

PROJECT DESCRIPTION

The project is a desktop-based Ping Pong game. It demonstrates the use of C++ classes and OOP techniques in game development. Players use arrow keys to control their paddle, and an AI algorithm moves the CPU paddle based on the ball's position.

Technical Requirements

- **Language: C++**
- **Library: raylib**
- **IDE: Microsoft Visual Studio or Visual Studio Code**
- **OS: Windows**

Project Phases

- ***Research*** **– Study basic game loops and OOP concepts.**
- ***Planning*** **– Define class structures and interactions.**
- ***Design*** **– Develop Ball and Paddle classes and integrate AI.**
- ***Implementation*** **– Code the game loop and handle real-time interactions.**
- ***Testing*** **– Debug paddle movement, ball behavior, and collision detection.**

METHODOLOGY

Approach

The group will follow a basic development process, starting with creating a blank screen and game loop. Then, the paddles and ball will be added, along with ball movement and edge collision detection. The player's paddle will be controlled via keyboard, and a simple AI will move the CPU paddle. Paddle ball collision detection and a basic scoring system will be added at the end. Each member will handle different parts to complete the project efficiently.

Team Responsibilities

- ***Mehak:*** Create blank screen, game loop, draw paddles and ball.
- ***Areesha:*** Move ball, detect collision with screen edges, Control player paddle
- ***Maryam:*** CPU paddle AI, paddle-ball collision detection, scoring and sounds.

EXPECTED OUTCOMES

Deliverables

- **A functional Ping Pong game (.exe file or source code)**
- **Project report**

Relevance

This project is primarily based on Object-Oriented Programming (OOP) concepts. It demonstrates the use of classes, encapsulation, inheritance, and polymorphism to design and organize a structured, maintainable codebase. Through this project, students gain practical experience in applying OOP principles in a real-world scenario, enhancing their understanding of software design, code reusability, and modular development.

RESOURCES NEEDED

Software

- **Microsoft Visual Studio / Visual Studio Code**
- **raylib C++ library**

Other Resources

- **C++ tutorials for game development**