TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
PULCHOWK CAMPUS

A PROJECT PROPOSAL ON

Tetris: The Classic Puzzle Game

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1 INTRODUCTION

Tetris, an iconic and enduring puzzle game, has captured the hearts of gamers around the world since its inception in 1984. Created by Russian game designer Alexey Pajitnov, Tetris challenges players with a deceptively simple objective: fitting different-shaped blocks, known as tetrominoes, together to form complete lines. Yet, beneath its straightforward premise lies an addictive and exhilarating experience that has stood the test of time.

Gameplay :

Tetrominoes: The game consists of various tetrominoes, each made up of four connected squares arranged in different shapes. The seven tetrominoes are: I, J, L, O, S, T, and Z.

Falling Blocks: Tetrominoes fall from the top of the playing area one at a time. You have the ability to move and rotate the tetrominoes as they descend.

Movement and Rotation: You can move the falling tetrominoes horizontally (left or right) using the arrow keys or buttons. You can also rotate them clockwise or counterclockwise to fit them into available spaces using the up arrow key or designated rotation buttons.

Clearing Lines: The primary goal is to create complete horizontal lines by filling all the spaces within a row. When a line is entirely filled, it clears from the screen, and you earn points.

Scoring: The more lines you clear at once, the higher the points you earn. Clearing multiple lines simultaneously is known as a "Tetris" and yields the highest points.

Leveling Up: As you accumulate points or clear a certain number of lines, you advance to higher levels. With each level, the tetrominoes fall faster, increasing the game's difficulty.

Game Over: The game ends when the stack of falling tetrominoes reaches the top of the playing area. If you can't clear lines fast enough, the stack will reach the top, and the game will be over.

Controls: The controls for Tetris are usually straightforward:

Left Arrow: Move tetromino left
Right Arrow: Move tetromino right
Down Arrow: Accelerate the fall of the tetromino
Up Arrow: Rotate tetromino clockwise or counterclockwise

2 OBJECTIVES

The objectives of building this game in C++ are listed below:

1. **Use Object-Oriented Programming (OOP):**
    - Create classes for Tetrominoes, game board, and game logic.
    - Organize code for easy maintenance and flexibility.
2. **Explore C++ Features:**
    - Manage game data efficiently using arrays and vectors.
    - Handle resources smartly to optimize performance.
3. **Graphics with SFML:**
    - Use SFML to draw Tetrominoes, game board, and animations.
    - Respond to player input using SFML's event system.
4. **Reusable Code:**
    - Create header files for sharing code across the game.
5. **Implement Game Mechanics:**
    - Make Tetrominoes rotate, move, and detect collisions.
    - Create a scoring system and difficulty levels.Create a scoring system and difficulty levels.Create a scoring system and difficulty levels.
6. **Add Sound Effects and Music:**
    - Integrate audio using SFML for a better gaming experience.
7. **Test and Debug:**
    - Thoroughly test the game to fix any issues.
    - Use logs and debugging tools for troubleshooting.
8. **Team Collaboration:**
    - Communicate well within the team.
    - Use Git for version control and collaboration.

3 PROPOSED SYSTEM

3.1 SYSTEM BLOCK DIAGRAM

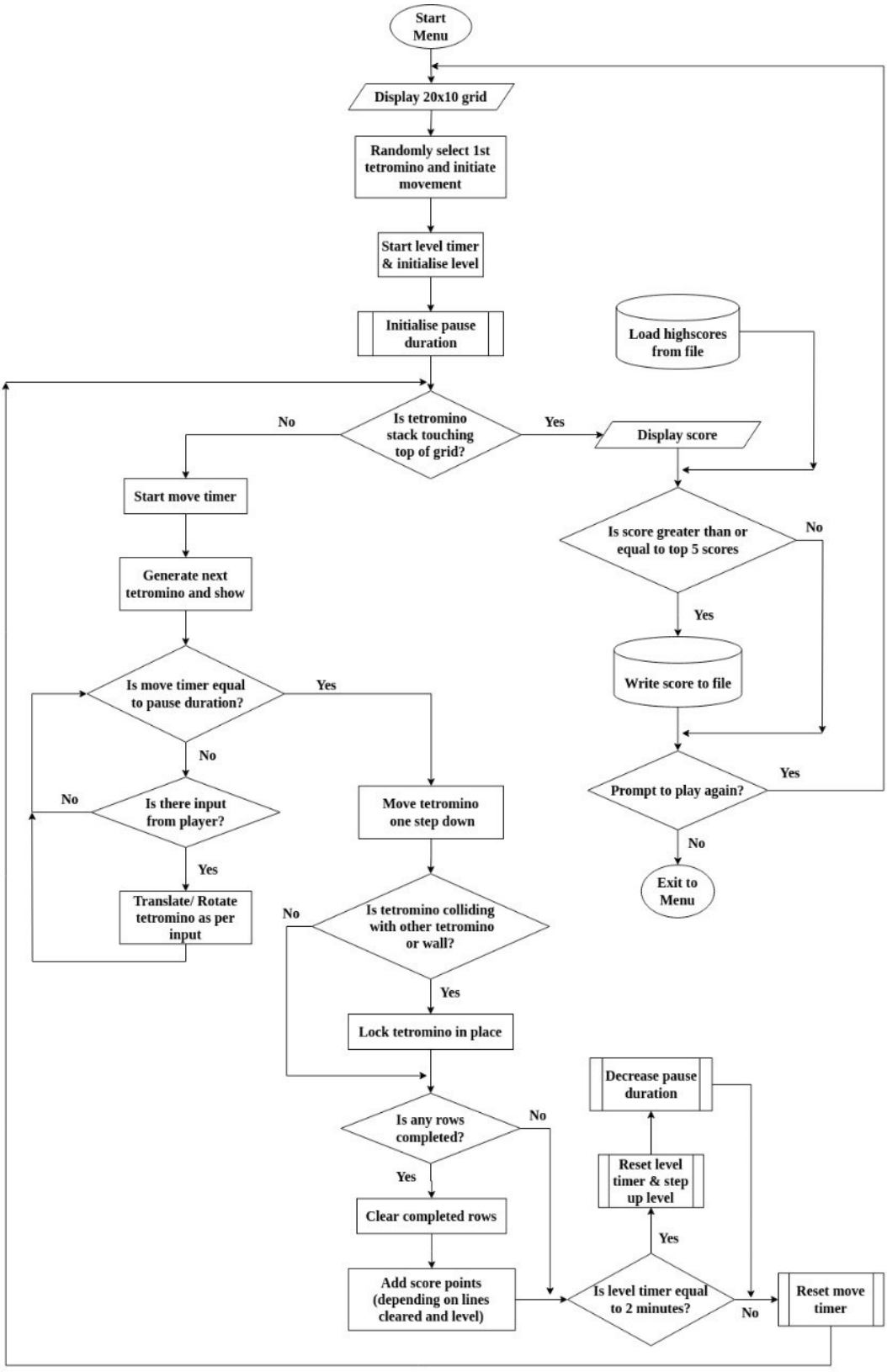

Figure 1: System Bock Diagram

4 METHODOLOGY

This proposed project aims to develop a Tetris game using Object-Oriented Programming principles and the SFML library for graphics. The project will be implemented using the CLion Integrated Development Environment and will utilize CMake for cross-platform build support. Version control and collaborative coding will be facilitated through Git and GitHub.

To ensure a structured and maintainable codebase, we will design the class hierarchy for the game. Different classes will be created to represent game objects such as the game board, tetrominoes, and scoring system. We will employ OOP concepts such as encapsulation, inheritance, and polymorphism to achieve modularity and code reusability. The game logic will be implemented within the classes defined in the previous step. Each class will have private and public member variables and member functions that handle specific aspects of the game, such as moving and rotating tetrominoes, checking for line clears, and updating the score. The SFML library will be utilized for rendering graphics and handling user input.

To facilitate collaboration among team members, we will utilize Git and GitHub for version control. Each team member will have their own branch to work on individual features or bug fixes. Regular commits and pull requests will be used to review and merge code changes. GitHub's issue tracking feature will also be utilized to manage and prioritize tasks. Proper documentation will be maintained to provide an overview of the project structure, class hierarchy, and function specifications. Additionally, a user guide will be created to assist players in understanding the game controls, rules, and scoring system.

This approach will ensure a systematic development process and deliver a high-quality game experience to the users.

5 PROJECT SCOPE

This project is a clone of the classic Tetris game created by Alexy Pajitnov in 1985. It will abide by standard rules and mechanics of the original tetris game with clean and user-friendly interface. It is developed to practice and learn Object Oriented Programming in the game development context.

6 PROJECT SCHEDULE

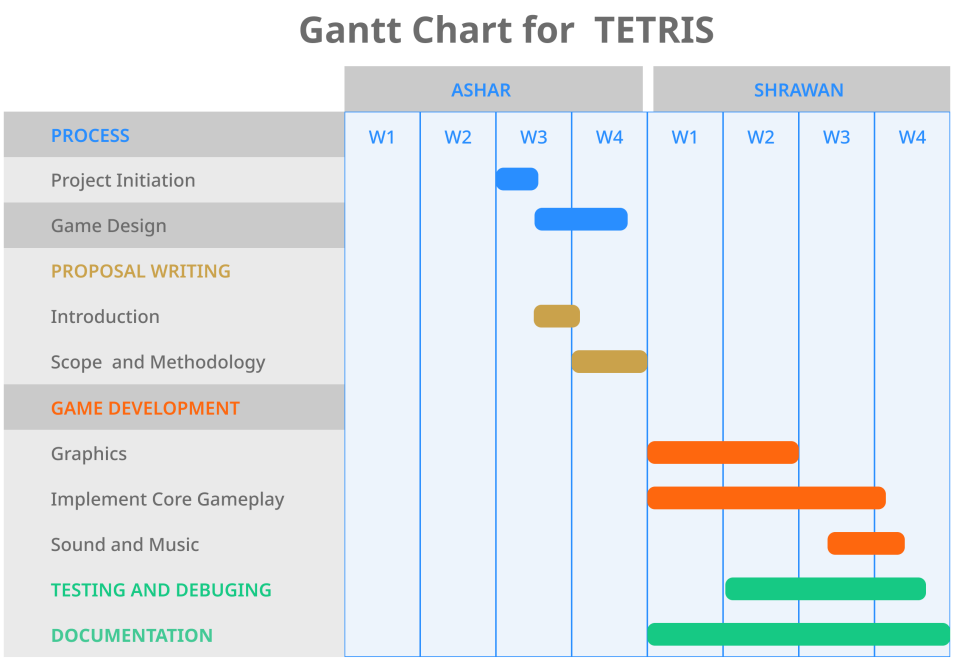

Figure 2: Gantt Chart for OOP Project : TETRIS