AMERICAN INTERNATIONAL UNIVERSITY-BANGLADESH
Faculty of Science and Technology
Department of Computer Science
CSC 4118 Computer Graphics

Final Term Project Evaluation **Semester:** Fall 2024-2025 **CO Assessed:** CO4 and CO5 **Total Marks:**

Project Name: Escape Room				
Student Name: Tahsinul Islam Nishat		**ID: 22-47478-2**	**Section: J**	**Group No: 10**
Obtained Marks:	**Part-A**	**Part-B**	**Part-C**	**Total**
	CO4: **CO5:**			

Evaluations: **Part: A – OBE**

CO4: Creates interactive computer graphics programs using OpenGL.			
Requirement fulfilment (5 marks)			**Total Marks**
Validation (5 marks)			
Verification (5 marks)			

CO5 [PO-i-1]: Perform as an effective individual in multi-disciplinary settings in solving computer science and engineering problems.			
Critical Thinking (5 marks)			**Total Marks**
Focus on the Task [Self-directed] (5 marks)			
Reflection (5 marks)			
Quality of the Work (5 marks)			

Part:B – Implementation

Design (10 marks)	**Unsatisfactory (2.5)**	**Satisfactory (5)**	**Good (7.5)**	**Very Good (10)**	**Obtained Marks**

Animation (10 marks)	**Total Number of Animations Implemented**	**Obtained Marks**

Mouse and Keyboard Interaction (10 marks)	**No. of Mouse Interaction**	**No. of Keyboard Interaction**	**Obtained Marks**

Scene Transition (5 marks)	**Change of events in individual scenario**	**Obtained Marks**
	○ **Yes** ○ **No**	

Part:C – Viva and Report

Viva (20 marks)	**Obtained Marks**

Report (10 marks)	**Obtained Marks**

AMERICAN INTERNATIONAL UNIVERSITY-BANGLADESH
Faculty of Science and Technology
Department of Computer Science
CSC 4118 Computer Graphics

Final Term Project Evaluation **Semester:** Fall 2024-2025 **CO Assessed:** CO4 and CO5 **Total Marks:**

Project Name: Escape Room				
Student Name: SM Ashikullha Mhamud		**ID: 22-47477-2**	**Section: J**	**Group No: 10**
Obtained Marks:	**Part-A**	**Part-B**	**Part-C**	**Total**
	CO4: **CO5:**			

Evaluations: Part: A – OBE

CO4: Creates interactive computer graphics programs using OpenGL.			
Requirement fulfilment (5 marks)			**Total Marks**
Validation (5 marks)			
Verification (5 marks)			

CO5 [PO-i-1]: Perform as an effective individual in multi-disciplinary settings in solving computer science and engineering problems.			
Critical Thinking (5 marks)			**Total Marks**
Focus on the Task [Self-directed] (5 marks)			
Reflection (5 marks)			
Quality of the Work (5 marks)			

Part:B – Implementation

Design (10 marks)	**Unsatisfactory (2.5)**	**Satisfactory (5)**	**Good (7.5)**	**Very Good (10)**	**Obtained Marks**

Animation (10 marks)	**Total Number of Animations Implemented**	**Obtained Marks**

Mouse and Keyboard Interaction (10 marks)	No. of Mouse Interaction	No. of Keyboard Interaction	Obtained Marks

Scene Transition (5 marks)	Change of events in individual scenario	Obtained Marks
	○ Yes ○ No	

Part:C – Viva and Report

Viva (20 marks)	Obtained Marks

Report (10 marks)	Obtained Marks

Computer Graphics Project Final Report – “Escape Room”

1. Introduction

The project "Escape Plan" is a 2D maze-based game developed using C++ and OpenGL. Inspired by the classic Pacman, this game introduces enhancements while maintaining a nostalgic gameplay experience. Players navigate through a maze, collecting items and avoiding obstacles to progress through multiple levels. The project provides an opportunity to explore graphics programming, collision detection, and interactive gameplay development.

2. Problem Statement/Literature Review/Background

Classic arcade games like Pacman have long been used as a reference point for learning game development. These games offer a balance of simplicity and challenge, making them ideal for studying interactive graphics and game mechanics.

The "Escape Plan" project builds upon these concepts, focusing on gameplay mechanics while leveraging OpenGL for rendering. By implementing features like efficient collision detection and object animation, this project aims to create an engaging gaming experience.

3. Objective of the Project

The primary objectives of this project include:

- Developing a 2D maze game with engaging mechanics.
- Implementing collision detection for player movement and interactions.
- Designing multiple levels with increasing difficulty.
- Enhancing user experience through animations.

4. Methodology/System Implementation Method

Development Environment & Tools:

- **Programming Language:** C++
- **Graphics Library:** OpenGL
- **Development Tools:** Code::Blocks IDE, MinGW, OpenGL
- **Operating System:** Windows 11
- **Additional Libraries:** FreeGLUT for window management and input handling

Implementation Techniques:

- **Rendering & Animation:** OpenGL functions are used to draw and animate 2D objects. Ex:

```
void move() {
      float newX = x + (movingRight ? speed : -speed);
      if (canMove(newX)) {
          x = newX;
      } else {
          movingRight = !movingRight;
      }
  }
```

```

    void draw() {
        glPushMatrix();
        glTranslatef(x, y+center, 0.0f);
        glScalef(0.8f, 0.8f, 1.0f);
        ... ... ...
}
```

- **Collision Detection:** Algorithmic implementation for handling player and enemy interactions with maze walls and collectibles. Ex:

```
bool checkCollision(float objX, float objY, float size = center) {
    return (player.x < objX + size && player.x + CELL_SIZE > objX &&
            player.y < objY + size && player.y + CELL_SIZE > objY);
}
```

- **Input Handling:** GLUT captures keyboard inputs for controlling player movements. Ex:

```
void keyboard(int key, int, int) {
    switch (key) {
        case GLUT_KEY_UP: player.move(0, CELL_SIZE); break;
        case GLUT_KEY_DOWN: player.move(0, -CELL_SIZE); break;
        case GLUT_KEY_LEFT: player.move(-CELL_SIZE, 0); break;
        case GLUT_KEY_RIGHT: player.move(CELL_SIZE, 0); break;
    }
    glutPostRedisplay();
}
```

- **Game Logic:** Score tracking and level progression are implemented. Ex:

```
void displayScore() {
    glColor3f(0.0f, 0.0f, 0.0f);
    glRasterPos2f(10, ROWS * CELL_SIZE - 40);
    string scoreText = "Score: " + to_string(score);
    for (char c : scoreText) {
        glutBitmapCharacter(GLUT_BITMAP_HELVETICA_18, c);
    }
}
```

5. Significance of the Project

- **Educational Value:** Enhances knowledge in computer graphics and game development.
- **Practical Application:** Demonstrates real-time rendering and collision detection.
- **User Engagement:** Provides an interactive and challenging gaming experience.
- **Future Enhancements:** Potential for multiplayer functionality, more levels and improved visual effects.

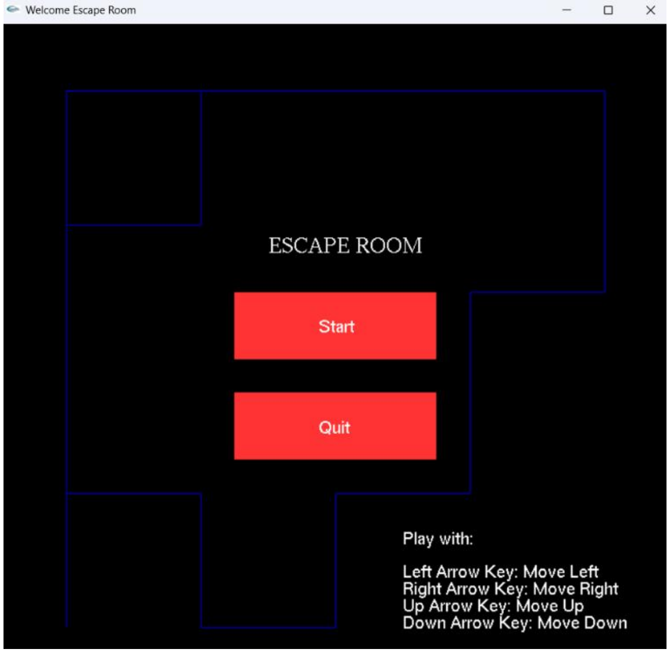
6. Conclusion

"Escape Plan" successfully integrates fundamental game development principles with some basic enhancements. The project demonstrates key concepts in graphics programming and collision detection. While the current scope covers essential gameplay mechanics, future improvements can expand its complexity and user engagement.

7. Referencing

https://github.com/ping543f/Computer-Graphics--OpenGL-GLUT
https://www.geeksforgeeks.org/getting-started-with-opengl/

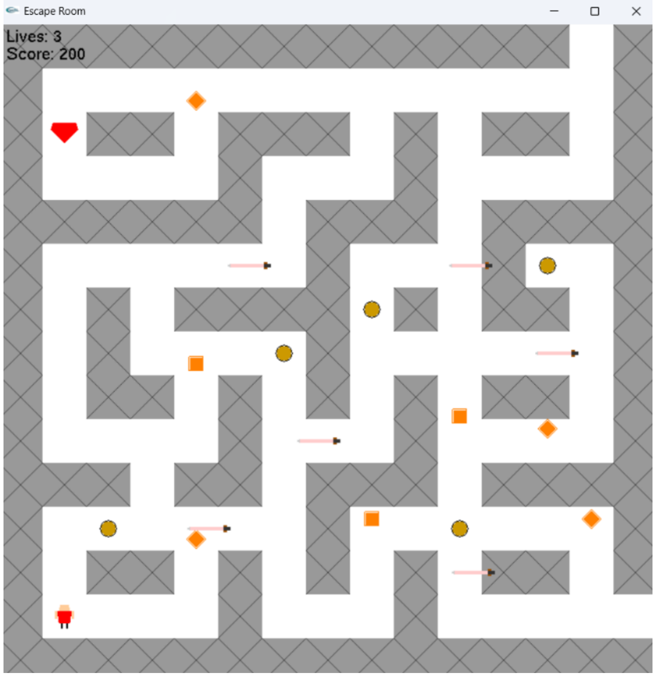
8. Screenshots of the System



Play with:

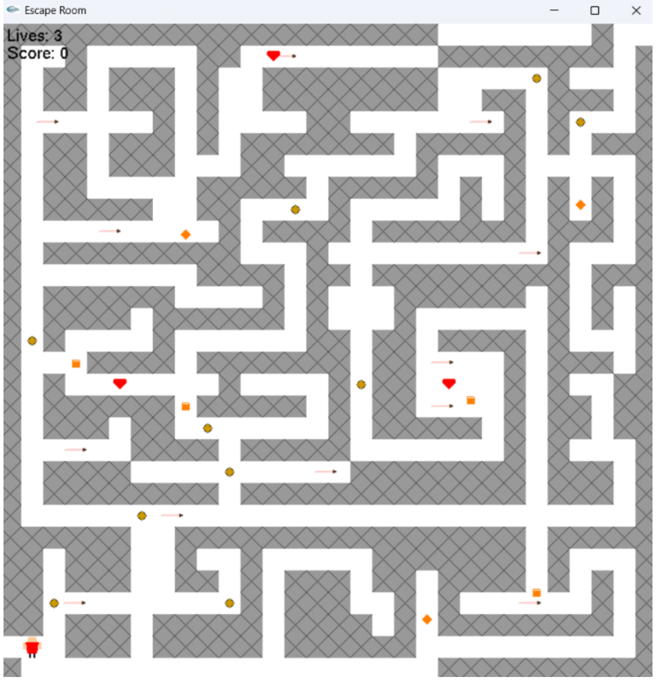
Left Arrow Key: Move Left
Right Arrow Key: Move Right
Up Arrow Key: Move Up
Down Arrow Key: Move Down

Screenshot 1 : The Home Screen Of the application that supports mouse interaction.



Lives: 3
Score: 200

Screenshot 2 : First Level of the game with a moderate maze map.



Lives: 3
Score: 0

Screenshot 3: Second Level of the game with more difficult and complex maze map.