



1. Introduction

In this project, you will create an interactive Fish Eat Fish game using Java, where the player controls a fish and attempts to grow by eating smaller fish while avoiding larger ones. As the player's fish grows, they unlock new player fish characters and advance through four levels. The game includes various elements, such as a scoring system and level progression. Additional features like a leaderboard, sound effects, high score display, and password hashing for secure authentication can be implemented for extra credit.

2. Problem Statement

Design and develop a Fish Eat Fish game that incorporates fundamental gameplay mechanics and challenges. The player's goal is to eat smaller fish to increase in size while avoiding larger fish that could end the game. Players can earn points, unlock larger fish characters at each level, and aim for the highest score possible.

The game should be developed in Java with a graphical interface that allows for seamless interaction. A user authentication system (sign-up, login, and logout) will track player data and progress.

3. Basic Requirements (8 marks)

Your project should include the following key elements:

A. Authentication (1 mark)

- Sign-Up
 - Create a form where new players enter their **username**, **name**, **password**, and **confirm password** to register.
 - Ensure that usernames are unique and passwords match during sign-up.
- Login
 - Implement a login screen where returning players can enter their username and password.
 - Authenticate the player and load their profile and saved progress.
- Logout
 - Allow players to log out from the game and save their progress.

B. Graphical User Interface (GUI) (1 mark)

- Implement a user-friendly and interactive GUI where the player can control their fish, view their score, and access menus for login, sign-up, and more.
- Include visual indicators for level progression, and score display.
- To create your GUI, consider using libraries like Java Swing, Java AWT, or JavaFX. These libraries offer tools for building windows, buttons, and other interface elements. JavaFX is especially useful for building modern and visually appealing GUIs.

- Refresh Rate & Smooth Animations: For smooth gameplay, set a consistent refresh rate. Implement double buffering to reduce flickering and improve performance, ensuring that animations and movements appear fluid.
- Sample Output:
 - <https://youtu.be/zxNGuZG32mU?si=gR91ZVdo8e5qTuOe>
 - <https://youtu.be/xLgqRPzEY2M?si=xcryVxwUTC0BrmGe>

C. Enemy Fish (1 mark)

- Add four sizes of enemy fish that swim at varying speeds, with each size presenting a different challenge:
 - Level 1: Small Fish - Slow and easy to catch.
 - Level 2: Medium Fish - Moderate speed and a bit more challenging.
 - Level 3: Large Fish - Faster and can pose a significant challenge.
 - Level 4: Giant Fish - Rare, fast, and dangerous.
- Implement a feature where, at the midpoint of each level, the next level's enemy fish will appear to increase the challenge. For example, halfway through Level 1, Medium Fish can start appearing.
- Use inheritance to define shared fish characteristics and specific behaviours, keeping your code organized and adaptable

D. Player Fish (1 mark)

- Add a player fish which is distinct from enemy fish.
- The player's fish will grow with each fish eaten but will not change species.
- Size increases should be visible and should indicate growth as the player levels up.

E. Character Movement (1 mark)

- Enable the player to control the fish using keyboard input (e.g., arrow keys or WASD) or mouse, with smooth and responsive movement.

F. Collision Detection (1 mark)

- Implement accurate collision detection to ensure fairness:
 - If the player collides with a larger fish, they lose the game.
 - If the player collides with a fish of equal or smaller size, the fish is "eaten," and the player earns points.

G. Scoring System (1 mark)

- Track points based on the size and number of fish eaten.
- As players accumulate points, they unlock new levels, which also unlock larger player fish characters:
 - Level 1: Unlocks a small fish character.
 - Level 2: Unlocks a medium fish character.
 - Level 3: Unlocks a large fish character.
 - Level 4: Unlocks a giant fish character.
- Display the current score and level on the screen during gameplay for players to track their performance.
- Display the score and level on the screen after their gameplay.

- To save and load player scores, use file I/O methods like CSV or text files. For instance, you could store each game session's score and level in a CSV or text file, allowing players to track their progress over time.

H. Game History (1 mark)

- Maintain a record of previous games played, including details such as scores, levels reached, number of fish eaten, number of gameplays.
- Allow players to view their game history through the menu, giving them insight into their performance and improvement over time.

4. Additional Features (Max 4 marks)

Enhance your game by implementing one or more of the following features:

A. Play/Pause Feature (1 mark)

- Allow players to pause and resume the game without losing progress.

B. Sound Effects & Background Music (BGM) (1 mark)

- Add background music and sound effects for eating, levelling up, and collisions.

C. Character Selection (1 mark)

- Provide a menu option to choose from various fish characters with different visual appearances.

D. High Score Display (1 mark)

- After each game, show the player's highest score on a separate screen or overlay.
- Allow players to compare their highest score with previous records.
- Display a congratulatory message when a new high score is achieved.
- Ensure the high score is also visible during gameplay for ongoing motivation.

E. Leaderboard (1 mark)

- Display a leaderboard showing the top scores and ranks of all players.

F. Password Hashing (1 mark)

- For enhanced security, implement password hashing when storing player passwords in the database.
- Ensure that during login, hashed passwords are compared to authenticate users securely.

5. Contact Information

If you have questions or require further clarification, you can contact **Lee Shin Yen** via WhatsApp (+6010-521 4323).