Letter Guessing Game, Marquee Project, and Snake Game Report

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Subject: Engineering Project

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Project Overview

Letter Guessing Game Overview

- **Main Learning Objective:** The Letter Guessing Game aimed to enhance skills in user interaction, randomization, and control flow. The project focused on creating a simple, engaging console game that tests players' letter-guessing abilities.
- **Functionality:** In this game, a random letter is selected from the alphabet, and the player must guess the letter within a limited number of attempts. Feedback is provided for each guess, indicating whether the guess is too high, too low, or correct.

Marquee Display Animation Project Overview

- **Main Learning Objective:** The Marquee project aimed to develop skills in animation and string manipulation. It provided an opportunity to learn how to create scrolling text effects in a console application, enhancing knowledge about managing display output in a time-sensitive manner.
- **Functionality:** The Marquee project enables scrolling text to be displayed across the console window. Users can input the text they wish to display, and the marquee effect shifts the text horizontally, allowing for smooth animations. The project showcases manipulation of console output and control of text speed.

Snake Game Overview

- **Main Learning Objective:** The primary learning objective of the Snake Game project was to understand the fundamentals of game development, including game logic, user interaction, and state management. The project provided insights into handling real-time input and creating a visually appealing, interactive console-based game.

- **Functionality:** The Snake Game features a snake that moves around the board, collecting fruit to grow longer while avoiding collisions with walls and itself. The game maintains a score that increases with each fruit collected, providing an engaging user experience.

Highlight Design Features

Letter Guessing Game Features

1. **Random Letter Selection:** The game randomly selects a letter from the alphabet for the player to guess.

2. **User Input Handling:** Players can input their guesses, with feedback provided for each attempt.

3. **Attempt Limit:** Players are allowed a limited number of attempts to guess the letter, adding a layer of challenge to the game.

4. **Feedback Mechanism:** The game gives hints after each guess, indicating if the guessed letter is higher or lower than the target letter, and congratulates the player upon a correct guess.

Marquee Display Animation Project Features

1. **Animation Logic:** Achieved the marquee effect by shifting characters in the console window, printing each character in a loop and continuously updating the output.

2. **User Input Handling:** Captured user input to allow any text to be scrolled across the console.

3. **Timing Mechanism:** Adjusted the speed of the scrolling text using a timer, enabling user control over text movement speed.

4. **Display Logic:** Cleared the console and printed the text in a new position during each loop iteration to ensure smooth animation.

Snake Game Features

1. **Game Logic:** The Snake Game is structured around a main game loop that continuously updates the game state, checks for user input, and renders the game board until a game-over condition is met.

2. **Input Handling:** Utilized _kbhit() and _getch() from the conio.h library for non-blocking keyboard input, ensuring responsiveness while waiting for user commands.

3. **Game Loop Logic:** The loop updates the snake's position, checks for collisions, and manages the display of the game board. If the snake collides with a wall or itself, the game ends. Includes a sleep function to control the speed of the snake's movement.

4. **Game Print Logic:** The board is cleared using system("cls") before redrawing the updated game state to ensure clarity.

5. **Food Logic:** Food (represented by an asterisk '*') is generated randomly on the board, ensuring it does not spawn on the snake's body or outside the board's boundaries.

Above and Beyond

New Features Added:

- **Letter Guessing Game:**
  - Enhanced user interface with clear prompts and instructions.
  - Option for the player to choose difficulty levels that affect the number of attempts allowed.

- **Marquee Display Animation Project:**
  - Dynamic text color changes.
  - An option to reverse the scrolling direction.
  - Interactive adjustment of scrolling speed.

- **Snake Game:**
  - High score tracker to maintain the best performance across multiple sessions.
  - A pause feature allowing users to temporarily halt the game.
  - Specific keys assigned to start or restart the game.

Major Challenges

1. **Challenges in Letter Guessing Game:**
   - **Input Validation:** Ensuring that the user inputs valid characters and handling invalid input gracefully required careful implementation.
   - **Game State Management:** Keeping track of the number of attempts and managing the game flow posed challenges, particularly in implementing win/loss conditions.
2. **Challenges in Marquee Project:**
   - **Smooth Animations:** Achieving smooth scrolling required precise timing and control of output to avoid flickering.

- **User Controls:** Integrating user controls to start and stop the marquee added complexity, requiring careful handling of input states and timing.

3. **Challenges in Snake Game:**
   - **Logic Errors:** Identifying and fixing issues related to snake movement and collision detection was challenging, requiring extensive testing and debugging.
   - **Dynamic Memory Management:** Managing the snake's body as its length increased led to difficulties in effective memory usage without causing leaks.

Problem-Solving Strategies:

Utilized debugging tools and print statements to trace logic flows and identify errors. Collaborating as a group allowed us to brainstorm solutions to the challenges faced during development.

GitHub

- **Importance of GitHub:** GitHub served as an essential tool for version control and collaboration throughout the project. It enabled effective management of code changes, progress tracking, and ensured all team members were aligned with the latest version of the projects.

- **How it was Used:** We adopted a branching model where features were developed in separate branches before merging into the main branch. This approach minimized conflicts and allowed for organized collaboration. Pull requests facilitated code reviews, enhancing code quality.

- **Link to Repository:** https://github.com/pn9623/CSE_Project.git

Conclusion

- **Summary of Learning:** Through the Letter Guessing Game, Marquee Display Animation, and Snake Game projects, we gained valuable experience in game development and animation techniques. We learned to manage user inputs effectively, implement game logic, and create engaging user interfaces.

- **Future Improvements:** Future iterations of the Letter Guessing Game could benefit from enhanced user feedback and different categories of words to guess. The Marquee project could be improved by enhancing text formatting options and adding sound effects for interaction. For the Snake Game, additional game modes, power-ups, or multiplayer options could be incorporated.