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**DATA STRUCTURE AND ALGORITHM**

**PROJECT**

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PROJECT PROPOSAL

**Project Title:**

**"DSA Snake Challenge: Reinforcing DSA Concepts through a Linked List-Based Snake Game"**

**Software Requirements Specification (SRS)**

1. **Introduction:**

The "DSA Snake Challenge" project aims to create an engaging Snake Game implementation that serves as an educational tool for reinforcing Data Structures and Algorithms (DSA) concepts, particularly focusing on **linked list** operations within the gameplay.

1. **Purpose:**

The purpose of the "DSA Snake Challenge" is to:

Offer an interactive and entertaining platform for learners to practice and understand linked list concepts through gameplay.

Engage users in maneuvering a snake, which emulates a linked list structure, reinforcing DSA principles.

Provide a visual representation of linked list manipulation within the familiar Snake Game environment.

1. **Scope**

**The project will involve:**

Implementation of the Snake Game using Java Swing, incorporating a linked list to represent the snake's body segments.

User-friendly controls allowing players to navigate the snake while demonstrating linked list operations.

Highlighting the significance of linked list manipulation through the snake's movement and growth mechanics.

1. **Functional Requirement;**
   1. **Game Mechanics:**

**Snake Movement:**

The snake's body segments are maintained using a linked list, emulating linked list operations (e.g., insertion, removal, traversal).

Each snake segment follows the position of the preceding segment, resembling linked list node connections.

**Apple Generation:**

Random generation of apples (food) on the game board.

Snake grows in length upon consuming an apple, mimicking linked list node addition.

* 1. **Gameplay Features:**

**Collision Detection:**

Detection of collisions between the snake's head and its body or game board boundaries.

Game termination upon collisions, ending the gameplay.

Score Tracking:

Incrementation of score upon consuming apples.

Display and update of the score during gameplay.

* 1. **User InterfaceGame Display:**

Visually appealing game board displaying the snake, apples, and game boundaries.

Visual representation of linked list structures via the snake's body segments.

**User Controls:**

Arrow keys for controlling the snake's direction.

Display of game instructions and real-time scoring information.

1. **Non-Functional Requirements:**

**Usability:**

Intuitive controls and game mechanics suitable for users with varying levels of DSA knowledge.

**Performance:**

Smooth and responsive gameplay without latency or performance issues.

**Compatibility:**

Compatibility with multiple operating systems (Windows, macOS, Linux).

1. **Constraints:**

The project will be implemented in Java programming language utilizing Java Swing for the user interface.

Emphasis on simplicity and clarity to facilitate understanding of linked list concepts in DSA.

1. **Conclusion:**

The "DSA Snake Challenge" project endeavors to merge entertainment with education, offering a platform to reinforce linked list concepts through a familiar and enjoyable Snake Game experience. By visualizing linked list manipulation within gameplay, the project aims to aid learners in comprehending and applying DSA principles effectively.

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