PROJECT PROPOSAL

Course: Data Structures & Algorithm

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BECE-3A

Project Proposal: Console-Based Shape Generator

- ## Introduction:

The aim of this project is to develop a console-based shape generator program using various data structures concepts. The program will allow users to create and visualize a variety of shapes, including snowflakes, polygons up to 6, triangles (different types), Quadrilaterals and more. This project will provide an interactive and educational experience for users to understand and implement fundamental data structures while exploring geometric shapes.

- ## Objectives:

a) Implement a console-based application that allows users to dynamically create and manipulate geometric shapes.

b) Utilize data structures such as arrays, linked lists, queues, and stacks to represent and store shape data efficiently.

c) Enable users to input parameters for different shapes, customize their properties, and visualize the output on the console.

d) Implement algorithms for drawing various shapes, such as snowflakes, polygons, and triangles, based on user specifications.

- ## Features:

a) **Shape Creation:** Users can create shapes by specifying parameters such as size, dimensions, and angles.

b) **Interactive Console Interface:** Implement an intuitive console interface for users to interact with the program, providing a menu-driven system for shape selection and customization.

c) **Shape Storage:** Utilize appropriate data structures to store information about each shape, allowing for efficient retrieval and modification.

d) **Dynamic Visualization:** Display the generated shapes dynamically in the console, updating in real-time as users modify parameters.

- ## Implementation:

a) **Language:** C++ will be the primary programming language for this project, given its efficiency and suitability for console-based applications.

b) **Data Structures:** Utilize arrays, linked lists, queues, and stacks to manage and represent shape data. For example, a Stack can be used to store a sequence of shapes, and can facilitate undo/redo functionality and for printing we will use Queue data structure.

c) **Algorithms:** Implement algorithms for drawing various shapes. For instance, the von Koch snowflake algorithm can be employed for snowflake generation.

- ## Future Enhancements:

a) Addition of more complex geometric shapes and algorithms.

b) Integration of color and enhanced visualization features.

c) Support for saving and loading shape configurations.

- ## Conclusion:

In conclusion, the console-based shape generator project aims to provide an interactive and educational platform for users to explore geometric shapes while implementing fundamental data structures concepts. The program, developed in C++, allows users to dynamically create, manipulate, and visualize various shapes using data structures such as arrays, linked lists, queues, and stacks. The interactive console interface facilitates easy shape selection and customization, while efficient data storage ensures quick retrieval and modification. The implementation includes algorithms for drawing shapes like snowflakes and polygons. As future enhancements, the project envisions the addition of more complex shapes, integration of color and enhanced visualization features, and support for saving and loading shape configurations. Overall, the project not only serves as a practical application of data structures but also offers a foundation for further expansion and refinement.