DATA STRUCTURE SIMULATOR

An interactive learning tool

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About DSS

- The **Data structure Simulator(DSS)** provides a visual and interactive learning experience for users .
- The simulator aims to help beginners and students gasp the underlying concepts of fundemental data structures.
- Stacks, queues, trees, graphs sorting techniques such as bubble sort, insertion sort, merge sort etc are visualized.

Goals

Objective 01

To make data structures easier to understand for the users

Objective 02

To let users visualize how various algorithms actually work

Project Features

01

Interactive Interface

02

Step-by-Step Process

03

Dynamic Data Input

04

Interactive Manipulation

Interactive Interface

- The simulator boasts a user-friendly interface.

- Allows users to select and interact with different data structures and algorithms easily.

Step-by-Step Process

- The DSS provides a step-by-step demonstration of how each data structure and sorting algorithm works.

- Users can follow along with the simulation to undersatnd the data flow and changes at each stage .

Dynamic Data Input

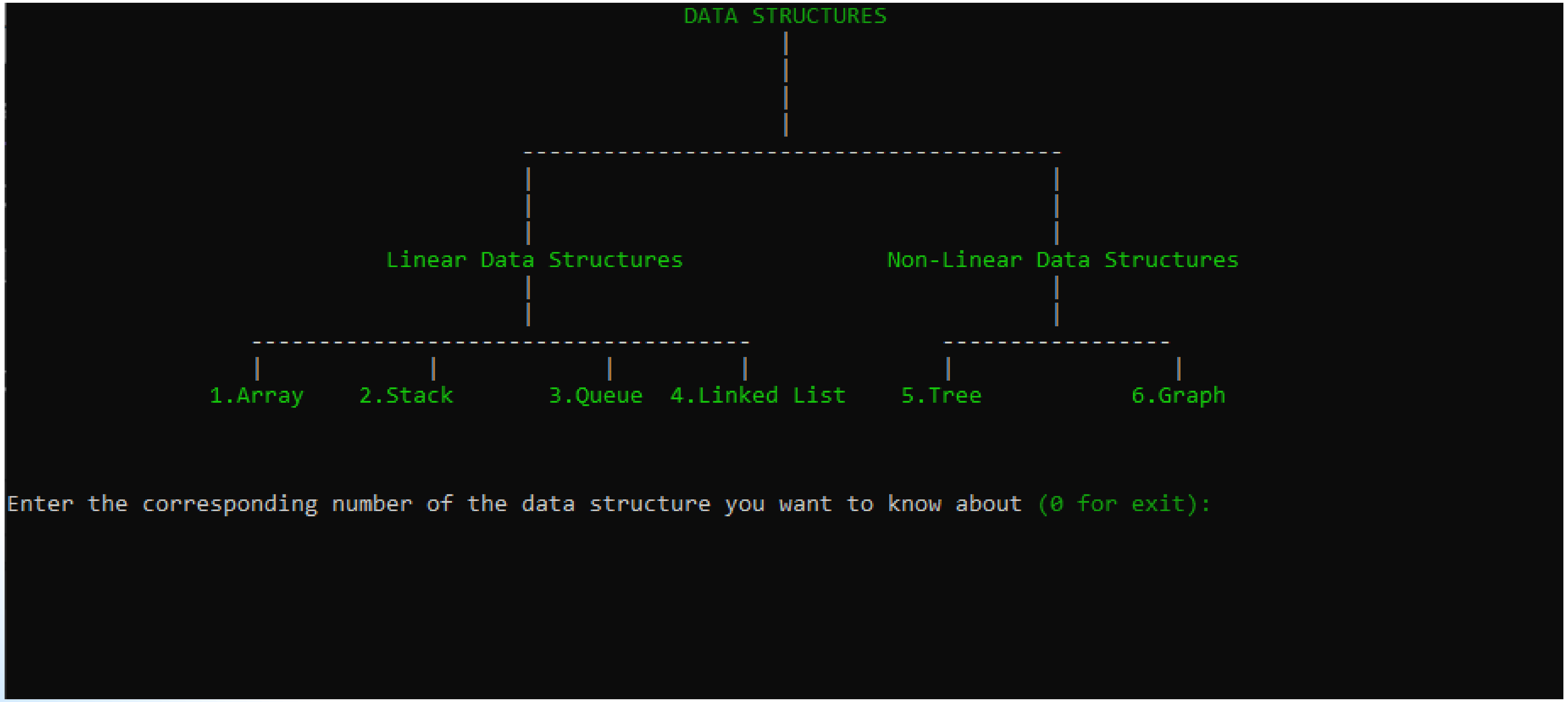
- Users have the option to input their data elements.

- This flexibility allows them to see first hand how the structure handles different data sets and how sorting algorithms arrange them in real-time.

Interactive Manipulation

- DSS allows users to interact with the simulated structure directly.
- They can add, remove, or modify elements.
- Test various operations,and observe how these actions affect the overall structure.

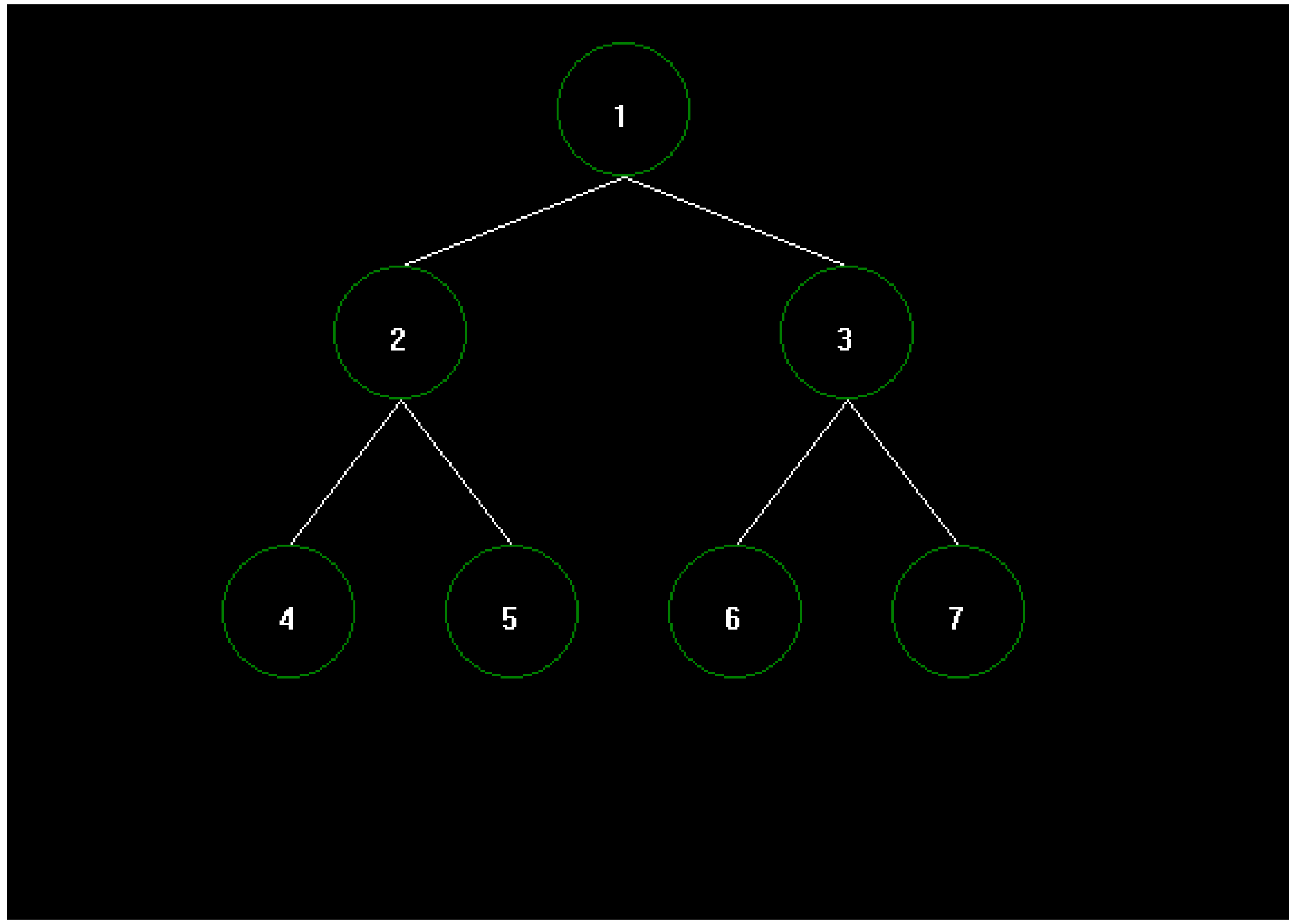
User-friendly interface



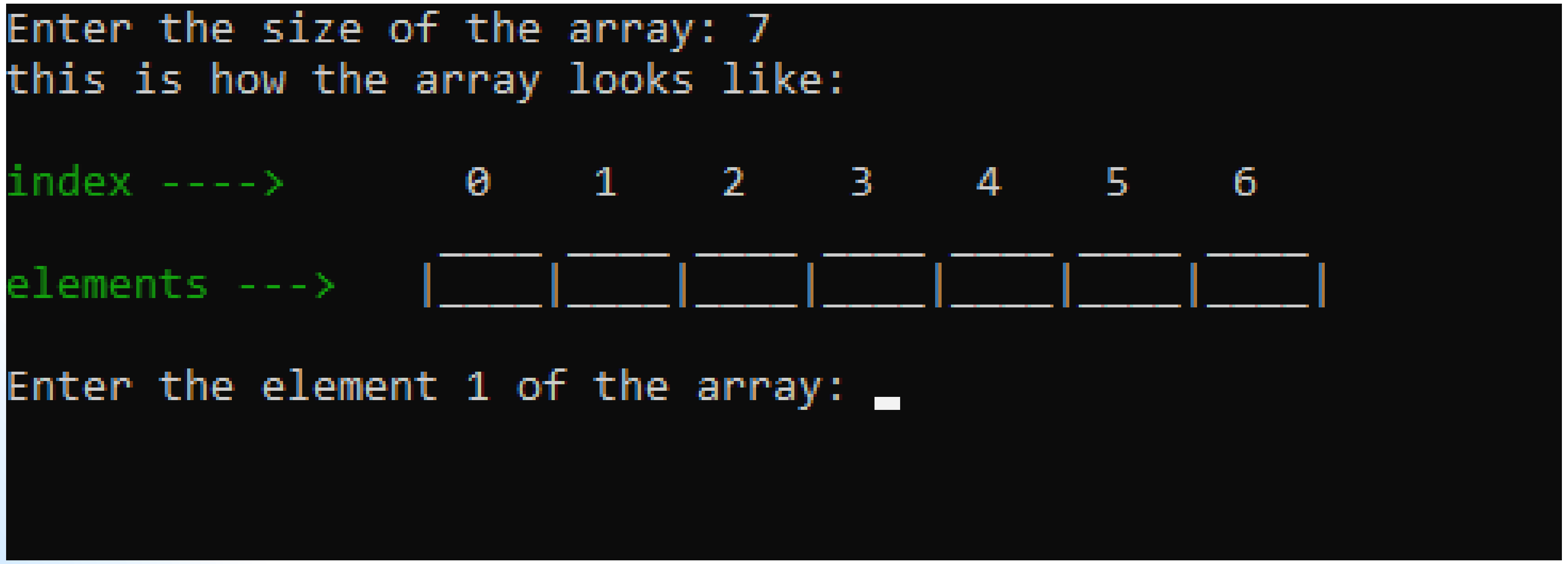
```
                                                  DATA STRUCTURES
                                                         |
                                                         |
                                                         |
                                                         |
                                      ----------------------------------------
                                      |                                      |
                                      |                                      |
                                      |                                      |
                            Linear Data Structures               Non-Linear Data Structures
                                      |                                      |
                                      |                                      |
                  --------------------------------------             ------------------
                  |            |            |         |              |                |
               1.Array    2.Stack       3.Queue  4.Linked List    5.Tree           6.Graph



Enter the corresponding number of the data structure you want to know about (0 for exit):
```



Get visually adapted to different data structures

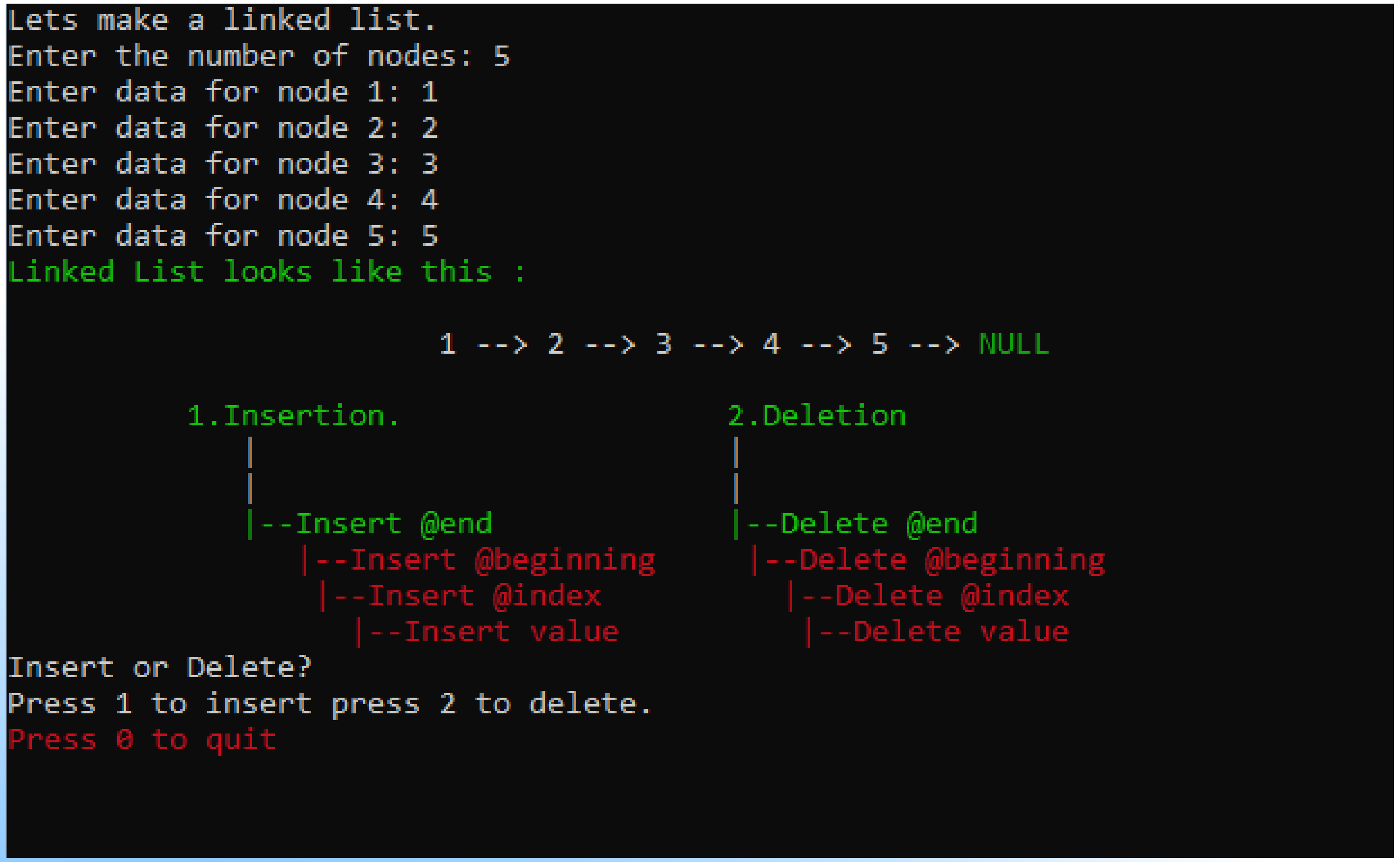


```
Enter the size of the array: 7
this is how the array looks like:

index ---->         0    1    2    3    4    5    6
                   ____ ____ ____ ____ ____ ____ ____
elements --->     |____|____|____|____|____|____|____|

Enter the element 1 of the array:
```

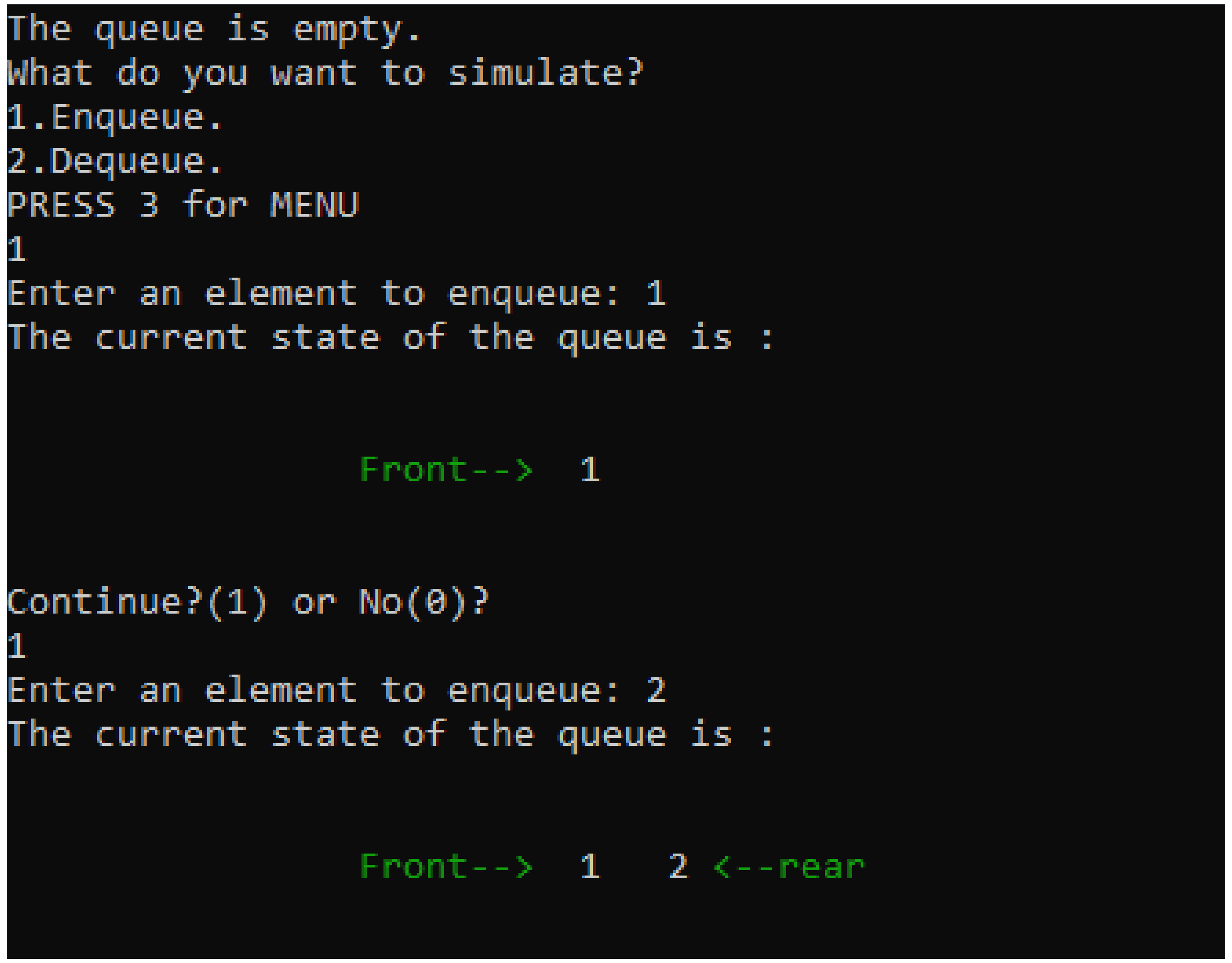
Dynamic inputs and outputs



```
Lets make a linked list.
Enter the number of nodes: 5
Enter data for node 1: 1
Enter data for node 2: 2
Enter data for node 3: 3
Enter data for node 4: 4
Enter data for node 5: 5
Linked List looks like this :

                        1 --> 2 --> 3 --> 4 --> 5 --> NULL

          1.Insertion.                          2.Deletion
             |                                   |
             |                                   |
             |--Insert @end                      |--Delete @end
                |--Insert @beginning              |--Delete @beginning
                 |--Insert @index                   |--Delete @index
                   |--Insert value                   |--Delete value
Insert or Delete?
Press 1 to insert press 2 to delete.
Press 0 to quit
```



```
The queue is empty.
What do you want to simulate?
1.Enqueue.
2.Dequeue.
PRESS 3 for MENU
1
Enter an element to enqueue: 1
The current state of the queue is :


                Front-->  1


Continue?(1) or No(0)?
1
Enter an element to enqueue: 2
The current state of the queue is :


                Front-->  1   2 <--rear
```

Challenges Faced

- Graphics Library Compatibility: Integrating the graphics.h library with modern compilers presented compatibility issues that required careful consideration.

- Algorithm Complexity: Implementing step-by-step visualizations for sorting algorithms demanded meticulous planning to ensure accuracy and clarity.

- User Interaction: Striking a balance between simplicity and functionality in the user interface required multiple iterations to meet diverse user needs.

Future Extensions

- Additional Data Structures and Algorithms
- Enhanced User Interface
- Performance Metrics
- Exercise and Quiz options

DSS

THANK YOU

For watching this presentation