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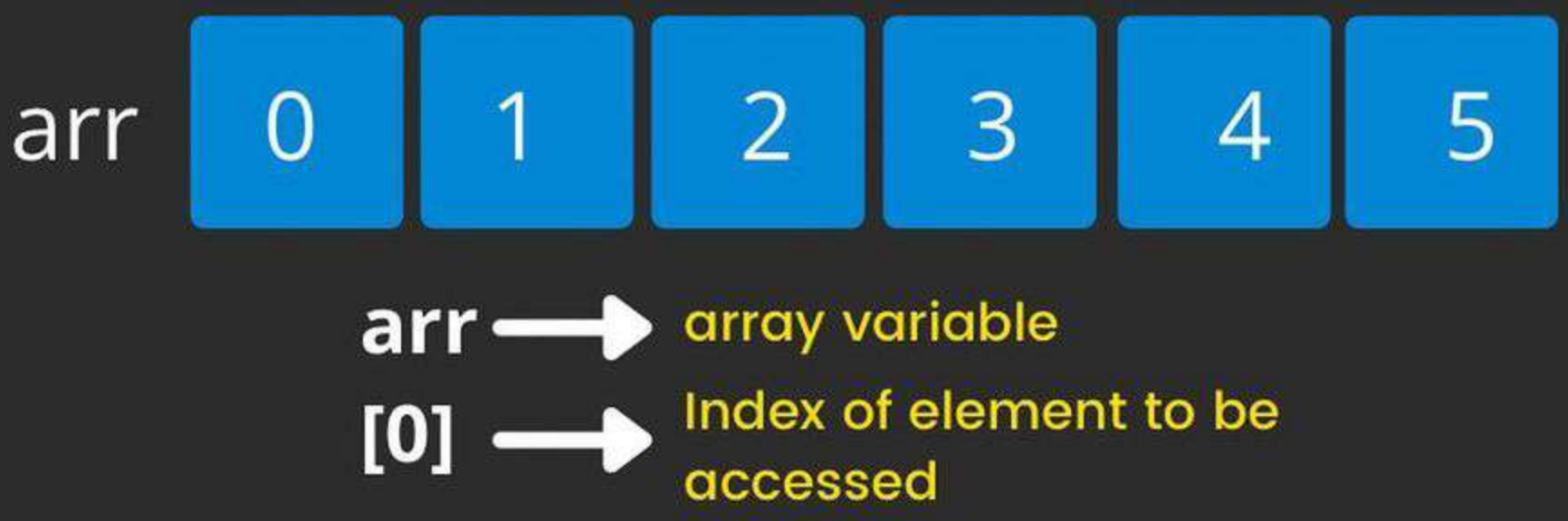
Data Structures Explained

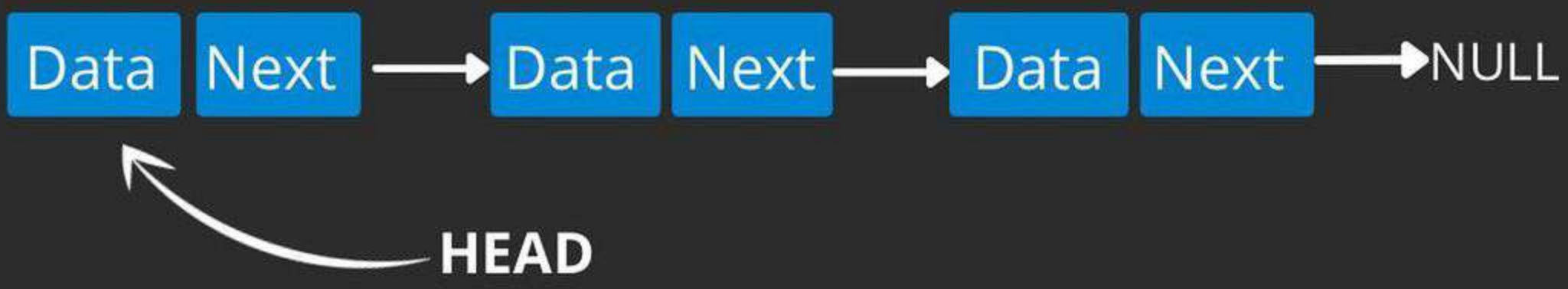
Arrays

- Arrays are defined as the collection of similar type of data items stored at contiguous memory locations.
- Arrays are the derived data type in C programming language which can store the primitive type of data such as int, char, double, float, etc.
- Array is the simplest data structure where each data element can be randomly accessed by using its index number.



Linked List

- A linked list is a data structure that has sequence of nodes where every node is connected to the next node by means of a reference pointer.
- The elements are not stored in adjacent memory locations. They are linked using pointers to form a chain. This forms a chain-like link for data storage.
- Each node element has two parts:
  - a data field
  - a reference (or pointer) to the next node.



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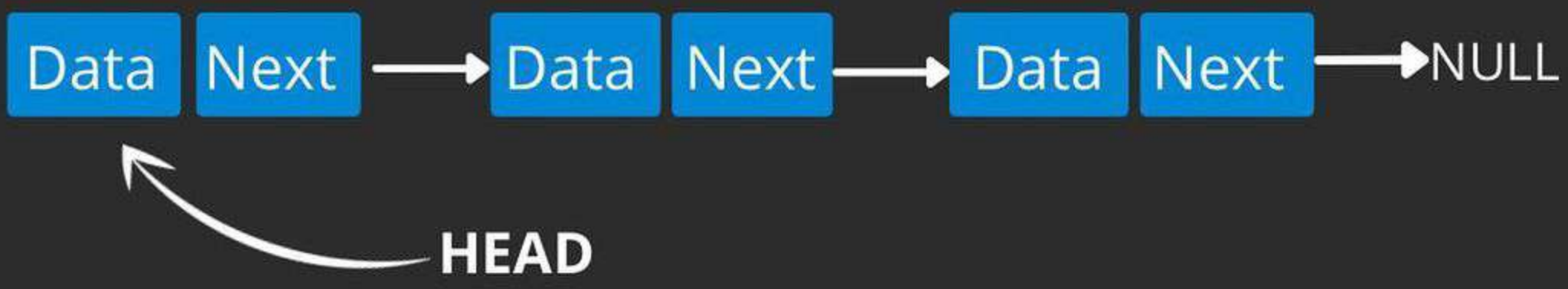


Stack

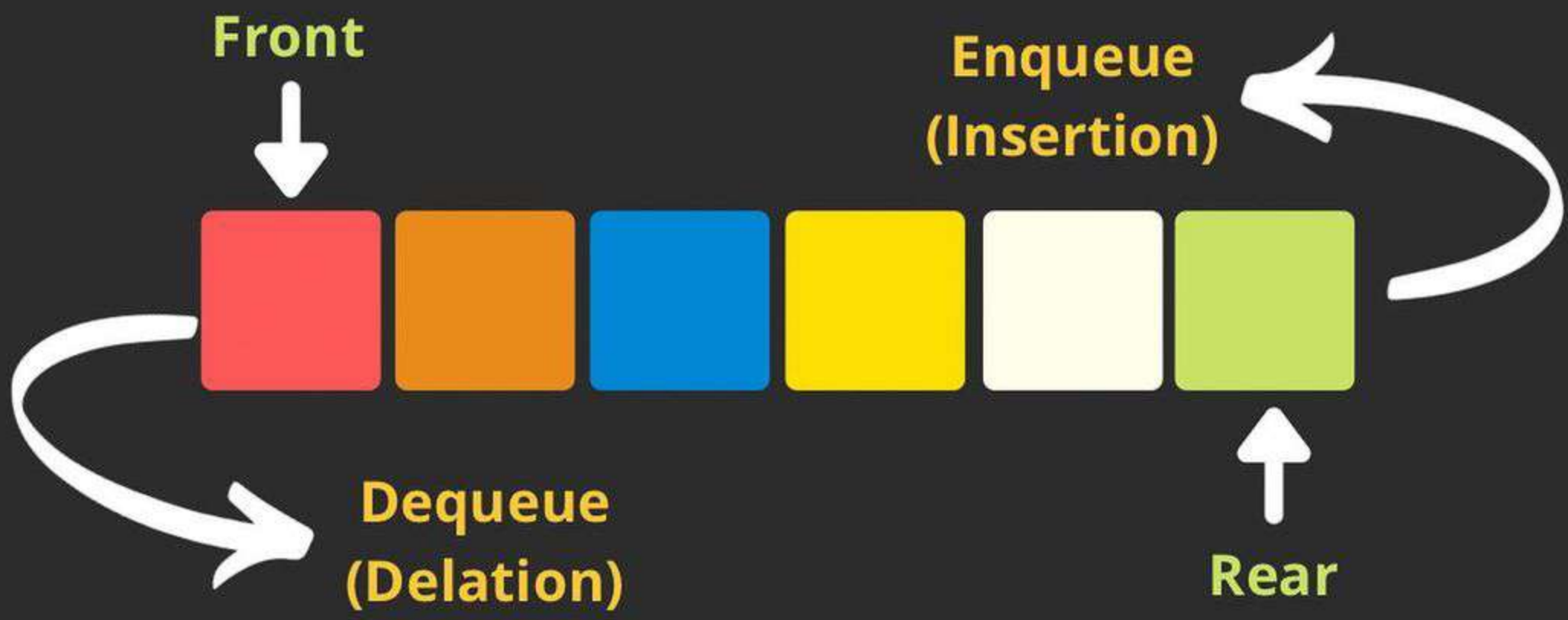
1. Stack is a linear data structure that follows LIFO (Last In First Out) approach for accessing elements.
2. Push, pop, and top (or peek) are the basic operations of a stack

applications of a stack:

- Check for balanced parentheses in an expression
- Evaluation of a postfix expression
- Problem of Infix to postfix conversion
- Reverse a string

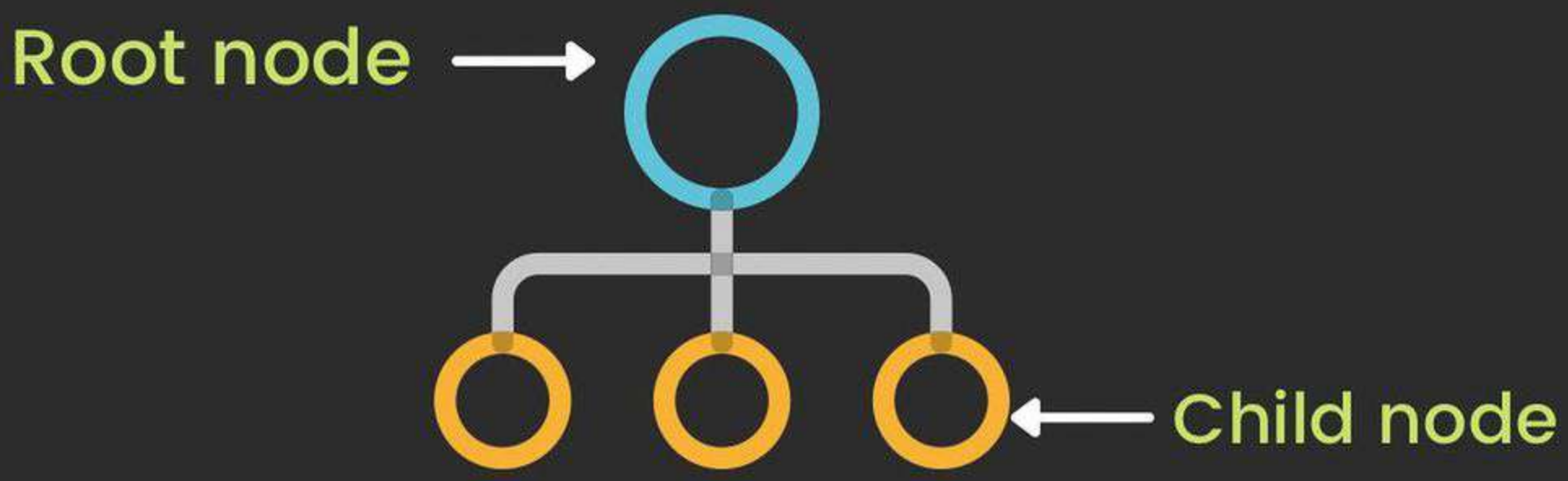
Queue

- A queue can be defined as an ordered list which enables insert operations to be performed at one end called REAR and delete operations to be performed at another end called FRONT.
- Queue is referred to be as First In First Out list.
- For example, people waiting in line for a rail ticket form a queue.



tree

- A tree is also one of the data structures that represent hierarchical data.
- A tree data structure can be defined recursively as a collection of nodes, where each node is a data structure consisting of a value and a list of references to nodes. The start of the tree is the "root node" and the reference nodes are the "children". No reference is duplicated and none points to the root.



Graph

- A graph can be defined as group of vertices and edges that are used to connect these vertices.
- A graph can be seen as a cyclic tree, where the vertices (Nodes) maintain any complex relationship among them instead of having parent child relationship.

A Graph G(V, E) with 5 vertices (A, B, C, D, E) and six edges ((A,B), (B,C), (C,E), (E,D), (D,B), (D,A)) is shown in the following figure.