

DATA STRUCTURE & ALGORITHMS



INTRODUCTION

"A DATA STRUCTURE IS THE ORGANIZED FORM OF THE DATA IN A WAY SO THAT IT CAN BE USED EFFICIENTLY."

- It is a specific format for storing, organizing, and processing data.
- Data structures make it simple for people to find and deal with the information they need.



Why its important?

1 SOLUTION

Computer Science deal with sorting, organizing and retrieving effectively of data.



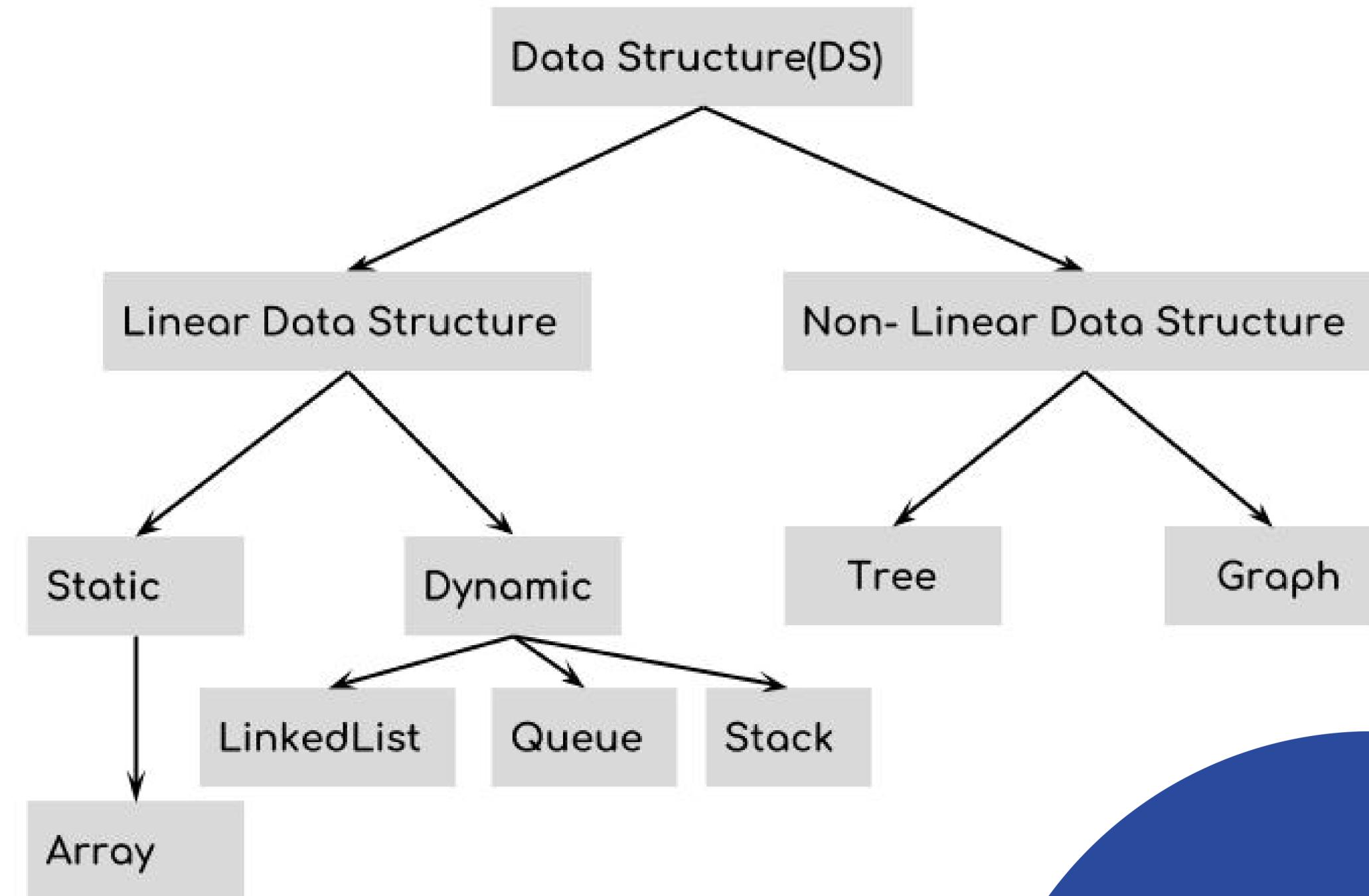
2 SOURCE

Computer Programmers should get data from user or another source use them.

3 SCALABILITY

Big data applications employ the data structures for the distributed storage locations allocation and management, to make sure the data is scalable and efficient.

DIFFERENT DSA



LINEAR AND NON LINEAR

" THIS FEATURE SPECIFIES THE ARRANGEMENT OF DATA OBJECTS, AS IN AN ARRAY OR A NON-ORDERED SEQUENCE SUCH AS THE GRAPH, IN A SEQUENTIAL ORDER."

LINEAR 1- ARRAYS

- A SET OF THINGS IS STORED IN OTHER MEMORY SITES.
- THE SAME KIND OF ITEMS ARE KEPT TOGETHER TO COMPUTE
- THE LOCATION OF EVERY ELEMENT BY INDEX.
- FIXED OR FLEXIBLE ARRAYS CAN BE USED IN LENGTH.

how to access:

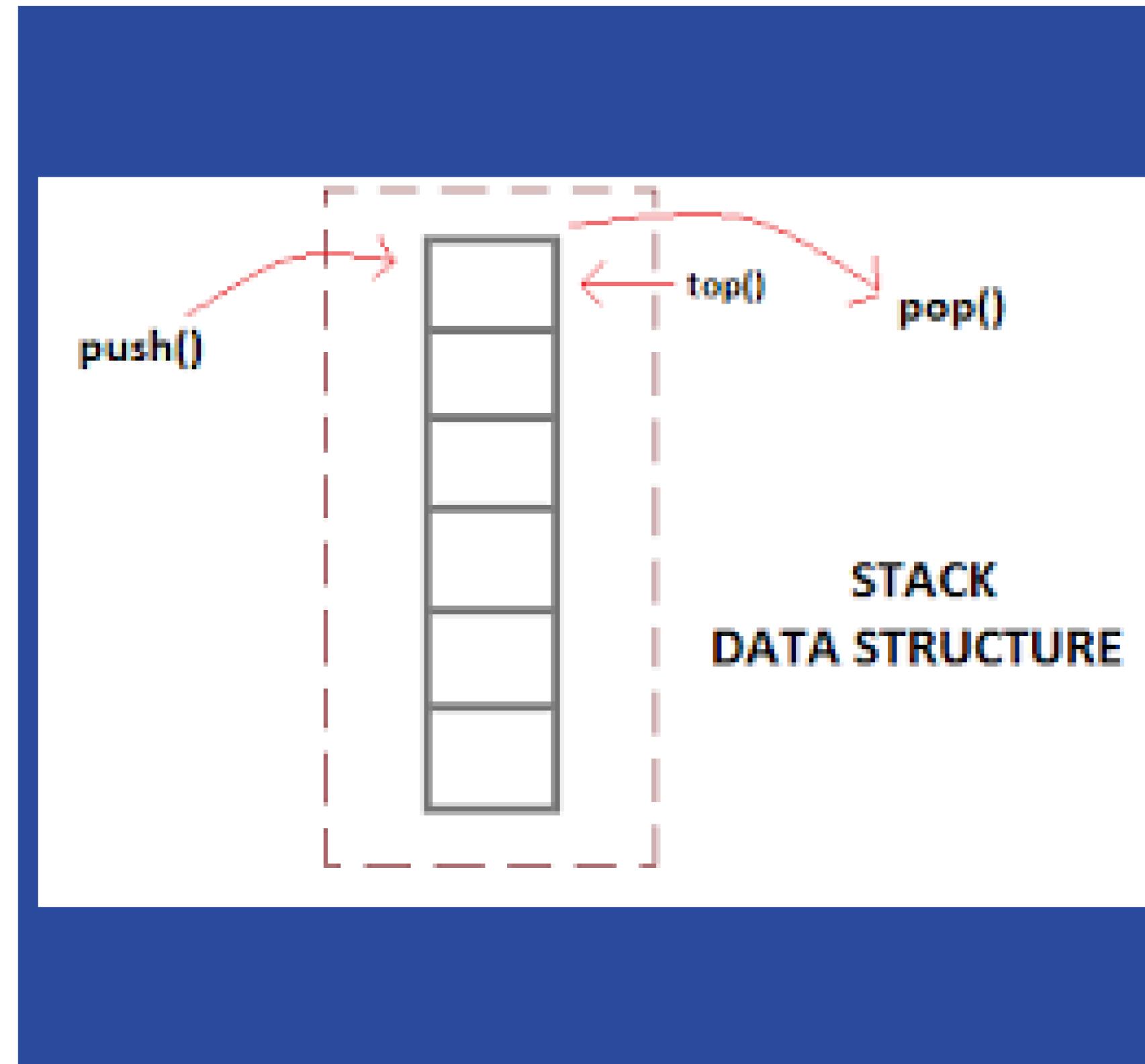
- `print(array[0]).`
`output:35`
- `datatype arrayname={}`



2-STACK

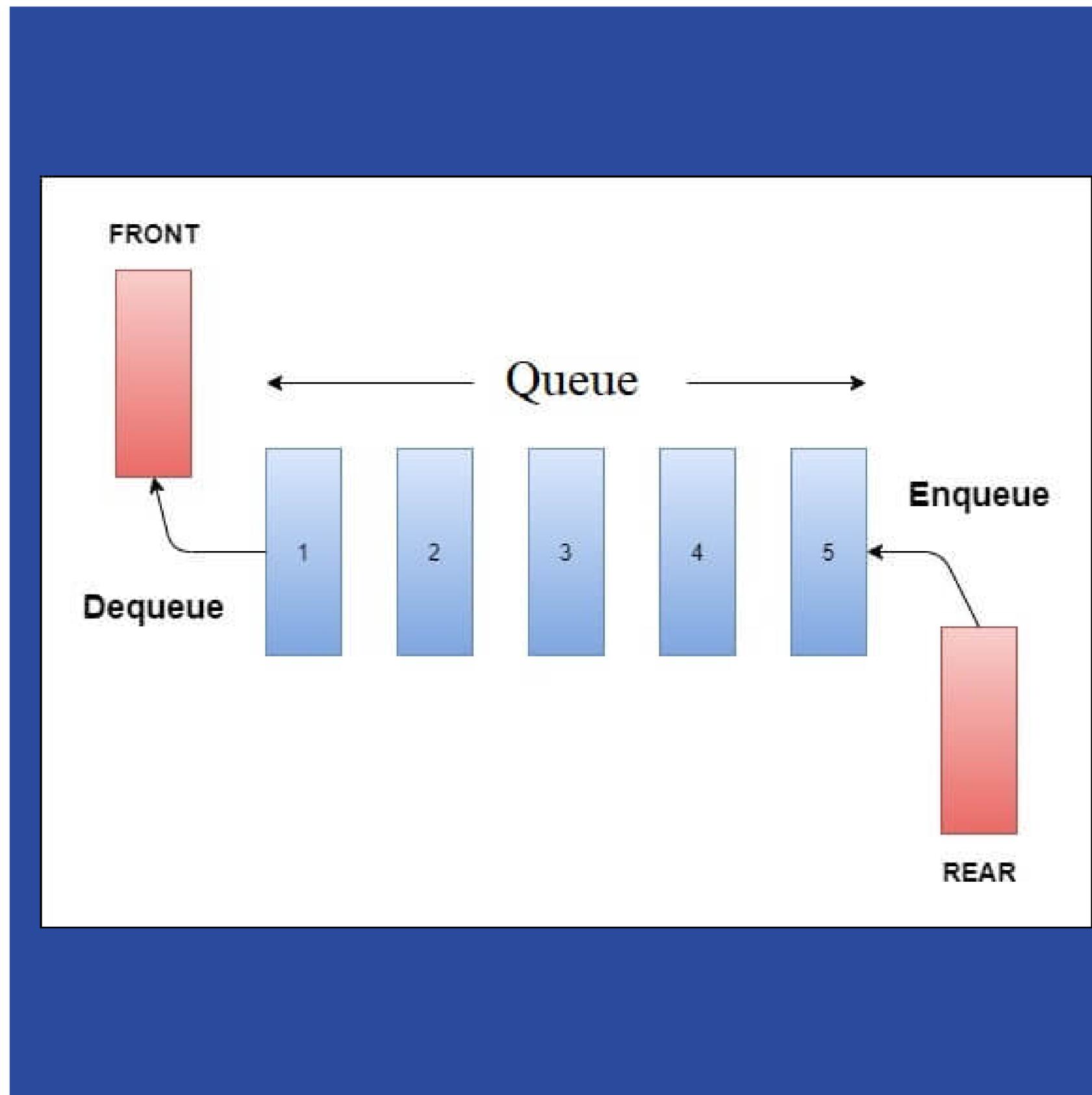
IN THE LINEAR SEQUENCE, A STACK STORES A GROUP OF ELEMENTS.

- LAST IN, FIRST OUT (LIFO)
- FIRST IN, FIRST OUT (FIFO).
- ADD VALUE USING PUSH.
- REMOVE VALUE USING POP.



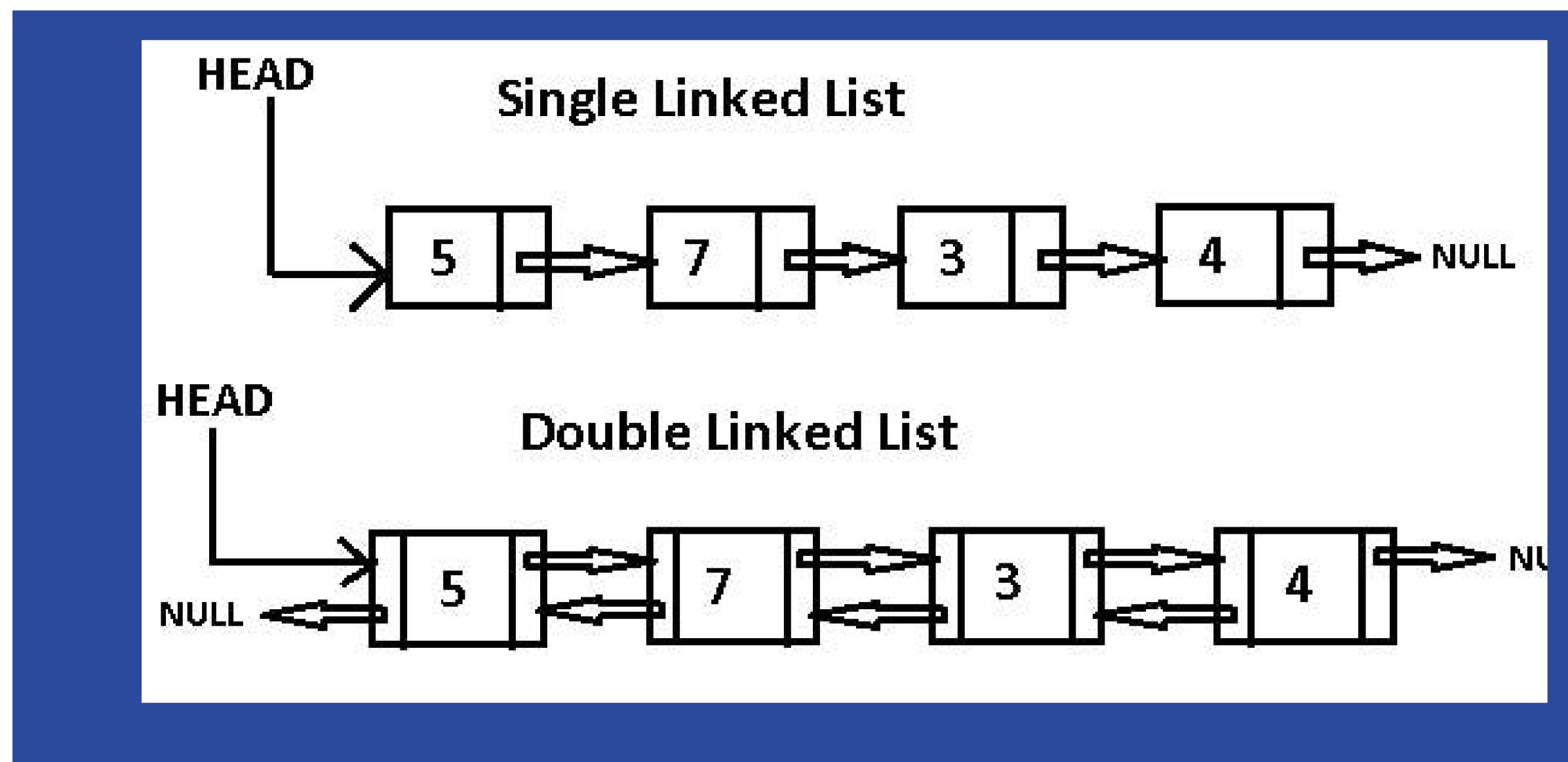
3-QUEUE

A QUEUE KEEPS THE COLLECTION OF
OBJECTS LIKE A STACK, BUT ONLY FIRST IN,
FIRST OUT.



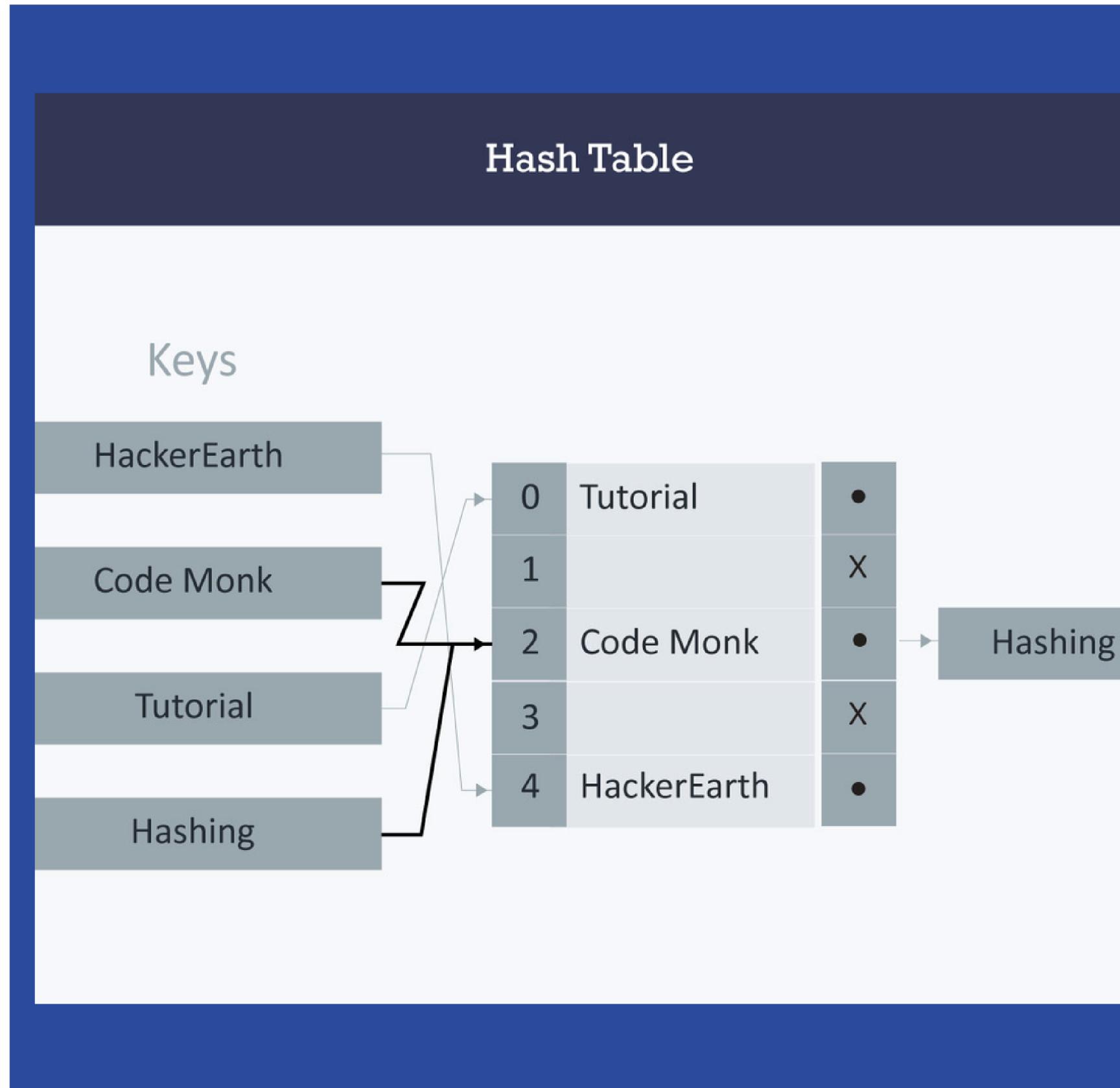
4-LINKED LIST

A LINKED LIST STORES A LINEAR ORDER OF OBJECTS. THE LINK LIST INCLUDES A DATA ITEM AS WELL AS A REFERENCE OR LINK TO THE NEXT ITEM IN THE LIST IN EACH ELEMENT OR NODE.



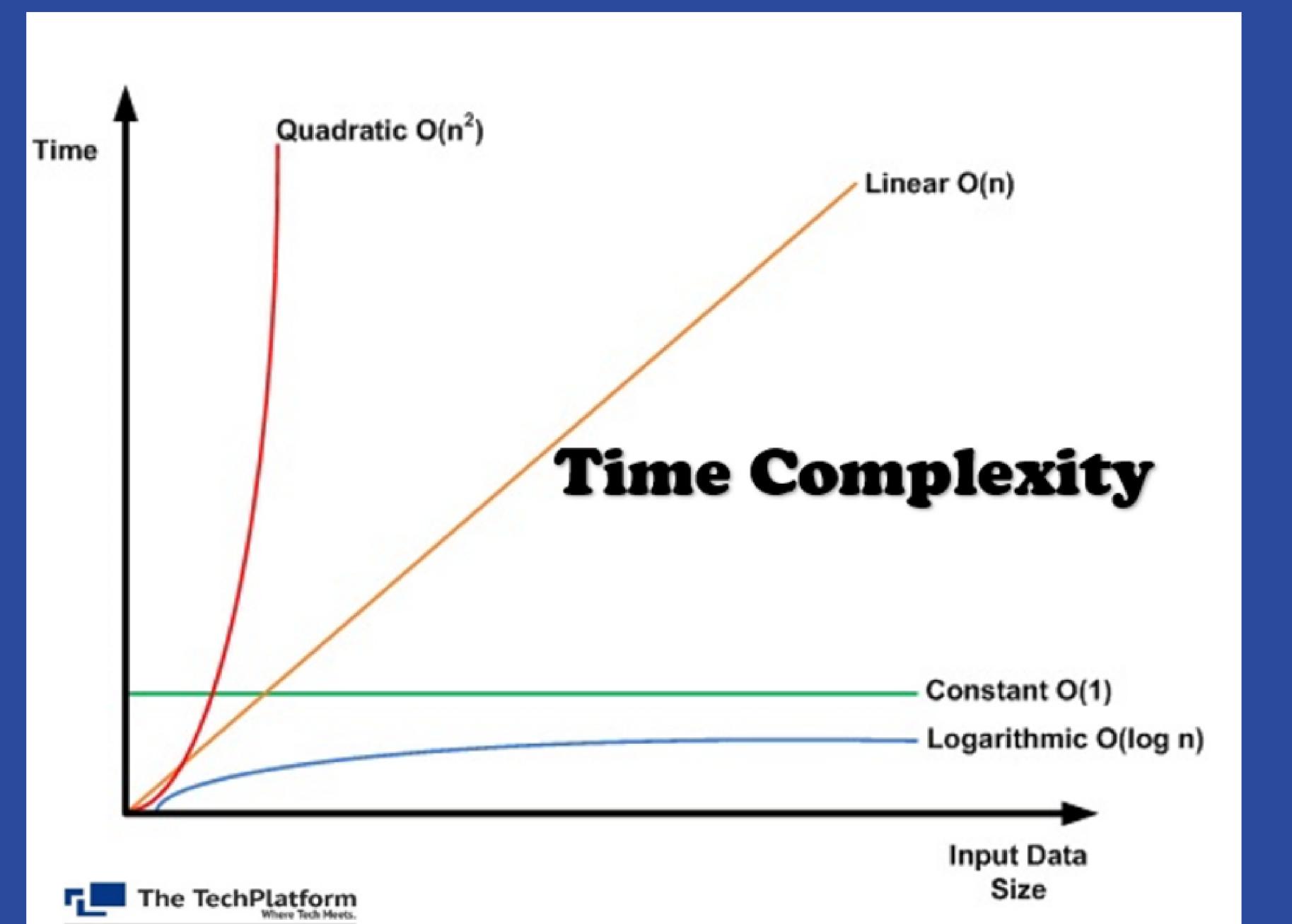
5-HASH TABLE

A HASH TABLE, ALSO KNOWN AS A HASH MAP, CONTAINS AN ASSOCIATIVE ARRAY OF OBJECTS THAT RECORD THE KEYS. A HASH TABLE EMPLOYS A HASH ALGORITHM TO TRANSFORM AN INDEX TO A BUCKET ARRAY THAT CONTAINS THE DATA ITEM YOU WANT.



TIME COMPLEXITIES

- Constant $O(1)$
- Linear $O(n)$
- Quadratic $O(n^2)$
- Logarithmic $O(\log n)$



WHICH WEBSITE BEST FOR DATA STRUCTURE



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