

DATA STRUCTURE

A data structure is a way of organizing and storing data in a computer so that it can be accessed and used efficiently. It refers to the logical or mathematical representation of data, as well as the implementation in a computer program.

Classification:

Data structures can be classified into two broad categories:

- **Linear Data Structure:** A data structure in which data elements are arranged sequentially or linearly, where each element is attached to its previous and next adjacent elements, is called a linear data structure. Examples are array, stack, queue, etc.
- **Non-linear Data Structure:** Data structures where data elements are not placed sequentially or linearly are called non-linear data structures. Examples are trees and graphs.

Applications of Data Structures:

Data structures are used in a wide range of computer programs and applications, including:

- **Databases:** Data structures are used to organize and store data in a database, allowing for efficient retrieval and manipulation.
- **Operating systems:** Data structures are used in the design and implementation of operating systems to manage system resources, such as memory and files.
- **Computer graphics:** Data structures are used to represent geometric shapes and other graphical elements in computer graphics applications.
- **Artificial intelligence:** Data structures are used to represent knowledge and information in artificial intelligence systems.

Advantages of Data Structures:

The use of data structures provides several advantages, including:

- **Efficiency:** Data structures allow for efficient storage and retrieval of data, which is important in applications where performance is critical.
- **Flexibility:** Data structures provide a flexible way to organize and store data, allowing for easy modification and manipulation.
- **Reusability:** Data structures can be used in multiple programs and applications, reducing the need for redundant code.
- **Maintainability:** Well-designed data structures can make programs easier to understand, modify, and maintain over time.

