

# Difference Between Linear and Non-Linear Data Structures

The major difference between linear and non-linear data structures is that linear data structures are ordered. In contrast, non-linear data structures are not ordered and are distributed in a random manner. Knowing the comparison of non-linear vs linear data structure can be really helpful in understanding the complex topics in the GATE CSE syllabus. Let us see the complete list of the differences between the linear and non-linear data structures in the table provided below:

## Key Differences Between Linear and Non-Linear Data Structures

Linear Data Structures	Non-Linear Data Structures
Elements are ordered in a linear and sequential manner.	Elements are ordered in a hierarchy.
Only a single level is present.	Multiple level data structures are present.
Implementation is relatively easier.	Implementation is relatively complicated.
Traversed in a single run	Take multiple runs to traverse the data.
Memory utilization is not efficient compared to non-linear data structures	Memory utilization is efficient.
Examples: array, queue, linked list, etc.	Examples: Trees, graphs, etc.

## What are Linear Data Structures?

Linear data structures are structures where data elements are ordered in a sequential or linear way. In the linear data structure, each element is attached to the elements before and after them. Various questions can be seen in the GATE previous years' question papers based on Linear data structures. The involvement of the structures is at a single level only. They are easy to implement.

The linear data structures can be of various types. A few types of linear data structures are:

- Array,
- Stack,

- Queue,
- Hash Tables
- Linked list

## What are Non-Linear Data Structures?

Non-linear data structures are structures where data is not ordered in a sequential or linear way. There exist multiple levels of arrangement. It requires multiple rundowns to traverse the elements. Non-linear data structures are important for the upcoming GATE 2023 exam. The elements may or may not be attached to them before and after. They are known to be more efficient than linear data structures.

The non-linear data structures have various types. A few of the Non-linear data structures are:

- Trees
- Graphs

