

INTRODUCTION TO DATA STRUCTURE

Data and Information

- Data are facts or values or set of values to be input to a computer.
- Data are not well organized in a format.
- Roll Number, Marks of students may be treated as data.
- The processed data which is meaningful to the receiver is called information.
- Information are organized in a format which is useful to the user.
- Result of students in tabular form is information.

Data Type

- A Data Item refers to a single unit of values.
- For example address of a customer.
- It may contain sub items street, city, district, state.
- Data type is a kind of data item used by a programming language.
- The programming language defines its set of values it can take and the operations that it can perform on it.
- For example int in c language; it can take values 2^{31} to -2^{32} and it can perform operations +, -, *, /, % on it

Data Structure, Operations and ADT

- The logical or mathematical model of a particular organization of data is called a data structure.
- It may address two fundamental concerns:
 - How data will be stored
 - What operations will be performed on it
- Functional Definition of a data structure is known as ADT(Abstract Data Type).

Data Structure, Operations and ADT

- Data structure is a scheme for data organization.
- The functional definition of a data structure should be independent of its implementation.
- The way in which the data is organized affects performance of a program for a task.
- Programmers decide which data structures to be used based on the nature of data and the operations that need to be performed on that data.

Classification Of Data Structure

- Data Structures are generally classified into primitive and non-primitive.
- Basic data types such as integer, real, character and boolean are known as primitive data structures.
- The primitive data structures are directly available by the machine.
- Based on the structure and arrangement of data, the non-primitive data structures are further divided into linear and non-linear data structures.

Linear and Non-Linear Data Structure

- A data structure is said to be linear if its elements form a sequence or a linear list.
- Arrays, Linked lists, Stack, Queues are example of linear data structures.
- Conversely a data structure is said to be non-linear if data are not arranged in sequence.
- The insertion and deletion of data is therefore is not possible in linear fashion.
- Tree and Graphs are example of non-linear data structure.