**DATA TYPES**

A data type is a set of objects and a set of operations on those objects which create, build-up, destroy, modify and pick about instances of the objects.

OR

A data object is a class of data objects together with a set of operations for creating and manipulating them.

A programming languages necessarily deals more commonly with data types such as the class of arrays, integers, or files and the operations provided for manipulating arrays, integers or files.

Eg:-

In LISP major data type is the binary tree (called on S-expression)

And basic operations are CAR, cdr, and cons.

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<th>FORTRAN 77</th>
<th>ALGOL</th>
<th>Pascal</th>
<th>Ada</th>
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<tbody>
<tr>
<td>INTEGER</td>
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The basic elements of a specification of a data type:

**Attributes:**
- Distinguish data objects of that type.

**Values:**
- That data objects of that type may have.

**Operations:**
- Possible manipulations of data objects of that type.

**Example:** Array data-type

- Attribute:
  - Numbers of dimensions
  - The subscript range for each dimension and the data type of components

- Value:
  - It would be sets of numbers that form valid values for array components.

- Operations:
  - It may include subscripting to select individual array components
  - Create arrays
  - Change their shape
  - Performing arithmetic on pairs of arrays

The basic elements of the implementation of a data type:

1. **Storage representation:** It is used to represent the data objects of the data type in the storage of the computer during program execution.
2. Algorithms or procedures: The manner in which the operations defined for the data type are represented in terms of particular algorithms or procedures that manipulate the chosen storage representation of the data objects.