

# Implementation of Elementary Data Types.

Implementation of an elementary data type consists of

- Storage Representation for data objects
- Values of that type
- Set of Algorithms or procedures that define the operations of the type in terms of manipulations of the storage representation.

## Storage Representation :-

1. > Hardware Influence : Computer hardware influence the Storage of Elementary Data Type.

In this case Computer hardware executes the program.

If the hardware storage representation are used, then the basic operations on data of that type may be implemented using hardware provided operations.

2. > Software influenced :

If we don't use hardware storage representation, then the operation must be software simulated and same operation will execute much less efficient.

## Two Methods to treat Attributes:-

- To be determined by the compiler and not stored in descriptors during execution or not stored in run-time storage representation. It is usually a method in C language.
- 

Stored in a descriptor as part of the data object at run time - in LISP, Prolog language.

Subscribe to our

**You Tube Channel**

**Computer Science Lectures By ER. Deepak Garg**

The storage representation is usually described in terms of

- Size of the block of memory required (the number of memory words, bytes, or bits needed)
- Layout of attributes and data values within the block.

### Implementation of operations:-

Each operation defined for data objects of a given type may be implemented in one of three main ways:-

- (1) **Directly as a hardware operation** :- If simple data types are stored using the hardware representation, then the primitive operations are implemented using the arithmetic operations built in to the hardware.
- (2) **As a Subprogram or procedure** : A square root for an example, this operation is not provided directly as a hardware operation. So it is software simulated, implemented as a procedure or function.
- (3) **As an inline Code Sequence** : It is software implementation of the code & its operation. Instead of using a subprogram, the operation in the subprogram are copied into the program at the point where the subprogram would otherwise have been invoked.

Subscribe to our

**You Tube Channel**

**Computer Science Lectures By ER. Deepak Garg**

for example :

The absolute value of function on numbers,

$abs(x) = \text{if } x < 0 \text{ then } -x \text{ else } x$

is usually implemented as an inline code sequence.

- (a) Fetch value of  $x$  from memory
- (b) if  $x > 0$ , skip the next instruction
- (c) set  $x = -x$
- (d) store new value of  $x$  in memory

Here each line is implemented by a single hardware operation.

Subscribe to our

**You Tube Channel**

**Computer Science Lectures By ER. Deepak Garg**