Data Structures

SY BTech(CSE)

Unit – 1

Introduction

PPT-1

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Unit 1 [6 hrs]

Introduction:

Data,
Data types,
Data structure,
Abstract Data Type (ADT),
Representation of Information,
Characteristics of algorithm,
Program,
Analyzing programs.

Objective

Be familiar with basics of data structures and abstract data types.

- **Computer:**

  Electronic machine that manipulates information.

- **Study of computer science includes the study of**

  1. **How information is organized in a computer.**
  2. **How information can be manipulated.**
  3. **How information can be utilized efficiently.**

- **Information:**

  Meaningful data.

- **Data:**

  Computer data is information processed or stored by computer.

  Ex: Text Document, Image, S/W program etc.

- **Basic unit:**

  Bit.

- **Data Structure:**

  A method of organization of information in computer memory.

- **Types:**

  1. Linear & Nonlinear
  2. Primitive & Non-primitive
  3. Homogeneous and Heterogeneous DS
  4. Static and Dynamic DS
  5. Active & Passive DS

1. Linear DS:

A DS that shows the linear relationship among adjacent elements is called linear DS.

Ex: Array, Stack & Queue using array.

2. Nonlinear DS:

A DS in which adjacent elements are not linearly related is called non-linear DS.

Ex: Trees, Graph, list, file

3. Primitive DS:

The structuring of data at the most primitive level within a computer, i.e. the DS that are directly operated by m/c level instructions are called primitive DS.

Ex: int, real, char

4. Non-primitive DS:

The DS that are not directly operated by m/c level instructions are called non-primitive DS.

Ex: array, list, file

list: collection of nodes

file: collection of records

3. Homogeneous and Heterogeneous DS

4. Static and Dynamic DS

5. Active & Passive DS

Android: Activity objects.

It is not actively being accessed, and

it is not being operated on,

so it should be considered passive.

Operations on DS:

1. Creation of DS
2. Insertion of items into DS
3. Deletion of items from DS
4. Removing DS

Data Types:

- char, int, float: data types
- In addition to these basic types, C helps us by providing 2 mechanisms for grouping data together.

  Ex: array, structure.
- Some data types may be modified by the keywords short, long & unsigned.

Type	Length	Range
unsigned char	8 bits	0 to 255
char	8 bits	-128 to 127
enum	16 bits	-32,768 to 32,767
unsigned int	16 bits	0 to 65,535
short int	16 bits	-32,768 to 32,767
int	16 bits	-32,768 to 32,767
unsigned long	32 bits	0 to 4,294,967,295
long	32 bits	-2,147,483,648 to 2,147,483,647
float	32 bits	3.4 * (10**-38) to 3.4 * (10**+38)
double	64 bits	1.7 * (10**-308) to 1.7 * (10**+308)
long double	80 bits	3.4 * (10**-4932) to 1.1 * (10**+4932)

- All programming languages provide at least a minimal set of predefined data types plus the ability to construct new or user-defined types.

Data Types:

A data type is a collection of objects and

a set of operations

that act on those objects.

Ex: int, char, float