



# **SNS COLLEGE OF ENGINEERING**

Kurumbapalayam (Po), Coimbatore – 641 107

**An Autonomous Institution**

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A' Grade  
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai



## **DEPARTMENT OF COMPUTER SCIENCE AND DESIGN**

**COURSE NAME : 19CS307- DATA STRUCTURES**

**II YEAR / III SEMESTER**

**Unit 1- LINEAR DATA STRUCTURES -LIST**

**Abstract Data Types (ADTs)**





# Data Structures



- Data structure is a representation of logical relationship existing between individual elements of data.
- A data structure defines a way of organizing all data items that considers not only the elements stored but also their relationship to each other.
- The term data structure is used to describe the way data is stored.
- **Algorithm + Data structure = Program**



# Types of Data Structures



- **Primitive Data Structures** are the basic data structures that directly operate upon the machine instructions. They have different representations on different computers.
- **Non-primitive data structures** are more complicated data structures and are derived from primitive data structures. They emphasize on grouping same or different data items with relationship between each data item.

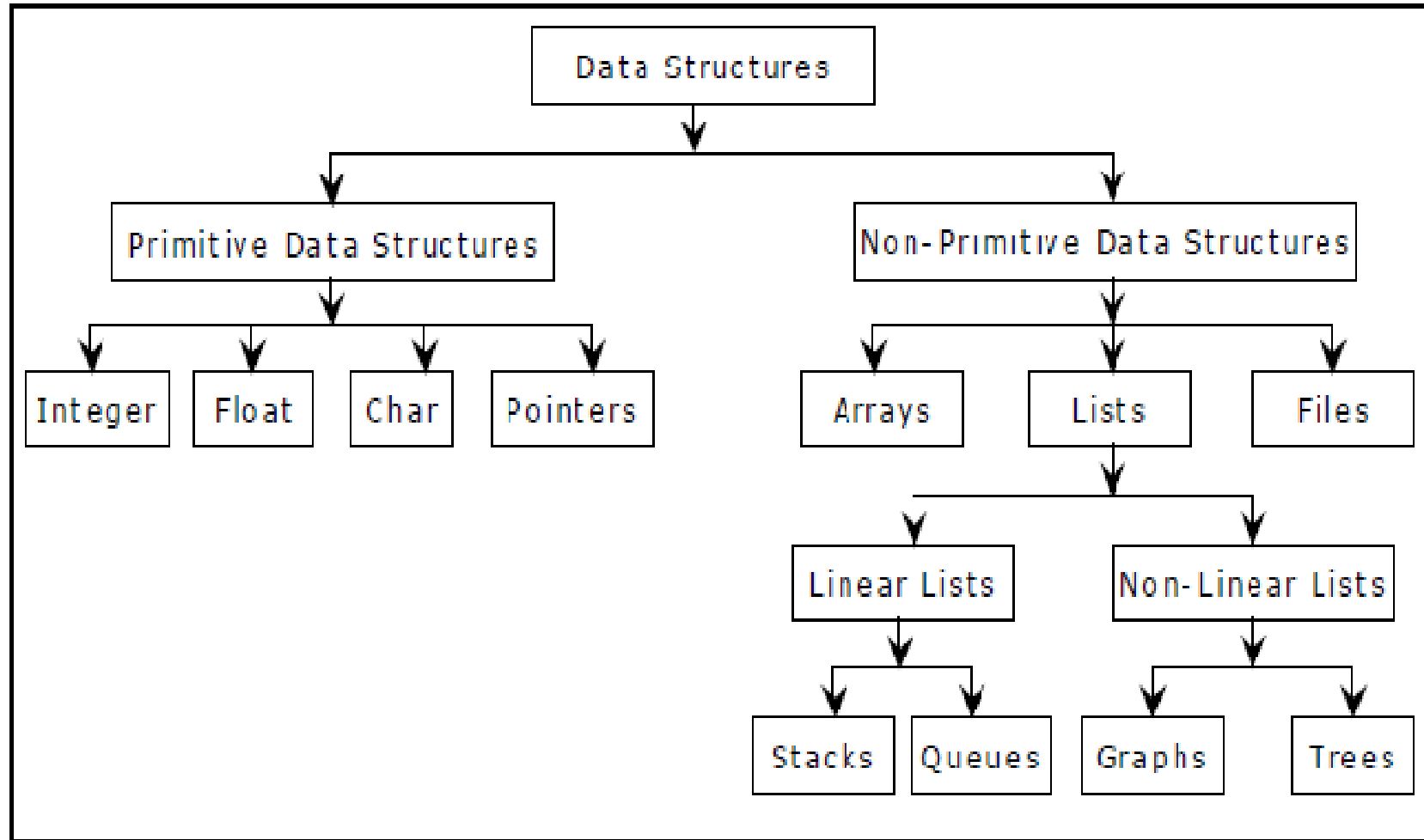


Figure 1.1. Classification of Data Structures



# Types of Data organization in memory



**Contiguous-** Continuous memory allocation

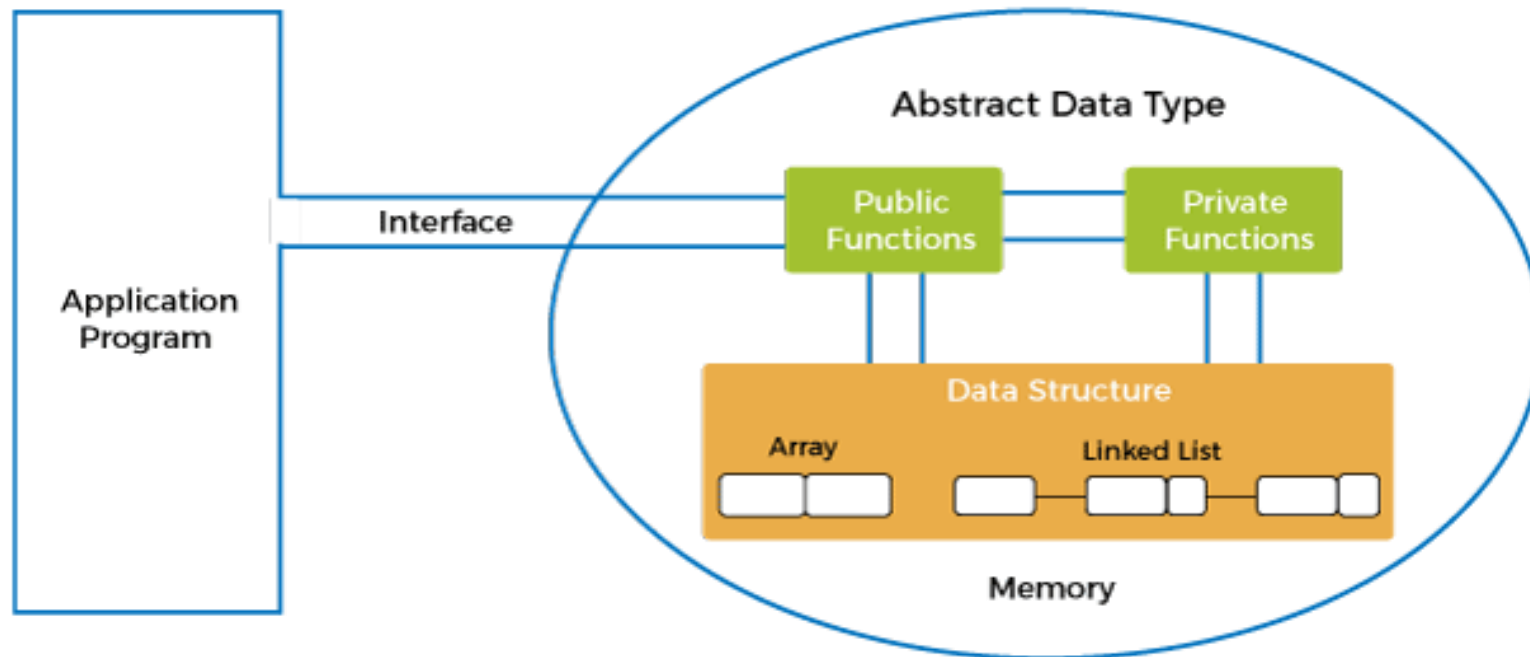
Ex: Array

**Non Contiguous** – Data can be scattered in memory, but we linked to each other in some way

Ex: Linked list, Tree, Graph

# ABSTRACT DATA TYPE (ADT)

- An abstract data type is an abstraction of a data structure that provides only the interface to which the data structure must adhere
- The interface does not give any specific details about something should be implemented or in what programming language





# ABSTRACT DATA TYPE (ADT)



- The keyword “Abstract” is used as we can use these data types, we can perform different operations. But how those operations are working that is totally hidden from the user.
- The ADT is made of with primitive data types, but operation logics are hidden.
- Examples of ADT are Stack, Queue, and List etc.
- A List is an abstract data type that is implemented using a dynamic array and linked list.
- A queue is implemented using linked list-based queue, array-based queue, and stack-based queue.
- A Map is implemented using Tree map, hash map, or hash table.





# Abstract data type with a real-world example



- If we consider the smartphome. We look at the high specifications of the smartphone, such as:
  - 4 GB RAM
  - Snapdragon 2.2ghz processor
  - 5 inch LCD screen
  - Dual camera
  - Android 8.0

The above specifications of the Smartphone are the data, and we can also perform the following operations on the Smartphone:

- call(): We can call through the smartphone.
- text(): We can text a message.
- photo(): We can click a photo.
- video(): We can also make a video.
- The Smartphone is an entity whose data or specifications and operations are given above. The abstract/logical view and operations are the abstract or logical views of a Smartphone.



# Activity



# Assessment 1



1. List out the advantages of ADT

- a) \_\_\_\_\_
- b) \_\_\_\_\_
- c) \_\_\_\_\_
- d) \_\_\_\_\_

2. Identify the disadvantages of ADT

- a) \_\_\_\_\_
- b) \_\_\_\_\_
- c) \_\_\_\_\_
- d) \_\_\_\_\_





# REFERENCES



1. M. A. Weiss, “Data Structures and Algorithm Analysis in C”, Pearson Education, 8<sup>th</sup> Edition, 2007. [Unit I, II, III, IV,V]
2. ReemaThareja, “Data Structures Using C”, Second Edition , Oxford University Press, 2011
3. A. V. Aho, J. E. Hopcroft and J. D. Ullman, “Data Structures and Algorithms”, Pearson Education, 2<sup>nd</sup> Edition, 2007
4. Stephen G. Kochan, “Programming in C”, 3rd edition, Pearson Education
5. A.M.Tenenbaum, Y. Langsam and M. J. Augenstein, “Data Structures using C”,PearsonEducation, 1<sup>st</sup> Edition, 2003.

## THANK YOU