

# ALGORITHMS AND DATA STRUCTURES

## CS106.3

### 1. Write down the difference between an array and structure.

#### Array:

- An array is a collection of elements of the same data type.
- Elements in an array are accessed using an index, which represents their position within the array.
- Arrays have a fixed size, determined at the time of declaration.
- Elements in an array are stored in contiguous memory locations.
- Arrays are suitable for storing and accessing homogeneous data (data of the same type).

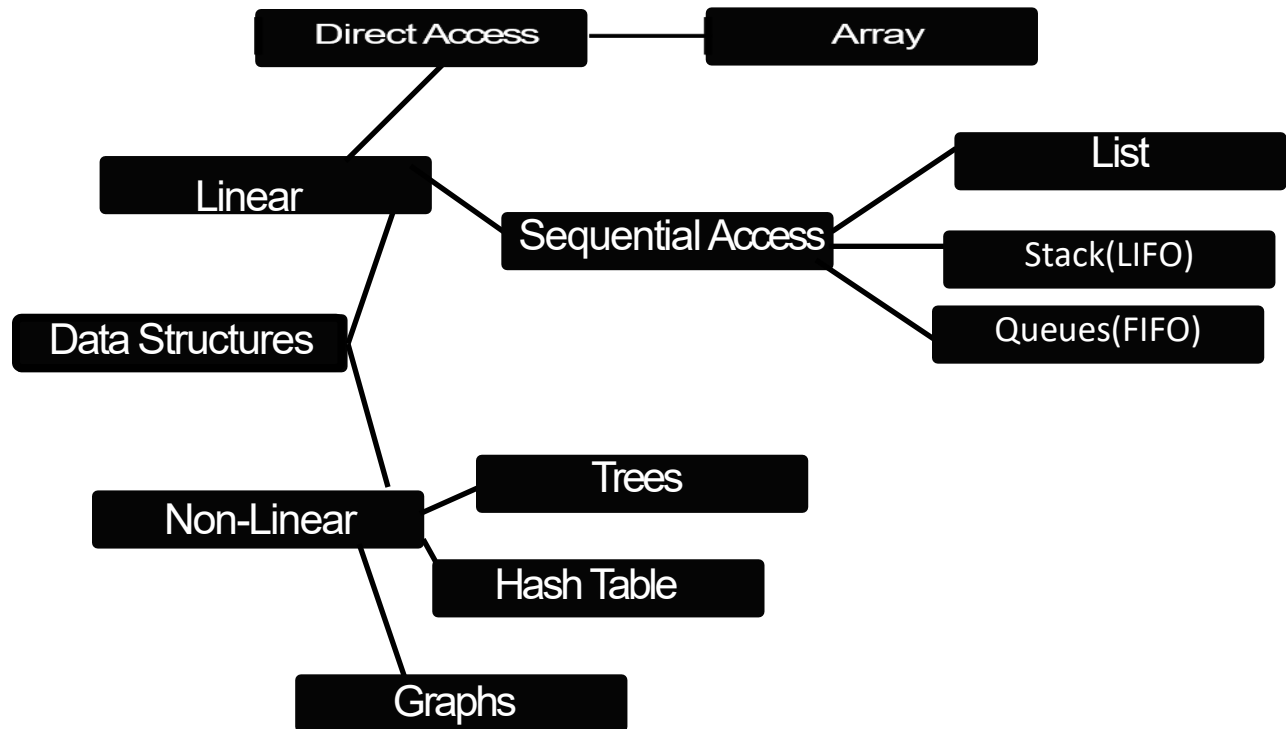
#### Structure:

- A structure is a user-defined data type that allows you to combine different types of variables under a single name.
- The elements in a structure, also called members, can have different data types.
- Structure members are accessed using the dot (.) operator.
- Structures provide a way to group related data together.

### 2. Where should you use data structures.

- Algorithms
- Databases
- Operating Systems
- Networking and Data Compression
- Artificial Intelligence and Machine Learning

### 3. What are the types of data structures.



### 4. What is a linked list data structure.

- A linked list is a linear data structure in which elements, called nodes, are connected together via links or pointers. Each node in a linked list contains data and a reference to the next node. The last node in the list points to null, indicating the end of the list.

### 5. Compare and contrast linear data structures vs nonlinear data structures.

Linear Data Structure	Non-Linear Data Structure
<ul style="list-style-type: none"><li>• The pieces are attached in a sequential or linear order here.</li></ul>	<ul style="list-style-type: none"><li>• Hierarchically or non-linearly, the elements are controlled here.</li></ul>
<ul style="list-style-type: none"><li>• In a linear data structure, each data and data item is</li></ul>	<ul style="list-style-type: none"><li>• Because the data item and data are not</li></ul>

inextricably linked to the others.	related due to their non-sequential existence, the application executes many times.
<ul style="list-style-type: none"> <li>• This data format allows for simple data implementation.</li> </ul>	<ul style="list-style-type: none"> <li>• This data structure contains data that is difficult and complicated.</li> </ul>
<ul style="list-style-type: none"> <li>• A linear data structure includes arrays, linked lists, and stacks.</li> </ul>	<ul style="list-style-type: none"> <li>• A non-linear data structure is made up of trees and graphs.</li> </ul>