

Data Structure & Classifications

DATA STRUCTURE

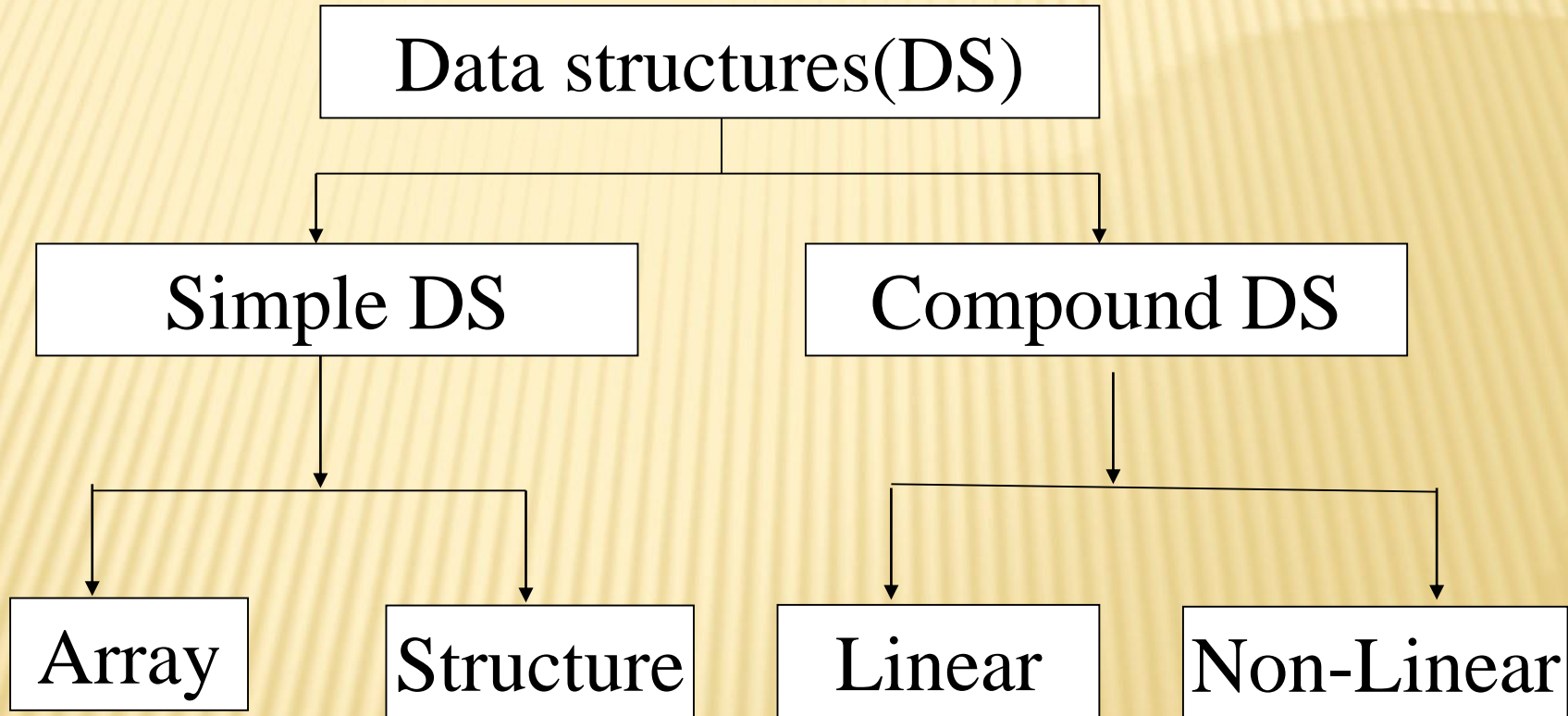
- It is a named group of data of different data types which can be processed as single unit.
 - a representation of the logical relationship existing between individual elements of data.
 - a way of organizing all data items that considers not only the elements stored but also their relationship to each other.
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Classification of data structures

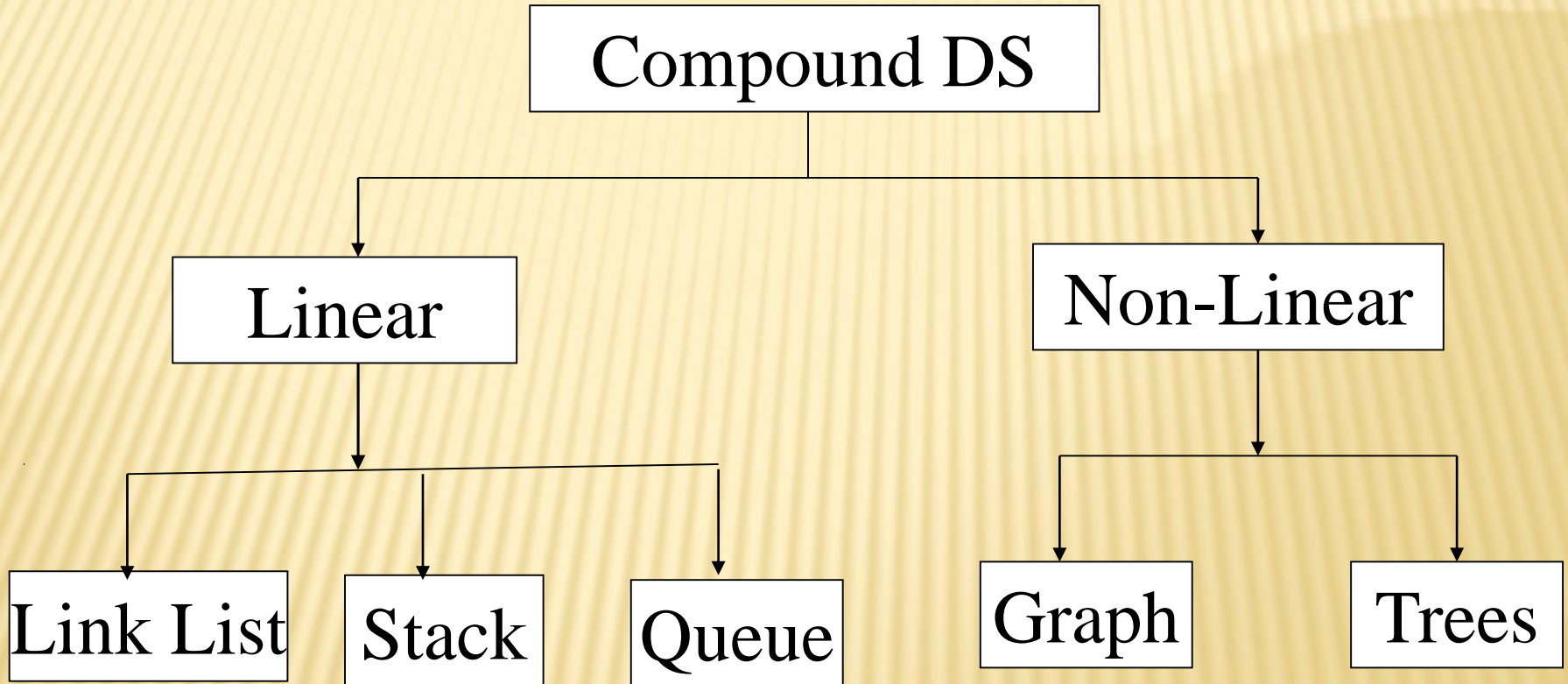
Data structure are normally divided into two broad categories:

- Simple Data Structure
- Compound Data Structure

Classification of data structures



Classification of Data Structures



Simple Data Structures

- Are normally built from primitive data types like integers, real, characters, Boolean.
 - I. Array
 - II. Structure

Compound Data Structures

- Simple data structures can be combined in various ways to form more complex structures are called compound data structures.
 - I. Linear data structures :- are single level data structures. Its elements form a sequence.
 - Stack
 - Queue
 - Linked list
 - II. Non-linear data structures:- are multilevel data structures.
 - Tree
 - Graph

Arrays

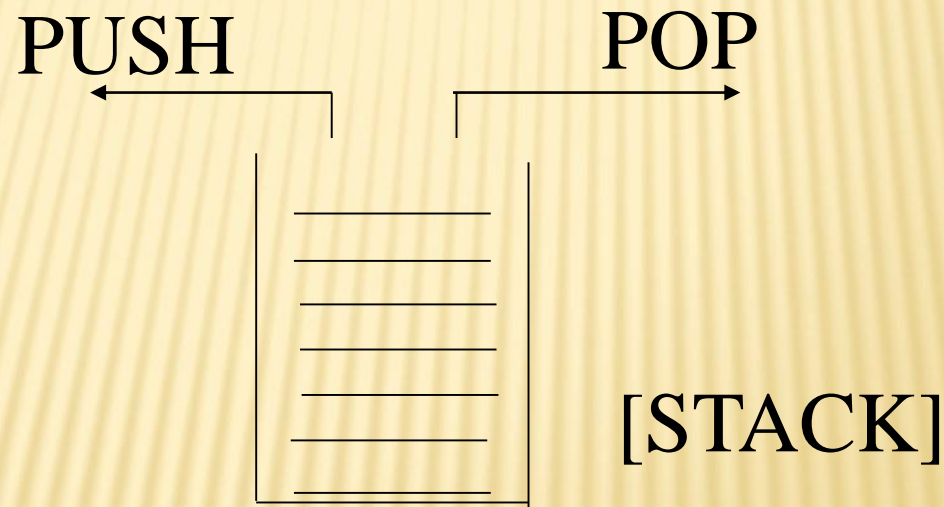
- is a named list of a finite number of similar data elements.
- is a continuous memory location shared by a common name, each element identified by its index value.
- Arrays can be one dimensional, two dimensional or multidimensional.

Structure

- Refers to a named collection of variable of different data types.
- It gathers together different types of information that form a given entity.
- Elements of a structure are referenced using dot operator.

Stacks

It refer to the lists stored and accessed in a special way, where LIFO technique is followed. Insertions and deletions take place only at one end called the top.



Queues

- Queue are first in first out type of data structure (i.e. FIFO)
- In a queue new elements are added to the queue from one end called REAR end and the element are always removed from other end called the FRONT end.
- The people standing in a railway reservation row are an example of queue.

Linked Lists

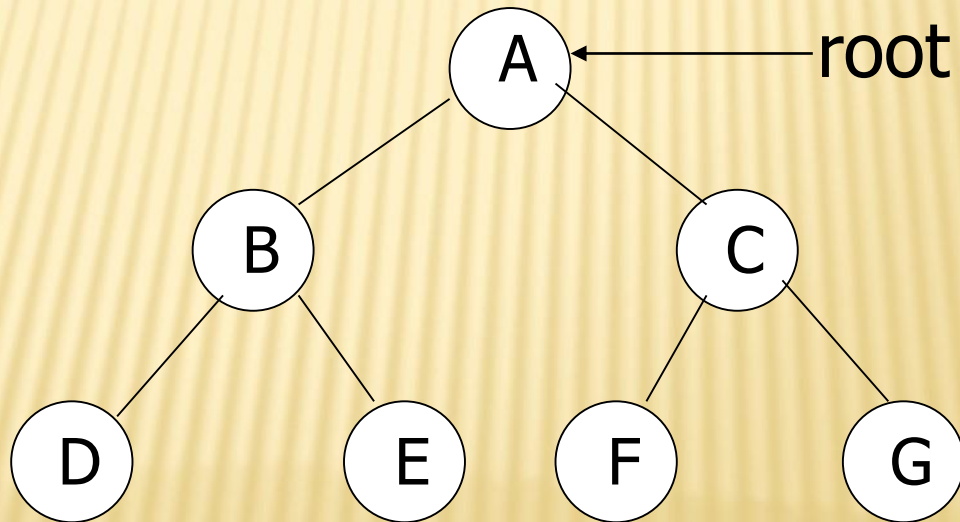
- It can be defined as a collection of variable number of data items.
- Lists are the most commonly used non-primitive data structures.
- An element of list must contain at least two fields, one for storing data or information and other for storing address of next element.

Trees

- A tree can be defined as finite set of data items (nodes).
- Tree is non-linear data structure in which data items are arranged or stored in a sorted sequence.
- Tree represent the hierarchical relationship between various elements.
- Topmost node is called root of the tree and bottommost node are called leaves.

Trees

- ✘ The tree structure organizes the data into branches, which related the information.



Graph

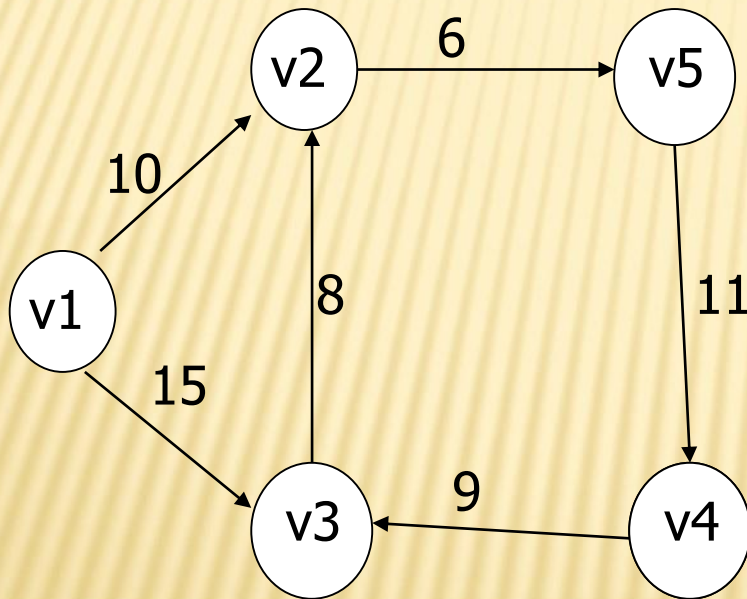
- Graph is a mathematical non-linear data structure capable of representing many kind of physical structures.
- It has found application in Geography, Chemistry and Engineering sciences.
- Definition: A graph $G(V,E)$ is a set of vertices V and a set of edges E .

Graph

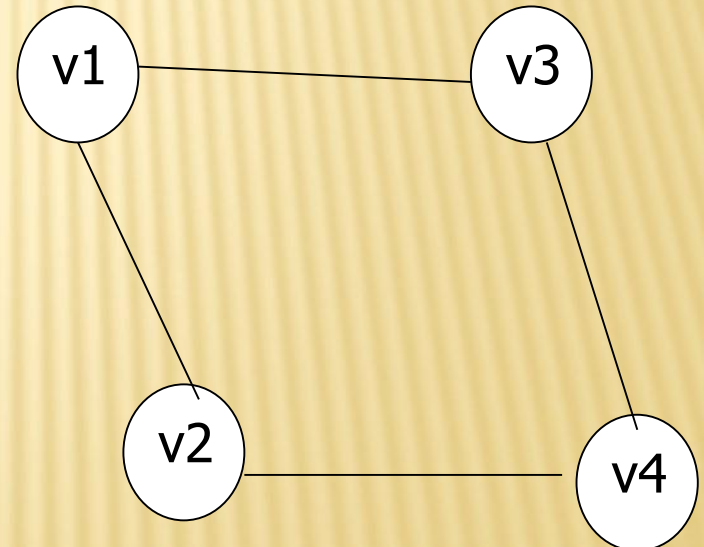
- An edge connects a pair of vertices and many have weight such as length, cost and another measuring instrument for according the graph.
- Vertices on the graph are shown as point or circles and edges are drawn as arcs or line segment.

Graph

✘ Example of graph:



[a] Directed & Weighted Graph



[b] Undirected Graph

Graph

- Types of Graphs:
 - ❖ Directed graph
 - ❖ Undirected graph
 - ❖ Simple graph
 - ❖ Weighted graph
 - ❖ Connected graph
 - ❖ Non-connected graph

Thanks

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