CLASSIFICATION OF DATA STRUCTURES

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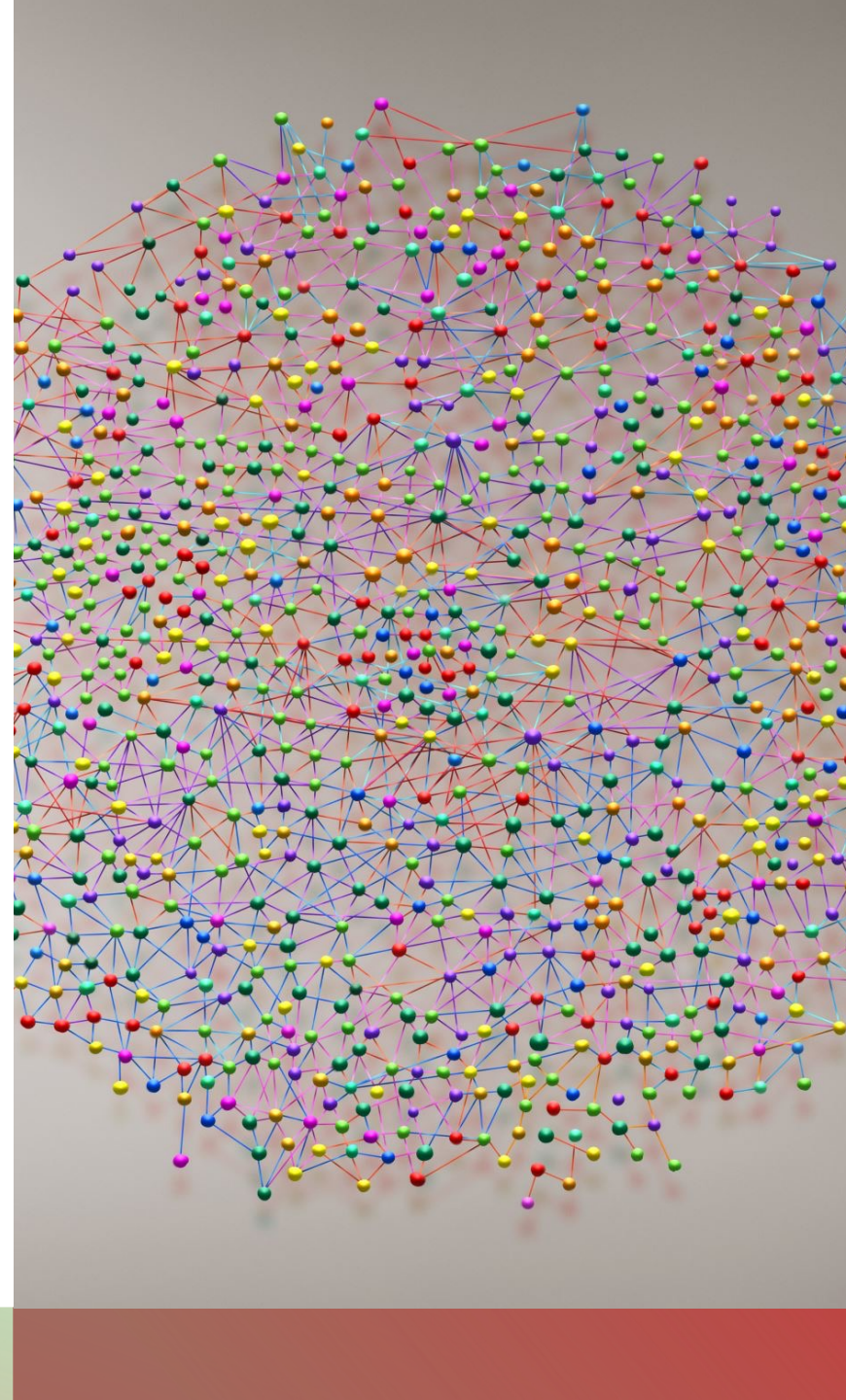
DATA STRUCTURES

- Data type
  - A collection of values along with a set of operations defined on those values
  - Forms
    - Simple, scalar, atomic
      - Made up of values that cannot be decomposed
    - Composite
      - Made up of values that can be decomposed
      - Also called DATA STRUCTURES!



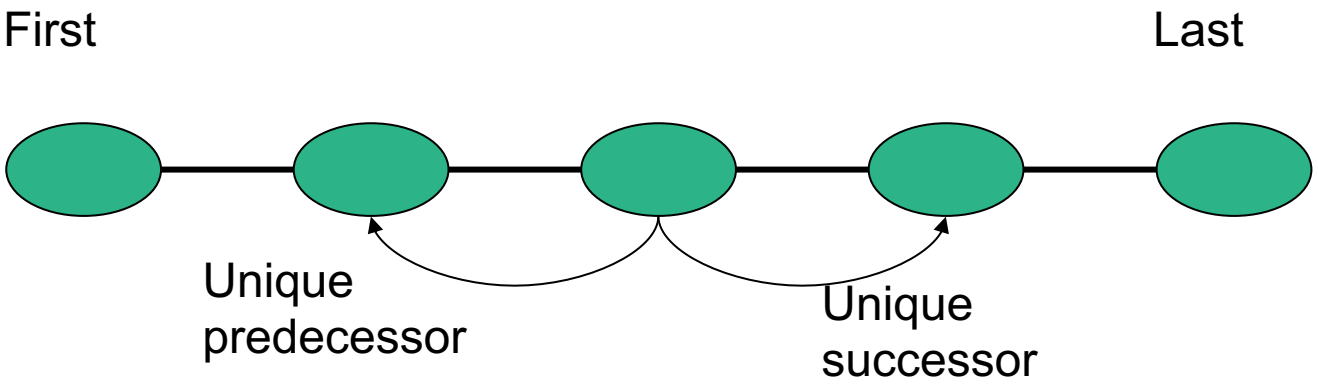
CLASSIFICATION OF DATA STRUCTURES

Classified by structural relationships between components

- Linear data structures
  - Have 1:1 relationship between elements
- Hierarchical data structures
  - Have 1:many relationship between elements
- Graph structures
  - Have many:many relationship between elements
- Set structures
  - No direct relationship between elements

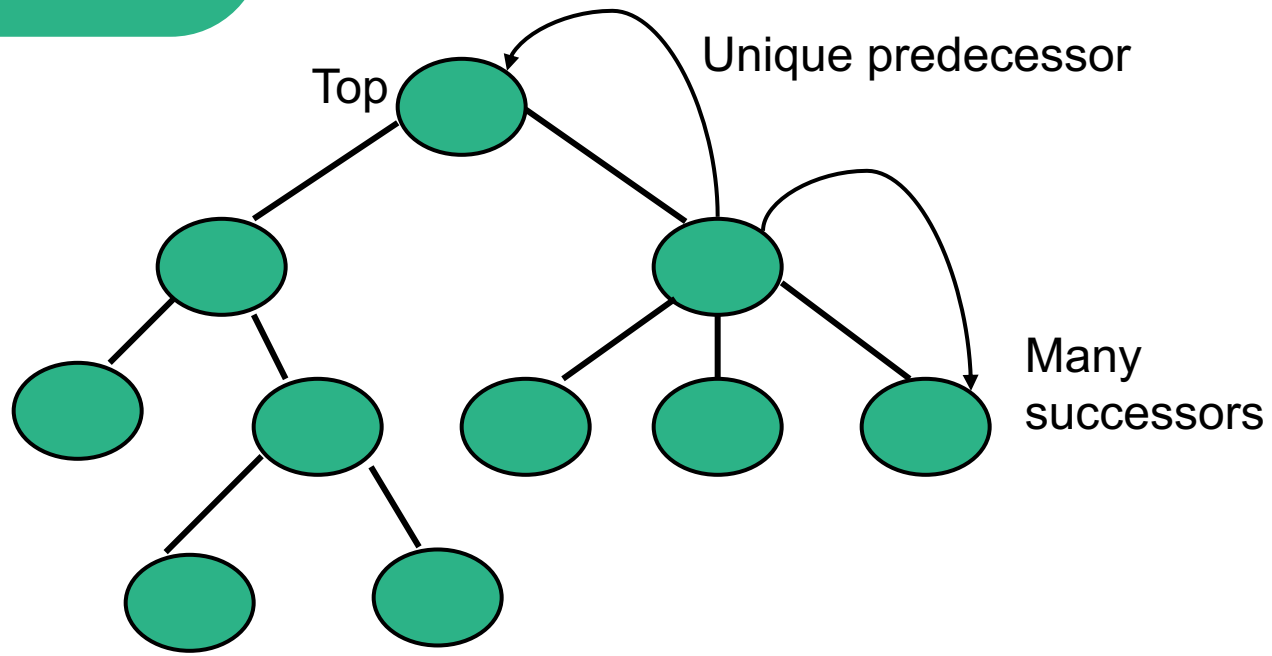
Linear

- Linear data structures – 1:1
  - There is FIRST and LAST element
  - EACH has 1 predecessor and 1 successor



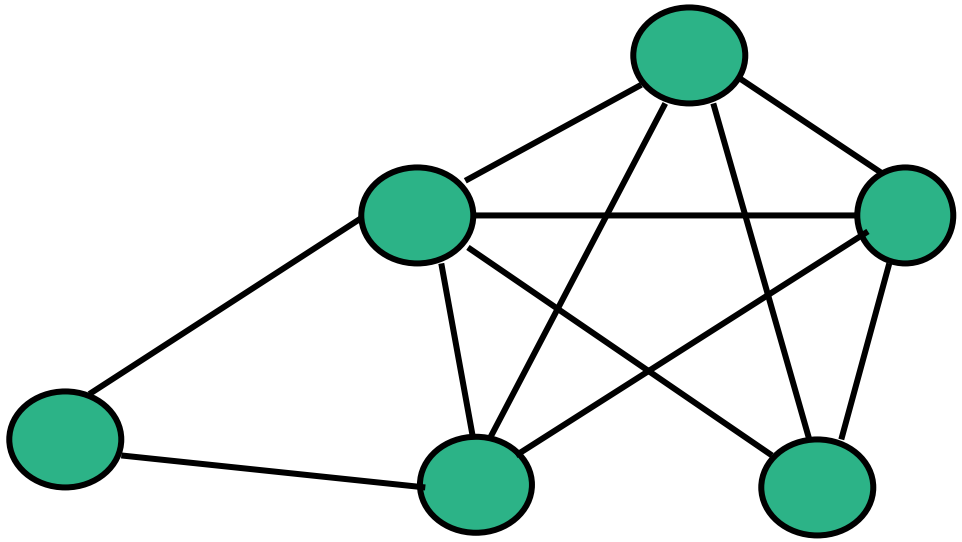
Hierarchical

- Hierarchical data structures – 1:many
  - EACH element has ONE predecessor and MANY successors



Graph

- Graph structures – many:many
  - Richest and most complex data representations
  - ANY element can connect or be connected to an ARBITRARY number of other elements in the structure

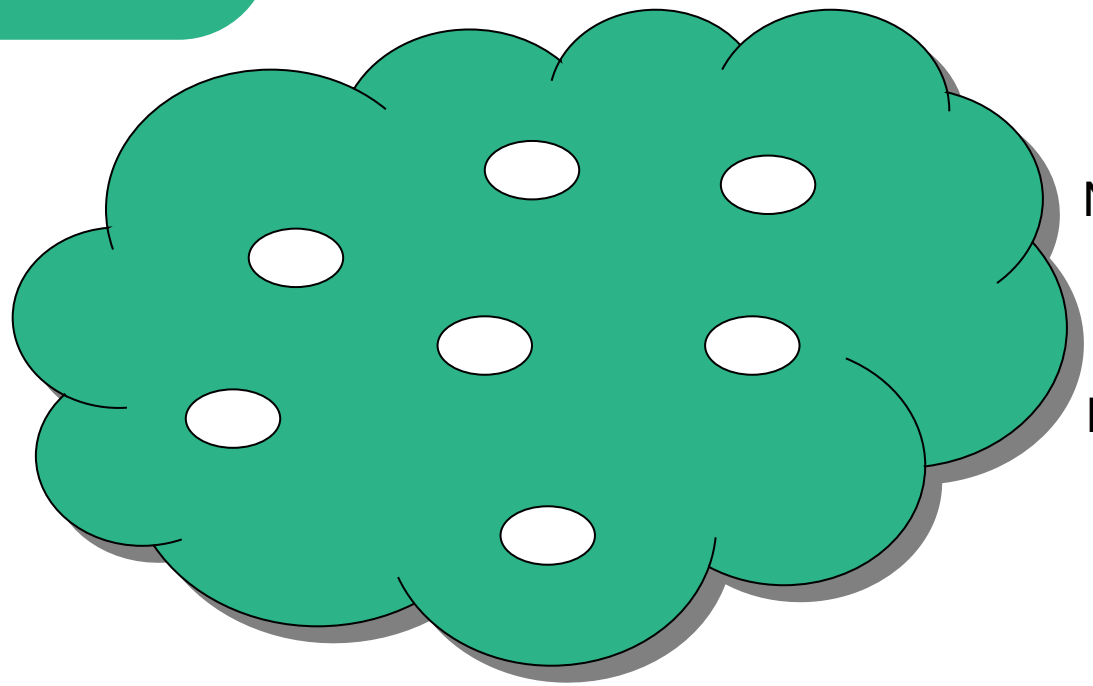


Many predecessors

Many successors

Set

- Set data structures – 0 relationships
  - There is ONLY MEMBERSHIP in the set structure
  - Positioning and location is irrelevant



No predecessors

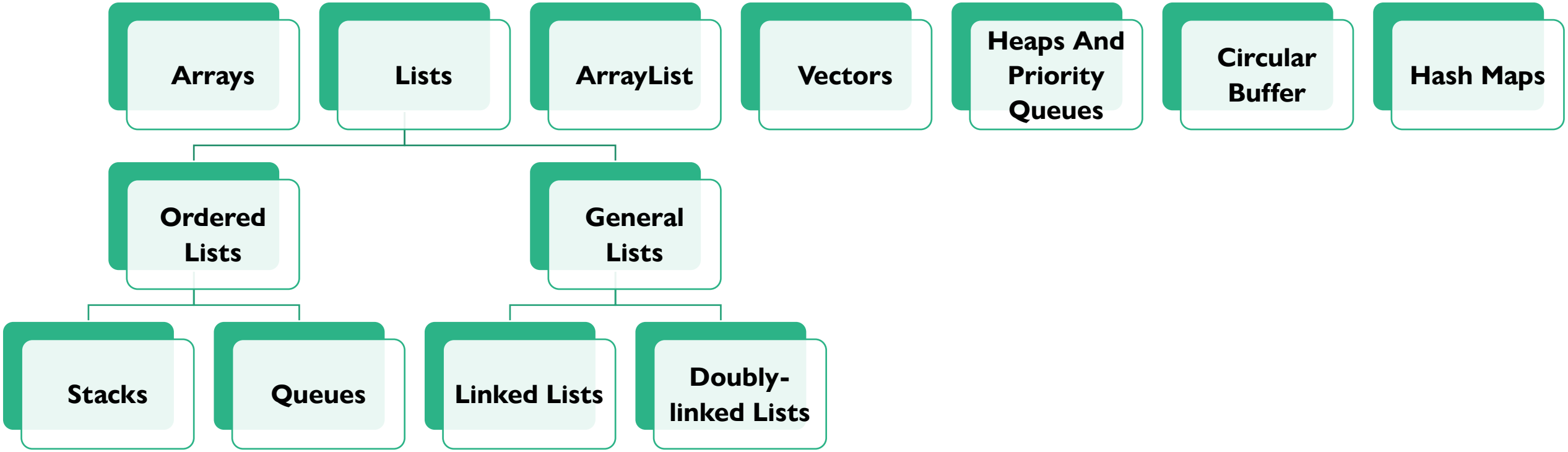
No successors

There are enormous number and variety of data structures

But they all fall into one of the four fundamental classes of data structures

Each of these four classes will be studied thoroughly

CLASSIFICATION OF DATA STRUCTURES



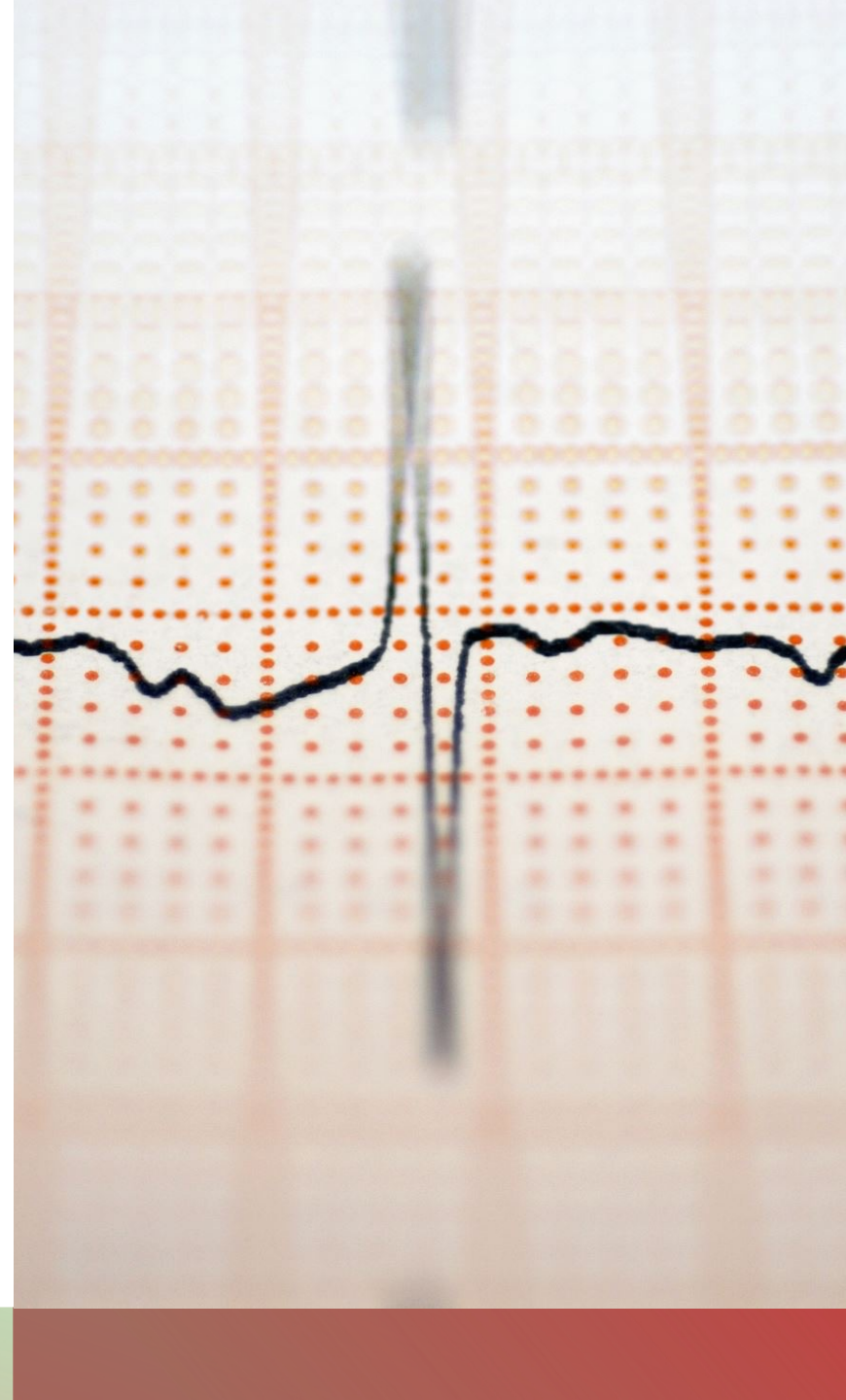
LINEAR DATA STRUCTURES

HIERARCHICAL

Trees	Binary Trees	Binary Search Trees	Heaps
N-ary Trees	Tries	Directed Acyclic Graphs (DAGs)	many more

GRAPH

- Undirected Graph
- Directed Graph (Digraph)
- Acyclic and Cyclic Graph



SETS

- Union
- Intersection
- Subset
- Superset
- **HashSet and HashMaps**