

DATA STRUCTURE

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Fall 2025

SUMMARY

- Classifying Data Structures

DATA STRUCTURE

- It is a way of organizing data in a computer so programmers can effectively use it in their programs.
- The best data structure to use in a program depends on what type of problem you are trying to solve and what you are trying to optimize for.

CLASSIFYING DATA STRUCTURES

- A **linear** data structure arranges data elements in a sequence.

Lists

- A **nonlinear** data structure links data nonsequentially.

Graphs

- **Traversing** a data structure means going from the first element in a data structure to the last.
- you can easily traverse a linear data structure, because you wouldn't need **backtracking**.
- Nonlinear data structures can be better and more efficient for certain kinds of problems, as when we want to store and access to the connections in a social network.

CLASSIFYING DATA STRUCTURES

- A **static** data structure has a fixed size.
 - *If you know how many data elements you want to store and that number is not likely to change.*
 - *An “undo” functions for a program that allows users up to 10 undo operations.*
- A **dynamic** data structure can grow or shrink in size.
 - *It allow you to add and remove data elements efficiently, and these structures make efficient use of memory resources.*
 - *Accessing elements in dynamic data structures can be slow.*
 - *Can often consume more memory.*

```
python

numbers = []
numbers.append(5)
numbers.append(10) # data changes dynamically
```

```
python

t = (10, 20, 30) # fixed size: 3 items

# t.append(40) # ✗ Not allowed
# t[0] = 99    # ✗ Not allowed
```

CLASSIFYING DATA STRUCTURES

- A **homogeneous** data structure can hold only a single data type, such as integers or strings.
- A **heterogeneous** array is one that can hold different types of data rather than just a single type, as List, Dictionary or Tuple in Python.