

# 3.1 Introduction to Abstract Data Types

## ABSTRACT DATA TYPE (ADTs):

- Defines some kind of data and the operations that can be performed on it
- Fundamentally concerned with the *what?!?!?*
  - What data is stored?
  - What can we do with this data?

## DATA STRUCTURE:

- Concrete strategy for *storing* some data
- Fundamentally concerned with the *how?!?!?*
  - How is that data stored?
  - How do we actually implement our desired methods to operate on this data?

## FAMOUS ABSTRACT DATA TYPES:

### SET:

- **Data:**
  - A collection of *unique* elements
- **Operations:**
  - Get size
  - Insert a value (*w/o using duplicates*)
  - Remove a specified value
  - Check membership

### MULTISET:

- **Data:**
  - A collection of elements (*possibly with duplicates*)
- **Operations:**
  - Same as set (*Insert operation allows for duplicates*)

### LIST:

- **Data:**
  - An ordered sequence of elements
- **Operations:**
  - Access element by index
  - Insert a value at a given index
  - Remove a value at a given index

## MAP:

- **Data:**
  - A collection of key-value pairs, where each **key is unique** and **associated with a single value**
- **Operations:**
  - Lookup a value for a given key
  - Insert a new key-value pair
  - Remove a key-value pair
  - Update the value associated with given key

## ITERABLE:

- **Data:**
  - A collection of values (*may/ may not be unique*)
- **Operations:**
  - Iterate through the elements of the collection one at a time

**Python has a built-in set class that implements the Set ADT & does all the work of duplicate-avoidance for you!**