Static and Dynamic Arrays

Overview

- Fundamental Building Block for Data Structures
- **Static Array**
  - A fixed-length container containing elements that are indexable (each element has a reference #)
  - Given as contiguous chunks of memory (memory addresses are adjacent)
- **Dynamic Array**
  - Can grow and shrink in size as needed

Why Use It?

- **Static Array**
  - Storing/accessing sequential data
  - Temporarily store objects
  - Used as buffers by IO routines

Big O Analysis

Operation	Static	Dynamic	Explanation
Insertion	N/A	O(n)	O(n) for dynamic array: original array elements must be shifted and potentially copied over to a new array with double the size once the capacity is reached
Deletion	N/A	O(n)	O(n) for dynamic array: array elements must shifted over
Access	O(1)	O(1)	
Search	O(n)	O(n)	

Code Implementation

- A dynamic array can be implemented using a static array
  - 1) Create a static array with an initial capacity
  - Add elements to the static array, keeping track to the number of elements
  - If the capacity is exceeded, a new array with twice the capacity is created and the original elements are copied over
- https://www.geeksforgeeks.org/how-do-dynamic-arrays-work/