Neetcode DSA

What is a data structure

* A data structure is a method to structure data inside of RAM
* Ram is where all variables are stored that is measured in bytes
  + A byte = 8 bits
  + A bit is a 0 or 1 and each byte holds 8 bits
  + Most common are 4bytes which are 32 bites
* Ram has two storage methods
  + Values and addresses
  + A blackboard with white text and numbers

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  + Each address increments by 4 because each value has 4bytes
* Arrays are considered the simplest structure because they appears exactly how they appear
* ASCII data only takes 1 byte to store so your address only increments by 1
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  + Values are stored contiguously

Static Arrays

* Reading arrays is easy as we do not need to know the exact address
* The first index always starts with 0
* Reading a specific index is always O(n) as the time complexity of picking a specific index will never increase
  + This occurs in constant time
* Ram = random access memory
  + In terms of reading an array this means we can access any part of the memory in constant time
* Looping through the entire array is a for or while loop in most languages
* Writing to an array, is a little bit more confusing
* Arrays are of a fixed size, meaning the size of 1,2,3 is 3
  + You are not allowed to add indexes because these are of a fixed size
  + Python and JavaScript don’t usually encounter this issue because they do not use static arrays and instead use dynamic arrays
  + To remove from a static array, you can remove, and the memory will usually unassign the value at the index
  + Writing to an array by removing or adding is also a O (1) time operation
* Inserting at any arbitrary position Is not efficient, like at the beginning or middle, because the index would have to slide each value over by 1
  + This is a 0(n) command
  + Inserting at the end is a O(1)
* Big O always refers to the worst case, aka the operation of my scenario that would take the most time
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Dynamic Arrays

* In python and JavaScript the default are dynamic arrays