

Data Structures + Algorithms = Programs  
↓  
ways to store data      ↓  
ways/functions to use data structures to write programs      instructions for computer

Find the best Data structures & Algorithms for a specific task to write great programs

Good code is:

- 1) Readable - Clean code that is maintainable
- 2) Scalable <  $\begin{cases} \text{Speed (CPU)} \\ \text{Memory (RAM)} \end{cases}$

Some solutions have a tradeoff between speed & memory  
• Sacrificing Speed for memory & vice-versa

When a program executes it has 2 ways it uses memory:

- 1) Heap, where we store variables
- 2) Stack, where we keep track of function calls

Examples of Good Design:

Instead of keeping data in an array where we need to lookup properties we could instead propagate data into a hashmap to optimize an  $O(N)$  time  $\rightarrow O(1)$  time

It's important to keep Big O in mind when writing code

Each D.S. is optimal to its specific use

- each has its own advantage/drawbacks
- each are just different variations of how to store data