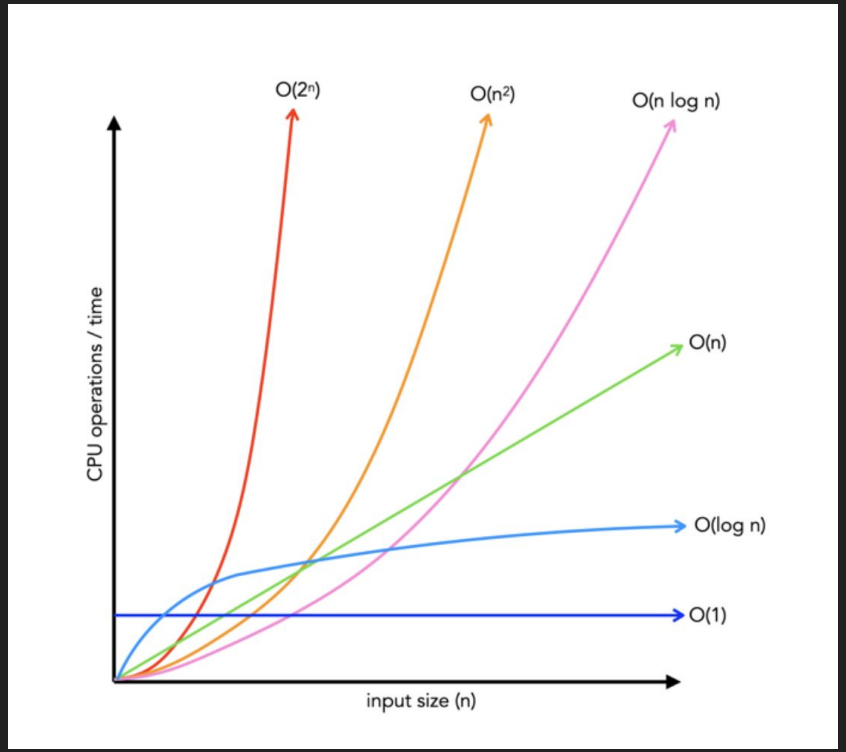
CL14: More on Big-O Notation

Common Runtimes

- O(1) - Constant
- O(n) - Linear
- O(n^2) - Quadratic
- O(x^n) - Exponential (BAD)



Source

Dictionaries vs. Lists

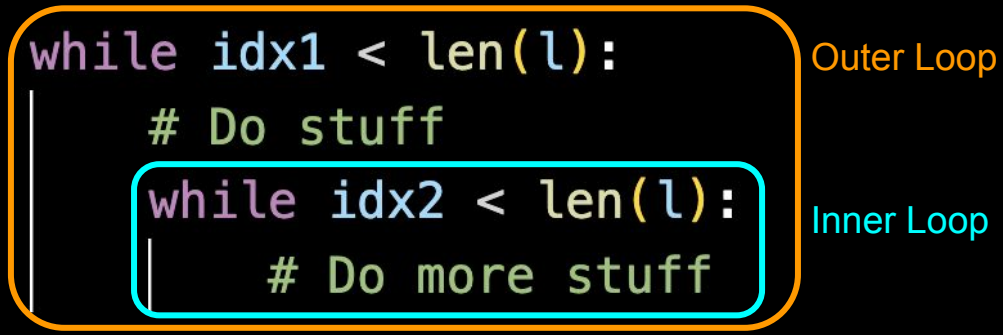
- There are runtime considerations for dictionaries/hash tables and lists!
- Dictionaries:
  - Faster lookup: “x in d” ~ O(1)
  - Slower iteration (theoretically)
- Lists:
  - Slower lookup: “x in l” ~ O(n)
  - Faster iteration (theoretically)
- There are many other pros/cons to dictionaries vs. lists, which you will see in other languages/future courses.

Search Algorithms

Selection Sort

Outer loop: Loop over list (everything up to pointer is sorted, everything else is not). Once you reach the end of the list, you're done!

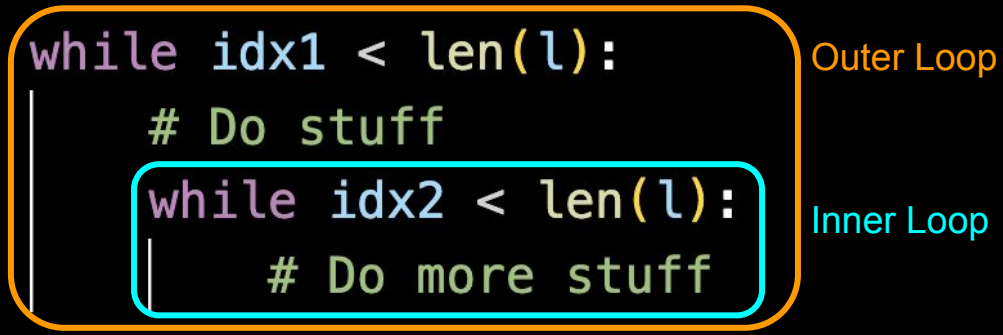
Inner loop: Loop over list to find minimum. Swap the object at outer pointer with the minimum.



Insertion Sort

Outer loop: Loop over list (everything up to pointer is sorted, everything else is not). Once you reach the end of the list, you're done!

Inner loop: Swap the object at the pointer backwards until it's in the correct position



Algorithm Analysis

- Runtime: O(n^2)
- Memory Usage: O(n)