Big O

- Big 0
- *Asymptotic Notation*
- *Time Complexity*

O - upper bound
θ - tight bound
Ω - lower bound

#insertion #merge

Insertion Sort

- $O(n^2)$
- If the array is already sorted, insertion sort would take $O(n)$ only.
- *in-place*
- it is faster when sorting data as it comes in.

Merge Sort

- $O(nlgn)$

Heap

- a **heap** is **a complete binary tree** that satisfies the **heap property**
- complete - fully filled except possibly for the last level

- heap property - the parent node is greater than or equal to its children
- monotonically increasing
- Used in Priority Queue (ADT) and Graph Algorithms

Quicksort

Sorted - $O(n^2)$
Rev - $O(n^2)$
Random - $O(nlgn)$

- Unstable
- In-place
- Insert-Search-Delete on collections

Hash Table

- hash function
- key-value pair
- hash table size should be about 1.3 times the maximum number of keys
- size of hash table should be a **prime number**
- keep ratio between keys and table size in range $[\alpha/4, \alpha]$

Separate Chaining
- keeping new keys at the front of the chain

Open Addressing

- Linear Probing
- Quadratic Probing
- Double Hashing