DSA

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1 Hashing

Definition: *Hashing is the process of mapping a key to a address for storing and retrieving.*
Advantages: *Easy to implement.*
Disadvantages: *Collisions.*

Collision Handling:

- **Linear probing** *Find the next empty slot.*
  - **Advantages:** *Easy to implement.*
  - **Disadvantages:** *Clustering, approximate to O(N) in the worst case.*
- **Chaining:** *Insert at the end of the linked list.*
  - **Advantages:** *No clustering.*
  - **Disadvantages:** *Extra space, hard to balance the size of linked-lists in hash table.*
- **Quadratic probing:** *Find the next empty slot by quadratic function.*
  - **Advantages:** *No clustering.*
  - **Disadvantages:** *May not find empty slot, lead to infinite loop.*
- **Double hashing:** *Find the next empty slot by another hash function.*
  - **Advantages:** *No clustering.*
  - **Disadvantages:** *Complex, need a large size hash table to work well.*

2 Recursion

Definition: *Recursion is repetition, a funtion will invokes itself.*
Advantages: *Easy to implement.*
Disadvantages: *When a function is called, a stack frame is push onto the stack, if recursion many times, lead to stack-over-flow.*