CSE-207

L-1
20.12.21

Hashing

linear search → O(n)

binary search → O(log n)

Hashing | Hash table → const. amount of time-এ store & retreive করে।

h : k → i ⇒ hash function

Direct addressing : h(k) = k, h(k) = k % m

i) Memory consuming

ii) same value একাধিকবার store হবে না।
multiple element same হয়ে যাবে। → collision

Collision depends on → hash function, array size (Table)

Hash function Assumption:

Simple Uniform Hashing

Table size → m

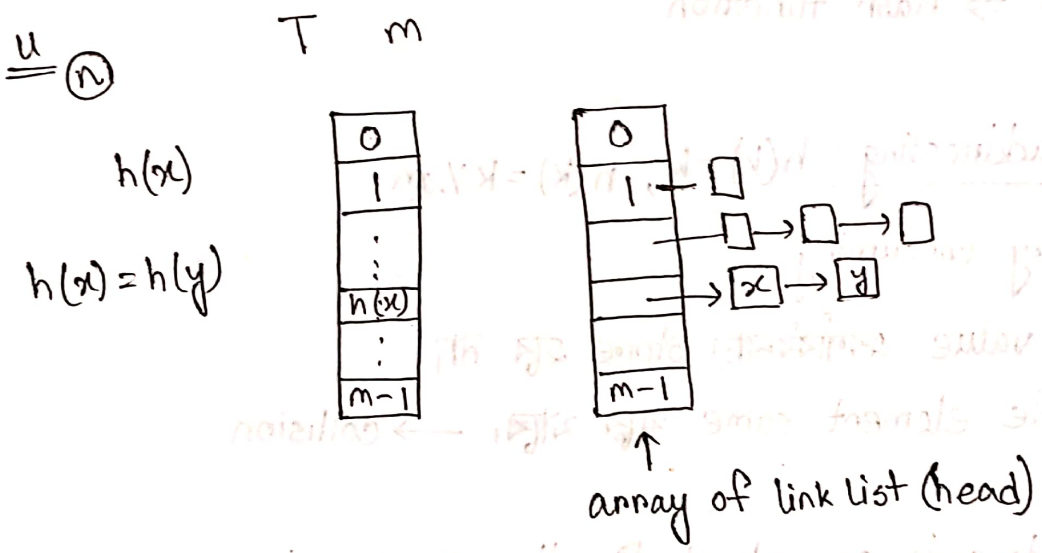
$h(x) = i = \frac{1}{m}$: Uniformity

Universal: যেকোন element যেকোথায় যাবে, সেটা একে অন্যের উপর dependent না;

$$x \neq y \quad P_r(h(x) = h(y)) = \frac{1}{m}$$

Collision Resolve Technique:

① Separate Chaining:



* length of a chain $l(x)$ will determine the running time.

$$C_{x,y} = \begin{cases} 1 & h(x) = h(y) \\ 0 & h(x) \neq h(y) \end{cases}$$

$$l_x = \sum_{y \in T} C_{x,y}$$

$$E(l_x) = E\left(\sum_{y \in T} C_{x,y}\right)$$

$$= \sum_{y \in T} \left(E(C_{x,y})\right)$$

$$= \sum_{y \in T} \left(1 * \frac{1}{m} + 0\right)$$

$$= \sum_{y \in T} \frac{1}{m}$$

$$= \frac{n}{m} \quad [n \text{ of elements}]$$

$$= \alpha$$

$$= \text{load factor}$$

Runtime : $O(1+\alpha)$ for unsuccessful search

↳ for computing hash function