

Analysis of Algorithms-CS 323

Lecture # 7 - March 16, 2016

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Hashing - For Searching

Linear Search $O(n)$

Binary Search $O(\log n)$

Binary Search Tree $O(\log n)$

when balanced
avg (balanced)
 $O(n) \rightarrow$ not balanced (worst case)

Variation of BST $O(\log n)$

Can we do better
the idea of Hashing is where the data is

Hash Function: # We need to identify the key.

In word and # $h(k)$: hash map is allowing in array
we use phone numbers that where the value is in array.

Usually we take a particular key

let say $h(k) = k \bmod 10000$
It give me last 4 numbers

last 4 numbers be happened to same
the same number last 4

$K_1 \neq K_2$ # Although keys are not same but
hashmap is same
 $h(K_1) = h(K_2)$ Collision \rightarrow chaining

n = Number of elements
m = Size of Array

Worst case = $O(n)$
Average case = $O(1)$



Collision solution is called resolution

2 examples - Social security numbers Phone numbers
YY-~~YY~~YY YYW
↓
exchange

Social security way based on 1

Parking spot when somebody are parked

2nd way probing (near parking) linear probing $h(k) = i \cdot a + b$

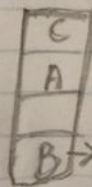
$h(k, i) = h(k) + i \cdot a + b \rightarrow$ quadratic probing
how populated still constant.

What happened if I delete something.

I take the place and marked it.

the searching will continue

Deletion upper the problems.



B \rightarrow withdraw from school.

Binary Search tree

Hash map Generally we use a lot.

Clustering means:- Data grouping together.