【DS】Day21

Tags	
Date	@June 20, 2022
Summary	

【Week 6】Hash Tables

6.1 Hash Table

Basic Plan

Save items in a key-indexed table(index is a function of the key).

Hash function: Method for computing array index from key.

Issues

- Computing the hash function
- Equality test: Method for checking whether two keys are equal
- Collision resolution: Algorithm and data structure to handle two keys that hash to the same array index.

Computing the Hash Function

- Efficiently computable
- Each table index equally likely for each key

Java's Hash Code Conventions

All Java classes inherit a method `hashCode()`, which returns a 32-bit int

If `x.equals(y)`, then `x.hashCode() == y.hashCode()`.

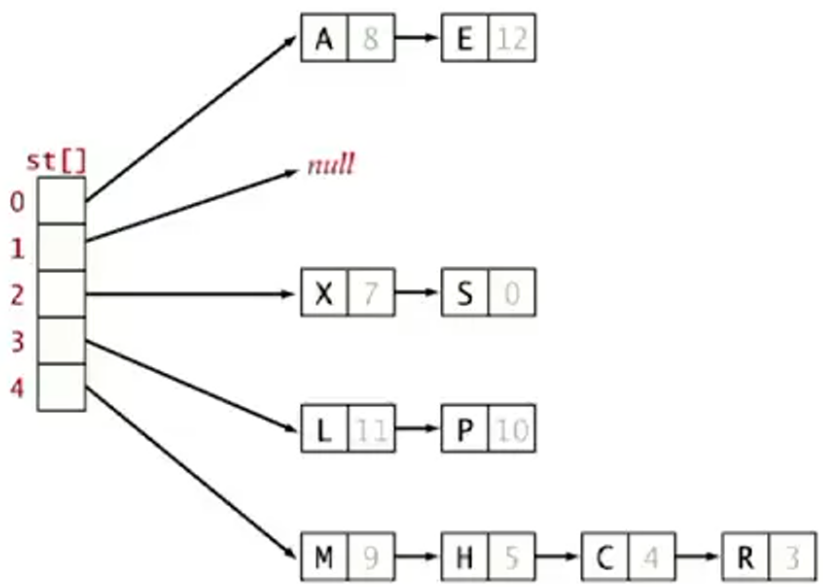
6.2 Collision Chaining

Collision: Two distinct keys hashing to same index

Use an array of M < N linked lists.

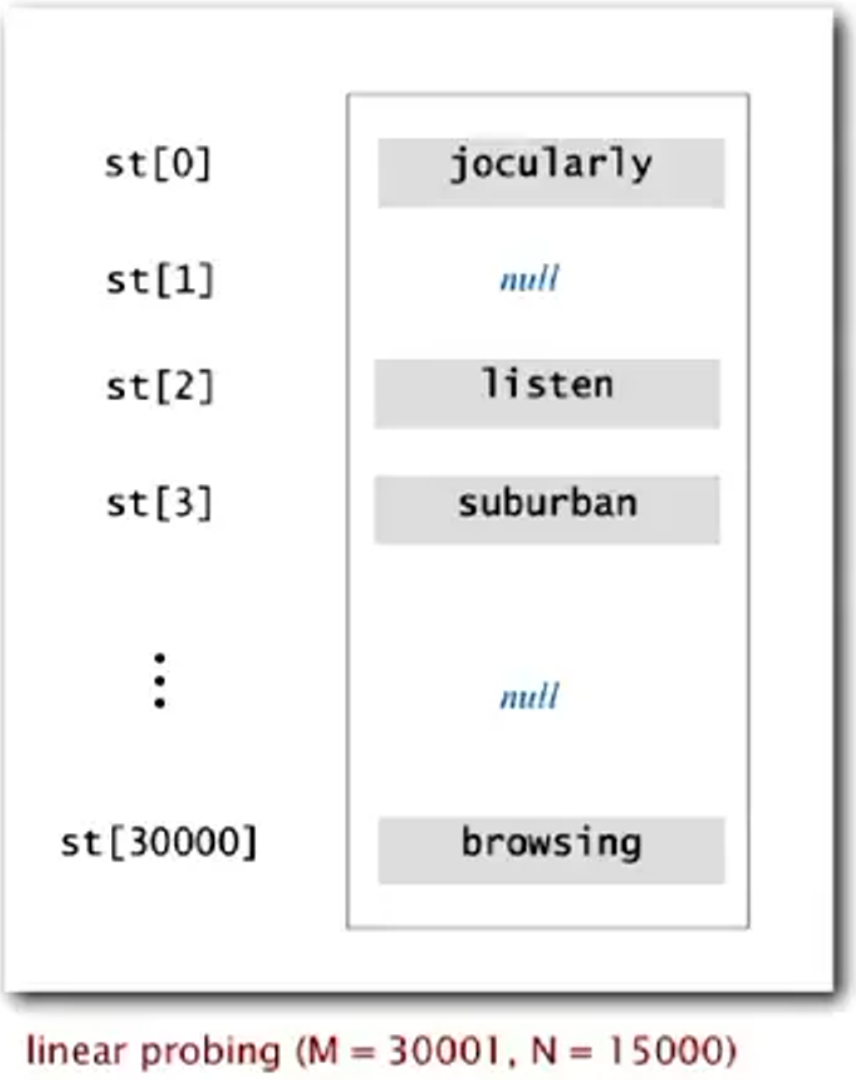
- Hash: Map key to integer i between 0 and M - 1
- Insert: Put at front of ith chain
- Search: Need to search only ith chain.

key	hash	value
S	2	0
E	0	1
A	0	2
R	4	3
C	4	4
H	4	5
E	0	6
X	2	7
A	0	8
M	4	9
P	3	10
L	3	11
E	0	12



6.3 Linear Probing

Open Addressing: When a new key collides, find next empty slot and put it there



linear probing (M = 30001, N = 15000)

Hash: Map key to integer i between 0 and M - 1

Insert: Put at table index i if free; if not try i+1, i+2, etc.

Note: Array size M must be greater than number of key-value pairs N.