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Hashmaps & Tries

↳ D.S. → <key, value>

Scorpio → 9
ballno → 3
Fortuner → 10

↑ key (string)

↑ value. (int)

ordered → O(logn)

unordered → O(1)

D.S create search, insertion, delete,
get random create a T.C. O(1).

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Implementation
↳ Linked List → O(n)
↳ BST → O(logn)

ordered Map → BST base implementation

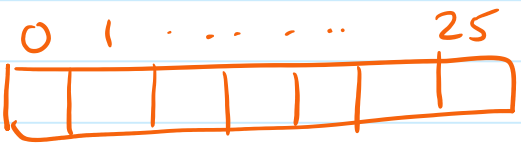
Array | Hashtable → if index known then O(1) me
↳ Bucket Array

Hash function

"meet" → H.F → 0^{th} index

Conversion
↓
Code.

Hash function → Hash
→ Compression function
↑
range me lana.



if 56 % 26 = 20

babbar → H.C

b + a + b + b + a + r.

→ 26.
↓
CF
% 26
↓
0^{th} index

index

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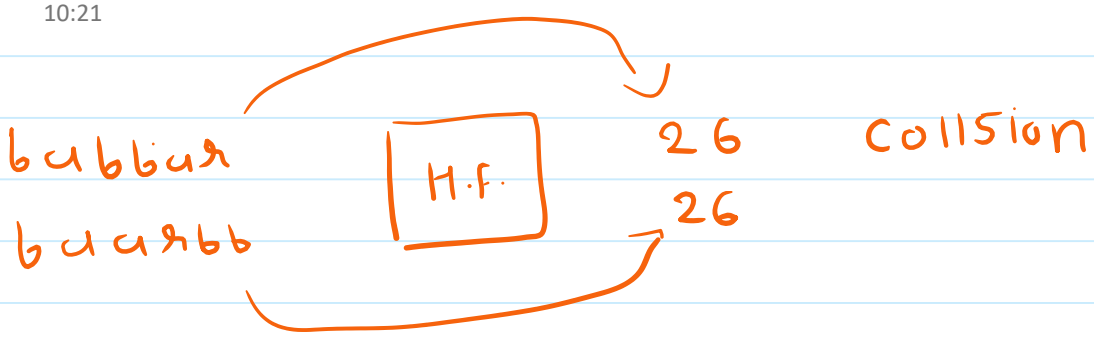
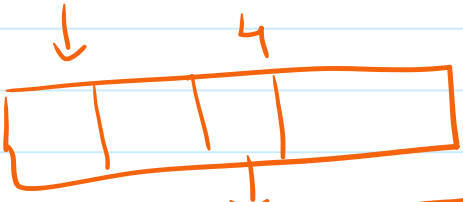


Collision Handling :- open Hashing

closed Addressing



→ h(i) + F(i)

↑

Free space.

Link list from store

already value store.

↖ linear probing

↓

f(i) = i

Quadratic probic => $f(i) = i^2$

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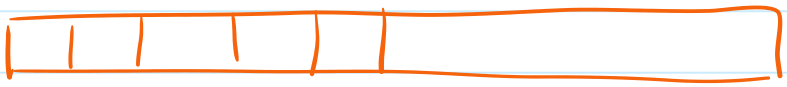


no. of element → n

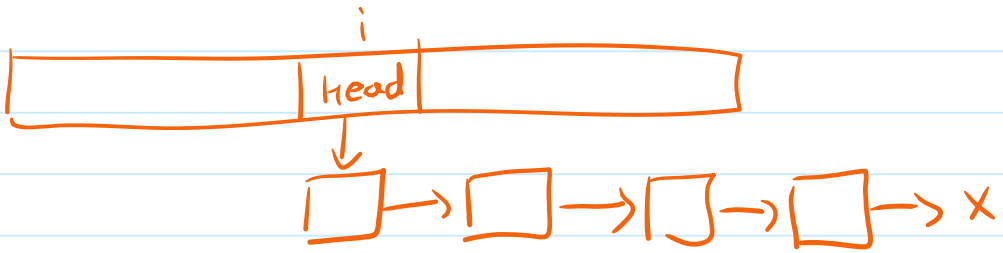
free box → b

load factor → $\frac{n}{b}$ < 0.7

Hash function good.

bubaca → k size O(k)

n >> k → O(k) → O(1)



H.f strong

(Q) i/p → string → "Thiruvananthapuram"

o/p → t →
v →
a → } all curcter How Many time?

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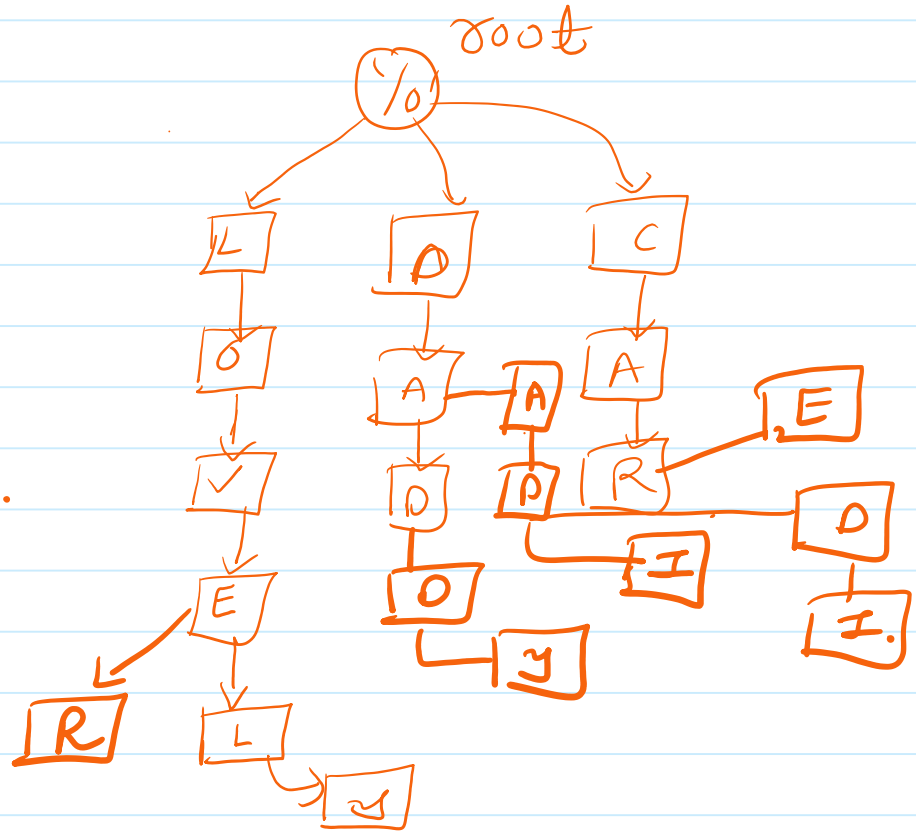
Tries : → D.S.
→ Multi-way Tree structure
→ Pattern-searching used

auto suggestion project. Credit

Pattern length ∝ time complexity

Strings

Love
LOVELY
DAD
CAR
DADDY
DADDI
DAADDI.
CARE
LOVER



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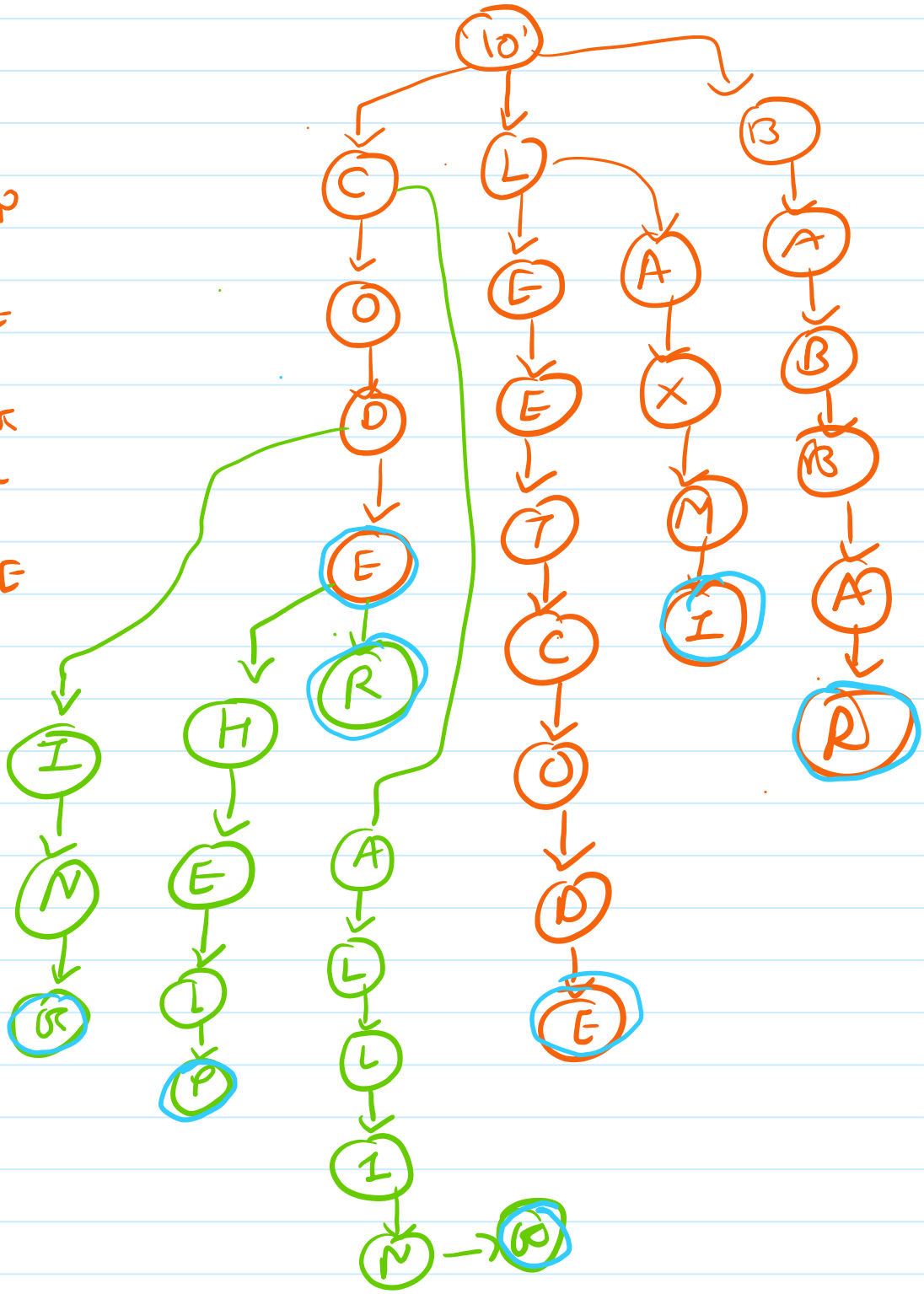
Strings

CODE
CODER
CODEHELP
CODING
LEETCODE
LAXMI
CALLING
BABBAR
INDIA
SUPREME

Terminal node Marked



If any string delete that time terminal node convert to normal node. if terminal node persent that string valid.

that string valid.

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Insertion
↳ node present
↳ node pe chale jao
↳ node absent
↳ node create karo &
node pe jao

Deletion → remove (root, 'CODEINK')
↳ search coding
↳ last character
↳ terminal false marked.

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14 longest common prefix

#1 code

code
coder
coding
codehelp

Lov
Love songs
Love code
Love babbar
Lovely.

vec[] -> {coding, coder, codehelp, code, codingDynia, codeforce}

i/p :- codef

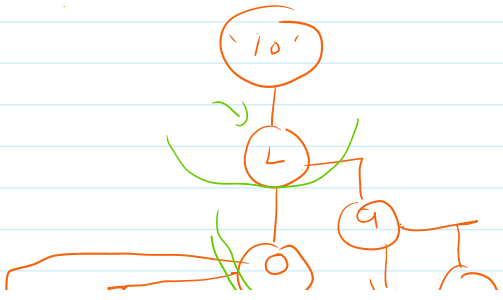
c -> [7 string]
co -> [7 string]
cod -> [7 string]
code -> [4 string]
codef -> [1 string]

vector -> [lover, lost, lend, loving, love, lord, least, Last, Live, list]

i/p :- lost

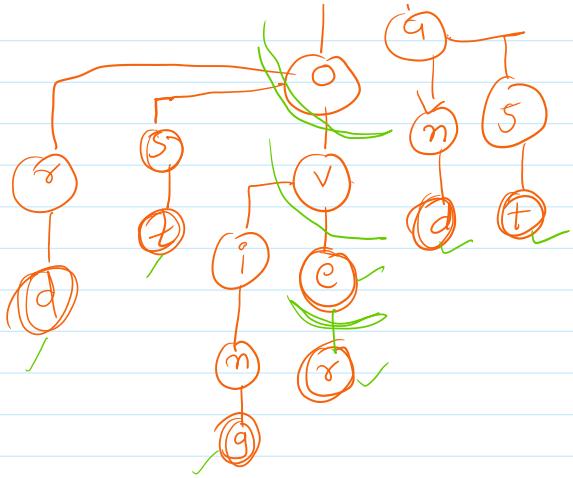
l -> [all string print]
lo [5 string]
los [1 string]
lost [1 string]

Vector -> [love, lover, loving, land, last, lost, lord]



i/p :- "love"

l = 7 strings
lo = 5 strings



ll = 7 strings
lo = 5 strings
love = 3 strings
love = 2 strings

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gfg Array subset of Another Array

a_1 = | 7 | 1 | 13 | 21 | 3 | 7 | 3 → N

a_2 = | 3 | 7 | 1 | 7 → M

a_2 is subset of a_1

(M1) loop throw

Check all element of a_2 in a_1 with same occurence

T.C = O(nm)

(M2) Binary search → sort

T.C = O(n log m) + O(m log n)

(M3) O(m + n)

Hashing

Map<int, int>

a_1 value	occurence.
11	+0
7	+1+0
1	+0
13	1

a_2 = 11 = 3 = 7 = 1 = 7 } true.

$$\begin{vmatrix} 7 & 10 \\ 13 & 1 \\ 21 & 1 \\ 3 & 21 \end{vmatrix} = 7$$

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gfg union of two linked lists

L1 9 -> 6 -> 4 -> 2 -> 3 -> 8 -> X

L2 1 -> 2 -> 8 -> 6 -> 2 -> X

UL = 1 -> 2 -> 3 -> 4 -> 6 -> 8 -> 9 -> X

(M) Map used

Map<int, Node*>

int	Node*
9	<9>
6	<6>
4	<4>
2	<2>
3	<3>
8	<8>
1	<1>

Map ki duplicate entry nut allow if duplicate element insert them that is a old value override.

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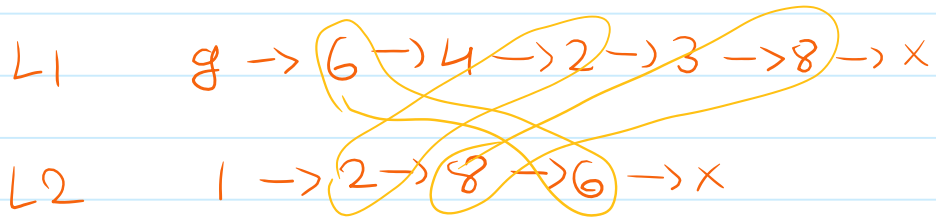
gfg intersection of two LL.



Ans :- 6 -> 2 -> 8

map<int, int>

key	Occurce.
1	1
2	1
8	1
6	1

(1) has L2 item.

(2) iterate L1 & eliminate items not in L2

(3) get the Find IL.

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gfg Sum Equals to sum

N=7 3|4|7|1|2|9|8

a+b = c+d

3+7 = 9+1

10 = 10

(M1) all pairs Gen.

Run loop 4 nested all possible pair & check cod^n.

T.C = $O(n^4)$

(M2)

3|4|7|1|2|9|8

a+b = c+d

(3,4) (4,7) SUM store Map
(3,7) (4,1)
(3,1)
(3,2)
(3,9)
(3,8)

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gfg

largest subarray with 0 sum ✓✓

largest subarray of 0's and 1's

a -> 15 | -2 | 2 | -8 | 1 | 7 | 10 | 23

M1

Compute all substring

filter subarray with sum 0

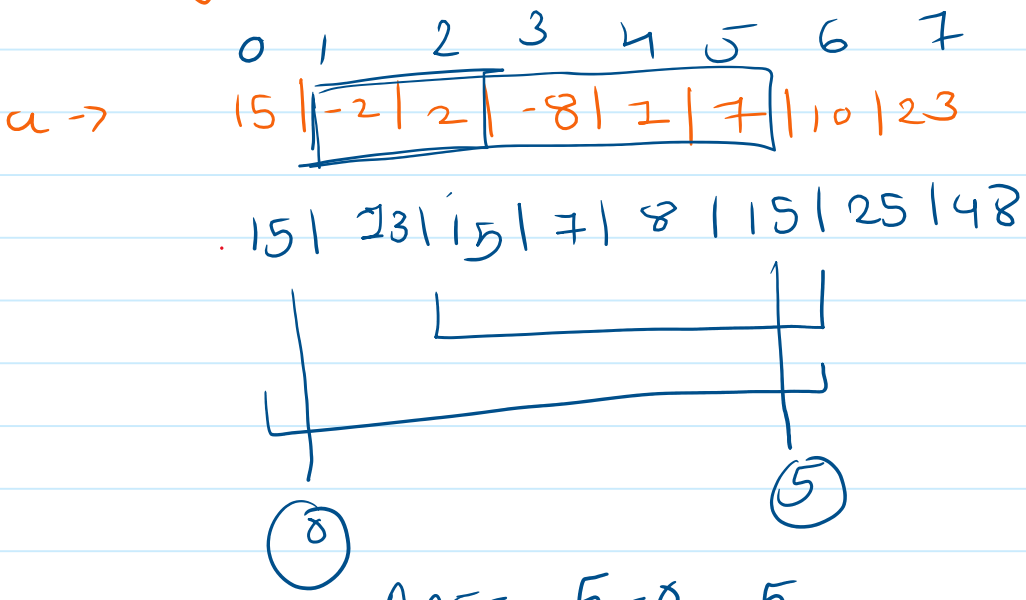
length

↳ max out the largest subarray with sum 0.

ToC = $O(n^3)$

M2

single iteration



Ans = 5 - 0 = 5

Map

csum	index
15	0
13	1

if(map has csum already)
{
length = i - index
old

largest Subarray of 0's & 1's

1 0 1 0 1 0 1

1 -1 1 -1 1 -1 1

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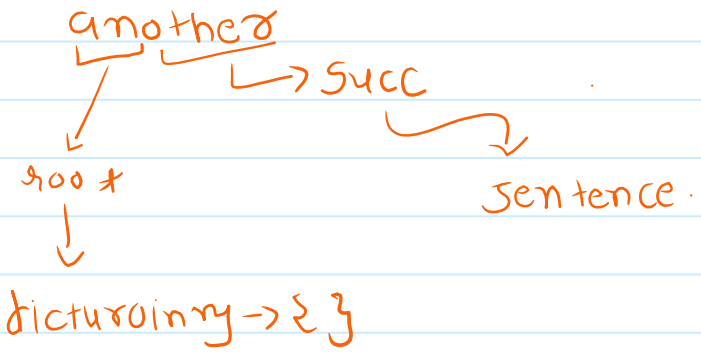
648 Replace Word. | 208 Trie implement



dic = "cat", "bat", "rat"

the cattle was ratled by the battery.

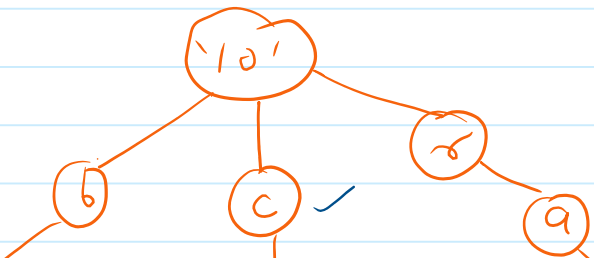
the cat was rat by the bat

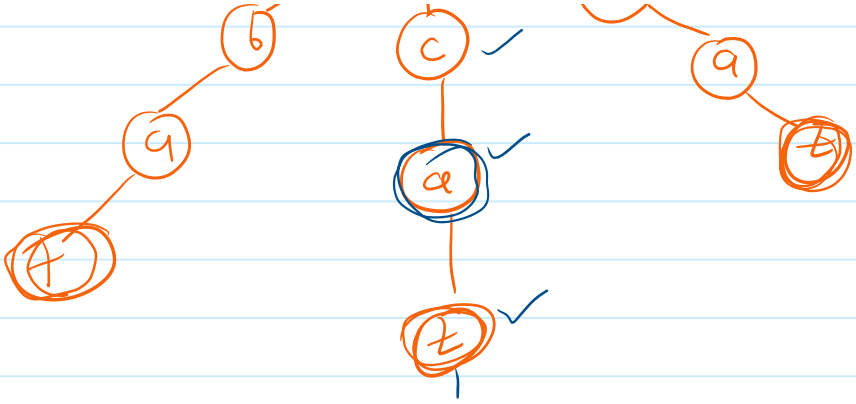
(M1) Brute → each word from sentence to be string matched with each root in dict.

T.C = O(nm)

Trie

① dict → make a trie





cattle → ~~cat~~ → cc

the → no replaced

ruttle → rut

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692 Top K Frequent Words

k = 2

[i, love, leetcode, i, love, coding]

i = 2
love = 2
leetcode = 1
coding = 1

2 → love
2 → i

ans = [i, love]

(1) Find frequency of each word

(2) Priority Queue → Top K frequent.

→ Hashing used

the day is sunny the the sunny is is

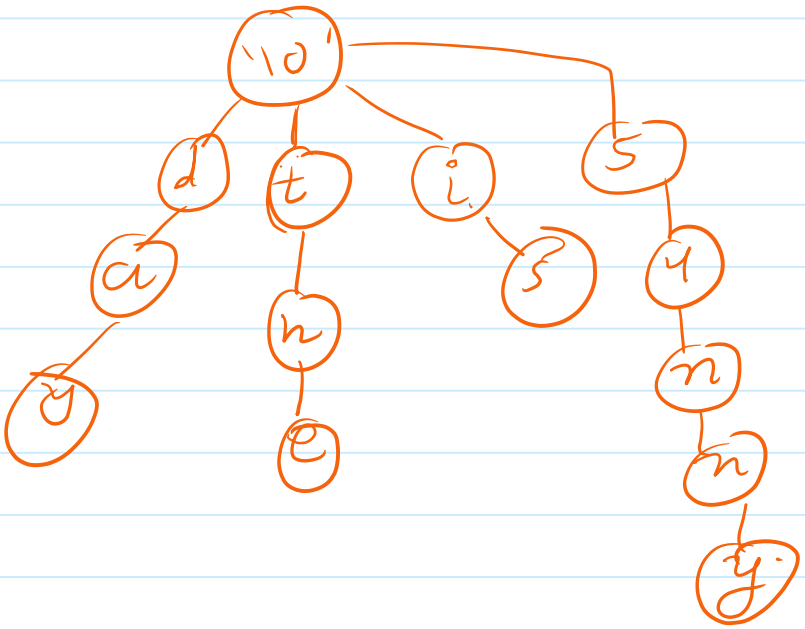
Map<string, int> mp

the → 4
day → 1
is → 3
sunny → 2

} priority_queue Make.

Pair<int, string>

(M2) Trie used



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1023 Camelcase Matching

Pattern -> FB

↳ F * B *

↓

any number of chars (lower case)

(1) FooBar = true.

F * B *

(2) FooBarTest = false

F * B *

Pattern

(3) FooBar

Fo * Ba *

↳ true

FoBa

Fo * Ba *

FoxceFeedBack false

Fo * Ba *

(4) Fa*Bao False

Fo * Ba*

String Matching

(M1) FooBarTest false two pointer approach

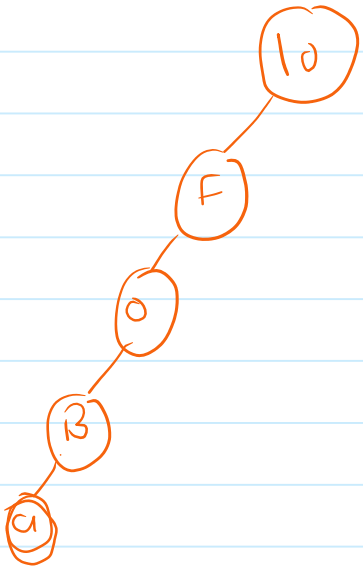
FB → F*B*

(M2) FooBar FoBa = True

same as increment

Trie

FoBa



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336 Palindrome Pairs

words => {abcd, dcba, lls, s, sssll}
0 1 2 3 4

words[0] + word[1] = abcd dcba

↑ palindrome or not.

(0, 1) (1, 0) (3, 2) (2, 4)

Brute force :-

all Concenet $T.C = O(n^2 k)$

for (i -> n) O(n)
  for (i+1 -> n) O(n)
    isPalindrom.(c) O(n+m)
k

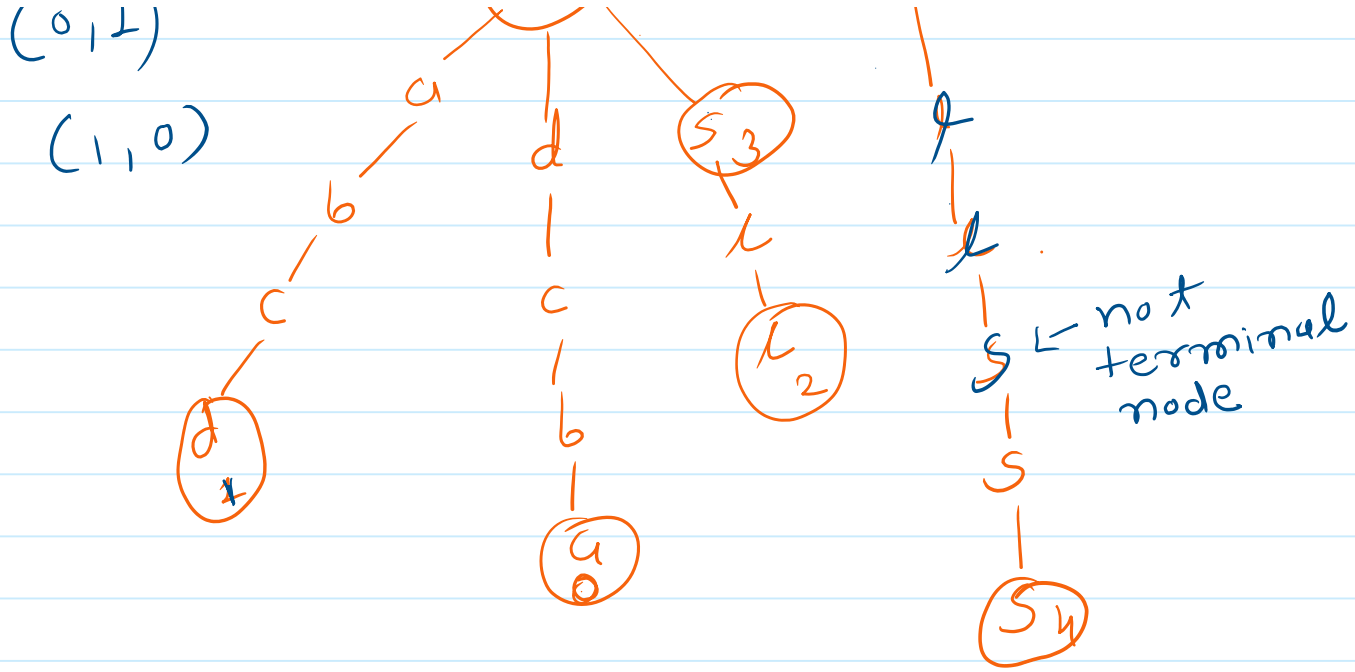
M2

{abcd, dcba, lls, s, sssll}
0 1 2 3 4

Pick → search

reverse → abcd - 0
abcd - 1

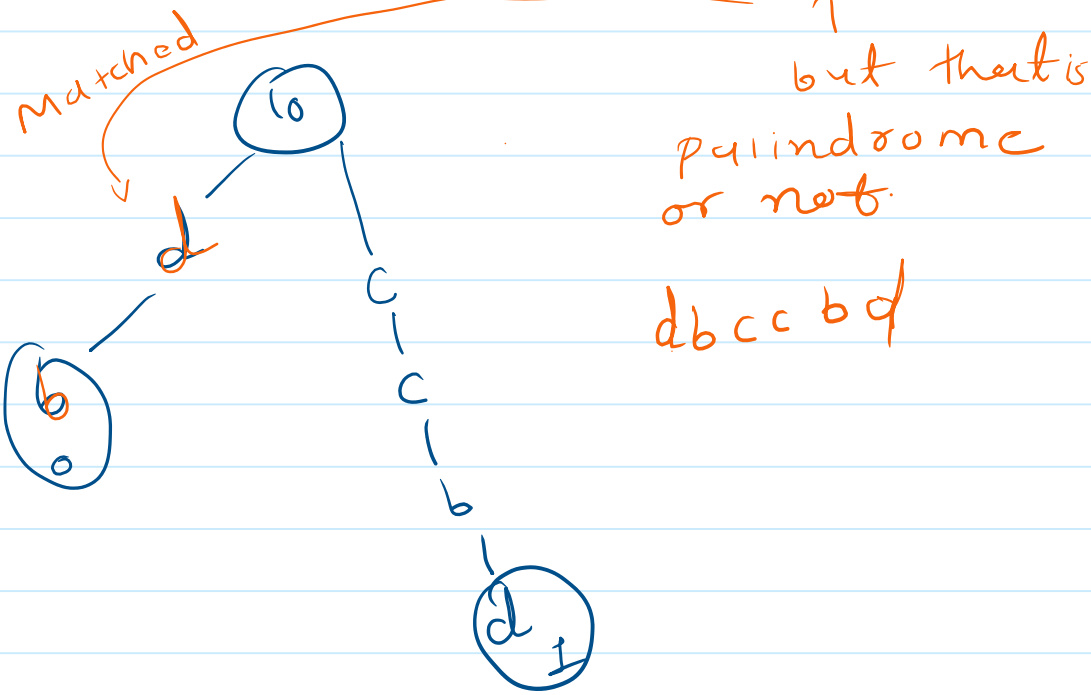
(0, 1)



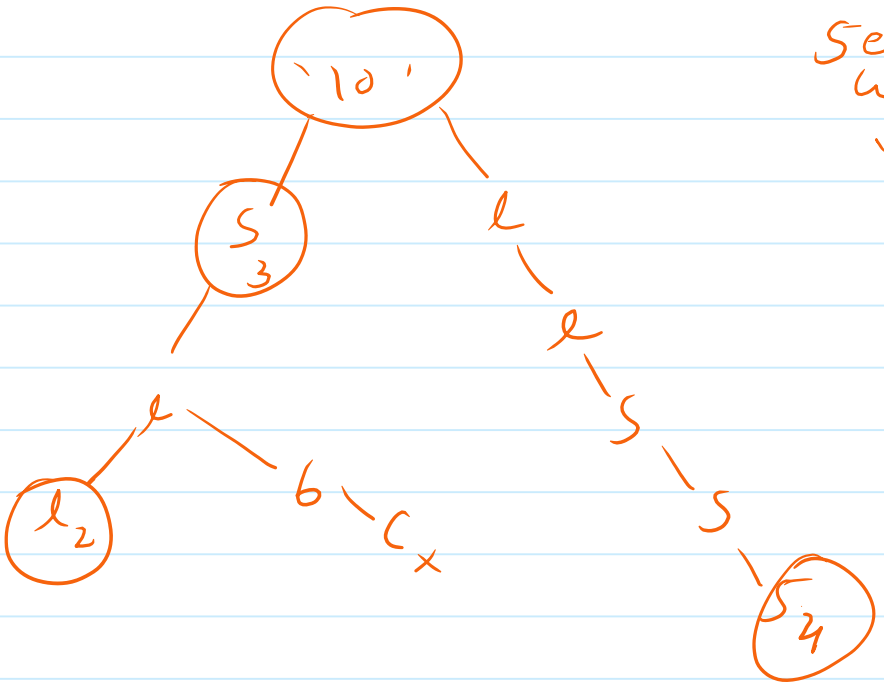
① Trie → insert → words reversed

② for each word → search Trie & check palindrome possible

Clue I : words → bd, dbcc



Case 2 :- Search-word is a prefix of a word in Trie



Search word. "S"

SLL

SLbc

check palindrome or not.