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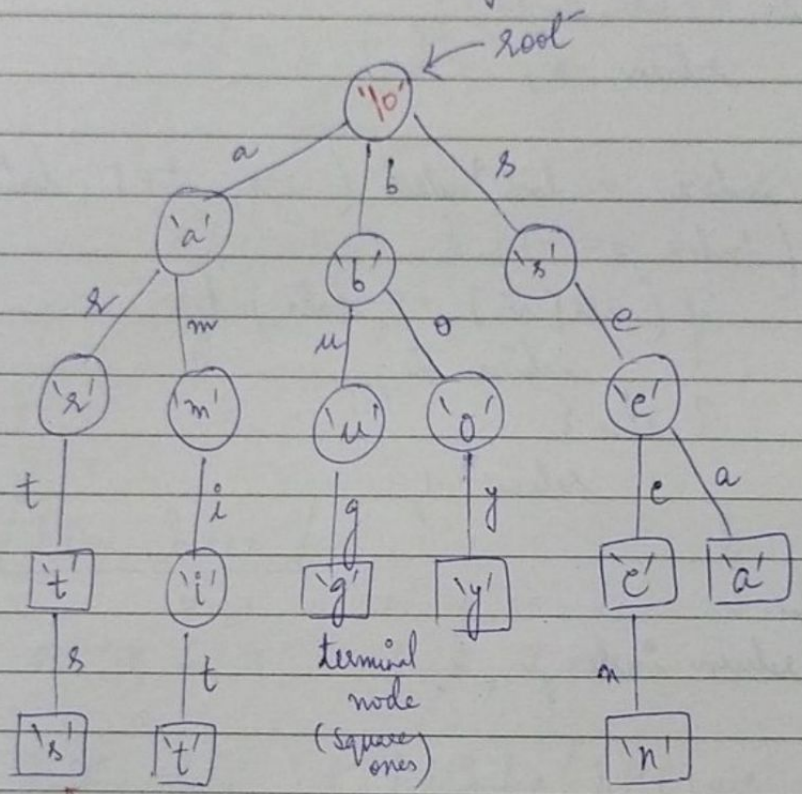
TRIES

* used in Contacts on our phones
* used for text processing



ant
ants
bug
boy
amit
see
sea
seen

This is how all words will be added in the Trie

Construct Trie → Code
Github

Complexities

⇒ add (O(length of word))
⇒ search (O(length of word))
⇒ remove (O(length of word))

```
class Node {
    char data;
    HashMap < Character, Node > children;
    boolean isTerminal;
}
```

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Huffman Encoding

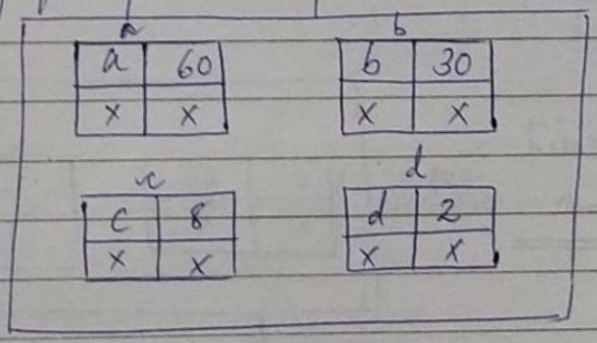
⇒ pass the string

① Make the freq map of characters

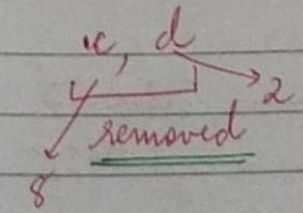
a	60
b	30
c	8
d	2

② for each key in freq map, create a Node and insert that node in a priority queue / min heap.

```
char data;
int cost;
Node left;
Node right;
```

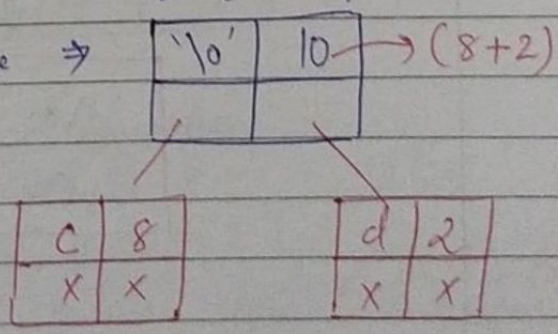


③ Loop through this heap, remove 2 elements from heap and we will combine them, until the size of heap remaining is 1.



(Smaller ones)

New Node ⇒



Updated Heap ⇒

a	60
x	x

b	30
x	x

'\0'	10
c	d

cd

cd b

10 30

Removed

⇒ New Node →

bcd

'\0'	40

b	30
x	x

'\0'	10

c	8
x	x

d	2
x	x

Updated Heap ⇒

bcd

a	60
x	x

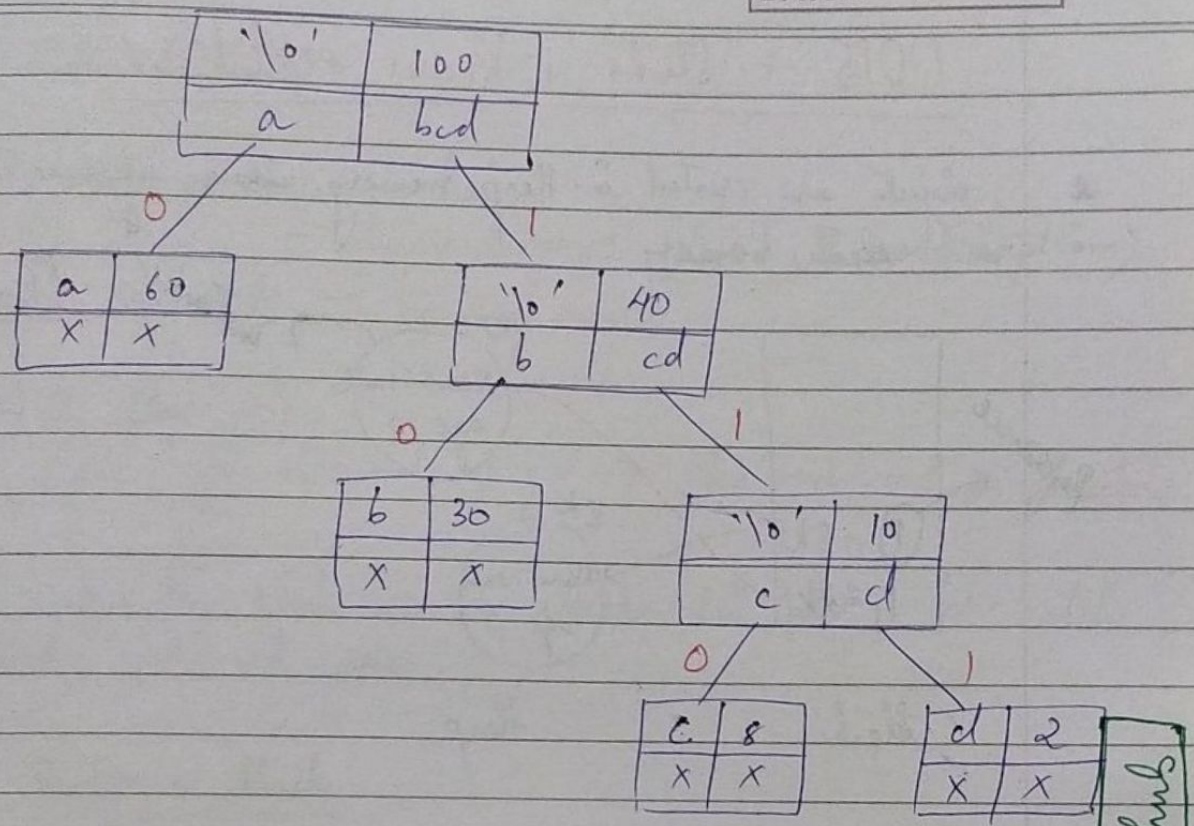
'\0'	40
b	cd

↳ a, bcd
60, 40

⇓

'\0'	100
a	bcd

← Updated Heap



Code → Github

(4) Retrieve the last node
(5) Parse the tree to fill encoder and decoder

encoder

Key	String (Value)
a	0
b	10
c	110
d	111

decoder

Key	Value (Character)
0	a
10	b
110	c
111	d

(6) ⇒ a b b c c d a ⇒ 7 characters
14 bytes × 8 = 112 bits

0 10 10 110 110 1110 ⇒ 15 bits space ← saved a lot of space

* How to do decompression?

0 is not a prefix to any other string
10 is not a prefix to any other string
similarly 110 is not a prefix to any other string