

1) AVL Tree

Insert Number

9, 8, 19, 16, 4, 17, 18, 1, 2, 14

Delete Number

16, 17

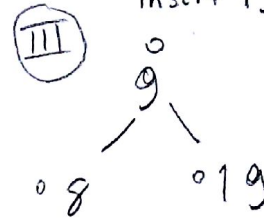
insert 9

(I) 9

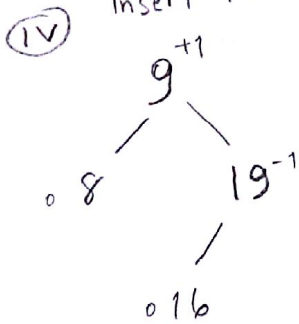
insert 8



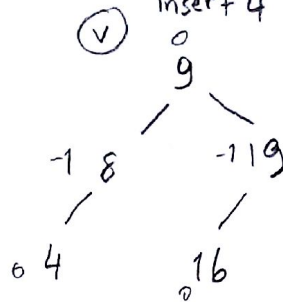
insert 19



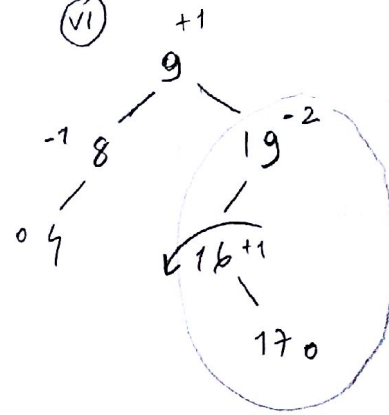
insert 16



insert 4

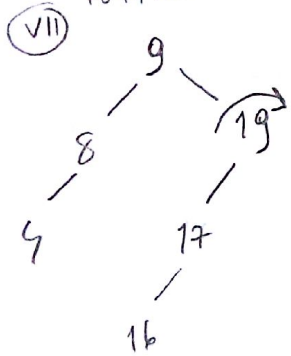


insert 17

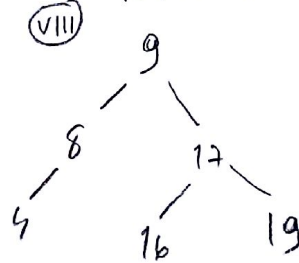


Left-right
geldiği için
önce
16 etrafında
left rotation
yapılır, sonra
19 etrafında
right rotation
yapılır.

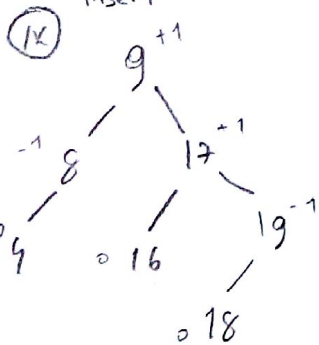
rotation



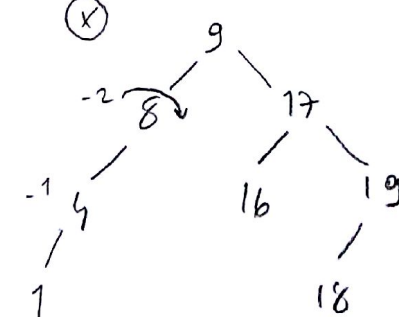
rotation



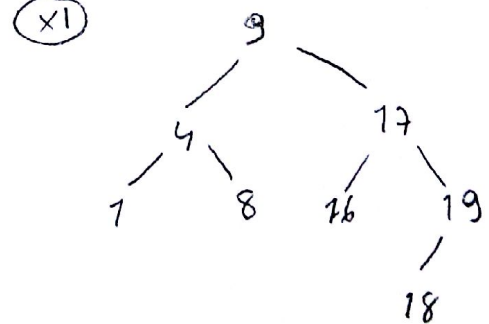
insert 18



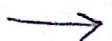
insert 1



rotation

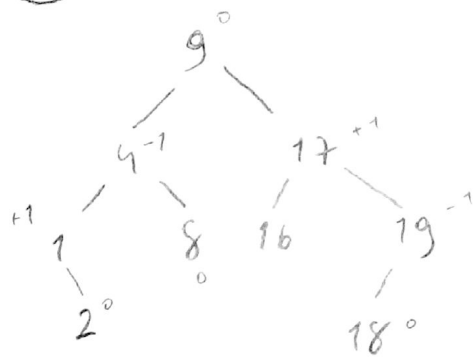


1 eklenince, 8'in dengesi
-2 olduğu için sağa
rotation yapılır



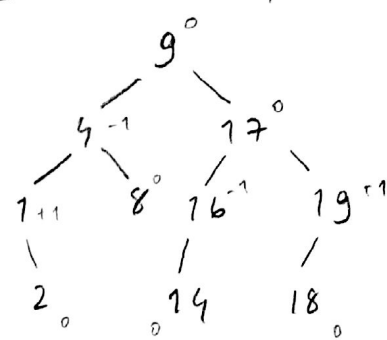
XII

insert 2



XIII

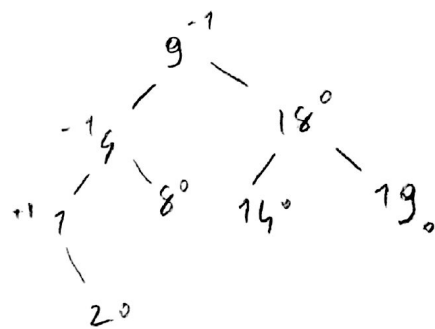
insert 14



Delete 16



Delete 17



17 'nin sağ
alt ağacındaki
minimum eleman
bulunur.

2) B-Tree

Insert Number

9, 8, 19, 16, 4, 17, 18, 1, 2, 14

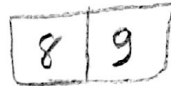
Delete Number

16, 17

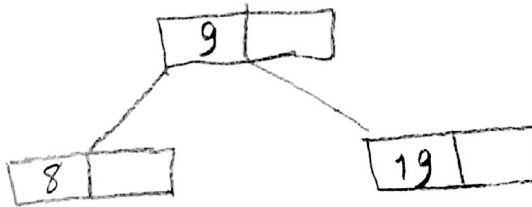
(I) Insert 9



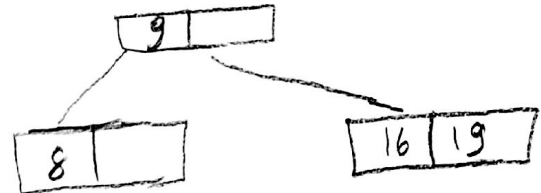
(II) Insert 8



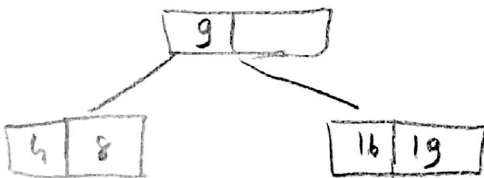
(III) Insert 19



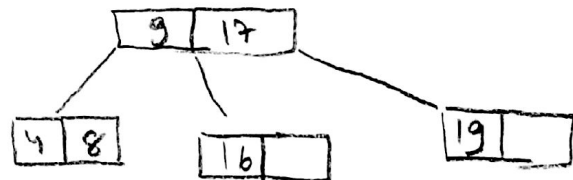
(IV) Insert 16



(V) Insert 4

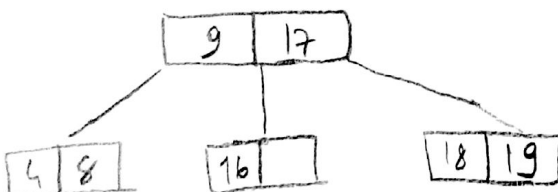


(VI) Insert 17

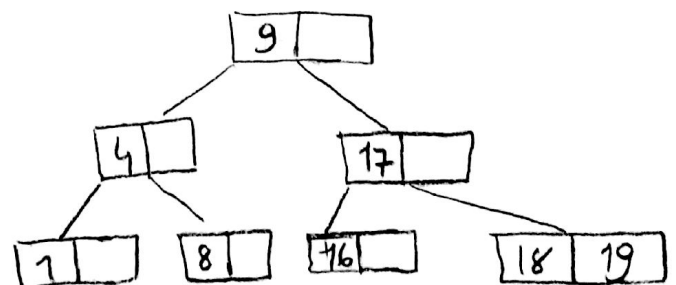


17 ekleyince 16, 19 kutucuğunda taşıma olur o yüzden 17, parente geçer 16 ve 19 ayrılır.

(VII) Insert 18

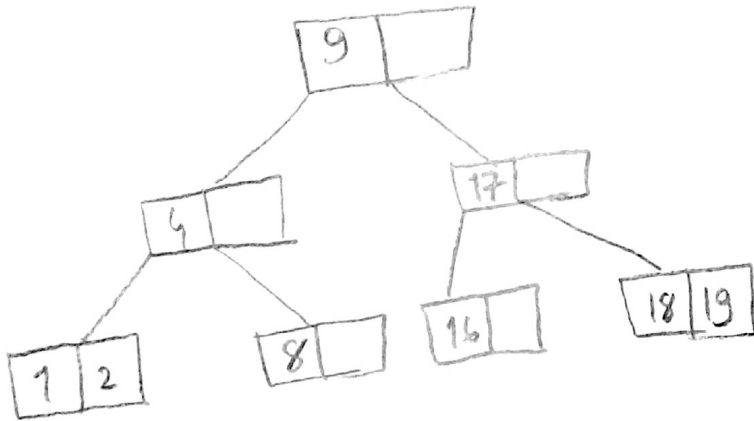


(VIII) Insert 1

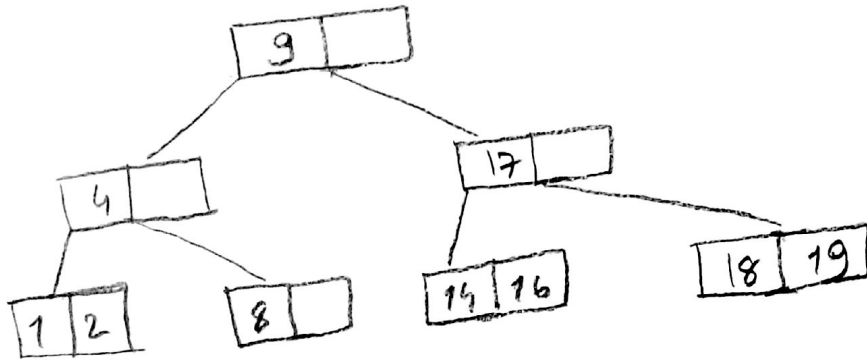


1 ekleyince 4, 8 kutucuğuna taşıma olur 4 parente geçer 1 ve 8 ayrılır, 4 yukarıdaki parenti da taşıyır 4 ve 17 ayrılır, 9 root olur.

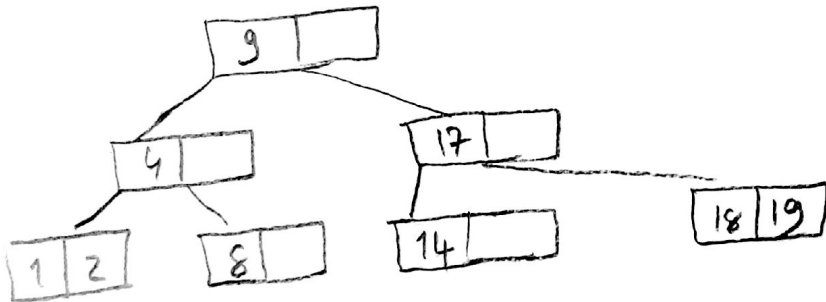
(1x) Insert 2



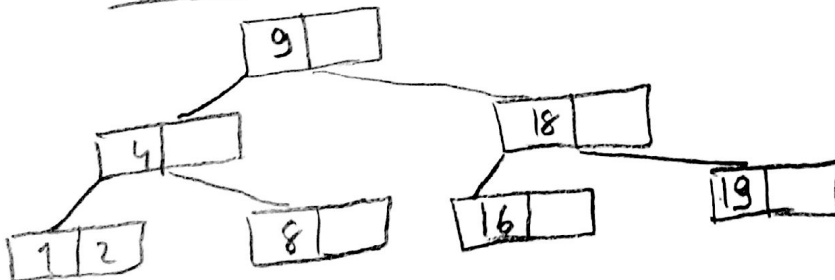
(X) Insert 14



Delete 16



Delete 17



17 silinince sağ taraftaki ağacın en küçükü onun yerine gelir.

3) 2-3 Tree

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5

Insert Number

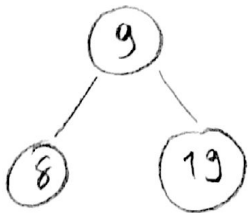
9, 8, 19, 16, 4, 17, 18, 1, 2, 4

Delete Number

16, 17

I Insert 9

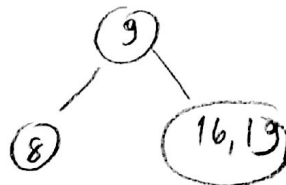
(9)



II Insert 8

(8, 9)

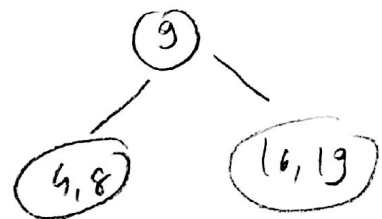
IV Insert 16



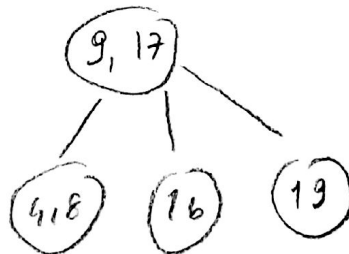
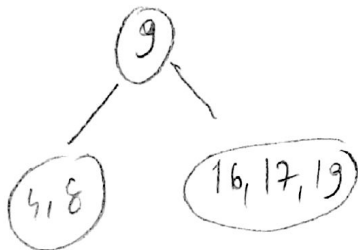
III Insert 19

(8, 9, 19)

V Insert 4

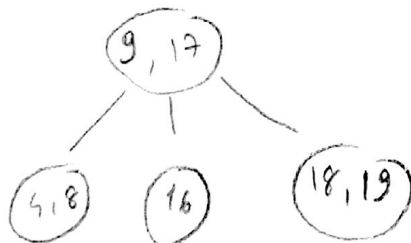


VI Insert 17

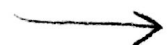
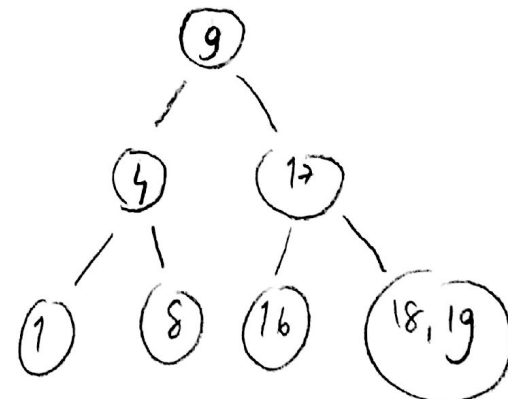
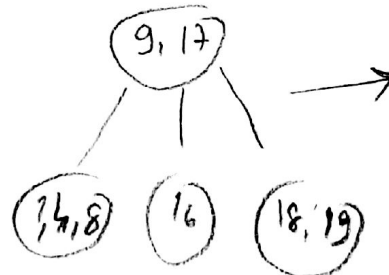


node da 3 tane eleman
olunca ortanca bir üste
göser iğdekliler split
edilir.

VII Insert 18



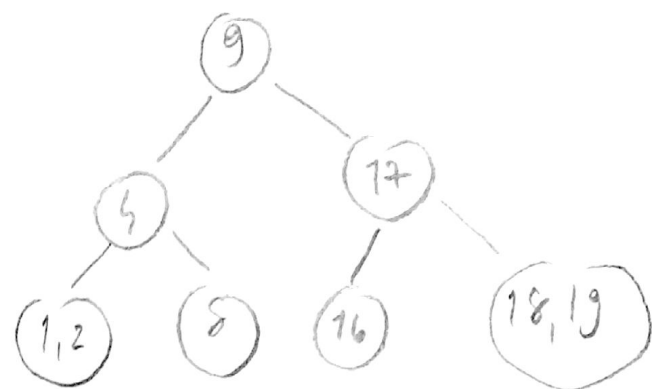
VIII Insert 1



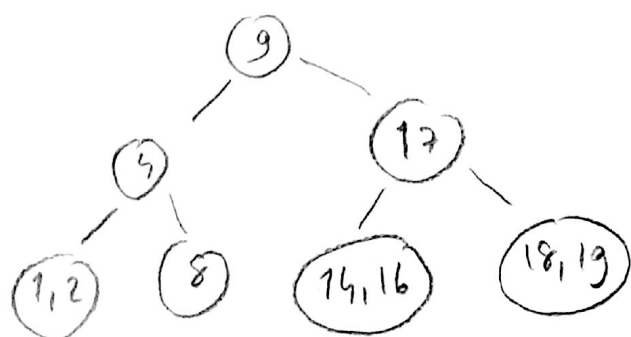
(X) Insert 2

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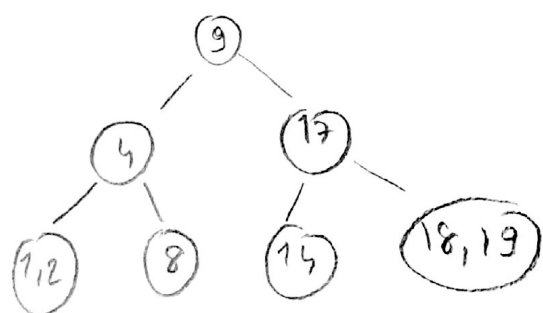
(6)



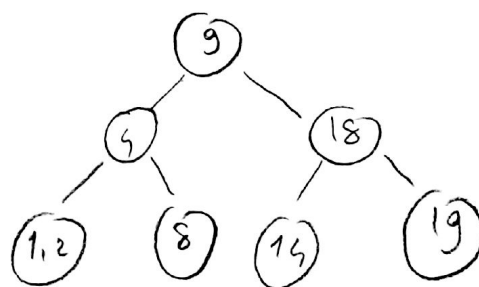
(X) Insert 14



Delete 16



Delete 17



4) Skip List

Insert Number

Delete Number

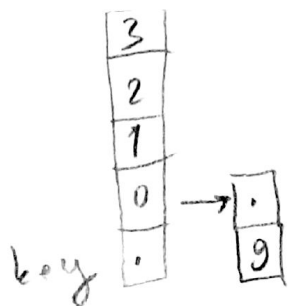
3, 8, 19, 16, 4, 17, 18, 1, 2, 14

16, 17

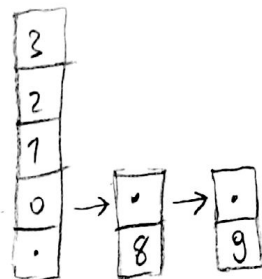
Random
Levels

1 1 4 3 1 2 2 3 1 4

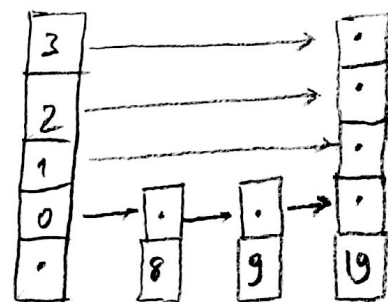
(I) Insert 9



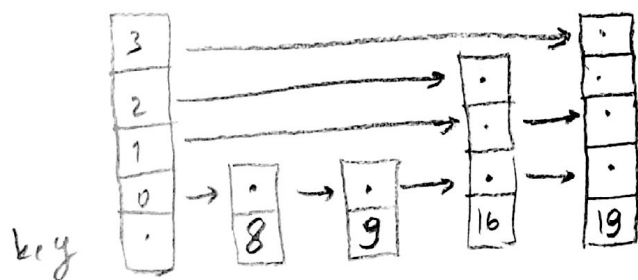
(II) Insert 8



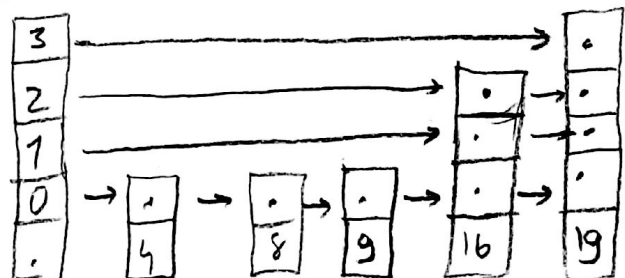
(III) Insert 19



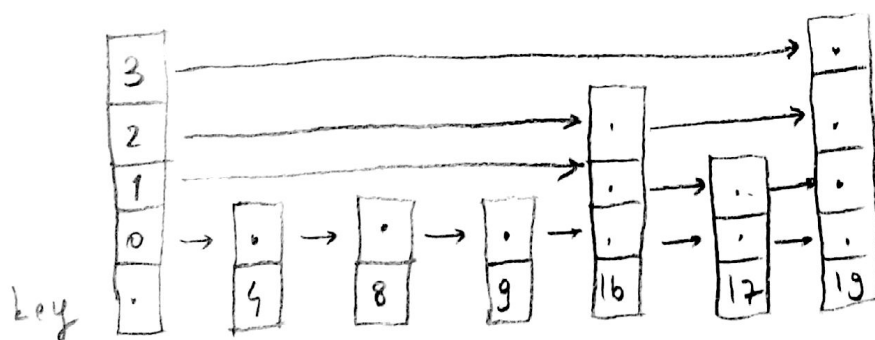
(IV) Insert 16



(V) Insert 4



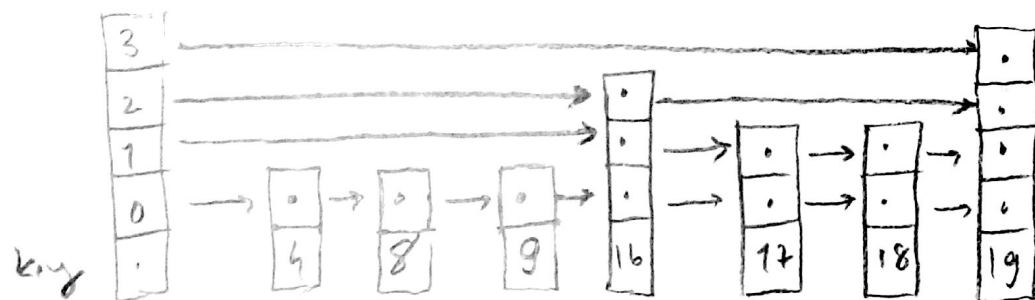
(VI) Insert 17



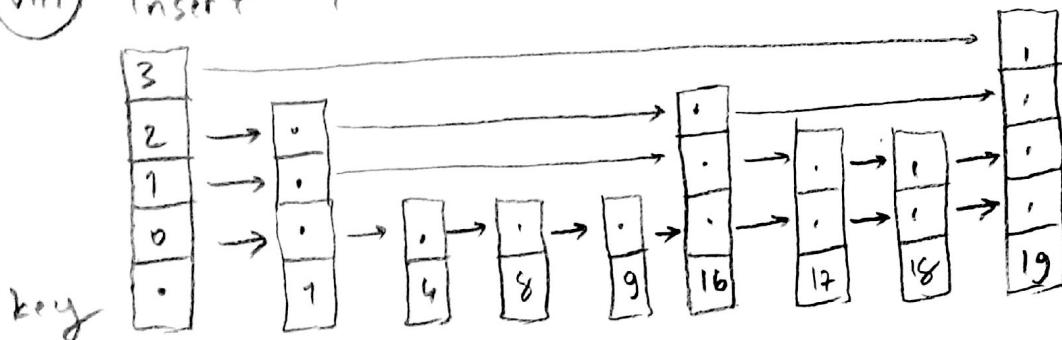
(VII) Insert 18

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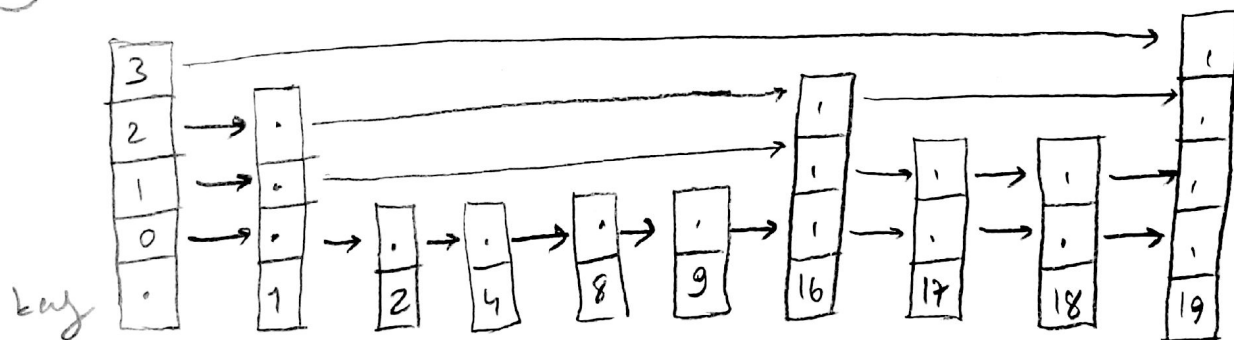
8



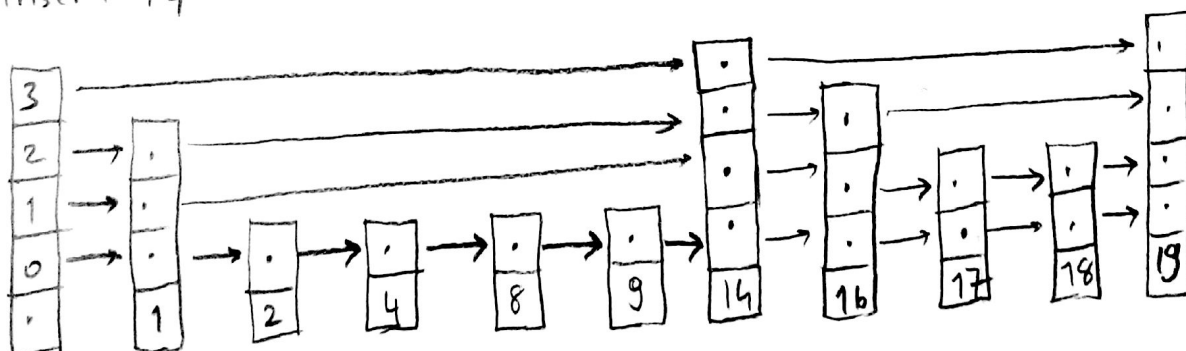
(VIII) Insert 1



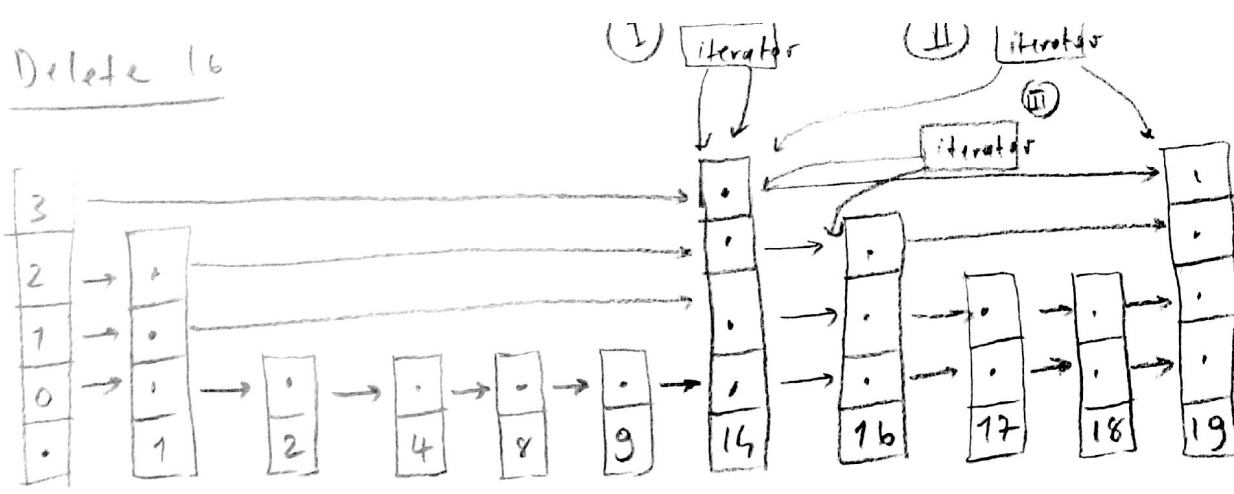
(IX) Insert 2



(X) Insert 14

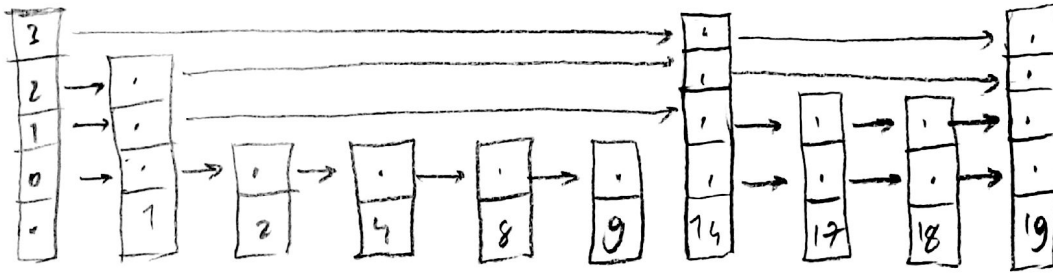


Delete 16



Onur
SEZER
121044024

Skip list listteki elemanları bulmak için çift göstericili iterator kullanılır. Önce en üst seviyeden başlanır, aranan sayının aralığı bulununca aşağı seviyelere inilir. 16'yı silmek için önce iki gösterici de 14'ü gösterir. Daha sonra diğer gösterici 19'a gider, 19'dan küçük olduğu için 14'e geri döner ve bir alt seviyeye iner ve 16'yı bulur.



16 silindikten
Sonra

Delete 17

Önce iki gösterici de 14'ü gösterir. Daha sonra diğer gösterici 19'a gösterir. 19'dan daha küçük olduğu için geri döner bir alt seviyeye iner ve 17'yı bulur.

