# M way search Tree Examples

01 October 2020 20:03

Create a M-Way Search tree of order 4 by inserting the following values

20, 10, 35, 78, 15

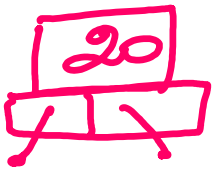
Ans:

Given order $m = 4$.

No. of keys $= m - 1 = 3$

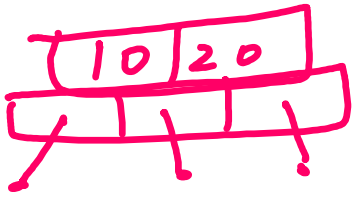
Step 1

Insert 20




Step 2

Insert 10




[search & find the correct node. If space available insert]

Step 3

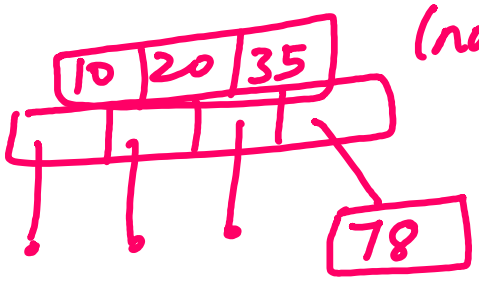
Insert 35


[space available]

Step 4

Insert 78

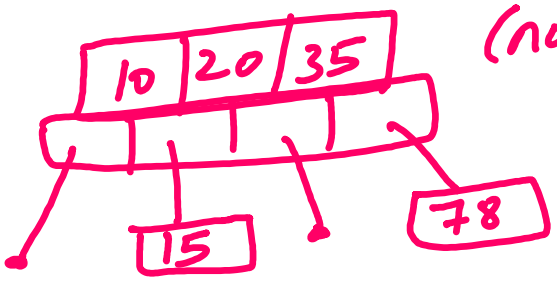
Root full.
Create new node




(node full)

Step 5

Insert 15

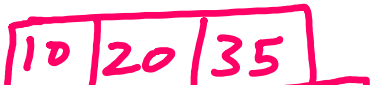


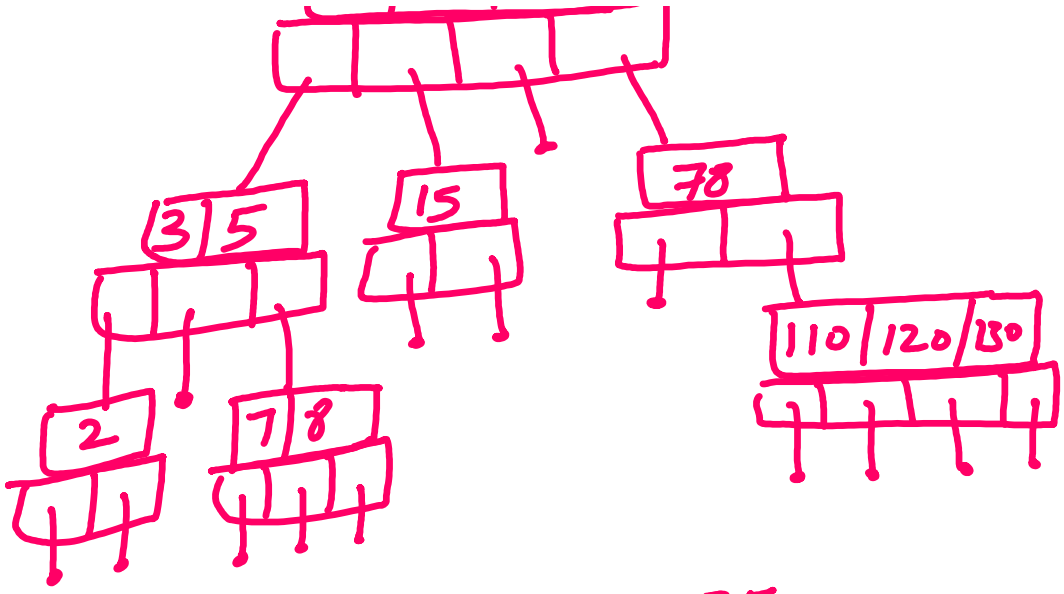

(node full)

[Note: Before insertion
Check node is full or not.
If node is full, then
Create new node one level down]

Deletion

Consider the following 4-way search tree.






Delete 15, 3, 5, 10, 35

Ans:

Given order m=4

(i) Delete 15

Search 15.

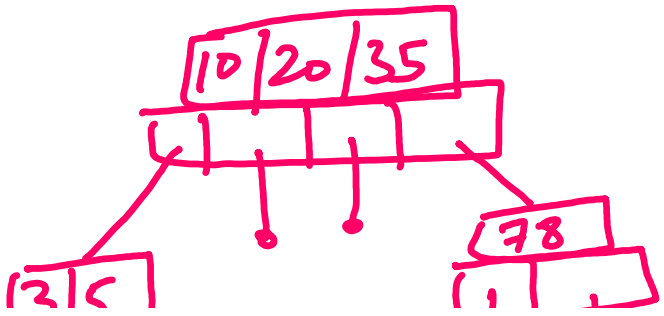
Found ✓

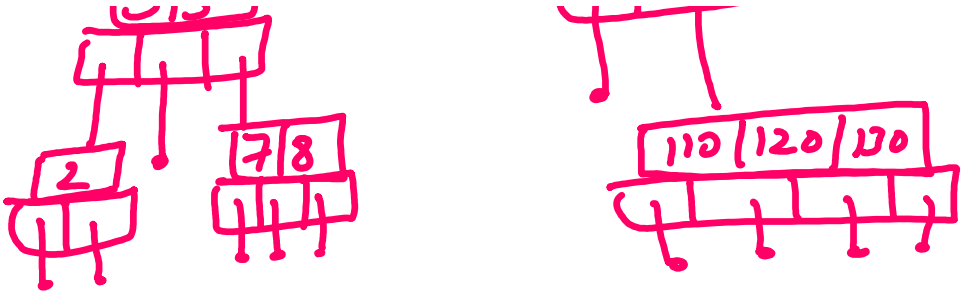
Left Pointer of 15 is null

Right Pointer of 15 is null

∴ Case (i) Deletion.

Simply Delete 15 & adjust Pointers.






(ii) Delete 3

Search key 3

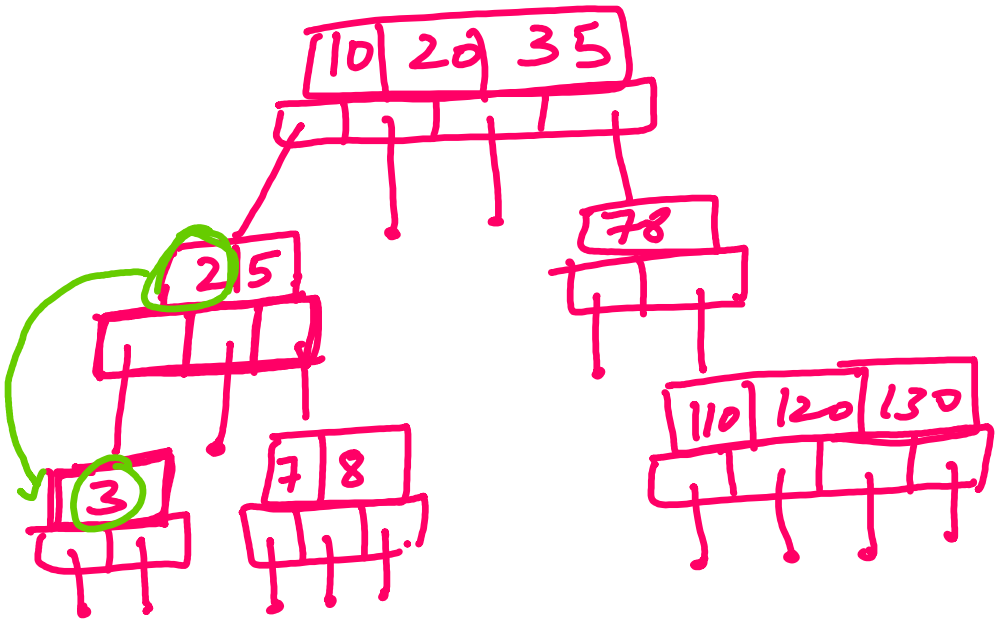
Found ✓

Left Pointer of 3 is not null

Right Pointer of 3 is null

∴ Case (iii) deletion.

Choose Largest from left & Swap. and delete.




Now Deletion of 3.

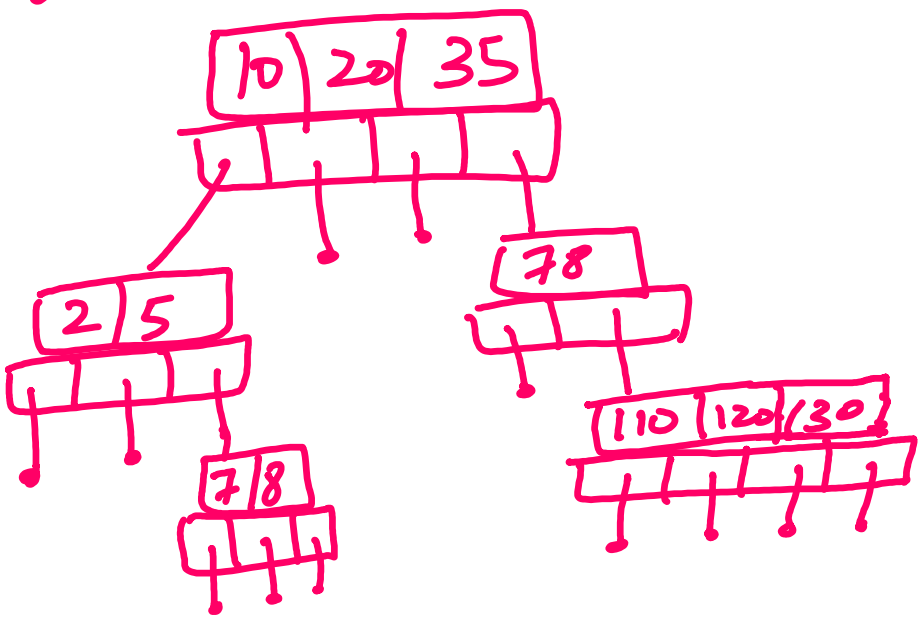
Left Pointer of 3 is null

Right Pointer of 3 is null

∴ Case (i) Deletion.

Simply delete 3 and

Simply delete & adjust pointers




## (iii) Delete 5

Search 5

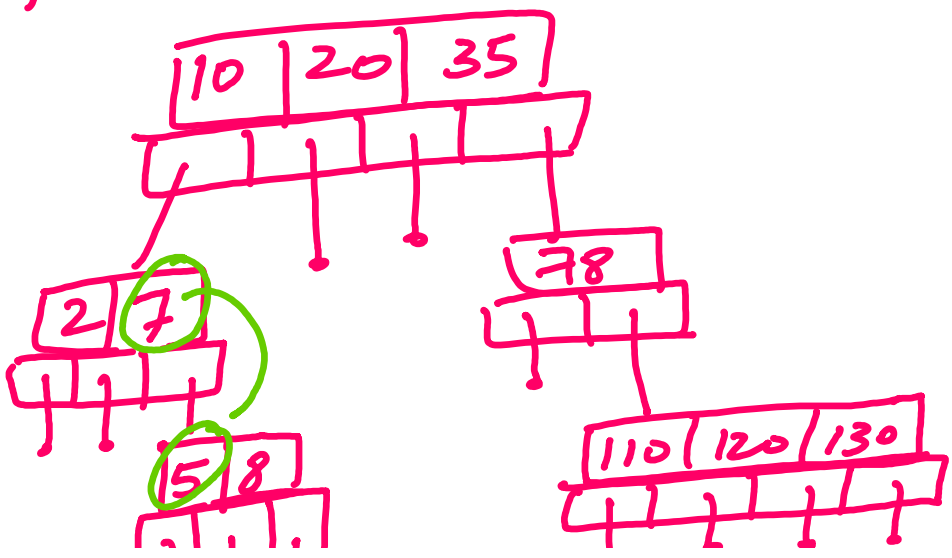
Found

Left Pointer of 5 is null

Right Pointer of 5 is not null

∴ case (iii) deletion.

Find smallest element in Right, Swap & delete.

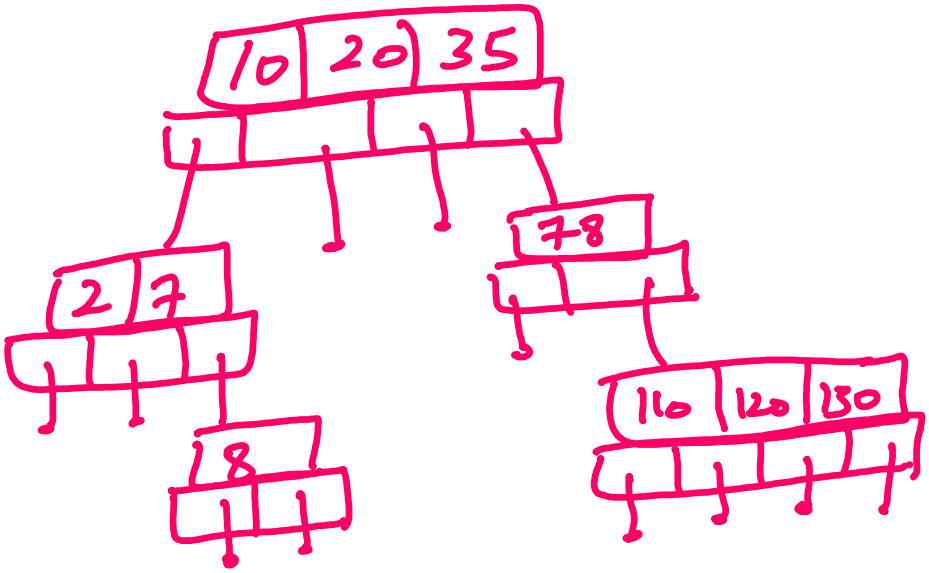


Now Delete 5.

Left Pointer of 5 is null

Right Pointer of 5 is null

Case (i) deletion, Simply delete & adjust pointers




iv) Delete 10

Search 10

Left pointer of 10 is not null.

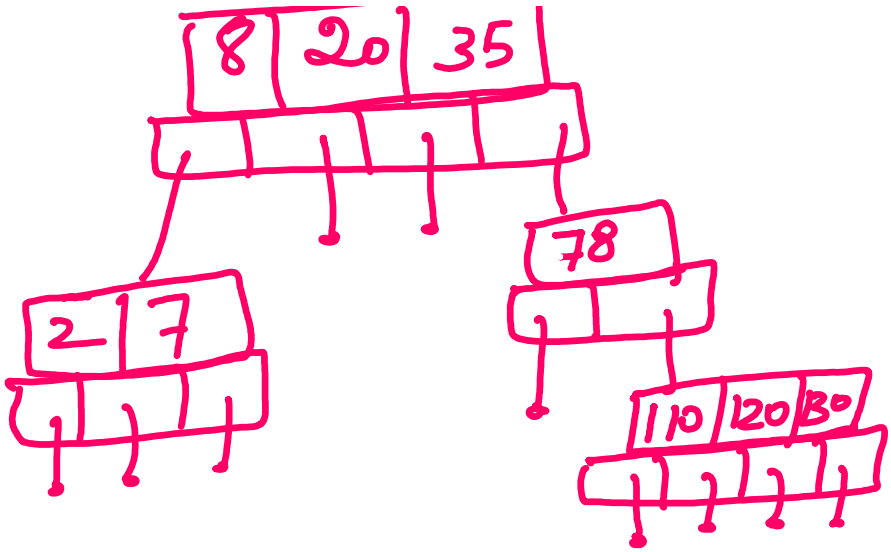
Right Pointer of 10 is null

∴ Case (ii) deletion.

Largest element in left, Swap & delete.

Largest element in left is 8.

Result is




## i) Delete 78

Search 35

Found.

Left Pointer of 35 is null.

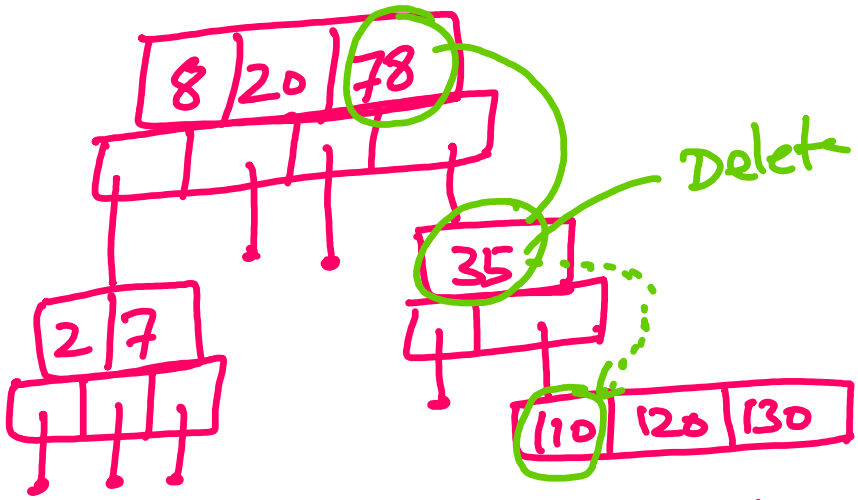
Right Pointer of 35 is not null.

Hence Case (iii) deletion.

Find smallest element in Right, swap & delete.

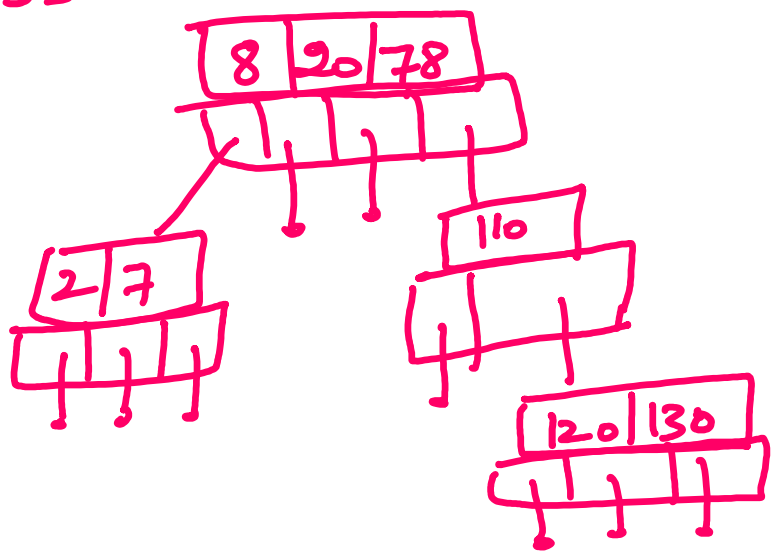
Smallest in Right is 78.

After swapping,




to delete 35.

Now we have
Left of 35 is null.
Right of 35 is not null.
Again case(iii) deletion.
Find smallest in Right,
Swap & delete. Deletion of 35 now triggers case(i)




Note

The insertion of key 146 in page 8 of "M-way search Tree1.pdf" is Correct.

We have to search 146 and we have to find the correct node.

Initially 146 > 76, so we proceed to right of 76.

Again 146 > 141, so again we proceed to right of 141.

In next level 146 < 148.

Hence we try to insert in that node. But that node is full.

So we create new node one level down to left of 148 and insert 146.