

# 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

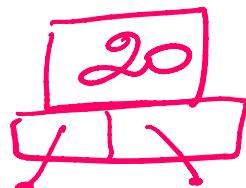
Ans:

Given order  $m = 4$ .

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

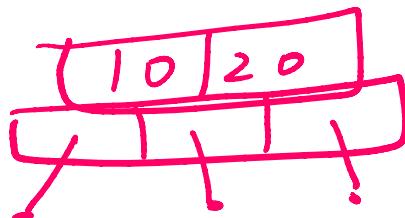
Step 1

Insert 20



Step 2

Insert 10



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

Step 3

Insert 35

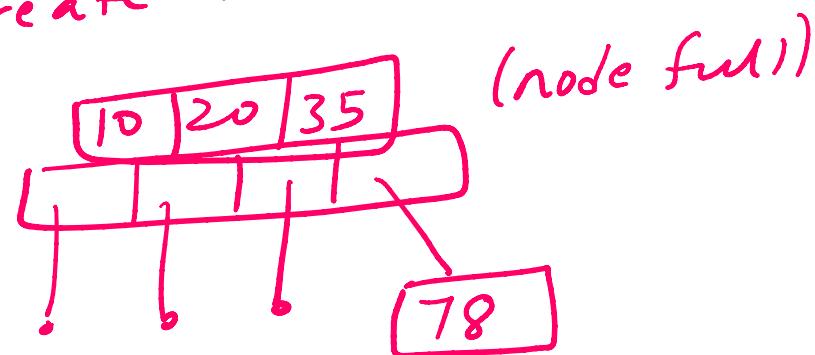


[space available]

Step 4

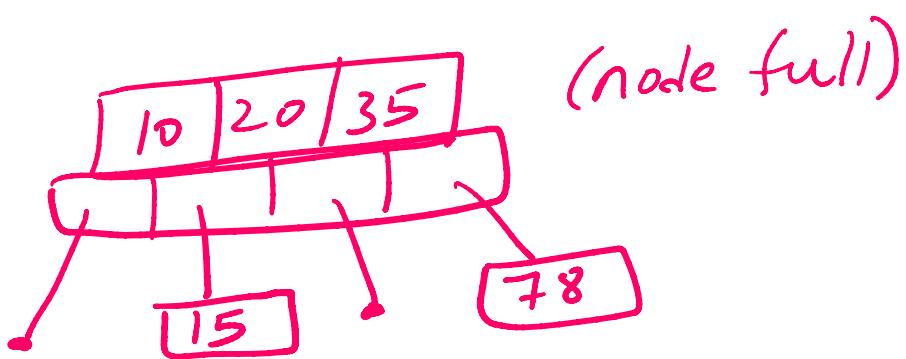
Insert 78

Root full.  
Create new node



Step 5

Insert 15

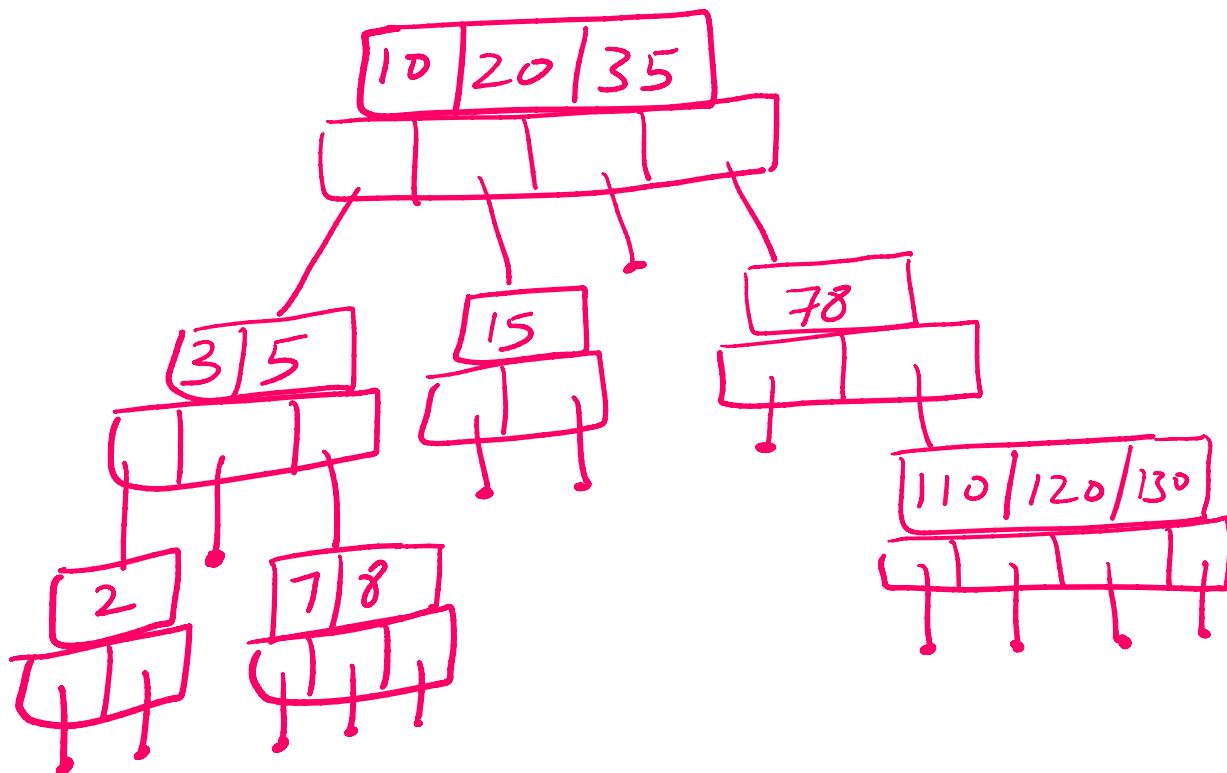


[Note: Before insertion  
check node is full or  
not. . . . then

clear  
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 .

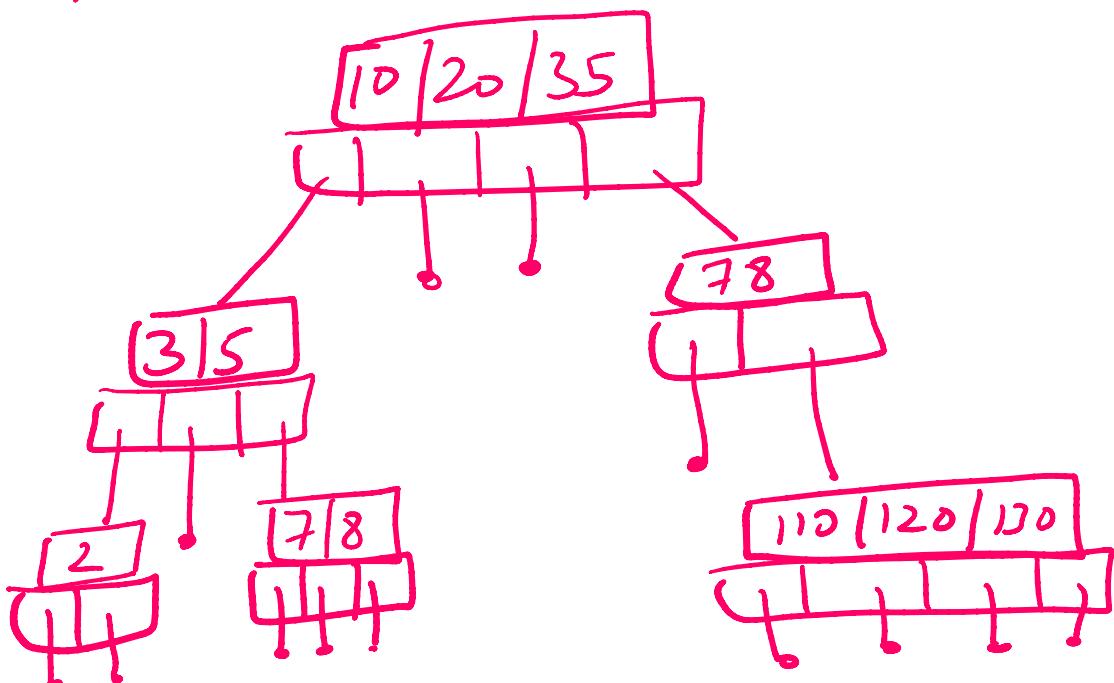
Found ✓

Left Pointer of 15 is null

Right Pointer of 15 is null

∴ Case (i) Deletion.

Simply Delete 15 & adjust  
Pointers.



## (ii) Delete 3

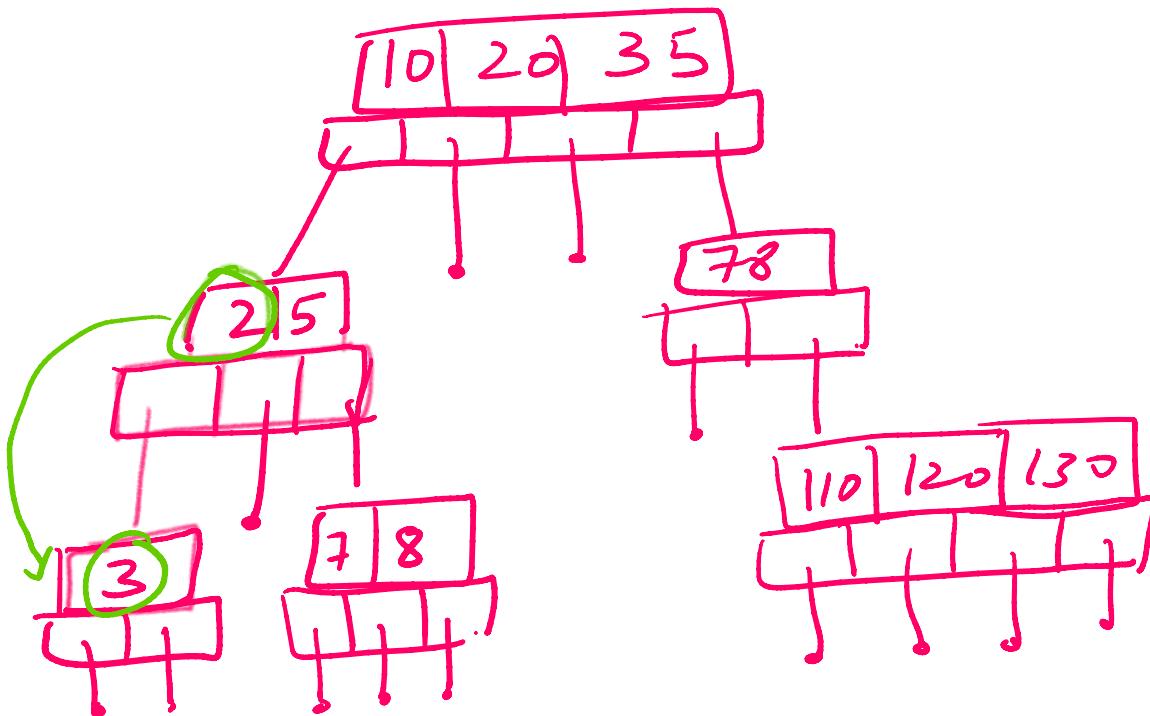
Search key 3

Found ✓

∴ pointer of 3 is not null

found ~  
Left Pointer of 3 is not null  
Right Pointer of 3 is null  
 $\therefore$  Case (ii) deletion.

Choose Largest from left  
& Swap and delete.



Now Deletion of 3.

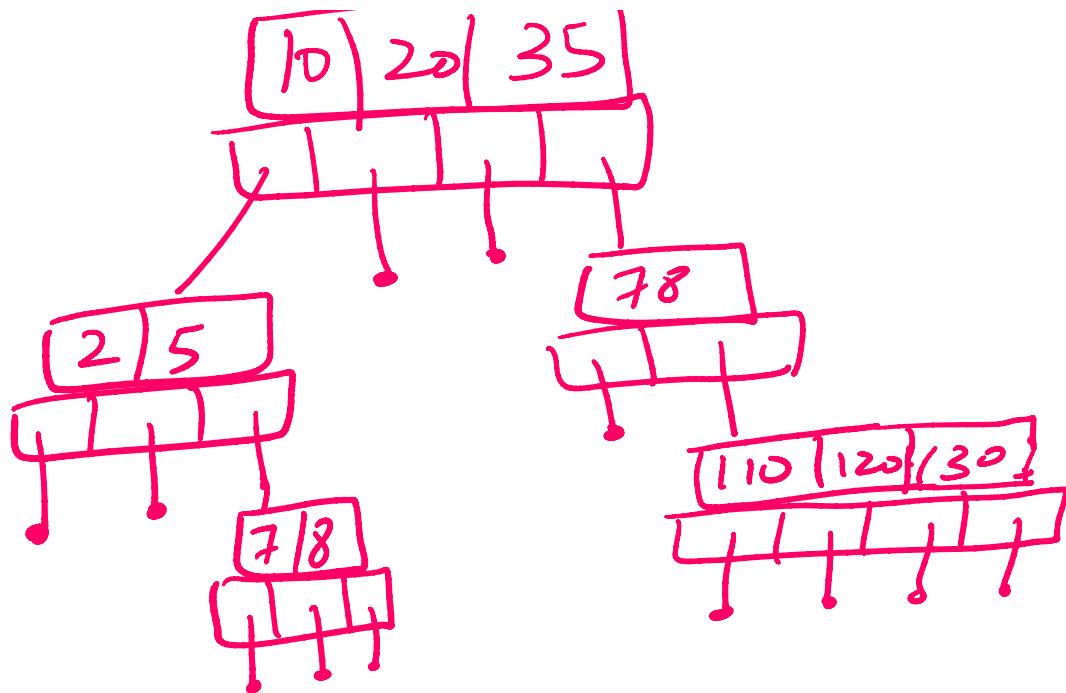
Left Pointer of 3 is not null

Right Pointer of 3 is null

$\therefore$  case (i) Deletion.

Simply delete 3 and  
adjust pointers





### (iii) Delete 5

Search 5

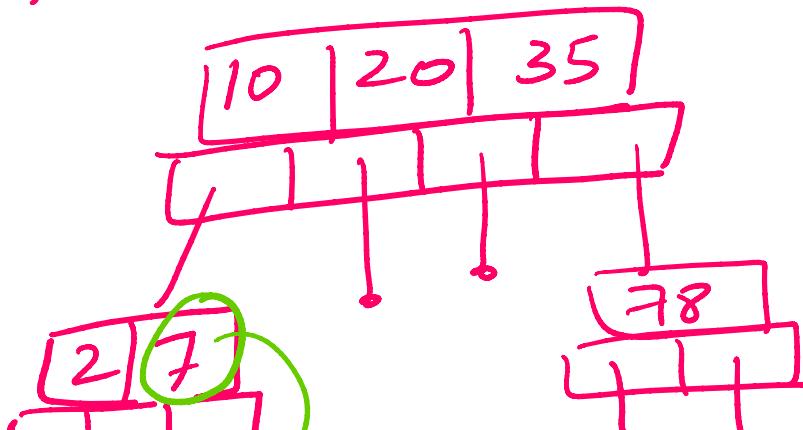
Found

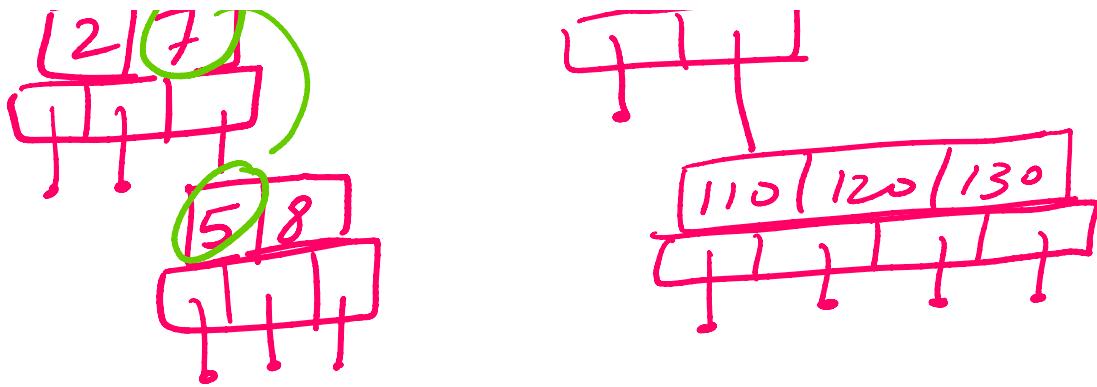
Left Pointer of 5 is null

Right Pointer of 5 is not null

∴ case (iii) deletion.

Find smallest element in  
Right, swap & delete.



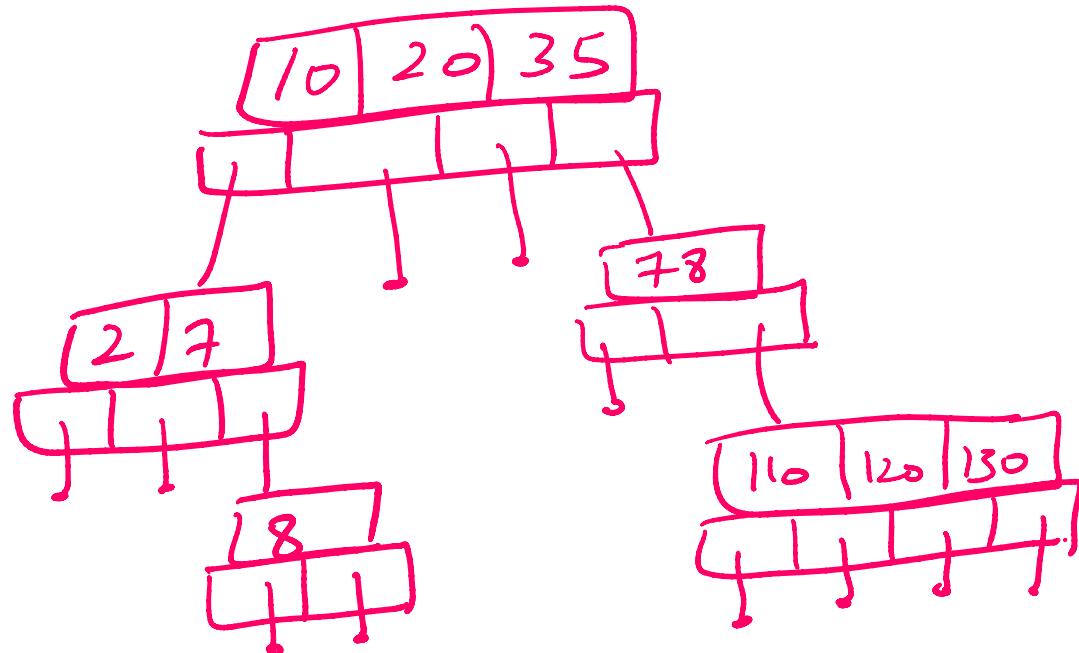


Now Delete 5.

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.  
- . . . in null

Left pointer of 10 is null.

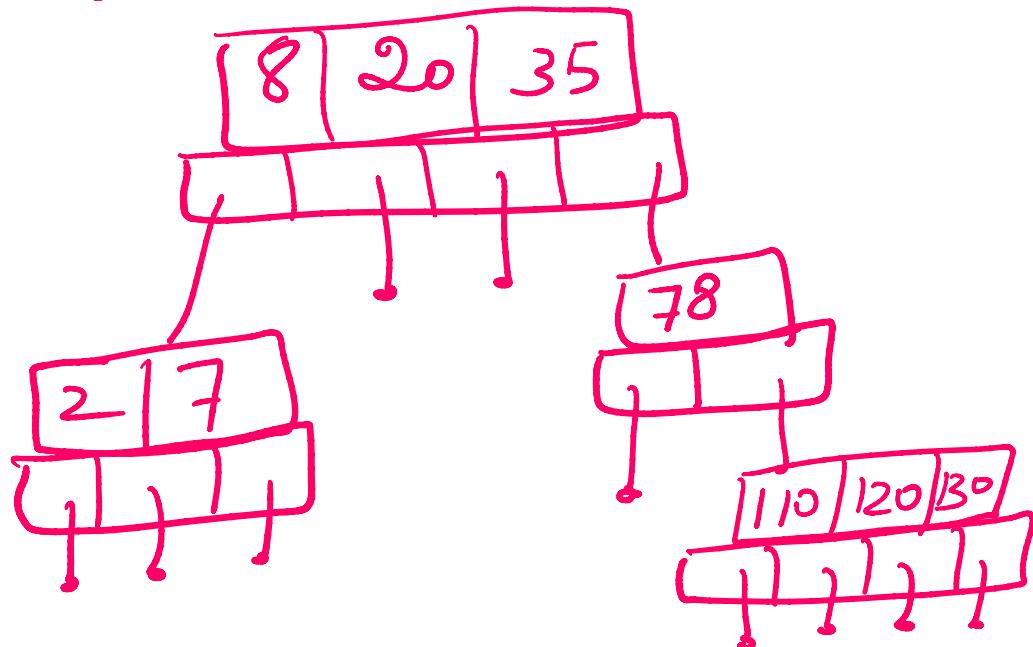
Right pointer of 10 is null

∴ Case (ii) deletion.

Largest element in left,  
Swap & delete.

Largest element in left  
is 8.

Result is



v) Delete 35

Search 35

Found.

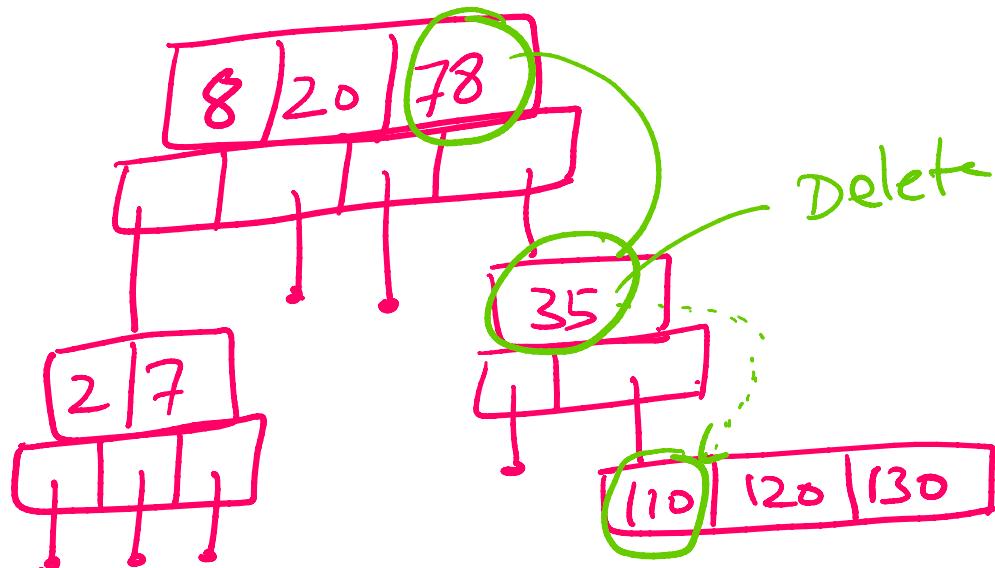
Left pointer of 35 is null.

Right pointer of 35 is not null.

" case (iii) deletion.

Right run  
Hence Case(iii) deletion.

Find smallest element  
in Right, Swap & delete.  
Smallest in Right is 78.  
After swapping,



Now we have to delete 35.

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)

T & 90 | 78

OF -- .

