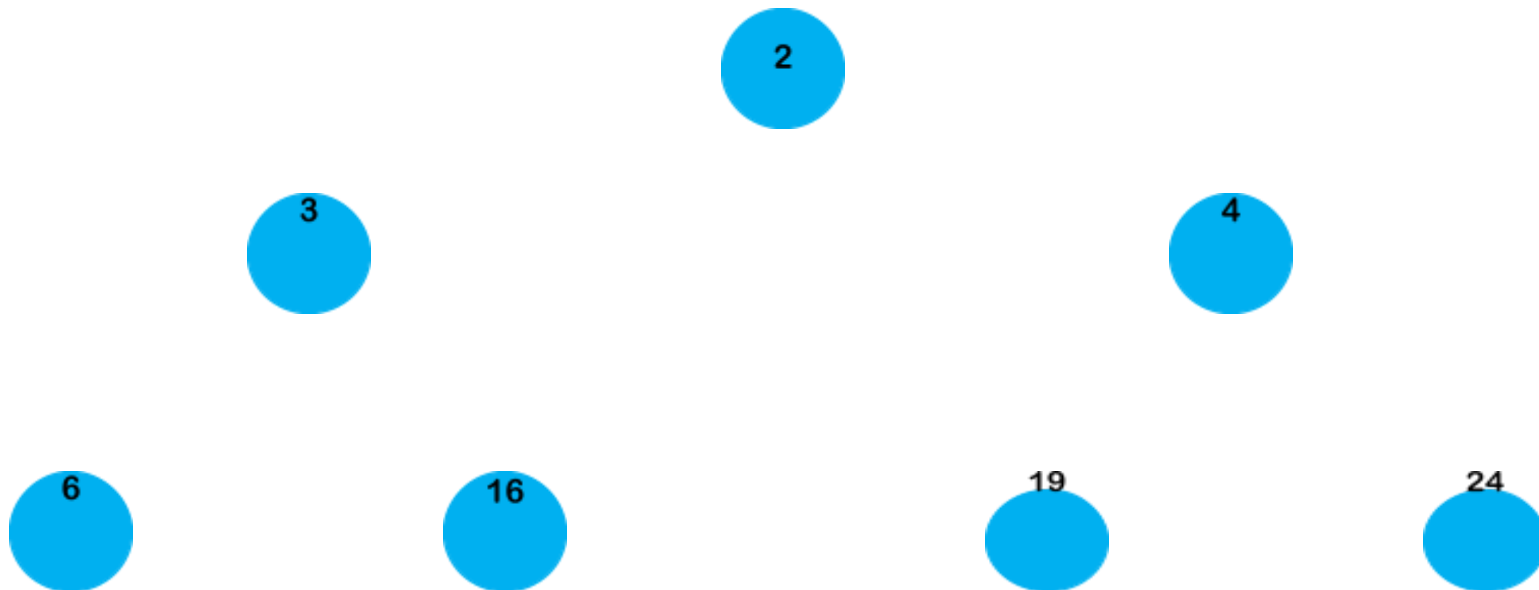


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- *Answer*

a) You are required to draw a complete binary tree from the above given array. After drawing a tree, identify which type of heap data structure is it showing either min heap or max heap?





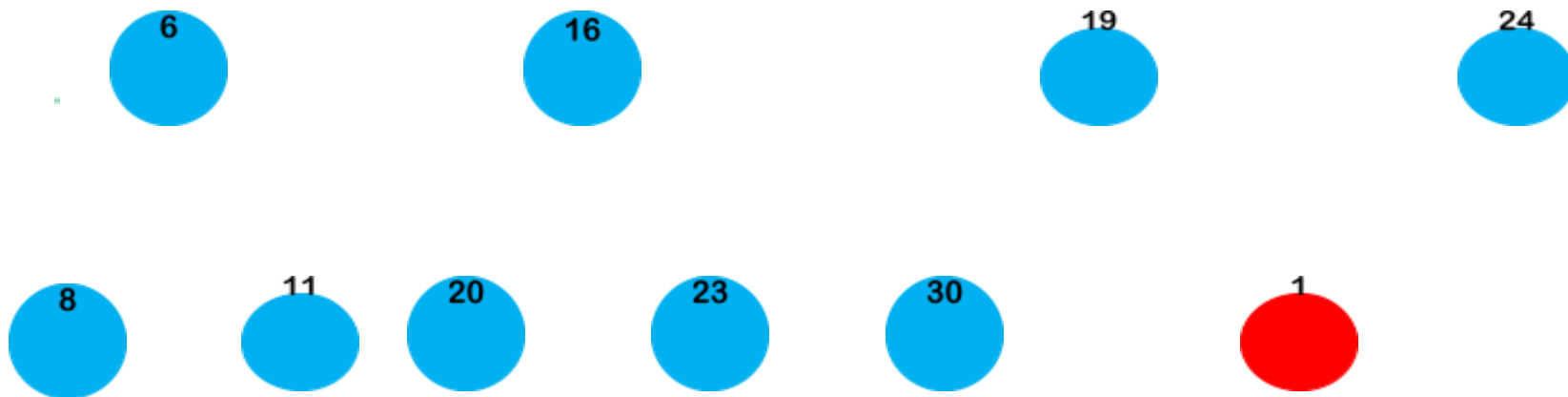
□ This is Min Heap. Because the key in the Parent Node is smaller than (or equal to) the key in the Child Nodes .So, definition of Min Heap satisfied.

b)Let's suppose, we insert a new value at an array index 13 then draw a heap tree after inserting a new node. Also show the changes done in array.

Data
Array Index

	2	3	4	6	16	19	24	8	11	20	23	30	1
0	1	2	3	4	5	6	7	8	9	10	11	12	13



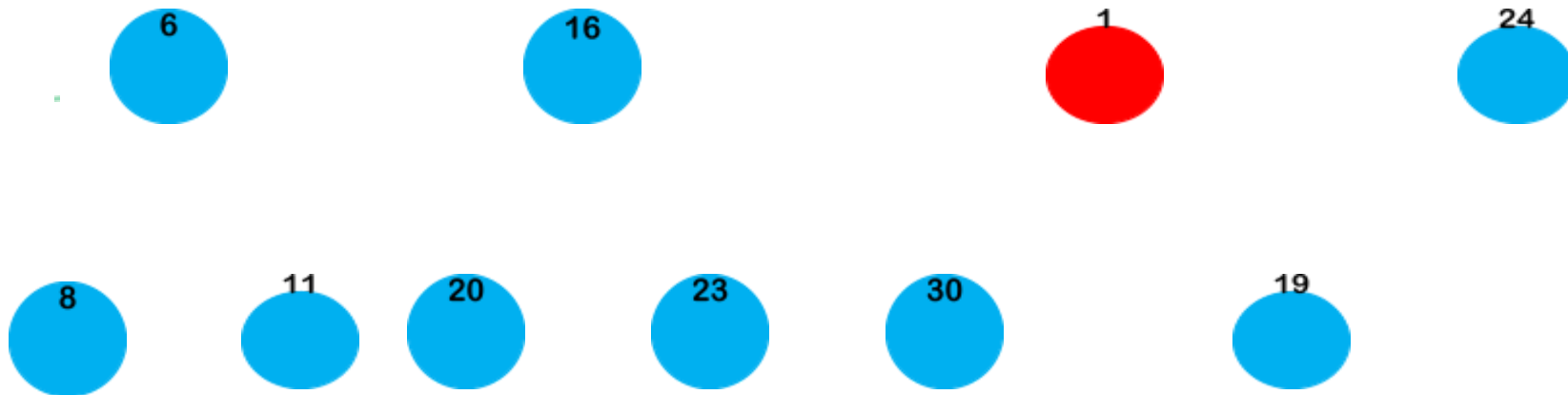


Data		2	3	4	6	16	19	24	8	11	20	23	30	1
Array Index	0	1	2	3	4	5	6	7	8	9	10	11	12	13

□ This newly inserted may distort the properties of Heap for its Parent. So, in order to keep the properties of Heap, heapify this newly inserted element following a bottom-up approach.

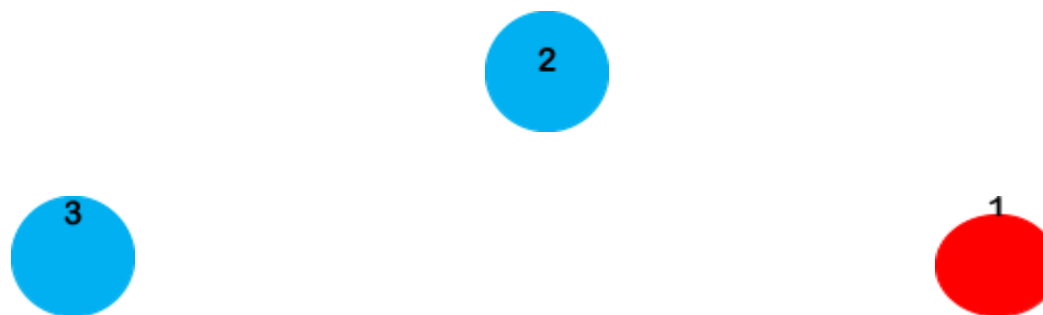
□ And New Child Node 1 is smaller than its Parent Node which violates the Min Heap property. So, we swap it.

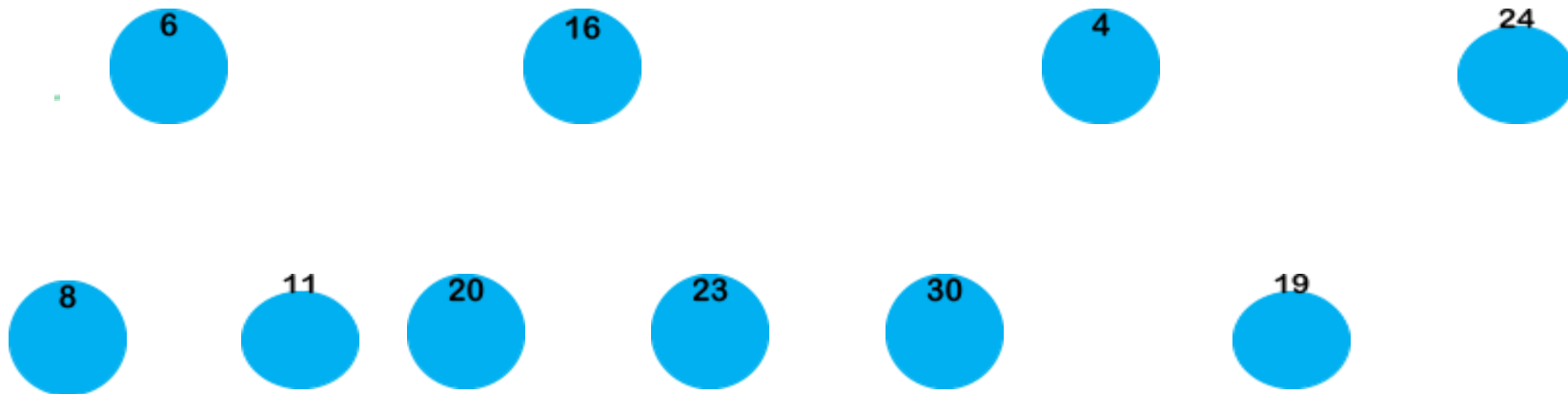




Data		2	3	4	6	16	1	24	8	11	20	23	30	19
Array Index	0	1	2	3	4	5	6	7	8	9	10	11	12	13

□ Again Child Node 1 is smaller than its Parent Node which violates the Min Heap property. So, we swap it more.

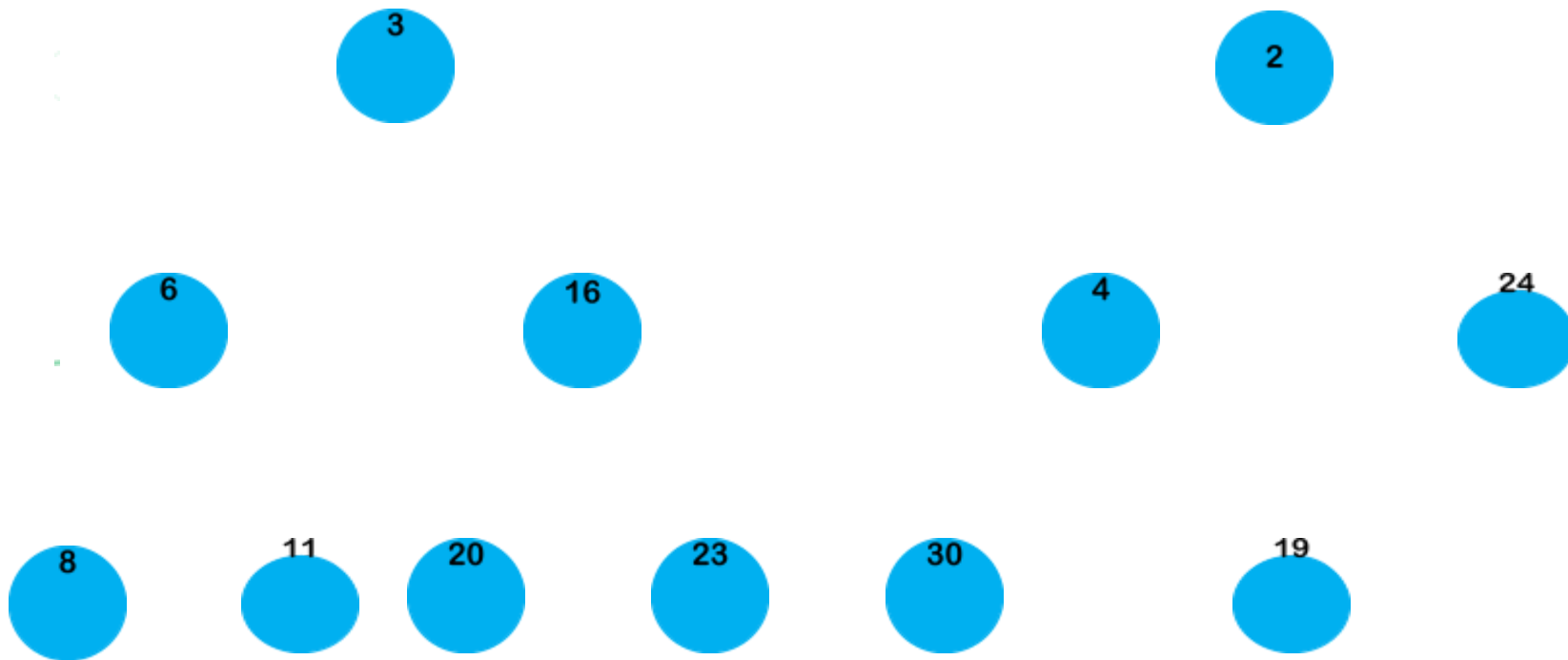




Data		2	3	1	6	16	4	24	8	11	20	23	30	19
Array Index	0	1	2	3	4	5	6	7	8	9	10	11	12	13

□ As Again Child Node 1 is smaller than its Parent Node which violates the Min Heap property. So, we swap it some more time.





Data		1	3	2	6	16	4	24	8	11	20	23	30	19
Array Index	0	1	2	3	4	5	6	7	8	9	10	11	12	13

Therefore, Min Heap property has maintained or fulfilled.