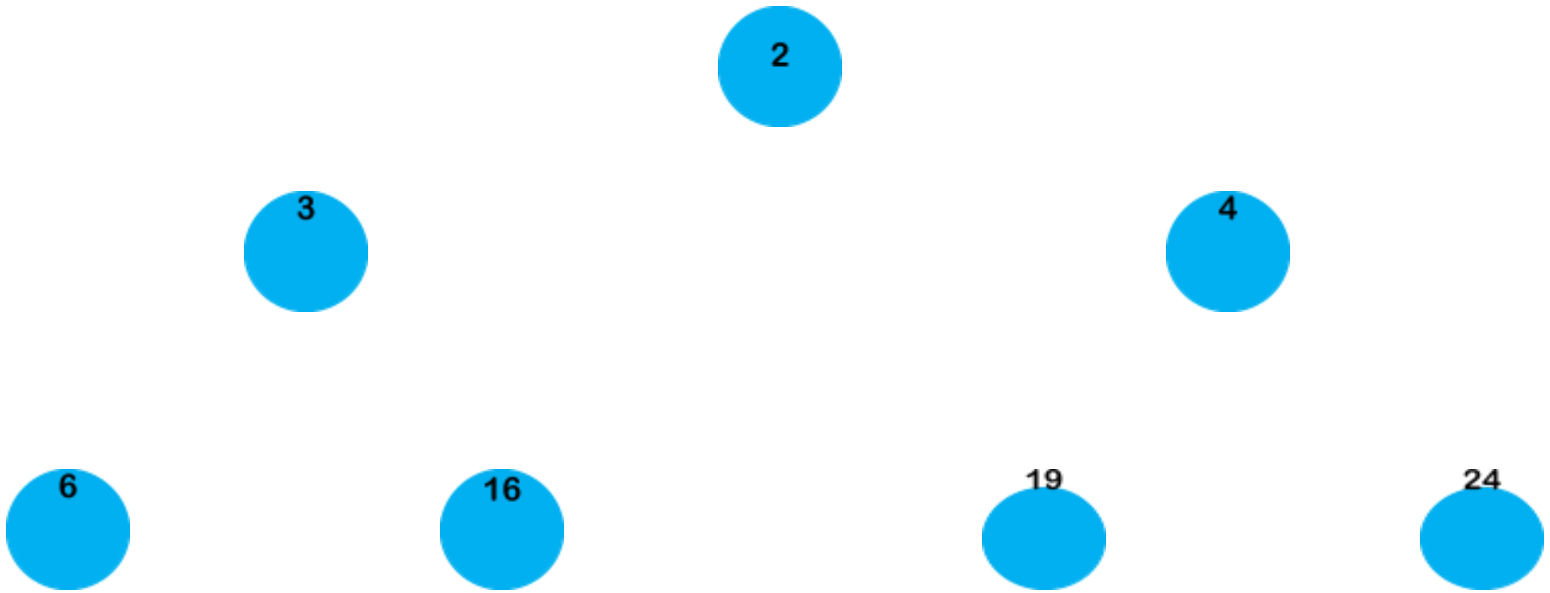
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- *Answer*

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?

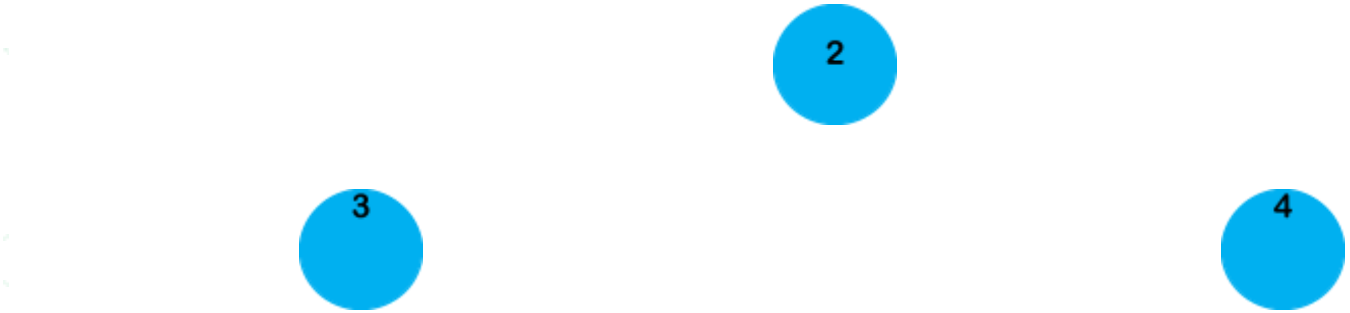


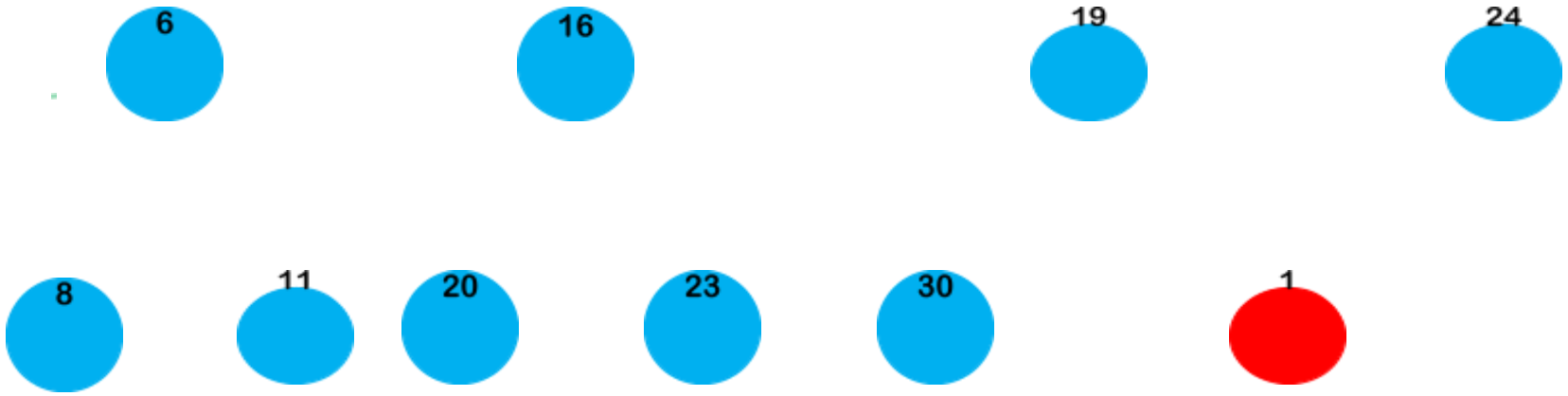


- **This is Min Heap. Because the key in the Parent Node is smaller than (or equal to) the key in the Child Nodes .So, definition of Min Heap satisfied.**

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.

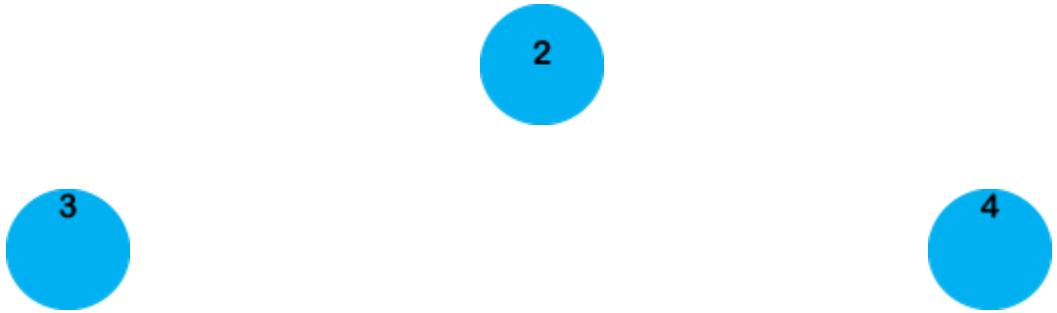
Data		2	3	4	6	16	19	24	8	11	20	23	30	1
Array Index	0	1	2	3	4	5	6	7	8	9	10	11	12	13

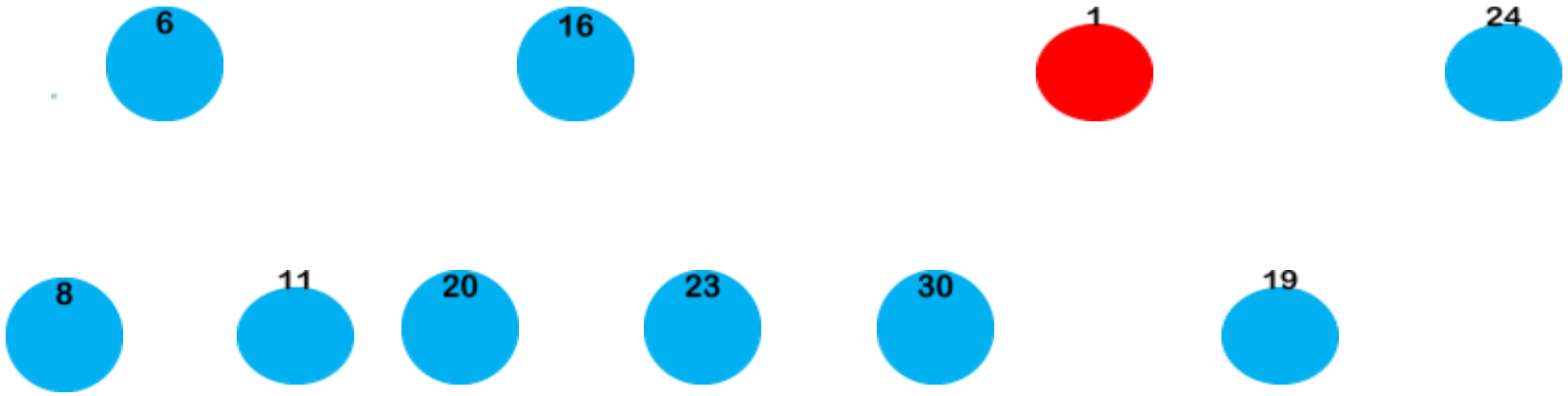




Data		2	3	4	6	16	19	24	8	11	20	23	30	1
Array Index	0	1	2	3	4	5	6	7	8	9	10	11	12	13

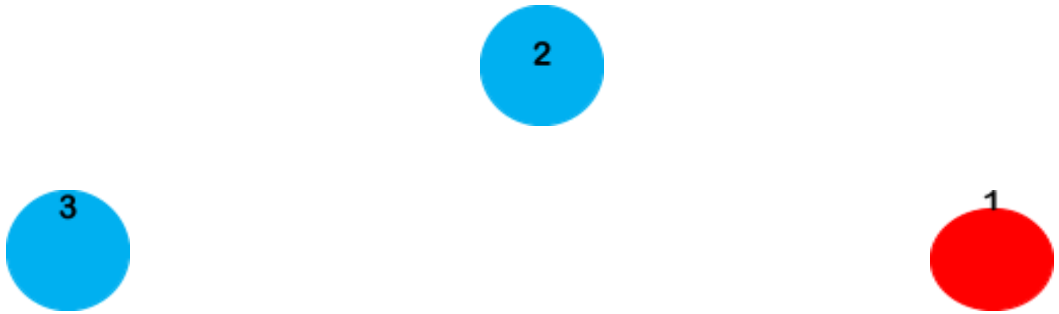
- **This newly inserted may distort the properties of Heap for its Parent. So, in order to keep the properties of Heap, heapify this newly inserted element following a bottom-up approach.**
- **And New Child Node 1 is smaller than its Parent Node which violates the Min Heap property. So, we swap it.**

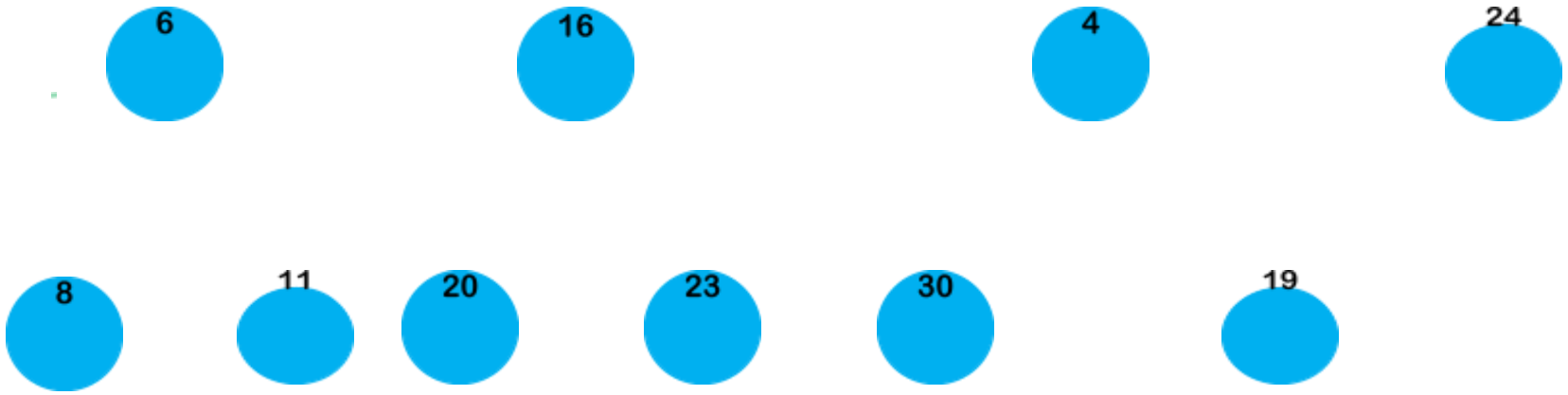




Data		2	3	4	6	16	1	24	8	11	20	23	30	19
Array Index	0	1	2	3	4	5	6	7	8	9	10	11	12	13

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

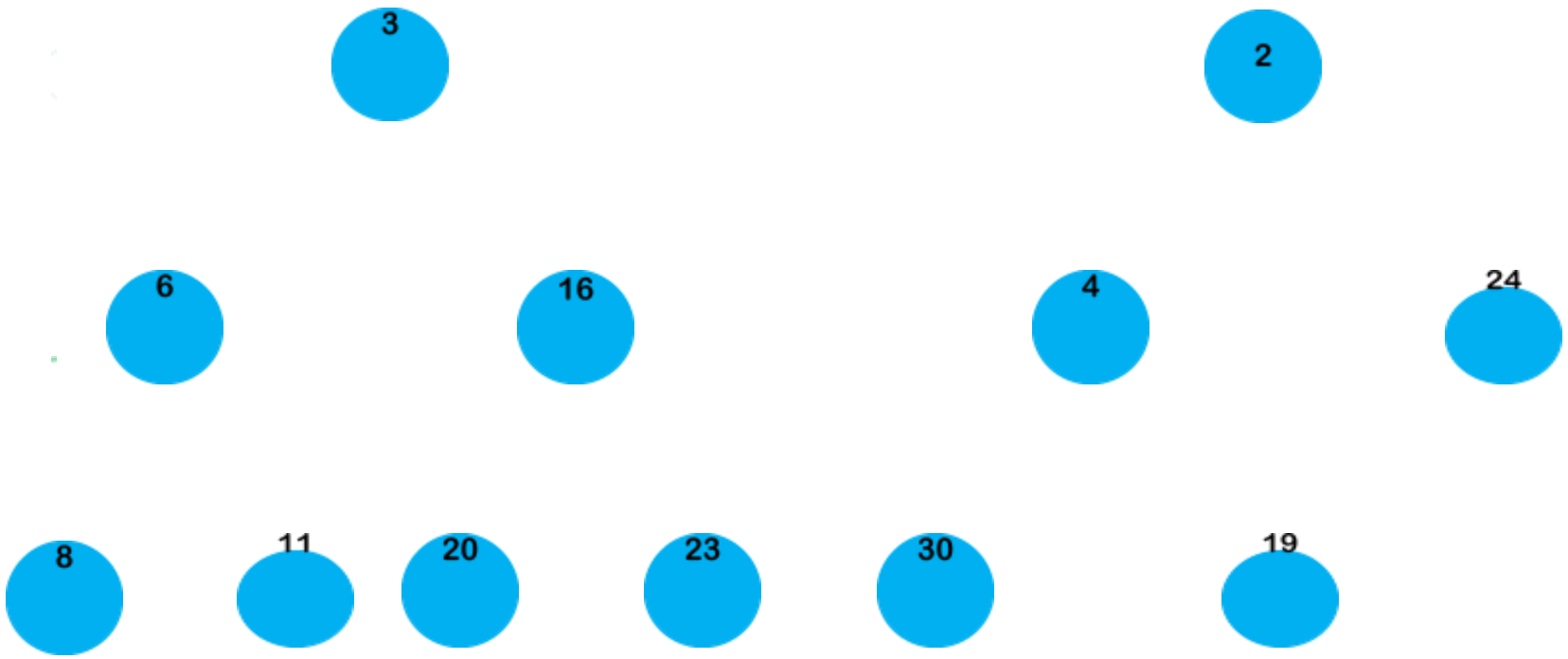




Data		2	3	1	6	16	4	24	8	11	20	23	30	19
Array Index	0	1	2	3	4	5	6	7	8	9	10	11	12	13

- 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.