

1104. Path In Zigzag Labelled Binary Tree

In an infinite binary tree where every node has two children, the nodes are labelled in row order.

In the odd numbered rows (ie., the first, third, fifth,...), the labelling is left to right, while in the even numbered rows (second, fourth, sixth,...), the labelling is right to left.

Given the label of a node in this tree, return the labels in the path from the root of the tree to the node with that label.

```
class Solution {
    public List<Integer> pathInZigZagTree(int label) {

        LinkedList<Integer> res = new LinkedList<>();
        int parent = label;
        res.addFirst(parent);

        while (parent != 1) {
            int d = (int)(Math.log(parent) / Math.log(2));

            // from largest to this label in the same level
            int offset = (int) Math.pow(2, d+1) -1 - parent;

            // real parent is from the opposite direction
            parent = (int)(Math.pow(2, d) + offset) /2;
            res.addFirst(parent);
        }

        return res;
    }
}
```