

### Problem Statement: Hotel Room Management

**Background:** You are managing a hotel represented as a binary tree, where each node represents a room in the hotel. Each room has a certain number of beds and a nightly rate. The root of the tree represents the main hotel lobby, and each leaf node represents a specific room.

**Objective:** Your goal is to determine the maximum revenue that can be generated from booking rooms in the hotel. You can only book rooms from the root to any leaf node, and the revenue from a path is calculated as the sum of the nightly rates of the rooms along that path multiplied by the number of beds in those rooms.

#### Input:

- The first line contains an integer **n**, the number of rooms (nodes) in the tree.
- The next **n** lines each contain four integers: **x**, **y**, **beds**, and **rate**, where:
  - **x** is the parent node,
  - **y** is the child node,
  - **beds** is the number of beds in the room at the child node,
  - **rate** is the nightly rate for the room at the child node.
- The input guarantees that the tree is valid and rooted at node **1**.

#### Output:

- Print a single integer, the maximum revenue that can be generated from booking rooms from the root to any leaf node.

#### Constraints:

- $1 \leq n \leq 1000$
- **beds** and **rate** are integers in the range **[1, 100]**.

#### Example Input:

```
1 5
2 1 2 2 100
3 1 3 3 150
4 2 4 1 200
5 2 5 2 250
6 3 6 4 300
```

#### Example Output:

```
11300
```

**Explanation:** In the example above, the tree structure is as follows:

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```
1  1
2  /\
3  2 3
4  /\ \
5  4 5 6
```

- The values at the nodes are:
  - Node 1: (not counted)
  - Node 2: 2 beds at a rate of 100  $\rightarrow$  Revenue =  $2 * 100 = 200$
  - Node 3: 3 beds at a rate of 150  $\rightarrow$  Revenue =  $3 * 150 = 450$
  - Node 4: 1 bed at a rate of 200  $\rightarrow$  Revenue =  $1 * 200 = 200$
  - Node 5: 2 beds at a rate of 250  $\rightarrow$  Revenue =  $2 * 250 = 500$
  - Node 6: 4 beds at a rate of 300  $\rightarrow$  Revenue =  $4 * 300 = 1200$

The maximum revenue path from the root (1) to any leaf is:

- Path 1  $\rightarrow$  2  $\rightarrow$  4: 200
- Path 1  $\rightarrow$  2  $\rightarrow$  5:  $200 + 500 = 700$
- Path 1  $\rightarrow$  3  $\rightarrow$  6:  $450 + 1200 = 1650$

The maximum revenue is **1650**.

#### Notes:

- You may assume that the input will always form a valid binary tree.
- The tree can be unbalanced, and some nodes may have only one child.
- You can use any traversal method (DFS, BFS) to solve the problem, but you should ensure that your solution is efficient enough to handle the upper limits of the constraints.