198. House Robber

Medium 11892 255 Add to List Share

You are a professional robber planning to rob houses along a street. Each house has a certain amount of money stashed, the only constraint stopping you from robbing each of them is that adjacent houses have security systems connected and **it will automatically contact the police if two adjacent houses were broken into on the same night**.

Given an integer array `nums` representing the amount of money of each house, return *the maximum amount of money you can rob tonight* ***without alerting the police***.

Example 1:

```
Input: nums = [1,2,3,1]
Output: 4
Explanation: Rob house 1 (money = 1) and then rob house 3 (money = 3).
Total amount you can rob = 1 + 3 = 4.
```

Example 2:

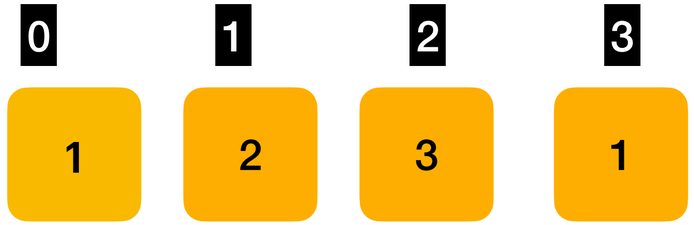
```
Input: nums = [2,7,9,3,1]
Output: 12
Explanation: Rob house 1 (money = 2), rob house 3 (money = 9) and rob house 5 (money = 1).
Total amount you can rob = 2 + 9 + 1 = 12.
```

Constraints:

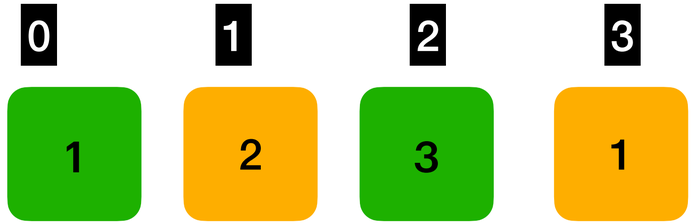
- `1 <= nums.length <= 100`
- `0 <= nums[i] <= 400`

Constraint : You can not rob from adjacent houses

Get the Max Profit without altering the police

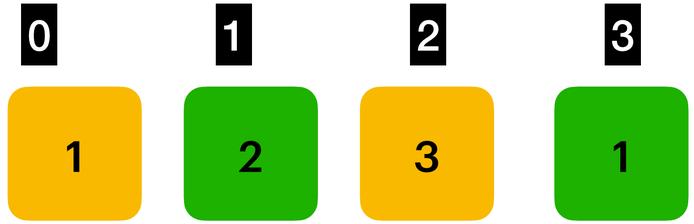


Case1



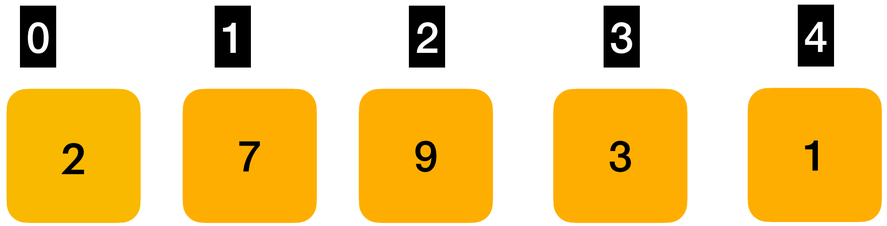
MaxProfit : 4

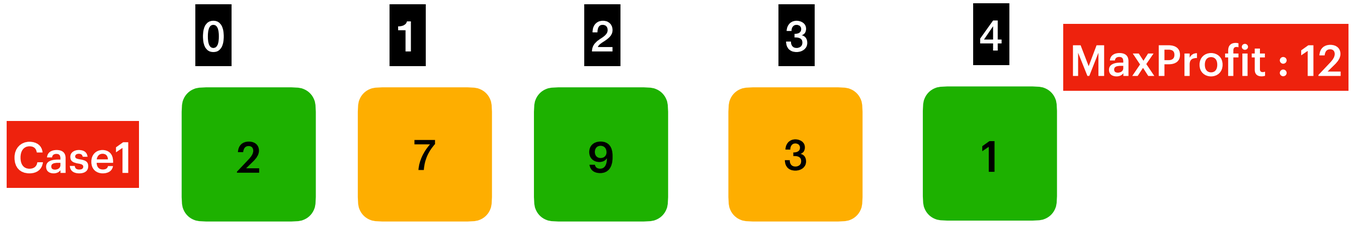
Case2

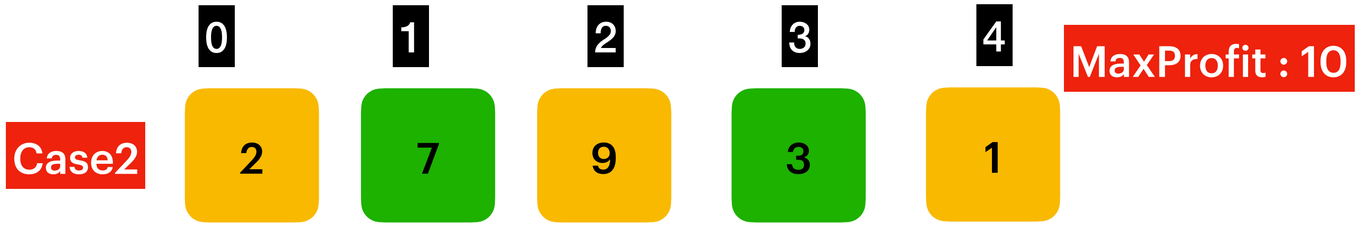


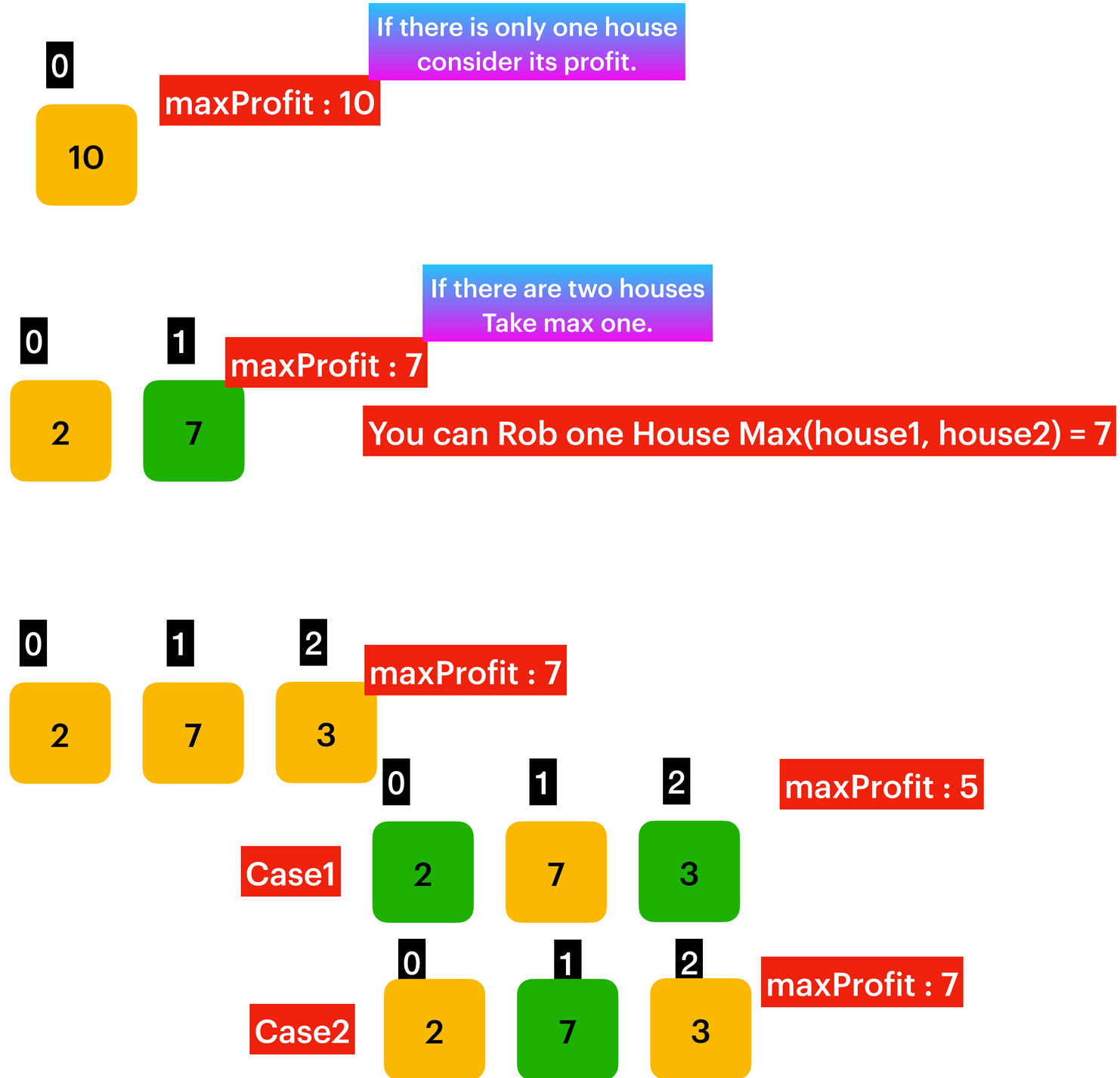
MaxProfit : 3

Should return Max Profit i.e 4


0
1
2
3
4
2
7
9
3
1

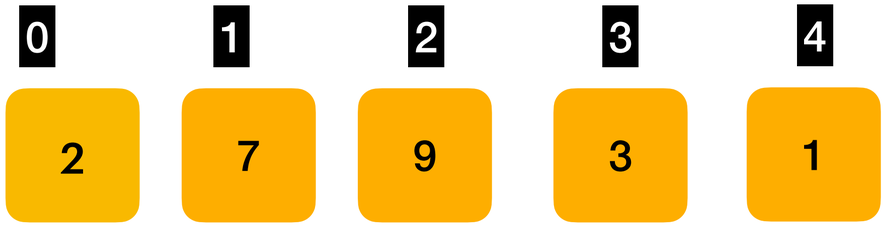

0
1
2
3
4
MaxProfit : 12
Case1
2
7
9
3
1


0
1
2
3
4
MaxProfit : 10
Case2
2
7
9
3
1


If there is only one house consider its profit.
0
10
maxProfit : 10
If there are two houses Take max one.
0
1
2
7
maxProfit : 7
You can Rob one House Max(house1, house2) = 7
0
1
2
2
7
3
maxProfit : 7
0
1
2
Case1
2
7
3
maxProfit : 5
0
1
2
Case2
2
7
3
maxProfit : 7

int[] dp = new int[n]

Used to store subProblem results



If there is only one house consider its profit.

SubProblem1 :

2

maxProfit : 2
dp[0] = 2

If there are two houses Take max one.

SubProblem2 :

2

7

maxProfit : Max(2,7) = 7
dp[1] = 7

SubProblem3 :

2

7

9

maxProfit : 11
dp[2] = 11

Include

Exclude

nums[i] + dp[i-2] = 9+2 = 11

dp[i-1] = 7

dp[i] = Math.max(nums[i] + dp[i-2] , dp[i-1])

SubProblem4 :

2

7

9

3

maxProfit : 11
dp[3] = 11

3+7 = 10

11

SubProblem5 :

2

7

9

3

1

1+11 = 12

11

maxProfit : 12
dp[4] = 12

Tabulation

Time Complexity : O(n)
Space Complexity: O(n)

Can we improve on Space on Tabulation Approach,
Yes we just need previous two subproblem results to solve current subproblem.
So we can swap between two variables. So that Space would be constant O(1).

Base checks :

```
if(currentHouseIndex == 0)
{
return nums[0];
}

if(currentHouseIndex == 1)
{
return Math.max(nums[0], nums[1]);
}
```

Memoization

Time Complexity : O(n)
Space Complexity: O(n)