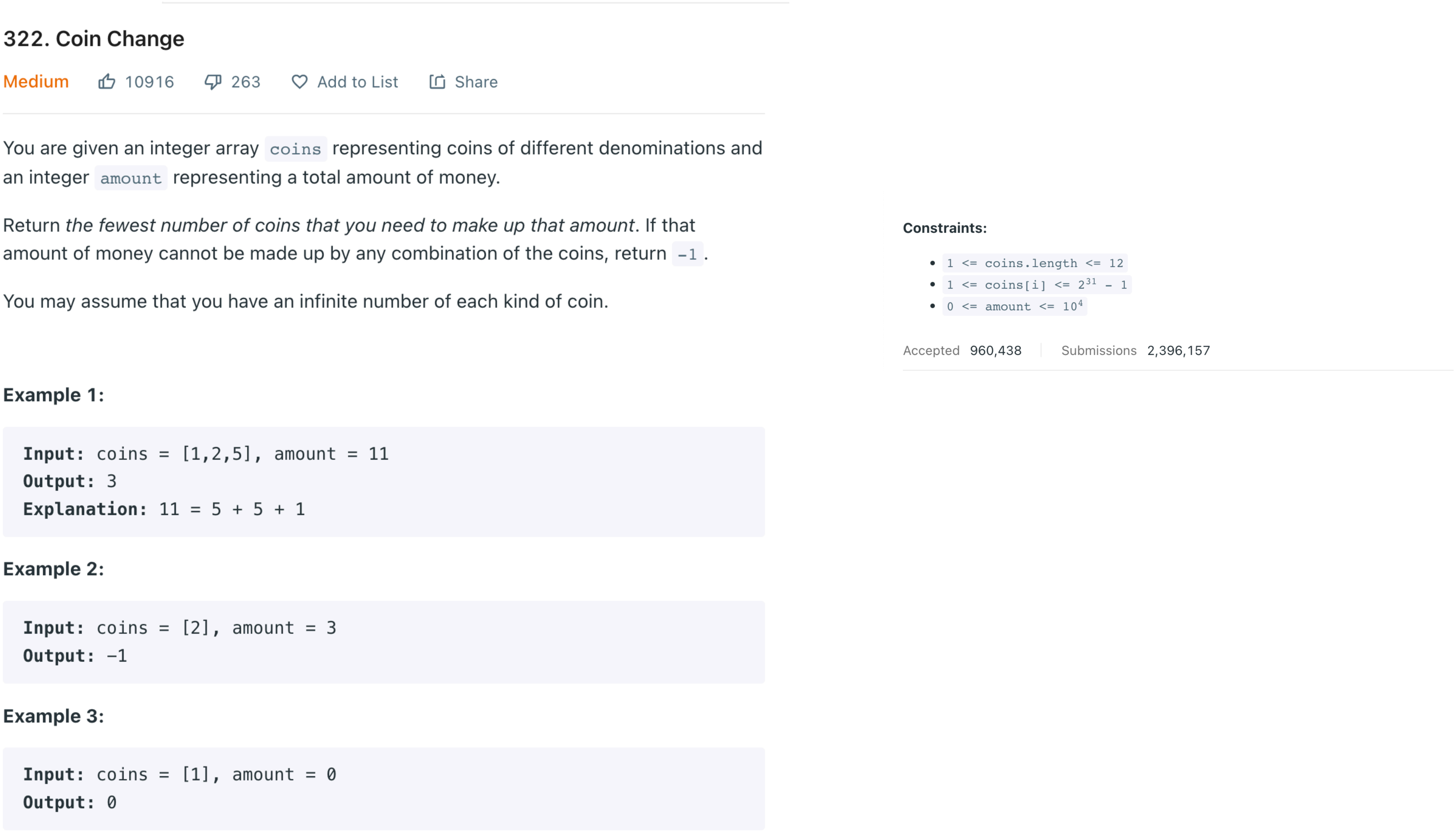

322. Coin Change

Medium 👍 10916 👎 263 ♡ Add to List Share

You are given an integer array `coins` representing coins of different denominations and an integer `amount` representing a total amount of money.

Return *the fewest number of coins that you need to make up that amount*. If that amount of money cannot be made up by any combination of the coins, return `-1`.

You may assume that you have an infinite number of each kind of coin.

Example 1:

```
Input: coins = [1,2,5], amount = 11
Output: 3
Explanation: 11 = 5 + 5 + 1
```

Example 2:

```
Input: coins = [2], amount = 3
Output: -1
```

Example 3:

```
Input: coins = [1], amount = 0
Output: 0
```

Constraints:

- `1 <= coins.length <= 12`
- `1 <= coins[i] <= `2^{31}` - 1`
- `0 <= amount <= `10^{4}

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Output : -1

Coins{2,5} amount : 3

int max = amount+1 = 4

int dp[] = new int[amount+1]

0	1	2	3
4	4	4	4

Solve the Base Sub Problem :
For amount:0 what are minimal notes needed : 0

0	1	2	3
0	4	4	4

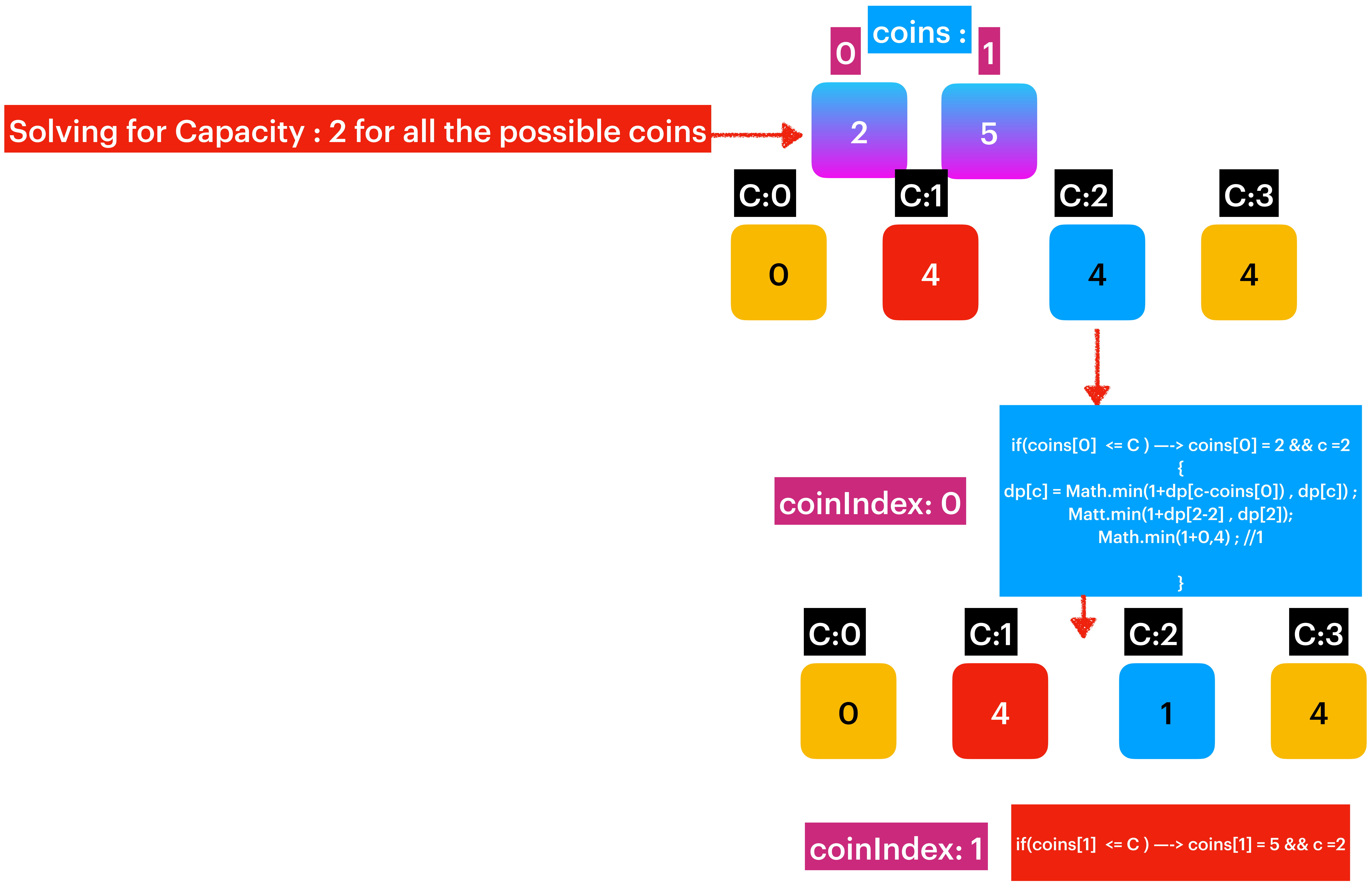
With coins[0], coins[1] we can
not make amount = 1
so there is no change

coins :

0	1
2	5

Solving for Capacity : 1 for all the possible coins

C:0	C:1	C:2	C:3
0	4	4	4



Solving for Capacity : 2 for all the possible coins

coins :

0	1
2	5

C:0	C:1	C:2	C:3
0	4	4	4

coinIndex: 0

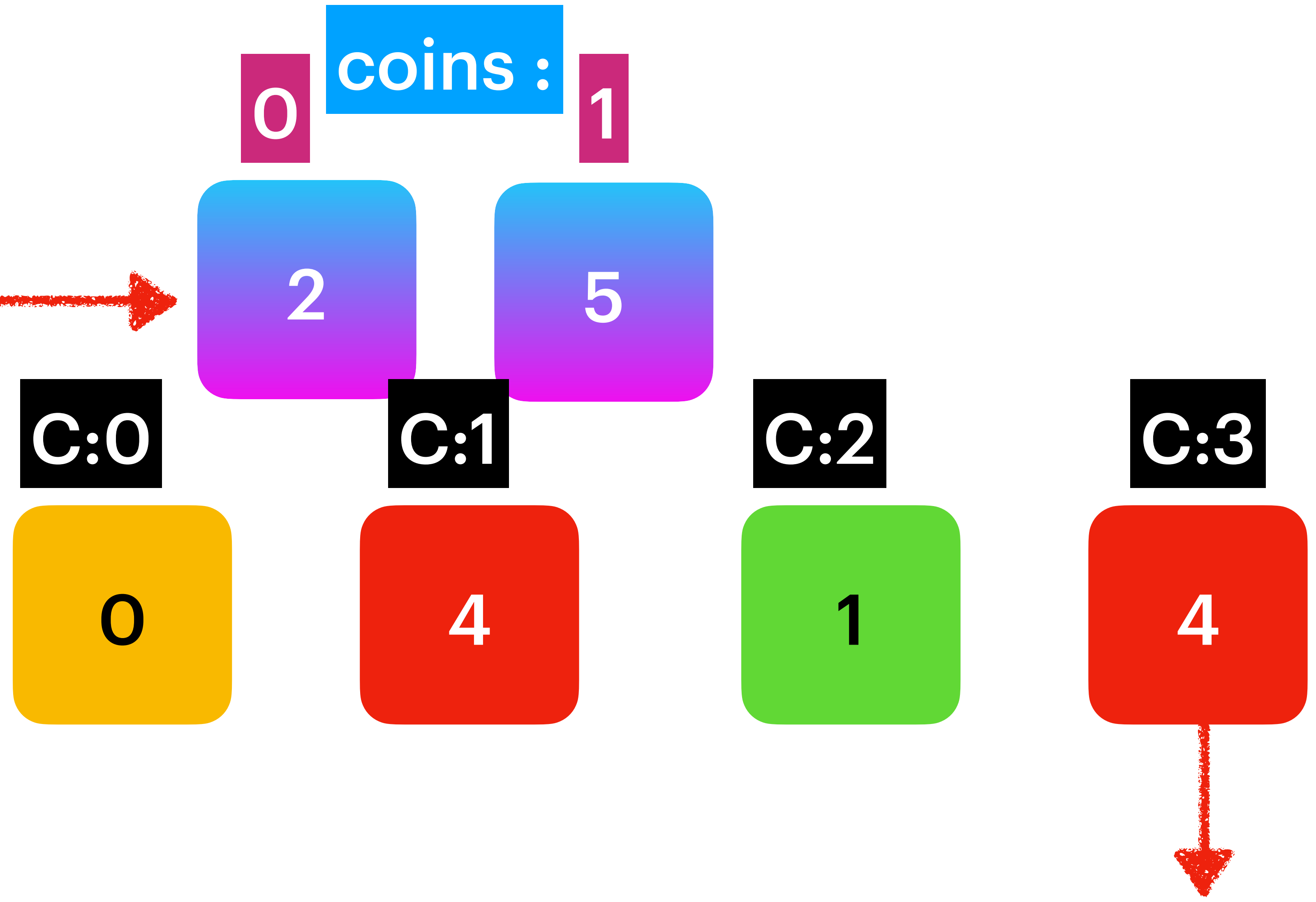
```
if(coins[0]  <= C ) —-> coins[0] = 2 && c =2
{
dp[c] = Math.min(1+dp[c-coins[0]) , dp[c]) ;
Matt.min(1+dp[2-2] , dp[2]);
Math.min(1+0,4) ; //1

}
```

C:0	C:1	C:2	C:3
0	4	1	4

coinIndex: 1

```
if(coins[1]  <= C ) —-> coins[1] = 5 && c =2
```

Solving for Capacity : 3 for all the possible coins



coins :

0	1
2	5

C:0	C:1	C:2	C:3
0	4	1	4

coinIndex: 0

```
if(coins[0]  <= C ) —-> coins[0] = 2 && c = 3
{
dp[c] = Math.min(1+dp[c-coins[1]) , dp[c]) ;
Math.min(1+dp[1] , dp[3]) ;
Math.min(1+4,4) ; 4
}
```

coinIndex: 1

```
if(coins[1]  <= C ) —-> coins[1] = 5 && c =3
```

```
return   dp[amount] > amount ? -1 : dp[amount]
```

Output : -1

Coins{2,5} amount : 5

int dp[] = new int[amount+1]

int max = amount+1 = 6

0	1	2	3	4	5
6	6	6	6	6	6

coins :

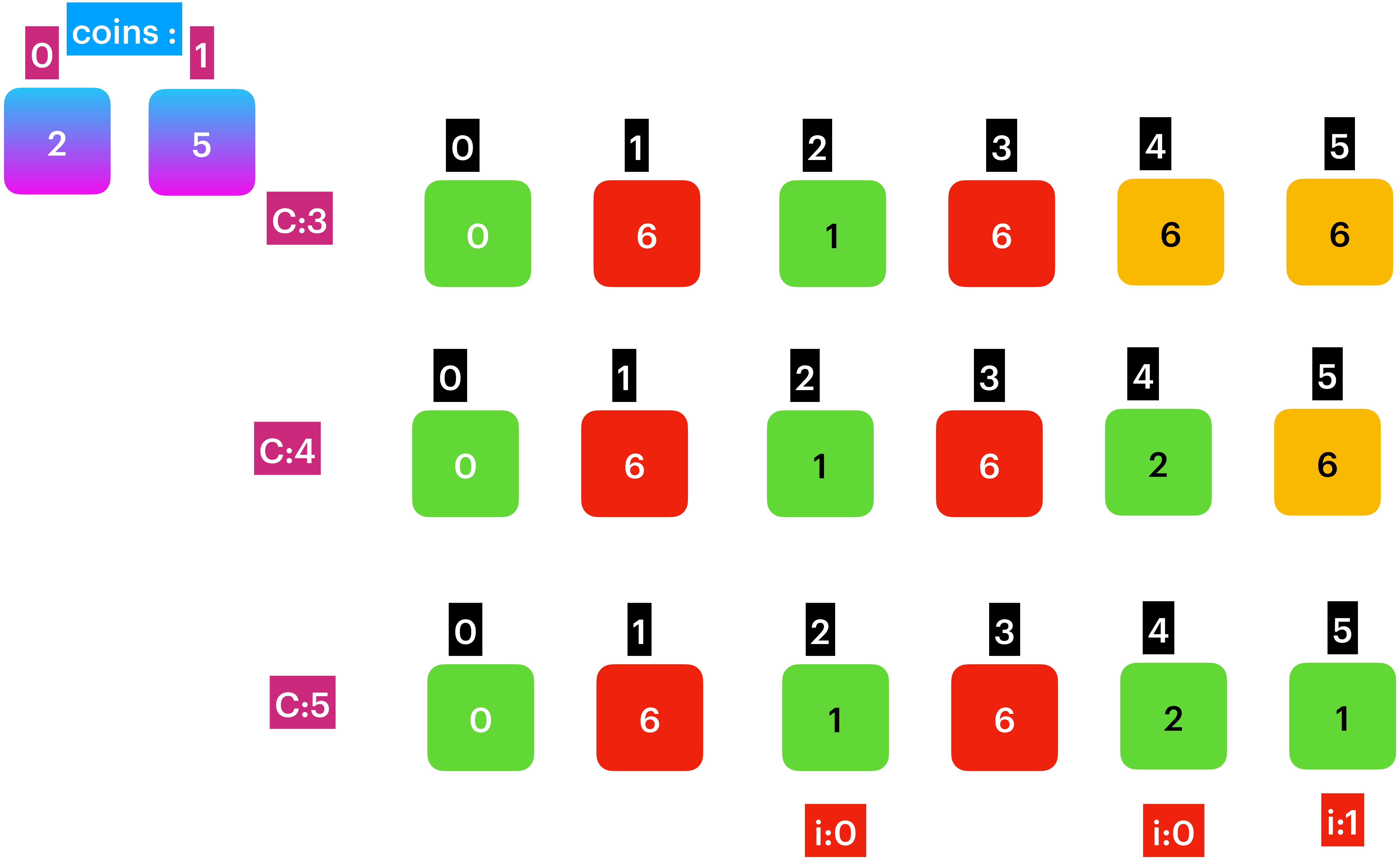
0	1
2	5

Solve the Base Sub Problem :
For amount:0 what are minimal notes needed : 0

	0	1	2	3	4	5
C:0	0	6	6	6	6	6

	0	1	2	3	4	5
C:1	0	6	6	6	6	6

	0	1	2	3	4	5
C:2	0	6	1	6	6	6



coins :

0	1
2	5

C:3

0	1	2	3	4	5
0	6	1	6	6	6

C:4

0	1	2	3	4	5
0	6	1	6	2	6

C:5

0	1	2	3	4	5
0	6	1	6	2	1
		i:0		i:0	i:1