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Experiment No.:-4

Write a program to solve a 0-1 Knapsack problem using dynamic programming or branch and bound strategy.

Source Code:-

In [1]:
```
def knapsack_01(n, values, weights, W):
    dp = [[0] * (W+1) for _ in range(n+1)]

    for i in range(n+1):
        for w in range(W+1):
            if i == 0 or w == 0:
                dp[i][w] = 0
            elif weights[i-1] <= w:
                dp[i][w] = max(dp[i-1][w], dp[i-1][w-weights[i-1]] + values[i-1])
            else:
                dp[i][w] = dp[i-1][w]

    selected_items = []
    i, w = n, W
    while i > 0 and w > 0:
        if dp[i][w] != dp[i-1][w]:
            selected_items.append(i-1)
            w -= weights[i-1]
        i -= 1

    return dp[n][W], selected_items

# Take input from the user
n = int(input("Enter the number of items: "))
values = list(map(int, input("Enter the values of the items separated by space: ").spl
weights = list(map(int, input("Enter the weights of the items separated by space: ").s
W = int(input("Enter the maximum capacity of the knapsack: "))

max_value, selected_items = knapsack_01(n, values, weights, W)
print("Maximum value:", max_value)
print("Selected items:", selected_items)
```

```
Enter the number of items: 4
Enter the values of the items separated by space: 3 4 5 6
Enter the weights of the items separated by space: 2 3 4 6
Enter the maximum capacity of the knapsack: 5
Maximum value: 7
Selected items: [1, 0]
```

In [ ]: