Experiment- 7A

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Branch:BE-CSE **Section/Group: NTPP 602-A**

Semester:6TH **Date of Performance:16/03/25**

Subject Name: AP Lab-2 **Subject Code: 22CSH-352**

1. TITLE:

Maximum Units on a truck.

2. AIM:

You are assigned to put some amount of boxes onto **one truck**. You are given a 2D array boxTypes, where boxTypes[i] = [numberOfBoxes, numberOfUnitsPerBox].

3. Algorithm

- **Sort** boxTypes in descending order based on numberOfUnitsPerBoxiCompute the depth of the left subtree.
- **Iterate** through boxTypes, adding as many boxes as possible to the truck until it is full.
- **Keep track** of the total units loaded and return the sum).

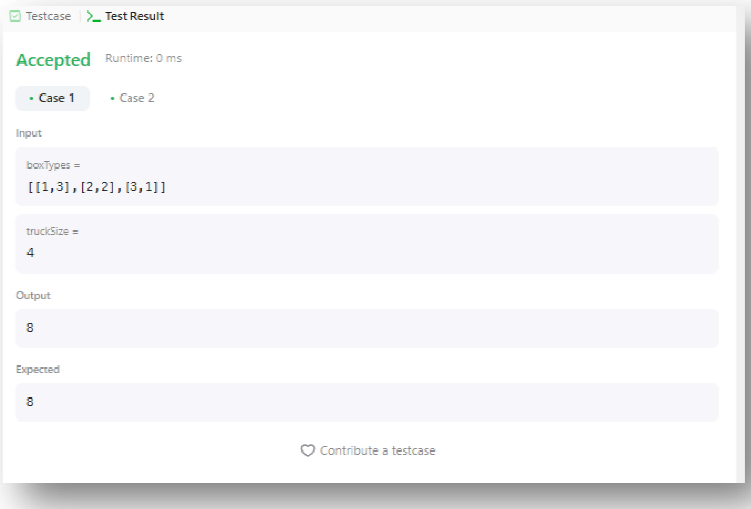
Implemetation/Code

```
class Solution {
public:
int maximumUnits(vector<vector<int>>& boxTypes, int truckSize) {
int ans = 0;
ranges::sort(boxTypes, ranges::greater{},
[](const vector<int>& boxType) { return boxType[1]; });

for (const vector<int>& boxType : boxTypes) {
const int boxes = boxType[0];
const int units = boxType[1];
if (boxes >= truckSize)
return ans + truckSize * units;
ans += boxes * units;
truckSize -= boxes;
}
```

```
return ans;
}
};
```

4. Output:



Time Complexity : O(NlogN)

Space Complexity : O(n)

Learning Outcomes:-

- Sorting and selecting the most valuable boxes first maximizes efficiency.
- Sorting first ensures an optimal selection process in O(Nlog N)O(N \log N)O(NlogN) time.

Experiment - 7B

Student Name: KARANVIR SINGH **UID: 22BCS16269**

Branch:BE-CSE **Section/Group: NTPP- 602(A)**

Semester:6TH **Date of Performance:16/03/25**

Subject Name: AP Lab-2 **Subject Code: 22CSH-352**

1. TITLE:

Maximum Score From Removing Substrings.

2. AIM:

You are given a string s and two integers x and y. You can perform two types of operations any number of times.

3. Algorithm

- **Iterate** through the string and greedily remove high-scoring substrings first (e.g., "ab" before "ba").
- **Keep track** of the total score while modifying the string dynamically.
- **Continue** the process until no more valid substrings remain, then return the total score.

4. Implemetation/Code:

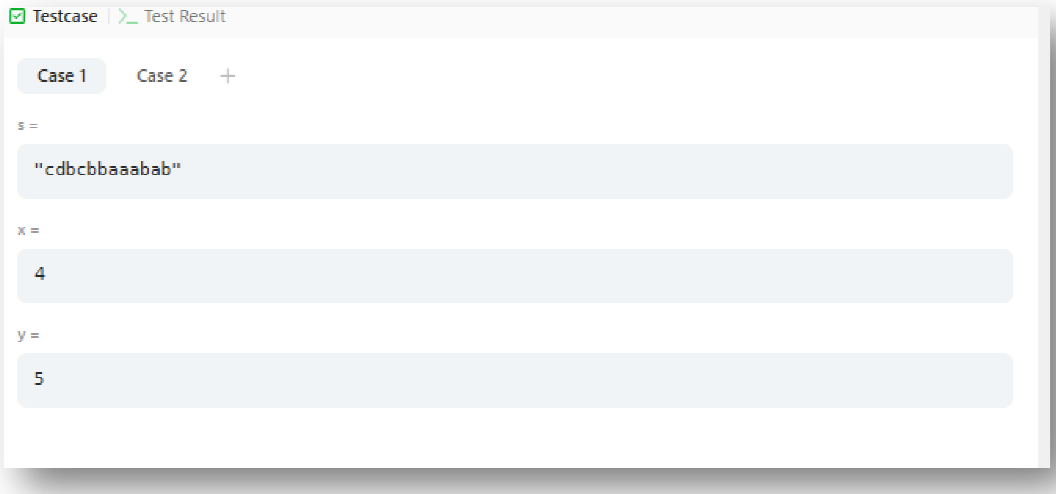
```
class Solution {
public:
int maximumGain(string s, int x, int y) {
return x > y ? gain(s, "ab", x, "ba", y) : gain(s, "ba", y, "ab", x);
}
private:
int gain(const string& s, const string& sub1, int point1, const string& sub2,
int point2) {
int points = 0;
vector<char> stack1;
vector<char> stack2;
for (const char c : s)
if (!stack1.empty() && stack1.back() == sub1[0] && c == sub1[1]) {
stack1.pop_back();
points += point1;
} else {
stack1.push_back(c);
```

```
}

for (const char c : stack1)
if (!stack2.empty() && stack2.back() == sub2[0] && c == sub2[1]) {
stack2.pop_back();
points += point2;
} else {
stack2.push_back(c);
}

return points;
}
};
```

5. Output:



6. Time Complexity : O(N)

7. Space Complexity : O(N)

8. Learning Outcomes:-

- Prioritizing high-scoring removals first leads to an optimal solution.
- Efficiently modifying a string while tracking scores is key to solving substring removal problems.