

```

1 import java.util.*;
2
3 /**
4  * File: Algorithm.java
5  * Description:
6  *   - The Investment Problem's Algorithm (Greedy Algorithm)
7  *
8  * Project:    Assignment 01 - ex2 Investment Problem
9  * Class:      CS353
10 *
11 * @author Dr. Lei Wang [Code Template Author]
12 * @author Kong Jimmy Vang [Completed Code Template]
13 */
14 public class Algorithm {
15
16     // solve investment problem
17     /*
18     * inputs:
19     *   m - the total amount of money to be distributed to projects
20     *   benefits - benefit function of each task
21     * output:
22     *   Money distribution on each project that can maximize the total benefit
23     */
24     public int[] investment(int m, int[][] benefits)
25     {
26         int[] res = new int[benefits.length];
27
28         //**** Investment Algorithm ****//
29         int n = benefits.length; // n = number of projects
30         int size = m + n - 1;    // size of int array
31
32         // Find all possible ints with 5 bits.
33         ArrayList<Long> longs = new ArrayList<>();
34         for (long i = 0; i < Long.SIZE * size; i++)
35         {
36             long bits = 0;
37             for (long j = 0; j < size; j++)
38             {
39                 bits += (i >> j) & 1;
40             }
41
42             if (bits == m)
43             {
44                 longs.add(i);
45             }
46         }
47
48         // Find the max benefit from each investment.
49         int maxBenefit = Integer.MIN_VALUE;
50         for (Long l : longs)
51         {
52             int[] investment = new int[benefits.length];
53             int benefit = 0;
54
55             // Calculate investment and set up investment array.
56             int bits = 0;
57             long bit = 0;
58             int k = 0;
59             for (int j = 0; j <= size; j++)
60             {
61                 bit = (l >> j) & 1;
62
63                 if (bit == 1)
64                 {
65                     bits++;
66                 }
67                 else
68                 {
69                     if (k < benefits.length) {
70                         investment[k++] = bits;
71                         bits = 0;
72                     }
73                 }
74             }
75
76             // Check if the current investment is better than the previous max benefit.
77             for (int j = 0; j < investment.length; j++)
78             {
79                 if (investment[j] < benefits[j].length) {
80                     benefit += benefits[j][investment[j]];
81                 }
82             }
83
84             // Replace max benefit if the current investment provides better benefits.
85             if (maxBenefit < benefit)
86             {
87                 maxBenefit = benefit;
88                 res = investment;
89             }
90         }
91
92         // Return the max benefit.

```

Algorithm.java

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93     } return res;  
94 }  
95 }  
96
```