

Introduction

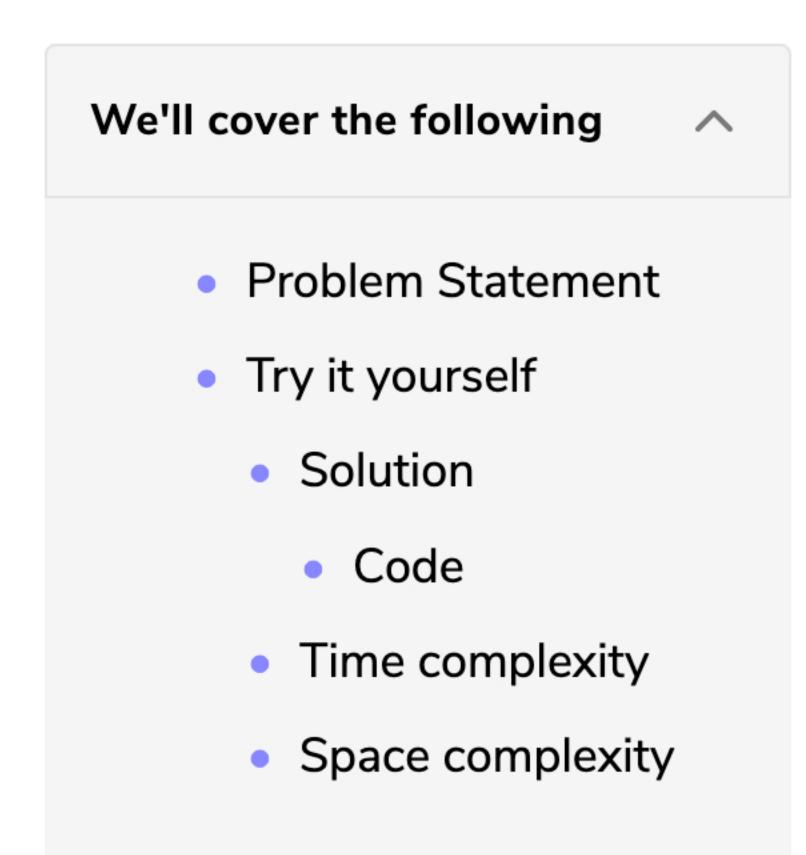
Stream (medium)

Find the Median of a Number

Sliding Window Median (hard)

Maximize Capital (hard)

Maximize Capital (hard)



Problem Statement

Given a set of investment projects with their respective profits, we need to find the **most profitable projects**. We are given an initial capital and are allowed to invest only in a fixed number of projects. Our goal is to choose projects that give us the maximum profit. Write a function that returns the maximum total capital after selecting the most profitable projects.

(%)

? Ask a Question

We can start an investment project only when we have the required capital. Once a project is selected, we can assume that its profit has become our capital.

Example 1:

Input: Project Capitals=[0,1,2], Project Profits=[1,2,3], Initial Capital=1, Number of Projects=2 **Output:** 6 **Explanation:**

Explanation:

- 1. With initial capital of '1', we will start the second project which will give us profit of '2'. Once we selected our first project, our total capital will become 3 (profit + initial capital).
- 2. With '3' capital, we will select the third project, which will give us '3' profit.

After the completion of the two projects, our total capital will be 6 (1+2+3).

Example 2:

Input: Project Capitals=[0,1,2,3], Project Profits=[1,2,3,5], Initial Capital=0, Number of Projects=3

Output: 8

Explanation:

2. Next, we will select the second project, which will bring our capital to 3.

1. With '0' capital, we can only select the first project, bringing out capital to 1.

3. Next, we will select the fourth project, giving us a profit of 5.

After selecting the three projects, our total capital will be 8 (1+2+5).

Try it yourself

Try solving this question here:

```
Python3
                        Js JS
                                    G C++
Java
 1 import java.util.*;
    class MaximizeCapital {
      public static int findMaximumCapital(int[] capital, int[] profits, int numberOfProjects, int
        // TODO: Write your code here
 6
        return -1;
      public static void main(String[] args) {
 9
        int result = MaximizeCapital.findMaximumCapital(new int[] { 0, 1, 2 }, new int[] { 1, 2, 3
10
        System.out.println("Maximum capital: " + result);
11
        result = MaximizeCapital.findMaximumCapital(new int[] { 0, 1, 2, 3 }, new int[] { 1, 2, 3,
12
        System.out.println("Maximum capital: " + result);
13
14
15
Run
                                                                              Save
                                                                                       Reset
```

While selecting projects we have two constraints:

Solution

1. We can select a project only when we have the required capital.

- 2. There is a maximum limit on how many projects we can select.
- Since we don't have any constraint on time, we should choose a project, among the projects for

will give us the best solution.

While selecting a project, we will do two things:

which we have enough capital, which gives us a maximum profit. Following this greedy approach

Find all the projects that we can choose with the available capital.
 From the list of projects in the 1st step, choose the project that gives us a maximum profit.

- We can follow the **Two Heaps** approach similar to Find the Median of a Number Stream. Here are
- the steps of our algorithm:
 - requirement.

 2. Go through the top projects of the min-heap and filter the projects that can be completed within our available capital. Insert the profits of all these projects into a max-heap, so that we

1. Add all project capitals to a min-heap, so that we can select a project with the smallest capital

- can choose a project with the maximum profit.

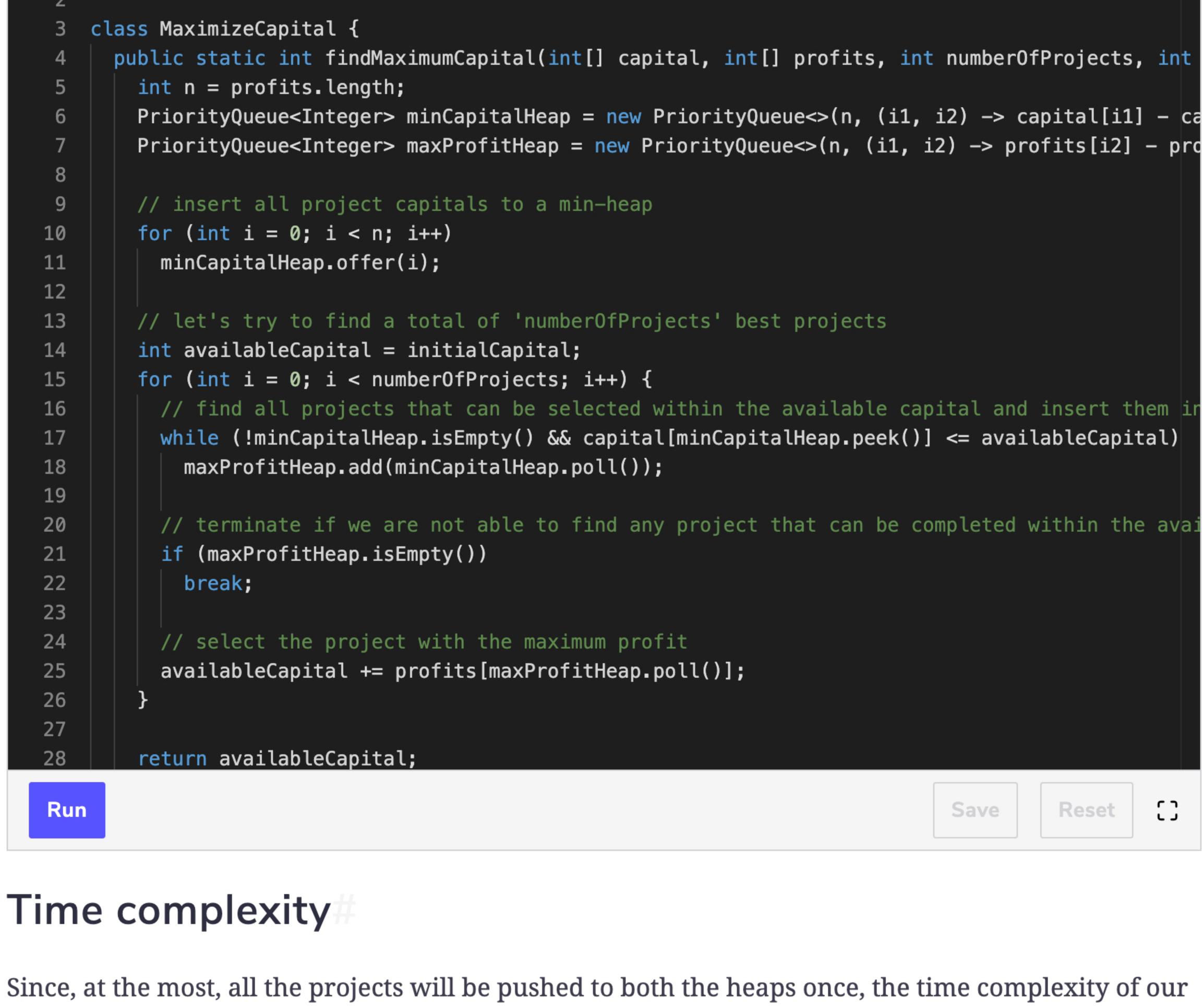
 3. Finally, select the top project of the max-heap for investment.
- 4. Repeat the 2nd and 3rd steps for the required number of projects.

 Code#

Here is what our algorithm will look like:

Java Python3 C++ Js JS

import java.util.*;



algorithm is O(NlogN + KlogN), where 'N' is the total number of projects and 'K' is the number

instead of you applying to them. See how ①

of projects we are selecting.

Space complexity#

The space complexity will be O(N) because we will be storing all the projects in the heaps.



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