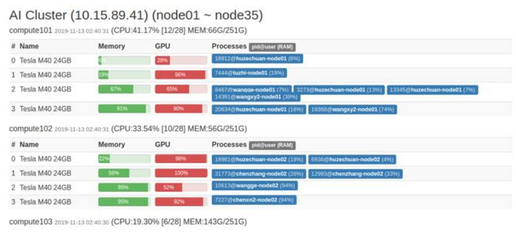
AI cluster consumption analysis

Description

Motivation

The GPU resources of AI Cluster on SIST decide how efficiently students can implement their experiments. AI cluster can be seen as a collection of GPUs. Each day, deep-learning guys are hungry for newly-arrived GPU. More GPUs indicate more experiments, which makes their research work solid. To analyze the consumption of resources, the administrative stuff builds a mathematical model.



Control panel of SIST AI Cluster

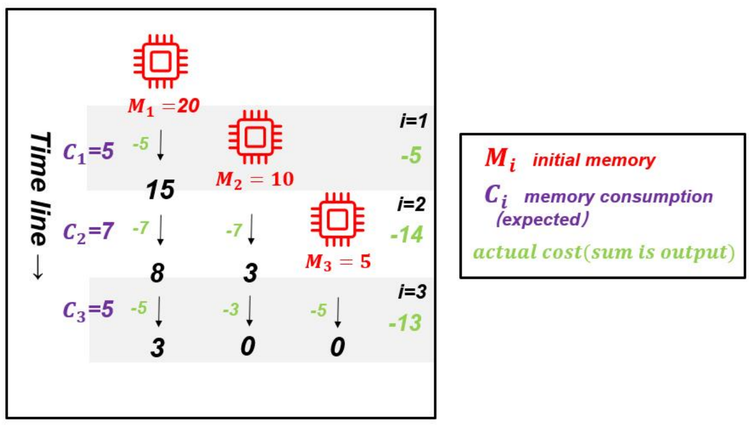
Assumption

A simplified model is set up to simulate real-world scenario. Plus, for now, we only consider the memory of GPU as criterion, for several days:

- **Hardworking administrative stuff**: A new GPU is installed at cluster every day.
- **Hungry students**: To simplify the model, all GPU memory will be consumed by a constant every day. The demand for all accessible GPUs is the same every day, unless the consumption is larger than some GPU's available memory(in this case, the consumption is equal to its rest of memory. Surplus is truncated).
- **Burst of consumption**: However, the demand for GPU differs from day to day.
- **Extremely long programs**: The occupied memory won't be freed once it is occpied.

Introduce some notations to crystalize those assumptions:

1. **About GPU memory M**: The i_th GPU is installed on i_th day, of which the memory is of M_i units initially.
2. **About memory consumption C**: C_i units of memory will be consumed on i_th day for each accessible GPU(including the newly-installed GPU).
3. **About how many days N**: There are N GPUs in total (a.k.a: we consider N days).



Goal

Estimate the sum of memory consumption for each day(consider all GPUs, in units of memory).

Update: 11/14: Simplify the descriptions.

Update 11/15: Add hint for long data type.

Input

1. The first line includes a single integer N (1<=N<=10^5), the number of GPUs(days).
2. The second line includes N integers M_1, M_2, ..., M_N (0<=M_i<=10^9), where M_i is the initial memory of a GPU installed on day i.
3. The third line includes N integers C_1, C_2, ..., C_N (0<=C_i<=10^9), where C_i is the units of consumption for all GPUs on day i.

Output

A line of N integers, where the i_th integer represents the total consumption of all GPUs on day i.

Sample Input 1

```
3
20 10 5
5 7 5
```

Sample Output 1

```
5 14 13
```

Hint

1. Consider using min/max heap / priority queue to find out which GPU is dead on each day.
2. The wise computation of [prefix sum] may be useful to speed up your program.
3. Note that for saving memory and consumption, you may use the data type, long, or overflow may occur in some testcases.

Problems
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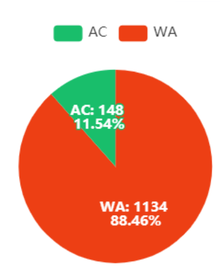
Information

ID	301
Time Limit	1000MS
Memory Limit	256MB
IO Mode	Standard IO
Created By	admin
Level	Mid
Score	100
Tags	Show

Statistic Details



Language: C++ Theme: Solarized Light