CS3201 ALGORITHM DESIGN TERM PROJECT

Instructed by Asst. Prof. Dr. Thitipong Tanprasert

MAGIC | Difficulty: 142

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Problem

Question

Did you ever dream of becoming a wizard? Or of being able to solve every problem of every contest?

Valya wanted to try out magic since childhood, so he became a programmer. One time he fell asleep trying to solve a problem, and he saw some magical dreams.

In his dream, Valya owns *A* red lands, *B* blue lands and *C* blue-red lands. A red land gives him one red mana, a blue land — one blue mana, and a blue-red land gives him either one red or one blue mana (for each blue-red land Valya can decide whether he gets red or blue mana from this land). Valya wants to cast a spell that costs *X* red mana, *Y* blue mana, and additionally *Z* mana of any color. Casting this spell will help him to solve the problem he fell asleep to. Determine if Valya has enough mana to use the spell.

Hint

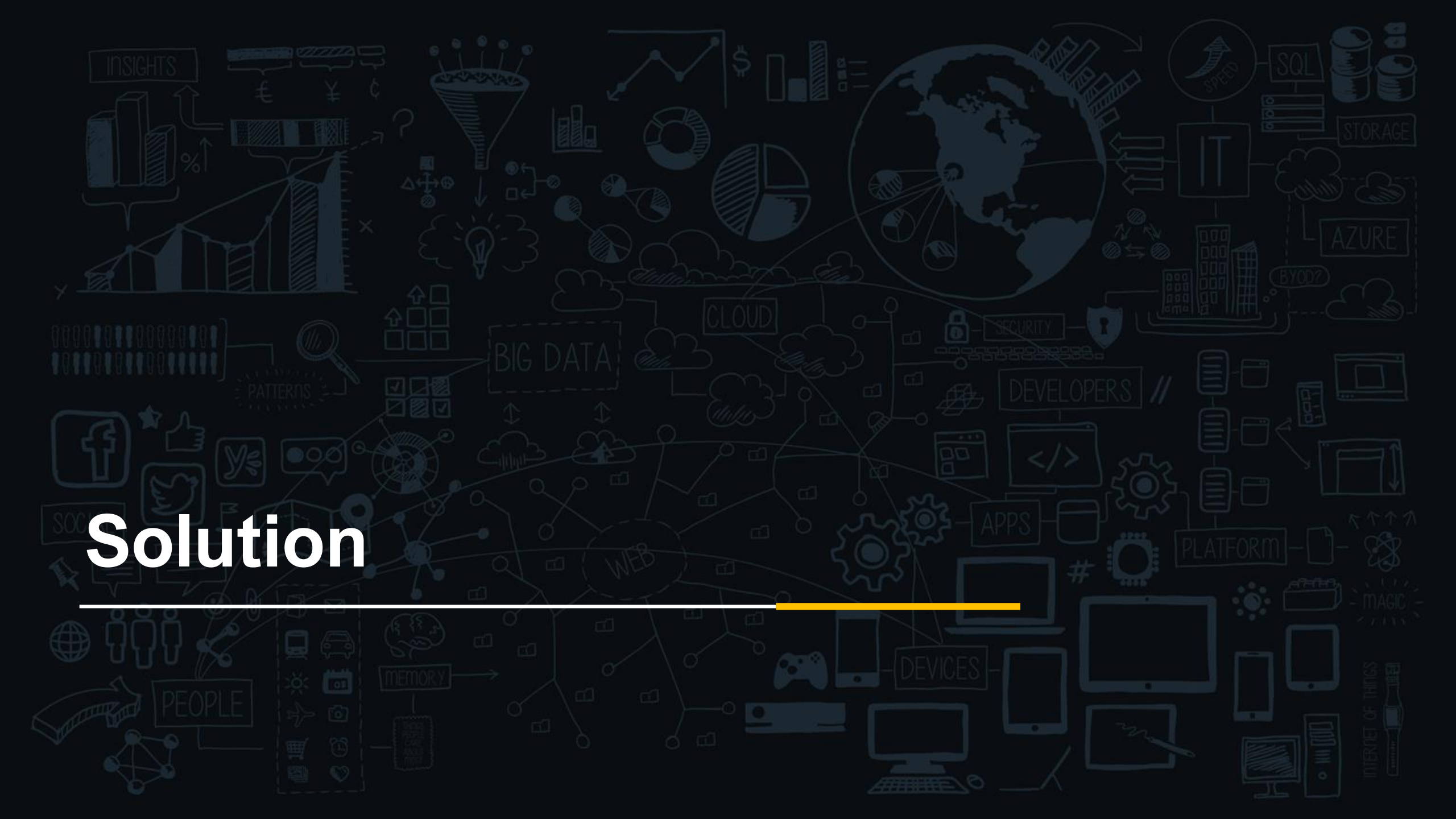
Input	Output
The first line contains three space-separated integers A, B and C — the number of red, blue and blue-red lands respectively ($0 \le A, B, C \le 10^9$). The second line contains three space-separated integers X, Y and Z — amount of red mana, blue mana and additional mana of any color required to cast the spell ($0 \le X, Y, Z \le 10^9$).	If Valya is able to cast the spell, print “It is a kind of magic” (without quotes). Otherwise, print “There are no miracles in life” (without quotes).

Sample

Input	Output
3 3 1 2 2 1	It is a kind of magic
5 6 5 6 5 6	There are no miracles in life

Analysis

There are 3 lands including red land, blue land, and blue-red land. They are replaced to A, B, and C respectively. Valya wants to cast a spell that costs *X* red mana, *Y* blue mana, and *Z* mana of blue or red. That means he can cast spell X from red land (A), and blue-red land (C), Y from blue land (B), and blue-red (C), and Z from all lands (A, B, and C).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Solution


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Full code

```python
lands = list(map(int, input().split()))
requires = list(map(int, input().split()))

for i in range(3):
    if lands[i] > requires[i]:
        lands[i] -= requires[i]
        requires[i] = 0
    else:
        requires[i] -= lands[i]
        lands[i] = 0

    if i < 2:
        if requires[i] > 0 and lands[2] > 0:
            if lands[2] > requires[i]:
                lands[2] -= requires[i]
                requires[i] = 0
            else:
                requires[i] -= lands[2]
                lands[2] = 0
    else:
        for i in range(2):
            if requires[2] > 0 and lands[i] > 0:
                if lands[i] > requires[2]:
                    lands[i] -= requires[2]
                    requires[2] = 0
                else:
                    requires[2] -= lands[i]
                    lands[i] = 0

if all(i == 0 for i in requires):
    print('It is a kind of magic')
else:
    print('There are no miracles in life')
```

Code

```
lands = list(map(int, input().split()))
requires = list(map(int, input().split()))
```

There are 2 input with integer list including lands and requires variable:

lands is input of the lands as Red land (A), Blue land (B), and Red-Blue land (C) respectively
So, requires variable represents the input of spell that cost with X, Y, and Z which X as Red mana, Y as Blue mana, and Z any colors from Red or Blue mana

Code

```
for i in range(3):
    if lands[i] > requires[i]:
        lands[i] -= requires[i]
        requires[i] = 0
    else:
        requires[i] -= lands[i]
        lands[i] = 0
```

(This is the part of using their own mana)

For every land, if its mana is more than the required mana to cast a spell, the mana from the land will be decreased by the number of required mana and the required mana will be set to zero.

On the other hand, if the required mana is higher, then the required mana will be reduced by the mana from the land and the mana from the land will be set to zero.

Code

```
if i < 2:
    if requires[i] > 0 and lands[2] > 0:
        if lands[2] > requires[i]:
            lands[2] -= requires[i]
            requires[i] = 0
        else:
            requires[i] -= lands[2]
            lands[2] = 0
else:
    for i in range(2):
        if requires[2] > 0 and lands[i] > 0:
            if lands[i] > requires[2]:
                lands[i] -= requires[2]
                requires[2] = 0
            else:
                requires[2] -= lands[i]
                lands[i] = 0
```

(This part is the part of borrowing mana from the other lands)

If the red or blue mana does not suffice to cast a spell and the red-blue mana is more than zero, he can borrow the mana from that land.

As for the red-blue mana, he can borrow the mana from the red, and/or the blue land.

Code

```
if all(i == 0 for i in requires):
    print('It is a kind of magic')
else:
    print('There are no miracles in life')
```

If all required mana is set to zero (i.e. all mana suffices to cast a spell) , it would print “It is a kind of magic”.

Or else, it would print “There are no miracles in life”.

Test cases

Test cases
3 3 1 2 2 1
5 6 5 6 5 6
7 1 10 9 2 7
8 4 2 5 2 5

Console: Output

```
james@
py
3 3 1
2 2 1
It is a kind of magic
james@
```

```
james@
py
5 6 5
6 5 6
There are no miracles in life
james@
```

```
james@Ja
factor.py
7 1 10
9 2 7
It is a kind of magic
james@Ja
```

```
james@
factor.py
8 4 2
5 2 5
It is a kind of magic
james@
```

Approval

ID	Date	Author	Problem	Language	Judgement result	Test #	Execution time	Memory used
9016786	11:03:32 13 Sep 2020	saharatTiew	2142. Magic	Python 3.8 x64	Accepted		0.078	352 KB


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Thank you