Machine-Fix

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WriteUp来源

https://dunsp4rce.github.io/csictf-2020/miscellaneous/2020/07/22/Machine-Fix.html

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题目描述

> We ran a code on a machine a few years ago. It is still running however we forgot what it was meant for. It completed n=523693181734689806809285195318 iterations of the loop and broke down. We want the answer but cannot wait a few more years. Find the answer after n iterations to get the flag. The flag would be of the format `csictf{answer_you_get_from_above}`

题目考点

解题思路

The python code in this question has a loop which runs `523693181734689806809285195318` times which is never ending. Instead of trying to find of what it does and how to optimize it, we generated the result for iterations 1 to 10 (`[1, 2, 4, 5, 6, 8, 9, 10, 13, 14]`) and used [oeis] to find out some formula for the sequence. And there was a recursive formula which generated the required sequence:

```
1 a(n) = n + a(n/3)
2 a(0) = 0
```

Implementation of this recursive function is much faster than what they had implemented:

```
1 def rec(n):
2     if n == 0: return 0
3     return n+rec(n//3)
4 rec(523693181734689806809285195318)
```

And we got the answer in no time - 785539772602034710213927792950.

Flag

```
1 csictf{785539772602034710213927792950}
```

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