

273. Integer to English Words

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Convert a non-negative integer to its english words representation. Given input is guaranteed to be less than $2^{31} - 1$.

Example 1:

Input: 123
Output: "One Hundred Twenty Three"

Example 2:

Input: 12345
Output: "Twelve Thousand Three Hundred Forty Five"

Example 3:

Input: 1234567
Output: "One Million Two Hundred Thirty Four Thousand Five Hundred Sixty Seven"

Example 4:

Input: 1234567891
Output: "One Billion Two Hundred Thirty Four Million Five Hundred Sixty Seven Thousand Eight Hundred Ninety One"

Solution

Approach 1: Divide and conquer

Let's simplify the problem by representing it as a set of simple sub-problems. One could split the initial integer 1234567890 on the groups containing not more than three digits 1.234.567.890. That results in representation 1 Billion 234 Million 567 Thousand 890 and reduces the initial problem to how to convert 3-digit integer to English word. One could split further 234 -> 2 Hundred 34 into two sub-problems : convert 1-digit integer and convert 2-digit integer. The first one is trivial. The second one could be reduced to the first one for all 2-digit integers but the ones from 10 to 19 which should be considered separately.

1234567890



```
Java Python
1 class Solution:
2     def numberToWords(self, num):
3         """
4         :type num: int
5         :rtype: str
6         """
7         def one(num):
8             switcher = {
9                 1: 'One',
10                2: 'Two',
11                3: 'Three',
12                4: 'Four',
13                5: 'Five',
14                6: 'Six',
15                7: 'Seven',
16                8: 'Eight',
17                9: 'Nine'
18            }
19            return switcher.get(num)
20
21         def two_less_20(num):
22             switcher = {
23                 10: 'Ten',
24                 11: 'Eleven',
25                 12: 'Twelve',
26                 13: 'Thirteen',
27                 14: 'Fourteen',
```

Complexity Analysis

- Time complexity : $\mathcal{O}(N)$. Intuitively the output is proportional to the number N of digits in the input.
- Space complexity : $\mathcal{O}(1)$ since the output is just a string.

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silly question
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This is not too bad as a question, as it reminds me of how to correctly spell "Forty", "Fourteen", etc. =)
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This is more like an English question to me
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- bamorim** ★25 ⌚ December 1, 2018 7:26 PM
Isn't the space complexity O(N) as well? If the number is smaller, the string will be smaller, if it get's big, the string will get bigger too. And that is linear.
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Complexity should be O(log10 N) which means the number of digits in that number
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- willye** ★878 ⌚ August 15, 2019 3:38 AM
Yeah we can hate on this question all we want, but that doesn't change the fact that it really focuses on finding edge cases, breaking stuff down, and some basic integer division and mod usage. Everything is pretty clear cut and there's no surprise test cases. I just wish it wasn't so dependant on the person being an English speaker.
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This problem is about the decomposition of the problem -- how do you break it down. Not about efficiency.
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Complexity should O(1). After all its a number.
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- ethanwc** ★8 ⌚ January 8, 2020 4:24 AM
It seems like a dumb problem at first glance, but it is actually a great divide and conquer exercise.
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If you get this question you have already failed the interview. They simply want to fail you and even if you pass the question they will find another reason to reject you. The interviewer will simply be on his phone checking reddit while you are frantically writing out the dictionaries thinking there is some hope for you.
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