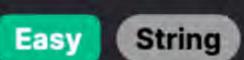
2710. Remove Trailing Zeros From a String



Leetcode Link

Problem Description

The LeetCode problem requires writing a function to remove any trailing zeros from a string representation of a positive integer. Essentially, given a string that contains numeric characters ending with one or more zeros, the task is to return a new string where these trailing zeros are stripped off.

For example, if the input string is num = "1234000", after removing the trailing zeros, the output should be "1234".

It is important to note that only the zeros at the end of the string (trailing) need to be removed. Any zeros that appear before other numeric characters must remain. For instance, in the case of num = "102030", the output should still be "102030" as there are no trailing zeros.

Intuition

The process of getting to the solution for removing trailing zeros from a string representing a positive integer is quite straightforward. In Python, strings are immutable sequences of characters that come with a built-in method called rstrip(). The rstrip() method is used to remove any trailing characters (characters at the end of a string) that match the specified set of characters.

Therefore, by passing the character "0" to the rstrip() method, we can effectively strip off all the trailing zeros from the string. This is done without affecting any other part of the string, which is crucial for maintaining the integer's representation without leading and middle zeros being affected.

The solution leverages this method to provide a simple and effective way to achieve the desired result. Since the rstrip() operation is performed in-place and strings in Python are immutable, the method will return a new string with the trailing zeros removed, exactly as required by the problem.

Solution Approach

The implementation of the solution is extremely simple due to Python's built-in string methods. The solution utilizes the rstrip() method which is inherently designed for the exact purpose of removing trailing characters from a string.

Here's a step-by-step breakdown of the solution:

- The rstrip() method is called on the input string num.
- The argument "0" is passed to rstrip(), which tells the function to remove all occurrences of the character "0" from the end of the string num.
- The rstrip() method works its way from the end of the string towards the start, stopping as soon as it encounters a character that is not "0". Thus, it will not affect any zeros that are not trailing zeros.
- The result of this operation is a new string with all the trailing zeros removed. This new string is then returned as the output of the function.

handle string manipulations efficiently.

This approach doesn't require the use of additional data structures or complex algorithms. It simply leverages Python's ability to

In terms of complexity, the time complexity is O(n), where n is the length of the input string. This is because, in the worst-case scenario, the method has to check each character in the string once (when there are no trailing zeros to remove). The space complexity is O(1) because no additional storage is needed regardless of the size of the input.

class Solution:

The reference solution code looks like this:

```
def removeTrailingZeros(self, num: str) -> str:
   return num.rstrip("0")
```

This concise implementation effectively solves the problem while being highly readable and leveraging Python's strengths for string manipulation.

Let's walk through a small example to illustrate the solution approach described above. Suppose we have as our input the following string representing a positive integer:

```
1 num = "1050000"
```

Example Walkthrough

Python, targeting the character "0". Below are the steps:

This string ends with trailing zeros, which we want to remove. According to our solution approach, we'll use the rstrip() method in

- 2. rstrip() starts checking characters from the end of the string and removes the first "0", updating the string to num = "105000".
- 3. It continues to strip each trailing "0" until it encounters a character that is not a "0", which in this case is the character "5". 4. As it stops at the first non-zero character while scanning from right to left, the remaining string is now num = "105".
- The reference solution code is simple and effective here:

walkthrough highlights the ease and efficiency of the solution approach using Python's rstrip() method.

5. The new string with the trailing zeros removed, "105", is immediately ready to be returned from the function.

class Solution: def removeTrailingZeros(self, num: str) -> str: return num.rstrip("0")

```
If we had to call the method using our example string, it would look like this:
```

public String removeTrailingZeros(String num) {

1 solution = Solution() 2 output = solution.removeTrailingZeros("1050000") 3 print(output) # Output: "105"

1. We call rstrip("0") on the string num. The string is num = "1050000".

Python Solution

The output "105" is the string representation of the initial number with the trailing zeros removed, which is the expected result. This

1 class Solution: def remove_trailing_zeros(self, num: str) -> str: # Remove trailing zeros from a numeric string

```
# 'rstrip' method removes all occurrences of given characters from the end of a string.
           # Here it removes all '0' characters from the right side of the num string.
           return num.rstrip('0')
Java Solution
```

// Start from the end of the string and move backwards int i = num.length() - 1;

class Solution {

```
// Loop until a non-zero character is found
           while (i >= 0 && num.charAt(i) == '0') {
               i--; // Decrement the index to move one character left
           // Return the substring from the beginning to the last non-zero character
           // If there were no zeros at the end, this returns the original string
13
           return num.substring(0, i + 1);
14
15 }
16
C++ Solution
   #include <string> // Includes the string library, which allows us to use the std::string type
```

public: // Function to remove trailing zeros from a string representing a number string removeTrailingZeros(string num) {

class Solution {

```
// Loop that continues as long as the last character in the string is a '0'
           while (!num.empty() && num.back() == '0') {
               num.pop_back(); // Removes the last character from the string
           return num; // Returns the modified string with trailing zeros removed
12
13
  };
14
Typescript Solution
   /**
    * Removes trailing zeros from a numeric string.
```

* @param {string} num - The numeric string to be processed.

```
* @returns {string} The numeric string with trailing zeros removed.
   function removeTrailingZeros(num: string): string {
       // Initialize an index variable starting from the end of the string
       let index = num.length - 1;
10
       // Loop backwards through the string until a non-zero character is found
11
       while (num[index] === '0') {
           --index; // Decrement the index to move to the previous character
13
14
       // Return the substring from the start of the string up to the last non-zero character
16
       return num.substring(0, index + 1);
17
18 }
19
```

number of characters it needs to check.

Time and Space Complexity The time complexity of the function removeTrailingZeros is O(n), where n is the length of the input string num. This is because rstrip iterates through the string from the end and stops when it encounters a non-zero character, making it linear with respect to the

The space complexity of the function is 0(1), as it does not allocate any additional space that is dependent on the input size. The rstrip function returns a new string, but the space used by this new string does not depend on the input size because it is at most the same size as the input.