Secret message

Problem description

A string is transformed to another string by Burrow-Wheeler Transform

Final string --> initial string

Full : N<=2*10^5

15% solution

- only ‘A’, ‘B’ and ‘#’, N <= 10
- Enumeration
- O(2^N)

Observation

- what is the first letter in the origianl string?
- Do we know the characters in first column?
- Relation between first character and last character?

20% solution

- N <= 27, all characters are unique
- sort the characters given to obtain first column
- start from the row that contains ‘#’ in last column
- Let the character be x, move on to the next row that contains x in last column, and push x into answer string, repeat until the string is full
- O (N^2) to O(N) depends on how you implement it

Observation

- Problem arises if characters are not unique
- Seems we have no clue about where the next row is

Observation

- For the character ranked x (among the same character) in the first column, the character it represents in the last column also ranks x (among the same character)

100% solution

- N <= 2*10^5
- sort the characters given to obtain first column
- start from the row that contains ‘#’ in last column
- Let the character be x, move on to the next row that x represents in the last column, and push x into answer string, repeat until the string is full
- O (N^2) to O(N) depends on how you implement it

Implementation stuff

How to sort characters in the original string in O(N)?

Bubble sort O(N^2)

Merge sort O(N lg N)

Count sort O(N + E) E = number of characters available

How do we get the next row in O(1)?

2D array