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**Question 1**

First we need to calculate the number of occurrences of each letter in the input sequence and express them as Ns,Nn,Na,Nk,Ne. we need to get the M = min(Ns,Nn,Na,Nk,Ne). Clearly, the largest possible venom level L <= M. We need to apply the greedy strategy to check whether the sequence can remove some letters or not to get the remain sequence like:

We need to use the binary search method to find the sequence that matches the maximum level of the Medusa DNA chain. We need to compare logn times.

**The following code shows the detailed steps:**

def binarySearch(string):

    start = -1

    end = max\_level(string)

    # binary search

    while start < end:

        mid = (end+start+1)//2

        # check the mid whether is correct

        if check\_match(mid,string):

            start = mid

        else:

            end = mid - 1

    if check\_match(start,string):

        return start

    else:

        return 0

def check\_match(mid,string):

    max\_level\_string = ""

    DNA = "SNAKE"

    # create new sequence

    for i in DNA:

        max\_level\_string += i\*mid

    i,j = 0,0

    # new sequence compare to the input string

    while i < len(max\_level\_string) and j < len(string):

        if max\_level\_string[i] == string[j]:

            i += 1

        j += 1

    # check if all letters mathc return true

    if(i == len(max\_level\_string)):

        return True

    else:

        return False

# calculte the possible max venom level

def max\_level(string):

    i = 0

    Ns,Nn,Na,Nk,Ne = 0,0,0,0,0

    while(i < len(string)):

        if (string[i]=="S"):

            Ns+=1

        elif (string[i]=="N"):

            Nn+=1

        elif (string[i]=="A"):

            Na+=1

        elif (string[i]=="K"):

            Nk+=1

        elif (string[i]=="E"):

            Ne+=1

        i+=1

    res = min(Na,Ne,Nk,Ns,Nn)

    return res

Input\_String = input("Enter a string: ")

print("Max Venom Level: ",binarySearch(Input\_String))

**Code testing:**

Enter a string: SSNNAAKKEE

Max Venom Level: 2

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Enter a string: SSSAAANNAAEEKKEE

Max Venom Level: 2

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Enter a string: KKEESSANNNAAAKKKEEE

Max Venom Level: 2

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Enter a string: SSSNNNAAAKKKEEE

Max Venom Level: 3