Fundamental Computer Programming- C++ Lab(I)

Lab 5

Characters and String

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Purposes

- Get familiar with CodingFrenzy
- Learn about characters and strings
- Learn how to use *for* loop
- Develop problem solving skills

Group Reverse

Group reversing a string means reversing a string by groups. For example consider a string:

"**TOBENU**MBERON**EWEMEE**TAGAIN**ANDAGA**INUNDE**RBLUEI**CPCSKY"

This string has length 48. We have divided into 8 groups of equal length and so the length of each group is 6. Now we can reverse each of these eight groups to get a new string:

"**UNEBOT**NOREBM**EEMEWE**NIAGAT**AGADNA**EDNUNI**IEULBR**YKSCPC"

Given the string and number of groups in it, your program will have to group reverse it.

Input

The input file contains at most 101 lines of inputs. Each line contains at integer G ($G < 10$) which denotes the number of groups followed by a string whose length is a multiple of G. The length of the string is not greater than 100. The string contains only alpha numerals. Input is terminated by a line containing a single zero.

Output

For each line of input produce one line of output which contains the group reversed string.

Example

Sample Input

```
3 ABCEHSHSH
5 FAOETASINAHGRIONATWONOQAONARIO
0
```

Sample Output

```
CBASHEHSH
ATEOAFGHANISTANOIRAQONOWOIRANO
```

String Type

- #include <string>
  - A string is stored as an array of characters.
  - An array is a continuous memory region that will store objects of the same type. The object's type can be *char*, *int*, *string*, *double*, etc. It has a number of locations. A location will hold exactly one object.
  - A string constant is double quoted by " ", for example "astring".

A string is an array of characters.

char s1[] = "happy"; ←→ string s1("happy");

Length = 5 (not including end-of-string \0)

h	a	p	p	y	\0

char s2[] = " birthday"; ←→string s2(" birthday);

Length = 9

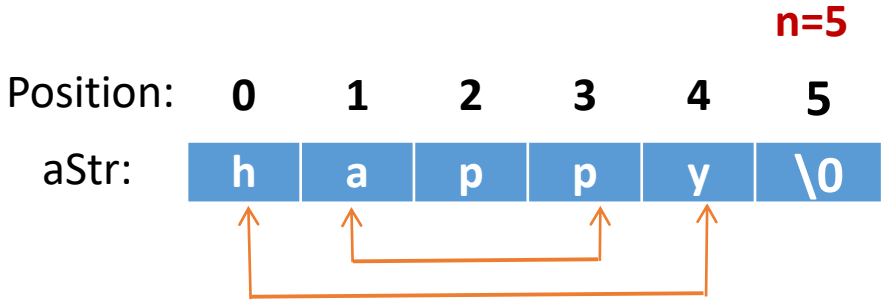
	b	i	r	t	h	d	a	y	\0

Manipulating a string

```
// Reversing a string
#include <iostream>
#include <string>
using namespace std;

Int main(){
    string aStr="abcdefg";
    char c;
    int strLen = aStr.length();
    for(int i=0; i<strLen/2; i++){
        c=aStr[i];
        aStr[i] = aStr[strLen-1-i];
        aStr[strLen-1-i] = c;
    }
    cout << aStr << endl;
    return 0;
}
```

- **Calculate string length**
  aStr.length();
- **Get access to a string element (i.e., a characters) at position i**
  aStr[i]
- **A string of length n is stored starting from position 0 through position n-1 in a character array.**
- **Reversing a string of length n can be done by exchanging the character at position n-1 with the one at position 0, the one at position n-2 with the one at position 1; The code is shown on the left.**



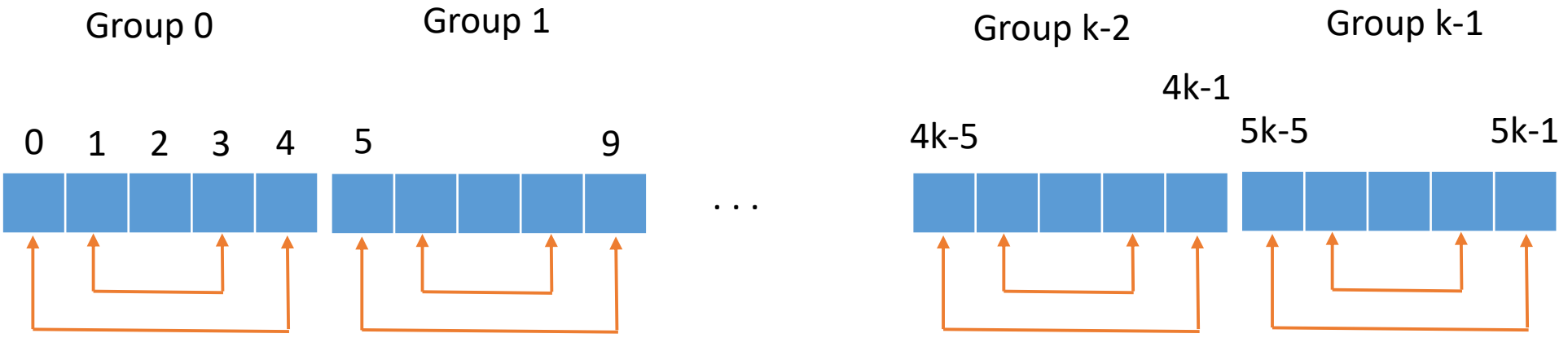
More on string and characters

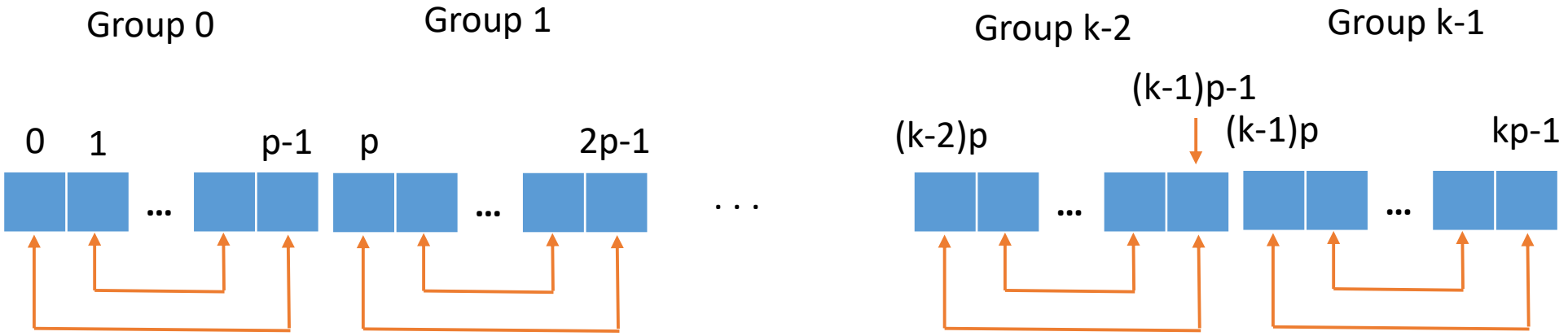
- Each string is a character array. For example, if aStr is a string variable that stores a string “He loves you.”, aStr[0] will contain ‘H’, sStr[1] contains ‘e’, aStr[2] contains ‘ ‘, aStr[3] contains ‘l’, aStr[4] contains ‘o’, etc.
- We can use a function aStr.length() to get the length of the string stored in aStr. It will return 13.
- Each character is stored in computers using ASCII. It is an integer. So we can have the following code.

```
int aDigit, anInt;
aDigit = ‘9’ – ‘0’;   // aDigit will have a value of 9.
anInt = ‘z’ – ‘a’;    // anInt will have a value of 25.
```

You may need use static_cast<char>(90) to convert an integer to a character.

Group Reverse





Algorithm for Group Reverse

1. Input the number of group
2. Read a string
3. Calculate string length
4. For each of all the groups
   Do reverse string
5. Print out the reversed string
6. Repeat (1) through (5) untill end of input

Lab 5: Sorting Digits in a Number

- Given a string that contains only digits from 0 through 9, convert the string into the one with the following property:
  - The values of digits are non-decreasing from left to right.
  - For example, given 2432898891237412, your program should print out 9988874433222211
- Requirements:
  - You should not explicitly use any array, but treating a string as a character array is fine.

Input & Output Format

Input format

Each line contains a string of digits. When the string length is equal to one, the input ends.

Output Format

Each line contains a string for the corresponding input.

Sample input	Sample output
19246819286249812649490412140910140894112784014235978897532987325532897055	9998886664442222119998444442111110000874421109998888777755553333222205

Follow All Requirements

- Input formats
- Output formats
- All constraints on input data, especially not accepting invalid inputs
- Coding styles
  - Avoiding using variables which do not have expressive power. That is, a variable name should carry the meaning of the matter in which the variable intends to represent.

If you don't follow the requirements, up to 30% of the points for your lab will be deduced.

Rules for Program Submission

- Put all the relevant files in the same folder.
- Name your folder SID_LabX, where ID is your student ID number and X is the number assigned to the lab. If a lab has N parts, N>1, then create N sub-folders with their names SID_LabX_N in the the folder SID_LabX.
  - For example, for Lab 2 with only one part and with student ID number 1041544, the name of the folder must be S1041544_Lab2. N is omitted if there is only one part.
  - Another example, similar to the above but Lab 2 has two parts. Then, you have to create a folder S1041544_Lab2 and two sub-folders S1041544_Lab2_1 and S1041544_Lab2_2
- Compress the folder into a file named SID_LabX.zip, for example, S1041533_Lab2.zip. Then, submit the compressed file
- If you violate this rule, your lab will not be graded. If graded other penalty will be applied.