



SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

An Autonomous Institution

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A' Grade

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai



DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE NAME :23ITT101-PROBLEM SOLVING AND C PROGRAMMING

I YEAR /I SEMESTER

Unit 3- Arrays and Strings

Topic 4: strings, string operations and string arrays



Brain Storming



1. How perform string manipulation operations?



String or character array Declaration



There are two ways to declare a string in c language.

1. By char array

- `char ch[10]={'j', 'a', 'v', 'a', 't', 'p', 'o', 'i', 'n', 't', '\0'};`

Or

- `char ch[]={'j', 'a', 'v', 'a', 't', 'p', 'o', 'i', 'n', 't', '\0'};`
- While declaring string, size is not mandatory

2. By string literal

- `char ch[]="coimbatore";`
- `'\0'` will be appended at the end of the string by the compiler.



C Strings



- The string can be defined as the one-dimensional array of characters terminated by a null ('\0').
- The character array or the string is used to manipulate text such as word or sentences.
- Each character in the array occupies one byte of memory, and the last character must always be 0.
- The termination character ('\0') is important in a string since it is the only way to identify where the string ends.



Difference between char array and string literal



- There are two main differences between char array and literal.
- We need to add the null character '\0' at the end of the array by ourself whereas, it is appended internally by the compiler in the case of the string literal.
- The string literal cannot be reassigned to another set of characters whereas, we can reassign the characters of the array.



String array

```
char city[4][12] = {  
    "Chennai",  
    "Kolkata",  
    "Mumbai",  
    "New Delhi"  
};
```

	0	1	2	3	4	5	6	7	8	9	10	11
0	C	h	e	n	n	a	i	\0				
1	K	o	l	k	a	t	a	\0				
2	M	u	m	b	a	i	\0					
3	N	e	w		D	e	l	h	i	\0		



Conti...



```
char language[5][10] = {"Java", "Python", "C++", "HTML", "SQL"};
```

```
char language[5][10] ={  
    {'J','a','v','a','\0'},  
    {'P','y','t','h','o','n','\0'},  
    {'C','+','+','\0'},  
    {'H','T','M','L','\0'},  
    {'S','Q','L','\0'}  
};
```



- Traversing string is somewhat different from the traversing an integer array. We need to know the length of the array to traverse an integer array, whereas we may use the null character in the case of string to identify the end the string and terminate the loop.

Two ways to traverse a string

- ✓ By using the length of string
- ✓ By using the null character.



Two ways to traverse a string
✓ By using the length of string
✓ By using the null character.



```
#include<stdio.h>
void main ()
{
    char s[11] = "coimbatore";
    int i = 0;
    int count = 0;
    while(i<11)
    {
        if(s[i]=='a' || s[i] == 'e' || s[i] == 'i' || s[i] ==
'u' || s[i] == 'o')
        {
            count ++;
        }
        i++;
    }
    printf("The number of vowels %d",count);
}
```

```
#include<stdio.h>
void main ()
{
    char s[11] = "coimbatore";
    int i = 0;
    int count = 0;
    while(s[i] != NULL)
    {
        if(s[i]=='a' || s[i] == 'e' || s[i] == 'i' || s[i] == 'u' || s[i] == 'o')
        {
            count ++;
        }
        i++;
    }
    printf("The number of vowels %d",count);
}
Output:The number of vowels 5
```

Output:The number of vowels 5

String Example in C



```
#include<stdio.h>

#include <string.h>

int main(){

char ch[11]={'c', 'o', 'i', 'm', 'b', 'a', 't', 'o', 'r', 'e', '\0'};

char ch2[11]="coimbatore";

printf("Char Array Value is: %s\n", ch);

printf("String Literal Value is: %s\n", ch2);

return 0;
```

Output:

Character Array Value is: coimbatore
String Literal Value is: coimbatore



Program: Reading and Writing Strings



Example 1: scanf() to read a string and printf() to print the string

```
#include <stdio.h>
int main()
{
    char name[20];
    printf("Enter name: ");
    scanf("%s", name);
    printf("Your name is %s.", name);
    return 0;
}
```

Output

```
Enter name: Dennis Ritchie
Your name is Dennis.
```



Program: Reading Strings



Example 2: fgets() and puts()

```
#include <stdio.h>
int main()
{
    char name[30];
    printf("Enter name: ");
    fgets(name, sizeof(name), stdin); // read string
    printf("Name: ");
    puts(name); // display string
    return 0;
}
```

Output

```
Enter name: Tom Hanks
Name: Tom Hanks
```

- The fgets() function to read a line of string.
- And, you can use puts() to display the string.



String operations



Sr.No.	Function & Purpose
1	strcpy(s1, s2); Copies string s2 into string s1.
2	strcat(s1, s2); Concatenates string s2 onto the end of string s1.
3	strlen(s1); Returns the length of string s1.
4	strcmp(s1, s2); Returns 0 if s1 and s2 are the same; less than 0 if s1<s2; greater than 0 if s1>s2.
5	strchr(s1, ch); Returns a pointer to the first occurrence of character ch in string s1.
6	strstr(s1, s2); Returns a pointer to the first occurrence of string s2 in string s1.



```
#include <string.h>
int main () {
    char str1[12] = "Hello";
    char str2[12] = "World";
    char str3[12];
    int len ;
        /* copy str1 into str3 */
    strcpy(str3, str1);
    printf("strcpy( str3, str1) : %s\n", str3 );
        /* concatenates str1 and str2 */
    strcat( str1, str2);
    printf("strcat( str1, str2): %s\n", str1 );
        /* total length of str1 after concatenation */
    len = strlen(str1);
    printf("strlen(str1) : %d\n", len );
    return 0;
}
```

```
strcpy( str3, str1) : Hello
strcat( str1, str2): HelloWorld
strlen(str1) : 10
```

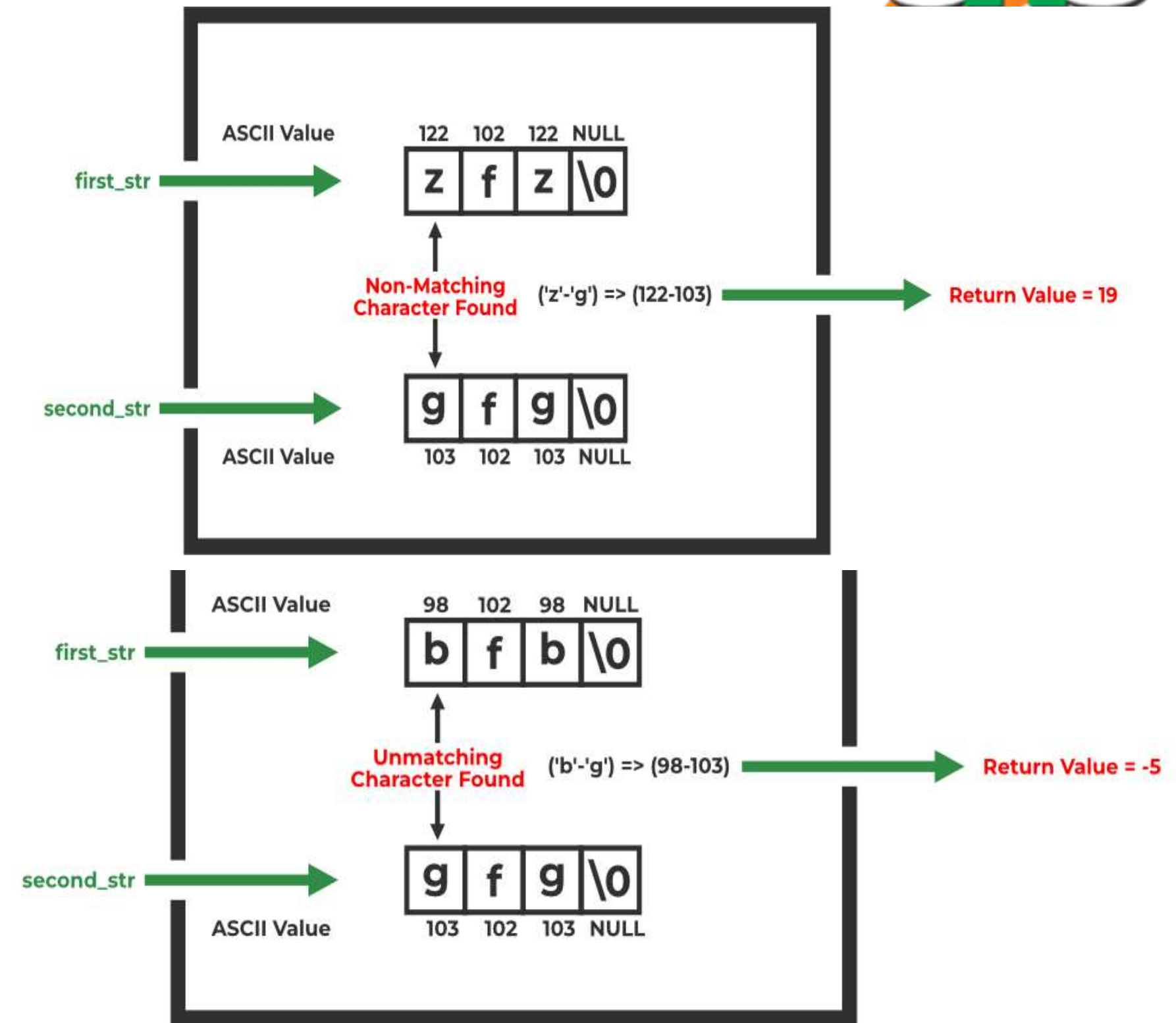



String comparison



C strcmp() function works by comparing the two strings lexicographically. It means that it compares the ASCII value of each character till the non-matching value is found or the NULL character is found. The working of the C strcmp() function can be described as follows:

- ✓ It starts with comparing the ASCII values of the first characters of both strings.
- ✓ If the first characters in both strings are equal, then this function will check the second character, if they are also equal, then it will check the third, and so on till the first unmatched character is found or the NULL character is found.
- ✓ If a NULL character is found, the function returns zero as both strings will be the same.
- ✓ If a non-matching character is found,
- ✓ If the ASCII value of the character of the first string is greater than that of the second string, then the positive difference (> 0) between their ASCII values is returned.
- ✓ If the ASCII value of the character of the first string is less than that of the second string, then the negative difference (< 0) between their ASCII values is returned.





Strcmp() functions



```
//string comparison using strcmp() function
#include <stdio.h>
#include<string.h>
int main()
{
    char str1[20]; // declaration of char array
    char str2[20]; // declaration of char array
    int value; // declaration of integer variable
    printf("Enter the first string : ");
    scanf("%s",str1);
    printf("Enter the second string : ");
    scanf("%s",str2);
    // comparing both the strings using strcmp() function
    value=strcmp(str1,str2);
    if(value==0)
    printf("strings are same");
    else
    printf("strings are not same");
    return 0;
}
```



C Program to Compare Two Strings Without Using Library Function



```
#include<stdio.h>

int main() {
    char str1[30], str2[30];
    int i;

    printf("\nEnter two strings :");
    gets(str1);
    gets(str2);

    i = 0;
    while (str1[i] == str2[i] && str1[i] != '\0')
        i++;
    if (str1[i] > str2[i])
        printf("str1 > str2");
    else if (str1[i] < str2[i])
        printf("str1 < str2");
    else
        printf("str1 = str2");

    return (0);
}
```



Concatenate Two Strings Without Using strcat()



```
#include <stdio.h>
int main() {
    char s1[100] = "programming ", s2[] = "is awesome";
    int length, j;

    // store length of s1 in the length variable
    length = 0;
    while (s1[length] != '\0') {
        ++length;
    }

    // concatenate s2 to s1
    for (j = 0; s2[j] != '\0'; ++j, ++length) {
        s1[length] = s2[j];
    }

    // terminating the s1 string
    s1[length] = '\0';

    printf("After concatenation: ");
    puts(s1);

    return 0;
}
```



Output

```
After concatenation: programming is awesome
```

- Here, two strings s1 and s2 are concatenated and the result is stored in s1.
- It's important to note that the length of s1 should be sufficient to hold the string after concatenation. If not, you may get unexpected output.



Calculate Length of String without Using strlen() Function

```
#include <stdio.h>
int main() {
    char s[] = "Programming is fun";
    int i;

    for (i = 0; s[i] != '\0'; ++i);

    printf("Length of the string: %d", i);
    return 0;
}
```

Output

```
Length of the string: 18
```




C Program to Copy One String into Other Without Using Library Function.



```
#include<stdio.h>

int main() {
    char s1[100], s2[100];
    int i;

    printf("\nEnter the string :");
    gets(s1);

    i = 0;
    while (s1[i] != '\0') {
        s2[i] = s1[i];
        i++;
    }

    s2[i] = '\0';
    printf("\nCopied String is %s ", s2);

    return (0);
}
```



Reverse String Without Using Library Function



```
#include<stdio.h>
#include<string.h>

int main() {
    char str[100], temp;
    int i, j = 0;

    printf("\nEnter the string :");
    gets(str);

    i = 0;
    j = strlen(str) - 1;

    while (i < j) {
        temp = str[i];
        str[i] = str[j];
        str[j] = temp;
        i++;
        j--;
    }

    printf("\nReverse string is :%s", str);
    return (0);
}
```

```
Enter the string : Pritesh
Reverse string is : hsetirP
```



Substring operation: insert



```
/* Write a C program to insert a sub-string in to given main string from a given position */  
  
#include <stdio.h>  
#include <string.h>  
  
int main()  
{  
char a[10];  
char b[10];  
char c[10];  
int p=0,r=0,i=0;  
int t=0;  
int x,g,s,n,o;  
//clrscr();  
  
puts("Enter First String:");  
gets(a);  
puts("Enter Second String:");  
gets(b);  
printf("Enter the position where the item has to be inserted: ");  
scanf("%d",&p);  
r = strlen(a);  
n = strlen(b);  
i=0;
```



Conti...



```
// Copying the input string into another array
while(i <= r)
{
    c[i]=a[i];
    i++;
}
s = n+r;
o = p+n;

// Adding the sub-string
for(i=p;i<s;i++)
{
    x = c[i];
    if(t<n)
    {
        a[i] = b[t];
        t=t+1;
    }
    a[o]=x;
    o=o+1;
}

printf("%s", a);
return 0;
}
```



Output...



Enter First String: program9

Enter Second String: ming

Enter the position where the item has to be inserted: 7

programming9



Assessment 1



1. How to perform character and string operations in C?

Ans : _____

2. Write about string handling functions?

Ans : _____

