C-Style Strings

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C-style strings

1. Objectives

After you complete this experiment you will be able to implement and use a c-style string

2. Introduction

A string is a character array which ends with the null character. The string library provides several functions that can be used to manage string or character arrays.

3. Definitions & Important Terms

We will define several terms you need to know to understand c-style string. They are as follows:

a. A string is a character array.
b. The null character is represented using the '\0' character.
c. The [ ] operator is used to access the members of a string
d. The index/subscript of a cell in a string must be between 0 and the length of the string minus 1.
e. The capacity of an array is the number of elements it can hold.
f. Always include one extra cell in your capacity for the null character.

4. Declaration Syntax

Consider the following syntax when declaring strings in C:

```
a. char my_string[10]; //creates a static array of size 10
b. char my_string[ ] = "Hello"; //creates a string of size 6 including the
                                //null character
```

More information on c-style strings can be found in your course textbook and on the web.

5. Experiments

Step 1: In this experiment you will investigate the declaration, initialization and implementation of c-style strings. Enter, save, compile and execute the following program in MSVS. Call the new directory "cStyleStringsExp1" and the program "cStyleStrings1.cpp". Answer the questions below:

```
#include <iostream>
#include <string>
using namespace std;

int main()
{
        char my_name[20] = "James Madison";
        char her_name[ ] = "Michelle Obama";
        char his_name[20];

        cout<<"my_name = "<<my_name<<endl;
        cout<<"The length of my_name is "<<strlen(my_name)<<endl;
        cout<<"The capacity of my_name is "<<sizeof(my_name)<<endl;

        cout<<"her_name = "<<her_name<<endl;
        cout<<"The length of her_name is "<<strlen(her_name)<<endl;
        cout<<"The capacity of her_name is "<<sizeof(her_name)<<endl;

        strcpy(his_name,"Barack Obama");
        cout<<"his_name = "<<his_name<<endl;
        cout<<"The length of his_name is "<<strlen(his_name)<<endl;
        cout<<"The capacity of his_name is "<<sizeof(his_name)<<endl;

        return 0;

}
```

Question 1: Please explain why the capacity and the length values for each string are different in the output produced by the program in Step 1 above?

Question 2: What is the does statement "strcpy(his_name,"Barack Obama");" do?

Question 3: Change the library from "string" to "cstring". Does the program compile without producing any errors?

Step 2: In this experiment you will investigate the declaration, initialization and implementation of c-style strings. Enter, save, compile and execute the following program in MSVS. Call the new directory “cStyleStringsExp2” and the program “cStyleStrings2.cpp”. Answer the questions below:

```
#include <iostream>
#include <string>
using namespace std;

int main()
{
        char his_name[20] = "James";
        char her_name[20];

        her_name[0]='M';
        her_name[1]='a';
        her_name[2]='r';
        her_name[3]='y';

        cout<<"his_name length equals "<<strlen(his_name)<<endl;
        cout<<"his_name is "<<his_name<<endl;
        cout<<endl<<endl;
        cout<<"her_name length equals "<<strlen(her_name)<<endl;
        cout<<"her_name is "<<her_name<<endl;

        return 0;
}
```

Question 4: Did the program produce any compiler errors or warnings?

Question 5: Was the output correct? Explain your answer?

Question 6: Can you state a rule that c-style strings must following when using the string library?

Step 3: In this experiment you will learn how to use functions in the string library. Enter, save, compile and execute the following program in MSVS. Call the new directory "cStyleStringsExp3" and the program "cStyleStrings3.cpp". Answer the questions below:

```
#include <iostream>
#include <string>
using namespace std;

int main()
{
        char s[ ] = "123abc456def789ghi";
        char r[40];

        cout<<"The string s contains "<<s<<endl;
        cout<<"The length of s equals "<<strlen(s)<<endl<<endl;

        strcpy(r,s);
        cout<<"The string r contains "<<r<<endl;
        cout<<"The length of r equals "<<strlen(r)<<endl<<endl;

        strncpy(r,"XXXXXX",3);
        cout<<"The string r contains "<<r<<endl<<endl<<endl;

        strcpy(r,"abcdef");
        cout<<"Now the string r contains "<<r<<endl;
        cout<<"The current length of r equals "<<strlen(r)<<endl<<endl;

        strcat(r,r);
        cout<<"Now the string r contains "<<r<<endl;
        cout<<"Now the current length of r equals "<<strlen(r)<<endl<<endl;

        return 0;
}
```

Question 7: What compiler warnings were given?

Question 8: What operation does the function “strcpy” perform? Please answer in detail?

Question 9: What operation does the function “strncpy” perform? Please answer in detail?

Question 10: What operation does the function “strcat” perform? Please answer in detail?

Step 4: In this experiment you will investigate the operation of the strcmp function. Enter, save, compile and execute the following program in MSVS. Call the new directory “cStyleStringsExp4” and the program “cStyleStrings4.cpp4”. Answer the question below:

```
#include <iostream>
#include <string>
using namespace std;

int main()
{
       char s[ ] = "123";
       char r[ ] = "abc";
       char x[ ] = "124";
       char y[ ] = "abc";

       if (strcmp(r,y) == 0)
       {
              cout<<"String "<<r<<" and string "<<y
                     <<" are equal."<<endl<<endl;
       }

       if (strcmp(s,x) == -1)
       {
              cout<<"String "<<s<<" has a lower lexicographical "
                     <<"order than string "<<x<<"."<<endl<<endl;
       }

       if (strcmp(x,s) == 1)
       {
              cout<<"String "<<x<<" has a higher lexicographical "
                     <<"order than string "<<s<<"."<<endl<<endl;
       }

       return 0;
}
```

Question 11: Explain the operation of the strcmp function and the output produced by the program in step 4.