ASSIGNMENT 5

STRING OPERATIONS

Problem Statement :-

Write a C++ program to perform String operations :

i. = Equality
ii. == String Copy
iii. + Concatenation
iv. << To display a string
v. >> To reverse a string
vi. Function to determine whether a string is a palindrome
vii. To find occurrence of a sub-string.

Use Operator Overloading.

Learning Objectives :-

i. String manipulating functions
ii. Friend functions
iii. Input / Output operator overloading
Etc.,

Theory :-

The String class in C++ :-

The standard C++ library provides a string class type that supports all the operations mentioned above, additionally much more functionality. We will study this class in C++ Standard Library but for now let us check this program.

String Function and Purpose :-

1. strcpy(s1,s2);
   Copies string s2 into string s1.
   If s1 = get and s2 = put
   After performing strcpy(s1,s2);
   s1 = put and s2 = put
2. strcat(s1,s2)
   Concatenates string s2 onto the end of string s1.
   If s1 = pine and s2 = apple
   After performing strcat(s1,s2);
   s1 = pineapple and s2 = put
3. strcat(s1,s2)
   If s = pine
   After performing l = strcat(s);
   l = 4
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.

This is used to check equality of string.
e.g. I = strcmp(s1,s2);

5. strstr(s1,s2)
   Returns a pointer to the first occurrence of string s2 in string s1.

Friend function :-
A friend function is permitted full access to private and protected members of a class. Even though the prototypes for friend function appear in the class definition, friends are not member functions.
A friend can be a function, function template, or member function, or a class, or class template, in which case the entire class and all of its members are friends.
To declare a function as friend of a class, precede the function prototype in the class definition with keyword “friend” as follows:

```
class Box
{
        double width;
        public:
                double length;
                friend void printWidth(Box box);
                void setWidth(double wid);
};
```

To declare all member functions of class classTwo as friends of class classOne, place the following definition in the classOne :

```
friend class classTwo;
```

Input / Output Operators Overloading :-
C++ is able to input and output the built-in data types using the stream extraction operator >> and the stream insertion operator <<. The stream insertion and stream extraction operators also can be overloaded to perform input and output for user-defined types like an object.
Here it is important to make operator overloading function a friend of the class because it would be called without creating an object.
For example,

```
friend ostream &operator<<( ostream &output, const Distance &D )
{
        output << "F : " << D.feet << " I : " << D.inches;
        return output;
}
```

```
friend istream &operator>>( istream &input, Distance &D )
{
        input >> D.feet >> D.inches;
        return input;
```

```
}
```

Related Mathematics :-
//Input :-
Si = { C1, C2, C3, ……..., Cn }
The sequence Si represents a string and C1, C2, ……, Cn represents characters in the string.

|Si| denotes the number of elements in the given sequence
Thus, |Si| denotes the string length

Sri = { Cn, Cn-1, ……..., C2, C1 }
Sri is the reverse sequence of Si i.e., reverse string.
If Si Sri ≠ , then string is a palindrome.
If the sequence of Si and Sri are the same, then the string is palindrome or we can say that
Si Sri.

If we have two strings S1 and S2
Then,
If S1 S2, then strings are equal.

If S2 S1, then string S1 contains S2.

Algorithm :-

1. START
2. Create class named str.
3. Declare data member string and its length.
4. Write read() to accept string from user.
5. Write operator() to find string`s length.
6. Define operators for the specific purpose as per the following.
   Equality(=), Copy of string(==), Concatenation(+), Palindrome(!), Check for substring(||)
7. The input / output operator >> and << are overloaded to display and reverse respectively.
8. Write constructor which initialize string`s length=0.
9. Write main() function.
10. Create objects of the class str.
11. Further program is based on selection logic.
12. Display Menu :-
    i. Length
    ii. Compare
    iii. Copy
    iv. Concatenate
    v. Display

vi. Reverse
vii. Palindrome
viii. Find substring
ix. Exit

13. If first option is selected, then find length of the given string using operator()
14. If second option is selected, then compare given two strings with the help of operator=()
15. If third option is selected, then copy second string into first string using operator==()
16. If fourth option is selected, then string S2 combine with string S1 using operator+ ()
17. If fifth option is selected, then display given string using overloaded << operator
18. If sixth option is selected, then reverse the given string using overloaded >> operator
19. If seventh option is selected, then check for palindrome using operator!()
20. If eighth option is selected, then check string S2 is present in string S1 using operator||()
21. If ninth option is selected, then exit from loop.
22. STOP

Conclusion :-

Using string manipulating functions, we can perform string operations.