### HOMEWORK 5

- **String.h**의 **String** 클래스를 구현하는 멤버함수들(operators)을 작성하여 프로그램을 완성하시오.

```cpp
#include <iostream>
using std::ostream;
using std::istream;

class String {
    friend ostream &operator<<( ostream &, const String & );
    friend istream &operator>>( istream &, String & );

public:
    String( const char * = "" ); // conversion/default constructor
    String( const String & ); // copy constructor
    ~String(); // destructor

    const String &operator=( const String & ); // assignment operator
    const String &operator+=( const String & ); // concatenation operator

    bool operator!() const; // is String empty?
    bool operator==( const String & ) const; // test s1 == s2
    bool operator!=( const String & right ) const ; // test s1 != s2
    bool operator<( const String & ) const; // test s1 < s2
    bool operator!=( const String &right ) const; // test s1 > s2
    bool operator<( const String &right ) const; // test s1 <= s2
    bool operator<=( const String &right ) const; // test s1 >= s2
    char &operator[]( int ); // subscript operator (modifiable lvalue)
    char operator[]( int ) const; // subscript operator (rvalue)

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```cpp
#include <iostream>
using std::cout;
using std::endl;
using std::boolalpha;

#include "String.h"

int main() {

    String s1( "happy" );
    String s2( " birthday" );
    String s3;

    // test overloaded equality and relational operators
    cout << "s1 is \"" << s1 << "\"; s2 is \"" << s2
           << "\"; s3 is \"" << s3 << "\"
           << boolalpha << "\nInThe results of comparing s2 and s1:" <<
           "s2 == s1 yields " << ( s2 == s1 )
           << "s2 != s1 yields " << ( s2 != s1 )
           << "s2 > s1 yields " << ( s2 > s1 )
           << "s2 < s1 yields " << ( s2 < s1 )
           << "s2 >= s1 yields " << ( s2 >= s1 )
           << "s2 <= s1 yields " << ( s2 <= s1 )
;
// test overloaded String empty (!) operator
cout << "\n\nTesting !s3:" << endl;

if ( !s3 ) {
    cout << "s3 is empty; assigning s1 to s3;" << endl; s3 = s1; // test overloaded assignment
    cout << "s3 is " << s3 << " \"; } // end if

// test overloaded String concatenation operator
cout << "\n\ns1 += s2 yields s1 = ";
s1 += s2; // test overloaded concatenation
cout << s1;

// test conversion constructor
cout << "\n\ns1 += " to you" yields" << endl; s1 += " to you"; // test conversion constructor cout
    << "s1 = " << s1 << " \n\n";

// test overloaded function call operator () for substring
cout << "The substring of s1 starting at\n"
    << "location 0 for 14 characters, s1(0, 14), is:\n" <<
    s1( 0, 14 ) << " \n\n";

// test substring "to-end-of-String" option
cout << "The substring of s1 starting at\n"
    << "location 15, s1(15), is: "
    << s1( 15 ) << " \n\n";

// test copy constructor
String *s4Ptr = new String( s1 );
cout << "\n*s4Ptr = " << *s4Ptr << " \n\n";

// test assignment (=) operator with self-assignment
cout << "assigning *s4Ptr to *s4Ptr" << endl;
*s4Ptr = *s4Ptr; // test overloaded assignment
cout << "**s4Ptr = " << *s4Ptr << endl;

// test destructor
delete s4Ptr;

// test using subscript operator to create a modifiable lvalue
s1[ 0 ] = 'H';
\s1[ 6 ] = 'B';
cout << "s1 after s1[0] = 'H' and s1[6] = 'B' is: "
   << s1 << "\n\n";

// test subscript out of range
cout << "Attempt to assign 'd' to s1[30] yields: " << endl;
s1[ 30 ] = 'd'; // ERROR: subscript out of range
return 0;

} // end main