```
/* The following code example is taken from the book
 * "The C++ Standard Library - A Tutorial and Reference"
 * by Nicolai M. Josuttis, Addison-Wesley, 1999
 *
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 * warranty, and with no claim as to its suitability for any purpose.
 */
#ifndef ICSTRING_HPP
#define ICSTRING_HPP

#include <string>
#include <iostream>
#include <cctype>

/* replace functions of the standard char_traits<char>
 * so that strings behave in a case-insensitive way
 */
struct ignorecase_traits : public std::char_traits<char> {
    // return whether c1 and c2 are equal
    static bool eq(const char& c1, const char& c2) {
        return std::toupper(c1)==std::toupper(c2);
    }
    // return whether c1 is less than c2
    static bool lt(const char& c1, const char& c2) {
        return std::toupper(c1)<std::toupper(c2);
    }
    // compare up to n characters of s1 and s2
    static int compare(const char* s1, const char* s2,
                       std::size_t n) {
        for (std::size_t i=0; i<n; ++i) {
            if (!eq(s1[i],s2[i])) {
                return lt(s1[i],s2[i])?-1:1;
            }
        }
        return 0;
    }
    // search c in s
    static const char* find(const char* s, std::size_t n,
                            const char& c) {
        for (std::size_t i=0; i<n; ++i) {
            if (eq(s[i],c)) {
                return &(s[i]);
            }
        }
        return 0;
    }
};

// define a special type for such strings
typedef std::basic_string<char,ignorecase_traits> icstring;

/* define an output operator
 * because the traits type is different than that for std::ostream
```

```
 */
inline
std::ostream& operator << (std::ostream& strm, const icstring& s)
{
    // simply convert the icstring into a normal string
    return strm << std::string(s.data(),s.length());
}

#endif    // ICSTRING_HPP
```