```cpp

// COS30008, Midterm, Problem 1, 2024

#include "KeyProvider.h"

#include <cctype>

KeyProvider::KeyProvider(const std::string& aKeyword) :
    // Member initializers
    fKeyword(nullptr),
    fSize(0),
    fIndex(0)
{
    initialize(aKeyword);
}

KeyProvider::~KeyProvider()
{
    // Release resources
    delete[] fKeyword;
}

void KeyProvider::initialize(const std::string& aKeyword)
{
    // Delete existing keyword
    if (fKeyword != nullptr)
    {
        delete[] fKeyword;
    }

    // Initialize or reset keyword
    fSize = aKeyword.length();
    fKeyword = new char[fSize];
    fIndex = 0;

    for (size_t i = 0; i < fSize; i++)
    {
        // Use operator<< to push new keyword character
        *this << aKeyword[i];
    }
}

char KeyProvider::operator*() const
{
    // Return current keyword character
    return fKeyword[fIndex];
}

KeyProvider& KeyProvider::operator<<(char aKeyCharacter)
```

```
50  {
51      // Push new keyword character if aKeyCharacter is a letter
52      if (isalpha(aKeyCharacter))
53      {
54          // Replace current keyword character
55          fKeyword[fIndex] = toupper(aKeyCharacter);
56          // Advance to next keyword character (circular)
57          fIndex = (fIndex + 1) % fSize;
58      }
59
60      return *this;
61  }
```