Swinburne University of Technology

Faculty of Science, Engineering and Technology

MIDTERM COVER SHEET

Subject Code:	COS30008
Subject Title:	Data Structures and Patterns
Assignment number and title:	Midterm, Solution Design, Design Pattern, and Iterators
Due date:	Octorber 21th , 2024, 07:30
Lecturer:	Dr. Ky Trung Pham

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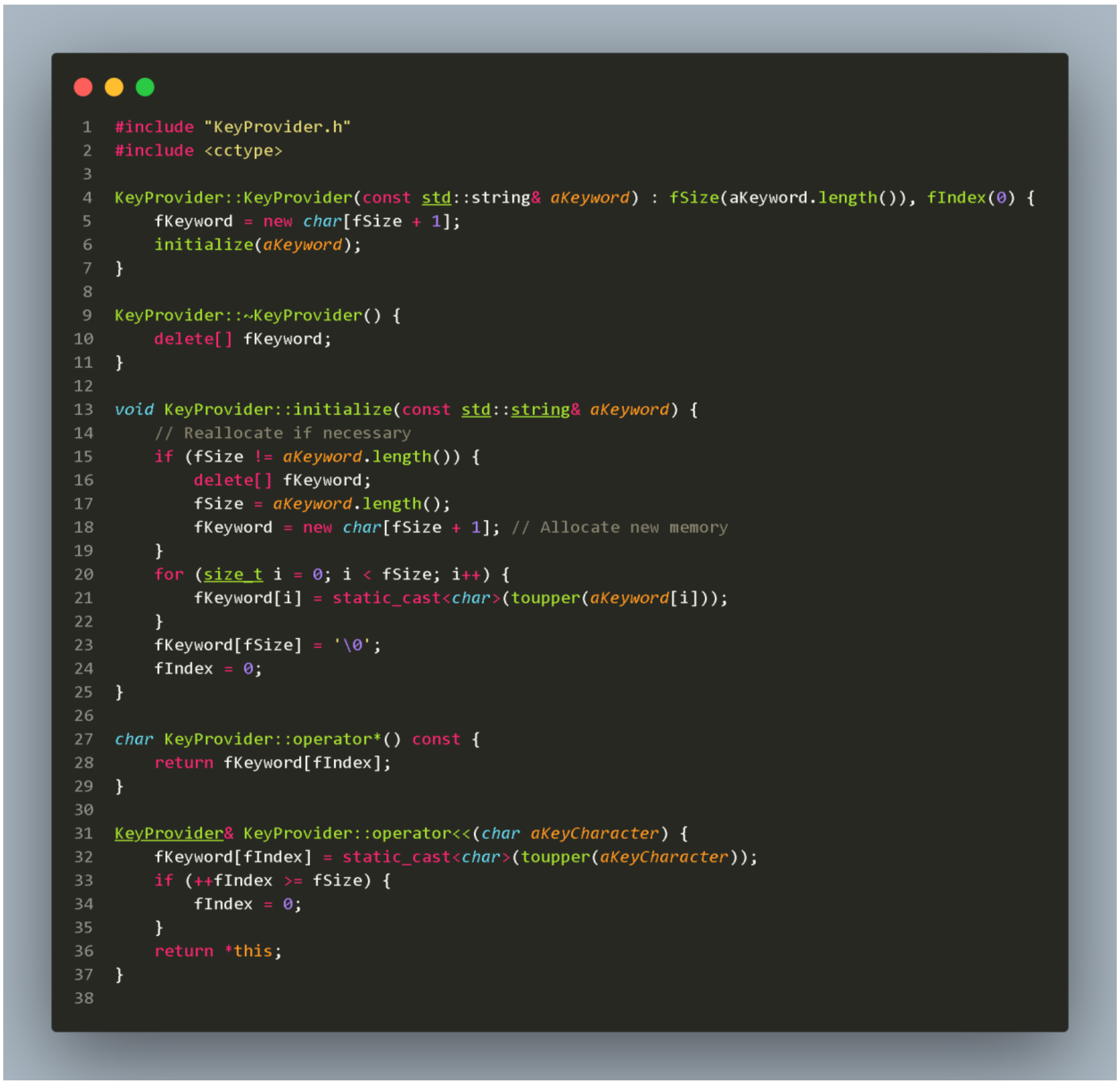
Student ID: 104198996

Check Tutorial	Mon 10:30	Mon 14:30	Tues 08:30	Tues 10:30	Tues 12:30	Tues 14:30	Tues 16:30	Wed 08:30	Wed 10:30	Wed 12:30	Wed 14:30
	X										

Marker's comments:

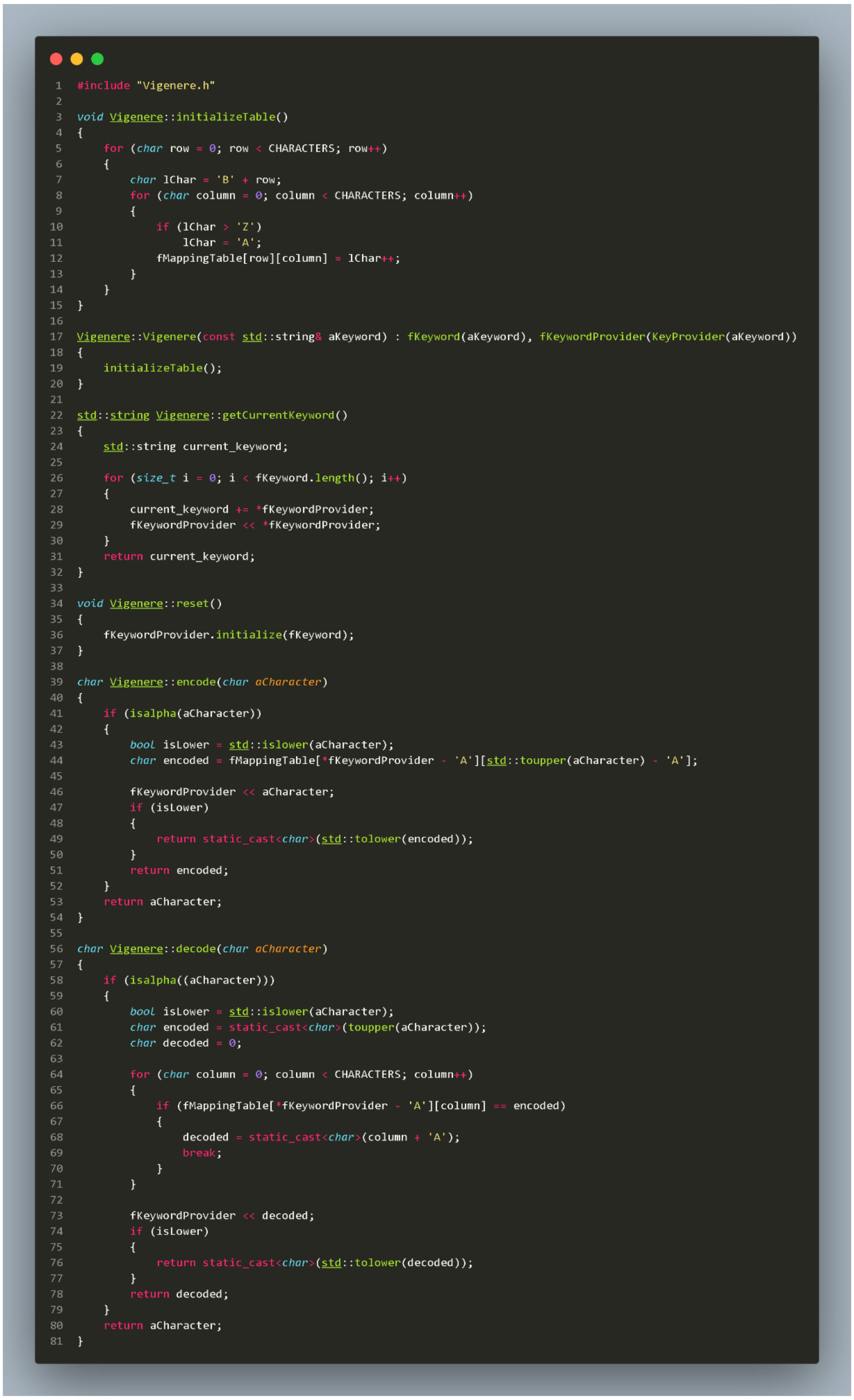
Problem	Marks	Obtained
1	68	
2	120	
3	56	
4	70	
Total	314	

KeyProvider.cpp



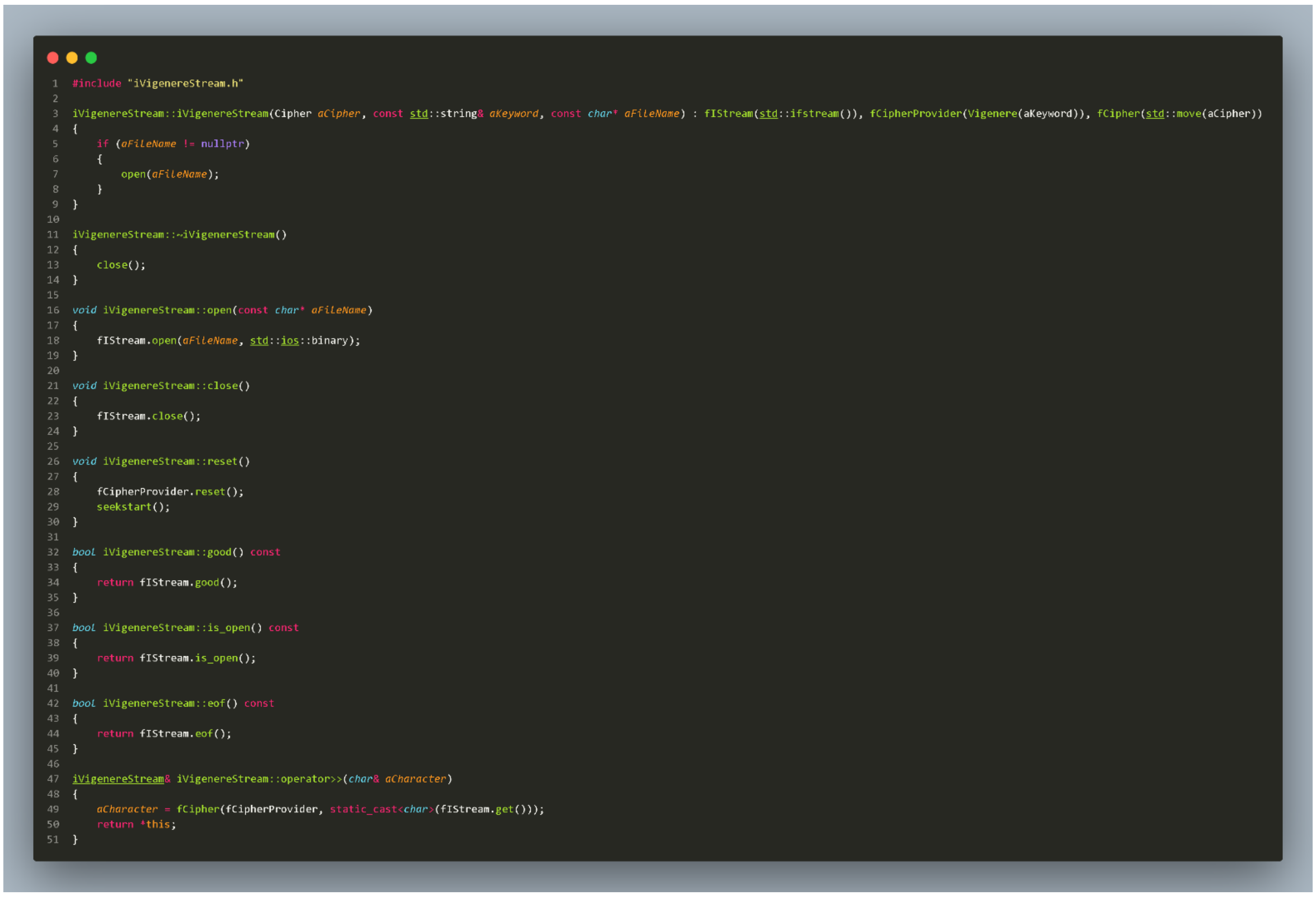
```cpp
#include "KeyProvider.h"
#include <cctype>

KeyProvider::KeyProvider(const std::string& aKeyword) : fSize(aKeyword.length()), fIndex(0) {
    fKeyword = new char[fSize + 1];
    initialize(aKeyword);
}

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

void KeyProvider::initialize(const std::string& aKeyword) {
    // Reallocate if necessary
    if (fSize != aKeyword.length()) {
        delete[] fKeyword;
        fSize = aKeyword.length();
        fKeyword = new char[fSize + 1]; // Allocate new memory
    }
    for (size_t i = 0; i < fSize; i++) {
        fKeyword[i] = static_cast<char>(toupper(aKeyword[i]));
    }
    fKeyword[fSize] = '\0';
    fIndex = 0;
}

char KeyProvider::operator*() const {
    return fKeyword[fIndex];
}

KeyProvider& KeyProvider::operator<<(char aKeyCharacter) {
    fKeyword[fIndex] = static_cast<char>(toupper(aKeyCharacter));
    if (++fIndex >= fSize) {
        fIndex = 0;
    }
    return *this;
}

```

VigenereMT.cpp



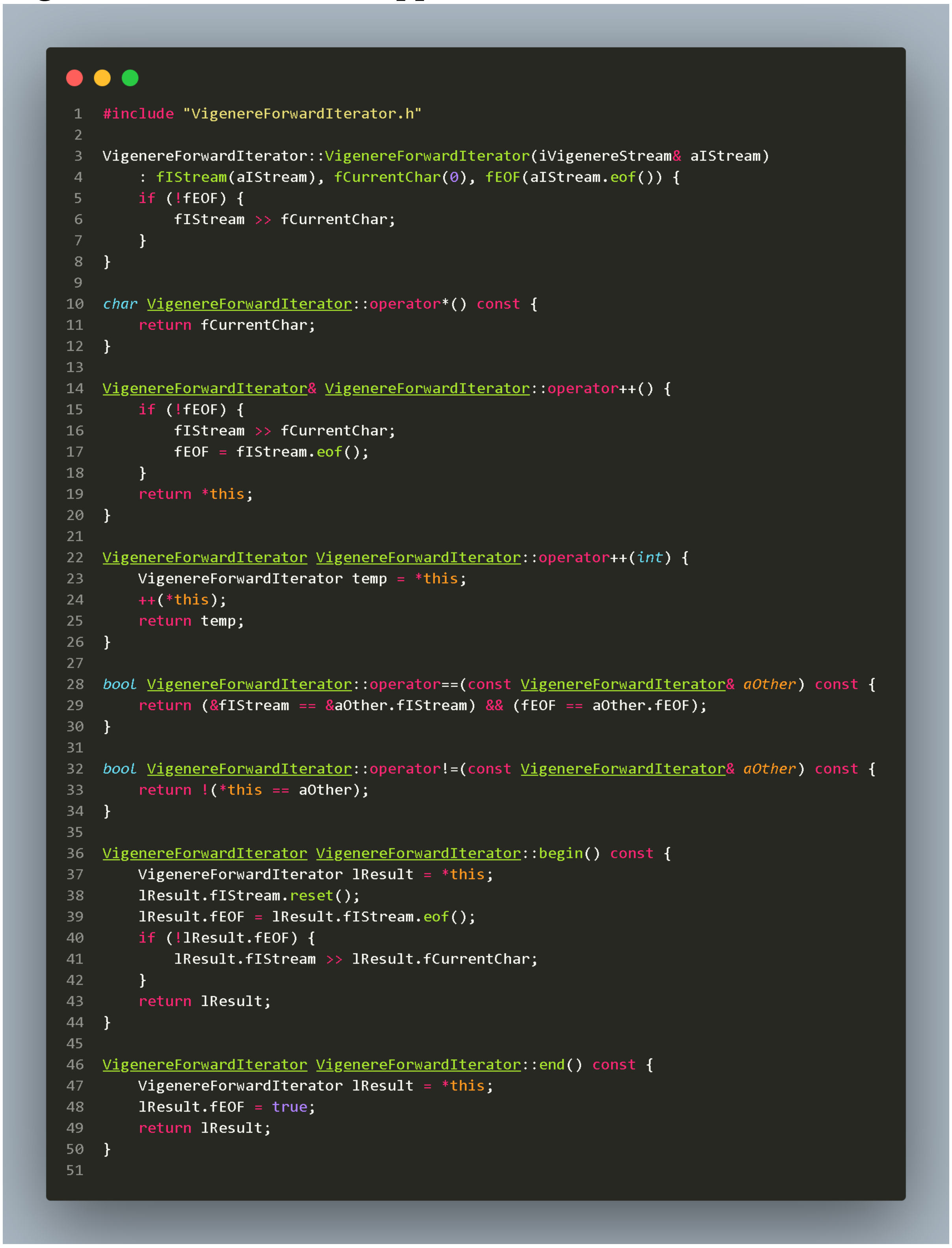
```cpp
#include "Vigenere.h"

void Vigenere::initializeTable()
{
    for (char row = 0; row < CHARACTERS; row++)
    {
        char lChar = 'B' + row;
        for (char column = 0; column < CHARACTERS; column++)
        {
            if (lChar > 'Z')
                lChar = 'A';
            fMappingTable[row][column] = lChar++;
        }
    }
}

Vigenere::Vigenere(const std::string& aKeyword) : fKeyword(aKeyword), fKeywordProvider(KeyProvider(aKeyword))
{
    initializeTable();
}

std::string Vigenere::getCurrentKeyword()
{
    std::string current_keyword;

    for (size_t i = 0; i < fKeyword.length(); i++)
    {
        current_keyword += *fKeywordProvider;
        fKeywordProvider << *fKeywordProvider;
    }
    return current_keyword;
}

void Vigenere::reset()
{
    fKeywordProvider.initialize(fKeyword);
}

char Vigenere::encode(char aCharacter)
{
    if (isalpha(aCharacter))
    {
        bool isLower = std::islower(aCharacter);
        char encoded = fMappingTable[*fKeywordProvider - 'A'][std::toupper(aCharacter) - 'A'];

        fKeywordProvider << aCharacter;
        if (isLower)
        {
            return static_cast<char>(std::tolower(encoded));
        }
        return encoded;
    }
    return aCharacter;
}

char Vigenere::decode(char aCharacter)
{
    if (isalpha((aCharacter)))
    {
        bool isLower = std::islower(aCharacter);
        char encoded = static_cast<char>(toupper(aCharacter));
        char decoded = 0;

        for (char column = 0; column < CHARACTERS; column++)
        {
            if (fMappingTable[*fKeywordProvider - 'A'][column] == encoded)
            {
                decoded = static_cast<char>(column + 'A');
                break;
            }
        }

        fKeywordProvider << decoded;
        if (isLower)
        {
            return static_cast<char>(std::tolower(decoded));
        }
        return decoded;
    }
    return aCharacter;
}
```

IVigenereStream.cpp



```cpp
#include "iVigenereStream.h"

iVigenereStream::iVigenereStream(Cipher aCipher, const std::string& aKeyword, const char* aFileName) : fIStream(std::ifstream()), fCipherProvider(Vigenere(aKeyword)), fCipher(std::move(aCipher))
{
    if (aFileName != nullptr)
    {
        open(aFileName);
    }
}

iVigenereStream::~iVigenereStream()
{
    close();
}

void iVigenereStream::open(const char* aFileName)
{
    fIStream.open(aFileName, std::ios::binary);
}

void iVigenereStream::close()
{
    fIStream.close();
}

void iVigenereStream::reset()
{
    fCipherProvider.reset();
    seekstart();
}

bool iVigenereStream::good() const
{
    return fIStream.good();
}

bool iVigenereStream::is_open() const
{
    return fIStream.is_open();
}

bool iVigenereStream::eof() const
{
    return fIStream.eof();
}

iVigenereStream& iVigenereStream::operator>>(char& aCharacter)
{
    aCharacter = fCipher(fCipherProvider, static_cast<char>(fIStream.get()));
    return *this;
}
```

VigenereForwardIterator.cpp



```cpp
#include "VigenereForwardIterator.h"

VigenereForwardIterator::VigenereForwardIterator(iVigenereStream& aIStream)
    : fIStream(aIStream), fCurrentChar(0), fEOF(aIStream.eof()) {
    if (!fEOF) {
        fIStream >> fCurrentChar;
    }
}

char VigenereForwardIterator::operator*() const {
    return fCurrentChar;
}

VigenereForwardIterator& VigenereForwardIterator::operator++() {
    if (!fEOF) {
        fIStream >> fCurrentChar;
        fEOF = fIStream.eof();
    }
    return *this;
}

VigenereForwardIterator VigenereForwardIterator::operator++(int) {
    VigenereForwardIterator temp = *this;
    ++(*this);
    return temp;
}

bool VigenereForwardIterator::operator==(const VigenereForwardIterator& aOther) const {
    return (&fIStream == &aOther.fIStream) && (fEOF == aOther.fEOF);
}

bool VigenereForwardIterator::operator!=(const VigenereForwardIterator& aOther) const {
    return !(*this == aOther);
}

VigenereForwardIterator VigenereForwardIterator::begin() const {
    VigenereForwardIterator lResult = *this;
    lResult.fIStream.reset();
    lResult.fEOF = lResult.fIStream.eof();
    if (!lResult.fEOF) {
        lResult.fIStream >> lResult.fCurrentChar;
    }
    return lResult;
}

VigenereForwardIterator VigenereForwardIterator::end() const {
    VigenereForwardIterator lResult = *this;
    lResult.fEOF = true;
    return lResult;
}
```