

```

/*
File: freq.cpp
Created by: Tan Qi Hao
Creation Date: 4/9/2019
Synopsis: This program reads text and then compute and display
the frequencies of vowels and the number of consonants in the text.
*/

#include <iostream>
#include <iomanip>
#include <string>
#include <vector>

using namespace std;

// FUNCTION PROTOTYPES GO HERE:
void init_vectors(vector<char> & vowels, vector<int> & frequencies);
string read_text(const string & prompt);
bool is_alphabetic(const char character);
void create_list(const string & str_text, vector<char> & vec_text);
bool is_member(const vector<char> & list, char character);
int find_index(const vector<char> & list, char character);
int compute_vowel_freqs(const vector<char> & text, const vector<char> &
vowels, vector<int> & freqs);
void display_characters(const vector<char> & characters, const int
colwidth);
void display_freqs(const vector<int> & freqs, const int colwidth);

int main()
{
    // Define local variables and constants
    vector<char> vowels; //vector variable vowels
    vector<int> freqs; //vector variable freqs
    string input; //string variable input
    vector<char> text; //vector variable text
    int consonants(0); //variable consonants

    const int COLUMNWIDTH = 2;

    // Initialize the list of vowels and vowel frequencies.
    // Call function init_vectors with variables vowels and freqs
    init_vectors(vowels, freqs);

    // Prompt the user for the input text by calling function read_text
    input = read_text("Enter your text: ");

    // Copy the characters (ignoring non-alphabetic characters) in the
input string to the vector of characters in variable text
    // Call function create_list to do this
    create_list(input, text);

    // Compute the frequencies of vowels and consonants from the input
text containing only alphabetic letters
    // Call function compute_vowel_freqs to do this

```

```

        consonants = compute_vowel_freqs(text, vowels, freqs);

        // Display the vowels and their frequencies
        // Call functions display_characters and display_freqs
        display_characters(vowels, COLUMNWIDTH);
        display_freqs(freqs, COLUMNWIDTH);

        // Display the number of consonants. No function calls here.
        cout << "There are " << consonants << " consonants." << endl;

    return 0;
}

// FUNCTION DEFINITIONS GO HERE:
// This function, init_vectors(), initialize vowels vectors and freqs
vectors
void init_vectors(vector<char> & vowels, vector<int> & frequencies){

    vowels.push_back('a');
    vowels.push_back('e');
    vowels.push_back('i');
    vowels.push_back('o');
    vowels.push_back('u');
    vowels.push_back('y');

    for(int i = 0; i < vowels.size(); i++){

        frequencies.push_back(0);

    }

}

//Function read_text() prompts user some text and return the input text.
string read_text(const string & prompt){

    string text; //variable for input text.

    cout << prompt;
    getline(cin, text);

    return text;

}

//Function create_list() copies the alphabetic characters into vectors
vec_text
void create_list(const string & str_text, vector<char> & vec_text){

    for(int i = 0; i < str_text.length(); i++){

        if( is_alphabetic(str_text[i]) == true ){

            vec_text.push_back(str_text[i]);

        }

    }

}

```

```

    }

}

//Function is_alphabetic() determine is the character an alphabetic
character
bool is_alphabetic(const char character){

    if( (character >= int('A') && character <= int('Z')) || (character >=
int('a') && character <= int('z'))){

        return true;

    }

    return false;

}

//Function compute_vowel_freqs() compute the freqs and number of
consonants
int compute_vowel_freqs(const vector<char> & text, const vector<char> &
vowels, vector<int> & freqs){

    int consonants(0); // variable of the number of consonants
    int ind; //index variable in freqs

    for (int i = 0; i < text.size(); i++){

        if( is_member(vowels, tolower(text[i])) == true){

            ind = find_index(vowels, tolower(text[i]));

            freqs[ind]++;

        }

        else{

            consonants++;

        }

    }

    return consonants;

}

//This function determine the existence of vowels in the text.
bool is_member(const vector<char> & list, char character){

```

```

    for(int i = 0; i < list.size(); i++){
        if(character == list[i]){
            return true;
        }
    }

    return false;
}

//Function find_index() find the location of index of the character.
int find_index(const vector<char> & list, char character){

    for(int i = 0; i < list.size(); i++){
        if(list[i] == character){
            return i;
        }
    }

    return -1;
}

//Function display_characters display characters
void display_characters(const vector<char> & characters, const int
colwidth){

    for(int i = 0; i < characters.size() - 1; i++){
        cout << setw(colwidth) << characters[i] << ", ";
    }

    cout << setw(colwidth) << characters[characters.size() - 1] << endl;
}

//This function display frequencies of vowels.
void display_freqs(const vector<int> & freqs, const int colwidth){

    for(int i = 0; i < freqs.size() - 1; i++){
        cout << setw(colwidth) << freqs[i] << ", ";
    }
}

```

```
cout << setw(colwidth) << freqs[freqs.size() - 1] << endl;  
  
}
```